EcoSystem®
Design and Application Guide

LUTRON®

Lutron solutions do more than just control the light in a space. With the right design strategies, they can save substantial amounts of energy, reduce operating costs, and improve productivity.

NEW EcoSystem® **H-Series digital ballasts**
pg. 16

NEW EcoSystem Energi Savr Node™ **module**
pg. 21

NEW Radio Powr Savr™
wireless daylight sensor
pg. 24

NEW Pico® **wireless controls**
pg. 28

NEW Radio Powr Savr™ **wireless occupancy and vacancy sensor**
pg. 26

Energy-saving strategies

High-end trim/Tuning [1]   (20% lighting)
Occupancy or vacancy sensing [2]   (15% lighting)
Daylight harvesting [3]   (15% lighting)
Personal dimming control [4]   (10% lighting)

Sources can be found on pg. 04.
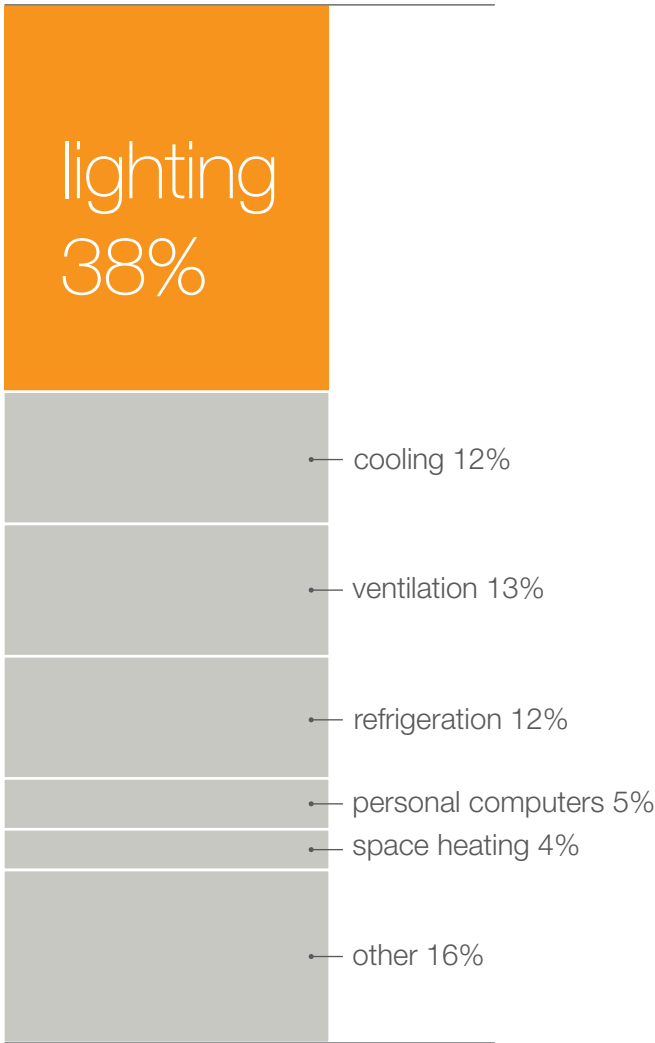
Potential lighting energy savings

60%

EcoSystem® a revolution in light control

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

- save up to 60% of lighting electricity usage
- increase space flexibility
- increase occupant comfort and productivity
- reduce maintenance costs

All EcoSystem components meet BAA requirements of the American Recovery and Reinvestment Act—see pg. 44 or visit www.lutron.com/baa for more information.

Annual electricity use in commercial buildings [1]

total 100%

lighting
38%

← cooling 12%

← ventilation 13%

← refrigeration 12%

← personal computers 5%
← space heating 4%

← other 16%

EcoSystem is designed for office spaces, K–12/university classrooms, and patient rooms, where lighting accounts for 38% of electricity usage. These applications benefit from EcoSystem's unparalleled energy savings through personal controls including wallstations and infrared remote control transmitters, 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 fluorescent ballasts and LED drivers are individually addressed. These ballasts and drivers 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 with fewer parts and user-friendly programming. Environmental sensors and personal controls integrate wirelessly or connect directly to any ballast, Energi Savr Node™ module, or QS sensor module, eliminating interfaces, power packs, and control devices.

EcoSystem® design and application guide

EcoSystem® H-Series
Programmed Rapid Start 1% Electronic Fluorescent Dimming Ballast

NEU N/C HOT   LINE   E1 E2   CLASS 2 BUS

LUTRON® Coopersburg, PA 18036 USA

dimming by **LUTRON®**

**NEW!** The new EcoSystem H-Series ballast is a cost-effective digital ballast option designed to meet the growing need for intelligent energy savings. The H-Series ballast offers superior capability, easy setup, and increased flexibility, see pg. 16.

1 Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey, released April 2009. (www.eia.doe.gov/emeu/cbecs/cbecs2003/lighting/lighting1.html)

EcoSystem® energy-saving light control strategies

Intelligent 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.**
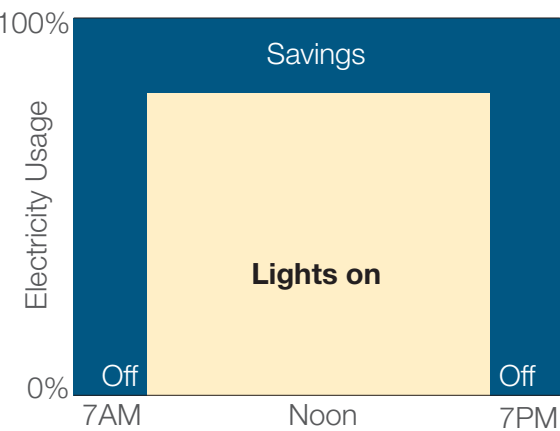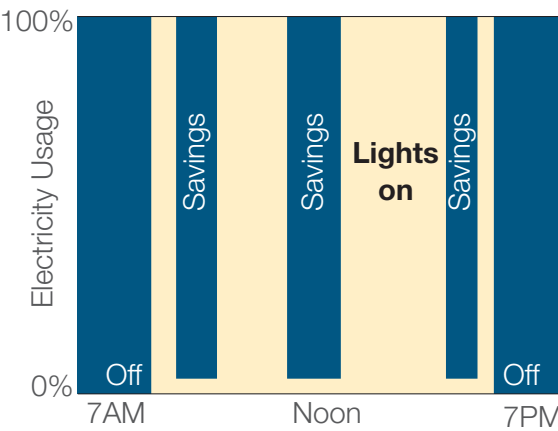
High-end trim/Tuning

Set the maximum light level in a space based on customer or design requirements.

Best applied in daylit spaces such as open office areas, classrooms, and corridors or when retrofitting an existing installation.

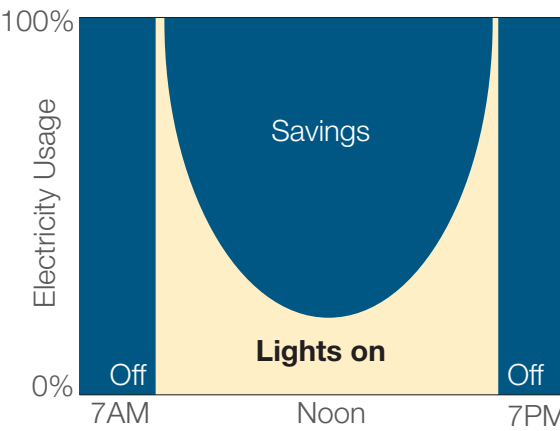**Typical lighting energy savings:** **20%** [1]

Occupancy/Vacancy sensing

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

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

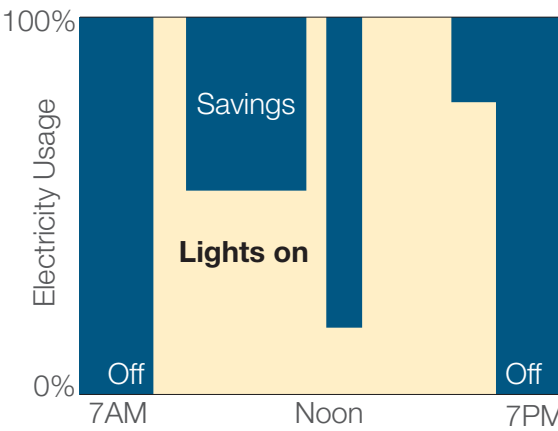**Typical lighting energy savings:** **15%** [2]

Daylight harvesting

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

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

Typical lighting energy savings: **15%** [3]

Personal dimming control

Provide personal choice and control of light levels to accommodate 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, classrooms, and patient rooms.

