

iLumin  
Plus



## design and application guide



**EATON**

*Powering Business Worldwide*

# Table of Contents

## Wired Connected Lighting System

Solutions overview	4
Built-in energy saving lighting control strategies	5
iLumin Plus system and integration	6-7
iLumin Plus system	8
Benefits	9-13
System components	14-15
Network devices and accessories	16-17
Tools for facility managers	21
Basic steps to design an iLumin System	22-23
Best practices / FAQs	24-25
Installation design guidelines	26-29
ControlSpec design tool	30-31
Energy codes application notes	32
Quick Reference Guide	33
Application code compliant sequence	34-35

# Wired Connected Lighting System

Eaton's iLumin Plus is one single lighting control solution for all traditional wired control application needs. This DIN Rail based lighting control system is capable of supporting energy management, code compliance, DMX lighting and individual addressable lighting control applications, all from a single platform.

Each panel configuration is fully networkable and commissioned via the iCANSuite software package.

**The iLumin Plus system can be configured using one or more of the standard IL Series panel configurations to create a powerful lighting control solution that can perform a variety of functions such as:**

- Occupancy/Vacancy sensing
- Scheduling
- Daylighting
- Shade Control
- A/V Integration
- Partitioning
- DMX control
- BMS integration
- and more

**Modular. Scalable. Simple.**



# Solutions overview

Eaton provides a number of product solutions to meet your code and application requirements. This guide provides information on how iLumin Plus can be used to meet or exceed your code and application requirements.

	Room Controller	Distributed Low-Voltage Power System	WaveLinX	iLumin Plus	Fifth Light	PoE	LumaWatt Pro
Space type	Interior	Interior	Interior / Outdoor	Interior	Interior	Interior	Any
Stand-alone or Network	Both	Stand-alone	Both	Network	Network	Network	Network

## Need-based feature progression

Basic compliance only	●	●	●	●	●	●	●
Occupancy sensing	●	●	●	●	●	●	●
Daylight harvesting	●	●	●	●	●	●	●
Zone control	●	●	●	●	●	●	●
Scheduling	●	●	●	●	●	●	●
0-10V dimming	●	●	●	●	●	●	●
Individual fixture control	●	●	●	●	●	●	●
Retrofit+Building Integration		●	●	●	●	●	●
Total wireless connectivity			●				●
A/V integration			●	●	●	●	●
BMS integration	●		●	●	●	●	●
UI options (touchscreen, apps, etc.)			●	●	●	●	●
Enterprise level building integration			●	●	●	● (IT based)	●
Facility management & tools			●	●	●	●	●
Floor plan & reporting tools					●	●	●
Value-added services							●
Asset tracking							●
API integration			●		●		●
Analytics/higher problem solving							●

## Cost progression


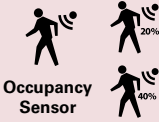






\$ per sq. ft. (controls only)*	\$0.75†	\$1.25†	\$1.00†	\$1.75†	\$1.75†	\$2.00†	\$2.50†
Installation cost (controls & fixtures)*	\$\$	\$	\$\$	\$\$	\$\$	\$\$\$	\$\$\$
Commissioning cost*	\$	\$	\$\$	\$\$\$	\$\$\$	\$\$\$	\$\$\$
Return on investment*	\$	\$\$	\$\$	\$\$\$	\$\$\$	\$\$\$	\$\$\$\$

\* Based on same coverage area installed with Eaton fixtures.

† Price above is only for comparison. For actual pricing, contact your local sales representative.

# Built-in energy saving lighting control strategies

iLumin Plus provides these energy saving strategies with a simple configuration app.

STRATEGY	DESCRIPTION	ESTIMATED SAVINGS
 <p><b>Manual Dimmer</b></p>	Manual/personal dimming control – is one of five alternative methods to meet the multi-level lighting control requirements.	<b>10-20%</b>
 <p><b>Occupancy Sensor</b></p>	Occupancy/vacancy sensing – provides Manual On/Automatic Off or Automatic On/Automatic Off and Partial Off capabilities.	<b>20-60%</b>
 <p><b>Daylighting Control</b></p>	Daylight dimming – provides multiple daylight dimming zones that automatically adjust the lighting based on daylight available in the space, or fixture integrated sensors for completely granular daylighting control.	<b>20-45%</b>
 <p><b>Receptacle Control</b></p>	Plug load control – automatically turns On receptacles upon occupancy regardless of light status. Ensures receptacles are turned Off when the space is vacant.	<b>15-50% Controlled loads</b>
 <p><b>Tuning Control</b></p>	High-end/Task Tuning – lowers the maximum light level for automatic energy savings.	<b>10-30%</b>
 <p><b>Demand Response</b></p>	Demand Response – automatically reduces light level based on signal from 3rd party system.	<b>10-40%</b>
 <p><b>Remote Signal Control</b></p>	BACnet- Coordinate control through BMS Remote Signal Control – Communicates to 3rd party systems via API.	<b>20%</b>
 <p><b>Outdoor Control</b></p>	Outdoor Control - automatically adjust area, site, flood lighting via scheduling or astronomic clock.	<b>25%</b>

