



EcoSystem® | a revolution in light control
Design guide



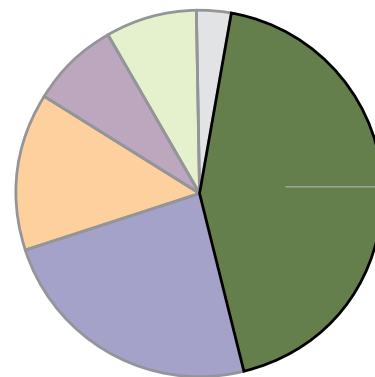
EcoSystem is a lighting control system comprised of digital dimming ballasts, controls, and environmental sensors. Working together, these components:

- **save energy from 40% to 70%**
- **increase space flexibility**
- **increase occupant comfort and productivity**
- **reduce maintenance costs**

EcoSystem is designed for office spaces and K-12/university classrooms, where lighting accounts for 30% to 44% of electricity usage. These applications benefit from EcoSystem's unparalleled energy savings through personal controls including wallstations and infrared remote controls, and environmental sensors such as daylight and occupancy/vacancy sensors.

In addition to providing energy savings, EcoSystem creates a more flexible workspace where lighting fixtures with EcoSystem ballasts are individually addressed. These ballasts are programmed, instead of wired, to work individually or as a group, creating flexibility in a space that adjusts to the shifting needs of any building.

Finally, EcoSystem reduces lighting system maintenance. All of the environmental sensors and personal controls connect directly to any ballast—eliminating interfaces, power packs, and control devices—that on other systems require more parts, programming and maintenance.



Annual electricity use in office buildings¹

44%	Lighting
24%	Office equipment
14%	Space cooling
8%	Ventilation
8%	Other
3%	Space heating

¹ Source: Energy Information Administration Office, 1995. Commercial Buildings Energy Consumption Survey, released September, 2000.

EcoSystem® design guide

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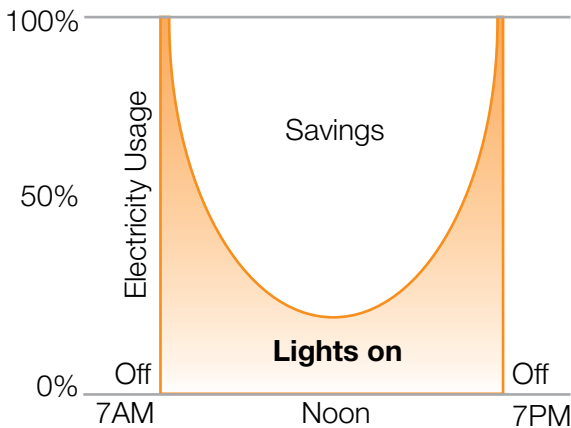


Energy savings

Efficient lighting control offers a significant energy-saving opportunity.

Despite the fact that most lighting is energy-efficient fluorescent,

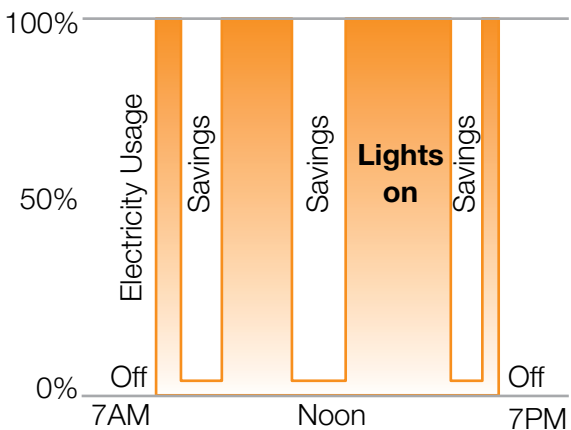
the number-one source of energy consumption in any building is still lighting.



Daylight harvesting saves energy

Take advantage of available natural light. Adjust electric lighting smoothly, unobtrusively and continuously.

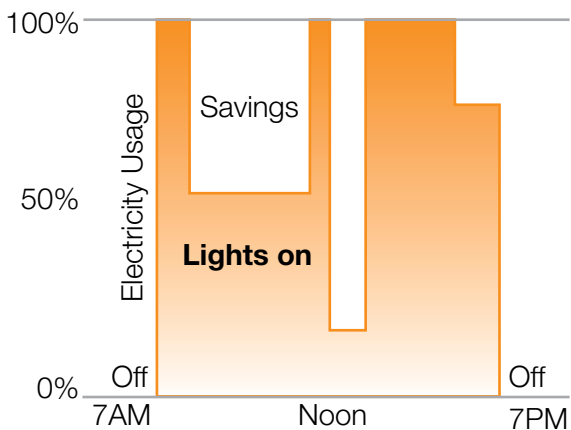
Best applied in areas with large windows or skylights, such as perimeter offices, classrooms, malls, and atria.



Occupancy/Vacancy sensing saves energy

Slowly dim lights to low level or turn lights off when space is unoccupied; turn lights on when someone enters.

Best applied in enclosed areas such as meeting rooms, offices, classrooms, and corridors.



Manual dimming control saves energy

Provide personal choice and control of light levels to adapt spaces for different tasks and activities. Permit dimming from multiple locations. Allow the ability to turn lights on and off.

Best applied in areas such as meeting rooms, offices, and classrooms.

Increased productivity

Occupant comfort

The cost of an employee (including salary and benefits) far exceeds the energy costs in any building. That's why **ergonomic lighting** — lighting that supports the physical and psychological needs of the people in buildings — pays big dividends for corporations today.

Studies by the Light Right Consortium™ and other researchers show that ergonomic lighting leads to positive effects such as improved productivity, reduced health complaints, and increased occupant satisfaction.

Effects of daylight

Heschong Mahone Group has confirmed that classrooms are more effective learning environments with greater amounts of daylight.¹ Likewise, office environments and employee productivity can be improved with the proper balancing of daylight and electric light. When the amount of daylight is increased, the amount of electric light must be reduced proportionately, to maintain proper luminance levels.

1 "Daylighting in Schools", Heschong Mahone Group, August 20, 1999.

Compliance with building codes and guidelines

Energy efficiency is the design requirement of the new millennium. Many states and cities have already adopted specific energy-saving guidelines and more will soon follow suit.

ANSI/ASHRAE/IESNA Standard 90.1-2004

ANSI/ASHRAE/IESNA Standard 90.1-2004 encourages the use of energy-efficient lighting controls in design practice for both interior and exterior lighting. Most states have energy codes based on the standard.

LEED® (Leadership in Energy and Environmental Design)

LEED is a rating system managed by the United States Green Building Council (USGBC) that provides a national standard for what constitutes a green building. Efficient lighting controls may contribute to obtaining up to 20 points in LEED for New Construction and Major Renovations (LEED-NC) credit categories, and up to 12.5 points in LEED for Commercial Interiors (LEED-CI) credit categories.

Title 24

California's building efficiency code has saved more than \$36 billion in electricity and natural gas costs since 1978. EcoSystem components help meet strict Title 24 guidelines and all devices are California Energy Commission (CEC) Listed.

IECC (International Energy Conservation Code)

The IECC, created by the International Code Council, is a building construction requirement for energy efficiency. Compliance solutions for the IECC are to follow ANSI/ASHRAE/IESNA Standard 90.1-2004 or pass performance-based evaluations. These standards are being adopted around the world.



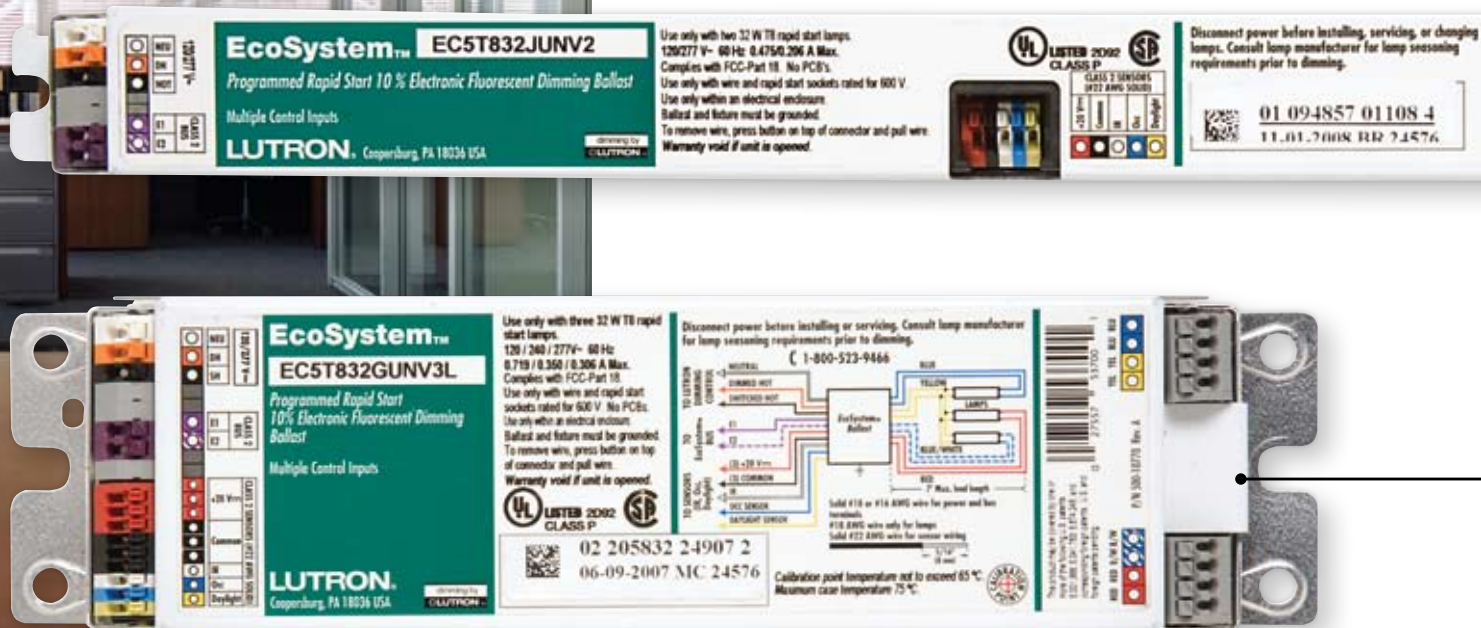
EcoSystem

EcoSystem lighting control starts with one simple, but essential building block—the EcoSystem ballast—which replaces the non-dim ballast in a fixture.