Typical lighting energy savings: **10%** [4]

1 California energy study. http://www.energy.ca.gov/efficiency/lighting/VOLUME01.PDF
2 IESNA 2000 Proceedings, Paper #43: An analysis of the energy and cost savings potential of occupancy sensors for commercial lighting systems. "Occupancy sensor savings range from 17% to 60% depending upon space type and time delay settings."
3 US Department of Energy. How to Select Lighting Controls for Offices and Public Buildings. Claim: 27% potential savings using daylight harvesting.
4 IESNA 2000 Proceedings, Paper #34: Occupant Use of Manual Lighting Controls in Private Offices. "Giving the occupant manual switching and dimming provided a total of 15% added savings above the 43% achieved by motion sensors."

Potential lighting energy savings when combining all light control strategies: **60%+**

EcoSystem® codes and standards

ASHRAE Energy Code 90.1–2007

ASHRAE Energy Code 90.1–2007 is currently the most widely used energy standard, and is the basis for most state-specific codes as well as the IECC code. The following chart outlines sections of the ASHRAE code that are most applicable to lighting energy, and identifies the Lutron lighting control solutions that can help you meet and exceed these codes.

For more specific information on energy codes in your state, visit www.bcap-energy.org.

ASHRAE Section	EcoSystem Lighting Control Solution
Automatic Lighting Shut-off (9.4.1.1)	
Emergency lighting must be controlled by automatic shut-off similar to the general lighting. **Interior lighting** shall be controlled with an automatic control device to shut off building lighting in all spaces (no 5,000 sq. ft. minimum building size)	EcoSystem with wired or wireless occupancy/vacancy sensors and timeclock integration
Space Control (9.4.1.2)	
Multi-level lighting—The controlled lighting in a space shall have at least one control step between 30% and 70% (inclusive) of full-lighting power in addition to all off.	EcoSystem with dimming control; multi-scene control
Each space enclosed by ceiling height partitions shall have at least one control device to independently control the general lighting within the space.	Energi Savr Node™ modules with seeTouch® QS wallstations, EcoSystem wallstations and/or Pico® wireless controls
An occupant sensor or timer switch shall be installed that automatically turns lighting off within 30 minutes of all occupants leaving a space (specific room type are defined within the code).	EcoSystem with occupancy/vacancy sensors, integration with a timeclock, or after hours mode

ASHRAE Section	EcoSystem® Lighting Control Solution
Automatic Daylighting Controls for Primary Sidelighted Areas (9.4.1.3) and for Toplighting (9.4.1.4)	
Sidelighted areas larger than 250 sq. ft. (and/or daylighted areas under skylights larger than 900 sq. ft.) must have a multi-level photocontrol that reduces electric lighting in response to available daylight with at least one control step that is between 50% and 70% of design lighting power and another control step that is no greater than 35% (including off) of design power.	EcoSystem with wired or wireless daylight sensor(s)
Additional Lighting Control (9.4.1.6)	
Task Lighting—supplemental task lighting, including permanently installed undershelf or undercabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided the control device is readily accessible and located so that the occupant can see the controlled lighting.	EcoSystem with Pico® wireless control or infrared remote control
Stairwell lighting—Lighting in enclosed stairwells shall have one or more control devices to automatically reduce lighting power in any one controlled zone by at least 50% within 30 minutes of all occupants leaving that controlled zone.	EcoSystem with wired or wireless occupancy/vacancy sensors
Additional Lighting Power (9.6.2)	
Additional lighting power allowances toward Lighting Power Density (LPD) requirements when you use controls that are not already mandated. Controls that give you credits are: Multi-level occupancy/vacancy sensors, dimming, workstation occupancy/vacancy sensors, daylight switching and daylight dimming).	EcoSystem with wired or wireless occupancy/vacancy sensors and/or daylight sensors, dimming ballasts, and personal control

EcoSystem® ballasts

Foundation for a system

EcoSystem lighting control starts with one simple, but essential building block—the EcoSystem ballast—which replaces the non-dim ballast in a fixture. Depending on the type of room or facility, any combination of environmental sensors or wallstations can be used to control the fixture.

1% NEW! Now the highest performance dimming solution meets any budget.

Basic digital control for 1% dimming

EcoSystem H-Series 1% fluorescent dimming ballasts, pg. 16
Available for:
• 4 ft. T8 1- and 2-lamp fixtures (1.0 and 1.17 ballast factor)
• 4 ft. T5 and T5HO 1- and 2-lamp fixtures

10%

Other EcoSystem digital ballast options

EcoSystem digital ballasts with integral sensor connections, pg. 18
Please visit www.lutron.com/ecosystem for model availability.

1%

Additional ballast options for 1% dimming

Hi-lume 3D 1% fluorescent dimming ballasts, pg. 17
Please visit www.lutron.com/ecosystem for model availability.

5%

Other EcoSystem digital ballast options
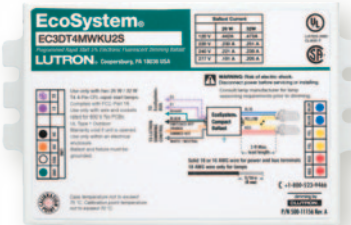
**EcoSystem digital ballasts, pg. 19**
Please visit www.lutron.com/ecosystem for model availability.

Before designing a system consider the following to help clarify the scope of the project:

Define your space

The appropriate lighting control solution is defined by the needs of the space. The following steps help to answer key questions and drive you to the ideal lighting control solution.
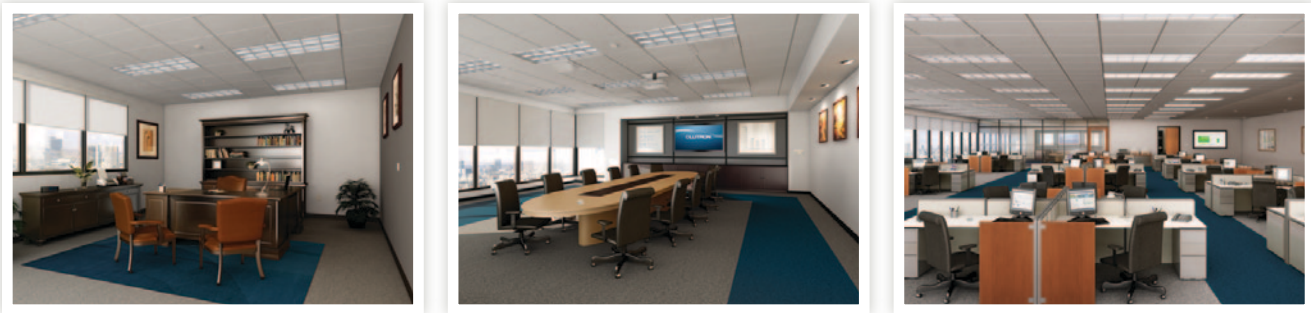
Use the following steps to plan and design an energy-saving light control system to suit your needs.

Step 1 ballast and driver selection

A Determine number of fixtures that will be connected to EcoSystem
B Determine the fixture type and how the fixtures are driven
   – Fluorescent and/or LED
   – Digital control only and/or digital and 3-wire control

See pgs. 16–20 for all ballast and driver options

Step 2 Energi Savr Node™ selection

A Select main control module
B Determine if additional lighting fixtures will be controlled as a switched or 0–10V zone

See pgs. 21–23 for all module options

Step 3 sensor selection

A Determine what sensors will be connected to EcoSystem
B Choose wireless or wired sensors or a combination of both technologies

See pgs. 24–27 for all sensor options

Step 4 control selection

Determine the type of wall control required and/or if there are additional points of control needed in the space

See pgs. 28–31 for all control options
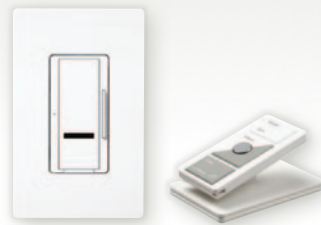
Step 5 integration

Determine integration strategy needed (if any)

See pg. 32 for all integration options

Step 6 programming

Determine point of responsibility for system programming

See pg. 33 for all programming options

TRIM OFF   TRIM OFF

NEW EcoSystem Energi Savr Node™ Module, pg. 21
• Counts as 1 QS device
• Provides 30 Power Draw Units (PDUs)
• Can count as 1 – 100 zones
• Can count as 1 – 100 areas
• Wired sensor connections: (12 total devices)
 – 4 daylight sensors (maximum)
 – 4 occupancy sensors (maximum)
 – 4 IR receivers or wallstations (maximum)
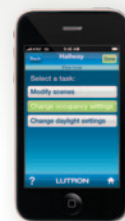• Wi-fi router and Apple iPod touch or iPhone device required for system programming, pg. 33

Energi Savr Node.™
EcoSystem.
QSN-2ECO-S
120-277 V∼
50/60 Hz 500 mA

To Distribution (120 V, 220/240 V, 277 V)

Type D

Type A

Type E

Type C

Type E

**NEW EcoSystem®
H-Series Ballast,**
pg. 16

Type B

Ballast accepts Type B wire, other wire types may be pig-tailed on.

