



AIA Division 16 Specification Section 16910 – Occupancy Sensors

PART 1 - GENERAL

1.1 SUMMARY

- A. The Occupancy Sensor system shall sense the presence of human activity within the desired space and fully control the “On” / “Off” function of the lights.
- B. Sensing technologies shall be completely passive meaning that they will not emit any radiation that is known to interfere with certain types of hearing aides, or electronic devices such as electronic white board readers. Acceptable programmable shall be Passive Infrared (PIR), and/or PIR/Microphonic Passive Dual Technology (PDT). Ultrasonic or Microwave based sensing technologies shall not be accepted.
- C. Time Delay settings shall be factory set at 10 minutes, and shall not be field adjusted unless specifically instructed by Architect. This delay selection is based on lamp life vs. energy savings and sensor performance. Automatic adjustments to this delay period by the sensor shall not be permitted.
- D. In high humidity or cold environments, the sensors must be conformably coated and rated for condensing humidity and -40 degree Fahrenheit (and Celsius) operation.
- E. Installer, in accordance with manufacturer’s recommendation, shall determine final sensor location. All sensors shall have non-adjustable factory calibrated sensitivity for maximum performance. Time Delay and Photocell field adjustments shall be provided as needed.
- F. The installing contractor shall be responsible for a complete and functional system in accordance with all applicable local and national codes.
- G. All applicable products must be UL Listed or other acceptable national testing organization.
- H. Product must be manufactured in the USA and be warranted for 5 years.

1.2 APPROVED MANUFACTURER AND SUBSTITUTIONS

- A. Approved manufacturer shall be Sensor Switch, Inc. (800) 727-7483
www.sensorswitch.com.
- B. Substitutions must be submitted no less than 5 days prior to bid date. An AutoCAD drawing of the facility showing coverage patterns and technical data must be provided with substitution request. All substitutions must clearly identify any and all exceptions to the specifications with a detailed explanation as to the exception. If substitution is approved, the contractor shall bear the responsibility of a fully functional system to the owner’s and Architect’s satisfaction.

PART 2 – PRODUCTS

2.1 WALL SWITCH SENSORS – SMALL AREAS

- A. Sensor shall recess into single gang switch box and fit a standard GFI opening.



- B. Sensor must meet NEC grounding requirements by providing a dedicated ground connection and grounding to mounting strap. Line and load wire connections shall be interchangeable. Sensor shall not allow current to pass to the load when sensor is in the unoccupied (Off) condition.
- C. Sensor shall use PIR sensing incorporating a nominal one half inch focal length lens viewing 9 inches above and below horizontal view pattern measured at 10 feet.
- D. Sensor shall have optional features for photocell/daylight override, vandal resistant lens, and no switch as specified.
- E. In areas with inboard/outboard switching, sensor shall provide two dedicated relays and override switches. Each relay shall have independent programmable time delays.
- F. In areas with obstructions to the occupant's workspace, sensor shall utilize programmable dual technology PIR/Microphonic sensing.
- G. All models shall have "Reduced Turn On". This is a field programmable function for problematic areas with unforeseen reflective surfaces. False turn on shall be eliminated with this feature.
- H. Sensor shall be the following Sensor Switch model numbers. Device color and optional features as specified.
 - 1. WSD (PIR)
 - 2. WSD-2P (PIR inboard/outboard)
 - 3. WSD-PDT (PIR/Microphonic)
 - 4. WSD-PDT-2P (PIR/Microphonic inboard/outboard)
 - 5. WSD-SA (PIR Semi-Automatic)
 - 6. WSD-PDT-SA (PIR/Microphonic Semi-Automatic)

2.2 WALL SWITCH SENSORS – LARGE AREAS

- A. Sensor shall surface mount to single gang switch box.
- B. Sensor shall use PIR sensing incorporating a nominal one-inch focal length lens viewing 9 inches above and below horizontal view pattern measured at 20 feet.
- C. Sensor shall have optional feature for photocell/daylight override.
- D. In areas with inboard/outboard switching or two circuits, sensor shall provide two dedicated relays and override switches.
- E. In areas with obstructions to the occupant's workspace, sensor shall utilize dual technology PIR/Microphonic sensing.
- F. Sensor shall be the following Sensor Switch model numbers. Device color and optional features as specified.
 - 1. LWS (PIR)
 - 2. LWS-2P (PIR inboard/outboard or two circuits)
 - 3. LWS-PDT (PIR/Microphonic)
 - 4. LWS-PDT-2P (PIR/Microphonic inboard/outboard or two circuits)



