Lighting the Way Forward: Next Generation Lighting Technologies

Eric Strandberg LC
Sr. Lighting Specialist,
Lighting Design Lab
OmniPoint™

Remotely controlled array-based luminaire with extremely flexible and reconfigurable light output via a wireless tablet.

Most Innovative Product of the Year
Trending in Lamps

- Screw in lamps
- CFL replacements (pin base)
- TLED retrofits for T-8
Ketra’s S38 lamp is an all-encompassing LED solution with the ability to render 90+ CRI white light, saturated colors and pastels from a fully mixed, single point source. Ketra’s wirelessly controlled and TRIAC-dimmable.
Dichroic MR16

The Verbatim LED Dichroic MR16 features the unique glitter/surround appearance of traditional halogen dichroic lamps.
3000K, 300lm LED Lamp
Conventional, Retrofit and Replacement LED Lamps

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watts</td>
<td>6.5</td>
</tr>
<tr>
<td>Incandescent Equivalent</td>
<td>60W</td>
</tr>
<tr>
<td>Lamp Shape</td>
<td>A19</td>
</tr>
<tr>
<td>Base</td>
<td>Medium</td>
</tr>
<tr>
<td>ANSI Base</td>
<td>E26</td>
</tr>
<tr>
<td>Finish</td>
<td>Clear</td>
</tr>
<tr>
<td>MOL In Inches</td>
<td>4 1/8&quot;</td>
</tr>
<tr>
<td>MOD In Inches</td>
<td>2.38&quot;</td>
</tr>
<tr>
<td>Initial Lumens</td>
<td>810</td>
</tr>
<tr>
<td>Average Rated Hours</td>
<td>15000</td>
</tr>
<tr>
<td>Kelvin Temp</td>
<td>2700</td>
</tr>
<tr>
<td>Color</td>
<td>Warm White</td>
</tr>
<tr>
<td>CRI</td>
<td>80</td>
</tr>
<tr>
<td>Beam Spread Deg</td>
<td>360</td>
</tr>
<tr>
<td>UL or ETL Listed</td>
<td>Yes</td>
</tr>
<tr>
<td>Warranty</td>
<td>3 Year Limited</td>
</tr>
</tbody>
</table>

SATCO®
This REFINE SERIES PAR38 was designed and engineered for commercial applications that demand high performance lighting and accurate color rendering. All new PAR REFINE Series lamps feature the full-face REFINE optic that provides a high candela to lumen ratio. This 120W replacement also features a typical high CRI 90, R9 50 and R13 90, providing crisp and vibrant colors across the whole spectrum. This lamp is also suitable for enclosed fixtures.
Conventional, Retrofit and Replacement LED Lamps

Plug & Play DIRECT installation for CFL lamps

For use with 13W / 18W / 26W / 32W / 42W electronic ballasts
Compatible with G24q / GX24q (4-pin CFL) installations
Exceptional efficacy 84 LPW
2700K / 3000K / 3500K / 4000K / 5000K CCT
Extra long 40 000 hr lifetime
So many choices. Which is right?
Upgrading fluorescent to LED – What are the options?

• Tubes
• Kits
• Fixtures
Tubes - different formats

- No diffuser
- Wide ends
- Narrow ends
- Metal heat sink
- Glass tube
Tubes – at least 3 variations

No rewiring- Ballast Compatible (BC TLED) product operates through existing ballast (has an integral driver)

Rewiring- (TLED) disconnect ballast, and rewire sockets for line voltage (product has an integral driver)

Rewiring- remote driver product operates off of a driver external to the tube, and may use the sockets.*

* When does a “tube” become a “kit”?*
Choose from our LED Tubes

- MASTER LEDtube Performance
- MASTER LEDtube
- CorePro LEDtube
- MASTER LEDtube SA1 Gen2
- Essential LEDtube
- MASTER LEDtube Internal Standard
- LEDtube Internal Standard
- LED T8 InstantFit Lamp
Luminaire type and TLED beam angle

Light loss with “Recessed Indirect”
Trending in ballasts and components

- Controllability
- Color capability
- Optical manipulation
OSLON® SSL 730 nm

The OSLON® SSL LED provides the perfect light for plants and flowers, with wavelengths of 450nm to 660nm and now including 730nm Far Red.