Type A

To Distribution

Hi-lume® 3D Ballast, pg. 17

Type A

To Distribution

EcoSystem Ballast, pg. 18

Type C

Integral sensor connections

Type B

Type A

To Distribution

EcoSystem Ballast, pg. 18

Type B

Type C

Integral sensor connections

Type A

To Distribution

EcoSystem CFL Ballast, pg. 19

Type B

Type A

To Distribution

**NEW Hi-lume®
A-Series LED Driver,** pg. 20

Type B

EcoSystem digital link is Class 1 or Class 2, topology free

Type A

To Distribution

To additional ballasts and drivers

To wired sensor or control

Type C

To other QS devices including additional Energi Savr Node™ modules

To wired sensor or control

Type C

Type E

NEW QS Sensor Module, pg. 22
(Required for wireless integration)
• Counts as 1 QS device
• Requires 3 – 11 PDUs depending on attached wired sensors
• 4 wired sensor connections in total can be used for daylight sensors, occupancy/vacancy sensors, or IR receivers or wallstations
• Wireless sensor and control limits: (30 total devices)
 – 10 Radio Powr Savr wireless daylight sensors (maximum)
 – 10 Radio Powr Savr wireless occupancy/ vacancy sensors (maximum)
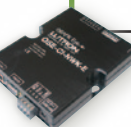 – 10 Pico wireless controls (maximum)

Wireless components

NEW Radio Powr Savr™ Daylight Sensor, pg. 24

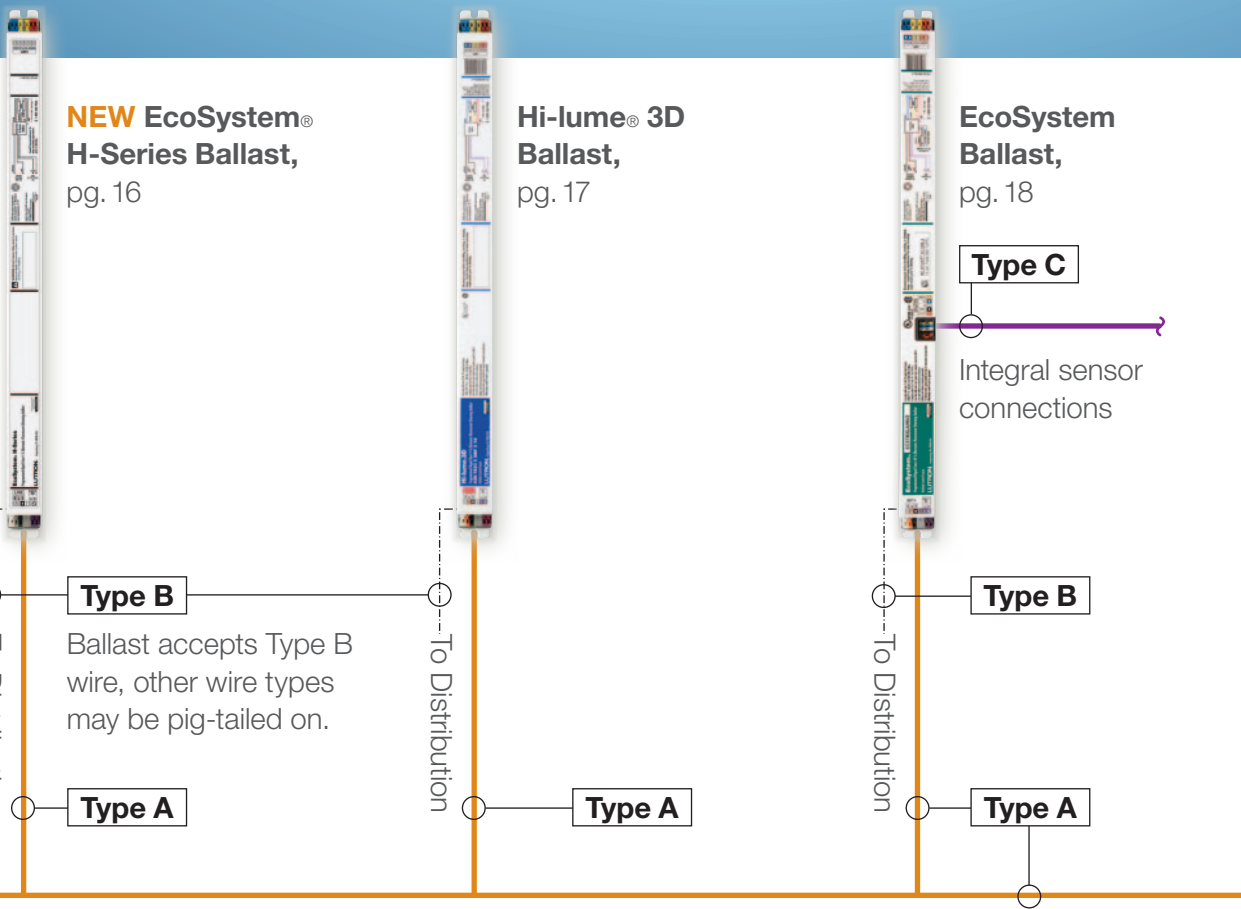**NEW Radio Powr Savr Occupancy/ Vacancy Sensor,** pg. 26

NEW Pico® Wireless Control, pg. 28
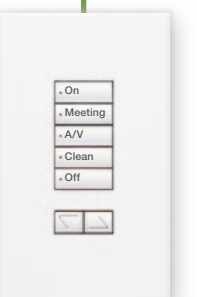
seeTouch® QS Wallstation, pg. 30
• Counts as 1 QS device
• Requires 1 PDU

QS Interfaces, pg. 32
• Counts as 1 QS device
• Consult product specification for PDU requirement

To 3rd party devices

Wired components such as wired daylight sensors, wired occupancy/vacancy sensors, infrared receivers, and EcoSystem wallstations can wire directly to the ballasts with integral sensor connections or to either the QS sensor module or the EcoSystem Energi Savr Node™ module using Type C wire.

Type C

Type C

Daylight Sensor, pg. 25

Occupancy/ Vacancy Sensor, pg. 27

Infrared Receiver, pg. 29

or

Wallstation with Infrared Receiver, pg. 31

System rules and maximums

EcoSystem® Digital Link Rules (Type A Wire)
• Up to 64 EcoSystem-compatible fluorescent ballasts and/or LED drivers per EcoSystem digital link
• Sensor and control communication limits:
 – 16 daylight sensors
 – 64 occupancy sensors
 – 64 IR receivers or wallstations
• A sensor or control counts as a device on the EcoSystem digital link if it is wired to an EcoSystem ballast on the same link, or is programmed to communicate with a fluorescent ballast or LED driver on the EcoSystem digital link
• EcoSystem-compatible fluorescent ballasts and LED drivers on the EcoSystem digital link do not count as QS devices

General QS Communication Link Rules (Type E Wire)
• Maximum of 100 zones
• Maximum of 100 areas
• Maximum of 100 devices, including Energi Savr Node™ modules, QS sensor modules, seeTouch® QS wallstations, and QS interfaces

Wire gauge key

Type A	**EcoSystem Digital Link** (#16 – #18 AWG Solid, Lutron recommends 2 different colors of wire) Standard: **C-CBL-216-WH-1**; Plenum Rated: **C-PCBL-216-CL-1**
Type B	**Line Voltage** (#16 – #18 AWG Solid)
Type C	**Class 2 Low Voltage** (#22 AWG Solid (90°C) Only) Standard: **C-CBL-522S-WH-1**; Plenum Rated: **C-PCBL-522S-CL-1**
Type D	**Line Voltage** (#12 – #14 AWG Solid)
Type E	**QS Communication Link** (4-conductor—**GRX-CBL-346S-500** or equivalent cable)

TRIM OFF

TRIM OFF

Step ① ballast and driver selection

EcoSystem H-Series digital ballasts NEW!

Design statement: Specify EcoSystem H-Series digital ballasts for high-performance 1% dimming. Lighting will be controlled entirely by EcoSystem; sensors communicate to ballasts via an Energi Savr Node™ module.

