

**SECTION 26 09 23
OCCUPANCY SENSORS**

PART 1 – GENERAL

Introduction

The work covered in this section is subject to all the requirements in the General Conditions of the Specifications.

The contractor shall coordinate all of the work in this section with all trades covered in the other sections of the specifications to provide a complete and operable system.

1.1 DESCRIPTION OF WORK

1. The extent of the lighting control system work is indicated by the drawings and by the requirements of this section. It is defined to include, but is not limited to, occupancy sensors, power packs and auxiliary relays.
2. System installation includes the installation of occupancy sensors, power packs and auxiliary relays in accordance with manufacturer's installation instructions.

1.2 QUALITY ASSURANCE

1. Component Testing: All electronic component board assemblies are to be factory tested and burned in prior to installation.
2. System Support: Factory fax/telephone/email support shall be available free of charge during normal business hours.
3. NEMA Compliance: Comply with applicable portions of NEMA standards pertaining to types of electrical equipment and enclosures.
4. NEC Compliance: Comply with applicable portions of the NEC.
5. UL Compliance: UL Listed in compliance with applicable UL Safety Standard.
6. FCC Emissions: All assemblies are to be in compliance with FCC Part 15, Class B.

1.3 WARRANTY

Manufacturer shall warrant specified equipment to be free from defects in materials and workmanship for at least 5 years from the date of manufacture.

1.4 EQUIPMENT

Equipment shall be PerfectSense Occupancy Sensors or approved equal.

1.5 SUBSTITUTIONS

If equipment from another manufacturer is submitted for approval, identification of any and all exceptions to the specifications must be provided with a detailed explanation of each exception.

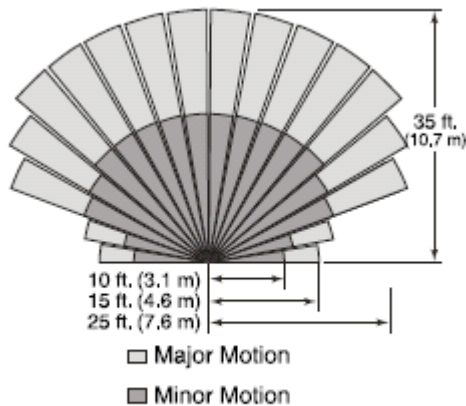
PART 2 – PRODUCTS

2.1 MANUFACTURERS

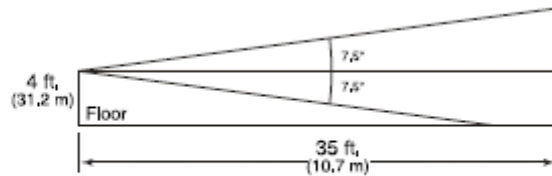
Basis-of-Design Product: Subject to compliance with requirements, provide PerfectSense or a comparable product by one of the following: [insert manufacturer's name below]

- 1.
- 2.
- 3.

2.2 PASSIVE INFRARED (PIR) WALL SWITCH OCCUPANCY SENSOR



Top view of sensor field of view



Side view of sensor field of view

1. Sensor shall recess into standard single gang wall switch box.
2. Sensor shall meet NEC grounding requirements, providing a green grounding wire with ring terminal and thread-forming screw.
3. Sensor shall have one line lead (black) and one load lead (red) for connection to lighting circuit.
4. Sensor shall be rated 120VAC and 277VAC input at line frequency of 60 hertz.
5. Sensor shall be rated for electronic and magnetic ballasts, incandescent and motor loads.

	Load Rating @ 120V	Load Rating @ 277V
Ballast	1000VA	1800VA
Incandescent	1000W	
Motor	1/4hp	

6. Sensor shall employ a mechanical relay to stop current flow to load when sensor is inactive (off).
7. Sensor shall employ a dual element PIR sensor having highest sensitivity to infrared with wavelength of 9.8 microns to detect human occupancy.
8. Sensor shall have major motion coverage up to 1000 square feet and minor motion coverage up to 300 square feet.
9. Sensor shall employ a multi-segmented lens having a 180 degree coverage pattern.
10. Coverage pattern and sensitivity shall be verified in accordance with NEMA WD-7 Guide for Occupancy Sensors.
11. Sensor shall have a bypass and time delay adjustment located behind a removable cover. A tool is required to remove cover, activate sensor bypass or adjust time delay.
12. Sensor shall have time delay adjustment ranging from 15 seconds to 30 minutes.

- Sensor shall include mounting hardware, decorator wall plate cover and screws to mount cover. Wall plate cover color shall match the sensor.

Auto-On Wall Switch Sensors

- Sensor shall have an Auto/Off latching push button allowing user to turn off lighting (off) in the out position, and enable the sensor to turn lighting on and off automatically in the in position (auto-on).
- Sensor shall be the following PerfectSense catalog numbers:

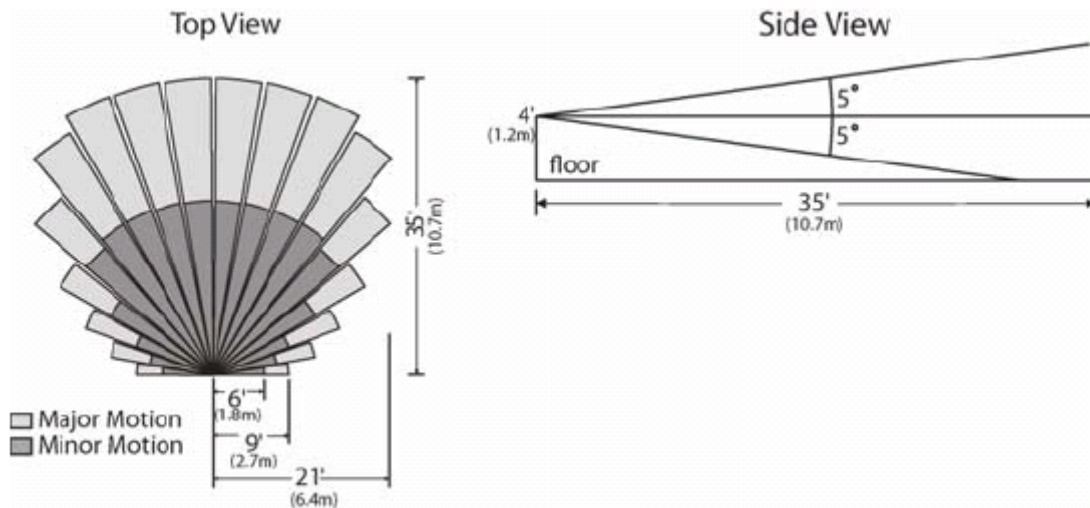
Catalog Number	Description
PS-PWS1277AI	PIR Wall Switch Auto-On, Ivory color
PS-PWS1277AW	PIR Wall Switch Auto-On, White color

Manual-On Wall Switch Sensors

- Sensor shall have a Manual On/Off momentary push button allowing the user to toggle the sensor on and off. In the on state, sensor will automatically turn off lighting after last occupancy was detected and time delay. When the sensor is in an off state, user must push button to turn on lighting.
- Sensor shall be the following PerfectSense catalog numbers:

Catalog Number	Description
PS-PWS1277MI	PIR Wall Switch Manual-On, Ivory color
PS-PWS1277MW	PIR Wall Switch Manual-On, White color