This single fixture is now the centerpiece of an efficient lighting system, in which a variety of environmental sensors or wallstations can be connected directly to the ballast.

Depending on the type of room or facility, any combination of environmental sensors or wallstations can be used to control the fixture.

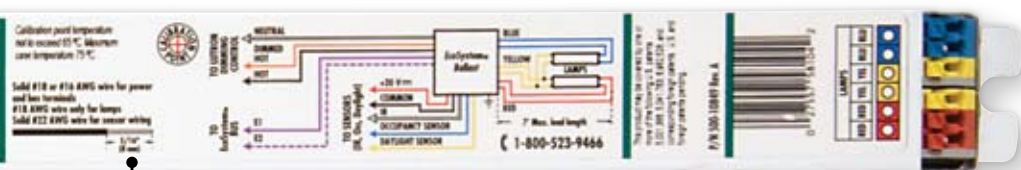
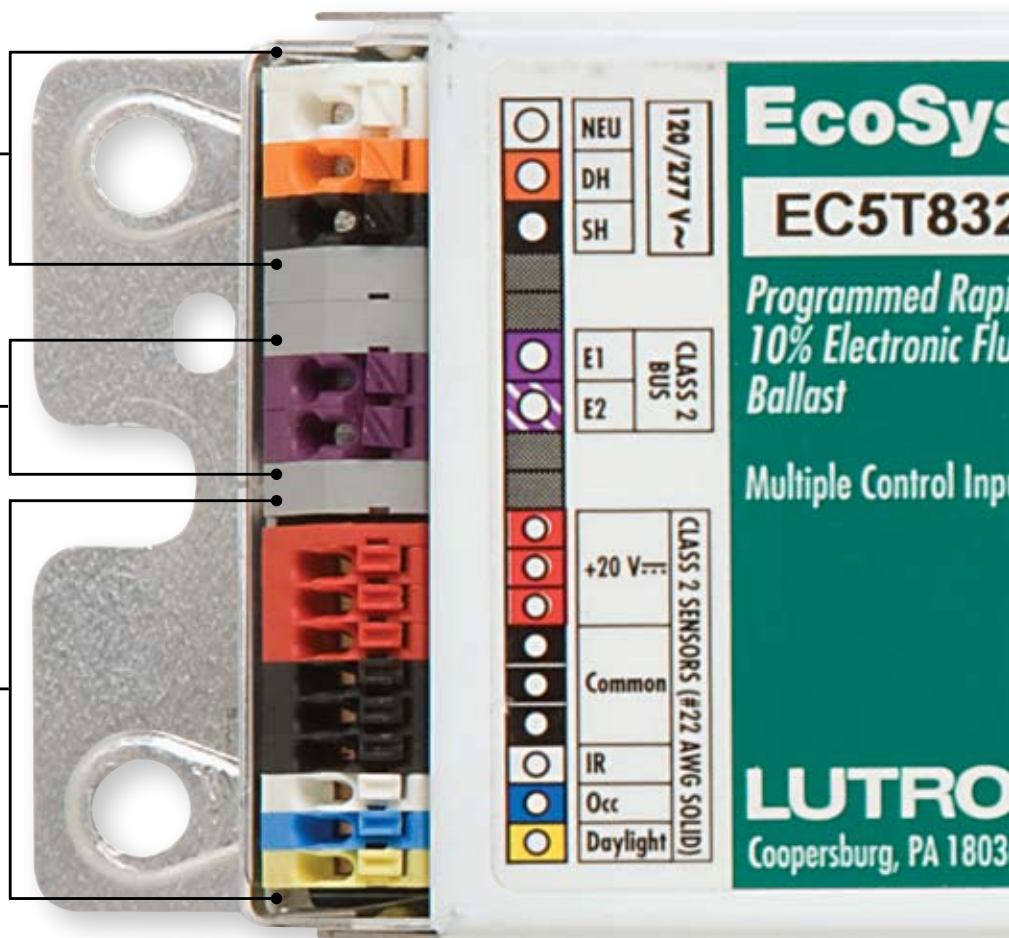
EcoSystem fluorescent dimming ballasts



Use any standard 3-wire control if desired

Connect to other EcoSystem® ballasts and bus supply

Connect Class 2 environmental sensors and wallstations as needed



Ballast Dimensions

L: 18.00" (457mm)
W: 1.18" (30mm)
H: 1.00" (25mm)
Mounting center: 17.70" (450mm)

Ballast Dimensions

L: 9.50" (241mm)
W: 2.38" (60mm)
H: 1.00" (25mm)
Mounting center: 8.90" (226mm)

Step 1 ballast selection

- A Determine number of fixtures that will be connected to EcoSystem.
- B Classify the type of ballast in each fixture.



EcoSystem T8 digital ballast

pg.08



EcoSystem T8, T5, T5HO, and T5 twin tube digital ballast

pg.08

Step 2 module selection

Determine which additional lighting fixtures will be controlled via EcoSystem as a zone.



EcoSystem ballast module fixture-mounted (BMF)

pg.09

Note: Not all lighting fixtures need an integral EcoSystem ballast. For some applications, a zone control module that can integrate dimming and non-dimming fixtures is beneficial.



EcoSystem zone control modules (BMJ and XPJ)

pg.09

Step 3 sensor selection

Determine what sensors will be connected to EcoSystem.



Daylight sensor

pg. 10



Occupancy/Vacancy sensor

pg. 11

Step 4 control selection

Determine whether EcoSystem® controls are needed for a single room or an entire building.



1-button wallstation
pg. 12



4-scene wallstation
pg. 12



IR receiver and remote control
pg. 13



GRAFIK Eye® QS
(optional preset control)
pg. 14



Quantum™
(optional entire building system)
pg. 16

Step 5 support components

- A Include 1 EcoSystem programmer for configuration.
- B Include 1 bus supply for each room or area, for up to 64 ballasts.



EcoSystem programmer
pg. 18



EcoSystem bus supply
pg. 19

Step 1 ballast selection

EcoSystem digital ballasts

Design statement: Specify an EcoSystem ballast to be installed in every light fixture that will be addressed and configured as part of an EcoSystem lighting control solution.



T8 digital ballast dimensions

L: 9.50" (241mm)

W: 2.38" (60mm)

H: 1.00" (25mm)

Mounting center: 8.90" (226mm)



T8, T5, T5HO, and T5 twin tube digital ballast dimensions

L: 18.00" (457mm)

W: 1.18" (30mm)

H: 1.00" (25mm)

Mounting center: 17.70" (450mm)

Flexibility

- Models available for T8, T5, T5HO, and T5 twin tube; use throughout an office, school, and/or healthcare buildings
- EcoSystem ballasts are digitally addressed and configured to work in zones after installation which can reduce zone definition and additional design steps
- Powers and responds to one daylight sensor, occupancy/vacancy sensor, and wallstation or IR receiver

Performance

- Universal voltage; operates at 120V, 220/240V, and 277V, at 50/60Hz
- Smoothly dims from 100 to 10%
- Strikes to any light level

Energy

- Saves energy as it dims
- Helps meet energy codes such as ANSI/ASHRAE/IESNA standard 90.1-2004, Title 24, and IECC

Models

For the latest information and model numbers visit www.lutron.com/ballasts, or refer to pg.29.

For concept drawings, see pgs.20–23

Step 2 module selection

EcoSystem® modules

Design statement: Not all lighting fixtures need an integral EcoSystem ballast. Specify an EcoSystem dimming or switching module if there are groups of lights that will be controlled as a zone.



Dimming module (BMF) dimensions

L: 9.30" (236mm)
W: 1.18" (30mm)
H: 1.00" (25mm)
Mounting center: 8.90" (226mm)



Dimming module (BMJ) dimensions

L: 7.80" (200mm)
W: 5.00" (130mm)
H: 2.50" (65mm)



Switching module (XPJ) dimensions

L: 7.80" (200mm)
W: 5.00" (130mm)
H: 2.50" (65mm)

Compatibility

- Control any light fixture as part of an EcoSystem solution
- Models available for fluorescent dimming and full-circuit switching
- Digitally addressed and configured in the field
- Powers and responds to one daylight sensor, occupancy/vacancy sensor, and wallstation or IR receiver

Performance

- Universal voltage; operates at 120 V, 220/240 V, and 277 V, at 50/60 Hz
- BMF easily mounts within fixtures, BMJ and XPJ modules mount on electrical junction boxes

Models

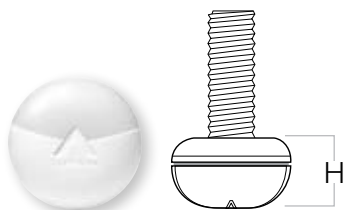
- **C5-BMF-2A**—dimming module rated for a maximum of 2A for Eco-10®, Hi-lume®, and Compact SE™ ballasts
- **C5-BMJ-16A**—16A (full circuit) dimming module for Eco-10, Hi-lume, and Compact SE ballasts
- **C5-XPJ-16A**—16A (full circuit) switching module uses Softswitch®—1,000,000 cycle rated relay technology—for any light source

For concept drawings, see pg.21

Step 3 sensor selection

EcoSystem daylight sensors

Design statement: Use one daylight sensor for each zone of sunlight (from windows and skylights). Wiring a daylight sensor to any one ballast enables daylight harvesting of multiple ballasts on any EcoSystem bus.



