SENSORWORX®

DAYLIGHT HARVESTING & ON/OFF PHOTOCELL SENSORS

0-10V • LOW VOLTAGE • CEILING MOUNT

INSTALLATION & OPERATION INSTRUCTIONS

CATALOG NUMBERS	DESCRIPTIONS
SWX-250-1	ON/OFF PHOTOCELL SENSOR LOW VOLTAGE, CEILING MOUNT
SWX-250-1-D	DAYLIGHT HARVESTING SENSOR 0-10V, LOW VOLTAGE, CEILING MOUNT

ADDITIONAL OPTIONS

- **HE:** High Humidity Environment

OVERVIEW

SENSORWORX photocell sensors control lighting according to measured ambient lighting in a space. Basic on/off units signal a connected power pack to turn lights off when ambient levels are high enough that desired overall light levels are maintained.

Units with the daylight harvesting (dimming) option track a space's overall illumination and dim connected lighting to achieve energy savings. During times of high daylight contribution to a space, controlled artificial lighting will be gradually dimmed to a minimum dimmed level. During times of no or low daylight contribution, controlled artificial lighting will increase back up to its maximum level. The sensor can also be configured to signal a connected power pack to switch lighting off completely in maintained high daylight conditions. Additional configurable parameters include high & low trim levels and fade rates.

All photocells provide the option of selecting the ambient light threshold (e.g., setpoint) from a range of preset values or running an auto-selection mode where the unit will determine the setpoint based on the measured amount of light it is controlling.

FEATURES

- **Auto-Setpoint Selection Mode**
- **Adjustable High & Low Trim Level**
- **Works Together with Low Voltage Occupancy Sensors**
- **Compact Size and Matte Finish**
- **Four Contractor Friendly Mounting Methods**
- **Mounting Nipple Attachment with Integrated Hole Saw**

SPECIFICATIONS

ELECTRICAL

OPERATING VOLTAGE
12-24 VAC/VDC

CURRENT DRAW
4mA

DIMMING CAPACITY
50mA

DIMMING COMPATIBILITY
0-10 VDC Ballasts or Drivers
Compliant with IEC 60929
Annex E.2

PHYSICAL

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

WEIGHT
4.75 oz

COLOR
White

ENVIRONMENTAL

OPERATING TEMP
32°F to 122°F (0°C to 50°C) - Standard
-40° F/C (with **-HE** Option)

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

OPERATIONAL MODES

Daylight Harvesting to Low Trim
Daylight Harvesting to Off
(requires power pack)
Photocell Override (On/ Off)
(requires power pack)

CODE COMPLIANCE

Sensors can be used to meet ASHRAE 90.1, IECC, & Title 24 energy code requirements

c UL US LISTED

BAA COMPLIANT · TAA COMPLIANT · MADE IN THE USA · LEAD FREE RoHS COMPLIANT

DAYLIGHT SENSOR PLACEMENT

Typically, a daylight harvesting sensor should be located in the intermost 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 close 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