2.3 COMMERCIAL GRADE PIR WALL SWITCH OCCUPANCY SENSOR



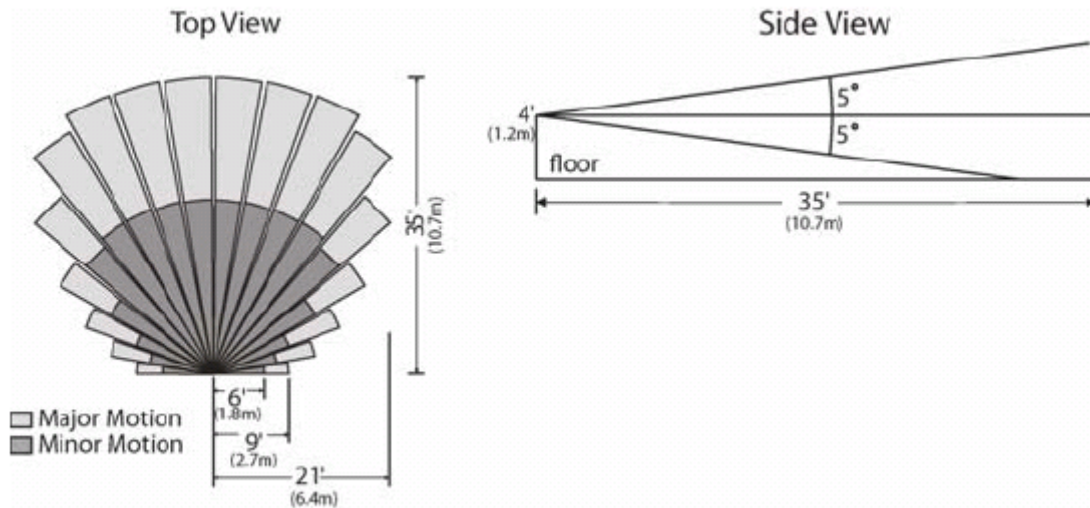
- Sensor shall recess into standard single gang wall switch box.
- Sensor shall meet NEC grounding requirements, providing a green grounding wire with ring terminal and thread-forming screw.
- Sensor shall have one line lead (black) and one load lead (red) for connection to lighting circuit.
- Sensor shall be rated 120VAC to 277VAC input at line frequency of 50 or 60 hertz.

	Load Rating @ 120V	Load Rating @ 277V
Ballast	1000VA	1800VA
Incandescent	1000W	
Motor	1/4hp	

5. Sensor shall employ a mechanical relay to stop current flow to load when sensor is inactive (off).
6. Sensor shall not require a neutral connection or minimum load.
7. Sensor shall employ a dual element PIR sensor having highest sensitivity to infrared with wavelength of 9.8 microns to detect human occupancy.
8. Sensor shall have major motion coverage up to 1000 square feet and minor motion coverage up to 300 square feet.
9. Sensor shall employ a multi-segmented lens having a 180 degree coverage pattern.
10. Coverage pattern and sensitivity shall be verified in accordance with NEMA WD-7 Guide for Occupancy Sensors.
11. Sensor multi-segmented lens shall match the color of the occupancy sensor and decorator style wall plate.
12. Sensor shall have a 3-position service switch located behind a removable cover with OFF, AUTO and ON positions. In the OFF position, the switch and connected load are disconnected from the AC power. In the AUTO position, the switch operates normally. In the ON position, the sensor is bypassed and connected load is turned on.
13. Sensor shall have a time delay adjustment located behind a removable cover to allow the adjustment of the time delay from 30 seconds to 30 minutes.
14. Sensor shall have a **Test Mode** in which the time delay is 15 seconds to reduce commissioning time.
15. Sensor shall have a **light level sensor** to prevent turning on lights when adequate natural light is present. Light level adjustment ranges from 0.5-250 foot-candles and is located behind a removable cover.
16. Sensor shall have a **Walk-Through Mode** that detects brief periods of occupancy and turns off lights within 2 minutes.
17. Sensor shall employ **Adaptive Technology** to automatically adjust time delay and sensitivity to maximize energy efficiency and minimize nuisance activation and shut off.
18. Sensor shall include mounting hardware, decorator wall plate cover and screws to mount cover. Wall plate cover color shall match the sensor. *May require a minimum 30-day lead-time.

Catalog Number	Description
PS-PWS1277UW	Commercial Grade PIR Wall Switch White
PS-PWS1277UI	Commercial Grade PIR Wall Switch Ivory
PS-PWS1277UG	Commercial Grade PIR Wall Switch Gray*
PS-PWS1277UL	Commercial Grade PIR Wall Switch Light Almond*
PS-PWS1277UB	Commercial Grade PIR Wall Switch Black*

2.4 COMMERCIAL GRADE DUAL CIRCUIT PIR WALL SWITCH OCCUPANCY SENSOR



1. Sensor shall have two independent relays to switch connected rated 120V to 277V at 50/60Hz.
2. Sensor shall have a **Lamp Saver** mode for 50/50 bi-level lighting control applications where an A and B group each provide 50% lighting in a uniform manor. When **Lamp Saver** mode enabled, the sensor alternates A and B groups each time sensor is activated to extend lamp life and reduce maintenance.
3. Sensor shall have (2) buttons for manual control of connected loads (primary and secondary loads).
4. Sensor shall recess into standard single gang wall switch box.
5. Sensor shall meet NEC grounding requirements, providing a green grounding wire with ring terminal and thread-forming screw.
6. Sensor shall have two leads for primary (black) and secondary (blue) inputs and two leads for primary (red) and secondary (brown) loads.
7. Sensor shall be rated 120VAC to 277VAC input at line frequency of 50 or 60 hertz.

	Load Rating @ 120V	Load Rating @ 277V
Ballast	1000VA	1800VA
Incandescent	1000W	
Motor	1/4hp	

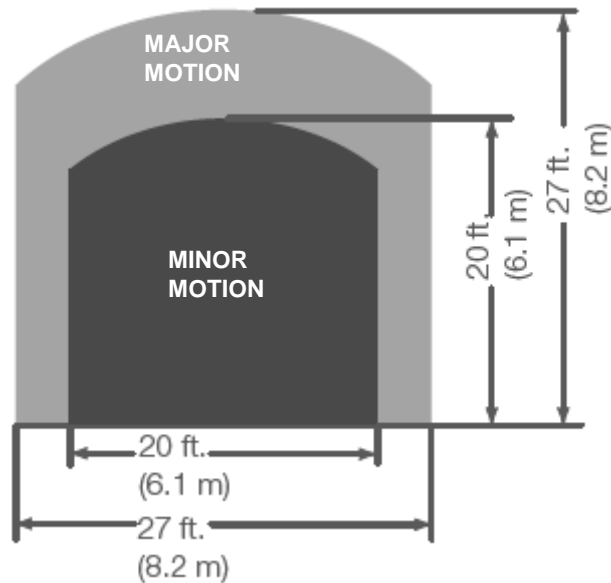
Note: Primary and secondary relays equally rated.

8. Sensor shall employ two mechanical relays to stop current flow to connected loads when sensor is inactive (off).
9. Sensor shall not require a neutral connection or minimum load.
10. Sensor shall employ a dual element PIR sensor having highest sensitivity to infrared with wavelength of 9.8 microns to detect human occupancy.
11. Sensor shall have major motion coverage up to 1000 square feet and minor motion coverage up to 300 square feet.
12. Sensor shall employ a multi-segmented lens having a 180 degree coverage pattern.
13. Coverage pattern and sensitivity shall be verified in accordance with NEMA WD-7 Guide for Occupancy Sensors.
14. Sensor multi-segmented lens shall match the color of the occupancy sensor and decorator style wall plate.