Daylight sensor dimensions

H: 0.69" (17mm)

D: 1.18" (30mm)

Stem Length: 1.25" (32mm)



Mounting on ceiling tile



Mounting on pendant fixture

Ease of installation

- Low profile for mounting on ceiling tiles or fixtures
- Class 2 low voltage enables simplified wiring and mounting

Performance

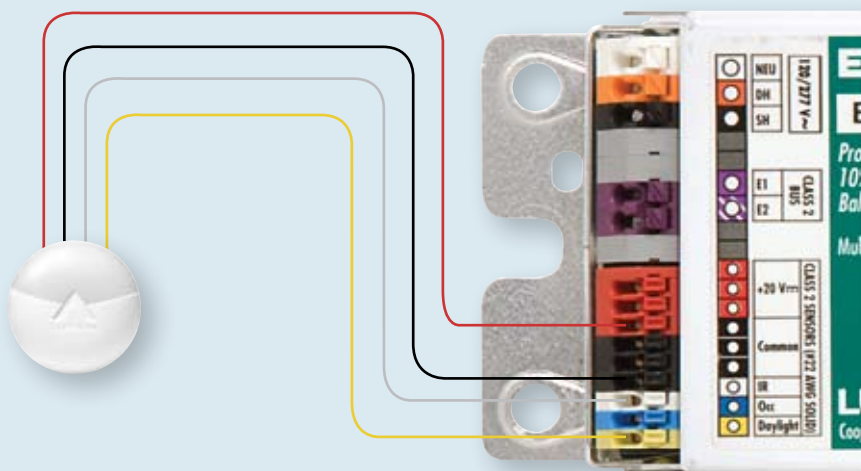
- Operates with the photopic response of the human eye
- Up to 16 daylight sensors may be used per EcoSystem bus

How it works

- EcoSystem daylight sensors detect incoming sunlight and communicate the sunlight level to the attached EcoSystem ballast
- EcoSystem ballast share the daylight information with each other and each dims appropriately
- The daylight sensor is suitable for internal ambient light levels between 0 and 500 fc

Models

- **C-SR-M1-WH**—IR daylight sensor



Step 3 sensor selection

EcoSystem® occupancy/vacancy sensors

Design statement: Occupancy/Vacancy sensors provide an automatic off for energy savings.



Ceiling-mounted occupancy/vacancy sensor dimensions

W: 6.12" (156mm)

H: 1.62" (41mm)

D: 2.31" (59mm)

Ceiling mounted: 0.75" (19mm)
diameter hole for mounting
post (Lutron-supplied)



Wall-mounted occupancy/vacancy sensor dimensions

W: 3.75" (95mm)

H: 5.50" (140mm)

D: 4.00" (102mm)

Ease of installation

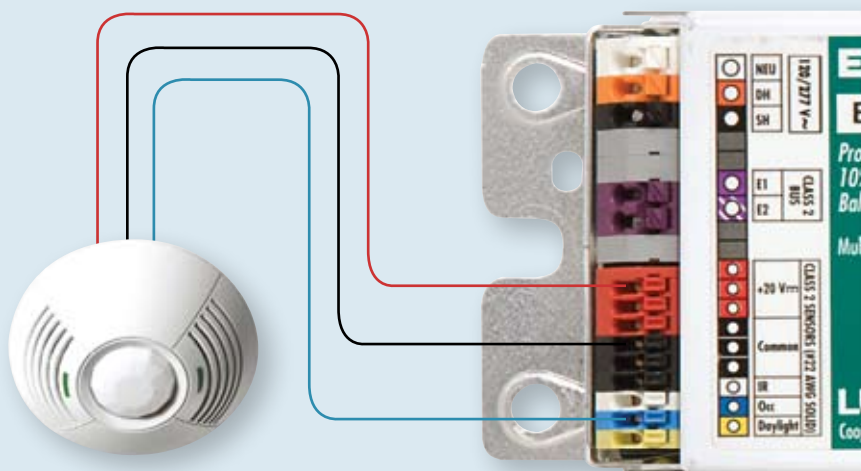
- No power pack required since power for the occupancy/vacancy sensor comes directly from the EcoSystem ballast
- Class 2 low voltage enables simplified wiring and mounting

Performance

- Broad range of models for offices to open spaces – 500sq. ft. to 2000sq. ft. spaces
- Wall-mounted and ceiling-mounted modules available
- Ultrasonic, infrared, and dual technology models available
- “-R” models provide auxiliary dry contact closure for easy integration with BMS (building management systems) and A/V systems
- Up to 64 occupancy/vacancy sensors may be used per EcoSystem bus

Models

- **LOS-CUS-(500, 1000, 2000)-WH** –Ultrasonic
- **LOS-CIR-(500, 1000, 2000)-WH** –Infrared
- **LOS-CDT-(500, 1000, 2000)-WH** –Dual technology
- **LOS-CCDT-(500R, 1000R, 2000R)-WH** –Dual technology with relay



Step 4 control selection

EcoSystem wallstations

Design statement: Add EcoSystem 1-button and 4-scene wallstations wherever needed for full-range lighting control.



1-button wallstation dimensions

W: 2.75" (70mm)
H: 4.56" (116mm)
D: 1.25" (32mm)



4-scene wallstation Dimensions

W: 2.75" (70mm)
H: 4.56" (116mm)
D: 1.25" (32mm)

Flexibility

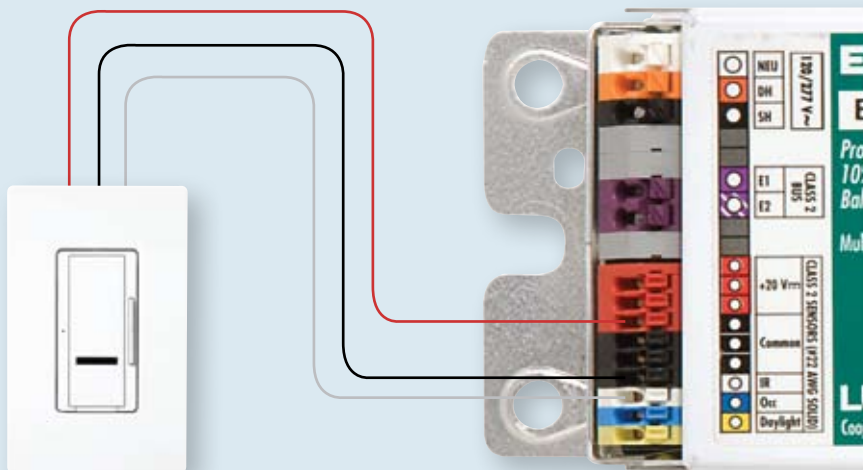
- Class 2 control wires directly to the ballast or EcoSystem power module
- Up to 64 ballasts to be controlled via any wallstation
- 4-scene wallstation recalls 4 preset scenes

Performance

- Smoothly dims from 100% to 10%
- Integral IR receiver for both programming and control of EcoSystem lighting
- Up to 64 wallstations (one per ballast) may be used per EcoSystem bus

Models

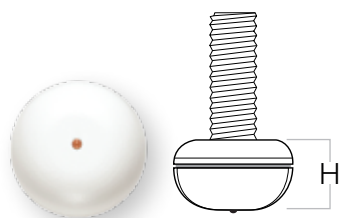
- **CC-1BRL-WH**—1-button control with toggle on/off and raise/lower
- **CC-4BRL-WH**—4-scene control for recall of all grouped lights to full, off, and presets 1-4



Step 4 control selection

EcoSystem® infrared receiver and remote control

Design statement: Add an EcoSystem IR receiver with remote to provide personal light control to any fixture on the EcoSystem bus.



IR receiver dimensions

H: 0.69" (17mm)

D: 1.18" (30mm)

Stem Length: 1.25" (32mm)



Remote control dimensions

W: 1.51" (38mm)

H: 4.63" (118mm)

D: 0.55" (14mm)

Ease of installation

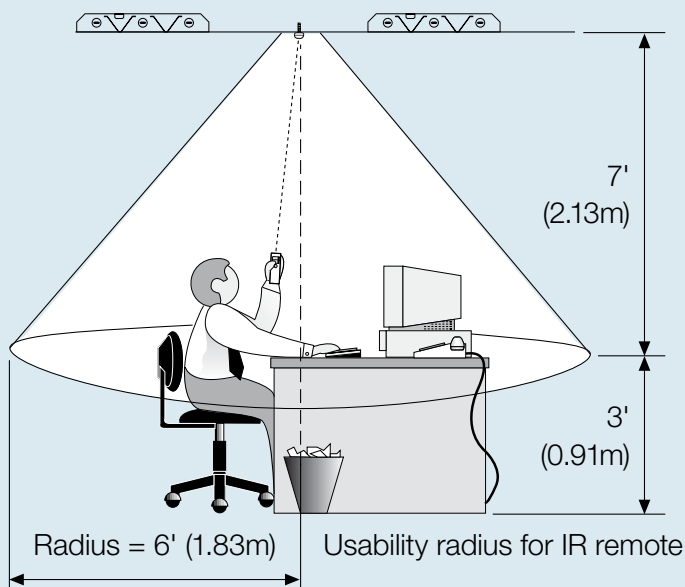
- Wires directly to the EcoSystem ballast that will be controlled
- Low profile for mounting on ceiling tiles or fixtures

Performance

- Personalized light levels
- Can control one fixture or a group of fixtures
- Integral LED indicates signal reception
- Up to 64 IR sensors may be used per EcoSystem bus

Models

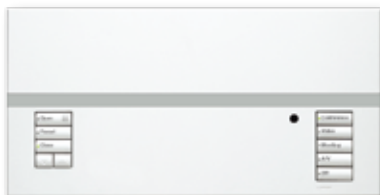
- **C-R-M1-WH**—Receiver
- **C-FLRC-WH**—Remote control



Step 4 control selection

GRAFIK Eye® QS with EcoSystem

Design statement: GRAFIK Eye QS allows lights and shades to be programmed to desired levels and easily recalled for any task. GRAFIK Eye QS has an integral bus supply, eliminating the need for an EcoSystem bus supply for connected ballasts and modules.



GRAFIK Eye QS dimensions

W: 4.687" (119mm)
H: 9.375" (239mm)
D: 0.375" (10mm)
4-gang backbox adds
1.812" (46mm) to depth.