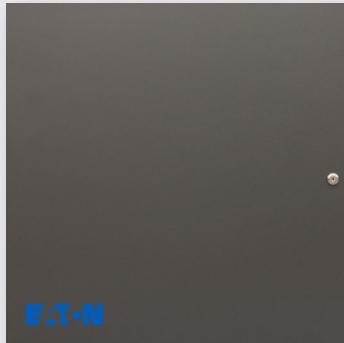
# iLumin Plus System and Integration

## PANELS

Large panel



Medium panel



Small panel



## SCUN

Universal dimming panel



## MODULES

**SCMR1220-NA**  
12 ea. 20A Relays



**SCMH1200-NA**  
12 ea. 0-10V Outputs



**SCMD4**  
4 ea. DALI buses



**EG2**  
Ethernet Gateway



**CR1-RJ**  
PC Connection



## SOFTWARE



**iCANSoft Suite**  
System Setup/  
Commissioning  
Scheduling Control



**iLumin Remote**  
Area control  
Zone control  
Scene control

## KEY



2 wire topology,  
polarity free device



5 wire bus

## INPUT DEVICES



**FDW**  
Wallstation



**Ineo**  
Wallstation



**Touchscreen**

## AUTOMATIC CONTROLS



**2 Wire Sensor**  
Powerpack



**Multi-Sensor**



**Highbay**  
Sensor



**Multi-Sensor**



**Low-Voltage**  
Ceiling  
Sensor



**TC1**  
Time  
Clock

## END DEVICES



**0-10V Fixture**  
Control



**Relay**



**Forward Phase**  
Dimmer



**0-10V to**  
Reverse  
Phase  
Converter

## INTEGRATION



**BMS Pro 2**  
BACnet  
Interface



**EG-2-NA**  
Ethernet  
Interface



**SCD96-NA**  
DMX  
Interface



**RI-2-NA**  
Relay  
Interface



**S1-2-NA**  
Serial  
Interface

## LOW-VOLTAGE INTEGRATION



**UIM**  
Partition  
and  
Input Interface



**UIG-2-NA**  
Partition  
and  
Input Interface



**IRTR** Partition  
Sensor

## EMERGENCY



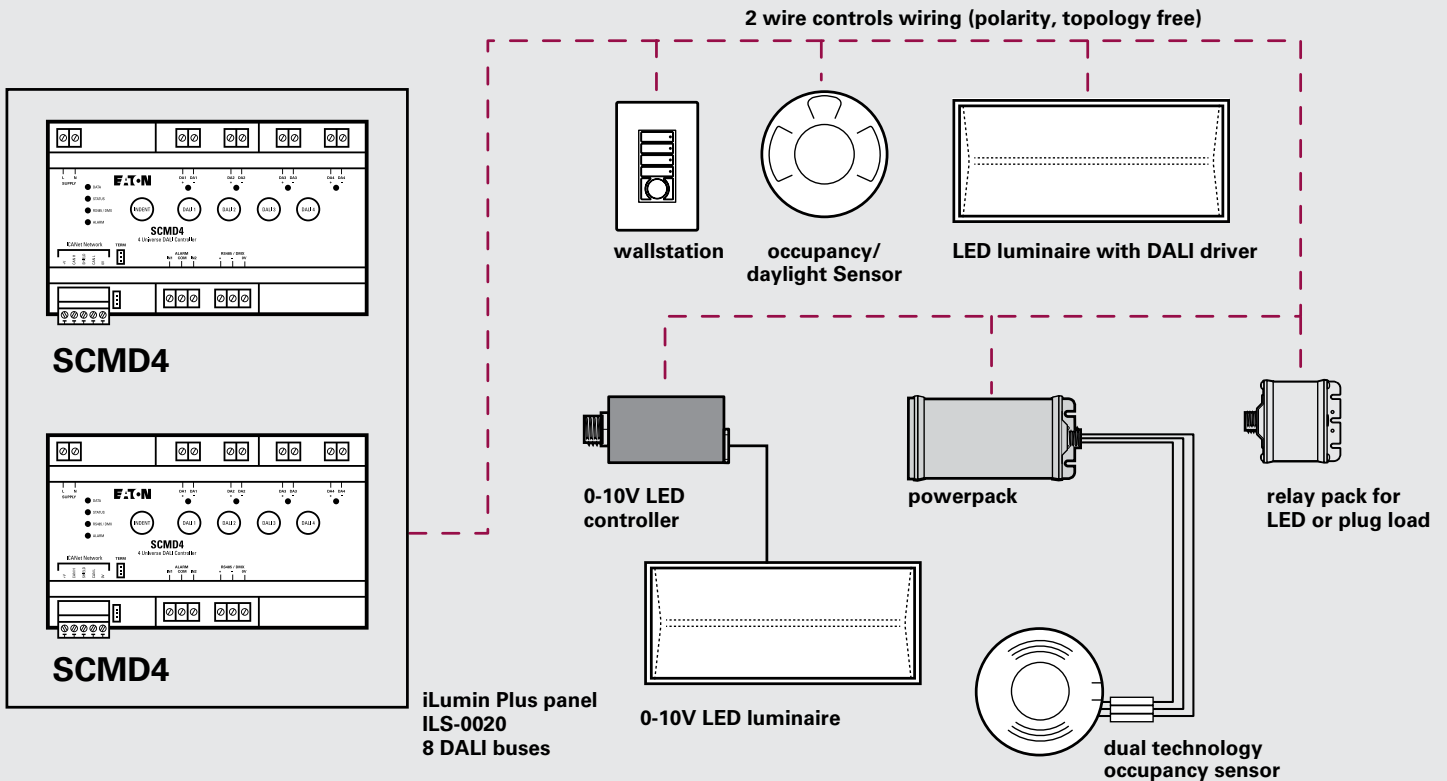
**RRU-UNV** Emergency  
Panel Control



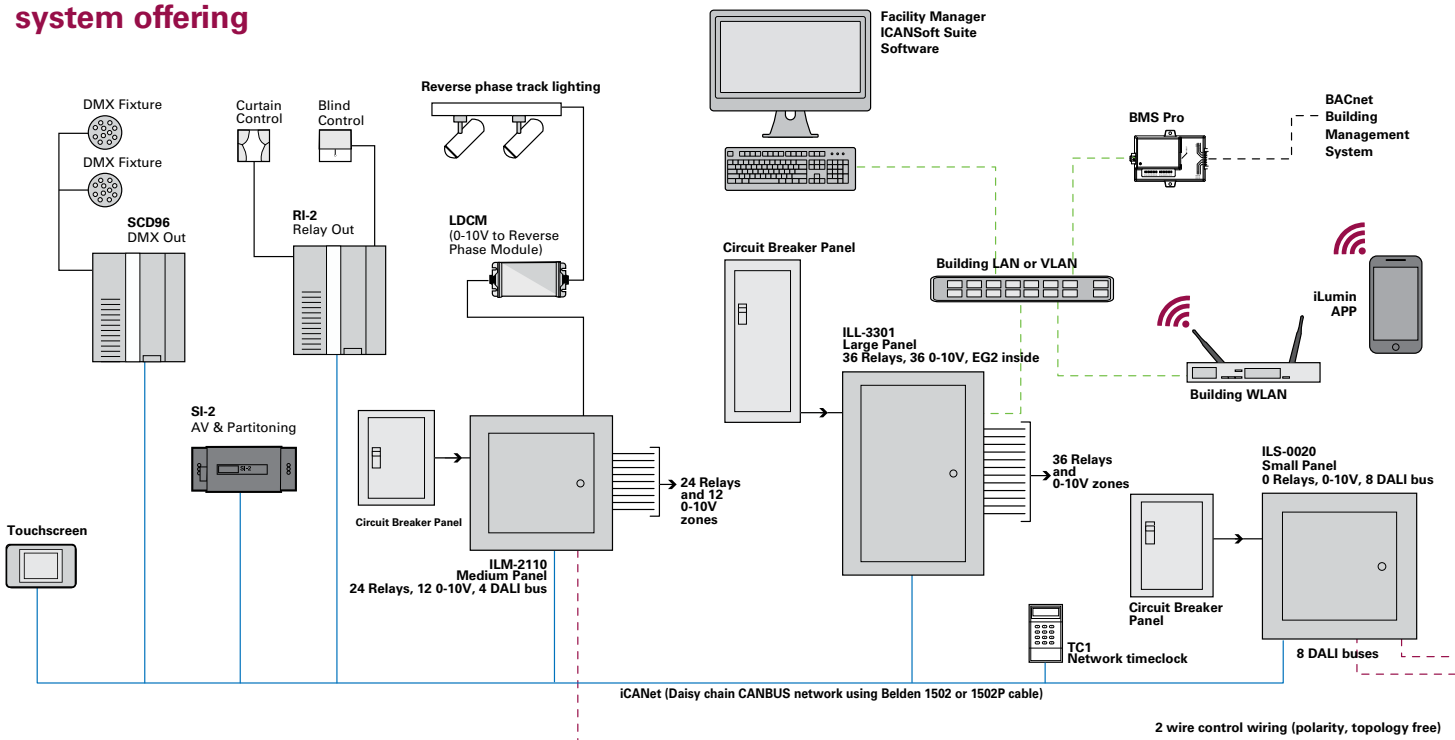
**CEPC-1-D** Emergency  
Circuit Control

# iLumin Plus System

## Simplified controls wiring



## Complete system offering





# Benefits

**Reduce** installation cost and time for sensors, switches and individual fixture control with 2 wire topology, polarity free bus.

**Achieve** more applications with plenum rated panels that include 25K SCCR

**Simplify** complete building integration and control with a system that supports sensors, touchscreens, Partitioning, 0-10V, relays, DALI, DMX, BACnet and AV integration

**Get** smart building ready with internal Ethernet Gateways allowing IoT connectivity

## Problems Solved:

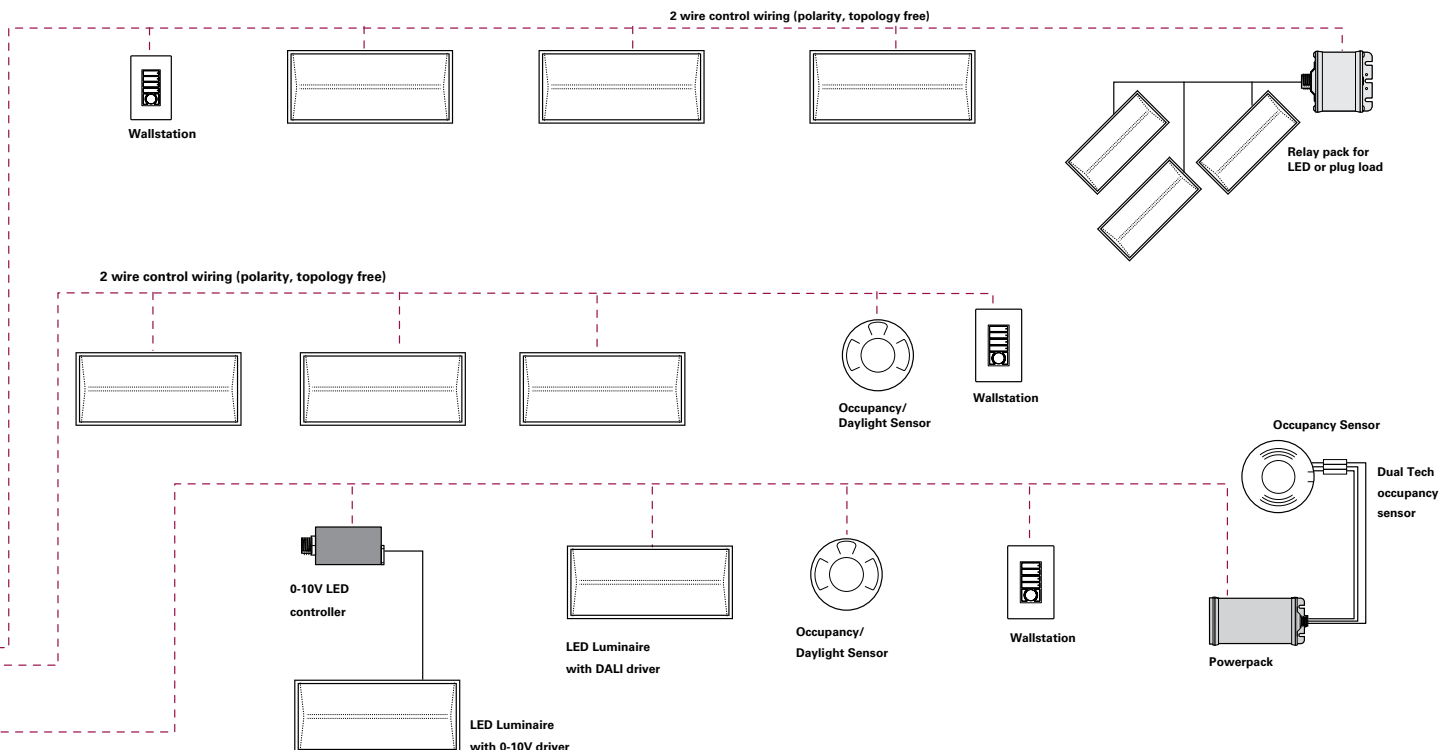
Do you want to control complete building lighting via area (relay), zone (0-10V), individual (DALI) or DMX, all from the same system?

Are you looking for a system that can integrate with commercial AV systems?

Do you need a system that can provide partitioning control of complex spaces?

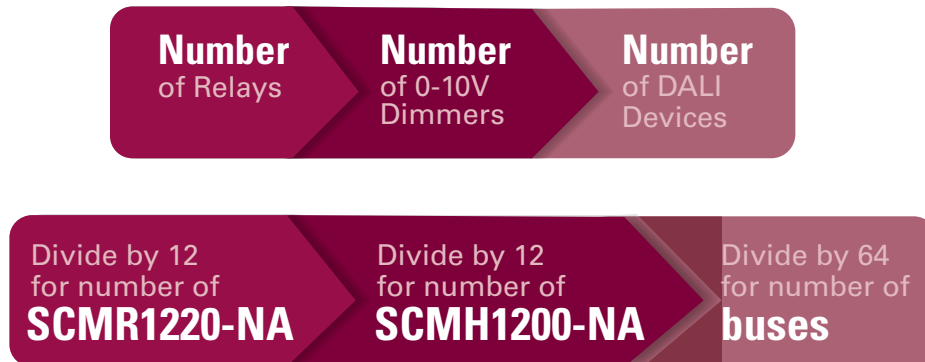
Would you need to connect your system to a BMS or other system to extract value added data and gather data from the system?

Do you need a future proof system that provides simplified control wiring to complete your complex system faster?