**Far-red** light is light at the extreme **red** end of the **visible spectrum**, between **red** and **infra-red** light. Usually regarded as the region between 710 and 850 nm **wavelength**, it is dimly visible to some eyes.
LuxiTune™ Gen 3.1

ZigBee controlled tunable white light engine for track lights enables ultra-precise and class-leading wireless CCT tuning
LED / OLED, Chips and Modules

Cooledge SQUARE

A flat, flexible light product that creates a uniform, consistent lit effect, in low profile architectural installations

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficacy</td>
<td>120 lm/W – 125 lm/W</td>
</tr>
<tr>
<td>Light Output</td>
<td>600 lm/SQUARE and 300 lm/SQUARE</td>
</tr>
<tr>
<td>CCTs</td>
<td>2700K, 3000K, 3500K, 4000K, 5700K</td>
</tr>
<tr>
<td>CRI (Ra)</td>
<td>&gt; 80 standard, &gt; 90 upon request</td>
</tr>
<tr>
<td>Color Uniformity</td>
<td>Typical 2 SDCM</td>
</tr>
<tr>
<td>Lumen Maintenance</td>
<td>L90 &gt; 100,000 hours</td>
</tr>
<tr>
<td>Dimming Range</td>
<td>100% to 1% Continuous</td>
</tr>
</tbody>
</table>

Projections based on IES LM-80 & TM-21 calculations
Non-Luminous Components, Specialty Hardware, Shades and Solar

TriGain™ Phosphor

TriGain family of potassium fluorosilicate (PFS)-based phosphors for LED-based backlighting in displays. The PFS technology enables richer reds with truer color control. The technology could have major implications in LED-based general lighting with the company planning to use the technology for its own lighting products. Enables improved color and high efficacy.
DigiSwitch

DigiSwitch is used with constant current LED drivers to create a system that can double the life span of LED fixtures.
Ballasts, Transformers, LED Drivers, Systems and Kits

Philips Advance Xitanium SR LED

SR LED Drivers reduce complexity and cost, making it practical to turn any light fixture into a wireless node.
ECOdrive LED drivers enable Visible Light Communication technology, delivering an accurate indoor positioning system.
MicroTEK™

Fusion Optix’s new MicroTEK™ technology platform now extends to a new range of beam shaping snap in lenses and profiles for linear LED lighting applications. Designed to combine high efficiency and light management. Low glare diffusion, batwing, tilting and custom options.
Trending in luminaires

- Optical control
- Dynamic CCT
- GUI
Indoor Decorative (Chandeliers, Pendants, Sconces, Task Lights)

Xterna LED Linear Suspension

LEDs embedded within Xterna’s signature X-shaped structure are gradually revealed as it extends from 7” to 76”.

| LED830  | LED module 40w 80 CRI 3000K 120v |
| LED830277 | LED module 40w 80 CRI 3000K 277v |
| dimmable with a low-voltage electronic dimmer |
Indoor Decorative (Chandeliers, Pendants, Sconces, Task Lights)

Windirect Asymmetric LED

A complete family of high performance products that provide exceptional efficacy and beam control
Indoor Decorative (Chandeliers, Pendants, Sconces, Task Lights)

CGL12 Decorative & Performance LED Pendant

The CGL12 Pendant delivers up to 8500 lumens and comes in various finishes, shade options and color temperatures.

- 28 to 98 watt
- 2,200 to 8,500 lumens
- 13.75” x 8”

Are we seeing the end of CFL & CMH for these applications?
Paloma Adjustable Beam LED Track head
This LED Track head allows for infield change of the beam angle by hand, allowing complete control over the fixture

WAC LIGHTING
Track, Display, Undercabinet and Shelf

Murro LED

Compact, passively cooled, track mounted wall wash is optically perfected to provide incredible 2:1 Fixture:Wall spacing.