15. Sensor shall have a 3-position service switch located behind a removable cover with OFF, AUTO and ON positions. In the OFF position, the switch and connected load are disconnected from the AC power. In the AUTO position, the switch operates normally. In the ON position, the sensor is bypassed and connected load is turned on.
16. Sensor shall have a time delay adjustment located behind a removable cover to allow the adjustment of the time delay from 30 seconds to 30 minutes.
17. Sensor shall have a **Test Mode** in which the time delay is 15 seconds to reduce commissioning time.
18. Sensor shall have a **light level sensor** to prevent turning on lights when adequate natural light is present. Light level adjustment ranges from 0.5-250 foot-candles and is located behind a removable cover.
19. Sensor shall have a **Walk-Through Mode** that detects brief periods of occupancy and turns off lights within 2 minutes.
20. Sensor shall employ **Adaptive Technology** to automatically adjust time delay and sensitivity to maximize energy efficiency and minimize nuisance activation and shut off.
21. Sensor shall include mounting hardware, decorator wall plate cover and screws to mount cover. Wall plate cover color shall match the sensor. *Requires a minimum 30-day lead-time.

Catalog Number	Description
PS-PWD1277UW	Commercial Grade Dual Circuit PIR Wall Switch White
PS-PWD1277UI	Commercial Grade Dual Circuit PIR Wall Switch Ivory
PS-PWD1277UG	Commercial Grade Dual Circuit PIR Wall Switch Gray*
PS-PWD1277UL	Commercial Grade Dual Circuit PIR Wall Switch Light Almond*
PS-PWD1277UB	Commercial Grade Dual Circuit PIR Wall Switch Black*

2.5 COMMERCIAL GRADE ULTRASONIC WALL SWITCH OCCUPANCY SENSOR



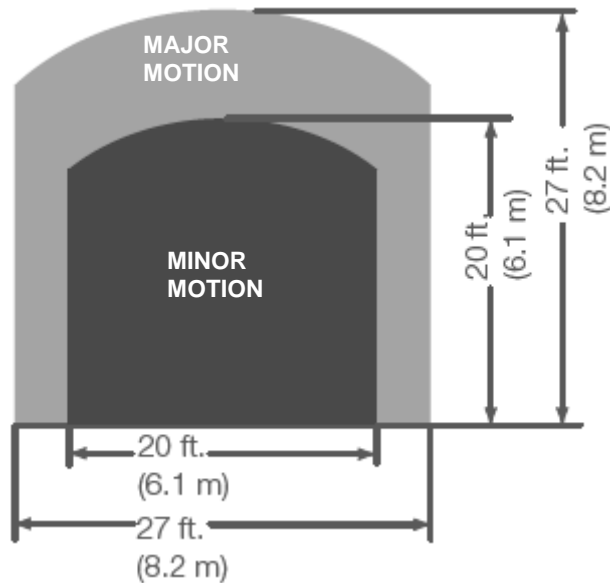
1. Sensor shall recess into standard single gang wall switch box.
2. Sensor shall meet NEC grounding requirements, providing a green grounding wire with ring terminal and thread-forming screw.
3. Sensor shall have one line lead (black) and one load lead (red) for connection to lighting circuit.
4. Sensor shall be rated 120VAC to 277VAC input at line frequency of 50 or 60 hertz.

	Load Rating @ 120V	Load Rating @ 277V
Ballast	1000VA	1800VA
Incandescent	1000W	
Motor	1/4hp	

5. Sensor shall employ a mechanical relay to stop current flow to load when sensor is inactive (off).
6. Sensor shall not require a neutral connection or minimum load.
7. Sensor shall employ active ultrasonic motion detection having a frequency of 40 kHz.
8. Sensor shall have major motion coverage up to 700 square feet and minor motion coverage up to 400 square feet.
9. Sensor shall employ two transducers, with one transducer transmitting and one transducer receiving.
10. Coverage pattern and sensitivity shall be verified in accordance with NEMA WD-7 Guide for Occupancy Sensors.
11. Sensor shall have a 3-position service switch located behind a removable cover with OFF, AUTO and ON positions. In the OFF position, the switch and connected load are disconnected from the AC power. In the AUTO position, the switch operates normally. In the ON position, the sensor is bypassed and connected load is turned on.
12. Sensor shall have a time delay adjustment located behind a removable cover to allow the adjustment of the time delay from 30 seconds to 30 minutes.
13. Sensor shall have a **Test Mode** in which the time delay is 15 seconds to reduce commissioning time.
14. Sensor shall have a **light level sensor** to prevent turning on lights when adequate natural light is present. Light level adjustment ranges from 0.5-250 foot-candles and is located behind a removable cover.
15. Sensor shall have a **Walk-Through Mode** that detects brief periods of occupancy and turns off lights within 2 minutes.
16. Sensor shall employ **Adaptive Technology** to automatically adjust time delay and sensitivity to maximize energy efficiency and minimize nuisance activation and shut off.
17. Sensor shall include mounting hardware, decorator wall plate cover and screws to mount cover. Wall plate cover color shall match the sensor. *May require a minimum 30-day lead-time.

Catalog Number	Description
PS-UWS1277UW	Commercial Grade Ultrasonic Wall Switch White
PS-UWS1277UI	Commercial Grade Ultrasonic Wall Switch Ivory
PS-UWS1277UG	Commercial Grade Ultrasonic Wall Switch Gray*
PS-UWS1277UL	Commercial Grade Ultrasonic Wall Switch Light Almond*
PS-UWS1277UB	Commercial Grade Ultrasonic Wall Switch Black*

2.6 COMMERCIAL GRADE DUAL CIRCUIT ULTRASONIC WALL SWITCH OCCUPANCY SENSOR



1. Sensor shall have two independent relays to switch connected rated 120V to 277V at 50/60Hz.
2. Sensor shall have a **Lamp Saver** mode for 50/50 bi-level lighting control applications where an A and B group each provide 50% lighting in a uniform manor. When **Lamp Saver** mode is enabled, the sensor alternates A and B groups each time sensor is activated to extend lamp life and reduce maintenance.
3. Sensor shall have (2) buttons for manual control of connected loads (primary and secondary loads).
4. Sensor shall recess into standard single gang wall switch box.
5. Sensor shall meet NEC grounding requirements, providing a green grounding wire with ring terminal and thread-forming screw.
6. Sensor shall have two leads for primary (black) and secondary (blue) inputs and two leads for primary (red) and secondary (brown) loads.
7. Sensor shall be rated 120VAC to 277VAC input at line frequency of 50 or 60 hertz.