## A. Selecting the right panel configurations

1. Before selecting the panel configurations, emergency circuits must be identified separately from normal circuits. Initially, use guidelines below keeping normal circuits in mind. Revert back, if you need to, for the emergency circuits once you have determined the emergency scheme.
2. Selecting the correct panel configuration requires that you have determined the total number of relays, 0-10V dimmers and/ or DALI devices (and types) that are needed within your panel. There are rules to be followed to complete this step. Use tables (next page) for reference.
3. Use the formulas below to determine how many of each module is needed.
4. iLumin Plus panel configurations are defined with the quantity of each module specified in the product catalog number. See available catalog options below:



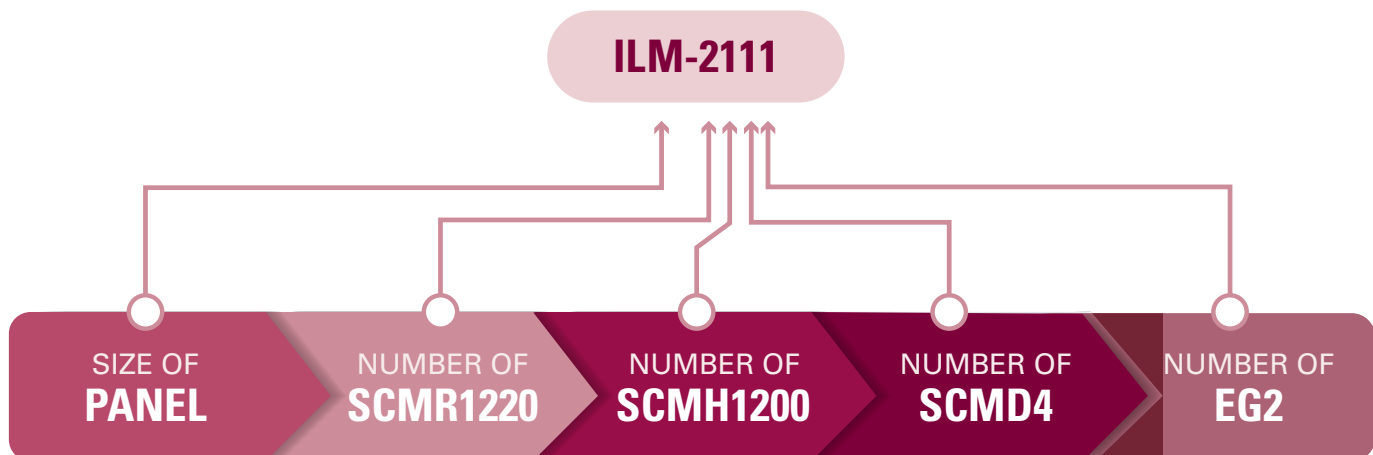
The iLumin Plus panel configuration includes place holders within the catalog number to define how many of each module to include within the panel.

### Sample iLumin Plus panel configuration:

This section of the catalog number defines how many of each module are contained within the panel configuration.

### Selecting the right iLumin Plus panel configuration:

Using the information provided, select the appropriate configuration from the list of iLumin Plus panel configurations below.



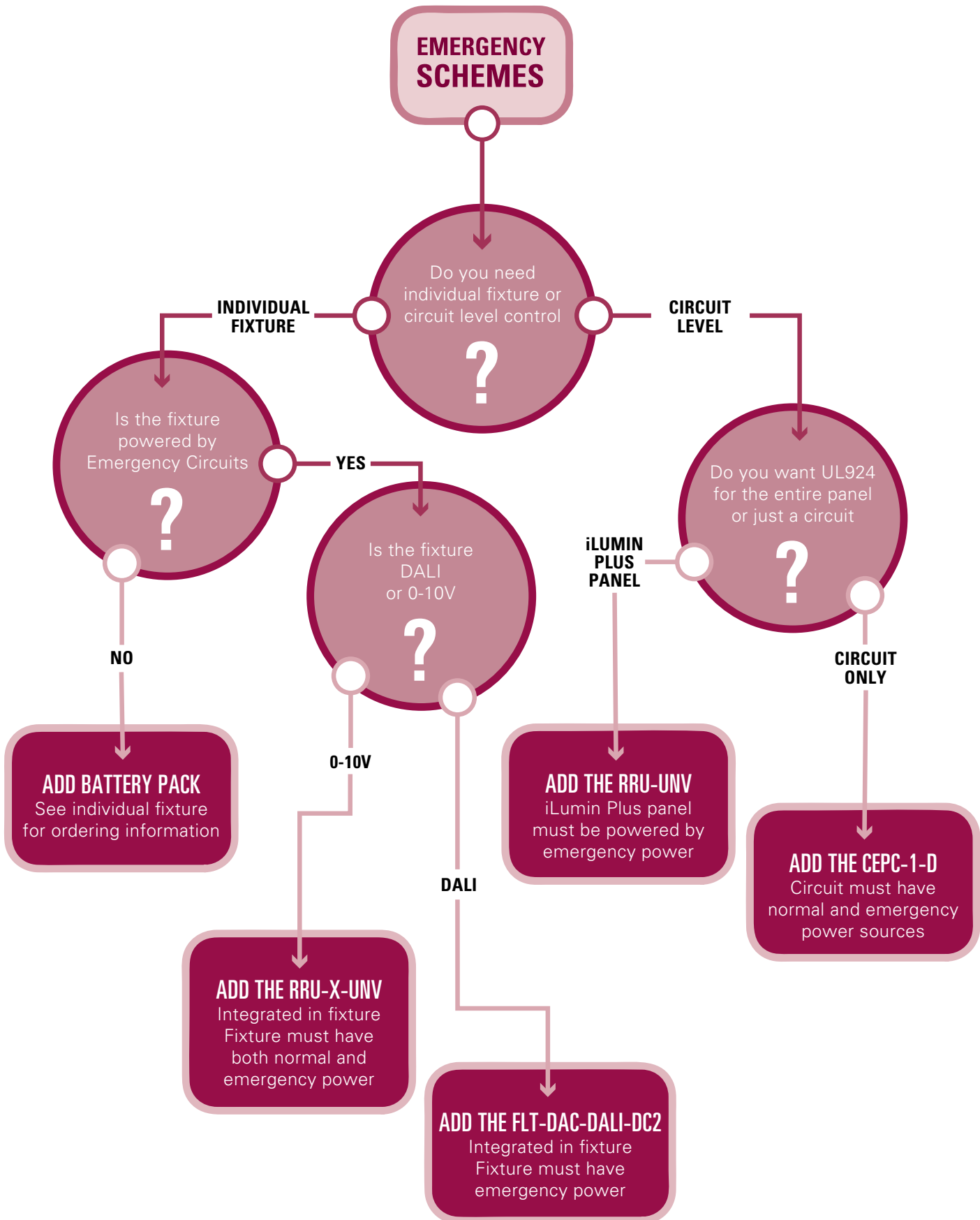
PANEL SIZE	CATALOG NO.	DESCRIPTION
Small	ILS - 0010	Small IL Panel with 4 DALI buses
Small	ILS - 1100	Small IL Panel with 12 20A Relays and 12 0-10V dimmers
Small	ILS - 0020	Small IL Panel with 8 DALI buses
Small	ILS - 2000	Small IL Panel with 24 20A Relays
Medium	ILM - 2201 ILM - 2200	Medium IL panel with 24 20A Relays and 24 0-10V dimmers and EG2 Medium IL panel with 24 20A Relays and 24 0-10V dimmers
Medium	ILM - 2111 ILM - 2110	Medium IL panel with 24 20A Relays and 12 0-10V dimmers, 4 DALI buses, and EG2 Medium IL panel with 24 20A Relays and 12 0-10V dimmers, 4 DALI buses
Medium	ILM - 0041 ILM - 0040	Medium IL panel with 16 DALI buses and EG2 Medium IL panel with 16 DALI buses
Medium	ILM - 3001 ILM - 3000	Medium IL panel with 36 20A Relays and EG2 Medium IL panel with 36 20A Relays
Medium	ILM - 4001 ILM - 4000	Medium IL panel with 48 20A Relays and EG2 Medium IL panel with 48 20A Relays
Large	ILL - 3301 ILL - 3300	Large IL panel with 36 20A Relays and 36 0-10V dimmers and EG2 Large IL panel with 36 20A Relays and 36 0-10V dimmers
Large	ILL - 4401 ILL - 4400	Large IL panel with 48 20A Relays and 48 0-10V dimmers and EG2 Large IL panel with 48 20A Relays and 48 0-10V dimmers

### iLumin Plus module information:

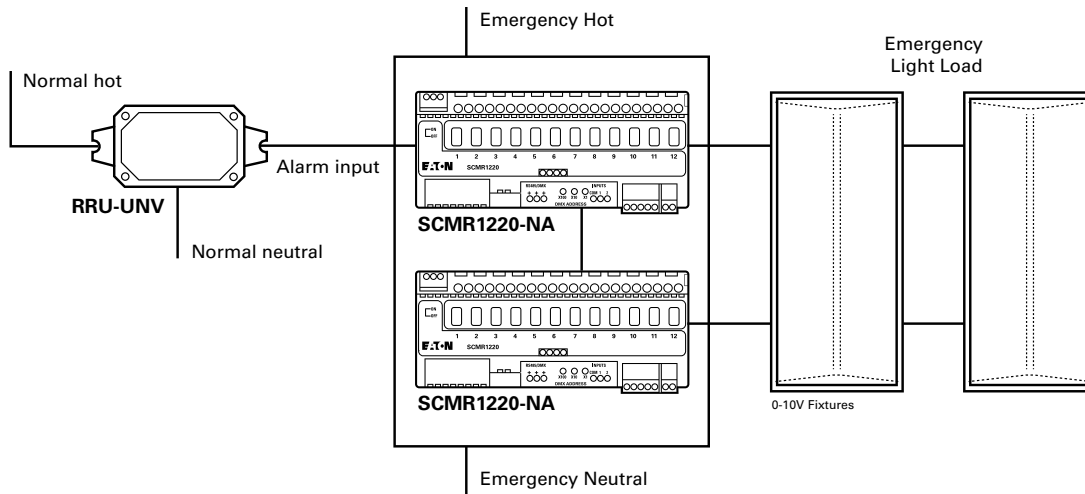
The table below provides information about each module to assist with loading calculations.