Performance

- Integrates EcoSystem light control with Sivoia® QS shades
- Easy to operate with one simplified information screen

Flexibility

- Program all necessary EcoSystem settings via integral LCD screen (beneath protective cover)
- Create lighting effects by assigning fluorescent lights to 6, 8 or 16 zones (By default, zones 1-3 are assigned to the three line-voltage outputs and zones 4 and higher are fixed as EcoSystem zones. However, the first three zones can be re-assigned to control EcoSystem zones instead of the line-voltage outputs if desired.)
- Integrate EcoSystem to touchscreens and other systems via RS232/Ethernet Interfaces and input/output devices
- 42 color options to coordinate with any décor

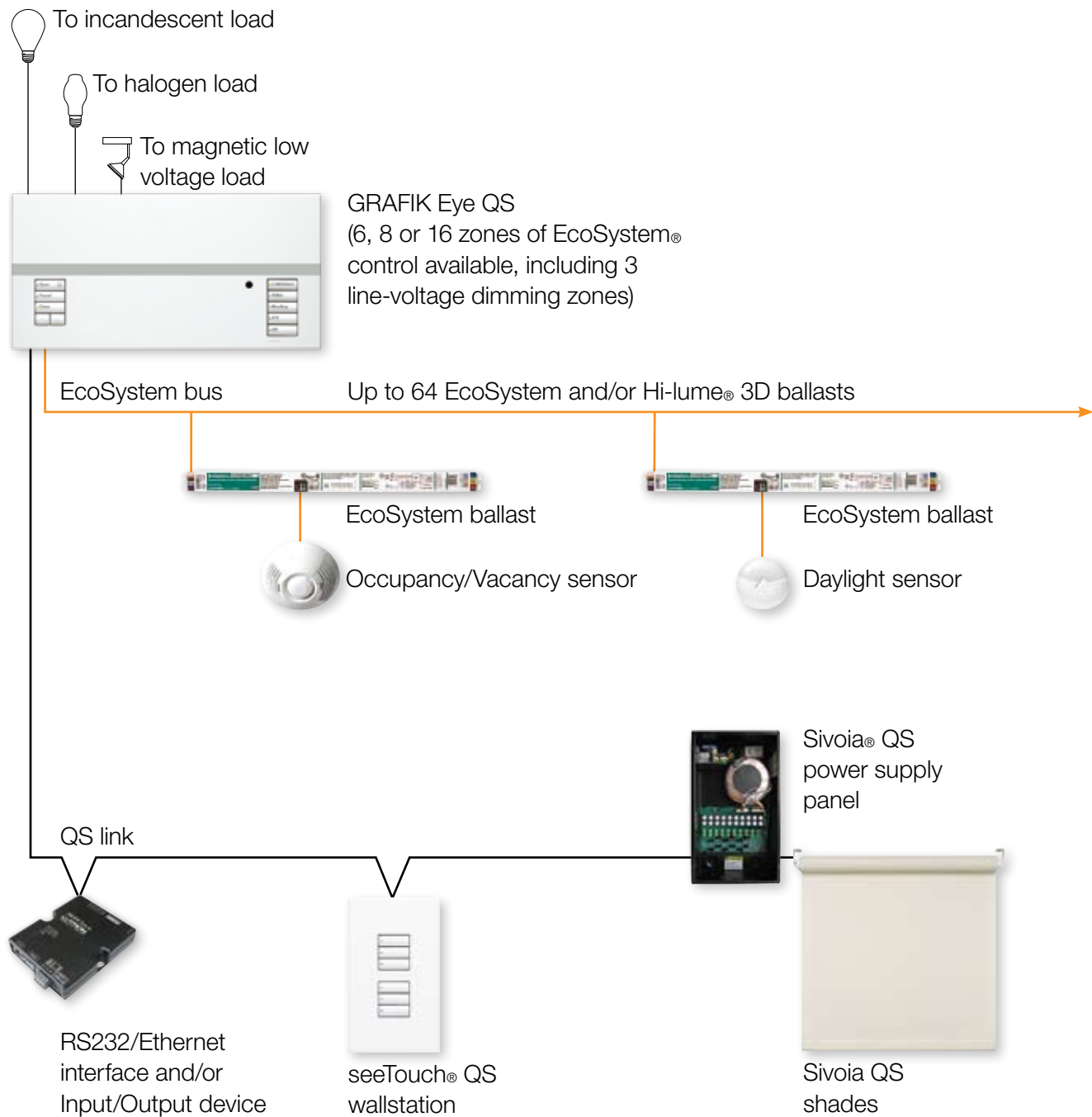
Models

- **QSG-6E120**—6 zone
- **QSG-8E120**—8 zone
- **QSG-16E120**—16 zone

www.lutron.com/grafikeyeqs

For concept drawings, see pgs. 22–23

Installation example



Step 4 control selection

Quantum™ total light management

Design statement: Quantum is a total light management system. It combines EcoSystem lighting controls with Sivoia® QS digital shades and lighting panels.



Q-Admin™ software

Benefits

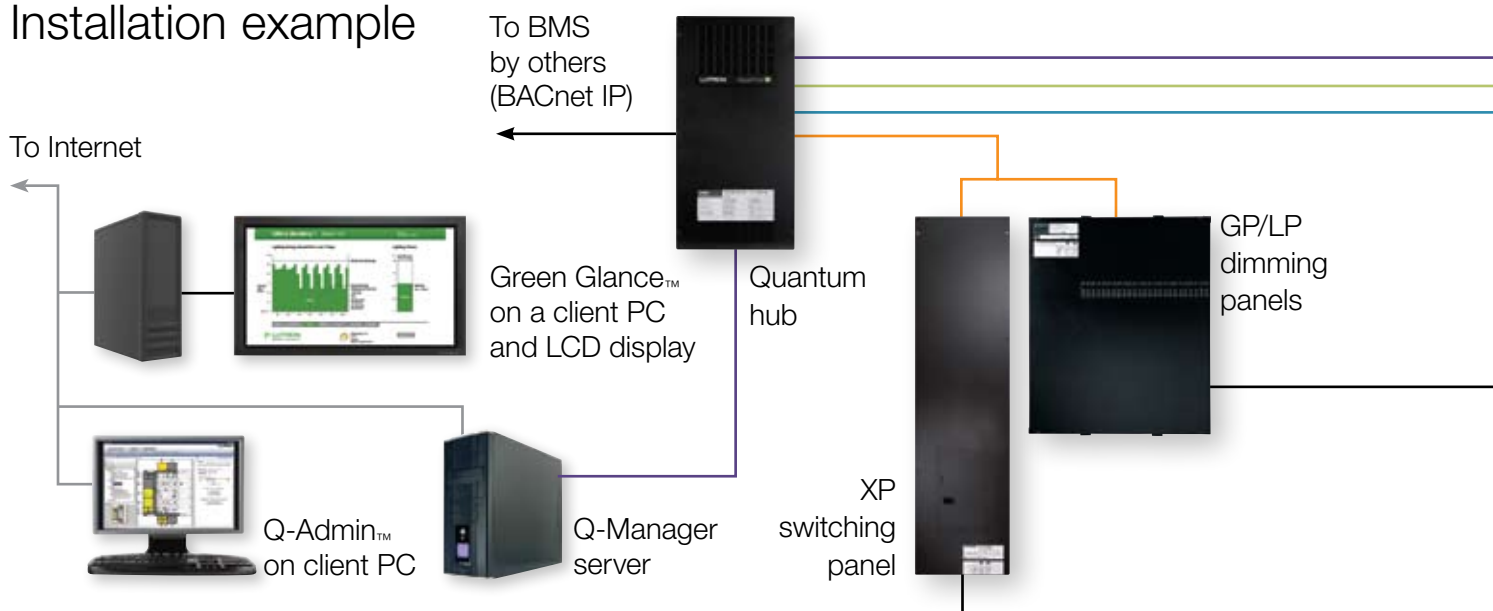
- Reduces greenhouse gases by eliminating unnecessary energy use
- Lowers operating costs and peak demand charges
- Lighting and shading zones can be re-configured without rewiring
- Makes occupants more productive and comfortable with preferred light levels and automated shade control

Performance

- Creates an energy-efficient environment by enabling centralized management, monitoring, and control
- Reduce cooling loads by dimming lights and controlling shades
- Reports lamp failures and monitors lamp hours to manage and reduce maintenance

