



SENSORWORX®
DIGITAL



SPECIFICATIONS

ELECTRICAL

OPERATING VOLTAGE
15 VDC

CURRENT DRAW
8 mA (PIR models)
8.5 mA (PIR w/ Photocell models)
9 mA (Dual Tech. models)
9.5 mA (Dual Tech. w/ Photocell models)

ISOLATED RELAY RATING
1A @ 30 VDC/VAC

DIGITAL DATA LINE

WIRES (3)
Power, Common, Digital Data
18/3 Cable Recommended

LENGTH
1000 ft - Point-to-Point
4000 ft - Total Bus Length

PROTOCOL
Proprietary **SENSORWORX**

ZONE CONFIG. METHODS
Out-of-the-box (single zone only)
Push-Button (required for multi-zone)
Mobile App (requires a **SWD-940/970**)

SECURITY

Digitally encrypted communications.

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

PHYSICAL

SIZE / WEIGHT / COLOR
4.00" Diameter x 1.25" H
(10.16 x 3.17 cm)
4.75 oz
White or Black with Matte Finish

LED INDICATION
Motion Detection
Pairing
Comm. Error

OPERATION

OPERATING MODES
Configured at paired load controller(s)
Occupancy: Auto-On, Partial On/Off,
Manual On (Vacancy), etc.
Photocell: Daylight Harvesting & On/Off

TEST MODES
Button press toggles all paired load
controllers
Coverage test mode shortens time delay
and isolates sensor.

TIME DELAY OPTIONS
Configured at paired load controller(s)
1, 5, 10, 15, 20, 30 min.
1, 2, 4, 8 hr.
Custom (via Mobile App)

CODE COMPLIANCE

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



CEILING MOUNT OCCUPANCY SENSOR

OVERVIEW

SENSORWORX digital ceiling mount occupancy sensors deliver excellent detection and are simple to install. In particular, their flexible mounting styles and multiple methods of digital pairing to other devices reduce contractor time greatly. Additionally, these sensors can be utilized with other ceiling, corner, or hallway sensors to provide extended coverage in large or irregularly shaped spaces. All **SENSORWORX** products are proudly made in the USA.

The **SENSORWORX** digital suite of products communicate over a topology-free, 3-wire data line connection. Wiring uses common 18/3 cable & wire nuts, thus eliminating the issues that plague CAT-5 based systems. These individually addressable sensors are digitally zoned together with load controllers and wall stations via one of three methods. The first is the out-of-the-box single zone default configuration, the second (for multi-zone applications) uses a push-button pairing sequence, and the third is via the **SENSORWORX** mobile application (also requires **SWD-940/970** Advanced Load Controller). Once paired, a digital control zone can be highly configured with several operating modes, dimming settings, and photocell parameters.

As with all **SENSORWORX** products, the latest PIR (passive infrared) technology and signal processing techniques are used to provide unmatched occupant detection performance and energy savings. Additionally, units are available with an integrated microphone to provide overlapping passive acoustic detection for rooms where occupant motion is limited or where there are obstructions. An added integrated daylight harvesting photocell and/or isolated auxiliary relay are also available options.

BASIC OPERATION

Sensors detect movement in the infrared energy that radiates from occupants as they move within the device's field-of-view. Once occupancy is detected, the sensor immediately signals a paired load controller to switch on or dim up the connected lighting. If equipped with passive dual technology (PIR/Acoustic), the unit's microphone is then also enabled to further enhance detection while the lights are on. At regular intervals, the sensor retransmits its latest occupancy status such that the load controller can keep lights on for occupants during brief periods of inactivity, while returning the space to an energy saving lights off (or dim) state once no longer occupied.

FEATURES

- Pairs w/ **SENSORWORX** Digital Load Controllers
- Passive Infrared (PIR) Detection w/ Three 360° Coverage Options
- Passive Dual Technology (PIR/Acoustic) Detection (Optional)
- Compact Size and Matte Finish
- Four Contractor Friendly Mounting Methods
- Mounting Nipple Attachment with Integrated Hole Saw
- Convenient Test Modes
- Optional Daylight Harvesting Photocell and/or Isolated Auxiliary Relay
- 3-Wire Topology-Free Digital Architecture Enables Flexible Installation
- Connects with 18/3 Cable & Wire Nuts - Eliminates Issues that Plague CAT-5 Systems