	SCMR1220-NA	SCMH1200-NA	SCMD4
<b>Size</b>	8.35" x 3.54" x 2.28"	8.35" x 3.54" x 2.28"	4.48" x 3.9" x 2.20"
<b># of Loads</b>	12	12	64 * 4
<b>Load types</b>	LED	LED	LED
<b>Voltages</b>	120/230/277VAC	0-10VDC	16V 250mA per loop
<b>Current</b>	20A per relay 192A total per module	80 drivers per channel 500 drivers total per module Assumes 2mA per driver	.2mA per device
<b>Requirements</b>		Requires relay for On/Off control (SCMR1220-NA)	
<b>Notes</b>		For each LDCM* dimmer add 1 SCMH1200 channel	

## B. Selecting the right emergency scheme

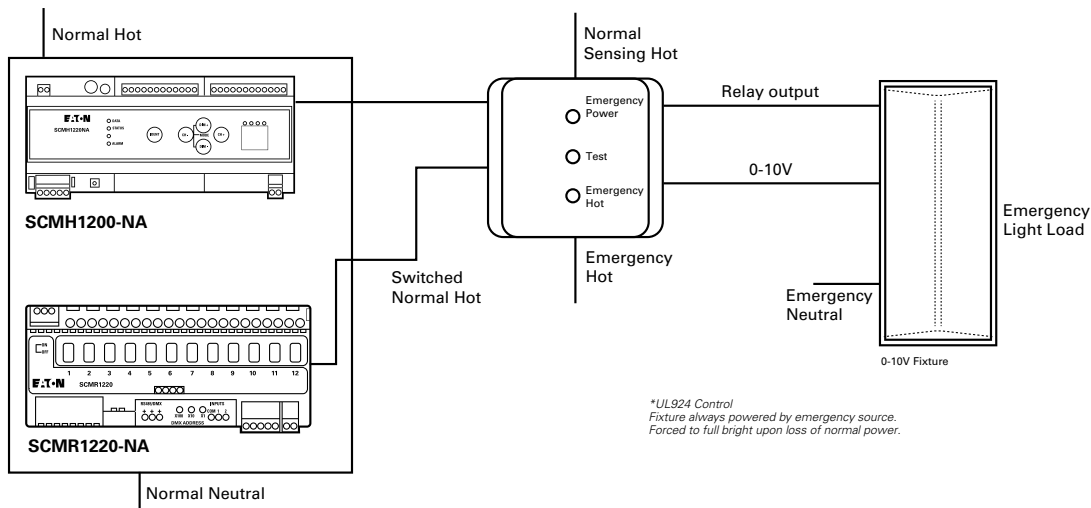


## iLumin Plus panel with a RRU-UNV for emergency override

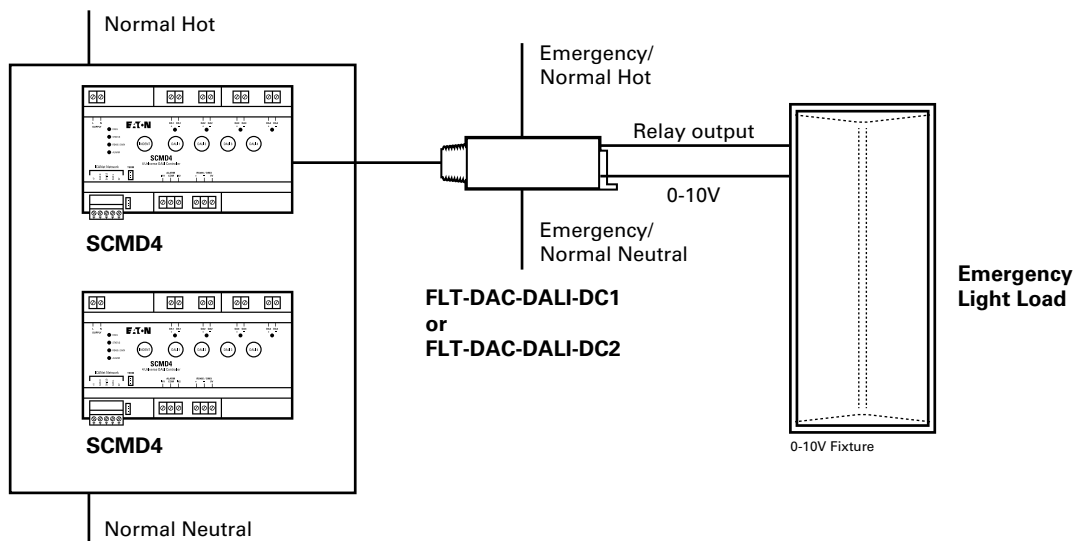


*iLumin Plus panel must be power by emergency power source.*

## iLumin Plus controlled circuit with CEPC-1-D for emergency override

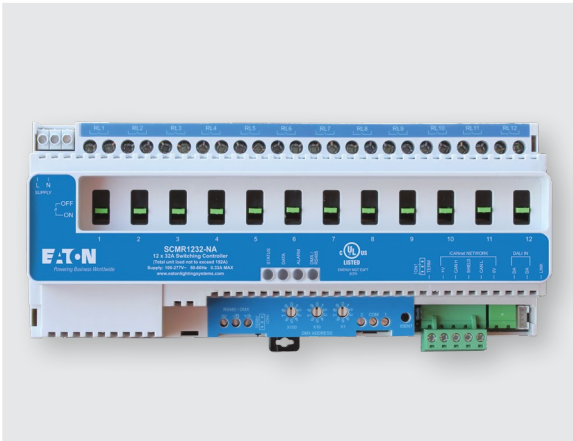


## iLumin Plus controlled fixture with FLT-DAC-DALI-DC1 for emergency override



# System components

## ILUMIN PLUS SYSTEM COMPONENTS



### SCMR1220-NA

This feed through relay unit provides outstanding features and performance in a truly competitive and compact package. Each channel is rated for up to 20A and is designed to switch heavy loads including LEDs. Recommend using only 16A per channel due to the overall module max of 192A.

#### Features

- 12 - 20A feed through relays
- (120/277VAC 50/60Hz)
- Switches resistive, inductive and capacitive lighting loads
- Manual override of loads
- DALI interface (12 address DALI end device)
- DMX512-A interface
- Two ALARM Inputs



### SCMH1200-NA

The SCMH1200-NA controls twelve 0-10V outputs that can be programmed to be controlled independent or aligned with relays from the SCMR1220-NA. Each channel may be configured to provide 1-10V or 0-10V control of luminaires.

#### Features

- 12 channel 1-10V, 0-10V control device
- iCANnet™ network terminal connections
- Forces 0-10V loads to full bright on power failure
- DALI interface (12 address DALI end device)



### SCMD4

The SCMD4 is a 4 bus ballast controller enabling dimming and switching of up to 64 individual addressable devices including luminaires. The compact design of SCMD4 delivers system flexibility as well as reducing installation costs and space used.

#### Features

- Simplified 2 wire control bus for input devices
- Includes ability to control and test DALI emergency luminaires
- Up to 64 devices per bus
- Easy installer test button per bus
- DMX512-A Interface

## ILUMIN PLUS SYSTEM COMPONENTS



### EG2 (DIN Rail)

The Ethernet Gateway provides a connection between the lighting control network and the building Ethernet LAN. This allows a user to control and configure the iLumin Plus system using iCANSsoft over the building LAN or via the internet rather than by connecting directly to an IL Series panel. Where a wireless LAN is in place (or by connecting a wireless router to the Ethernet Gateway) the user can access the network with a Wi-Fi enabled PC running iCANSsoft.

#### Features

- Connects to the building LAN
- Enables internet and Wi-Fi LAN access into the lighting control network
- Required for iLumin App via mobile devices (iPhone®/ iPad®)
- Provides access for API integration via ASCII control strings
- Required for BMSPRO 2 BACnet integration



### CR1-RJ

The CR1-RJ is included in every medium and large size IL panel. It Provides access to the iLumin Plus network from a laptop.

#### Features

- Simple PC network connection
- Powered from the iLumin Plus network



### SC-UN

The Universal Source Controller (SC-UN) contains individual control cards that are the industry's only true universal type cards capable of controlling every load type without a separate interface or multiple cards. In addition, each panel has on board Ethernet, A/V interface, Contact Closure, and DMX.

#### Features

- 6, 12, and 24 circuit variants
- Forward Phase triac slow rise-time dimmer engine

# Network devices and accessories

## Input Devices



### Wallstation

- Intuitive user control
- All device settings programmable
- Uses 2 wire polarity, topology free control bus
- Requires SCMD4

(See spec sheet for full list of catalog numbers)

FDW-#TLB-RL-W  
FDW-#TSB-RL-W



### Ineo Wallstation

- Scene selection fully programmable
- Intuitive user control
- Uses a 5 wire daisy chain control bus
- Built in IR receiver

(See spec sheet for full list of catalog numbers)

CLS-#TLB-RL-W  
CLS-#TSB-RL-W



### 3.5" Color Touchscreen

- Provides easy selection of controls
- Zone, scene or area controls
- Fully programmable

TSC-30-W-NA  
TSC-30-B-NA  
TSC-30-SS-NA  
TSC-30-V-NA



## Automatic Controls



### Multi-Sensor

- Daylight and occupancy detection
- All device settings programmable
- Uses 2 wire polarity, topology free control bus
- Requires SCMD4

FLT-MTS6-DALI  
FLT-MTS12-DALI



### iCANnet Multi-Sensor

- Daylight and occupancy detection
- All device settings programmable
- Uses a 5 wire daisy chain control bus
- IR receiver for handheld remote

NS3-C





## Automatic Controls



### Greengate Low Voltage Sensor

- *Occupancy sensors*
- *MicroSet self-adjusting technology*
- *Standard low voltage input*
- *Works with the following:*
  - *Sensor Powerpack*
  - *UIG*
  - *UIM (Mini-UIG)*