NEW T8, T5, and T5HO digital ballast dimensions
L: 18.00" (457mm)
W: 1.18" (30mm)
H: 1.00" (25mm)
Mounting center: 17.70" (450mm)

Performance
- Universal voltage input allows the ballast to be operated at 120 V, 220/240 V, or 277 V at 50/60 Hz
- High-performance dimming down to <1% for T8, 1% for T5 and T5HO
- Strikes to any light level

Benefits
- With models available for T8, T5, and T5HO, use EcoSystem H-Series throughout any space
- Digitally configured zones can be changed at any time without re-wiring
- The EcoSystem digital link offers improved flexibility and can be wired as Class 1 or Class 2—making the H-Series ballast the perfect choice for retrofit or new construction
- The low-voltage, 2-conductor EcoSystem digital link installs as easy as 0–10 V and provides for individual fixture control
- Responds to daylight sensors, occupancy/vacancy sensors, and controls connected to the EcoSystem digital link, Energi Savr Node™ module, or QS sensor module

Energy
- Helps meet energy codes such as ANSI/ASHRAE/IESNA standard 90.1-2007, Title 24, and IECC
- Custom factory-tuned ballast factors available to help meet lighting power density requirements

Models
For the latest information and model numbers, visit www.lutron.com/ecosystem

For wiring overview, see pgs. 12–15
For concept drawings, see pgs. 36–41

Note: For 2 ft., 3 ft., and 3-lamp 1% dimming ballasts use Hi-lume® 3D, see www.lutron.com/ballasts for more information.

Step ① ballast and driver selection

Hi-lume® 3D digital ballasts

Design statement: Specify Hi-lume 3D ballasts to be installed in areas of an EcoSystem lighting control solution that require architectural level dimming. Ballasts also have 3-wire inputs.
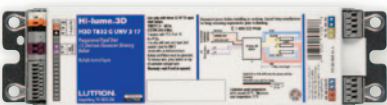
T8 digital ballast dimensions
L: 9.50" (241mm)
W: 2.38" (60mm)
H: 1.00" (25mm)
Mounting center: 8.90" (226mm)

T8 and T5 digital ballast dimensions
L: 18.00" (457mm)
W: 1.18" (30mm)
H: 1.00" (25mm)
Mounting center: 17.70" (450mm)

Performance
- Universal voltage; operates at 120 V, 220/240 V, and 277 V, at 50/60 Hz
- Smoothly dims from 100% to 0.7% for T8 lamps; 100 to 1% for T5 lamps
- Strikes to any light level

Benefits
- Models available for T8 and T5; use in conference rooms, classrooms, and/or patient rooms
- Hi-lume 3D ballasts are digitally addressed and configured to work in zones after installation, which can reduce zone definition and additional design steps
- Responds to daylight sensors, occupancy/vacancy sensors, and controls connected to the EcoSystem digital link, Energi Savr Node™ module, or QS sensor module

Energy
- Saves energy as it dims
- Helps meet energy codes such as ANSI/ASHRAE/IESNA standard 90.1-2007, Title 24, and IECC
- Custom factory-tuned ballast factors available to help meet lighting power density requirements

Models
For the latest information and model numbers, visit www.lutron.com/hilume3d

For wiring overview, see pgs. 12–15
For concept drawings, see pgs. 36–41

Step ① ballast and driver selection

EcoSystem digital ballasts with integral sensor connections

Design statement: Specify EcoSystem ballasts for dimming performance to 10%. Lighting controls can be a combination of EcoSystem digital and/or 3-wire controls; sensors communicate directly via integral ballast sensor connections or through the Energi Savr Node™ module.

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)

Performance
- Universal voltage; operates at 120 V, 220/240 V, and 277 V, at 50/60 Hz; select models are available in 347 V
- Smoothly dims from 100% to 10% for T8, T5, T5HO and T5 twin-tube
- Strikes to any light level

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

Energy
- Saves energy as it dims
- Helps meet energy codes such as ANSI/ASHRAE/IESNA standard 90.1-2007, Title 24, and IECC
- Custom factory-tuned ballast factors available to help meet lighting power density requirements

Models
For the latest information and model numbers, visit www.lutron.com/ecosystem

For wiring overview, see pgs. 12–15
For concept drawings, see pgs. 36–41

Step ① ballast and driver selection

EcoSystem® digital ballasts

Design statement: Specify EcoSystem digital ballasts for dimming performance to 5%. Lighting controls can be a combination of EcoSystem digital and/or 3-wire controls; sensors communicate to ballasts via the Energi Savr Node™ module.

T4 triple-tube and T4 quad-tube digital ballast dimensions
L: 4.90" (124mm)
W: 3.00" (76mm)
H: 1.00" (25mm)
Mounting center: 4.60" (117mm)

Performance
- Universal voltage; operates at 120 V, 220/240 V, and 277 V, at 50/60 Hz
- Smoothly dims from 100% to 5% for T4 triple-tube and T4 quad-tube
- Strikes to any light level

Benefits
- Models available for T4 triple-tube and T4 quad-tube; use throughout an office, school, and/or healthcare building
- EcoSystem ballasts are digitally addressed and configured to work in zones after installation, which can reduce zone definition and additional design steps
- Responds to daylight sensors, occupancy/vacancy sensors, and controls connected to the EcoSystem digital link, Energi Savr Node™ module, or QS sensor module

Energy
- Saves energy as it dims
- Helps meet energy codes such as ANSI/ASHRAE/IESNA standard 90.1-2007, Title 24, and IECC
- Custom factory-tuned ballast factors available to help meet lighting power density requirements

Models
For the latest information and model numbers, visit www.lutron.com/ecosystem

For wiring overview, see pgs. 12–15
For concept drawings, see pgs. 36–41

Step ① ballast and driver selection

Hi-lume® A-Series LED drivers

Design statement: Specify Hi-lume A-Series LED drivers
for smooth and continuous 1% dimming for virtually any LED
device, constant current or constant voltage.
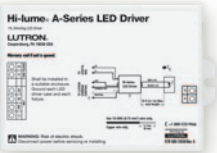
**NEW Hi-lume A-Series LED
compact driver dimensions**
L: 4.90" (124mm)
W: 3.00" (76mm)
H: 1.00" (25mm)
Mounting center: 4.60" (117mm)

**NEW Hi-lume A-Series LED
stick driver dimensions**
L: 14.13" (359mm)
W: 1.18" (30mm)
H: 1.00" (25mm)
Mounting center: 4.60" (117mm)

Performance
• Constant voltage options from 10V to 40V, available in 0.5V steps
• Constant current options from 200mA to 2.1 Amps,
  available in 10mA steps
• Universal voltage; operates at 120V and 277V, at 50/60Hz
• Immediate light output
• Strikes to any light level

Benefits
• Compatible with Lutron EcoSystem, 3-wire controls,
  and electronic low voltage controls
• Service-free lifetime of 50,000 hours
• The Lutron fixture qualification program ensures that approved
  fixtures are compatible with the driver
• Responds to daylight sensors, occupancy/vacancy sensors,
  and controls connected to the EcoSystem digital link,
  Energi Savr Node™ module, or QS sensor module

Energy
• Saves energy as it dims
• Contact the LED Control Center of Excellence for details:
  1.877.DIM.LED8

Models
For the latest information and model numbers,
visit www.lutron.com/HilumeLED
For a list of compatible fixtures, visit
www.lutron.com/HilumeLED/fixtures

For wiring overview, see pgs. 12–15
For concept drawings, see pgs. 36–41

Step ② Energi Savr Node™ selection

EcoSystem® Energi Savr Node (ESN) module

Design statement: EcoSystem communication starts with an ESN
module. The ESN module digitally links ballasts and powers communications
throughout the lighting control system. Specify an ESN module for controlling
up to 64 or 128 fluorescent ballasts or LED drivers.

**NEW EcoSystem ESN
module dimensions**
W: 9.25" (243mm)
H: 13.25" (337mm)
D: 3.16" (80mm)

**NEW EcoSystem with
Shades ESN module**
See pg. 35

Features
• Provides individual control of 64 or 128 EcoSystem-compatible
  fluorescent ballasts and/or LED drivers
• Combines high-end trim, daylight harvesting, occupancy/vacancy
  sensing, personal control, and contact closure integration
• Connect directly to other ESN modules, GRAFIK Eye® QS units,
  or Quantum® to expand functionality and control
• Sensor information can be shared across multiple EcoSystem
  digital links and across multiple Energi Savr Node™ modules
  (iPod touch programming application and ESN programming
  interface required)
• Programmable contact-closure input can activate scenes,
  enable/disable after hours mode, or enable/disable
  loadshed for demand response
• Model also available for integration with shades, see pg. 35

Mounting
• Surface mounted
• Can be installed in accordance with National Electrical
  Code® (NEC®) Article 300.22(c) "Other spaces used for
  environmental air"

Models
QSN-1ECO-S—1 EcoSystem digital link controlling up to 64
EcoSystem-compatible fluorescent ballasts and/or LED drivers
QSN-2ECO-S—2 EcoSystem digital links controlling up to 128
EcoSystem-compatible fluorescent ballasts and/or LED drivers
QSN-2ECO-PS120—2 EcoSystem digital links controlling
up to 128 EcoSystem-compatible fluorescent ballasts
and/or LED drivers and up to 10 Sivoia® QS shade drives

For wiring overview, see pgs. 12–15
For concept drawings, see pgs. 36–41

Step ② Energi Savr Node™ selection

QS sensor module

Design statement: Add a QS sensor module to integrate Lutron wireless and wired sensors and controls through the Energi Savr Node™ module to EcoSystem®-compatible ballasts and Hi-lume® A-Series LED drivers.