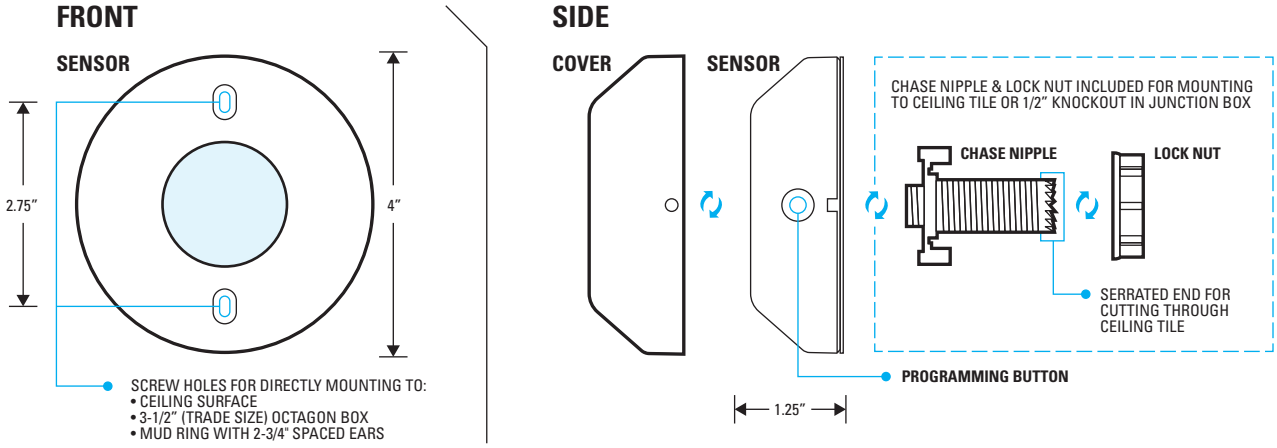
MOUNTING OPTIONS

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

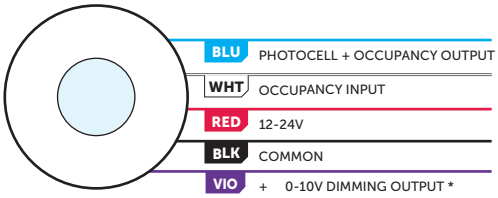
- If mounting to ceiling tile, use the serrated end of the chase nipple to cut a 7/8" hole. Then thread the wires through nipple prior to screwing into rear of sensor. Install and tighten lock nut as needed.
- To install cover, line up dimples with indents on sensor and turn clockwise.



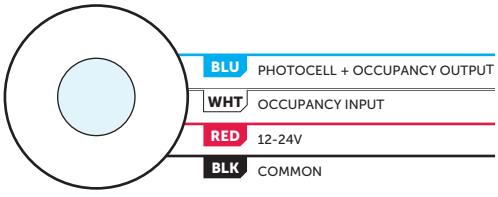
Note: If mounting to a Single Gang Mudring, Handy Box, or 4" Octagon Box, a trim ring is required. Part Number: **SWX-299-JP.**