**OAC-DT-2000-R**  
**OAC-DT-1000-R**  
**OAC-DT-500-R**  
**OAWC-DT-120W-R**  
**OAWC-P-120W-R**



### Sensor Powerpack

- *Supports up to five (5) Greengate occupancy sensors*
- *Plenum rated*
- *Device identification buzzer*
- *Requires SCMD4*
- *Uses 2 wire polarity, topology free control bus*

**FLT-SP-MV-DC2**  
**FLT-SP-240-DC2**  
**FLT-SP-347-DC2**



### Astronomical Time Clock

- *255 events*
- *8 sequences with up to 30 steps per sequence*
- *Scene selection and programming*
- *Channel level raise and lower*

**TC1**



## End Devices



### 0-10V to Reverse Phase

- Dims ELV with 0-10V control
- Auto voltage sensing
- Plenum rated
- Simple reverse phase control
- Requires a 0-10V channel from the SCMH1200-NA

LDCM-PL-120-277-010V-GR



### 0-10V Fixture Control

- Permits control of standard 0-10V luminaires
- Available in class 1 and class 2
- UL924 listed
- Uses 2 wire polarity, topology free control bus

FLT-DAC-DALI-DC1  
FLT-DAC-DALI-DC2



### Dimming Module

- Forward phase dimming control
- Control wires can be run with power wires
- Mounts to standard 4" square box
- Uses 2 wire polarity, topology free control bus

FLT-HPDM-DALI



### Relay

- Universal 120V-347V
- Power loss automatically closes relay
- Plug load rated
- Uses 2 wire polarity, topology free control bus

FLT-HPRS-DALI



## Integration



### BACnet Interface

- Multi-protocol and lighting control system support
- Web-based setup
- Integrated BACnet explorer
- Automatic BACnet point mapping
- Connects to the building LAN or VLAN

\*Requires EG2-NA for connectivity

FPA-W34-1130

## Integration



### Ethernet Interface

- LAN or VLAN connectivity
- Integral web server
- Enables mobile control
- Enables BACnet or AV control
- Bridges LAN connections

EG2-NA



### DMX Interface

- DMX output of 96 channels
- DMX control from timeclock, touchscreen, wallstation, or software
- Allows control of DMX luminaire

SCD96-NA



### Relay Interface

- Volt free relay outputs for shade or curtain
- Enables control from wallstation, sensor, touchscreen or software

RI-2-NA



### Serial Interface

- Serial connection for AV integration
- Configurable for advanced partition spaces

SI-2-NA



### Network Bridge Interface

- Connect multiple lighting control networks
- Expand beyond 100m/3200ft of wired network distance
- Simplifies multifloor network wiring

BN-2-NA



## Low-Voltage Integration



### Partition and Input Interface

- 6 digital optically isolated inputs
- Programmable network inputs
- Provides simple partition control with IRTR

UIM



### Partition and Input Interface

- 4 digital optically isolated inputs
- 4 analog inputs
- Programmable network inputs
- Provides simple partition control with IRTR

UIG-2-NA



### Partition Sensor

- Partition transmit and receiver for all open/close
- LED indicator makes sensor alignment simple
- Requires power from EXPS-15

\*Requires UIM or UIG-2-NA

IRTR

## Emergency



### UL924 Relay Control

- UL924 listed panel accessory
- Detects loss of normal power and provides override signal

RRU-UNV



### UL924 Dimmer Control

- UL924 listed
- Forces 0-10V loads to full bright upon loss of normal power
- Integral test switch
- Visible status LEDs

CEPC-2-D

# Tools for Facility Managers



## iLumin App

- Free downloadable from App store
- Compatible with latest iOS version
- Easily control your lights while walking the floor
- View, modify and select scenes

*\*Search for iLumin Remote on the Apple store*



Download the iLumin Remote App



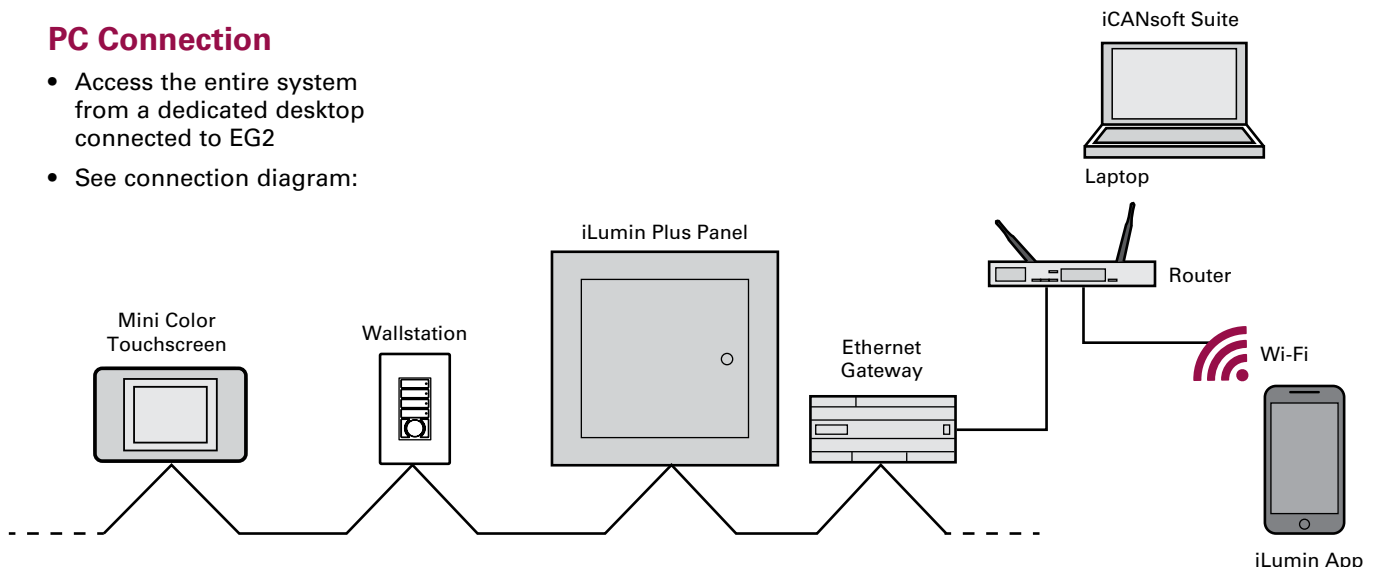
## Event Scheduler

- View and manage entire building lighting events and schedules
- Graphical presentation
- Create events and make changes
- Easily create exceptions

**iCANsoft\_Suite**

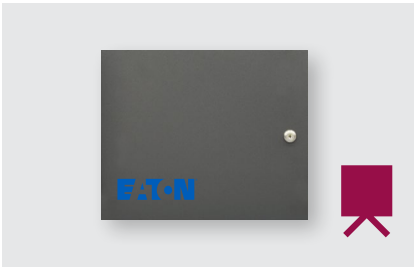
## PC Connection

- Access the entire system from a dedicated desktop connected to EG2
- See connection diagram:

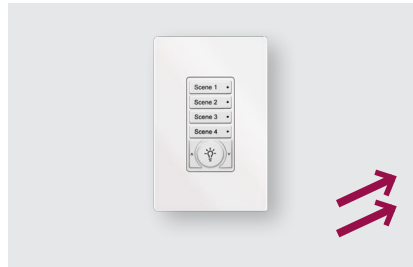


# Basic steps to design an iLumin System

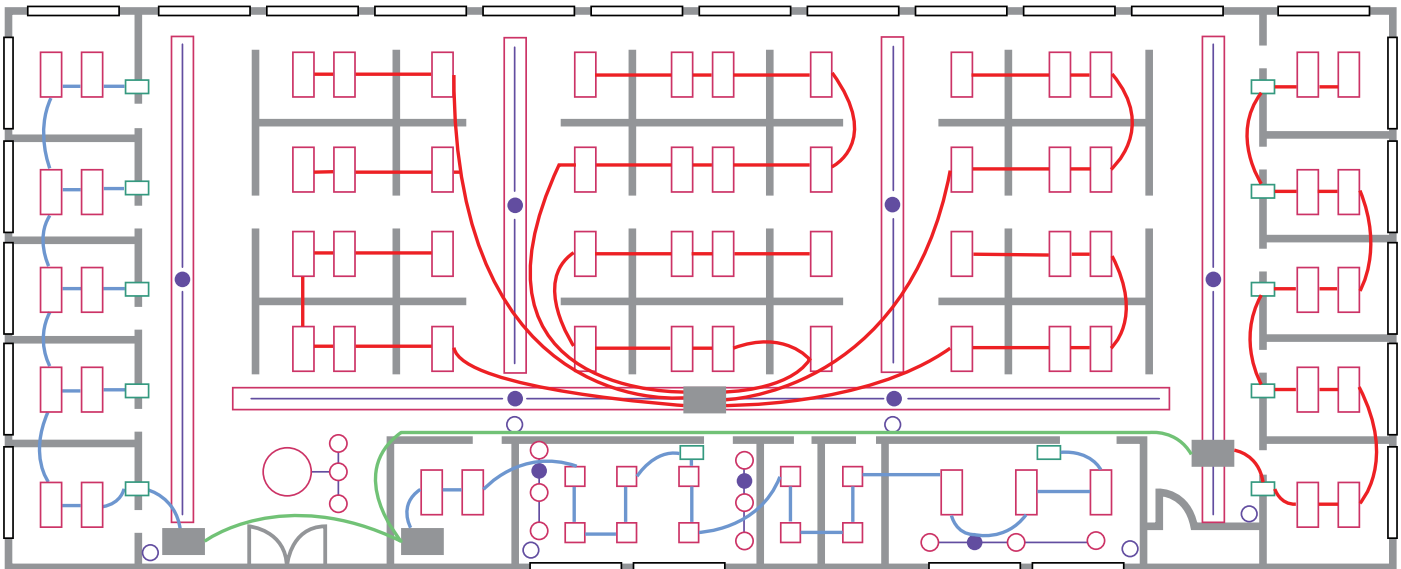
## 1. Select and layout Configured panels



## 2. Select and layout Wallstations on 2 wire controls network



## 3. Select and layout 2 Wire multi sensors



## 4. Select and layout Wallstations on 2 wire controls network optional touchscreens



## 5. Add Optional time clock



## 6. Add Optional lighting network interfaces

- Ethernet
- BACnet
- DMX
- Shade
- A/V
- Partitioning

## Scheduling

For a time schedule based control, TC1 is required. Typically a single timeclock is good for the entire project. TC1 sits on the lighting control network and is powered from the network bus. No separate power supply is needed.