ORDERING INFO

SAMPLE MODEL # SWD-221-AR

	PRODUCT		FUNCTIONALITY		COVERAGE		OPTIONS
SWD	SENSORWORX Digital Ceiling Mount Sensor	- 2	Passive Infrared (PIR)	0	Small Motion 360°	1	Isolated Auxiliary Relay - AR
			Passive Infrared (PIR) + Daylight Harvesting Photocell	1	Large Motion 360°	2	Black Cover Lid & Lens - BK ²
			Passive Dual Technology (PIR/Acoustic)	2	High Bay 360°	3 ¹	Low Temp / High Humidity - HE
			Passive Dual Technology (PIR/Acoustic) + Photocell	3			

Note 1: Available for PIR-only units

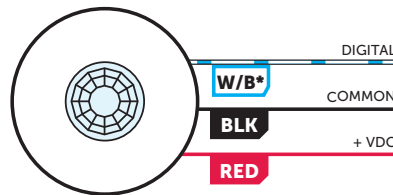
Note 2: Units w/ Photocells will have standard white lenses

ACCESSORY	DESCRIPTION
SWX-299-JP	Ceiling Sensor Trim Ring for Mounting to Single Gang Mudring, Handy Box, or 4" Octagon Box

WIRING

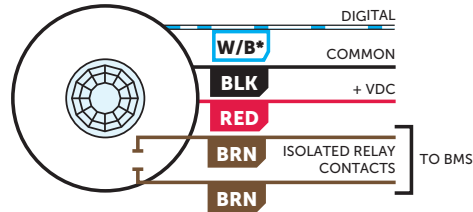
- 3-wire digital data line (class 2)
- Topology free
- 18/3 wire recommended (18 Gauge, 3 Conductor)
- Example common class 2 wire types
 - Belden 8463MN (Non-Plenum, unshielded, 18/3)
 - Belden 8770 (Shield, 18/3)
 - Belden 82418 (Plenum & Shield, 18/4)

SWD-200 SERIES



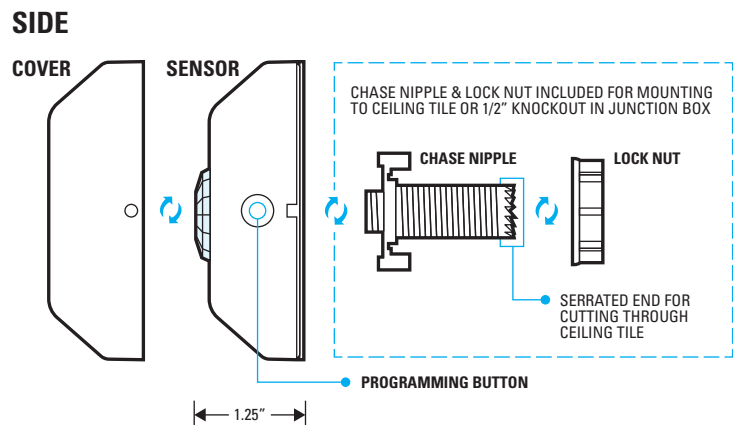
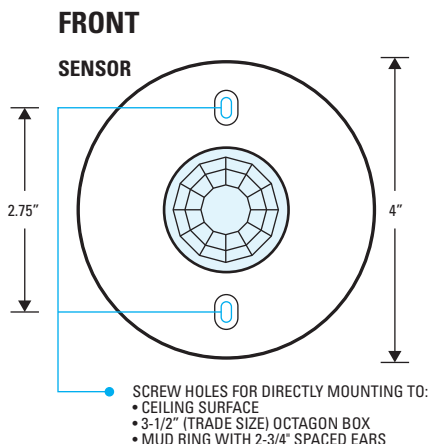
*W/B = White with Blue Dashes

SWD-200-AR SERIES



*W/B = White with Blue Dashes

INSTALLATION



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

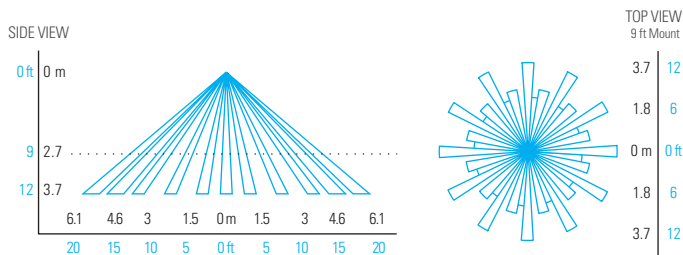
COVERAGE

PASSIVE INFRARED (PIR)