	Load Rating @ 120V	Load Rating @ 277V
Ballast	1000VA	1800VA
Incandescent	1000W	
Motor	1/4hp	

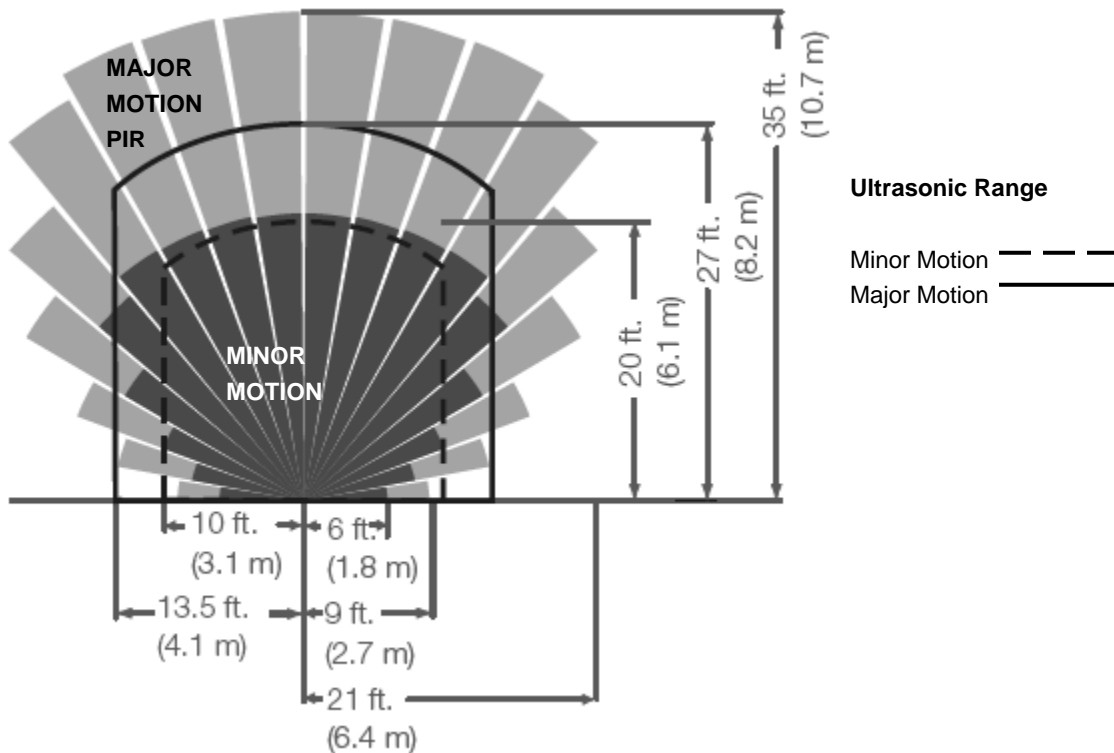
Note: Primary and secondary relays equally rated.

8. Sensor shall employ two mechanical relays to stop current flow to connected loads when sensor is inactive (off).
9. Sensor shall not require a neutral connection or minimum load.
10. Sensor shall employ active ultrasonic motion detection having a frequency of 40 kHz.
11. Sensor shall have major motion coverage up to 700 square feet and minor motion coverage up to 400 square feet.
12. Sensor shall employ two transducers, with one transducer transmitting and one transducer receiving.

13. Coverage pattern and sensitivity shall be verified in accordance with NEMA WD-7 Guide for Occupancy Sensors.
14. Sensor shall have a 3-position service switch located behind a removable cover with OFF, AUTO and ON positions. In the OFF position, the switch and connected load are disconnected from the AC power. In the AUTO position, the switch operates normally. In the ON position, the sensor is bypassed and connected load is turned on.
15. Sensor shall have a time delay adjustment located behind a removable cover to allow the adjustment of the time delay from 30 seconds to 30 minutes.
16. Sensor shall have a **Test Mode** in which the time delay is 15 seconds to reduce commissioning time.
17. Sensor shall have a **light level sensor** to prevent turning on lights when adequate natural light is present. Light level adjustment ranges from 0.5-250 foot-candles and is located behind a removable cover.
18. Sensor shall have a **Walk-Through Mode** that detects brief periods of occupancy and turns off lights within 2 minutes.
19. Sensor shall employ **Adaptive Technology** to automatically adjust time delay and sensitivity to maximize energy efficiency and minimize nuisance activation and shut off.
20. Sensor shall include mounting hardware, decorator wall plate cover and screws to mount cover. Wall plate cover color shall match the sensor. *May require a minimum 30-day lead-time.

Catalog Number	Description
PS-UWD1277UW	Commercial Grade Dual Circuit PIR Wall Switch White
PS-UWD1277UI	Commercial Grade Dual Circuit PIR Wall Switch Ivory
PS-UWD1277UG	Commercial Grade Dual Circuit PIR Wall Switch Gray*
PS-UWD1277UL	Commercial Grade Dual Circuit PIR Wall Switch Light Almond*
PS-UWD1277UB	Commercial Grade Dual Circuit PIR Wall Switch Black*

2.7 COMMERCIAL GRADE DUAL TECH WALL SWITCH OCCUPANCY SENSOR



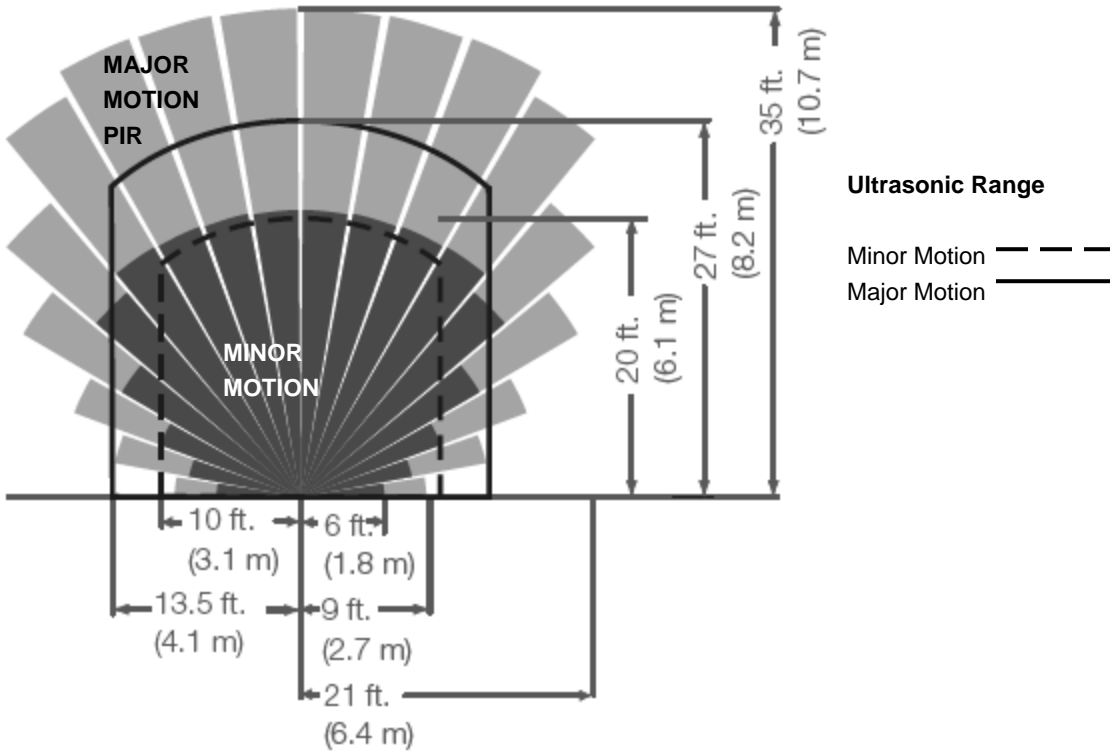
1. Sensor shall recess into standard single gang wall switch box.
2. Sensor shall meet NEC grounding requirements, providing a green grounding wire with ring terminal and thread-forming screw.
3. Sensor shall have one line lead (black) and one load lead (red) for connection to lighting circuit.
4. Sensor shall be rated 120VAC to 277VAC input at line frequency of 50 or 60 hertz.