> **Required for integration with Radio Powr Savr wireless sensors, pgs. 24, 26, and Pico wireless controls, pg. 28.**

NEW QS sensor module dimensions
H: 4.00" (102mm)
W: 4.00" (102mm)
D: 1.20" (30mm)

Performance
- Uses Clear Connect™ RF Technology for communication with up to 10 Radio Powr Savr™ occupancy/vacancy sensors, up to 10 Radio Powr Savr daylight sensors, and up to 10 Pico® wireless controls
- QS sensor module connects to up to four Lutron wired sensors or controls—occupancy sensors, daylight sensors, EcoSystem infrared (IR) receivers, or EcoSystem wallstations (each input is universal)
- QS sensor module integrates Radio Powr Savr wireless sensors and Pico wireless controls
- Also compatible with Softswitch® Energi Savr Node and Energi Savr Node 0–10V modules
- RF Range: 60 ft. (18m) line of sight, or 30 ft. (9m) through walls

Benefits
- Powered by QS communication link—no line voltage connections are required

Mounting
- Installs on the ceiling, visible from inside the space, to guarantee wireless range

Models
QSM2-4W-C—434 MHz North America (wired and wireless capability)

For wiring overview, see pgs. 12–15
For concept drawings, see pgs. 36–41

Step ② Energi Savr Node™ selection

Other Energi Savr Node™ modules

Design statement: Specify additional Energi Savr Node modules based on the control type and functionality you need to add to the lighting control system. For example, adding additional switched zones and/or additional 0–10V dimming zones.

NEW Softswitch® Energi Savr Node dimensions
W: 9.25" (243mm)
H: 13.25" (337mm)
D: 3.16" (80mm)

NEW Energi Savr Node for 0-10V dimming dimensions
W: 9.25" (243mm)
H: 13.25" (337mm)
D: 3.16" (80mm)

Features
- Provide switched and dimming control of other lighting loads
- Combines high-end trim, daylight harvesting, occupancy/vacancy sensing, personal control, and contact closure integration
- Easily expand a system by connecting Energi Savr Node modules directly to other Energi Savr Node modules, GRAFIK Eye® QS units, or Quantum® to expand functionality and control
- Sensor information can be shared across multiple EcoSystem digital links and across multiple Energi Savr Node™ modules (iPod touch programming application and ESN programming interface required)
- Programmable contact-closure input can activate scenes, enable/disable after hours mode, or enable/disable loadshed for demand response

Mounting
- Surface mounted
- Can be installed in accordance with National Electrical Code® (NEC®) Article 300.22(c) "Other spaces used for environmental air"

Models
QSN-4S16-S—Softswitch Energi Savr Node for switching of four 16A circuits of lighting loads
QSN-4T16-S—Energi Savr Node for 0–10V for switching and dimming of four 16A circuits of 0–10V loads

For wiring overview, see pgs. 12–15
For concept drawings, see pgs. 36–41

EcoSystem®

NEW! Radio Powr Savr™ **wireless** daylight sensors

Design statement: Specify a wireless daylight sensor to dim or switch zones of light in response to daylight. Wireless integration is ideal in most situations and perfect for retrofit applications.

Wireless integration requires:

QS sensor module pg. 22
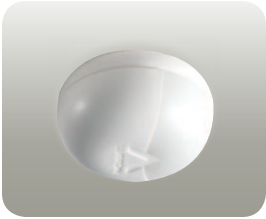
Step 3 sensor selection

EcoSystem **wired** daylight sensors

Design statement: Specify a wired daylight sensor to dim or switch multiple zones of light in response to daylight. Select a wired solution for installations where wireless communication is not recommended or approved (i.e. certain government or medical buildings).

NEW Radio Powr Savr wireless daylight sensor dimensions
H: 1.60" (41mm)
D: 1.70" (17mm)

Performance
- 10-year battery life
- Up to 10 wireless daylight sensors per QS sensor module
- Features Lutron's reliable proportional daylight open loop control
- Has a light range (0–10,000 fc) and a photopic response matches human eye
- Designed to give a linear response to changes in viewed light level
- One sensor is capable of switching, stepped dimming, and continuous dimming of multiple zones
- RoHS compliant
- Capable of override for a maximum of 2 hours

Benefits
- Sensors require no wiring and simple calibration
- Multiple ceiling-mount methods available for different ceiling materials
- Front accessible test buttons make setup easy
- Sensor information can be shared across multiple EcoSystem digital links and across multiple Energi Savr Node™ modules (iPod touch programming application and ESN programming interface required, see pg. 33)

How it works
- Daylight sensors detect sunlight and communicate the sunlight level to the digital ballasts or LED drivers
- The daylight sensor is suitable for internal ambient light levels between 0 and 500 fc

Models
LRF2-DCRB-WH—434 MHz daylight sensor

For wiring overview, see pgs. 12–15
For concept drawings, see pgs. 36–41

Daylight sensor dimensions
H: 0.69" (17mm)
D: 1.18" (30mm)
Stem length: 1.25" (32mm)
Max wire length: 100 ft. (30m)

Performance
- Up to 16 wired daylight sensors per EcoSystem digital link
- Features Lutron's reliable proportional daylight open loop control
- Has a light range (0–10,000 fc) and a photopic response matches human eye
- Designed to give a linear response to changes in viewed light level
- One sensor is capable of switching, stepped dimming, and continuous dimming of multiple zones
- RoHS compliant

Benefits
- Low profile for mounting on ceiling tiles or fixtures
- Class 2 low voltage enables simplified wiring and mounting
- Wires directly to the nearest EcoSystem ballast with integral sensor connections, Energi Savr Node module™, or QS sensor module
- Sensor information can be shared across multiple EcoSystem digital links and across multiple Energi Savr Node modules (iPod touch programming application and ESN programming interface required, see pg. 33)

How it works
- EcoSystem daylight sensors detect incoming sunlight and communicate the sunlight level to the digital ballasts or LED drivers
- The daylight sensor is suitable for internal ambient light levels between 0 and 500 fc

Models
EC-DIR-WH—Infrared daylight sensor

For wiring overview, see pgs. 12–15
For concept drawings, see pgs. 36–41

EcoSystem®

Step ③ sensor selection

NEW! Radio Powr Savr™ **wireless** occupancy/vacancy sensors

Design statement: Specify a wireless occupancy/vacancy or vacancy only sensor to provide an automatic off for energy savings. Wireless integration is ideal in most situations and perfect for retrofit applications.

Wireless integration requires:

QS sensor module pg. 22

Step ③ sensor selection

EcoSystem® **wired** occupancy/vacancy sensors

Design statement: Specify a wired occupancy/vacancy sensor to provide an automatic off for energy savings. Select a wired solution for installations where wireless communication is not recommended or approved (i.e. certain government or medical buildings).

NEW Radio Powr Savr wireless ceiling mount occupancy/vacancy sensor dimensions
W: 4.00" (102mm)
H: 4.00" (102mm)
D: 1.30" (33mm)

NEW Radio Powr Savr wireless wall/hall mount occupancy/vacancy sensor dimensions
W: 6.12" (156mm)
H: 1.62" (41mm)
D: 2.31" (59mm)

Performance
- 10-year battery life design
- Up to 10 wireless occupancy/vacancy sensors per QS sensor module
- Passive infrared motion detection with exclusive Lutron XCT™ Technology for fine motion detection
- 360° coverage ranges from 324 sq. ft. to 676 sq. ft. for superior fine motion detection
- Vacancy model available to meet CA Title 24 requirements

Benefits
- Sensors require no wiring
- Front-accessible buttons make setup easy
- Sensors have simple test modes to verify ideal locations during installation
- Multiple ceiling-mount methods available for different ceiling materials
- Sensor information can be shared across multiple EcoSystem digital links and across multiple Energi Savr Node™ modules (iPod touch programming application and ESN programming interface required, see pg. 33)

Models
Ceiling Mount
LRF2-OCRB-P-WH—434 MHz occupancy/vacancy sensor
LRF2-VCRB-P-WH—434 MHz vacancy sensor
Wall Mount
LRF2-OWLB-P-WH—434 MHz occupancy/vacancy sensor
LRF2-VWLB-P-WH—434 MHz vacancy sensor
LRF2-OKLB-P-WH—434 MHz occupancy/vacancy sensor
LRF2-VKLB-P-WH—434 MHz vacancy sensor
Hall Mount
LRF2-OHLB-P-WH—434 MHz occupancy/vacancy sensor
LRF2-VHLB-P-WH—434 MHz vacancy sensor

Ceiling mount occupancy/vacancy sensor dimensions
H: 4.50" (114mm)
W: 4.50" (114mm)
D: 1.40" (38mm)
Max wire length: 100 ft. (30m)

