LOAD CONTROL
Application Guide
Energy Efficiency Products
Costs and Maintenance

Lighting consumes as much as 40% of a typical commercial building’s energy costs, but Hubbell Load Control Solutions use advanced technology to bring this number down. Energy costs can be reduced by between 13% and 90%, offering a significant return on investment (ROI).

In addition to occupancy sensors, Hubbell Load:Logic® family of control devices offers a broad range of controls that meet the latest codes and standards and contribute to LEED certification points. An easy setup and operation process offers an “install-and-forget” experience.

Additional features include:
- Occupancy or time-based controls
- Manual ON mode automatically turns lights OFF when a space is unoccupied for a specified period of time
- Photo sensors control for dimming or to keep the lights OFF when natural light is sensed

Hubbell's Load Control Solutions are part of Hubbell’s Sustainability Initiative, which focuses on environmental stewardship, innovative products and efficient building operations. Hubbell also offers superior service and support with:
- Online worksheets for calculating energy savings and ROI
- Detailed online e-learning courses
- Product selection guide to assist in choosing the right technology
- Online specification assistance
- Comprehensive layout and take-off services
- Highly knowledgeable network of trained professionals and staff
- BIM models and 3D coverage patterns

Notes:
- Energy Information Administration:
  - Commercial Buildings
  - Energy Consumption Survey
- Based on 40% lighting savings from sensors. Actual results may vary.
The Right Technology for the Right Application

**Passive Infrared (PIR)**

Requires a clear, unobstructed line of sight for detection, because it senses occupancy as movement of heat emitted from the body against the background space. A segmented Fresnel lens divides a coverage area into zones. Movement across zones is interpreted as occupancy.

**Ultrasonic (US)**

Senses occupancy by emitting an ultrasonic high-frequency sound wave (32 kHz to 45 kHz), sensing the frequency of the reflected signal, and then determining occupancy based on a change in frequency. While this has a limited range, it detects small motions and does not require a clear line of sight.

**Dual Technology**

Combines PIR and US technology, minimizing the risk of lights turning ON when the space is unoccupied. Once occupancy is detected by both technologies within the space lights are turned ON, only one technology is necessary to keep the lights ON.

Typical Applications

<table>
<thead>
<tr>
<th>Application</th>
<th>Sensor Technology</th>
<th>Sensor Style</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adaptive Dual Ultra PIR Wall Switch Ceiling Wall</td>
<td></td>
</tr>
<tr>
<td><strong>Office</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Large</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Open Office</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Large</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Rest Room</strong></td>
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<td></td>
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<tr>
<td>Small</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Large</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Classroom</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Large</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td><strong>Conference Room</strong></td>
<td></td>
<td></td>
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<tr>
<td>Small</td>
<td>✓</td>
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</tr>
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<tr>
<td><strong>Storage/Warehouse</strong></td>
<td></td>
<td></td>
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<tr>
<td>Small</td>
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<td>✓</td>
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<tr>
<td>Large</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Hall</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
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Wired or Wireless Sensors

What is the right choice?
Both choices offer advantages and selecting the most suitable one is key to a successful energy control strategy.

New construction, retrofit applications, construction materials, type of space to be controlled, etc. play a role in the selection process.

Wired
Wired technology has been available for over 50 years and is traditionally used when there is no restriction for running wires. It also offers more choices of sensing technologies.

Wired technology is:
• The preferred choice for new construction, as wiring can be run easily while construction is underway.
• Offers more technologies; passive infrared, ultrasonic and dual.
• Easily interfaces with other technologies and control systems like wireless, building automation and HVAC.

Wired Controls’ New Companion
Hubbell’s WL Series wireless controls can be installed to work with Hubbell’s traditional wired technology to provide an optimal solution when running extra wiring is difficult or impractical.

Wireless
The WL Series sensors are designed for ultra-low power consumption which translates into a ten year battery life. They also combine advanced Digital Signal Processing (DSP) with Passive Infrared (PIR) technology to maximize sensitivity to the movement of heat emitted from people occupying a space.

Commands are transmitted up to 60 feet over the low interference 434MHz band to associated Clear Connect® enabled devices that automatically turn lights OFF and other non-essential loads.

Wireless technology is:
• Flexible, making moves, additions and changes easy because there is no need for additional wiring.
• Fast to install and setup, typically involves replacing the existing wall switch and pairing the desired sensor.
• These controls utilize a simplified 6-second press and hold commissioning procedure. No need for remotes, computers, smartphones or any other device to set up the system.

VS.

Wired or Wireless Sensors

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VS.
Hubbell Load Controls
Manage More than Just the Lights

Designers and manufacturers have been implementing solutions to reduce the power consumption of lighting and HVAC systems for decades. Office equipment, appliances and plug in lighting loads are the next major target area for reduction of energy consumption. When left ON, these devices increase energy costs and a building’s carbon footprint. As a result, codes and standards now mandate that a number of electrical receptacles in certain spaces be automatically controlled to reduce the likelihood of occupants forgetting to turn lights OFF or unplug equipment.

Load:Logic® Control Panels

These panels are a cost effective solution to achieve code compliance in small office buildings, retail, motel and warehouse applications. They provide centralized intelligence and also work as part of a hybrid control system.