	Load Rating @ 120V	Load Rating @ 277V
Ballast	1000VA	1800VA
Incandescent	1000W	
Motor	1/4hp	

5. Sensor shall employ a mechanical relay to stop current flow to load when sensor is inactive (off).
6. Sensor shall not require a neutral connection or minimum load.
7. Sensor shall employ active ultrasonic motion detection having a frequency of 40 kHz.
8. Sensor shall have major motion coverage up to 700 square feet and minor motion coverage up to 400 square feet.
9. Sensor shall employ two transducers, with one transducer transmitting and one transducer receiving.
10. Sensor shall employ a dual element PIR sensor having highest sensitivity to infrared with wavelength of 9.8 microns to detect human occupancy.
11. Sensor shall have PIR major motion coverage up to 1000 square feet and minor motion coverage up to 300 square feet.
12. Sensor shall employ a multi-segmented lens having a 180 degree coverage pattern.
13. Coverage pattern and sensitivity shall be verified in accordance with NEMA WD-7 Guide for Occupancy Sensors.
14. Sensor multi-segmented lens shall match the color of the occupancy sensor and decorator style wall plate.
15. Sensor shall have a 3-position service switch located behind a removable cover with OFF, AUTO and ON positions. In the OFF position, the switch and connected load are disconnected from the AC power. In the AUTO position, the switch operates normally. In the ON position, the sensor is bypassed and connected load is turned on.
16. Sensor shall have a time delay adjustment located behind a removable cover to allow the adjustment of the time delay from 30 seconds to 30 minutes.
17. Sensor shall have a **Test Mode** in which the time delay is 15 seconds to reduce commissioning time.
18. Sensor shall have a **light level sensor** to prevent turning on lights when adequate natural light is present. Light level adjustment ranges from 0.5-250 foot-candles and is located behind a removable cover.
19. Sensor shall have a **Walk-Through Mode** that detects brief periods of occupancy and turns off lights within 2 minutes.
20. Sensor shall employ **Adaptive Technology** to automatically adjust time delay and sensitivity to maximize energy efficiency and minimize nuisance activation and shut off.
21. Sensor shall include mounting hardware, decorator wall plate cover and screws to mount cover. Wall plate cover color shall match the sensor. *May require a minimum 30-day lead-time.

Catalog Number	Description
PS-DWS1277UW	Commercial Grade Ultrasonic Wall Switch White
PS-DWS1277UI	Commercial Grade Ultrasonic Wall Switch Ivory
PS-DWS1277UG	Commercial Grade Ultrasonic Wall Switch Gray*
PS-DWS1277UL	Commercial Grade Ultrasonic Wall Switch Light Almond*
PS-DWS1277UB	Commercial Grade Ultrasonic Wall Switch Black*

2.8 COMMERCIAL GRADE DUAL CIRCUIT DUAL TECH WALL SWITCH OCCUPANCY SENSOR



1. Sensor shall have two independent relays to switch connected rated 120V to 277V at 50/60Hz.
2. Sensor shall have a **Lamp Saver** mode for 50/50 bi-level lighting control applications where an A and B group each provide 50% lighting in a uniform manor. When **Lamp Saver** mode is enabled, the sensor alternates A and B groups each time sensor is activated to extend lamp life and reduce maintenance.
3. Sensor shall have (2) buttons for manual control of connected loads (primary and secondary loads).
4. Sensor shall recess into standard single gang wall switch box.
5. Sensor shall meet NEC grounding requirements, providing a green grounding wire with ring terminal and thread-forming screw.
6. Sensor shall have two leads for primary (black) and secondary (blue) inputs and two leads for primary (red) and secondary (brown) loads.
7. Sensor shall be rated 120VAC to 277VAC input at line frequency of 50 or 60 hertz.

	Load Rating @ 120V	Load Rating @ 277V
Ballast	1000VA	1800VA
Incandescent	1000W	
Motor	1/4hp	

Note: Primary and secondary relays equally rated.

8. Sensor shall employ two mechanical relays to stop current flow to connected loads when sensor is inactive (off).
9. Sensor shall not require a neutral connection or minimum load.
10. Sensor shall employ active ultrasonic motion detection having a frequency of 40 kHz.

11. Sensor shall have major motion coverage up to 700 square feet and minor motion coverage up to 400 square feet.
12. Sensor shall employ two transducers, with one transducer transmitting and one transducer receiving.
13. Sensor shall employ a dual element PIR sensor having highest sensitivity to infrared with wavelength of 9.8 microns to detect human occupancy.
14. Sensor shall have major motion coverage up to 1000 square feet and minor motion coverage up to 300 square feet.
15. Sensor shall employ a multi-segmented lens having a 180 degree coverage pattern.
16. Coverage pattern and sensitivity shall be verified in accordance with NEMA WD-7 Guide for Occupancy Sensors.
17. Sensor multi-segmented lens shall match the color of the occupancy sensor and decorator style wall plate.
18. Sensor shall have a 3-position service switch located behind a removable cover with OFF, AUTO and ON positions. In the OFF position, the switch and connected load are disconnected from the AC power. In the AUTO position, the switch operates normally. In the ON position, the sensor is bypassed and connected load is turned on.
19. Sensor shall have a time delay adjustment located behind a removable cover to allow the adjustment of the time delay from 30 seconds to 30 minutes.
20. Sensor shall have a **Test Mode** in which the time delay is 15 seconds to reduce commissioning time.
21. Sensor shall have a **light level sensor** to prevent turning on lights when adequate natural light is present. Light level adjustment ranges from 0.5-250 foot-candles and is located behind a removable cover.
22. Sensor shall have a **Walk-Through Mode** that detects brief periods of occupancy and turns off lights within 2 minutes.
23. Sensor shall employ **Adaptive Technology** to automatically adjust time delay and sensitivity to maximize energy efficiency and minimize nuisance activation and shut off.
24. Sensor shall include mounting hardware, decorator wall plate cover and screws to mount cover. Wall plate cover color shall match the sensor. *May require a minimum 30-day lead-time.

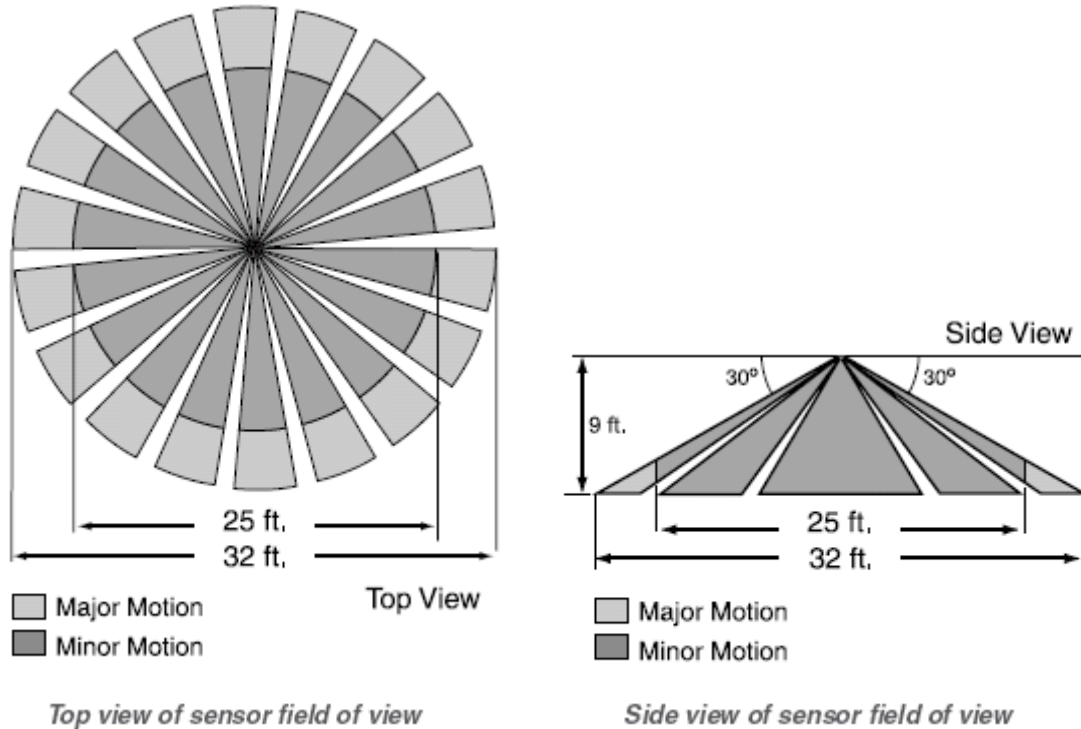
<u>Catalog Number</u>	<u>Description</u>
PS-DWD1277UW	Commercial Grade Dual Circuit PIR Wall Switch White
PS-DWD1277UI	Commercial Grade Dual Circuit PIR Wall Switch Ivory
PS-DWD1277UG	Commercial Grade Dual Circuit PIR Wall Switch Gray*
PS-DWD1277UL	Commercial Grade Dual Circuit PIR Wall Switch Light Almond*
PS-DWD1277UB	Commercial Grade Dual Circuit PIR Wall Switch Black*