WIRING

BASIC WIRING

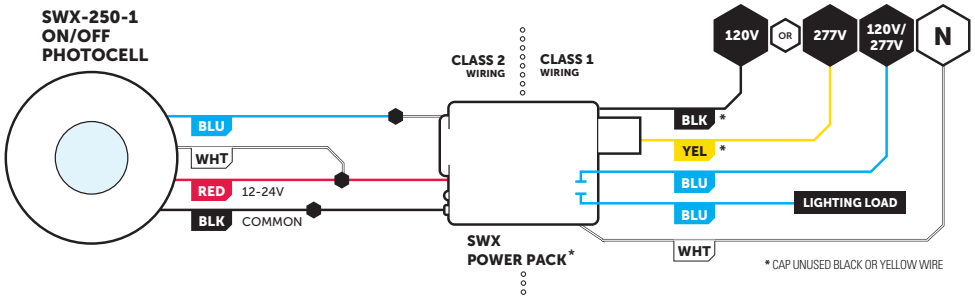


SWX-250-1-D DAYLIGHT HARVESTING SENSOR



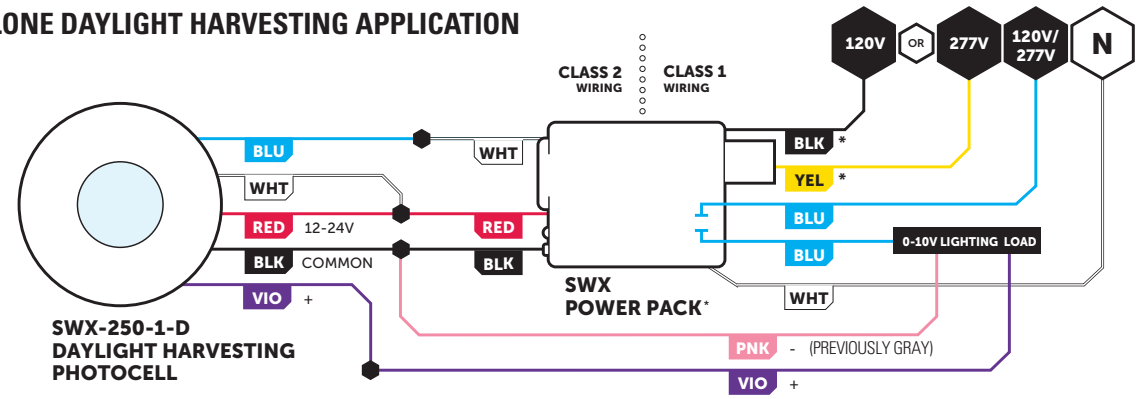
SWX-250-1 ON/OFF PHOTOCELL

STANDALONE ON/OFF PHOTOCELL APPLICATION



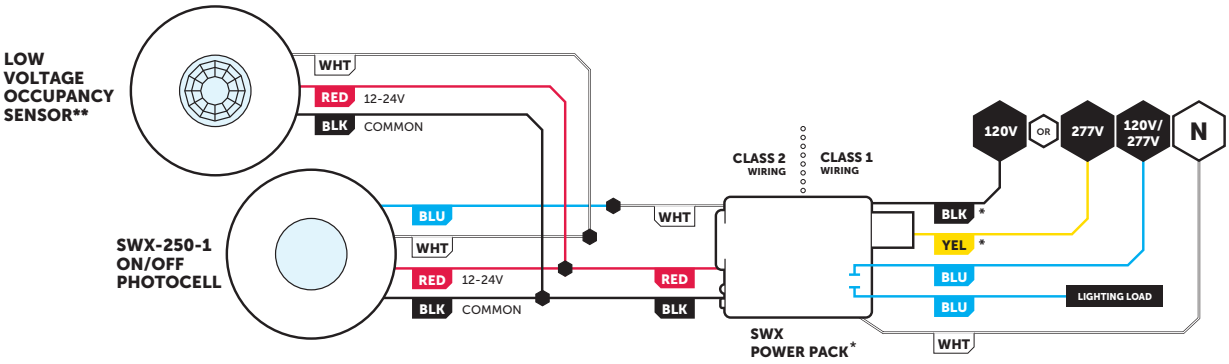
WIRING (CONT.)