- Save time with low voltage devices that connect directly to the panel.
- Panels meet ASHRAE 90.1, IEEC and California (CEC) Title 24 energy codes.
- Lower setup and maintenance costs with expanded programming and pre-programmed options to reduce consumption for each control zone. Integrated astronomical clock eliminates the need for roof mounted photocells.

Occupancy-Based Control

Occupancy sensors are already required in most applications to control lighting. These same sensors can be utilized to control electrical receptacles. This minimizes the installation cost and provides a control method that adapts easily to how the space being monitored is actually being used.

Time-Based Control

Time schedule based control is preferred for applications where devices need to be ON at defined periods. This can include schools, hospitality and office building applications.

Codes and Standards

ASHRAE 90.1

ASHRAE 90.1 is the leading energy building efficiency standard for commercial buildings in North America. Section 8.4.2, ASHRAE 90.1-2010 instituted the requirement that in certain spaces at least 50% of all receptacles are to be controlled by either time of day control device, an occupancy sensor or by an automated signal from another control or alarm system.

LEED v4

The latest version of the US Green Building Council’s LEED rating system mandates compliance to all mandatory provisions in ASHRAE 90.1-2013. This includes the electrical receptacle control requirement.

California Energy Commission Title 24

Section 130.5(d) of California Energy Commission Title 24, Part 6 - 2013 code requires receptacles to have automatic shutoff controls in certain spaces in all buildings.

NEC 2014

Article 406.3(E) of the NEC® 2014 edition selected the standby ( ) symbol as the marking for a receptacle connected to an automatic control system.

For more details about Automatic Receptacle Control (ARC), see the Hubbell Load:Logic® ARC Guide available on our website, or contact your Hubbell Territory Manager for a printed copy.
Flexible work hours, telecommuting, hoteling and adaptable workspaces mean that modern offices experience constant changes in occupancy patterns. If your lighting system has not been modernized to accommodate this trend, you are most likely wasting energy and money in unoccupied spaces as employees come and go throughout the week. Incorporating a daylight harvesting strategy to benefit from advancements in Solid State Lighting (SSL) is becoming common practice to save even more in energy costs.

These diagrams visually represent occupancy sensor design recommendations based on specific spaces in different building types.
These diagrams visually represent occupancy sensor design recommendations based on specific spaces in different building types.
Restrooms are typically occupied less than 50% of the day, but lights are often left ON all the time. Significant savings can be achieved by using Hubbell Occupancy Sensors to automatically turn lights ON when someone enters the restroom, and turn them OFF after the occupant leaves. The sensors also eliminate light switches as a restroom component that must be touched on the way out the door, helping improve hygiene.

Hubbell Occupancy Sensors with dual circuit capabilities allow for integrated functionality while maintaining independent timer control of lights and exhaust fans. This simplifies installation and demonstrates a practical approach for the application. Are the lights ON in your building’s restroom right now?

LEGEND
- Ceiling Sensor
- Wall Sensor
- Wall Switch
- Exhaust Fan
- Wireless Signal

COVERAGE PATTERN
Minor/Major Motion
- Ultrasonic
- Passive Infrared (PIR)

Wireless Approach
- Wireless Ceiling Sensor: WLP450C
- Wireless Wall Switch: WL1278 Series

Optional receiver unit for fan control: WLC316R
These diagrams visually represent occupancy sensor design recommendations based on specific spaces in different building types.

**Large Public Restroom | Wired Approach**

- **Ceiling Sensor:** ATU500C
- **Control Unit required:** CU300A or ATU2000CL
- **No Control Unit required**

Optional auxiliary unit for exhaust fan control: AAR20P

**Large Public Restroom | Wireless Approach**

- **Wireless Ceiling Sensor:** WLP450C
- **Wireless Control Unit required:** WLC316R
- **Optional Override Switch:** WLS1278 Series

Optional receiver unit for fan control: WLC301
With the constant buzz of activity involving students and teachers who are in and out of classrooms all day, making sure the lights are turned OFF when the room is empty is a challenge. Occupancy sensors provide an inexpensive way to guarantee that energy waste is kept to a minimum so teachers can focus on teaching instead of making sure lights, monitors, TV screens, projectors and other systems are OFF.

Optional photo sensors can also be used to turn lights OFF in classrooms when enough natural light is detected in the space, allowing the use of natural daylight. The Adaptive Technology used in Hubbell’s Occupancy Sensors adjusts to the occupancy and environmental changes caused by school-day activities and after-school programs, as well as field trips, holidays and cancellations.

**Library | Wireless Approach**

- **Wireless Ceiling Sensor:** WLP450C
- **Wireless Control Unit required:** WLC316R
- **Optional Override Switch:** WLS1278 Series

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**LEGEND**

- **Ceiling Sensor**
- **Wall Switch**
- **Receiver**
- **Wireless Signal**

**Permanently Marked Receptacles**

- **Fully Controlled**
- **Half Controlled**

**COVERAGE PATTERN**

- **Minor/Major Motion**
  - **Ultrasonic**
  - **Passive Infrared (PIR)**
These diagrams visually represent occupancy sensor design recommendations based on specific spaces in different building types.
Laboratory Design Guide

Laboratory spaces are enclosed environments unlike any other. Technicians and scientists often have their hands full dealing with sensitive equipment, harsh chemicals or biomaterials—they may want to avoid touching a light switch in a clean environment. Occupancy Sensors ensure that lab occupants do not have to deal with the lights turning OFF at an inopportune moment.