2.9 CEILING MOUNTED OCCUPANCY SENSORS

1. Sensors shall operate on a class 2, three-conductor system. Sensors shall operate at nominal 24VDC.
2. Sensor shall immediately turn on lighting when occupancy is detected.
3. Sensor shall employ a PerfectSense Power Pack to supply power to sensor.
4. Sensor shall employ power pack or auxiliary relay to switch class 1 lighting loads and control switching of lighting loads.
5. Sensor shall employ a light level sensor with range from 0.5 to 250 foot candles, and shall come factory set at 250 foot candles to override light level feature.
6. Sensor shall have sensitivity, mode and time delay adjustments located behind a snap-on cover which is accessible when sensor is fully installed and mounted, and does not require the sensor to be moved or removed to make adjustments.
7. Sensor shall have a sensitivity adjustment ranging from 60 to 100%.

8. Sensor shall have a set of normally opened and normally closed contacts, called an isolated form c relay, rated no less than 1A@24VDC, allowing the sensor to interface with building automation systems (BAS), HVAC, security, lighting control and other control systems.

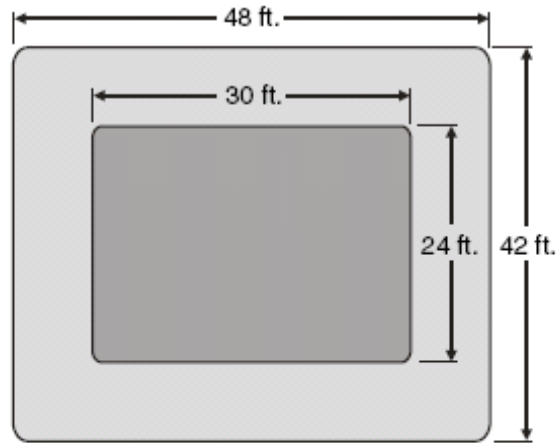
PIR Ceiling Sensor



9. Sensor shall detect occupancy using passive infrared (PIR) technology and employ a lens with 360 degree coverage pattern covering up to 1000 sq. ft. at a mounting height of 9 ft.
10. Sensor shall have a mode selector switch and have 2 operating modes; automatic and manual. In the manual mode, sensor remains activated and will not turn off (for service and maintenance use only).
11. PIR Ceiling sensor shall be the following PerfectSense catalog number:

Catalog Number	Description
PS-CPS1000	Ceiling Mounted PIR

Ultrasonic Ceiling Sensor



Area of Detection

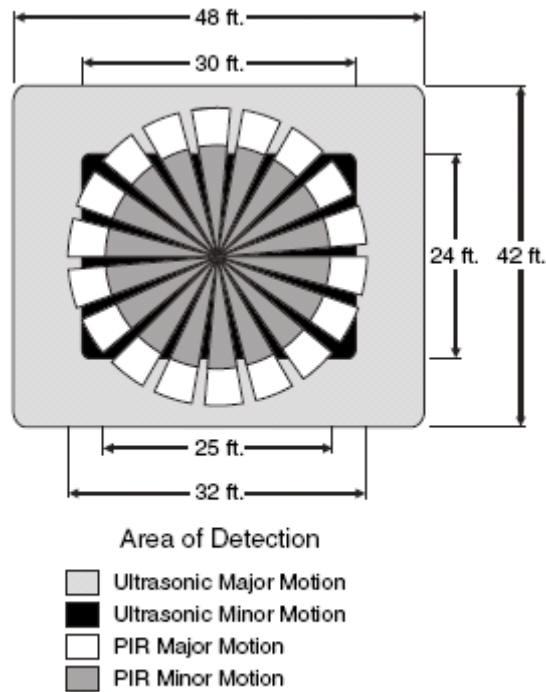
- Major Motion
- Minor Motion

Top view of sensor field of view

12. Sensor shall detect occupancy using ultrasonic technology and radiate a signal of 32.8 kHz (+/- 3 kHz) less than 110dB at a distance of 5 ft.
13. Sensor shall have a 360 degree coverage pattern covering up to 2000 sq. ft. at a mounting height of 9 ft.
14. Sensor shall have a mode selector switch and have 2 operating modes; automatic and manual. In the manual mode, sensor remains activated and will not turn off (for service and maintenance use only).
15. Ultrasonic Ceiling sensor shall be the following PerfectSense catalog number:

<u>Catalog Number</u>	<u>Description</u>
PS-CUS2000	Ceiling Mounted Ultrasonic

Dual Tech Ceiling Sensor



Top view of sensor field of view

1. Sensor shall detect occupancy using both PIR and ultrasonic technology and radiate an ultrasonic signal of 32.8 kHz (+/- 3 kHz) less than 110dB at a distance of 5 ft.
2. Sensor shall have a 360 degree coverage pattern for both PIR and ultrasonic detection covering up to 1000 sq. ft. for both and 2000 sq. ft. for ultrasonic only at a mounting height of 9 ft.
3. Sensor shall have a mode selector switch and have 3 operating modes; instant, normal and manual. In instant mode, sensor employs both PIR or ultrasonic to turn on lighting. In normal mode, sensor employs PIR only to turn on lighting. In manual mode, sensor remains activated and will not turn off (for service and maintenance use only). In instant and normal modes, sensor employs both PIR and ultrasonic to hold lighting on.
4. Dual Tech Ceiling sensor shall be the following PerfectSense catalog number:

