Lighting management and control can minimize power consumption and energy costs by providing the right light levels where and when they’re needed. Standards and codes provide guidance for the automation of lighting systems but taking advantage of these can be complicated.

To be effective, lighting management control systems need to be simple, flexible and reliable. Full-featured systems include motion sensing, daylight control, power metering, event monitoring and performance reporting.

The LumaWatt Outdoor Wireless Control System makes implementation easy. The LumaWatt system eliminates the need for remote sensors, reducing installation costs and commissioning time. Multi-functional sensors are factory-installed and tested in each luminaire so reliability, area coverage and location are never concerns. Energy codes, such as, ASHRAE and Title 24, can be met with LumaWatt automation.
The LumaWatt system's flexible programming optimizes energy savings and light quality while taking into account the unique requirements of different spaces.
Control and Monitoring bring Savings and Accountability to Outdoor Lighting

Different environments pose different challenges when balancing power reduction against usage requirements. The LumaWatt system offers the perfect combination of features to provide the right level of lighting where and when it's needed. No more and no less.

Pathway
Power is best conserved by managing light levels according to pedestrian traffic and safety needs. Lighting can be reduced during low usage hours, saving energy, then raised on demand with occupancy sensing.

Area and Site
To minimize energy expense, lighting should be dimmed or turned off after business hours. Installing occupancy detection devices provides security lighting through the night, while ensuring egress lighting is available when needed.

Parking Garage
Peak load reduction and overall energy conservation can be maximized by combining time scheduling, dimming on vacancy and daylight harvesting strategies. When properly automated, energy savings, security and task demands can be balanced for optimal energy savings.
Automated Energy Solutions

Light Level Automation
A 30 percent to 50 percent reduction of energy use is not uncommon as a result of combining basic lighting control strategies. The LumaWatt system employs four control strategies to automate luminaire behavior:

- **Scheduled ON/OFF**
  One basic automated event is a scheduled on or off. The LumaWatt system uses time scheduling or photo sensing to schedule lighting from dusk-to-dawn, dusk-to-curfew, e.g., business closing or any time-scheduled period of operation.

- **Scheduled Dimming**
  In addition to a scheduled ON/OFF event, a change in light level may be time scheduled, for example dimming 50 percent to maintain security lighting levels from business closing until dawn.

- **Occupancy Detection**
  Motion sensing may be scheduled to monitor occupancy of a site for any period of time. Full lighting will be available upon occupancy, then reduced or turned off when vacancy is confirmed.

- **Daylight Harvesting**
  Photo sensing can take advantage of available daylight entering the space, saving energy. The overall system can automatically adjust to maintain a balance of artificial and natural light for a constant light level throughout the space.

Automating Luminaire Behavior
There are two competing goals in determining how lighting systems should operate. First, saving energy by minimizing the length of time and the amount of lighting that is provided, and second, by matching occupant and organizational requirements. For example, pedestrians will feel more secure while traveling a pathway where the lighting assists in the accurate recognition of wayfinding or of potential danger or harm. Facility security and energy requirements are met by using occupancy controlled dimming, which reduces energy when pathway vacancy is detected.

Understanding Profiles
Luminaire behavior is determined by how each LumaWatt sensor responds to its profile software. A sensor profile is defined as a set of configuration values that determines behavior of a luminaire based on rules used by sensor monitoring of operational and environmental conditions. Conditions include ambient light, time of day and occupancy detection. Operational modes define ramp-up times, length of operation on occupancy detection, sensitivity to motion and ambient light, as well as dimming levels for each event.
Lighting Intelligence

Sensor Module
The sensor is the heart of the system. Sensors provide granular control of the fixture behavior independent from a centralized controller. Integral sensing and communication avoids external antenna and remote sensors.

Gateway
A gateway communicates with the sensors via wireless technology. One or more gateways may be deployed to relay information between the sensors and the energy manager appliance.

Energy Management Server
The energy management server hosts the graphical user interface. It is a server class appliance that discovers, commissions and manages smart sensors. A network router powers and connects the gateways to the energy manager.