2.3 LOW VOLTAGE SENSORS

- A. Sensors shall operate on a class 2, three-conductor system. Sensors shall operate on 12 to 24 VAC or VDC and consume no more than 5 milliamps so that up to 14 sensors may be connected to a single power pack.
- B. Upon initial power up, sensors must immediately turn on. Power packs may be wired on the line or load side of local switching and must not exhibit any delays when switch is energized.
- C. In areas with clear line of site view of the workspace, sensors shall use PIR detection. In areas with obstructions, sensors shall use PIR/Microphonic detection.
- D. Optional interface with Building Automation System (BAS): Each zone designated shall provide one sensor with a SPDT class 2 relay providing a digital input to BAS. All sensors in designated zone shall communicate to sensor with relay for status to BAS. Sensor relay coil shall energize in the unoccupied state to load share the low voltage current from power pack. Note that Power Pack must be installed on the Line side of the local toggle switch for Relay to work properly.
- E. Specific sensors shall have optional feature for photocell/daylight override, and/or Low Temperature/High Humidity environments.
- F. Sensors shall be the following Sensor Switch model numbers.
 - 1. CM-9 (PIR Ceiling)
 - 2. CM-PDT (PIR/Microphonic Ceiling)
 - 3. CM-10 (PIR Ceiling-Extended Range)
 - 4. CM-PDT-10 (PIR/Microphonic Ceiling-Extended Range)
 - 5. WV-16 (PIR Wall Mount)
 - 6. WV-PDT (PIR/Microphonic Wall Mount)
 - 7. HW-13 (PIR Hallway)
 - 8. HM-10 (PIR High Bay Aisle Way)
 - 9. CM-6 (PIR High Bay)

2.4 POWER PACKS

- A. Power Packs shall accept 120 or 277 VAC, be plenum rated, and provide class 2 power for up to 14 remote sensors.
- B. Power Pack shall securely mount to junction location through a threaded ½ inch chase nipple. Plastic clips into junction box shall not be accepted. All class 1 wiring shall pass through chase nipple into adjacent junction box without any exposure of wire leads. Note: UL Listing under Energy Management or Industrial Control Equipment automatically meets this requirement, whereas Appliance Control Listing does not meet this safety requirement.
- C. When required by local code, Power Pack must install inside standard electrical enclosure and provide UL recognized support to junction box. All class 1 wiring is to pass through chase nipple into adjacent junction box without any exposure of wire leads.



- D. Power Pack shall incorporate a Class 1 relay and an A/C electronic switching device. The A/C electronic switching device shall make and break the load, while the relay shall carry the current in the On condition. This system shall provide full 20 amp switching of all load types, and be rated for 400,000 cycles.
- E. Power Packs shall be single circuit, or two circuits. Slave Packs may be used to control additional circuits. When two circuit power packs, or slave packs are used, the power packs must be wired directly to circuit breaker. Otherwise, power packs may be wired on the line or load side of the local switch.
- F. Power Packs shall be the following Sensor Switch model numbers.
 - 1. PP-20 (Single Pole)
 - 2. PP-20-2P (Two Pole)
 - 3. SP-20 (Slave Pack)