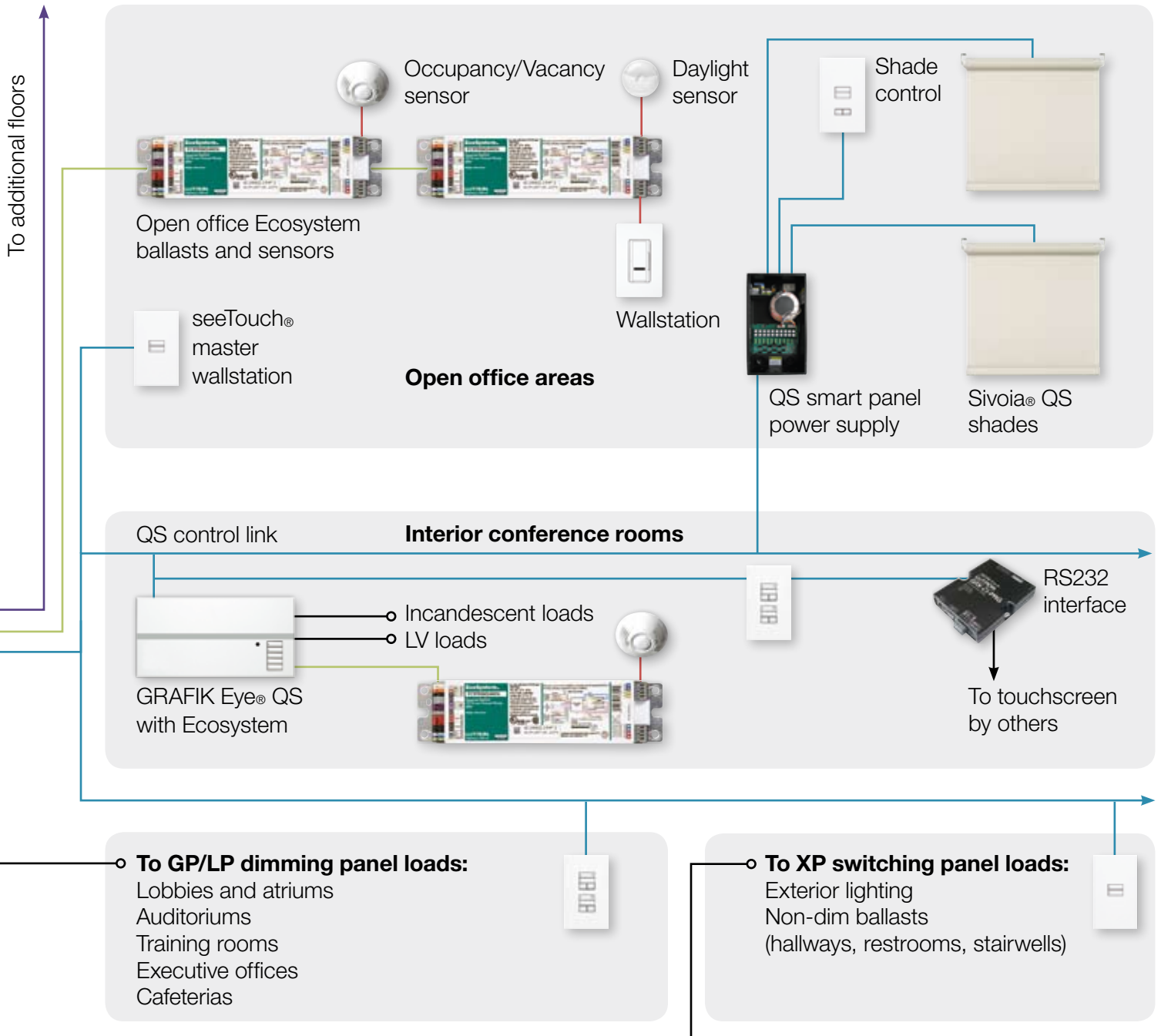
www.lutron.com/quantum

Installation example



Key

- Building intranet
- Interprocessor communication link
- QS link (RS-485)
- Power panel link (RS-485)
- EcoSystem® loop
- Sensor connection



Step 5 support components

EcoSystem programmer

Design statement: The EcoSystem wireless, hand-held programmer is designed with a graphic display for intuitive step-by-step system setup and maintenance.



Programmer dimensions

W: 3.00" (76mm)
H: 4.75" (121mm)
D: 0.50" (13mm)

Flexibility and performance

- Handles programming changes for all sensors and ballasts
- Transmits to any daylight sensor, occupancy/vacancy sensor, IR receiver, or wallstation
- Helpful on-screen directions make programming EcoSystem fast and easy

How it works

The EcoSystem programmer allows you to:

- Assign and group fixtures to wallstations and sensors
- Set up devices such as occupancy/vacancy sensors, daylight sensors and wallstations
- Address and configure ballasts; new or replacements

Note: When EcoSystem is controlled by Quantum™ or GRAFIK Eye® QS the EcoSystem programmer is not needed.

Models

- **C-PDA-CLR**—Wireless, hand-held programming device

Step 5 support components

EcoSystem® bus supply

Design statement: The EcoSystem bus supply is required for two or more ballasts (or modules) to work together. The bus supply powers the communication bus between ballasts.



Bus supply dimensions

W: 1.77" (45mm)

H: 3.56" (85mm)

D: 3.62" (92mm)

Performance

- Supports up to 64 ballasts or modules
- Maintains redundant non-volatile memory of programming for 10 years from power down to power restored

Wiring to an EcoSystem bus supply

- E1 and E2 wires are polarity insensitive
- Bus length is limited by the wire gauge used for E1 and E2 as follows:

Wire gauge	Max loop length
#12 AWG (2.05mm)	2,200' (670m)
#14 AWG (1.63mm)	1,400' (426m)
#16 AWG (1.29mm)	900' (274m)
#18 AWG (1.02mm)	550' (167m)

Contact closure

EcoSystem bus supplies have 2 configurable contact closure inputs.

To program these inputs you must:

1. Select mode of operation
 - a. Load-shed (automatic reduction in light energy)
 - b. Activate a preset scene
 - c. Occupancy activation
2. Assign ballasts to respond to either one or both contact closures. From 1 to 64 ballasts can be assigned.

Activation of contact closures can be done with a maintained closure input from a BMS, A/V, or alarm system. For more information about contact closures please go to www.lutron.com/ecosystem or read the **Lutron Application Note 236**.

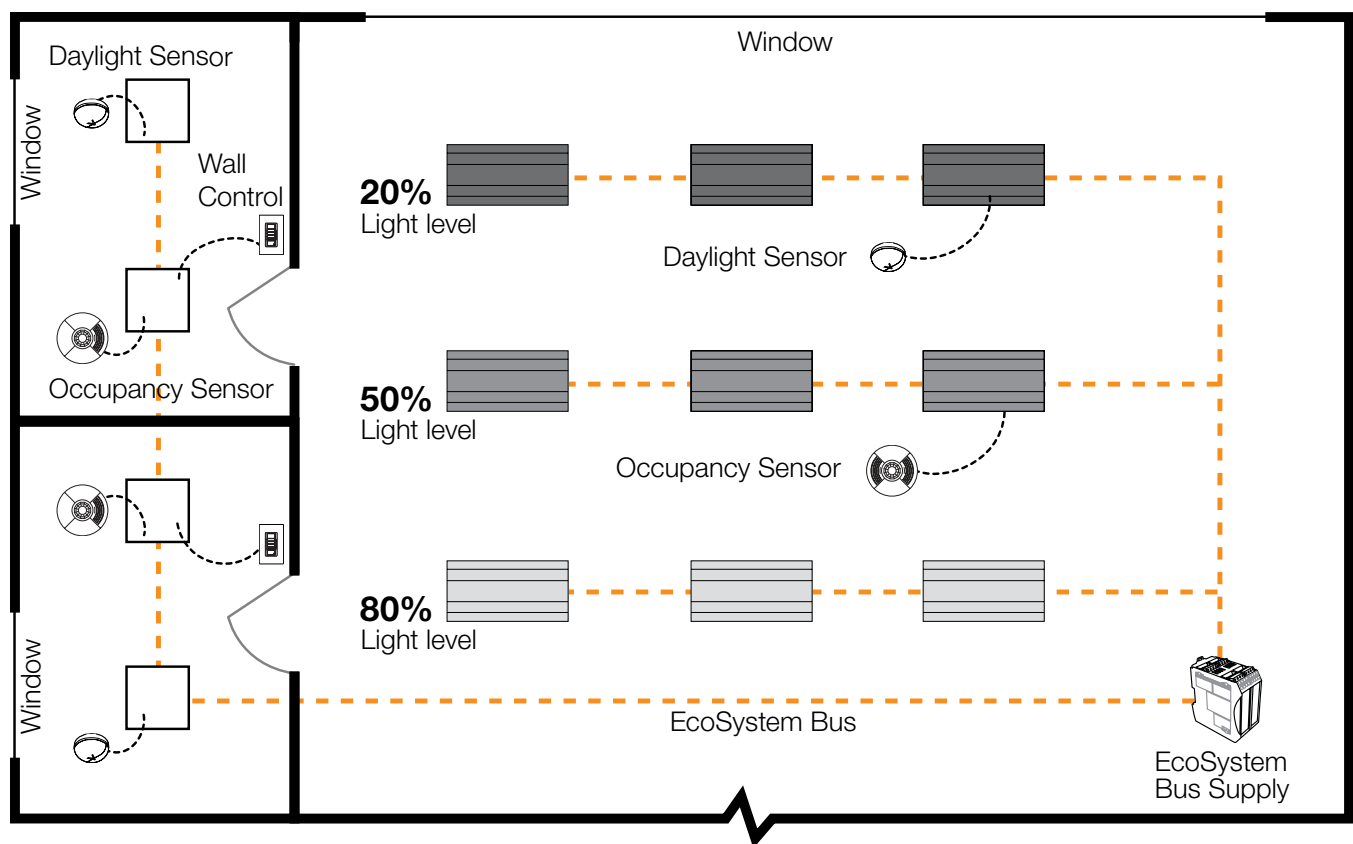
Models

- **CS-1L-CM** – Contractor mountable no enclosure
- **CS-1L-WM** – Wall mountable inside enclosure

Using EcoSystem ballasts to control all fluorescent lights in an office space*

Design statement: EcoSystem ballasts are used throughout an office space to provide individual fixture control, daylight harvesting, and occupancy sensing.