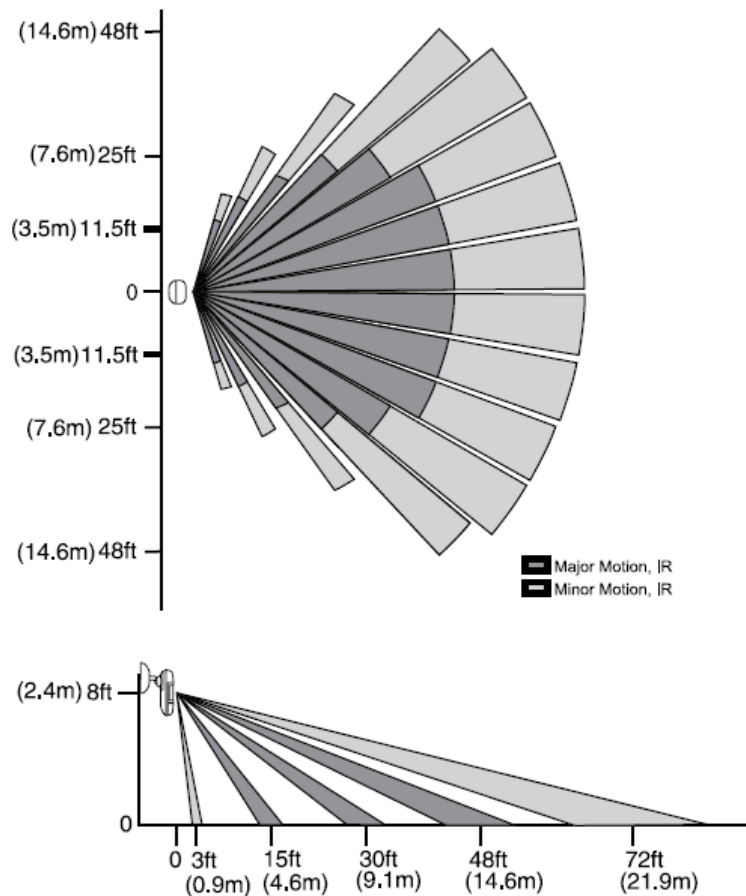
Catalog Number	Description
PS-DTC24	Ceiling Mounted Dual Tech

2.6 WALL MOUNTED OCCUPANCY SENSORS

1. Sensors shall operate on a class 2, three-conductor system. Sensors shall operate at nominal 24VDC.

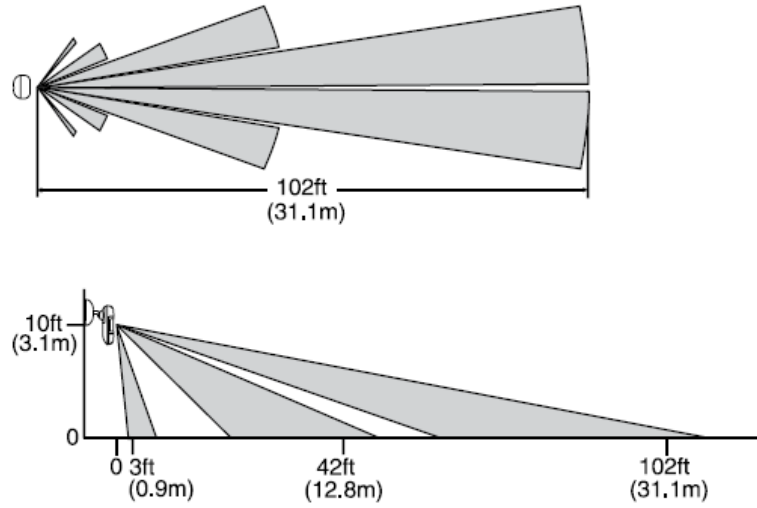
2. Sensor shall immediately turn on lighting when occupancy is detected.
3. Sensor shall employ a PerfectSense Power Pack to supply power to sensor.
4. Sensor shall employ power pack or auxiliary relay to switch class 1 lighting loads and control switching of lighting loads.
5. Sensor shall employ a light level sensor with range from 0.5 to 250 foot candles, and shall come factory set at 250 foot candles to override light level feature.
6. Sensor shall have sensitivity, mode and time delay adjustments located behind a snap-on cover which is accessible when sensor is fully installed and mounted, and does not require the sensor to be moved or removed to make adjustments.
7. Sensor shall have a sensitivity adjustment ranging from 60 to 100%.
8. Sensor shall have a set of normally opened and normally closed contacts, called an isolated form c relay, rated no less than 1A@24VDC, allowing the sensor to interface with building automation systems (BAS), HVAC, security, lighting control and other control systems.

Wall Mounted PIR Sensor with Wide-View Lens



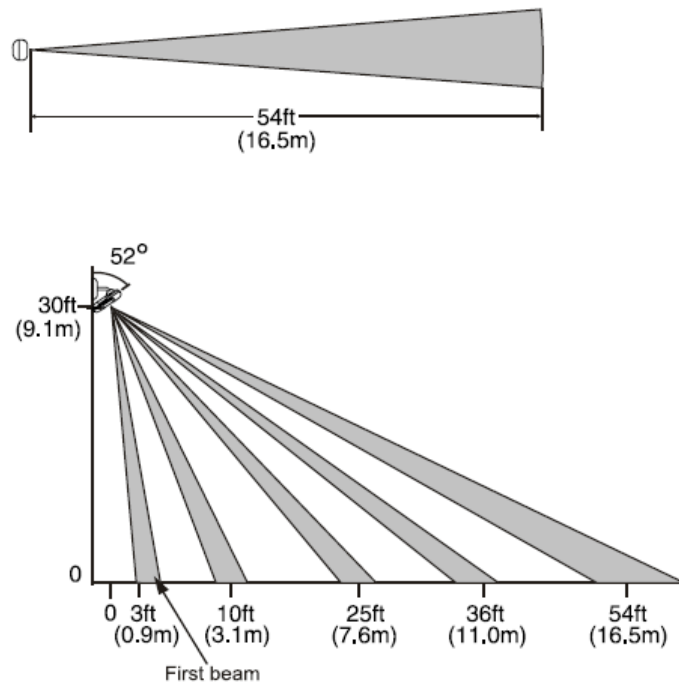
Wide Angle Lens Field of View Top and Side

Wall Mounted PIR Sensor with Long Range Lens



Long Range Lens Field of View Top and Side

Wall Mounted PIR with High Bay Lens



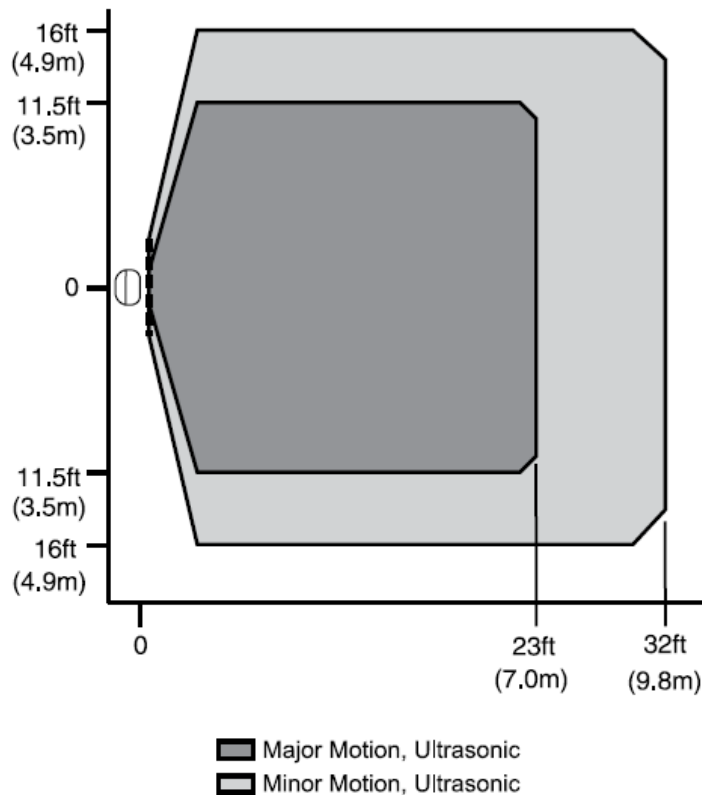
High Bay Lens Field of View Top and Side

9. Sensor shall detect occupancy using passive infrared (PIR) technology and be capable of being field configured to provide either wide-view, long range or high bay coverage.
 - a. Wide-View: Employ a segmented lens to provide 110° field of view covering at least 1500 square feet (as shown above) from a mounting height of 9 feet.