Wall mount occupancy/vacancy sensor dimensions
H: 3.75" (95mm)
W: 5.50" (140mm)
D: 4.00" (102mm)
Max wire length: 100 ft. (30m)

Performance
- Up to 64 occupancy/vacancy sensors per EcoSystem digital link
- Broad range of models for offices to open spaces— 500 sq. ft., 1000 sq. ft., 1600 sq. ft., or 2000 sq. 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

Benefits
- No power pack required since power for the sensor comes directly from the EcoSystem ballast with integral sensor connection, an Energi Savr Node™ module, or the QS sensor module
- Sensor information can be shared across multiple EcoSystem digital links and across multiple Energi Savr Node™ modules (iPod touch programming application and ESN programming interface required, see pg. 33)

Models
Ceiling Mount
LOS-CDT-(500,1000)-WH—Dual technology, 180°
LOS-CDT-2000-WH—Dual technology, 360°
LOS-CDT- (500R,1000R)-WH—Dual technology with relay, 180°
LOS-CDT-2000-WH—Dual technology with relay, 360°
Wall Mount
LOS-WDT-WH—Dual technology, 110°
LOS-WDT-R-WH—Dual technology with relay, 110°

For wiring overview, see pgs. 12–15
For concept drawings, see pgs. 36–41

See www.lutron.com/occsensors for more information

EcoSystem®

Step ④ control selection

Pico® **wireless** lighting control

Design statement: Use Pico wireless lighting controls to control lights or shades wirelessly within a space with the touch of a button.

Wireless integration requires:

QS sensor module pg. 22

Pico wireless control dimensions
H: 2.60" (66mm)
H: 1.28" (33mm)
D: 0.33" (8mm)

Other control mounting styles

Performance
- Communicates with the QS sensor module via radio frequency (RF) using Clear Connect™ RF Technology
- Can be assigned to control up to ten (10) dimmers, switches, and lamp dimmers that are within a 100 ft. (30m) line of sight or 30 ft. (9m) through walls range
- Unique serial number prevents interference between systems
- Battery powered (5-year battery life)—requires no new wiring

Benefits
- Flexible device that allows the user to control lights or shades by wirelessly communicating with the QS sensor module
- Can function as a tabletop control on a pedestal, a lightweight handheld remote, or it can be wall-mounted with or without a Lutron Claro® wallplate
- Available in 2- and 3-button configurations with options for preset and raise/lower buttons

Models
Pico wireless controls
MRF2-3BRL-L-XX—3 buttons with raise/lower
MRF2-3B-L-XX—3 buttons with preset button
MRF2-3B-L-XX-E01—3 buttons with Welcome button
MRF2-2BRL-L-XX—2 buttons with raise/lower
MRF2-2B-L-XX—2 buttons
Pedestals
L-PED1-XX—Single pedestal
L-PED2-XX—Double pedestal
Wallplates
CW-1-XX—1-gang wallplate (gloss/stainless steel)
CW-2-XX—2-gang wallplate (gloss/stainless steel)
CW-3-XX—3-gang wallplate (gloss/stainless steel)

XX in the model number represents color/finish code. Please see www.lutron.com for color choices.

Step ④ control selection

EcoSystem® **wired** infrared receiver and remote control transmitter

Design statement: Add an EcoSystem infrared receiver with an infrared remote control transmitter to provide personal light control to any fixture on the EcoSystem digital link.

Infrared receiver dimensions
H: 0.69" (17mm)
D: 1.18" (30mm)
Stem length: 1.25" (32mm)
Max wire length: 100 ft. (30m)

Infrared remote control transmitter dimensions
W: 1.51" (38mm)
H: 4.63" (118mm)
D: 0.55" (14mm)

Performance
- Allows personalized light level selection from maximum to minimum light levels
- Can control multiple zones or areas
- Integral LED indicates signal reception
- Up to 64 infrared receivers (one per ballast) may be used per EcoSystem digital link

Benefits
- Low profile for mounting on ceiling tiles or fixtures
- Class 2 low voltage enables simplified wiring and mounting
- Wires directly to the nearest EcoSystem ballast with integral sensor connections, Energi Savr Node™ module, or QS sensor module

Models
EC-IR-WH—Infrared receiver
C-FLRC-WH—Infrared remote control transmitter
RCTH-GR—Remote control holster/tether

For wiring overview, see pgs. 12–15
For concept drawings, see pgs. 36–41

EcoSystem ®

Step ④ control selection

seeTouch® QS wallstations

Design statement: Specify seeTouch QS wallstations where needed for full-range dimming control with engraved buttons.

seeTouch QS wallstation dimensions
W: 2.75" (70mm)
H: 4.56" (116mm)
D: 1.25" (32mm)
Max wire length: 100 ft. (30m)

Performance
- Buttons are backlit and can be engraved to provide intuitive control of the space
- Recall scenes to adjust lighting for different activities
- Control individual zones of light to set the perfect light for any task
- Control up to 100 zones of lighting from up to 99 wallstations

Benefits
- Class 2 low voltage QS communication link simplifies wiring and mounting
- Wallstations are powered directly from the QS communication link

Models
QSWS2-1B*—1-button wallstation
QSWS2-3B*—3-button wallstation
QSWS2-5B*—5-button wallstation
QSWS2-7B*—7-button wallstation
QSWS2-2BRL*—2-button wallstation with raise/lower
QSWS2-3BRL*—3-button wallstation with raise/lower
QSWS2-5BRL*—5-button wallstation with raise/lower
QSWS2-2BRLIR*—2-button wallstation with raise/lower and IR receiver
QSWS2-3BRLIR*—3-button wallstation with raise/lower and IR receiver
QSWS2-5BRLIR*—5-button wallstation with raise/lower and IR receiver
QSWS2-1RLD*—dual wallstation with 3-button and 2-button with raise/lower
QSWS2-2RLD*—dual 2-button wallstation with raise/lower
QSWS2-3BD*—dual 3-button wallstation
* Consult seeTouch QS specification submittal sheet for information on specifying insert style, engraving, and color.

For wiring overview, see pgs. 12–15
For concept drawings, see pgs. 36–41

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 and 4-scene wallstation dimensions
W: 2.75" (70mm)
H: 4.56" (116mm)
D: 1.25" (32mm)
Max wire length: 100 ft. (30m)

Performance
- Smoothly dims from maximum to minimum light levels
- Integral infrared receiver for both programming and control of EcoSystem lighting
- Up to 64 wallstations (one per ballast) may be used per EcoSystem digital link
- 4-scene wallstation recalls 4 preset scenes

Benefits
- Class 2 low voltage enables simplified wiring and mounting
- Wires directly to the nearest EcoSystem ballast with integral sensor connections, Energi Savr Node™ module, or QS sensor module

Models
CC-1BRL-WH—1-button wallstation in White (-WH)* with toggle on/off and raise/lower
CC-4BRL-WH—4-scene wallstation in White (-WH)* for recall of 4 scenes plus all on/all off

* Also available in Black (-BL), Ivory (-IV), and Light Almond (-LA)

For wiring overview, see pgs. 12–15
For concept drawings, see pgs. 36–41

Step ⑤ integration

QS interfaces

Design statement: Specify QS interfaces to integrate third-party devices through RS-232/Ethernet and/or contact closures.

QS RS-232/Ethernet interface dimensions
W: 4.26" (108mm)
H: 5.26" (134mm)
D: 1.06" (27mm)

QS contact closure interface dimensions
W: 4.26" (108mm)
H: 5.26" (134mm)
D: 1.06" (27mm)

Performance
- Each QS interface counts as 1 QS device; QS communication link system limit is 100 QS devices
- RS-232/Ethernet interface uses standard 9-pin female serial connector or RD45 connector
- Contact closure interface provides five inputs and five dry contact closure outputs

Benefits
- Integrate with third-party devices and controls via RS-232/Ethernet or contact-closure inputs
- Sweep lights to low levels or off through RS-232/Ethernet or contact closure commands from third-party controls
- Add third-party touchscreen control using RS-232/Ethernet commands

Models
QSE-CI-NWK-E—RS-232/Ethernet control interface
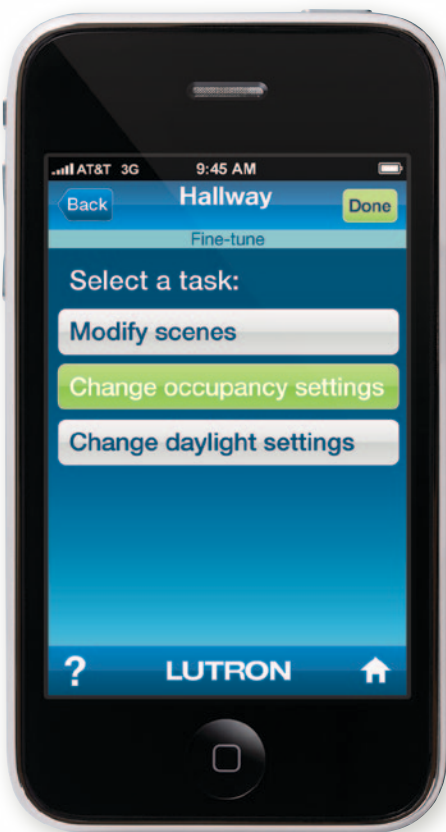**QSE-IO**—Contact closure input/output interface

For wiring overview, see pgs. 12–15
For concept drawings, see pgs. 36–41

For more information on mounting options and installation, please visit www.lutron.com/TechnicalDocumentLibrary.