Management Software
Management software creates and manages sensor profiles via easy-to-use, web-based software. Summaries of power metering and system performance are clear, concise and easy to understand.
The LumaWatt system is a peer-to-peer wireless network of luminaire-integrated sensors, which operate in accordance with stored programmable profiles. Each sensor is capable of motion and photo sensing, metering power consumption and wireless communication. Sensor profiles dictate how the individual luminaires operate, as well as how to function among network peers. The end user can create and manage sensor profiles with browser-based management software and transmit to sensors via wireless gateways. The sensor will operate in accordance to its last-loaded profile, regardless of network connectivity.

Performance Features

- Factory installed sensors control luminaire output ON/OFF or dim in 1 percent increments, triggered by photo or motion sensing
- System operation is monitored and reported in real time, verifying and documenting performance
- Power consumption is measured, in real time, to 2 percent accuracy
- Service quality is enhanced by failure detection
- Device self-diagnostics assist in network troubleshooting
- Easy-to-use energy manager software creates and manages sensor profiles
- Profiles maintain up to nine events daily, managed by astronomical clock, photo sensing or motion detection
- Energy manager device addresses up to ten gateways, each of which can address an additional 300 sensors, scaling to a total system capacity of 1,000 sensors per energy management server
- Gateways communicate at a radio frequency of 2405-2480 MHz using 128-bit AES encryption security
- Sensors and gateways can communicate up to 300’ line-of-sight (LOS) without obstructions
Intuitive, Clear and Concise...Making it Easy

Graphical User Interface
Energy management software provides a web-based portal in which sensors can be added, commissioned and located on a graphical site plan for easy monitoring and management. It’s a user-friendly environment from which sensor profiles are created, modified and managed, defining the behavior of each luminaire.

Industry-standard security safeguards the integrity of the system. The gateways use 128-bit AES encryption to ensure secure connections. Users require password-protected administration accounts for system access. Automatic system backups prevent data loss and restore fixtures to operational modes.

Setup and Commissioning
The LumaWatt system was designed to minimize setup and installation time. Hardware self-diagnostics assist in troubleshooting network issues. Energy management software can be accessed with any web browser-capable device. Luminaire data is discovered and analyzed by software to prepare for geographic location of luminaire representative icons on site plans. Verifying the location of site plan icon locations is as easy as flashing light onto a specific on-site sensor to highlight the corresponding energy manager screen icon for drag-and-drop positioning on the site plan.

Monitoring and Reporting
All operating data is monitored and reported in real time by the energy manager appliance. When viewing a site plan, the operating state of any luminaire is quickly recognized from the status of an icon representation of dimmed, ON/OFF, communication status, occupancy, energy or error conditions. Summaries of system performance and events are clear, concise and easy to understand.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
<th>Measured Ambient Light Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>☀</td>
<td>Bright</td>
<td>Ambient light level greater than or equal to 65 footcandles</td>
</tr>
<tr>
<td>☀</td>
<td>Normal</td>
<td>Ambient light levels greater than or equal to 30 footcandles and less than 65 footcandles</td>
</tr>
<tr>
<td>☀</td>
<td>Dim</td>
<td>Ambient light level greater than or equal to 10 footcandles and less than 30 footcandles</td>
</tr>
<tr>
<td></td>
<td>Dark</td>
<td>Ambient light level to be less than 10 footcandles</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
<th>Determined Occupancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>🧐</td>
<td>Occupied</td>
<td>Occupancy seen in the last 30 seconds</td>
</tr>
<tr>
<td>🧐</td>
<td>Just Vacated</td>
<td>Ambient light level greater than or equal to 30 footcandles and less than 65 footcandles</td>
</tr>
<tr>
<td>🧐</td>
<td>Not Occupied</td>
<td>Ambient light level greater than or equal to 10 footcandles and less than 30 footcandles</td>
</tr>
</tbody>
</table>

Communication Status between a Luminaire and Energy Manager

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
<th>Communication Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>✅</td>
<td>Healthy</td>
<td>Communication last occurred no longer than 15 minutes ago</td>
</tr>
<tr>
<td>🛑</td>
<td>Power Off</td>
<td>Communication last occurred between 15 minutes and 7 days ago</td>
</tr>
<tr>
<td>⚠</td>
<td>Problem</td>
<td>No communication has occurred in the last 7 days</td>
</tr>
</tbody>
</table>
**Occupancy Sensing**