STANDALONE DAYLIGHT HARVESTING APPLICATION



* CAP UNUSED BLACK OR YELLOW WIRE

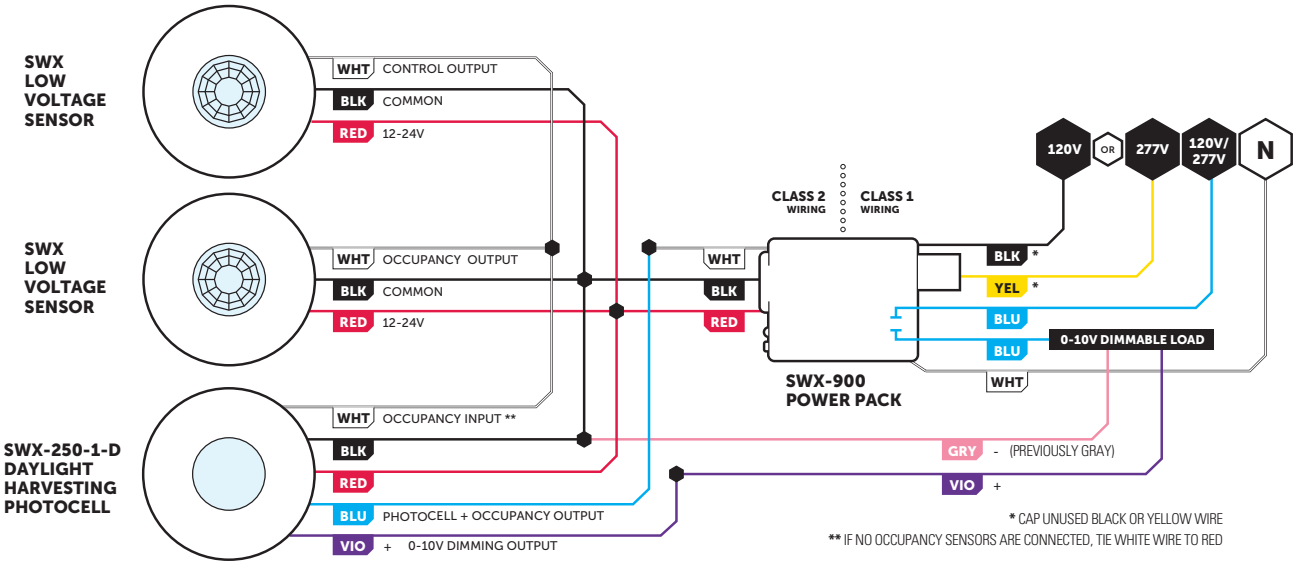
ON/OFF PHOTOCELL + OCCUPANCY APPLICATION



* CAP UNUSED BLACK OR YELLOW WIRE

** IF NO OCCUPANCY SENSORS ARE PRESENT, CONNECT PHOTOCELL WHITE WIRE TO RED

DAYLIGHT HARVESTING + OCCUPANCY SENSOR(S) APPLICATION



* CAP UNUSED BLACK OR YELLOW WIRE

** IF NO OCCUPANCY SENSORS ARE CONNECTED, TIE WHITE WIRE TO RED

OPERATION

There are two types of photocell operation; ON/OFF PHOTOCELL CONTROL and DAYLIGHT HARVESTING CONTROL (see descriptions below). A photocell sensor can be used by itself (e.g., STANDALONE operation) or together with low voltage occupancy sensors. Only one photocell sensor should be configured to control any particular group of lights.

ON/OFF PHOTOCELL CONTROL

- Recommended for public spaces (hallways, entryways, etc) where fully switching lighting off/on will not be noticed .
- Photocell output (blue wire) will turn lights 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 based on the measured level of light being controlled is continuously maintained in the unit. For lighting to turn off the ambient light level must be higher than the sum of the setpoint and the deadband.

DAYLIGHT HARVESTING CONTROL

- Requires **SWX-250-1-D** model
- Recommended for spaces where it is important to not distract occupants (e.g., offices, classrooms).
- Unit will gradually dim lighting in order to maximize energy savings while maintaining desired overall lighting level.
- After dimming to low trim level, unit can optionally be enabled to turn off lights completely using the method specified by **FUNCTION #5 - TURN OFF MODE**.

ON/OFF PHOTOCELL OPERATION NOTES

To achieve ON/OFF Photocell Control, the unit's blue wire output is used to control the desired lighting's connected power pack. Lighting will be switched off when the measured light level is high enough for 5 min. such that turning the lights off will not drop the level below the selected setpoint. During this 5 min. transition time the LED will blink blue at 0.5 second intervals. After lights are turned off, the sensor's LED double blinks blue every 15 seconds as an indication that sufficient ambient light is the reason the lights are being held off. If the ambient light level falls below the setpoint for more than 45 seconds, lights will switch back on. During this transition time the LED also will blink blue at 0.5 second intervals.

CONFIGURATION SETTINGS

FUNCTION #4 - PHOTOCELL SETPOINT

The minimum overall light level that is to be maintained in a space by the sensor is referred to as the "setpoint". This value is user selectable or can be chosen by the Auto-Setpoint function that is built into the sensor.