## Daylighting

For areas that need daylighting in addition to occupancy, use one of the available multi sensors to provide occupancy and daylighting control in the space.

- For 2 wire networks, choose the **FLT-MTS12-DALI Multi Sensor** for daylighting.
- For the 5 wire network, choose **NS3-C Multi Sensor** for each daylighting sensor required

## Occupancy/Vacancy

Estimate the total no. of Greengate occupancy/vacancy sensors. Each sensor requires an input. For every 4 inputs, choose 1 UIM (mini-UIG).

- *Note 1: The Greengate sensors do not sit on the lighting control network. The UIM (mini-UIG) acts as an interface to connect the GG sensors. Note also, that each Greengate sensor is powered off a Switchpack.*
- *Note 2: The Greengate sensors do not sit on the 2 wire network. Use Sensor Powerpack to connect the Greengate sensor to the 2 wire network.*

## Partitioning

If partitioning is required, assess the number of partitioned areas. For each partitioned area, estimate the number of partitions. Based on that choose either a UIG-2-NA or SI-2-NA. See table below:

Number of partitions in a room/area	Device needed
3 or less	UIG-2-NA
>3	SI-2-NA

For any custom partitioning regardless of the no. of partitions, choose SI-2-NA-CP.

## 3rd Party Integration

For A/V integration interface, choose the SI-2-NA for serial RS232 interface or EG2 for Ethernet interface. These products connect to the lighting control network directly.

For BACnet integration, a BMS Pro is required.

- Typically, one BMS Pro is needed for entire project.
- BMS Pro typically is capable of handling up to 10,000 points.
- BMSPro requires a dedicated EG2 or EG2-NA for connection between the lighting control network and the building LAN or VLAN.

For building LAN integration, an EG2 is required. Many panel configurations have integrated EG2 option available. Alternatively, a wall mountable EG2-NA can be ordered as a separate accessory.

## DMX

For DMX fixture control include the SCD96-NA. The SCD96-NA supports 96 DMX output channels that can be controlled by any input on the lighting control network. Multiple SCD96-NA panels can be supported on the lighting control network providing for flexible DMX integration application support.

## Phase Dimming

Linear Dimming Control Module Plenum Rated (LDCM-PL) takes a 0-10V dimming signal and converts it to an ELV dimmed output for up to 1000W with a 277V load and 450W on a 120V load. The LDCM-PL is rated to directly mount to a junction box in a plenum space for easier installations and to meet building requirements.

Each LDCM-PL can be connected to any output on the iLumin Plus SCMH1200-NA module.

# Best practices / FAQs

## **Is it possible to buy the individual DIN Rail modules mounted inside the panel?**

iLumin Plus is sold in the form of factory pre configured panels. These panels come in different configurations and sizes. Individual DIN Rail modules are not currently available for sale separately.

## **Is it possible to customize the panel configurations?**

iLumin Plus is provided in a wide variety of configurations that should meet most applications. See page 11 for a full list of configurations.

## **Can we mix 2 wire and 5 wire networks in the same network design?**

Yes, this is one of the advantages of the iLumin Plus System. The iLumin Plus system supports multiple control methods including 2 wire topology free, relay, 0-10V dimming, and DMX. Use this design guide to ensure your system is designed appropriately.

## **Where should the iLumin Plus panels be installed?**

Depends on the size of the panel. All medium and large sized panels should be installed in accordance with applicable codes and standards and the installation manual guidelines. Small sized panels are plenum rated and can be mounted in the ceilings.





### **What sensor technologies work with iLumin Plus?**

iLumin Plus supports multi sensors that provide daylighting and occupancy detection. Additionally a 2 wire powerpack provides a connection for any low voltage occupancy sensor which provides PIR, Ultrasonic or Dual Technology occupancy detection.

### **Do iLumin Plus panels perform phase dimming?**

Adding a LDCM module to any 0-10V output in an iLumin Plus panel will convert a 0-10V output to a phase dimmed output (reverse phase).

### **Do iLumin Plus panels have integrated astro time clock?**

Using the accessory timeclockTC1 that integrates directly with the lighting control network provides time clock capabilities. Typically a singleTC1 is all that is required for the entire lighting control network.

### **When using iLumin Plus panels with SCMD4's, is it possible to design my system completely with DALI?**

Yes, you would network multiple iLumin Plus panels together using the lighting control network, however all inputs and outputs would reside on the 2 wire topology, polarity free DALI bus.



# Installation design guidelines

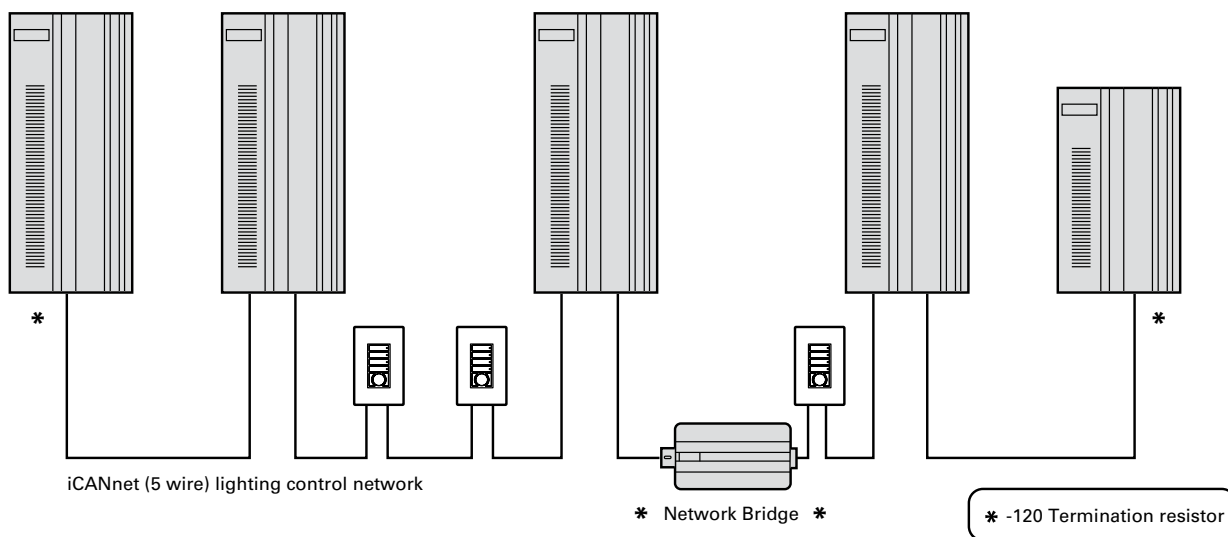
This section is divided into two:

- 1) iCANnet based installation design guide
- 2) DALI based installation design guide

The factors that lead to a good network are:

- Quality of the cable used
- Quality of the connections
- Cable length
- Voltage drop

If these are ignored then the problems that arise will consume more time and money than getting it correct from the outset.



## iCANnet Based Network Design & Installation Guidelines

### Basic Concept of a iCANnet

- iCANnet Bus is a multidrop network on which spurs or stars are not allowed
- A 120Ω Resistor is required at each end of the network.

### General iCANnet network requirements

The iCANnet network requires devices to be linked together in a daisy-chain arrangement. A single run of daisy-chained devices is called a Segment.

There are three main constraints for a iCANnet network segment:

- The combined cable lengths of the segment may not exceed 3280 feet (1000 meters)
- No more than 100 devices or nodes may be connected within a single segment.
- Terminate the devices at each end of the segment with a 120- ohm resistor. Leave the remaining devices on the segment un-terminated. See schematic above.

Where more than 100 devices or excessive overall cable lengths are required, it is necessary to use a Bridge device to link two or more segments together. See Accessories page for details on the iCANnet network bridge BN2-NA (also called Network Bridge).

Refer to the panel installation manual for complete instructions on iCANnet wire termination for iLumin Plus Systems.

## iCANnet Network Loading and Power Requirements

DEVICE	NETWORK LOAD
NS3-C	15 mA
EG2	100 mA
Wall-Station / KeyPad	20 mA
BN2-NA	40 mA
UIM (Mini-UIG)	50 mA
UIG	50 mA
TC1 Time Clock	140 mA

### Available iCANnet Network Power from the Panel

Varies by configuration. Most of the configurations come included with a network Power Supply. See table below

PANEL CONFIGURATION NUMBER	TOTAL BUS CURRENT OUTPUT AVAILABLE	CURRENT FROM ADDITIONAL 15V DC PSU IN THE PANEL
ILS-0010	500 mA	n/a
ILS-1100	600 mA	n/a
ILS-0020	1000 mA	n/a
ILS-2000	200 mA	n/a
ILM-2201 ILM-2200	1000 mA	2000 mA
ILM-2111 ILM-2110	1000 mA	2000 mA
ILM-0041 ILM-0040	1800 mA	2000 mA
ILM-3001 ILM-3000	100 mA	2000 mA
ILM-3301 ILM-3300	1600 mA	2000 mA
ILL-4001 ILL-4000	200 mA	2000 mA
ILL-4401 ILL-4400	2200 mA	2000 mA

### Rules for Determining Additional PSU Unit Requirements

- All medium and large panels already include one 15V DC power supply unit. See table above. Each of these panels can power up to 10 Wall-Stations within 1000 ft.
- Besides the PSU, any bus current available (per above table) can be used to power either additional keypads or other devices. Refer to the iCANnet network loads table to see the current draw by different iCANnet device types.
- For devices on the network beyond 1000 ft, deploy an additional 15V DC EXPS power supply. This additional EXPS power supply can be field installed and power 10 additional keypads for another 1000 ft.