Hubbell specialized occupancy sensor enclosures are ideal for keeping particulate exposure to a minimum. The enclosures’ smooth surface can be easily cleaned and it will not compromise the sterile environment of a typical research or educational laboratory.

Research Laboratory | Wired Approach

Lighting Control

- Ceiling Sensor: ATP1500C
- Control Units:
  - CU300A - Auto ON
  - CU300M - Manual ON
  - DSM30 Series - Manual ON Switch
- NEMA 4X Enclosure
- ACIPE

These diagrams visually represent occupancy sensor design recommendations based on specific spaces in different building types.

www.hubbell-wiring.com
These diagrams visually represent occupancy sensor design recommendations based on specific spaces in different building types.
Hotel guestroom occupancy is never predictable and, even when occupied, each room has different lighting needs, based upon who is using the space and behavior. Occupancy sensor controls can not only reduce energy consumption in unoccupied guestrooms, but also ensure that hotel staff do not need to manually turn OFF lights when the room is not in use. By reducing lighting energy costs, hotel management can spend the savings elsewhere—on a guestroom refresh, updated technology, or additional green building projects.

### Main Room

**Lighting Control**
- Ceiling Sensor: ATP1500C
- Control Unit required: CU300A
- Override Wall Switch: DS120 Series

**Automatic Receptacle Control**
- Receiver: CU300HD
- Controlled Receptacles:
  - BR15C2 - Fully Controlled
  - DR15C2 - Fully Controlled

### Bathroom

**Lighting Control**
- Wall Switch Sensors: WS1020 Series, WS1000 Series, WS2000 Series

---

**LEGEND**

- Ceiling Sensor
- Wall Sensor
- Wall Switch
- Exhaust Fan
- Receiver
- Wireless Signal
- Permanently Marked Receptacles
  - Fully Controlled
  - Uncontrolled

**COVERAGE PATTERN**

- Minor/Major Motion
- Ultrasonic
- Passive Infrared (PIR)
These diagrams visually represent occupancy sensor design recommendations based on specific spaces in different building types.

**Main Room**
- **Lighting Control**
  - Wireless Ceiling Sensor: WLP450C
  - Wireless Control Unit required: WLC316R
  - or Wireless Wall Switch: WLS1278 Series

**Bathroom (Wired)**
- **Lighting Control**
  - Wall Switch Sensors:
    - WS1000 Series
    - WS2000 Series
    - WS1020 Series

**Automatic Receptacle Control**
- Receiver: WLC301
- Controlled Receptacles:
  - BR15C2 - Fully Controlled
  - DR15C2 - Fully Controlled

**Hotel Room | Wireless Approach**

**Closet | Wired Approach**

**Lighting Control**
- Wall Switch Sensors:
  - WS1000 Series - Single voltage, single relay
  - WS2000 Series - Dual voltage, single relay
  - AP2000 Series - Single or dual relay, adaptive technology
These diagrams visually represent occupancy sensor design recommendations based on specific spaces in different building types.

Warehouse applications can be very challenging. Traffic patterns, working hours, the presence of skylights and code compliance are fundamental when selecting the appropriate design technique. Occupancy sensors will ensure that only areas that are being used are illuminated.

The main challenge in a warehouse is the possibility of false triggering in aisles where there is no real occupancy as people walk near the entrances of these aisles. A successful layout will involve carefully taking into account the coverage patterns and placement of the sensors to avoid false triggering.

**Legend**
- Fixture Mount Sensor
- Outdoor Sensor

**Coverage Pattern**
- Minor/Major Motion
- Passive Infrared (PIR)

**Indoor Lighting Control**
- Fixture Mount Sensor: HMHB2x9 Series
- Dimming Series: HMHB2xxPCWD
- Replacement Lenses:
  - 8–16 ft. use Low Bay; HMLBLxxx lens
  - 18–45 ft. use High Bay; HMHBLLxxx lens

**Outdoor Lighting Control**
- Outdoor Sensor: H-MOSS® MAXX™ AHP1600WRP Series
- Control Unit: CU300HD
When work schedules and occupancy patterns in a warehouse are reasonably defined, a centralized or a hybrid method of control may be considered.

Depending on the warehouse size, a load control panel may be needed as a centralized control point or to complement occupancy sensors with dimming capabilities.

The control panel also provides a significant reduction in setup and maintenance costs because it provides many pre-programmed options and astronomical clock.

This approach addresses code and standards requirements like demand response.

**Time-Based Control**

Time schedule based control is preferred for applications where devices need to be ON at defined periods. This can include schools, hospitality and warehouse applications.

These diagrams visually represent occupancy sensor design recommendations based on specific spaces in different building types.
Hubbell sensors can interact with HVAC systems, activating damper controllers in a room based on occupancy, reducing heating and cooling consumption costs. Select the “RP” (Relay and Photocell) option on ceiling and wall mount sensors. This option is available in the WL316R Wireless Control Unit.