Step ⑥ programming

NEW! Programming application for Apple iPhone or iPod touch digital devices

Design statement: Use the Energi Savr Node™ programming application to setup, fine-tune, and maintain the lighting control system.

The Energi Savr Node programming application for Apple iPhone or iPod touch mobile digital devices is the key to an intelligent light and shade control system.
- Adjust ballasts to the needs of any space
- Define light level
- Adjust sensor and control preferences

NEW System Backup
The iPod application can be used to save all configuration settings in the system. In the event that a Energi Savr Node module is replaced, all system settings and configuration can be automatically restored.

Programming interface
The **QSE-CI-AP-D** is a programming interface for Energi Savr Node modules that provides the capability to program the lighting control system with an intuitive application for Apple iPhones or iPod touch devices.

Features
- Program all Energi Savr Node modules connected to the same QS communication link with the Energi Savr Node Programming interface, using the Apple iPhone or iPod touch mobile digital devices
- Programming interface installs via surface mount or DIN-rail

Requirements
- The Energi Savr Node programming interface is powered by the QS communication link, and consumes 2 power draw units
- QS communication link wire (PELV, Class 2: USA)
  – Two #18 AWG (1.0mm^2) conductors for control power
  – One twisted, shielded pair of #22 AWG (0.34mm^2) for data link
  – Available from Lutron, part number GRX-CBL-346S; check compatibility in your area
- Connect a wi-fi router the Energi Savr Node programming interface for Apple iPhone or iPod touch programming

Apple and iPod are registered trademarks and iPhone is a trademark of Apple, Inc., registered in the U.S. and other countries.

EcoSystem® expanding the system

Lutron EcoSystem control solutions can be installed to control any size space, and expand easily to accommodate changing lighting control needs, enhanced performance requirements, or building renovation and expansion.

Lutron systems ensure interoperability and wireless capability that provide many options for growth including multi-scene control, timeclock interface, shade control, and even total light management for the entire building.

EcoSystem® with Shades
Energi Savr Node™ module

• Control electric lights and daylight with one control panel
• Integrates up to 10 Sivoia® QS shade drives and up to 128 EcoSystem-compatible fluorescent ballasts and/or LED drivers
• System provides a power source for seeTouch® QS keypads, QS interfaces, QS sensor modules, or up to 10 Sivoia QS shade drives
• System can expand via the QS communication link—add panels as a system grows or upgrade to Quantum

Standard Model Number QSN-2ECO-PS120
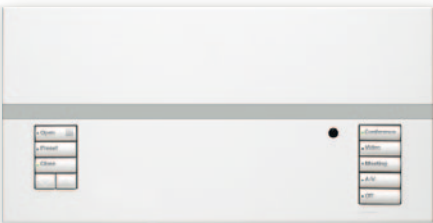
**GRAFIK Eye QS Wireless ◄〰►
with EcoSystem**

GRAFIK Eye® QS Wireless
with EcoSystem

• Preset light and shade control that allows you to adjust the total light level for any task or activity, while saving energy
• Create lighting effects by assigning fluorescent lights to 6, 8, or 16 zones
• Combines EcoSystem light control, Sivoia® QS wired and wireless shades, and timeclock
• Integrates EcoSystem to touchscreens and other systems via RS-232/Ethernet interfaces and input/output devices

For more information, visit www.lutron.com/grafikeyeqs

**Q-Admin™ software**

Quantum® total light management

• Create an energy-efficient environment by enabling a centralized management, monitoring, and light and shade control system
• Reduce cooling loads by dimming lights and controlling shades to block solar heat gain
• Increase operating efficiency-system automatically reports lamp failures and monitors lamp hours to manage and reduce maintenance
• Reconfigure lighting and shading zones without costly rewiring

For more information, visit www.lutron.com/quantum

EcoSystem® concept drawings

Use EcoSystem to control all the fluorescent lights in a private or open office—**wireless option**

Design statement: EcoSystem ballasts and wireless controls (can be wall-mounted or personal control) enable individual fixture control, daylight harvesting, and/or occupancy/vacancy sensing through the office space. Easily reprogram lighting zones if the space is reconfigured or if the employee needs change.

Window

Window

Window

EcoSystem Digital Link

QS Communication Link
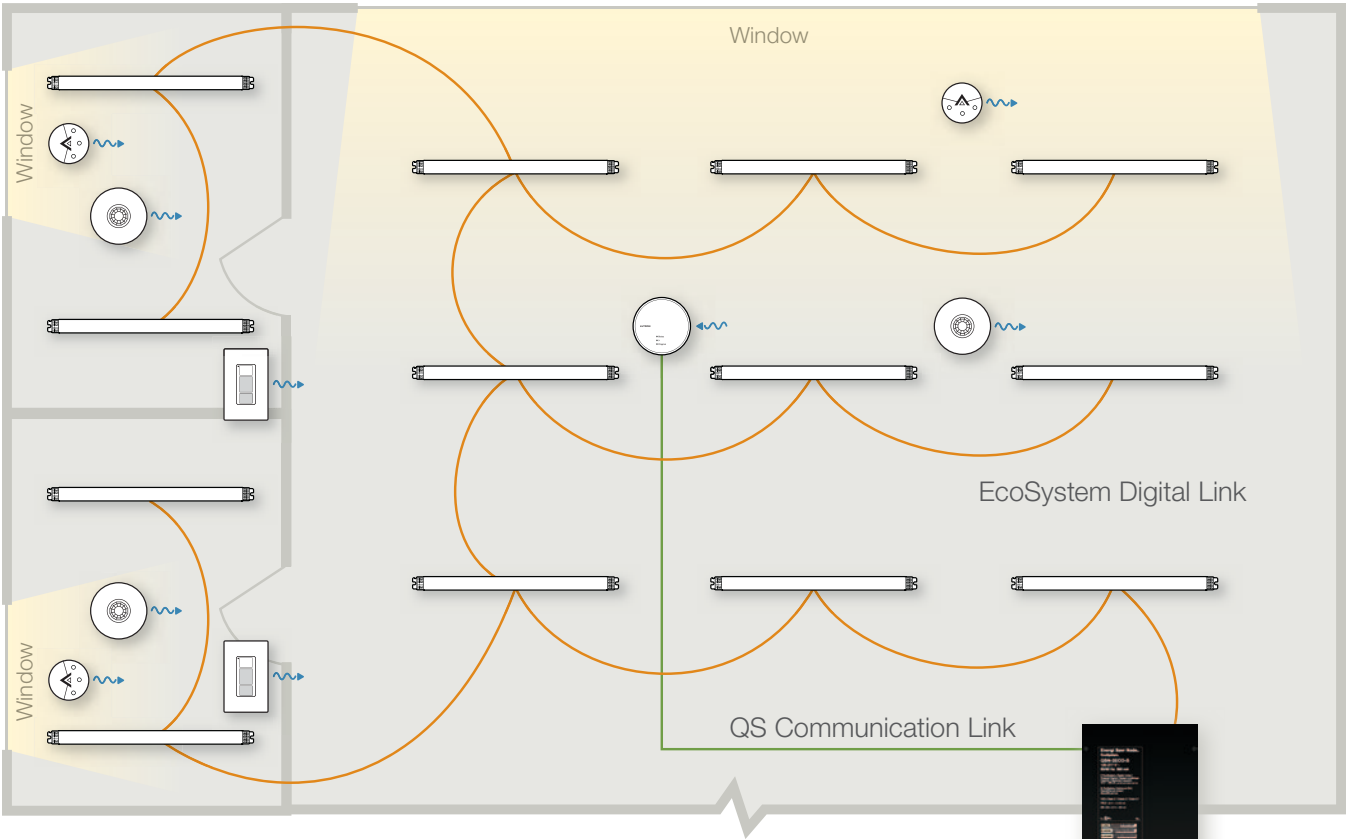
NEW EcoSystem H-Series Digital Ballast