- 8 to 15 ft (2.44 to 4.57 m) mounting height recommended for small and large motion lenses. For 15 to 40 ft (2.44 to 12.20 m) mounting heights use high bay lens.
- Detection range improves when walking across beams as compared to into beams
- Lenses can be swapped in field if necessary, contact technical support for assistance

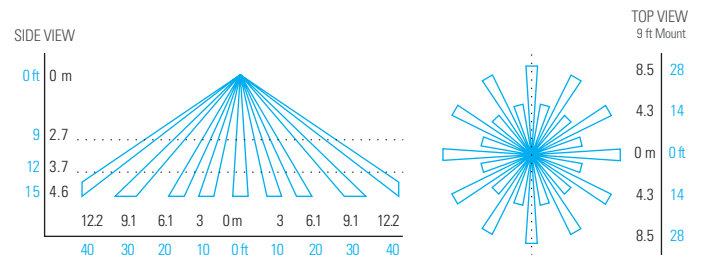
SMALL MOTION 360°

- Best choice for detection of small motions from sitting occupants (e.g., hand motion)
- ~500 ft² of coverage



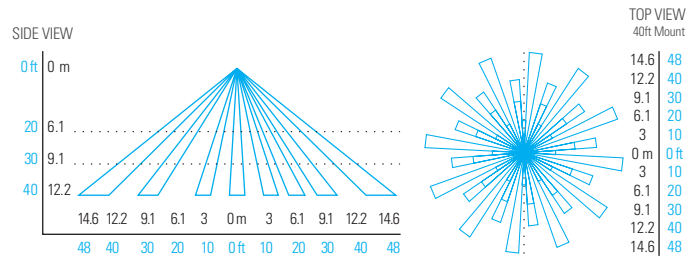
LARGE MOTION 360°

- Best choice for detection of larger motion (e.g., walking)
- ~2000 ft² of coverage
- One of the longer segments of the coverage pattern aligns with the screw hole axis on the sensor (shown as dotted line on Top View diagram below)



HIGH BAY 360°

- Best choice for mounting heights above 15ft
- Recommended for gyms, warehouses, and other high ceiling areas where multiple sensor coverage is required
- Not recommended for areas where occupants are sitting
- Gaps between outer segments get larger as mounting height increases
- Not available with acoustic (dual technology)



DUAL TECHNOLOGY (PIR/ACOUSTIC)

- Units with dual technology (model **SWD-221/SWD-231**) have overlapping acoustic detection of the complete PIR coverage area.
- A PIR event is required to initially enable acoustic detection.
- Sounds indicating occupancy reset the sensor's time delay while non-occupant noises are filtered out. Occupant sounds alone will not keep lights on indefinitely, PIR motion must be periodically detected for lights to remain on for an extended time.
- After sensor time out expires, acoustic detection remains enabled for 15 seconds to enable voice reactivation of lights for additional convenience and safety.

APPLICATIONS

SMALL SPACES

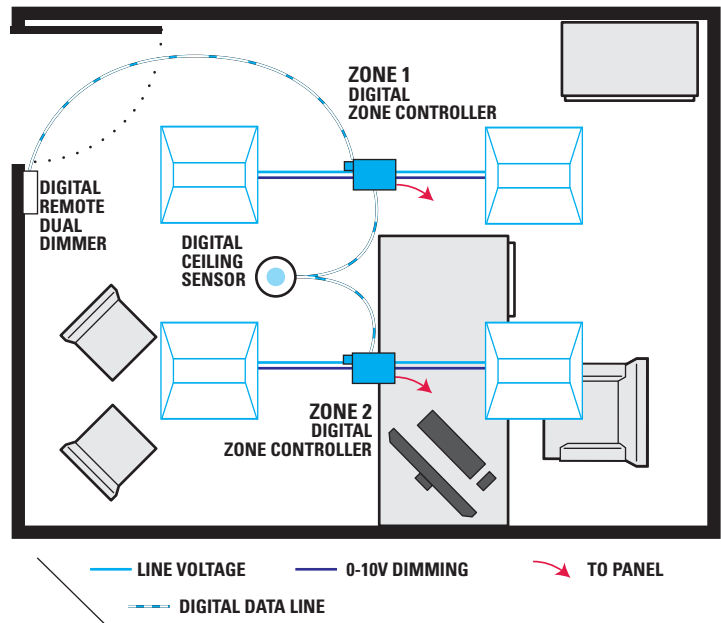
For control of small spaces like a private office, a single sensor paired to a **SENSORWORX** digital load controller (such as the **SWD-900** Load Controller or **SWD-940** Advanced Load Controller) is recommended. Pairing additional sensors is also an option if necessary. Switching from a second location (e.g. 3-way) is achieved by pairing a digital remote wall switch to the same load controller. Both occupancy (auto-on) and vacancy (manual-on) operation are achievable in order to meet energy code requirements. Dual Technology sensors are recommended in spaces where people are seated or where obstructions like bathroom stalls block line of site to the sensors.