**Wired Approach**

ATP Series - Ceiling Sensor: ATP600CRP

Control Units:
- CU300A - Auto ON
- CU300M - Manual ON
- DSM30 Series - Manual ON Switch

**Adaptive Technology**

ATD, ATP and ATU Series ceiling/wall mount sensors with RP option

**Lighting Control**

Wireless Ceiling Sensor: WLP450C

Wireless Control Unit: WL316R

Optional Wireless Wall Switch: WLS1278 Series

These diagrams visually represent occupancy sensor design recommendations based on specific spaces in different building types.

www.hubbell-wiring.com
WL Series wireless sensors are the ideal solution for stairwell applications. When unoccupied, light level is at 50%. At the moment of occupancy, fixtures associated with a sensor in a specific location will turn lights ON to full bright light level, allowing for maximum safety to the occupant.

To achieve maximum safety and enhance security, a sensor can be associated to lamp fixtures a floor above and a floor below of the space where the occupant is located.
Adaptive Wall Switch Sensors

<table>
<thead>
<tr>
<th>Description</th>
<th>Selectable Auto ON or Manual ON Operating Modes</th>
<th>Vacancy</th>
<th>Manual ON Operating Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single Relay</td>
<td>Dual Relay</td>
<td>Single Relay</td>
</tr>
<tr>
<td>Dual Technology (Ultrasonic and Passive Infrared)</td>
<td>AD2000xx1</td>
<td>AD2000xx2</td>
<td>AD2001xx1</td>
</tr>
</tbody>
</table>

Note: xx = Color: BK (Black), GY (Gray), I (Ivory), LA (Light Almond) and W (White). Neutral Versions available on selected models. Substitute prefix "AD", "AU", "AP" for "ADN", "AUN" or "APN" prefix respectively. Consult your Hubbell Territory Manager for details.

Passive Infrared Manual Adjust Switch Sensors

<table>
<thead>
<tr>
<th>Description</th>
<th>Selectable Auto ON or Manual ON Operating Modes</th>
<th>120V AC Auto ON Operating Mode</th>
<th>Vacancy, 120V AC Manual ON Operating Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard</td>
<td>Nightlight</td>
<td>Standard</td>
</tr>
<tr>
<td>With neutral</td>
<td>WS2004xx</td>
<td>WS2004Nxx</td>
<td>—</td>
</tr>
<tr>
<td>Dual circuit, no neutral required</td>
<td>—</td>
<td>—</td>
<td>WS1020xx</td>
</tr>
<tr>
<td>Dual circuit with neutral</td>
<td>—</td>
<td>—</td>
<td>WS1024xx</td>
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Note: xx = Color: GY (Gray), I (Ivory), LA (Light Almond) and W (White).

Low Voltage Switches

<table>
<thead>
<tr>
<th>Description</th>
<th>Latching, 1 Button</th>
<th>Momentary, 1 Button</th>
<th>Momentary, 2 Button</th>
<th>Momentary, 4 Button</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low voltage switch</td>
<td>DSL30xx1</td>
<td>DSM30xx1</td>
<td>DSM30xx2</td>
<td>—</td>
</tr>
<tr>
<td>Low voltage switch with LED pilot light</td>
<td>—</td>
<td>DSM30xx1P</td>
<td>DSM30xx2P</td>
<td>DSM30xx4P</td>
</tr>
</tbody>
</table>

Note: xx = Color: I (Ivory), LA (Light Almond) and W (White).

Wireless Wall Switch Receivers

<table>
<thead>
<tr>
<th>Description</th>
<th>Color</th>
<th>Electronic Switch 120–277V AC; No Neutral Wire Required</th>
<th>Accessory Switch 120V AC</th>
<th>Accessory Switch 277V AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>8A lighting, 3A fan (1/10 HP motor, 120V AC Only), Specification Grade</td>
<td>Ivory</td>
<td>WLS1278I</td>
<td>WLAS120I</td>
<td>WLAS277I</td>
</tr>
<tr>
<td>120V AC Only</td>
<td>White</td>
<td>WLS1278W</td>
<td>WLAS120W</td>
<td>WLAS277W</td>
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Wireless Ceiling and Wall Mount Sensors

<table>
<thead>
<tr>
<th>Color</th>
<th>Ceiling Mount 360° / 324-676 sq. ft.</th>
<th>Wall Mount 180° / 3000 sq. ft.</th>
<th>Corner Mount 90° / 2500 sq. ft.</th>
<th>Hallway Up to 150 Linear Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>WLP450C</td>
<td>WLP3000W</td>
<td>WLP2500W</td>
<td>WLP150H</td>
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</table>

Wireless Control Units

<table>
<thead>
<tr>
<th>Description</th>
<th>Single (1) Circuit</th>
<th>Dual (2) Circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireless load control unit with isolated relay</td>
<td>15A, 120/277V AC</td>
<td>WLC316R</td>
</tr>
<tr>
<td>Wireless status transmitter</td>
<td>24V DC</td>
<td>WLCA</td>
</tr>
<tr>
<td>Heavy duty control unit with wireless transmitter</td>
<td>100-277V AC</td>
<td>WLCU301</td>
</tr>
<tr>
<td>Heavy duty load control units with wireless receiver</td>
<td>100-277V AC</td>
<td>WLC301, WLC302</td>
</tr>
<tr>
<td>Furniture feed box with heavy duty relays and wireless receiver</td>
<td>100-277V AC</td>
<td>WLC402W</td>
</tr>
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</table>