2,000 – 4,000 Lumens
EcoSense Trov

A one-of-a-kind LED lighting platform that allows for unparalleled freedom in lighting design.
Infinite Color +

Enjoy complete freedom to design and define your own perfect architectural white light source, plus billions of colors.
Industrial, Vandal, Emergency and Exit

LED Vapor Tight

The first fixture of its kind designed using engineered thermal plastics for corrosion resistance in harsh environments.
# IG Series

## PERFORMANCE SUMMARY

- Utilizes Cree WaveMax™ Technology
- **Initial Delivered Lumens**: 4,000 or 7,500 lumens
- **Input Power**: 33 or 65 watts
- **Efficacy**: 118 or 115 LPW
- **CRI**: Minimum 80 CRI
- **CCT**: 4000K, 5700K
- **OPTIC**: Type V Short Distribution
- **Limited Warranty**: 10 years*
ELEMENT Merge Recessed Linear System

Combines 3” aperture recessed linear indirect channel with concealed bus to independently control spots or pendants.

TECH LIGHTING - GENERATION BRANDS
Palladium

The Palladium (Pd) is a clean, efficient, and striking bi-directional luminaire capable of employing tunable white LEDs
Commercial Indoor (Linear Fluorescent, Troffers, Suspended, Surface, LED, OLED)

Cava

- Direct and Indirect or both with variable output
- 350 to 750 lumens per foot
- Open or closed end caps.
- Onboard control options
FineTune™ System

- **Controls for**: recessed troffer, linear slot, pendant, and cove LED luminaires.
- Dynamic CCT color tuning between 2700K and 6500K.
- Dimming from 10% to 100%.
- Plug-and-play DMX controls.
- Intuitive user interface with pre-set CCT and dimming levels.
- Simple up/down arrows for more granular control.
- Digital display for CCT.
BeveLED 5.0 10° Adjustable

- Industry's first true 10° beam to deliver over 6,000 lumens enables highest quality lighting design with precise control.
- Max Output with Warm Glow Dimming provides warmth and glow.
Adjust-e-Lume® with Bluetooth® Wireless Technology

Breakthrough Bluetooth® wireless technology controls lumen response at each Adjust-e-Lume® fixture with iOS® platform.

B-K LIGHTING & TEKA ILLUMINATION
SUFA

LED sports lighting that is uniquely designed using reflectors to create a glare-free light distribution.

SF800
800 watts
84,000 lumens
15 or 30 degree
5,000K

640 x 640 x 292 mm
25 Kg
The Lumenfacade Inground is a high-performance, feature-rich LED luminaire designed for simple, safe installation.
Contemporary design and form combine to deliver high performance lighting where it matters most—on the pedestrian scale.
Parking, Roadway and Area Luminaires

Olivio Sistema 2 LED

Lamping 20-150W HID - 58W LED

<table>
<thead>
<tr>
<th>Type II</th>
<th>Type V</th>
<th>Spot Narrow</th>
<th>Flood Medium</th>
<th>Flood Wide</th>
</tr>
</thead>
</table>

10 15/16" (275mm)

12 5/8" (320mm)

Outstanding Versatility
SPES2

LED Area Light with Surveillance Camera that's uniquely designed using reflectors to create a glare-free light distribution
Lighting for Exterior Environments (RP-33-14)

Published by the IES, RP-33-14 addresses design issues related to outdoor lighting.
LSD 64
Lighting Controls Terminology

• “...a set of industry-accepted definitions for lighting controls terminology typically found in energy codes, standards, design guides,...to have the NEMA definitions used as the definitive reference.”
### Lighting Controls Terminology