## DALI Based Network Design & Installation Guidelines

### What is DALI?

- DALI is an abbreviation for Digital Addressable Lighting Interface
- DALI is a bi-directional protocol for digital communication between lighting devices
- The DALI standard is now defined in IEC 62386
- Adoption of the DALI standard by many manufacturers has ensured a long term future with expanding capabilities

### Key DALI Network Topology Rules

- Maximum of 64 DALI addresses on a DALI network.
- 300 meter network length when using 14 AWG cable. 150 meter when using 18 AWG
- No special cable required
- Network can be open topology, polarity free allowing spurs, stars, and T-taps.
- DALI data is bi-directional allowing for input and output devices

### DALI Physical Network Electrical Characteristics

- Maximum current on DALI network is 250mA
- No additional power supplies are allowed.
- No termination resistors are required

### DALI Addressable Features

- All DALI devices required to have an address
- Some devices have multiple addresses e.g. RGB drivers
- Maximum number of 64 addresses per DALI network

### DALI Network Loading

DEVICE TYPE	DALI CURRENT LOAD	MAX PER LOOP	ADDRESSES
Lighting driver or Ballast	2mA	64	1
2 wire Wallstation	3.75mA	64	1
2 wire Relay	3.75mA	64	1
2 wire Multi Sensor	3.75mA	8	1
2 wire 0-10V fixture control	3.75mA	64	1

\*Note: Max Load is 250 mA on the bus (loop). Max no. of devices is 64 per loop. Max no. of addresses are 64 per loop

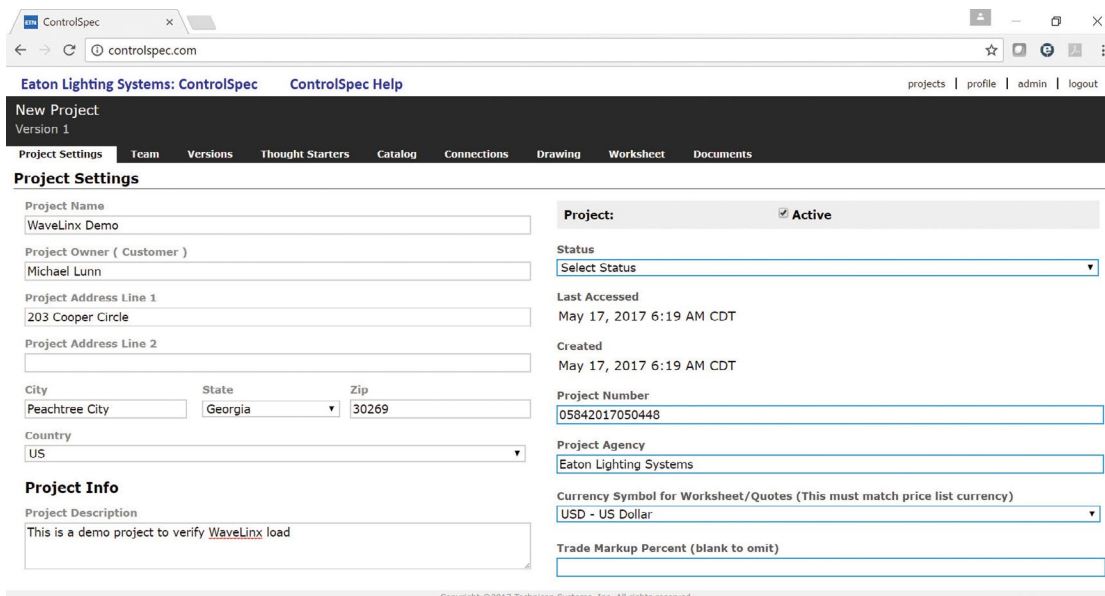


# ControlSpec design tool

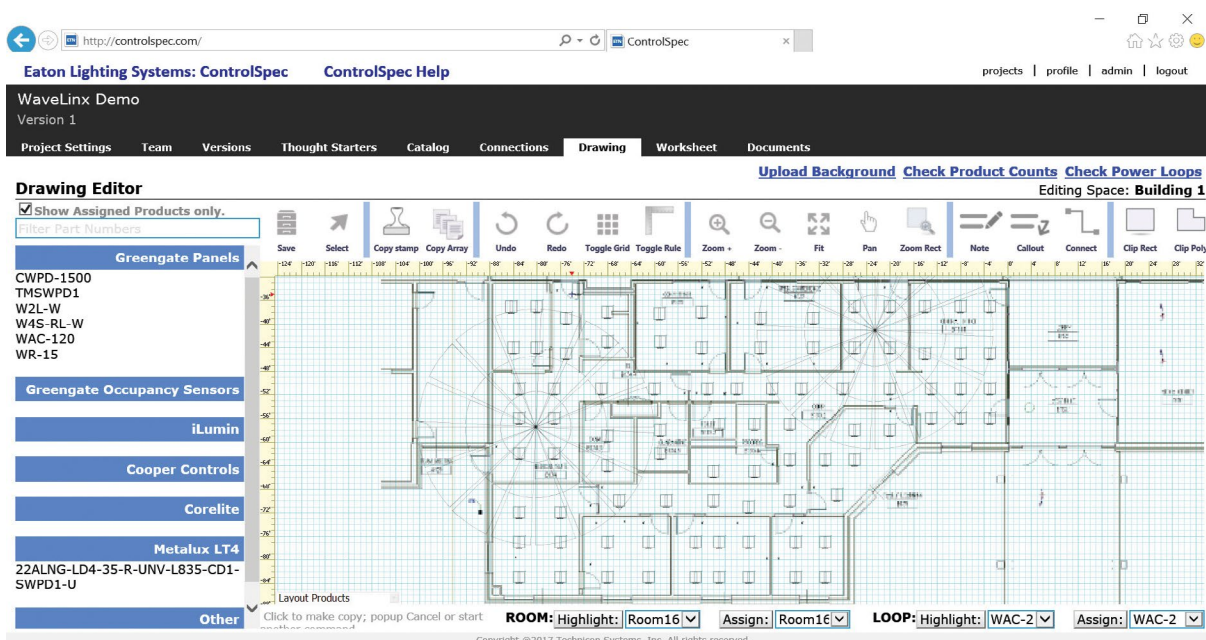
ControlSpec is your design and quote tool of choice, enabling you to layout, quote and submit on a project from within one tool. For the iLumin Plus product line all control devices and a large selection of iLumin Plus accessories are at your fingertips. Create your project, perform a takeoff, create one-line drawings and price your project. Product pricing is inside ControlSpec reducing your quote time.

## ControlSpec value to you:

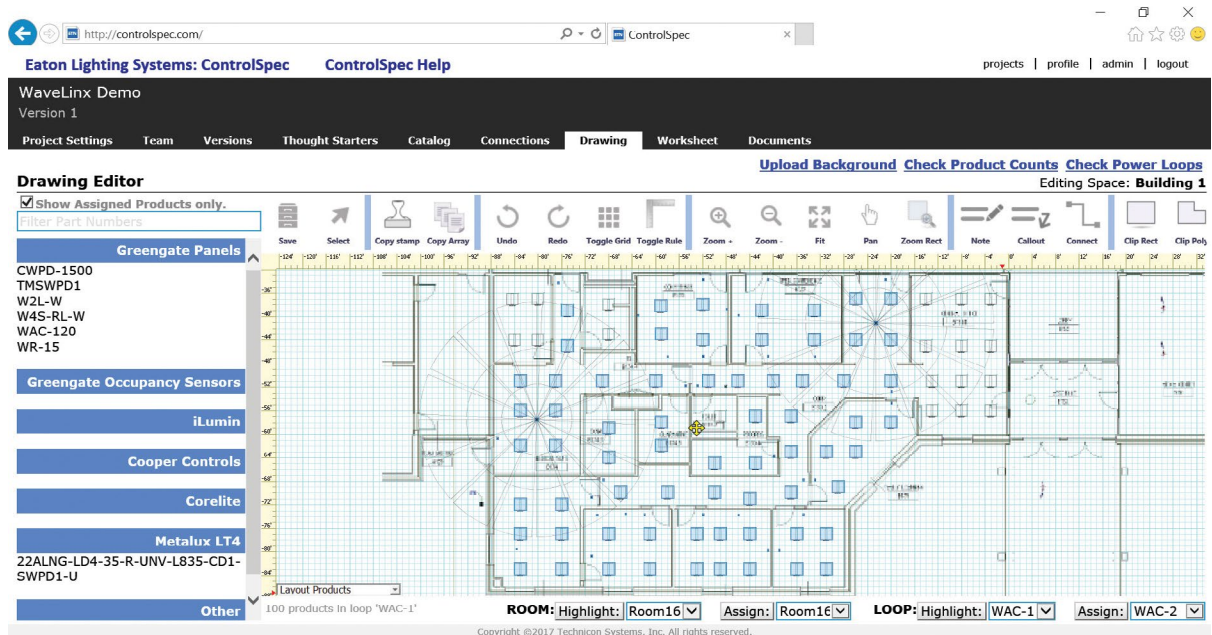
- Create a project
- Perform layout take-off
- Review and adjust pricing
- Create customized one line drawings
- Print quote and submittal documentation
- Product filtering for faster access and selection
- Quick product addition on every screen