Wireless Daylight Sensor

<table>
<thead>
<tr>
<th>Description</th>
<th>Color</th>
<th>Catalog Number</th>
</tr>
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<tbody>
<tr>
<td>Daylight sensor 0–107,000 Lux (0-10,000 foot candles)</td>
<td>White</td>
<td>WLDH</td>
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Permanently Marked Receptacles for Use with Automatic Outlet Control Systems

<table>
<thead>
<tr>
<th>Description</th>
<th>Color</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>15A, Split</td>
<td>BR15C1xx</td>
<td>BR20C2xx</td>
</tr>
<tr>
<td>20A, Fully</td>
<td>DR15C1xx</td>
<td>DR20C2xx</td>
</tr>
</tbody>
</table>

Note: xx = Color: BK (Black), GY (Gray), I (Ivory), LA (Light Almond) and WHI (White).
Ceiling and Wall Mount Sensors

<table>
<thead>
<tr>
<th>Description</th>
<th>Color</th>
<th>Dual Technology (Ultrasonic and Passive Infrared)</th>
<th>Ultrasonic</th>
<th>Passive Infrared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling low voltage sensor</td>
<td>Office White</td>
<td>2000 sq. ft. (360°)</td>
<td>1000 sq. ft. (180°)</td>
<td>120 linear feet</td>
</tr>
<tr>
<td>Wall mount low voltage sensor for aisle</td>
<td>Office White</td>
<td>—</td>
<td>—</td>
<td>ATP120HB*</td>
</tr>
<tr>
<td>and high bay applications</td>
<td></td>
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</tbody>
</table>

Note: *Add RP suffix if a photocell and isolated relay is required for HVAC or BAS integration.
For additional devices, please see our online catalog at www.hubbell-wiring.com or consult your Hubbell Territory Manager for details.

OPTIMYZER® High Bay Sensors

<table>
<thead>
<tr>
<th>Description</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>End mount PIR sensor, indoor</td>
<td>HMHB219</td>
</tr>
<tr>
<td>End mount PIR watertight sensor, outdoor</td>
<td>HMHB21UPCW</td>
</tr>
</tbody>
</table>

Watertight PIR Sensors

<table>
<thead>
<tr>
<th>Description</th>
<th>Voltage</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIR sensor with isolated relay and photocell</td>
<td>24V DC</td>
<td>AHP1600WRP</td>
</tr>
<tr>
<td>Extreme temperature PIR ceiling sensor</td>
<td>24V DC</td>
<td>AHP1500CRP</td>
</tr>
<tr>
<td>IP66, NEMA 4X enclosure</td>
<td>—</td>
<td>ACIPE</td>
</tr>
</tbody>
</table>

Daylight Harvesting and Dimming

<table>
<thead>
<tr>
<th>Description</th>
<th>Voltage</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single zone continuous auto dimming control</td>
<td>0-10V DC</td>
<td>DHADC</td>
</tr>
<tr>
<td>daylight tracker with dimming control</td>
<td>0-10V DC</td>
<td>DHTD</td>
</tr>
<tr>
<td>Dimming PIR selectable auto ON/auto OFF</td>
<td>120/277V</td>
<td>APD2000xx1</td>
</tr>
<tr>
<td>manual ON/auto OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Vacancy) only</td>
<td>120/277V</td>
<td>APD2001xx1</td>
</tr>
</tbody>
</table>

Note: xx = Color: BK (Black), GY (Gray), I (Ivory), LA (Light Almond) and W (White).

Control Units

<table>
<thead>
<tr>
<th>Description</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto ON operation, 100-277V AC, 50/60Hz</td>
<td>CU300A</td>
</tr>
<tr>
<td>Manual ON operation, 100-277V AC, 50/60Hz</td>
<td>CU300M</td>
</tr>
<tr>
<td>Heavy duty latching relay, auto or manual ON operation, 100-277V AC, 50/60Hz</td>
<td>CU300HD</td>
</tr>
</tbody>
</table>

Add-A-Relay

<table>
<thead>
<tr>
<th>Description</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>For use with CU series control units and Hubbell ATD, ATU and ATP series ceiling and wall mount sensors</td>
<td>AAR</td>
</tr>
<tr>
<td>Heavy duty latching relay; for use with CU300HD in plug load applications</td>
<td>AAR20P</td>
</tr>
</tbody>
</table>

Load:Logic® Control Panels

<table>
<thead>
<tr>
<th>Description</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-Relay panel with 4 spaces, 120/208/240/277V AC</td>
<td>CP042RRR3</td>
</tr>
<tr>
<td>8-Relay panel with 8 spaces, 120/208/240/277V AC</td>
<td>CP082RRR1</td>
</tr>
<tr>
<td>16-Relay panel with 16 spaces, 120/277V AC</td>
<td>CP162RRR1</td>
</tr>
<tr>
<td>16-Relay panel with 16 spaces, 347-480V AC</td>
<td>CP163RRR1</td>
</tr>
</tbody>
</table>

Field Installed Relays

<table>
<thead>
<tr>
<th>Description</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrically held, 20A/1P, 120/277V AC, 14k SCCR, N/O</td>
<td>R21HN</td>
</tr>
<tr>
<td>Latching relay, 30A/1P, 120/277/347V AC, 16k SCCR</td>
<td>R31LX</td>
</tr>
<tr>
<td>Electrically held, 20A/2P, 480V AC, 14k SCCR, N/C</td>
<td>R202HN</td>
</tr>
<tr>
<td>Electrically held, 20A/2P, 480V AC, 14k SCCR, N/C</td>
<td>R202HC</td>
</tr>
</tbody>
</table>