<table>
<thead>
<tr>
<th></th>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Bi-level Control</td>
<td>A lighting control strategy that provides two light levels—one at full-ON or at a high light level and one at a lower level. This may include turning off some portion of the lighting so that uniform light level and distribution is maintained. In addition to the two ON settings, bi-level control may provide for full-OFF. Also known as bi-level switching.</td>
</tr>
<tr>
<td>19</td>
<td>Daylight Harvesting</td>
<td>A lighting control strategy used to manage a building’s energy consumption by automatically regulating the use of electric lighting in response to the amount of daylight available.</td>
</tr>
<tr>
<td>42</td>
<td>Lighting Control System</td>
<td>A lighting control where two or more components are required to be installed in the field to provide all of the functionality required to make up a fully functional and compliant lighting control.</td>
</tr>
<tr>
<td>58</td>
<td>Networked Lighting Control System</td>
<td>A lighting control system with multiple components that is connected by a network and offers multiple strategies such as energy reporting and may be integrated with various building systems.</td>
</tr>
<tr>
<td>70</td>
<td>Sequence of Operation</td>
<td>A description of how lighting and/or other systems shall operate to fully meet the control design intent.</td>
</tr>
<tr>
<td>71</td>
<td>Sequence of Operation: Automatic Partial-ON/Automatic- OFF</td>
<td>Automatic activation of a lighting load to a reduced power level between full-ON and full-OFF and automatic deactivation of the lighting load from either an occupancy or time-based system.</td>
</tr>
</tbody>
</table>
Trending in Controls

• Graphical User Interface
• Integrated platforms
• Reporting capabilities
• Communication innovations
Fresco show WM

A stand-alone DMX512 touchscreen lighting controller that mounts in a 3-gang wall box.
Controls and Control Software, Building Integration, Site Automation and Distribution Systems

• Complete energy usage monitoring by branch circuit, space, and system, for benchmarking of lighting and plug loads.

• Actual metering used, not a calculation.
Wireless on/off control receptacle that also measures and reports energy consumption levels in watts and kilowatt-hours.

Wireless Z-Wave technology (Signal Frequency is 908.42 MHz) created a mesh network for command and control interoperability with other Z-Wave compliant controllers.

15A Smart Meter TR Duplex Receptacle
Ruggedized Sensor

• Used in outdoor applications, parking structures, damp and wet locations and other areas that require an IP65 rated sensor.
  • Monitors occupancy, daylight and temperature

• Incorporates all the programmability, sensing, and wireless communications needed to autonomously control illumination levels, monitor occupancy and environmental conditions.
Enlighted Fixture Mount Sensor

- Wirelessly adds intelligent control to any fixture with a small form factor and ease of installation.
- Designed so the device installs into the fixture cavity, leaving only the sensor face visible.
- Daylight harvesting, occupancy, and thermal monitoring.
- 105 degree view, 150 foot range

- Body L 2.03" 51.6mm
- W 0.9" 24mm
- Face Dia. 1.06" 27mm
- Weight 0.8 oz 22.6 grams
Evokit LED Retrofit Kit

An energy efficient LED lighting source which simultaneously provides lighting, temperature and occupancy data.
Energi Advisor™ App

• **All-in-one tool** for lighting energy audits and proposal creation, feature Lutron wireless light controls.
  - Only basic project info needed
  - More info = more detail
  - **Always up to date**
• **Simplifies energy audits**, allowing users to quickly recommend energy-efficient lighting control upgrades.
  - Available for iPad or iPhone
SnapCount

• This automated, integrated software solution runs readily on your mobile platform (IOS & Android) and in the cloud.
  • Record multiple fixture types.
  • Use camera and mic. to add photos and narrate.
  • Sketch w/ finger or stylus.

Accelerates the adoption of large-scale lighting retrofit projects.

http://streamlinnx.com/
Osram Sylvania will work with Belkin to add the Web-enabled devices maker's Internet-connected functionality to a selection of lighting products.

The manufacturer-developer duo aims to improve compatibility and communication among Web-enabled devices and the home-control systems with which they are synced.

https://www.sylvania.com
WeMo Light Switch

• Replaces a standard light switch in your home and can be controlled remotely with an Android smartphone or tablet, iPhone, iPad. It works with your existing Wi-Fi® network and anywhere your smartphone or tablet has an Internet connection.
  • Enhanced sunrise/sunset rules
  • Away mode setting
  • Customizable long press option

www.belkin.com/us/
NETCAM WORKS WITH WEMO
NETCAM WI-FI CAMERAS
Controls and Control Software, Building Integration, Site Automation and Distribution Systems

Equinox 41 LCD Touchscreen

Powerful touchscreen based on ethnographic research that delivers a familiar experience for multiple system control.