Designed to detect motion within its field-of-view, LumaWatt system sensors are considered line-of-sight sensors, meaning that no obstruction can exist between the sensor and the object being detected. A beam pattern of infrared detection regions is monitored and motion is detected when an object crosses from one region to the next. The area of coverage depends on the mounting height determined from a chart of its detection pattern. The LumaWatt system sensor is available with two passive infrared sensor geometries—wide for mounting heights of 8’ to 16’ and narrow for 16’ to 40’. The sensing detection area depends upon mounting height, as per the chart below, in combination with setting a sensitivity parameter in the sensor profile.
Ordering Information

System Ordering Information

<table>
<thead>
<tr>
<th>Product Family</th>
<th>Components ¹</th>
<th>Options</th>
<th>Accessories (Order Separately)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GW-1=Gateway ⁴,⁵</td>
<td>DIMRF-LN=LumaWatt Wireless Sensor, Narrow Lens for 16’ - 40’ Mounting</td>
<td>RFSEN1LNWH=Narrow Distribution Replacement Luminaire Sensor Finished in White ⁷</td>
</tr>
<tr>
<td></td>
<td>ROUT-1=Router ⁶</td>
<td>ENCR=NEMA 3R Rated Enclosure ⁸,⁹</td>
<td>RFPP1=Replacement Fixture Power Pack</td>
</tr>
</tbody>
</table>

NOTES: ¹ Minimum system requires RF-EM-1, RF-GW-1, and RF-ROUT-1. ² 120 VAC, 50/60 Hz only. ³ Maximum of ten gateways per energy management server. System maximum of 1,000 sensors. ⁴ Sensors and gateways communicate up to 300’ LOS. Maximum 300 sensor per gateway. ⁵ Connect an appropriate length CAT5 ethernet cable (maximum length 330’) to the router PoE (power-over-ethernet) port (ports 1 thru 4). The gateway should be placed on the interior of an exterior building wall, within 150’ of one luminaire. ⁶ Maximum of four gateways per router. ⁷ ENCR enclosure consists of, factory installed: RF-EM-1, RF-GW-1, and RF-ROUT-1, see optional components for ordering details. Suitable for 40°C ambient temperatures. Rated for outdoor use. ⁸ Factory installed replacement only. See luminaire specification sheet for more information.

Dimensions

Energy Management Server (RF-EM-1)

Gateway (RF-GW-1)

Router (RF-ROUT-1)

Enclosure Ordering Information

Sample Number: ENCR3-1EM-8P-120V

<table>
<thead>
<tr>
<th>Product Family</th>
<th>Components</th>
<th>Number of Switch Ports</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENCR=NEMA 3R Rated Enclosure</td>
<td>Energy Manager ²EM=No Energy Manager ³EM=Energy Manager Installed Gateway ⁴G=Gateway</td>
<td>BP=8-Port Network Switch ⁸</td>
<td>120V=120V</td>
</tr>
</tbody>
</table>

NOTES: ¹ Installed in gateway enclosure. ² High ambient 8-port switch is standard when ordering enclosures.

Additional Information

<table>
<thead>
<tr>
<th>Specification</th>
<th>CE Certified ⁸</th>
<th>Shipping Data (Approximate Net Weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gateway Input Voltage PoE/48V</td>
<td>IEEE 802.15.4 Compliant ⁸</td>
<td>Energy Manager = 2.3 lbs. (1.04 kgs.)</td>
</tr>
<tr>
<td>128-bit AES Encryption Gateway-to-Sensor Controller Input Voltage 120V/277V, 50/60 Hz</td>
<td>Radio Frequency 2405-2480 MHz (Channels 11-26) ⁸</td>
<td>Gateway = 0.3 lbs. (0.13 kgs.)</td>
</tr>
<tr>
<td>Dimmer Control Output 0-10V DC</td>
<td>Sensing Technology Dual-tech Passive IR/Photo ⁸</td>
<td>Router = 1.7 lbs. (0.77 kgs.)</td>
</tr>
<tr>
<td>Certification FCC Part 15 Class A RoHS</td>
<td>Standard Height Wide Lens 8’ - 16’ ⁸</td>
<td>Enclosure = 38 lbs. (17.3 kgs.)</td>
</tr>
<tr>
<td>UL and cUL Listed</td>
<td>Standard Height Narrow Lens 16’ - 40’ ⁸</td>
<td>Luminaire Sensor = 0.2 lbs. (0.09 kgs.)</td>
</tr>
</tbody>
</table>
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