Interface Cards

<table>
<thead>
<tr>
<th>Description</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-Channel dimming controller option board</td>
<td>CPDM8CTRB</td>
</tr>
</tbody>
</table>

Dimming Switches (Compatible with Hubbell Wiring Device Load Control Panels)

<table>
<thead>
<tr>
<th>Description</th>
<th>Catalog Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load control panel, low voltage dimming switch</td>
<td></td>
</tr>
<tr>
<td>1 Button</td>
<td>C P S D 1 x x</td>
</tr>
<tr>
<td>2 Button</td>
<td>C P S D 2 x x</td>
</tr>
<tr>
<td>3 Button</td>
<td>C P S D 3 x x</td>
</tr>
<tr>
<td>4 Button</td>
<td>C P S D 4 x x</td>
</tr>
</tbody>
</table>

Note: xx = Color: I (Ivory), LA (Light Almond) and W (White).
**Coverage Patterns**

**Wall Switch Sensors**

- **AD2000 Series**
- **AP2000 Series**
- **AU2000 Series**
- **ATP2000, WS2000 Series**

**Wall Mount Sensors**

- **ATD1600W Series**
- **ATP1600W Series**

**Ceiling Sensors**

- **ATD2000C Series**
- **ATD1000C Series**
- **ATD500C Series**
- **ATP1500C Series**
- **ATP600C Series**
- **ATU2000C Series**
- **ATU1000C Series**
- **ATU500C Series**
- **ATU2000C Series Hallway Application**
- **LVPR1500R(P)**

**Legend**

- **Blue**: Ultrasonic
- **Orange**: Passive Infrared (PIR)
Coverage Patterns

Legend
- Minor/Major Motion
- Passive Infrared (PIR)

Wireless Sensors

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Top View</th>
<th>Side View</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling Mount WLP450C</td>
<td><img src="image1" alt="Coverage Pattern" /></td>
<td><img src="image2" alt="Coverage Pattern" /></td>
</tr>
<tr>
<td>Wall Mount WLP3000W</td>
<td><img src="image3" alt="Coverage Pattern" /></td>
<td><img src="image4" alt="Coverage Pattern" /></td>
</tr>
<tr>
<td>Corner Mount WLP2500W</td>
<td><img src="image5" alt="Coverage Pattern" /></td>
<td><img src="image6" alt="Coverage Pattern" /></td>
</tr>
</tbody>
</table>

High Bay Sensors

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Top View</th>
<th>Side View</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMHB Series</td>
<td><img src="image7" alt="Coverage Pattern" /></td>
<td><img src="image8" alt="Coverage Pattern" /></td>
</tr>
</tbody>
</table>

Lens Coverage
- HMLB360
  - C = 1.4 @ 00–30 and 1.1 @ 30–45 (FT)
  - | H | R | D |
  - | 18 | 25.2 | 50.4 |
  - | 20 | 28 | 56 |
  - | 24 | 33.6 | 67.2 |
  - | 28 | 39.2 | 78.4 |
  - | 30 | 42 | 84 |
  - | 32 | 35.2 | 70.4 |
  - | 36 | 39.6 | 79.2 |
  - | 40 | 44 | 88 |
  - | 42 | 46.2 | 92.4 |
  - | 45 | 49.5 | 99 |

Outdoor Sensors

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Top View</th>
<th>Side View</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHP1600WRP</td>
<td><img src="image9" alt="Coverage Pattern" /></td>
<td><img src="image10" alt="Coverage Pattern" /></td>
</tr>
<tr>
<td>AHP1500CRP</td>
<td><img src="image11" alt="Coverage Pattern" /></td>
<td><img src="image12" alt="Coverage Pattern" /></td>
</tr>
</tbody>
</table>
AD, AU, AP, 2000 Series Wall Switch Sensors

**Two Relay Sensor, Wired for Two Loads**

- Line Circuit: 120/277V AC
- Black (Line)
- Red (Load 1)
- Blue (Load 2)
- Green (Ground)

**WS2000 Series Wall Switch Sensors**

- **Hot**
- **Neutral**
- **Black** (Line)
- **Red** (Not used)
- **Yellow**
- **Green** (Ground)

**Lighting Load**

**WS1020 Series Wall Switch Sensors**

- **Line 1 Black**
- **Line 2 Blue**
- **Green** (Ground)
- **Black** (Line)
- **Red** (Load 1)
- **Brown** (Load 2)

**High Bay Low Voltage Sensor with Control Unit**

- **Neutral**
- **Hot**
- **Red** (+24VDC)
- **Black** (Common)
- **Blue** (Control)

**High Bay Line Voltage Sensor Dual Relay, Single Fixture**

- **Neutral**
- **Hot**

Note: *Load can not exceed the rating of one switch. Sensor is shipped with all dip switches in the OFF position (factory default).*

**Dimming Wall Switch Sensor with Automatic Receptacle Control**

- **Dimming Ballast**
- **AAR10Cxxx Relay**
- **Control Unit CU300HD**
- **Plug Load**

- **Red** (+24VDC)
- **Black** (Common)
- **Blue** (Control)
- **Gray** (Occupancy and Photo Sensor Control)
- **Blue/White** (Relay Normally Closed)
- **Black/White** (Relay Normally Open)
- **Yellow/White** (Relay Normally Open)

- **Lighting Load A**
- **Lighting Load B**

- **Override Switch (Optional)**
- **AAR or AAR20P for MAXX™ Version Slave Pack**

www.hubbell-wiring.com
Ceiling and Wall Mount Sensors ATD, ATU and ATP Series

Single lighting circuit 1 to 4 sensors wired to control unit with optional override OFF switch application.