Perimeter offices



Legend

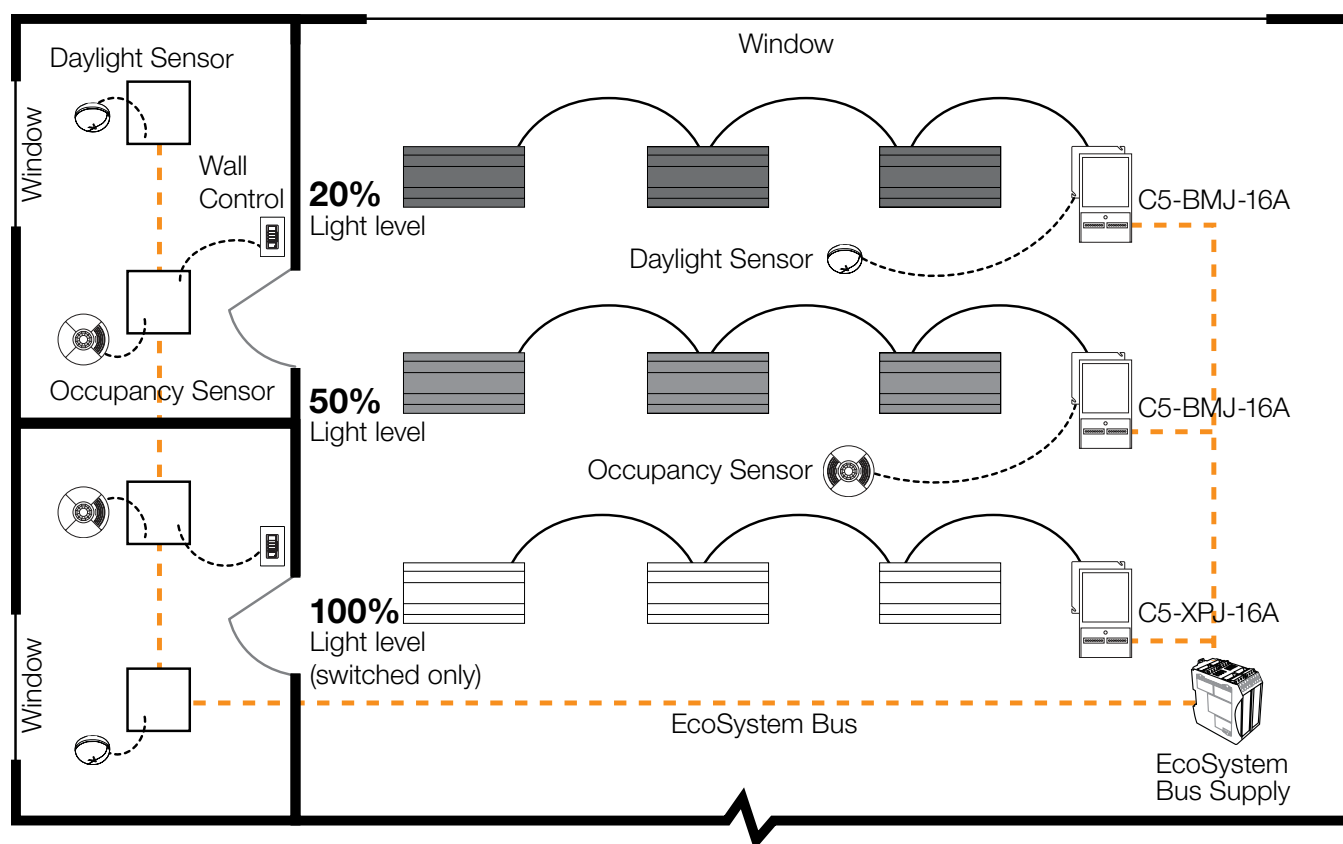
- 2' x 2' Fluorescent fixture with Lutron EcoSystem dimmable ballast
- ▨ 2' x 4' Fluorescent fixture with Lutron EcoSystem dimmable ballast

* Not drawn to scale.

Using a BMJ dimming module and an XPJ switching module to control fluorescent lights in an office space*

Design statement: Use a dimming module in conjunction with EcoSystem® ballasts where individual fixture control is not required but daylight harvesting is possible. Use a switching module in conjunction with EcoSystem ballasts to switch on/off light fixtures where dimming and rezoning are not required but automated control is.

Perimeter offices



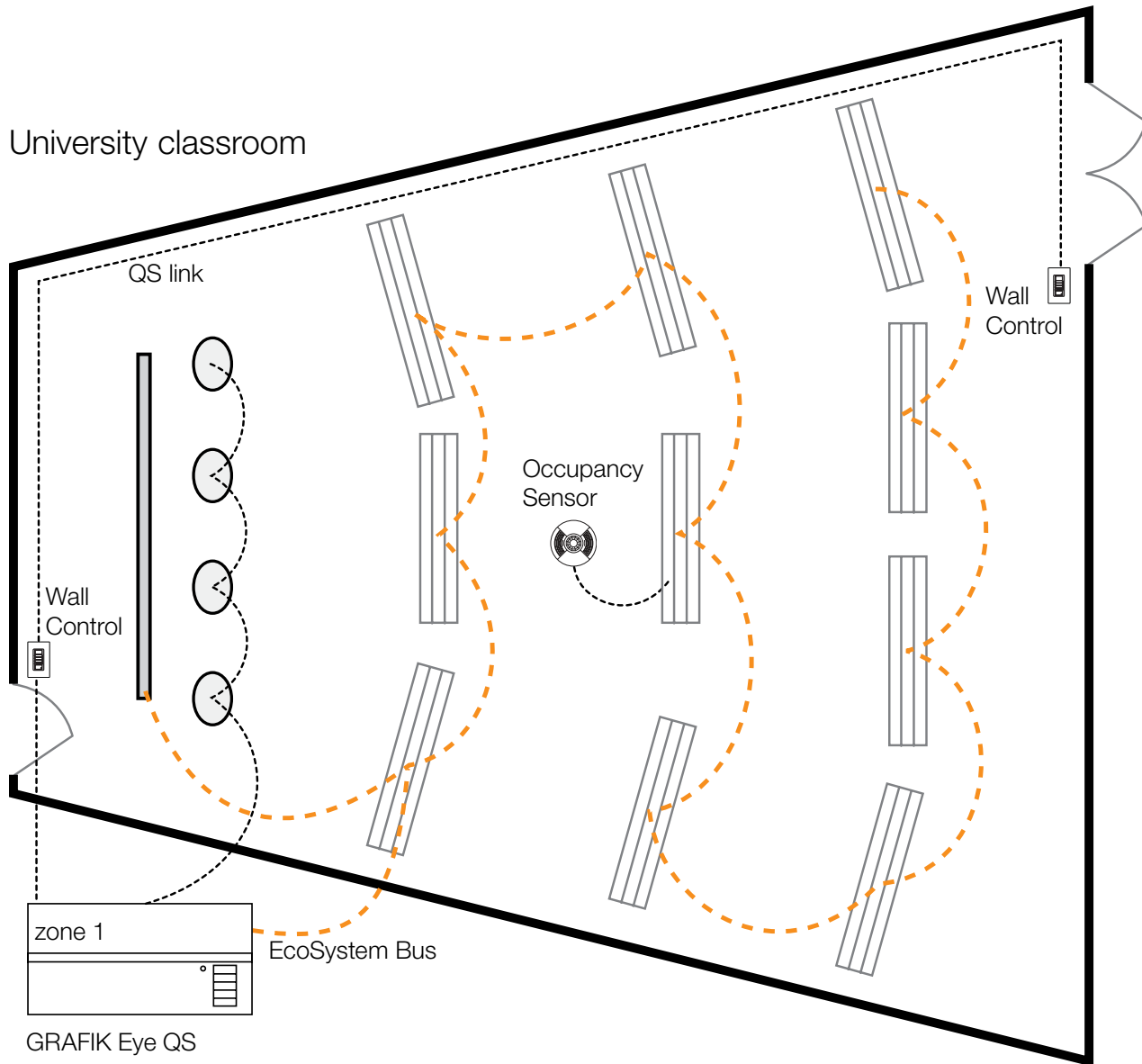
Legend

- 2' x 2' Fluorescent fixture with Lutron EcoSystem dimmable ballast
- 2' x 4' Fluorescent fixture with Lutron Eco-10® dimmable ballast controlled by EcoSystem dimming module C5-BMJ-16A
- 2' x 4' Fluorescent fixture with a fixed output ballast controlled by EcoSystem switching module C5-XPJ-16 A




* Not drawn to scale.

Using GRAFIK Eye® QS control within a university classroom*

Design statement: Both fluorescent fixtures and low voltage downlights are controlled within a classroom through GRAFIK Eye QS.



Legend

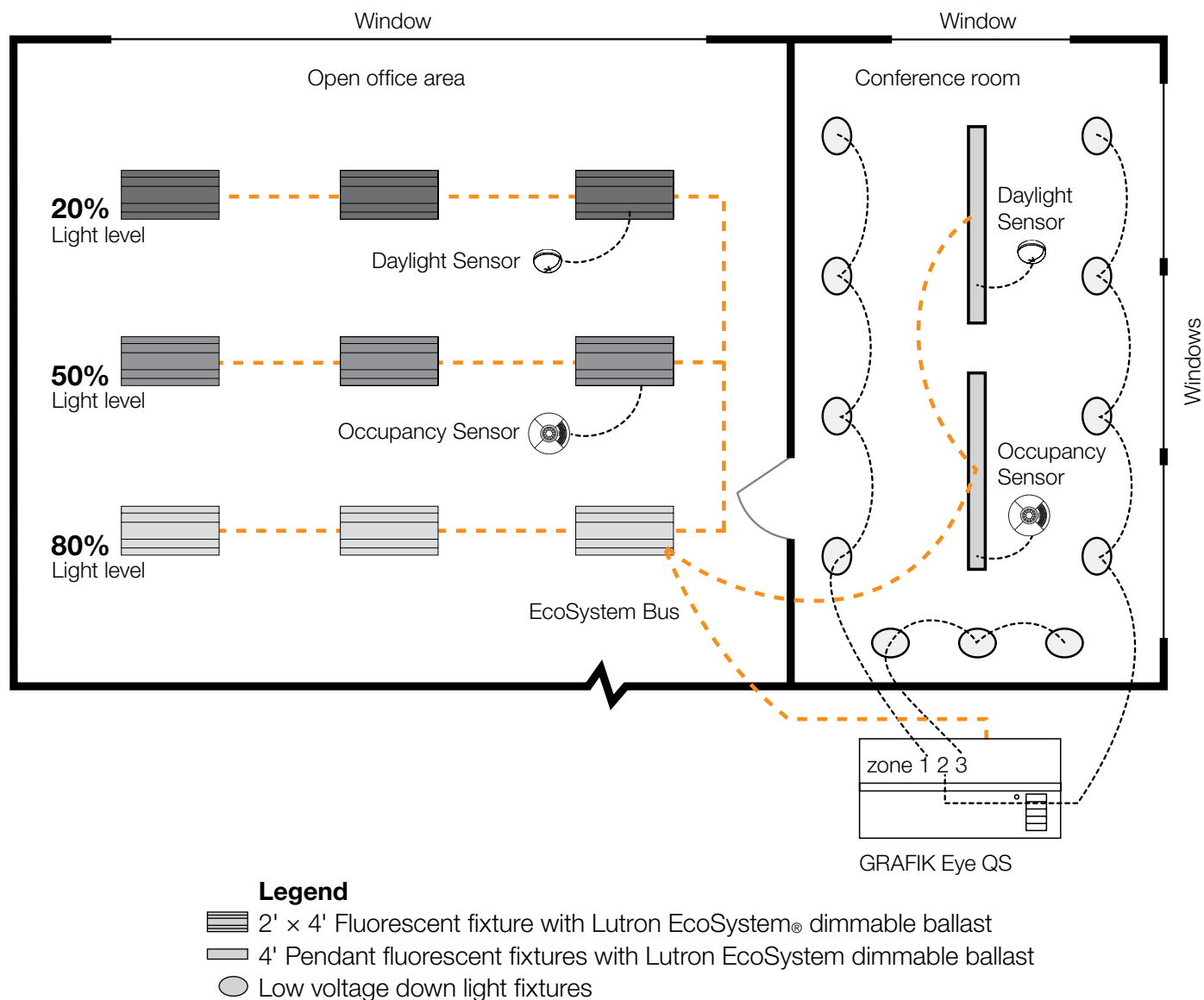
-  2' x 8' Suspended 2-lamp T8 fixture with Lutron EcoSystem dimmable ballasts
-  8' Suspended T5 fixture with Lutron EcoSystem dimmable ballasts
-  Low-voltage downlights controlled as a power zone

* Not drawn to scale.