- Small Offices
- Copy Rooms
- Private Restrooms

LARGE SPACES

Multiple sensors can be easily paired to a **SENSORWORX** digital load controllers (such as the **SWD-900** Load Controller or **SWD-940** Advanced Load Controller) to provide coverage for larger spaces (or larger loads) like an open office. Additional functionality such as switching/dimming from multiple locations (e.g. 3-way) is achieved by pairing to a zone controller with appropriate functionality. Dual Technology sensors are recommended in spaces where people are seated and/or where obstructions like cubicle walls block line of site to the sensors.

- Classrooms
- Conference Rooms
- Break Rooms
- Open Areas
- Hallways



OCCUPANCY W/ INTEGRATED DAYLIGHT HARVESTING PHOTOCELL OPTION (MODEL SWD-211/SWD-231 & SWD-212/SWD-232)

There are several types of photocell operational modes supported by this option. The mode is selected at the paired **SENSORWORX** digital load controllers (such as the **SWD-900** Load Controller or **SWD-940** Advanced Load Controller) that is wired to the lighting load(s).

DAYLIGHT HARVESTING

- 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.
- Option to dim to low trim or turn lighting off.

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.

INHIBIT ONLY PHOTOCELL CONTROL

- Lighting is held off if sufficient ambient light level is present upon initial occupancy.
- Lighting will turn on if light level drops below setpoint.
- Once on, lighting will only turn off from vacancy or a manual switch, never from daylight.

ISOLATED AUXILIARY RELAY OPTION (MODELS WITH -AR SUFFIX)

Digital sensors with the **-AR** option (for example **SWD-201-AR** & **SWD-221-AR**) come equipped with an isolated auxiliary relay. This output is intended to provide an occupancy status signal to an external system (like a BMS system controlling a space's HVAC).

SENSORWORX DIGITAL ZONE CONFIGURATION

DIGITAL ZONE CONFIGURATION

- A. Out-of-the-Box (single zone only)
- B. Push-Button Pairing (required for multi-zone)
- C. Mobile App Pairing (requires a **SWD-940/970** on digital data line)

A. OUT-OF-THE-BOX FUNCTIONALITY

By default, digital load controllers listen to all devices connected via the data line. This enables installers to immediately verify all device wiring, and provides instant control of single zone rooms. Default listening is cancelled once first device is paired via method below.

B. PUSH-BUTTON PAIRING (see diagram below)

Step 1. Enter pairing mode by holding down the button on the load controller to be linked for 3 seconds until the LED starts alternating white then blue.

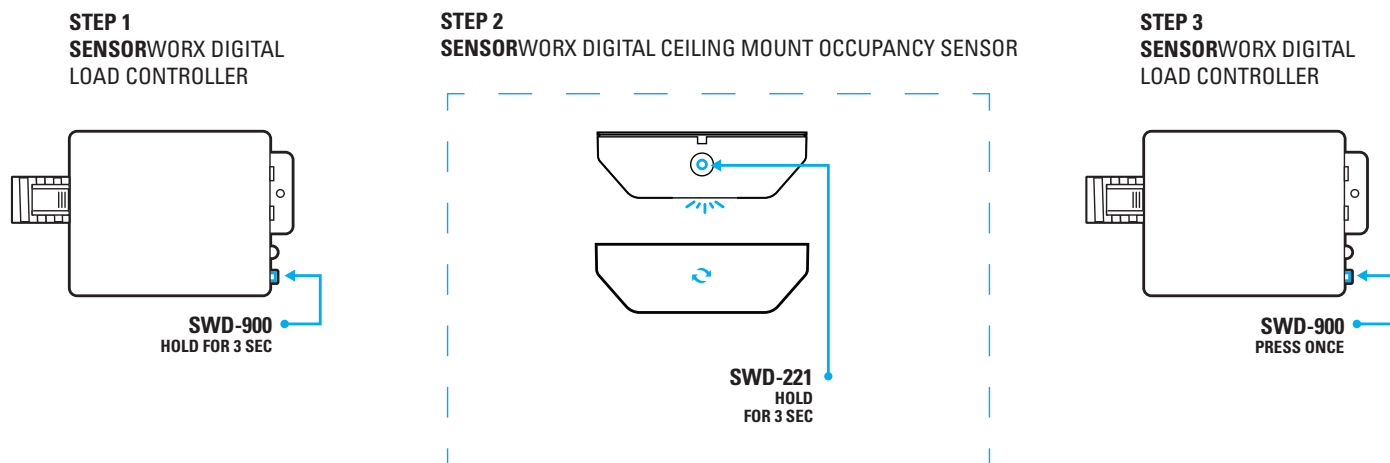
Step 2. At the sensor, hold down the button for 3 seconds until the LED starts alternating white then blue. Upon release the load controller will be paired (i.e. linked) to the sensor. The lights will toggle once as confirmation.