- **CU Series Control Unit**
  - Red, Black, Blue
- **ATD, ATU and ATP Series Sensors**
  - Red, Black, Blue

*Optional Override OFF Switch

Note: **For wiring sensors with isolated relay and photocell option (models with “RP” suffix): Photocell Option: Cap off Blue sensor wire. Connect Gray sensor wire to Blue control unit wire. Isolated Relay Option: Common-Blue/White wire, Normally Closed-Black/White wire, Normally Open-Yellow/White wire.

Bi-level lighting circuit and automatic receptacle control application.

- Control Unit CU300A
  - Red, Black, Blue
- Control Unit CU300M
  - Red, Blue, Black, Brown
- Control Unit CU300HD
  - Red, Black, Blue, White

Two lighting circuits and automatic receptacle control application.

- Control Unit CU300A
  - Red, Black, Blue
- Control Unit CU300HD
  - Red, Black, Blue

Dimmable Fluorescent Fixture

0-10 V Dimming Photocell. Can control up to 50 dimmable ballasts.
<table>
<thead>
<tr>
<th>Code Provision</th>
<th>Description</th>
<th>Typical Control Device</th>
<th>Requirement</th>
<th>Hubbell Energy Efficiency Product Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON / OFF Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>130.1 (a)</td>
<td>Area Controls</td>
<td>Local Switch</td>
<td>Readily accessible device(s) to control lighting within an enclosed space.</td>
<td>Wall Switch Sensors and Adaptive Ceiling Sensors with Override Switch</td>
</tr>
<tr>
<td>130.1 (c) 1 &amp; 4</td>
<td>Shut-OFF Controls</td>
<td>Occupancy Sensors, Programmable Time clocks with Automatic Holiday feature</td>
<td>Occupant sensing, automatic time-switch, or other control capable of automatically shutting OFF all of the lighting when the space is unoccupied</td>
<td>Load:Logic® Control Panel, Wall Switch Sensors and Adaptive Ceiling Sensors</td>
</tr>
<tr>
<td>130.1 (c)5</td>
<td>Occupant Sensor Shut-OFF Control</td>
<td>Vacancy Sensor - Manual ON / Automatic Full-OFF</td>
<td>Automatically shuts off lighting power after vacancy of 30 minutes or less.</td>
<td>Vacancy Wall Switch Sensors and Adaptive Ceiling Sensors with Manual ON Feature</td>
</tr>
<tr>
<td>Light Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>130.1 (b)</td>
<td>Multi-Level Lighting Controls</td>
<td>Step or Manual Dimming</td>
<td>At least one multi-level lighting control device (manual or automatic) in enclosed areas 100 sq. ft. or larger. Light level requirements are defined in Table 130.1-A.</td>
<td>Adaptive Dimmable Wall Switch Sensors, WL Series Sensors, OPTIMYZER® Sensors, Load:Logic® Control Panel</td>
</tr>
<tr>
<td>130.1 (c) 6 &amp; 7</td>
<td>Occupant Sensor Partial-OFF Control Areas</td>
<td>Occupancy Sensors with dimming capability and bi-level lighting control</td>
<td>Automatically reduce lighting power by at least 50 percent when the areas like aisle ways, open areas in warehouses, stairwells and corridors are unoccupied.</td>
<td>Adaptive Wall Mount Sensors, WL Wall Sensors, OPTIMYZER® Sensors</td>
</tr>
<tr>
<td>130.1 (d) and 140.6 (d)</td>
<td>Automatic Daylighting Controls</td>
<td>Daylight Harvesting Devices</td>
<td>Sensor to reduce lighting in response to available daylight. Daylighting zones defined in Section 130.1(d)1. Primary daylight zones must be controlled separately from secondary zones. Refer to Table 130.1-A for lighting-level requirements.</td>
<td>Load:Logic® Control Panel, Adaptive Ceiling Sensors, DHAC, DHT, WLDH Daylighting Harvesting Sensors, WL Series Sensors, OPTIMYZER® Sensors</td>
</tr>
<tr>
<td>Additional Provisions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>130.1 (e)</td>
<td>Demand Responsive Controls</td>
<td>Receive and respond to a demand response signal for reducing lighting power</td>
<td>Automatically reduce lighting power by a minimum of 15% in response to a Demand Response Signal. Required for new buildings larger than 10,000 sq. ft. or luminarie alterations that increase the lighting power in the enclosed space.</td>
<td>Load:Logic® Control Panel</td>
</tr>
<tr>
<td>130.4</td>
<td>Control Acceptance and Installation Certificate Requirements</td>
<td>Acceptance testing (Installation and functionality testing)</td>
<td>Code compliance, Installation requirements and Testing shall ensure that control hardware and software are calibrated, programmed, and functioning properly.</td>
<td>Adaptive Sensors, Wall Switch Sensors, Daylighting Harvesting Sensors, WL Series Sensors, OPTIMYZER® Sensors, Load:Logic® Family</td>
</tr>
<tr>
<td>130.5 (d)</td>
<td>Circuit Controls for 120-Volt Receptacles and Controlled Receptacles</td>