Music, Climate, Security, Video, etc ... and Lighting.
Setting a wall box device
So simple, just one button

**OPERATIONAL SETTINGS**

NOTE: (*) Indicates factory default (unless otherwise marked)

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
</table>
| 2 | **Occupancy Time Delay**<br>Time sensor keeps lights on after last occupancy detection.<br>1: 30 sec 2: 2.5 min 3: 5.0 min 4: 7.5 min 5: 10.0 min 6: 12.5 min 7: 15.0 min 8: 17.5 min 9: 20.0 min |}

10: 30.0 min<br>For additional time settings, contact technical support at 1.800.PASSAGE

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td><strong>On Mode</strong>&lt;br&gt;Automatic On turns lights on when occupancy is detected. Manual On requires a button press to turn the lights on. Reduced Turn-On directs the sensor to only detect large motions, such as a person entering a room. Weaker signals, such as reflections from glass, are ignored. Once lights are on, the sensor returns to maximum sensitivity.&lt;br&gt;1: Automatic On* 2: Manual On** 3: Reduced Turn-On</td>
</tr>
<tr>
<td>*</td>
<td>Standard Factory Default</td>
</tr>
<tr>
<td>**</td>
<td>Factory Default for -SA and -NL versions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td><strong>Switch Modes</strong>&lt;br&gt;These modes dictate switch functionality. Pressing the button in Override Off mode (setting 1) turns off and keeps lights off until pressed again. Disabling the Switch (setting 2) prevents the button from turning the lights on.&lt;br&gt;Predictive Mode (setting 3) automatically determines if a user has left the room after the lights are switched off. It does this by monitoring the space for a period after the button is pressed (Predictive Grace Time), following a certain delay (Predictive Exit Time). If occupancy is detected the device will disable auto-on and hold the lights off until manually switched on. If no occupancy is detected the sensor instantly reverts to auto-on mode. (continued next column)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td><strong>Photocell Set-Point</strong>&lt;br&gt;The ambient light level at which the sensor prevents the lights from initially turning on. Once on, the lights will remain on until the occupancy time delay expires and turns them off.&lt;br&gt;1: Disabled* 2: Auto Setpoint 3: 0.5 fc 4: 1 fc 5: 2 fc</td>
</tr>
<tr>
<td>*</td>
<td>Standard Factory Default</td>
</tr>
<tr>
<td>**</td>
<td>Factory Default for -SA and -NL versions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td><strong>LED Operation</strong>&lt;br&gt;Indicates behavior of device’s LED.&lt;br&gt;1: Occupancy Indication* 2: Relay Indication 3: 6 4 fc 5: 8 fc 6: 16 fc 7: 32 fc 8: 64 fc</td>
</tr>
<tr>
<td>*</td>
<td>Standard Factory Default</td>
</tr>
<tr>
<td>**</td>
<td>Factory Default for -NL versions</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td><strong>Restore Factory Defaults</strong>&lt;br&gt;Returns all functions to original settings.&lt;br&gt;1: Maintain Current* 2: Restore Defaults</td>
</tr>
<tr>
<td>*</td>
<td>Standard Factory Default</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td><strong>Dual Technology (Microphonics™)</strong>&lt;br&gt;Relative responsiveness of Microphonics detection. Included in -PDT versions only.&lt;br&gt;1: Normal* 2: Off 3: Medium 4: Low</td>
</tr>
<tr>
<td>*</td>
<td>(15-10-5 min)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td><strong>Microphone Grace Period</strong>&lt;br&gt;Time period after lights are automatically turned off that they can be voice reactivated. Included in -PDT versions only.&lt;br&gt;1: 0 sec 2: 10 sec* 3: 20 sec 4: 30 sec 5: 40 sec 6: 50 sec 7: 60 sec 8: 70 sec</td>
</tr>
<tr>
<td>*</td>
<td>(15-10-5 min)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td><strong>Predictive Mode Exit Time</strong>&lt;br&gt;Time period after manually switching lights off for occupant to leave the space.&lt;br&gt;1: 5 sec 2: 6 sec 3: 7 sec 4: 8 sec 5: 9 sec 6: 10 sec* 7: 15 sec 8: 20 sec</td>
</tr>
<tr>
<td>*</td>
<td>(15-10-5 min)</td>
</tr>
</tbody>
</table>