Step 3. Repeat step 2 to link additional sensors or remote devices.

Step 4. When all devices have been linked, exit pairing mode on the load controller by pressing its button 1 time. Exiting will also occur automatically after 15 minutes of no new devices being linked.

Note 1: When in pairing mode, the alternating LED colors on the 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 via the push-button (or mobile app.) pairing process.

Note 2: Once the first remote device has been paired to the load controller it will stop listening to all non-paired devices on the data line.



C. MOBILE APP PAIRING (download via QR codes below):

Note: Requires a **SWD-940/970** Advanced Load Controller be on the same data line as the sensor.



TESTING ZONE CONFIGURATION (PAIRING)

Press and release the programming button one time. All lighting controlled by linked load controller(s) will toggle one time as confirmation.

DATA LINE COMM. ERROR INDICATION

If there is a communication error on the digital data line (white/blue wire), the sensor's blue LED will periodically flash rapidly two times. If all devices on the data line exhibit the error, a miswire or short is probable. If only a subset of devices on the data line exhibit the error, a break or poor wiring connection between the device and the load controller is probable.

OPERATION NOTES

OCCUPANCY ONLY MODELS (SWD-201/SWD-221, SWD-202/SWD-222, & SWD-203)

- If a sensor transmitted “unoccupied” at its last heartbeat, any new PIR detection event will be transmitted immediately.
- Using the information received from paired sensors, digitally paired load controllers switch lighting accordingly.
- All load controllers have a master time delay that is initially set only when a PIR occupancy transmission is received from a paired sensor. The time delay will then be reset every time a sensor reports any occupancy (either PIR or acoustic). Lights will be switched off once all paired sensors have continuously reported unoccupied for the duration of the time delay.
- To prevent lights from staying on indefinitely from just acoustic events, after ~30 minutes the load controller will stop considering acoustic events from all paired sensors until after a PIR event is received again.
- As an added safety measure after lights are switched off, acoustic detection remains enabled for 15 seconds to enable voice reactivation of lights.
- If a load controller does not receive any heartbeat transmissions from a paired sensor for 10 minutes it will blink out an error code (4 blue blinks, followed by a pause) and consider itself occupied (so as to override the lights on). If more than one sensor is paired, the sensor heartbeats from all sensors must have stopped for the error warning to begin blinking.

OCCUPANCY W/ INTEGRATED PHOTOCELL OPTION (SWD-211/SWD-231 & SWD-212/SWD-232)

- Sensors with the integrated photocell require auto-setpoint calibration to be initiated from the sensor in order to enable photocell operation.
- 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 digitally paired load controller compares the received light level to the setpoint and controls the connected lighting accordingly.
- **SENSORWORX** digital load controllers will only listen to a single photocell sensor. If more than one is paired, 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 paired controllers for information on their respective LED blink out behavior when controlled lights are transitioning on or off from photocell operation.
- To accommodate multi-zone photocell applications, load controllers can be configured to track according to the received daylight level, but control lights a fixed percentage brighter.

SENSORS W/ AUXILIARY RELAY OPTION (-AR SUFFIX)

- By default, the auxiliary relay will close when the overall the state of all sensors on the wired digital bus is occupied.
- This logic can be reversed such that the relay will be open when the overall the state of all sensors on the wired digital bus is occupied.
- Only one sensor with the -AR option is needed per digital bus.
- By default, a 10 minute time delay is utilized by the sensor's auxiliary relay and can be modified via the unit's push-button.
- The sensor's auxiliary relay time delay is independent of all load controller time delays.