SETPOINT CONFIGURATION

1. Read through the below setpoint values list and note the number of the desired setpoint (e.g., default is 7 = 25 fc).
2. Press and release the unit's pushbutton 4 times, then wait 2 seconds. The white LED will blink back the number of the current setting.*
3. At any time after blinking starts, enter number of new setting (from Setpoint Value Table).
4. New setting is saved after white LED blinks new setting back 3 times. If blue LED double flashes at any time, an error condition exists and process must be repeated.

FUNCTION #4 - SETPOINT VALUE TABLE

SETTING #	DESCRIPTION
2	Run Auto-Setpoint*
3	2.5 fc
4	5.0 fc
5	10.0 fc
6	15.0 fc
7	25 fc (default)
8	35 fc
9	50 fc
10	75 fc
11	100 fc

Manual Setpoint Options

*If Auto-Setpoint has been previously run, the value will be blinked back in two alternating digits:
Blue LED = 10's digit (1-9 blinks or rapid blink for 0)
White LED = 1's digit (1-9 blinks or rapid blink for 0)

***AUTO-SETPOINT SELECTION DETAILS**

A Once setting 2 "Run Auto-Setpoint" has been selected (by following above steps 1-4), the sensor's LED will alternate blue and white for 30 seconds. During this time user should move away from sensor.

B Lights will then be cycled in order for sensor to calculate the controlled (artificial) light level. This is done by subtracting the light level with the lights off (relay open) from the light level with the lights on (relay closed).

C A setpoint will then be chosen using the following conditions:
- If controlled level is less than 3 fc, the application is considered open loop and the setpoint will be set to 25 fc.
- If controlled level is between 3 and 50 fc, setpoint will be set to that level times 1.25.
- If controlled level is greater than 100 fc the setpoint will be set to 125 fc.

D Unit will immediately start operating with new setpoint (i.e. blue LED may begin flashing indicating it will transition lights soon)

E To check auto selected setpoint, press and release button 4 times. Setpoint will be blinked back in two alternating digits:
Blue LED = 10's digit (1-9 blinks or rapid blink or 0)
White LED = 1's digit (1-9 blinks or rapid blink or 0)

CONFIGURATION SETTINGS (CONT.)

FUNCTION #5 - TURN OFF MODE

The method by which a sensor with daylight harvesting (dimming) turns off connected lighting. Units without dimming will always be set to **DROP TO OFF.**

CHANGING THE TURN-OFF MODE

1. Read through the **FUNCTION #5 - TURN OFF MODE** table and note the SETTING # of the desired mode.
2. Press and release the unit's pushbutton 5 times, then wait 2 seconds. The white LED will blink back the number of the current setting (e.g. 5 for **FADE TO LOW TRIM**).
3. At any time after blinking starts, enter number of new setting (e.g., 4 for **FADE TO 0V**).
4. New setting is saved after white LED blinks new setting back 3 times. If blue LED double flashes at any time, an error condition exists and process must be repeated

FUNCTION #5 TURN OFF MODE

SETTING #	VALUES	NOTES
2	Drop to Off *(default for SWX-250-1)*	Dimming output drops to low trim level & connected power pack's relay is signaled to open (i.e. blue wire goes low).
3	Fade to Off	Dimming output fades to low trim and connected power pack's relay is signaled to open (i.e. blue wire goes low).
4	Fade to 0V	Dimming output fades to low trim level and then drops to 0 volts (e.g. below a connected driver's electronic off level). The connected power packs's relay is signaled to remain closed (i.e. blue wire stays high).
5	Fade to Low Trim *(default for SWX-250-1-D)*	Dimming output fades down to low trim level and the connected power packs's relay is signaled to remain closed (i.e. blue wire stays high).
6	Drop to Low Trim	Dimming output drops down to low trim level and the connected power packs's relay is signaled to remain closed (i.e. blue wire stays high).
7	Drop to 0V	Dimming output drops to 0 volts (e.g. below a connected driver's electronic off level and the connected power packs's relay is signaled to remain closed (i.e. blue wire stays high).