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<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td><strong>Predictive Mode Grace Time</strong>&lt;br&gt;Time period after Predictive Mode Exit Time that sensor rescans the room for remaining occupants.&lt;br&gt;1: 0 sec 2: 10 sec 3: 50 sec* 4: 60 sec 5: 70 sec 6: 80 sec 7: 90 sec</td>
</tr>
<tr>
<td>*</td>
<td>(15-10-5 min)</td>
</tr>
</tbody>
</table>
There is only one button to do everything...
# Setting a Wall Box Device

## Operational Settings

**Note:** (*) indicates factory default (unless otherwise marked)

### 2 = Occupancy Time Delay

<table>
<thead>
<tr>
<th>Setting</th>
<th>Time Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30 min</td>
</tr>
<tr>
<td>2</td>
<td>6 min</td>
</tr>
<tr>
<td>3</td>
<td>10.0 min</td>
</tr>
<tr>
<td>4</td>
<td>15.0 min</td>
</tr>
<tr>
<td>5</td>
<td>30.0 min</td>
</tr>
</tbody>
</table>

For additional time settings, contact technical support at 1.800.PASSIVE.

### 3 = On Mode

Automatic On turns lights on when occupancy is detected. Manual On requires a button press to turn the lights on. Reduced Turn-On directs the sensor to only detect large motions, such as a person entering a room. Weaker signals, such as reflections from glass, are ignored. Once lights are on, the sensor returns to maximum sensitivity.

- **1** Automatic On
- **2** Manual On
- **3** Reduced Turn-On

* Standard Factory Default
** Factory Default for -SA and -NL versions

### 4 = Switch Modes

These modes dictate switch functionality. Pressing the button in Override Off mode (setting 1) turns off and keeps lights off until pressed again. Disabling the Switch (setting 2) prevents the button from turning the lights on.

Predictive Mode (setting 3) automatically determines if a user has left the room after the lights are switched off. It does this by monitoring the space for a period after the button is pressed (Predictive Grace Time), following a certain delay (Predictive Exit Time). If occupancy is detected the device will disable auto-on and hold the lights off until manually switched. If no occupancy is detected the sensor instantly reverts to auto-on mode. (continued next column)

### 5 = Photocell Set-Point

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6 fc</td>
</tr>
<tr>
<td>2</td>
<td>7 fc</td>
</tr>
<tr>
<td>3</td>
<td>8 fc</td>
</tr>
<tr>
<td>4</td>
<td>16 fc</td>
</tr>
<tr>
<td>5</td>
<td>9 fc</td>
</tr>
<tr>
<td>6</td>
<td>32 fc</td>
</tr>
<tr>
<td>7</td>
<td>50 fc</td>
</tr>
</tbody>
</table>

Note: Sensor will be changed to Automatic On mode if photocell is enabled. Photocell not present in -NL versions. LED flashes while Auto-Setpoint mode is running.

### 7 = LED Operation

- **1** Occupancy Indication
- **2** Relay Indication
- **3** Disabled
- **4** Override On

*Standard Factory Default
** Factory Default for -NL versions

### 9 = Restore Factory Defaults

Returns all functions to original settings.

- **1** Maintain Current
- **2** Restore Defaults

### 10 = Minimum On Time

Required initial time for lamps to be on after each switch on, regardless of occupancy status. Once met, lights resume following occupancy time delay.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 min</td>
</tr>
<tr>
<td>2</td>
<td>15 min</td>
</tr>
<tr>
<td>3</td>
<td>30 min</td>
</tr>
<tr>
<td>4</td>
<td>45 min</td>
</tr>
<tr>
<td>5</td>
<td>60 min</td>
</tr>
</tbody>
</table>

### 11 = Manual On Grace Period

Time period after lights automatically turn off that they can be reactivated by motion. (Manual On (Semi-Auto) mode only).