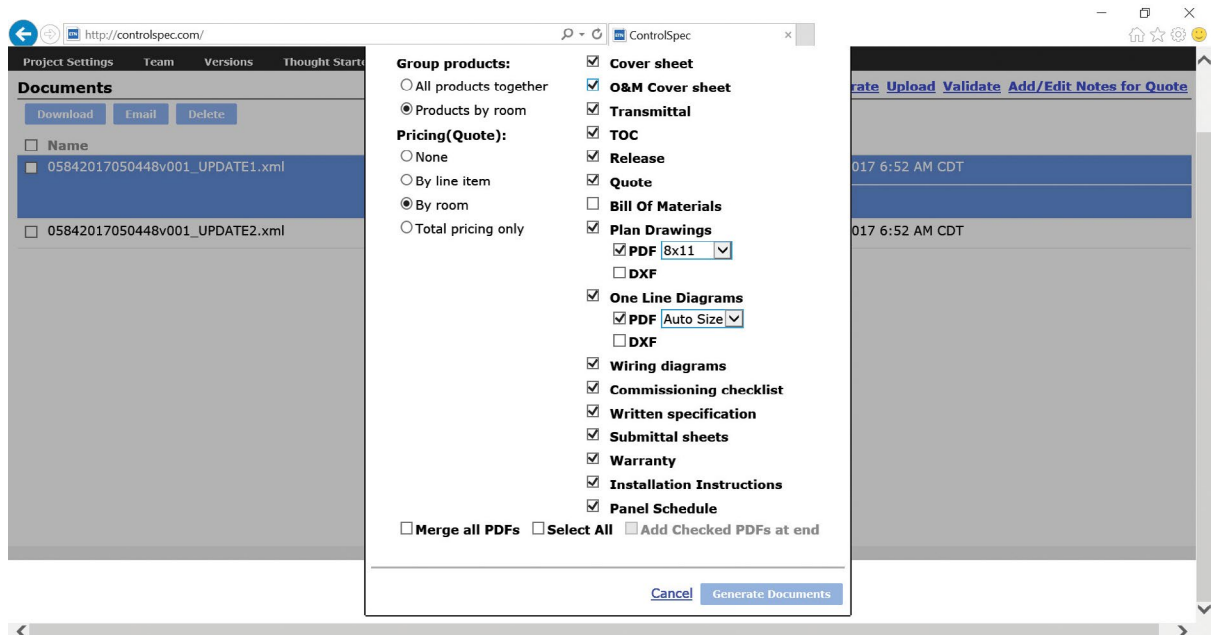
Create a project with customer information and share with other members of the design team.



Use the floorplan tool to layout your project, add luminaires, wallstations, ceiling sensors, relays and lighting panels.



Define rooms, and see occupancy coverage.



Generate a full submittal package, quotation, one lines and floor plan drawings.

# Energy Codes application notes

## ANSI / ASHRAE / IES Standard 90.1-2016

Energy Standard for Buildings Except Low-Rise Residential Buildings (Standard 90.1-2016) adopted as of September 2016. This code significantly fine-tunes the design requirements for code-compliant lighting controls systems, mechanical systems, and the building envelope. This application note summarizes the new mandatory lighting control requirements and highlights where they can be used in various spaces. Please note: this document is intended to provide a general reference and design professionals should consult Standard 90.1-2013 and the authority having jurisdiction for project-specific requirements and interpretation.

**ASHRAE 90.1 was recognized by the U.S. Department of Energy (DOE) as the national energy reference standard.**

### Below summarizes changes from 90.1-2013 to 90.1-2016:

- Reduced occupancy-sensor time delay from 30 to 20 minutes
- Requires partial-off to 50% in spaces where lights should remain ON, such as corridors and stairwells
- Requires daylight controls in primary, secondary and top light zones
- Requires functional testing requirements

## International Energy Conservation Code (IECC) 2018

IECC 2018 establishes minimum energy efficiency requirements for new and renovated buildings. This latest iteration contains dramatic changes to the prescriptive and performance-based criteria that previously defined IECC-compliant lighting and lighting control systems. ASHRAE 90.1 is recognized by the DOE as the national reference standard, however IECC is adopted by many states. Please note: this document is intended to provide a general reference and design professionals should consult IECC 2018 and the authority having jurisdiction for project-specific requirements and interpretation.

### Below summarizes changes from 2015 to 2018:

- Use Luminaire level lighting controls (LLLC) to satisfy controls requirements
- Daylighting enhancements
- Expand occupancy sensor requirements to open office
- Reduces Light Power Densities (LPD) for interior and exterior lighting systems

## California Title 24

California's Building Energy Efficiency Standards are updated on an approximately three-year cycle. The 2016 Standards will continue to improve upon the 2013 Standards for new construction of, and additions and alterations to, residential and nonresidential buildings. The effective date of the 2016 Standards is January 1, 2017.

### Below summarizes changes from 2013 to 2016:

- Mandatory controls eliminates power adjustment factors
- Simplify multilevel lighting controls
- Clarify partial-ON and partial-OFF requirements
- Clarified alterations controls requirements



# Quick Reference Guide - Commercial Requirements

IECC(2018), ASHRAE 90.1(2016), Title 24(2016), NECB(2011)

	IECC 2018	ASHRAE 90.1 2016	T24 2016	iLumin Plus
<b>Automatic Controls</b>				
<b>Occupancy Sensors</b>	C405.2.1	9.4.1.1(h)	130.1(c)	●
<b>Partial Off</b>	C405.2.1.2 (warehouse) C405.2.1.3 (open office)	9.4.1.1(g)	130.1(c)	●
<b>Full Off</b>	C405.2.1.1.1 (20min)			●
<b>Scheduled Off</b>	C405.2.2	9.4.1.1(h)	130.1(c)-(warehouse, corridor, stairwell, library stacks)	●
<b>Plug Load Off</b>	N/A	8.4.2	130.1(d)	●
<b>Manual On/Partial On</b>	C405.2.1.1.2	9.4.1.1(b)-(manual ON) 9.4.1.1(c)-(partial ON)	130.1(c)-(office<250ft <sup>2</sup> , classrooms, conference rm)	●
<b>Manual Controls</b>				
<b>Manual On/Partial On</b>	C405.2.1.1.2	9.4.1.1(b)-(manual ON) 9.4.1.1(c)-(partial ON)	130.1(c)-(office<250ft <sup>2</sup> , classrooms, conference rm)	●
<b>Manual Light Reduction</b>	C405.2.2.2			●
<b>Area/Local Controls</b>	C405.2.5	9.4.1.1(a)	130.1(b)-(multi-level controls)	●
<b>Daylighting</b>				
<b>Daylight Responsive Control</b>	C405.2.3	9.4.1.1(e)-(>150W sidelighting) 9.4.1.1(e)-(>150W toplighting)	130.1(d)-(>120W with <.5W/ft <sup>2</sup> dimming optional) 130.1(d)-(>120W with <.5W/ft <sup>2</sup> dimming required)	●
<b>Exterior Controls</b>				
<b>Parking Garage Lighting</b>		9.4.1.2		●
<b>Exterior Lighting</b>	C405.2.5	9.4.1.4		●
<b>Special Items</b>				
<b>Specific Application Controls</b>	C405.2.4			●
<b>Additional Efficiency Packages</b>	C406.1			●
<b>Guest Room or Sleeping Units</b>	C405.2.4.3	9.4.1.3(b)		●
<b>Functional Testing</b>	C408.3	9.4.3	130.4	●
<b>Metering</b>			130.5(a)	Option
<b>Demand Responsive Controls</b>			130.1(e)-(>10K ft <sup>2</sup> reduce by 15%)	●

# Application code compliant sequence best practices

	ASHRAE 90.1 2016	IECC 2018	T24 2016	Atrium	Banking	Classroom / Training / Lecture	Conference / Meeting room
Local Control	9.4.1(a)	C405.2.5	130.1(a), (b)	●	●	●	●
Manual ON	9.4.1(b)	C405.2.5	130.1(a), (b)	●	●	●	●
Partial Automatic ON	9.4.1(c)	C405.2.1.1.2	130.1(b)	●	●	●	●
Bi-level Lighting	9.4.1(d)					●	●
Daylighting Side lighting	9.4.1(e)	C405.2.3.2	130.1(d)	●	●	●	●
Daylighting Top lighting	9.4.1(f)	C405.2.3.3	130.1(d)	●	●	●	●
Automatic Partial OFF	9.4.1(g)	C405.2.1.3	130.1(c).6				
Automatic Full OFF	9.4.1(h)	C405.2.1.1.1	130.1(c).5	●	●	●	●
Scheduled Shutoff	9.4.1(i)	C405.2.2	130.1(c)	●	●	●	●
Receptacle Control	8.4.2	C405.2.4	130.5(d)		●	●	●
Energy Monitoring	8.4.3.2		130.5(b)	●	●	●	●
Parking Garage Lighting Control	9.4.2	C405.2.6	130.1(a), (b)				
Functional Testing	9.4.3	C408.3	130.1(a), (b)	●	●	●	●
Demand Response			130.1(a), (b)	●	●	●	●
Enhanced Digital Lighting Controls		C406.4		●	●	●	●



Required



Choose one



Choose one



Choose one

Copy / Print room	Corridor	Courtroom	Dining area	Food preparation	Library	Office	Restroom	Sales area	Stairwell
●	●	●	●	●	●	●	●	●	●
●		●	●	●	●	●	●	●	●
●		●	●	●	●	●	●	●	●
●	●	●	●	●	●	●		●	●
●	●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●
									●
●	●	●	●	●	●	●	●	●	●
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●			●		●	●	●	●	
●	●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●

● Required     
 ● Choose one     
 ● Choose one     
 ● Choose one









### **Lighting Product Lines**

Ametrix  
AtLite  
Corelite  
Ephesus  
Fail-Safe  
Halo  
Halo Commercial  
Invue  
io  
Iris  
Lumark  
Lumière  
McGraw-Edison  
Metalux  
MWS  
Neo-Ray  
Portfolio  
RSA  
Shaper  
Streetworks  
Sure-Lites

### **Controls Product Lines**

Fifth Light Technology  
Greengate  
iLight (International Only)  
iLumin  
Zero 88

### **Connected Lighting Systems**

Distributed Low-Voltage Power  
HALO Home  
iLumin Plus  
LumaWatt Pro  
WaveLinx

### **Eaton**

1121 Highway 74 South  
Peachtree City, GA 30269  
P: 770-486-4800  
[www.eaton.com/lighting](http://www.eaton.com/lighting)  
For service or technical assistance:  
1-800-553-3879

### **Canada Sales**

5925 McLaughlin Road  
Mississauga, Ontario L5R 1B8  
P: 905-501-3000  
F: 905-501-3172

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