Using GRAFIK Eye QS control within an office building*

Design statement: GRAFIK Eye QS is used to control multiple types and zones of light within a conference room, and an open office area, maximizing control.

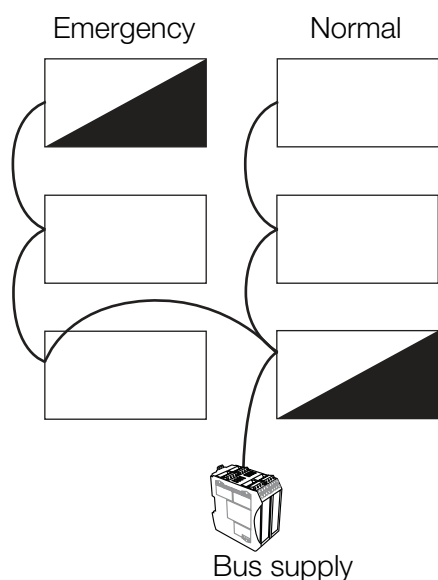
Open office with conference room



* Not drawn to scale.

Emergency system integration

Design statement: EcoSystem lighting control can be an integral part of an emergency lighting strategy. Several methods exist to achieve this:



Use emergency battery backup ballasts within an EcoSystem controlled fixture.

- In this case the fixture operates under EcoSystem control when normal power is present
- With loss of normal power the emergency battery back-up ballast drives the lamp(s)

Power EcoSystem ballasts via emergency/essential power and power the bus supply from normal power.

- Loss of normal power causes the EcoSystem bus to turn off
- This signals emergency powered EcoSystem ballasts to operate at their emergency levels (100% by default)

Note: For multi-phase lighting systems, or those requiring UL 924 compliance, EcoSystem can be used. In these applications the loss of any phase of normal power results in the emergency mode being activated. Ballasts will operate at their emergency light level until the fault is cleared.

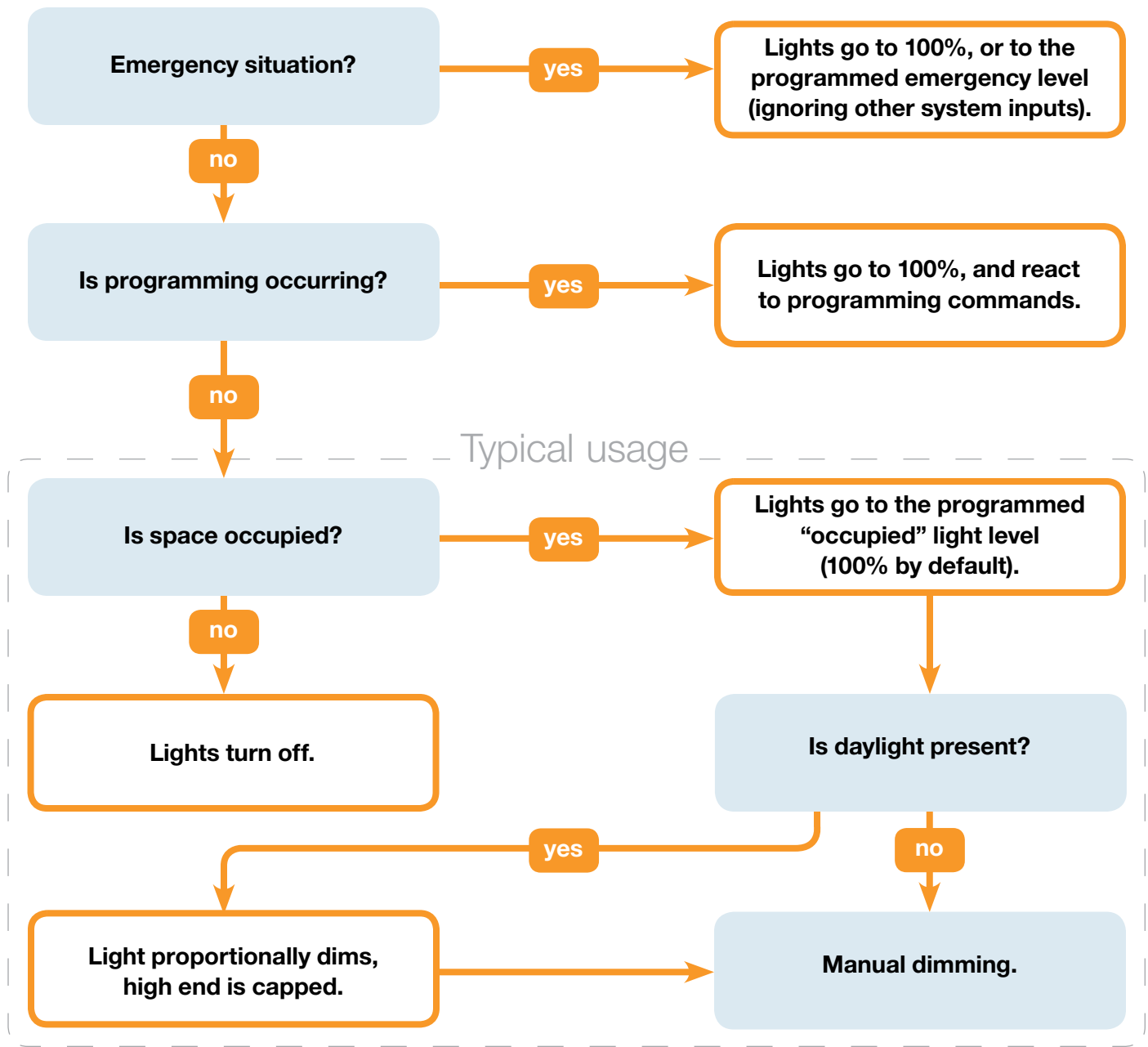
The following design consideration should be met to achieve this performance:

1. Power emergency fixtures with EcoSystem ballasts via emergency/essential power.
2. Power the bus supply and 24V DC power pack via emergency/essential power.
3. Install and connect LUT-ELI-3PH to the EcoSystem bus supply via installation instructions.

For more information please see **Lutron Application Note 140**.

System hierarchy

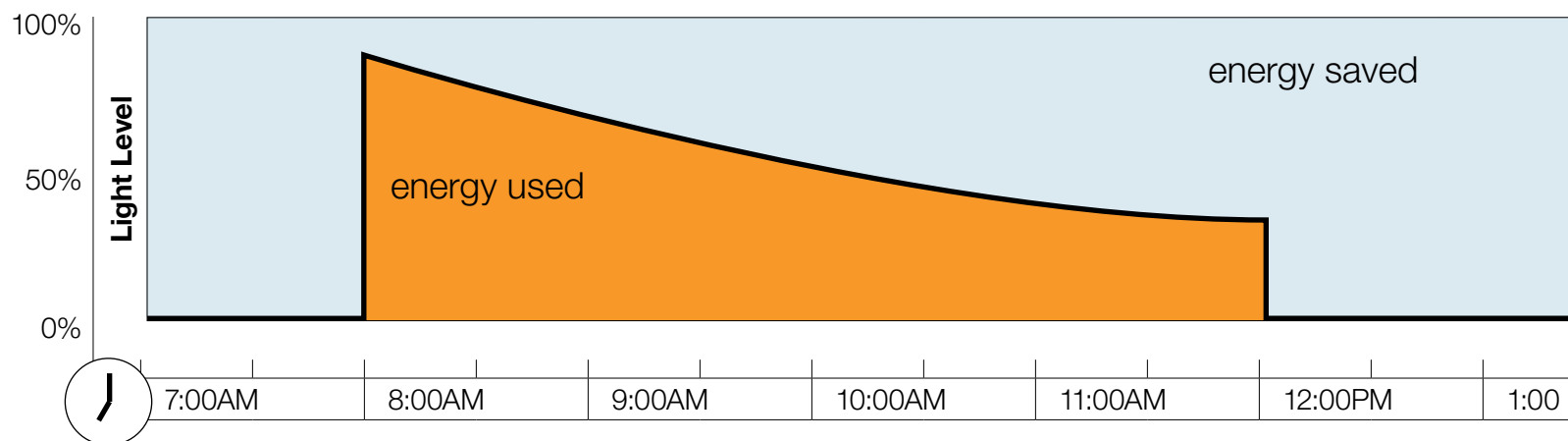
EcoSystem achieves coordinated integration of controls and sensors. The flow chart below shows the hierarchy of the system.



A day in the life of an office with EcoSystem®

EcoSystem fixtures reduce electricity usage by 40% or more by using input from occupancy/vacancy sensors, daylight sensors, and/or manual controls.