- b. Long Range: Employ a segmented lens to provide a narrow viewing angle with a range of at least 102 linear feet from a mounting height of 10 feet.
 - c. High Bay: Employ a segmented lens to provide a narrow viewing no less than 10 feet wide covering at least 54 linear feet from a mounting height of 30 feet.
10. Sensor shall have a mode selector switch and have 2 operating modes; automatic and manual. In the manual mode, sensor remains activated and will not turn off (for service and maintenance use only).
11. Wall mounted PIR sensor shall be the following PerfectSense catalog number:

Catalog Number	Description
PS-WPS1500	Wall Mounted PIR

Wall Mounted Ultrasonic Sensor

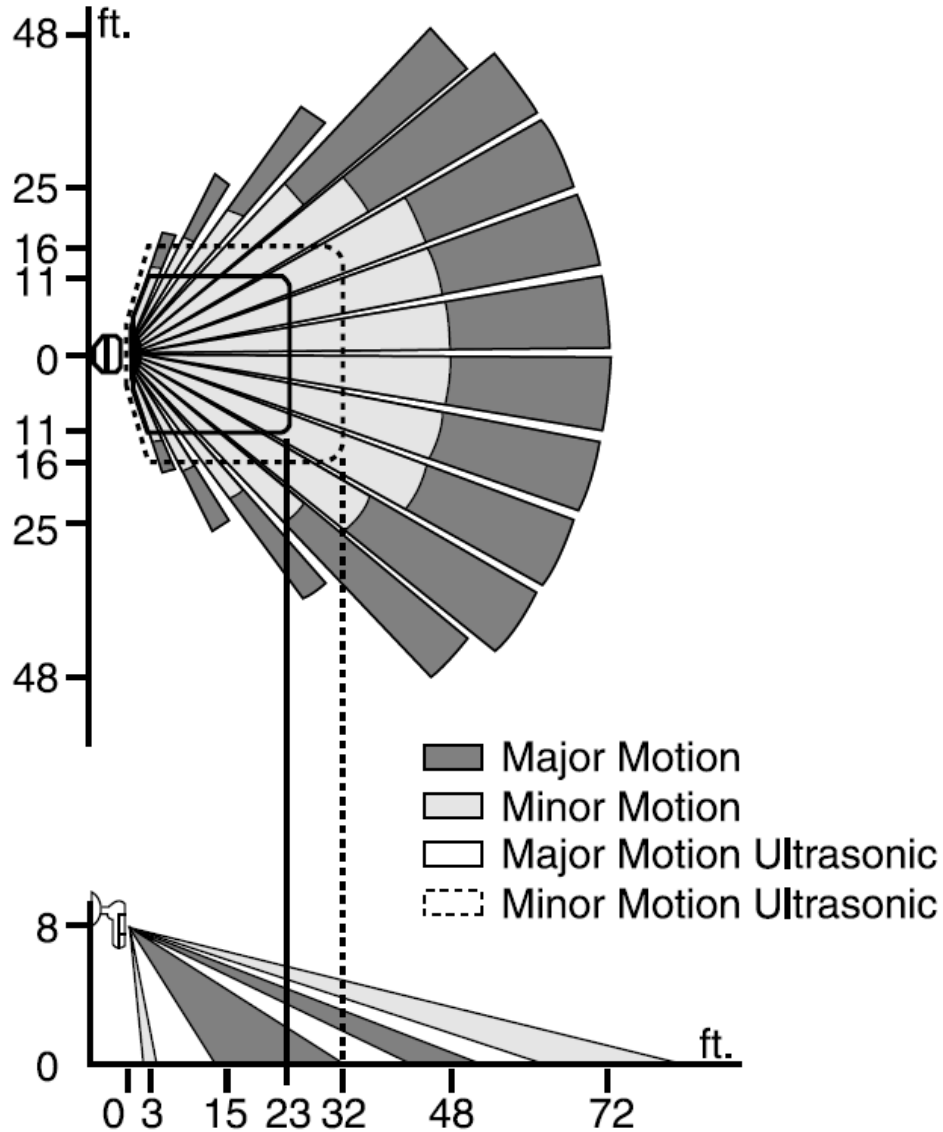


Ultrasonic Sensor Field of View Top

12. Sensor shall detect occupancy using ultrasonic technology and radiate a signal of 32.8kHz (+/- 3kHz) less than 110dB at a distance of 5 ft.
13. Sensor shall have a 180° coverage pattern covering up to 1500 sq. ft. at a mounting height of 9 ft.
14. Sensor shall have a mode selector switch and have 2 operating modes; automatic and manual. In the manual mode, sensor remains activated and will not turn off (for service and maintenance use only).
15. Ultrasonic Ceiling sensor shall be the following PerfectSense catalog number:

Catalog Number	Description
PS-WUS1500	Ceiling Mounted Ultrasonic

Wall Mounted Dual Tech Sensor



Ultrasonic Sensor Field of View Top

16. Sensor shall detect occupancy using both PIR and ultrasonic technology and radiate an ultrasonic signal of 32.8 kHz (+/- 3 kHz) less than 110dB at a distance of 5 ft.
17. Sensor shall have a 180° ultrasonic viewing angle and a 110° PIR viewing angle and achieve a coverage area of at least 1500 sq. ft. from a mounting height of 8 feet.
18. Sensor shall have a mode selector switch and have 3 operating modes; instant, normal and manual. In instant mode, sensor employs both PIR or ultrasonic to turn on lighting. In normal mode, sensor employs PIR only to turn on lighting. In manual mode, sensor remains activated and will not turn off (for service and maintenance use only). In instant and normal modes, sensor employs both PIR and ultrasonic to hold lighting on.

19. Wall mounted dual tech sensor shall be the following PerfectSense catalog number:

<u>Catalog Number</u>	<u>Description</u>
PS-WDS1500	Ceiling Mounted Dual Tech

2.7 POWER PACK & AUXILIARY RELAY

1. Power pack and auxiliary relay shall be rated for 120VAC and 277VAC loads at line frequency of 60Hz.
2. Power pack shall have an input voltage selector switch to select 120VAC or 277VAC input and switch shall require a tool.
3. Power pack shall supply 100mA@24VDC to power class 2 sensors and auxiliary relays.
4. Power pack and auxiliary relay shall have plenum rated enclosure.
5. Power pack and auxiliary relay shall have separate threaded ½ in. chase nipples for class 1 and class 2 wiring, allowing both power pack and auxiliary relay to be mounted in or out of a standard 4 in. x 4 in. junction box, and providing separation of class 1 and class 2 wiring. Power pack and auxiliary relay may be mounted between two junction boxes, allowing both class 1 and class 2 wiring to be enclosed in conduit as may be required by code.
6. Power pack and auxiliary relay shall incorporate one relay rated no less than 16A for tungsten filament incandescent lighting loads and 20A for fluorescent ballast loads at either 120 or 277VAC 60Hz.
7. Power pack and Auxiliary relay shall have a 24VDC control input to allow class 2 sensors to turn on lighting connected to power pack or auxiliary relay.
8. Power pack and auxiliary relay shall be the following PerfectSense catalog numbers:

<u>Catalog Numbers</u>	<u>Description</u>
PS-PP1277	Power Pack
PS-SP24	Auxiliary Relay