FUNCTION #7 - LED INDICATION

Prior to the daylight harvesting sensor turning lights on or off, the unit's LED will blink blue at 0.5 sec intervals to indicate a pending transition. The LED also blinks twice rapidly every 15 sec when lights are being held off during occupied periods of high ambient light. The intensity of this LED can be increased or disabled.

TO CHANGE LED INTENSITY SETTINGS:

1. Press unit's pushbutton 7 times, then wait two seconds. The white LED will blink back the number of current setting.
2. Change to new setting by pressing the button equal times to below numbered choices:
3. New setting will be saved after white LED blinks back number three times. If blue LED double flashes at any time, start process over.

FUNCTION #7 - LED INTENSITY

SETTING #	DESCRIPTION
2	Normal brightness [Default]
3	Increased brightness
4	Disable LED

FUNCTION #8 - RESET

To restore factory settings, press and release the pushbutton 8 times, wait 2 seconds, then press and release the pushbutton 3 times again.

CONFIGURATION SETTINGS (CONT.)

DETAILED DIMMING CONFIGURATION

Several dimming parameters can be adjusted using the following programming procedure.

1 From the below tables of detailed dimming functions, note the number (#) of the function to be modified. For example, the HIGH TRIM setting is #9.
3 To access a particular function, press and release the programming button the number of time of the chosen function. For example, press the button 9 times to access the HIGH TRIM function.
4 The LED will flash back the setting number of the current value as it appears in each function's detailed table below. For example, the default HIGH TRIM is setting #2 (10V)
5 To change the setting number, press and release the button the number of times equal to the new setting #. For example, 3 times (for 9V).
6 The LED will flash back the new setting number as confirmation and will be saved after three confirmations. If blue LED double flashes at any time, start process over.

DETAILED DIMMING FUNCTION TABLES

FUNCTION #9 HIGH TRIM

The maximum voltage to which the daylight harvesting sensor is allowed to raise its dimming output when measuring a low level of ambient light.

SETTING #	VALUES	NOTES
2	10 VDC (default)	
3	9 VDC	Light output at each voltage level depends on driver/ballast and luminaire.
4	8 VDC	
5	7 VDC	
6	6 VDC	
7	5 VDC	

FUNCTION #10 LOW TRIM

The minimum voltage to which the daylight harvesting sensor is allowed to reduce its dimming output when measuring high levels of ambient light.

SETTING #	VALUES	NOTES
2	0 VDC	
3	1 VDC	Light output at each voltage level depends on driver/ballast and luminaire.
4	2 VDC	
5	3 VDC (default)	
6	4 VDC	
7	5 VDC	
8	6 VDC	

FUNCTION #11 FADE OFF TIME

Adjustable time interval for lights to ramp down to off.

SETTING #	VALUES	NOTES
2	0.75 Sec	
3	1.5 Sec	Default for all models
4	3 Sec	
5	5 Sec	
6	15 Sec	

FUNCTION #12 FADE ON TIME

Time interval for lights to ramp up when connected occupancy sensors signal an occupied state.

SETTING #	VALUES	NOTES
2	0.75 Sec	
3	1.5 Sec	Default for all models
4	3 Sec	
5	5 Sec	
6	15 Sec	

TESTING

FUNCTION #2 - TEST MODE

A test mode that quickens the dimming rate and shortens the on/off transition periods (to 30 secs) is available by following the below steps. After 10 minutes, test mode will expire and the unit will return to normal operating parameters.

TO PUT UNIT IN TEST MODE FOR 10 MINUTES:

1. Press sensor's pushbutton 2 times, then wait until LED starts blinking back (approx 2 secs).
2. Interupt blinking and press button 1 time to start test mode. Unit will confirm setting by blinking once followed by a pause (repeats three times).
To exit test mode early, repeat procedure, substituting 2 button presses instead of 1 in second step.