Energy use in a typical open office with EcoSystem



Office workers begin to arrive:

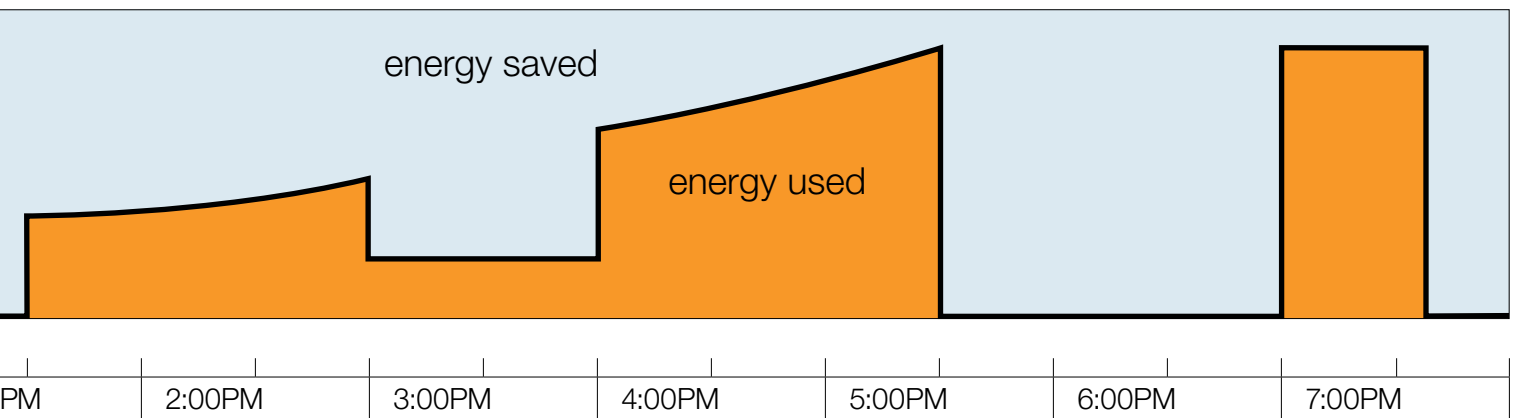
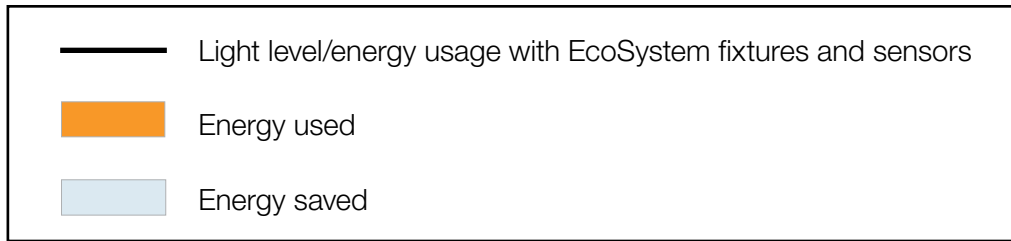
Workers arrive and the lights are automatically set to a tuned 90% light level to save energy and eliminate glare on computer screens. Daylight sensors automatically reduce the electric light levels in response to the available daylight. Workers are unaware of the smooth and slow light level changes.

Lunch:

Workers depart for lunch. Lights turn off automatically from occupancy/vacancy sensing.



Lutron occupancy/vacancy and daylight sensors



Workers return:

Lights automatically rise to occupied light level. As daylight decreases electric light levels increases.

Webinar:

Workers dim their lights with handheld remote controls or from their PCs to clearly view the webinar and have enough light to take notes.

Workers leave:

Lights turn off automatically from occupancy/vacancy sensing.

Cleaning:

Lights automatically turn on to a 90% light level for the cleaning staff. Lights automatically turn off when staff departs.



EcoSystem hand-held remote

Wiring considerations

An EcoSystem project can be simpler to install if the fixtures are pre-wired with EcoSystem bus and sensor whips.

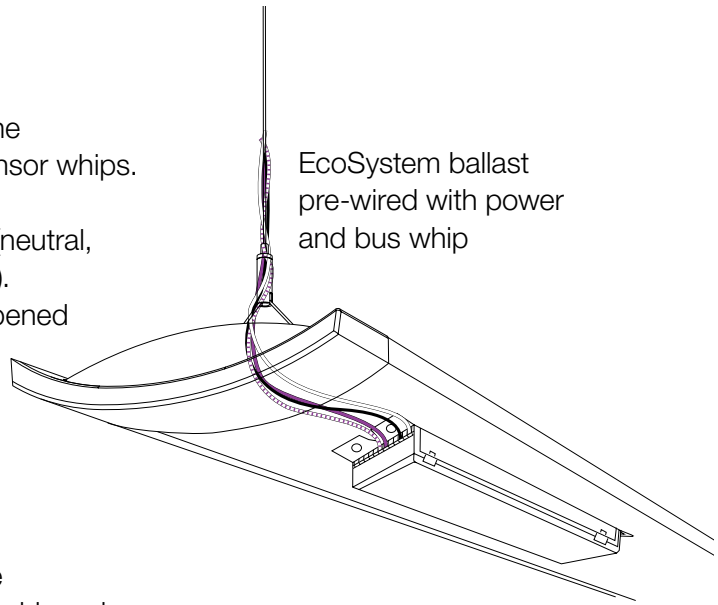
Power and bus whips consist of 5 wires: power (neutral, hot, ground) and communication wires (E1 and E2). This means that the fixture does not need to be opened for connection of power and control wiring.

EcoSystem power and bus cables:
Standard: C-CBL-216-WH-1
Plenum Rated: C-PCBL-216-CL-1

Sensor whips are wires that are connected to the ballast's sensor inputs within the fixture before it is shipped. This means that the fixture does not need to be opened in order to connect EcoSystem sensors.

EcoSystem sensor cables:
Standard: C-CBL-522S-WH-1
Plenum Rated: C-PCBL-522S-CL-1

Visit www.lutron.com/ecosystem for more details and a specifications.



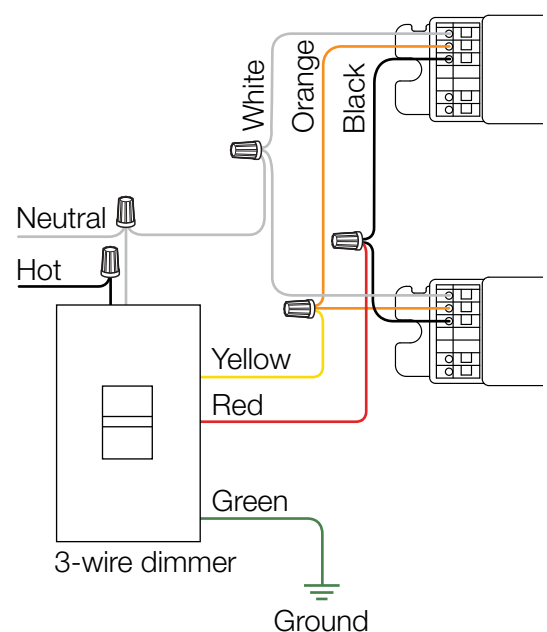
3-wire control

EcoSystem ballasts can be controlled from any of Lutron's 3-wire fluorescent dimmers. However, these ballasts must be hardwired to the control, and cannot be rezoned as they could when an EcoSystem digital control is used (CC-1BRL, CC-4BRL).

When 3-wire controls and the digital bus are used in conjunction on the EcoSystem ballast the following capabilities are enabled:

- **vacancy mode**—(manual on/automatic off) manual on is triggered easily via the 3-wire control
- **daylight harvesting**—the 3-wire dimmer operates just like a digital control, dimming the EcoSystem ballasts according to the existing daylight.

Note: If 3-wire and digital bus are used together, unique fixture wiring must be coordinated and specified.



Ballast model numbers

For the latest information and model numbers visit www.lutron.com/ballasts.

T8 Lamp	No. of Lamps	Case	Ballast Model Number*
F32T8 (48")	3	G	EC5 T832 G UNV 3
	2	G	EC5 T832 G UNV 2
		J	EC5 T832 J UNV 2
	1	J	EC5 T832 J UNV 1
F25T8 (36")	2	J	EC5 T825 J UNV 2
	1	J	EC5 T825 J UNV 1
F17T8 (24")	2	J	EC5 T817 J UNV 2
	1	J	EC5 T817 J UNV 1
T5 Lamp	No. of Lamps	Case	Ballast Model Number*
F35T5 (57.1")	1	J	EC5 T535 J UNV 1
F28T5 (45.2")	2	J	EC5 T528 J UNV 2
	1	J	EC5 T528 J UNV 1
F21T5 (33.4")	2	J	EC5 T521 J UNV 2
	1	J	EC5 T521 J UNV 1
F14T5 (21.6")	2	J	EC5 T514 J UNV 2
	1	J	EC5 T514 J UNV 1
T5HO Lamp	No. of Lamps	Case	Ballast Model Number*
F54T5 (45.2")	2	J	EC5 T554 J UNV 2
	1	J	EC5 T554 J UNV 1
F39T5 (33.4")	2	J	EC5 T539 J UNV 2
	1	J	EC5 T539 J UNV 1
F24T5 (21.6")	2	J	EC5 T524 J UNV 2
	1	J	EC5 T524 J UNV 1
T5 Twin Tube Lamp	No. of Lamps	Case	Ballast Model Number*
FT55 (20.7")	2	J	EC5 T555 J UNV 2
	1	J	EC5 T555 J UNV 1
FT50 (22.5")	2	J	EC5 T550 J UNV 2
	1	J	EC5 T550 J UNV 1
FT40 (22.5")	2	J	EC5 T540 J UNV 2
	1	J	EC5 T540 J UNV 1
FT39/FT36 (15.5")	2	J	EC5 T536 J UNV 2
	1	J	EC5 T536 J UNV 1

* All EcoSystem® ballasts are UL listed for operation at 120V, 220/240V, and 277V at 50/60Hz.



www.lutron.com/ecosystem

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