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>2</td>
<td>2 sec</td>
</tr>
<tr>
<td>3</td>
<td>3 sec</td>
</tr>
<tr>
<td>4</td>
<td>1 sec</td>
</tr>
<tr>
<td>5</td>
<td>3 sec</td>
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<tr>
<td>6</td>
<td>5 sec</td>
</tr>
<tr>
<td>7</td>
<td>10 sec</td>
</tr>
<tr>
<td>8</td>
<td>15 sec</td>
</tr>
<tr>
<td>9</td>
<td>30 sec</td>
</tr>
<tr>
<td>10</td>
<td>60 sec</td>
</tr>
</tbody>
</table>

### 12 = Dual Technology

Relative responsiveness of Microphonic detection. Included in -PDT versions only.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</tr>
<tr>
<td>2</td>
<td>Medium</td>
</tr>
<tr>
<td>3</td>
<td>Phase Off</td>
</tr>
<tr>
<td>4</td>
<td>Off</td>
</tr>
</tbody>
</table>
| 5       | Low   | (15-105 min)

### 13 = Microphone Grace Period

Time period after lights are automatically turned off that they can be voice reactivated. Included in -PDT versions only.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>7</td>
<td>30 sec</td>
</tr>
<tr>
<td>8</td>
<td>60 sec</td>
</tr>
</tbody>
</table>

### 15 = Predictive Mode Exit Time

Time period after manually switching lights off for occupant to leave the space.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
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<td>8</td>
<td>7 sec</td>
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<tr>
<td>9</td>
<td>30 sec</td>
</tr>
<tr>
<td>10</td>
<td>2 sec</td>
</tr>
</tbody>
</table>

### 16 = Predictive Mode Grace Time

Time period after Predictive Mode Exit Time that sensor rescans the room for remaining occupants.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
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<td>7</td>
<td>30 sec</td>
</tr>
<tr>
<td>8</td>
<td>60 sec</td>
</tr>
</tbody>
</table>
SmartCast

- **Self-programming wireless lighting control**
- Integrated sensors
t  - Motion sensing
  - Daylight harvesting
  - Task tuning
- Daylight harvesting task tuning
- **One button set-up**
  *Automated luminaire association and configuration*
Beacon Products Beaconnect™

The wireless control system dims fixtures when full output isn’t needed to save owners energy and maximize life span.
DWHS Humidity & Fan Control with PIR Occupancy Sensor

Occupancy Sensor allows monitoring & controlling the condensation level.
Controls and Control Software, Building Integration, Site Automation and Distribution Systems

Lumewave MWX-LVE-180U

Radar based, long range Microwave Sensor

Bluetooth enabled, radar based long range sensor/controller specifically designed for controlling outdoor lighting
Visible Light Communication Finds Its Applications

BY CRAIG DILOUIE, ON MAY 20, 2015

What is VLC?
The concept is simple. Varying the intensity of a beam of light can be used to encode information. Light can be transmitted across a free space (e.g., lasers communicating between two buildings) or across a medium (e.g., fiber optics). With the advent of LED, use general lighting to communicate with users in a space as a replacement or supplement to Wi-Fi. While traditional light sources present practical limitations, LED lighting can be modulated at very high frequencies, with a cycle as short as nanoseconds. This concept, called Li-Fi, could be a solution to RF bandwidth limitations as the visible light spectrum is 10,000 larger than the radio spectrum.
LiFi - Wireless communication

Li-fi, or "light fidelity", is a theorized way to stream data via LED lighting instead of Wi-Fi. Although still under investigation, the technology could be used in high-speed, visible-path transmission applications.

Moreover, it can be used in intrinsically safe environments - petrochemical plants, hospitals, aircraft, etc., where the use of radio frequency Wi-Fi can have restrictions.
Thank You!

Eric Strandberg LC
Sr. Lighting Specialist,
Lighting Design Lab
Thanks

eric@lightingdesignlab.com