<td>Automatic controlled receptacle and Pre-marked “Controlled” receptacles</td>
<td>At least 50% of the 15- and 20-Amps receptacles in a shall be equipped with automatic shut-OFF control. Controlled receptacles shall have a permanent marking to differentiate them from uncontrolled receptacles.</td>
<td>Load:Logic® Family of Control units and Control Panel, Wall Switch Sensors and Adaptive Ceiling Sensors</td>
</tr>
<tr>
<td>Code Provision</td>
<td>Description</td>
<td>Typical Control Device</td>
<td>Requirement</td>
<td>Hubbell Energy Efficiency Product Family</td>
</tr>
<tr>
<td>----------------</td>
<td>-------------</td>
<td>------------------------</td>
<td>-------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td><strong>ON / OFF Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.4.1.1 (a)</td>
<td>Local Control</td>
<td>Local Switch</td>
<td>Readily accessible device(s) to control lighting within an enclosed space.</td>
<td>Wall Switch Sensors and Adaptive Ceiling Sensors with Override Switch</td>
</tr>
<tr>
<td>9.4.1.1 (b &amp; c)</td>
<td>Manual ON or Partial ON Operation</td>
<td>Vacancy Sensors</td>
<td>Manual ON when using an occupant sensor. Less than 50% of general lighting power allowed to be automatically turned ON, and none of remaining lighting automatically turned ON.</td>
<td>Load:Logic® Control Panel, Vacancy Wall Switch Sensors and Adaptive Ceiling Sensors</td>
</tr>
<tr>
<td>9.4.1.1 (g)</td>
<td>Automatic Partial OFF</td>
<td>Occupancy Sensors, Programmable Time clocks</td>
<td>Requires lighting power to be reduced by 50% within 20 minutes of all occupants leaving the space. This requirement is not optional in some spaces.</td>
<td>Load:Logic® Control Panel, Adaptive Ceiling OPTIMYZER® and WL Series Sensors</td>
</tr>
<tr>
<td>9.4.1.1 (h &amp; i)</td>
<td>Automatic Full OFF and Scheduled Lighting Shutoff</td>
<td>Occupancy Sensors, Programmable Time clocks with Automatic Holiday feature</td>
<td>All lighting automatically shut off within 20 minutes of all occupants leaving the space by either scheduled time-of-day operated control, occupant sensor or a signal from another control system.</td>
<td>Load:Logic® Control Panel, Wall Switch Sensors and Adaptive Ceiling OPTIMYZER® and WL Series Sensors</td>
</tr>
<tr>
<td><strong>Light Level</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.4.1.1 (d)</td>
<td>Bi-level Lighting Control</td>
<td>Step or Manual Dimming</td>
<td>Provide at least one intermediate step in lighting power or continuous dimming in addition to full ON and full OFF. At least one control step between 30% and 70% (inclusive) of full lighting power in addition to all OFF.</td>
<td>Adaptive Dimmable Wall Switch Sensors, WL Series Sensors, OPTIMYZER® Sensors, Load:Logic® Control Panel</td>
</tr>
<tr>
<td>9.4.1.1 (e &amp; f)</td>
<td>Automatic Daylighting Responsive Controls</td>
<td>Daylight Harvesting Devices</td>
<td>Photocell to reduce lighting in response to available daylight using either continuous dimming or at least one control point between 50% and 70%. Second control point between 20% and 40% of design light power or the lowest dimming level technology allows or all controlled lighting OFF.</td>
<td>Load:Logic® Control Panel, Adaptive Ceiling Sensors, DHAC, DHT, WLDH Daylighting Harvesting Sensors, WL Series Sensors, OPTIMYZER® Sensors</td>
</tr>
<tr>
<td><strong>Additional Provisions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.4.3</td>
<td>Functional Testing</td>
<td>Acceptance testing (Installation and functionality testing)</td>
<td>Testing shall ensure that control hardware and software are calibrated, programmed, and adjusted properly within 90 days of occupancy.</td>
<td>Adaptive Sensors, Wall Switch Sensors, Daylighting Harvesting Sensors, WL Series Sensors, OPTIMYZER® Sensors, Load:Logic® Family</td>
</tr>
<tr>
<td>8.4.2</td>
<td>Automatic Receptacle Control</td>
<td>Automatic controlled receptacle and Pre-marked “Controlled” receptacles</td>
<td>In certain areas, at least 50% of the 15- and 20-Amps receptacles in a shall be automatically controlled. Shall turn OFF within 20 minutes of all occupants leaving the space. Controlled receptacles shall have a permanent marking to differentiate them from uncontrolled receptacles.</td>
<td>Load:Logic® Family of Control units and Control Panel, Wall Switch Sensors and Adaptive Ceiling Sensors</td>
</tr>
</tbody>
</table>
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Hubbell offers an extensive literature library for product support. Downloadable PDFs are available online.