2.5 PHOTOCELLS AND DIMMING/DAYLIGHT HARVESTING

- A. Photocell shall accept 12 to 24 VAC or VDC and provide a SPDT relay for interface with remote switching system. Sensor shall interface with occupancy sensors, directly with power pack, or other system as shown.
- B. Photocell shall provide for an On/Off set-point, and a deadband to prevent the artificial light from cycling. Delay shall be incorporated into the photocell to prevent rapid response to passing clouds.
- C. Photocell set-point and deadband shall be automatically calibrated through the sensor's micro-controller by initiating the "Automatic Set-point Programming" subroutine. Further adjustment may be made manually if needed. Deadband setting shall be verified and modified by the sensor automatically every time the lights cycle to accommodate physical changes in the space (i.e., furniture layouts, lamp depreciation, or lamp outages).
- D. Low voltage Dimming Sensors shall accept 12 to 24 VAC or VDC (from power pack or other low voltage source) and control 0 to 10 VDC dimmable ballasts by sinking up to 20 milliamps of class 2 current (typically 40 or more ballasts).
- E. Low voltage Dimming Sensor's set point shall be automatically calibrated through the sensor's micro-controller by initiating the "Automatic Set-point Programming" subroutine. Min and Max dim settings as well as set-point may be manually entered.
- F. Low voltage Dimming Sensors shall be equipped with an automatic override for 100 hour burn-in of lamps. This feature must be available at any time for lamp replacements. (Note: This function should be performed prior to any dimming of the lamps including the "auto set-point" setting.)
- G. Combination Photocell/Dimming Sensors shall accept 12 to 24 VAC or VDC (from power pack or other low voltage source) and control the On/Off function as well as the dimming function of 0 to 10 VDC dimmable ballasts.
- H. Combination Photocell/Dimming Sensor's set-point and deadband shall be automatically calibrated through the sensor's micro-controller by initiating the "Automatic Set-point Programming" subroutine. Min and Max dim settings as well as set point may be manually entered.

- I. Combination Photocell/Dimming Sensors shall be equipped with an automatic override for 100 hour burn-in of lamps. This feature must be available at any time for lamp replacements. (Note: This function should be performed prior to any dimming of the lamps including the "auto set-point" setting.)
- J. Dual zone option shall be available for Photocell, Dimming Sensors, or Combination units. The second zone shall be controlled as an "offset" from the primary zone and shall be the zone farthest from the natural light source.
- K. Stand alone Ambient Light Sensors shall interface directly with the 0 to 10 VDC, without any other power source connection, and control dimmable ballasts by sinking up to 20 milliamps of class 2 current. Sensor shall incorporate a photodiode viewing out of a ceiling enclosure at a 30 degree angle from horizontal to detect diffused light from the ambient and artificial sources. Sensor shall allow for removal of response delays for adjustment, however provide dampening delay for normal operation. Settings shall be made manually.
- L. Sensors shall be the following Sensor Switch model numbers.
 - 1. CM-PC (Photocell for On/Off)
 - 2. CM-ADC (Dimming Sensor)
 - 3. CM-PC-ADC (Combination Photocell/Dimming Sensor)
 - 4. CM-PC-DZ, CM-ADC-DZ, OR CM-PC-ADC-DZ (Dual Zone Version)
 - 5. CM-ALC (Stand Alone Ambient Light Sensor for Daylight Harvesting)

2.6 LINE VOLTAGE SENSORS

- A. Sensors shall be self-contained and accept Class 1 wiring directly without the use of a power pack.
- B. In areas with clear line of site view of the workspace, sensors shall use PIR detection. In areas with obstructions, sensors shall use PIR/Microphonic detection.
- C. Multiple sensors controlling the same load shall be wired in parallel.
- D. Wall Mounted Sensors must be installed at 7 to 8 feet above the floor. Single and two circuit units shall be available.
- E. High Bay sensors controlling HID Bi-Level must incorporate a Start to High timer on initial power up to provide full light output for up to 20 minutes to prevent shortened lamp life.
- G. Specific sensors shall have optional feature for Low Temperature/High Humidity environments.
- F. Sensors shall be the following Sensor Switch model numbers.
 - 1. CMR-9 & CMR-9-2P (PIR Ceiling Mount- single and two pole)
 - 2. CMR-PDT & CMR-PDT-2P (PIR/Microphonic Ceiling Mount- single and two pole)
 - 3. CMR-10 & CMR-10-2P (PIR Ceiling Mount Extended Range - single and two pole)
 - 4. CMR-PDT-10 & CMR-PDT-10-2P (PIR/Microphonic Ceiling Mount Extended Range - single and two pole)



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5. WVR-16 & WVR-16-2P (PIR Wall Mount single and two pole)
6. WVR-PDT & WVR-PDT-2P (PIR/Microphonic Wall Mount single and two pole)
7. HMR-10 (PIR High Bay Aisle Way)
8. CMR-6 & CMR-6-SH (High Bay Ceiling)

END OF SECTION