NEW EcoSystem Energi Savr Node™ Module

NEW Radio Powr Savr™ Wireless Daylight Sensor

NEW Radio Powr Savr Wireless Occupancy/ Vacancy Sensor
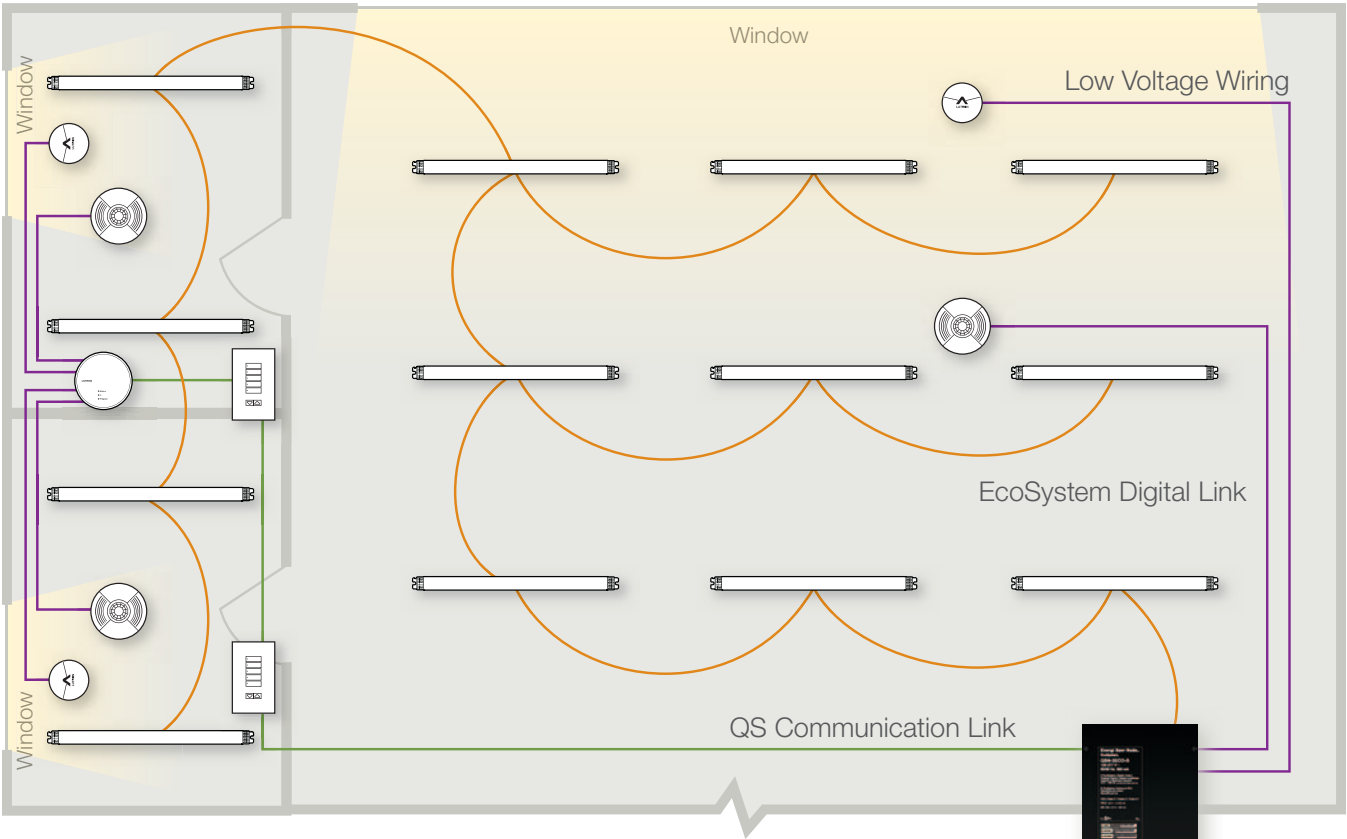
NEW Pico® Wireless Control (Wall-mounted)

NEW QS Sensor Module

Use EcoSystem® to control all the fluorescent lights in a private or open office—**wired option**

Design statement: EcoSystem ballasts and wallstation controls enable individual fixture control, daylight harvesting, and/or occupancy/ vacancy sensing through the office space. Easily reprogram lighting zones if the space is reconfigured or if the employee needs change.

Window

Window

Window

Low Voltage Wiring

EcoSystem Digital Link

QS Communication Link

NEW EcoSystem H-Series Digital Ballast

NEW EcoSystem Energi Savr Node™ Module

EcoSystem Daylight Sensor

EcoSystem Occupancy/ Vacancy Sensor
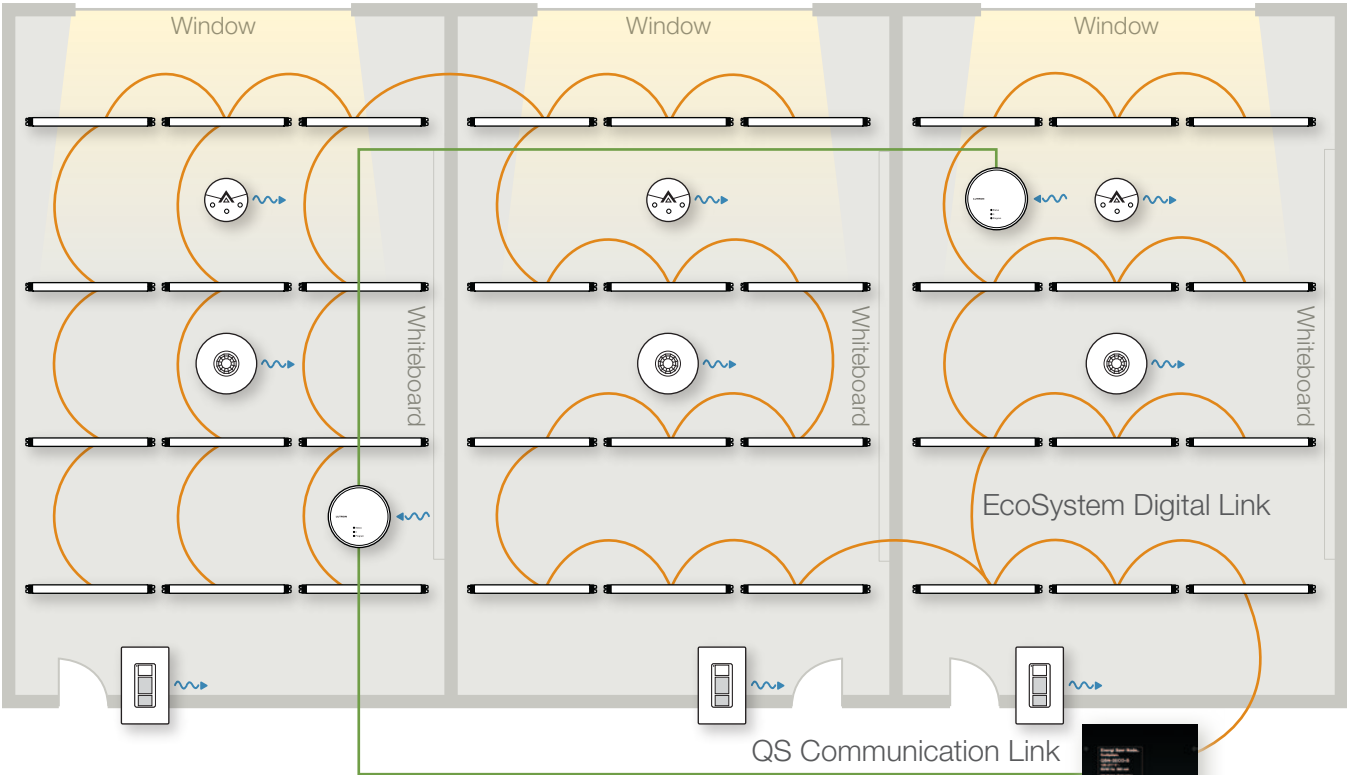
seeTouch® QS Wallstation

NEW QS Sensor Module

EcoSystem® concept drawings

Use EcoSystem to control lighting in traditional classroom spaces

Design statement: In classrooms, EcoSystem ballasts provide individual fixture control, daylight harvesting, and occupancy/vacancy sensing to save energy, save money, and create a more productive teaching and learning environment.

Window   Window   Window

Whiteboard   Whiteboard   Whiteboard

EcoSystem Digital Link

QS Communication Link

NEW EcoSystem H-Series
Digital Ballast

NEW EcoSystem Energi
Savr Node™ Module

NEW Radio Powr
Savr™ Wireless
Daylight Sensor

NEW Radio Powr Savr
Wireless Occupancy/
Vacancy Sensor

NEW Pico®
Wireless Control
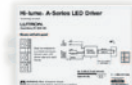(Wall-mounted)

NEW QS Sensor
Module

Use EcoSystem® to control lights in university lecture halls

Design statement: Control both fluorescent and LED fixtures within the space, and take advantage of the ability to integrate A/V and shade control (wired or wireless). Automatic controls like occupancy and daylight sensors ensure energy savings.
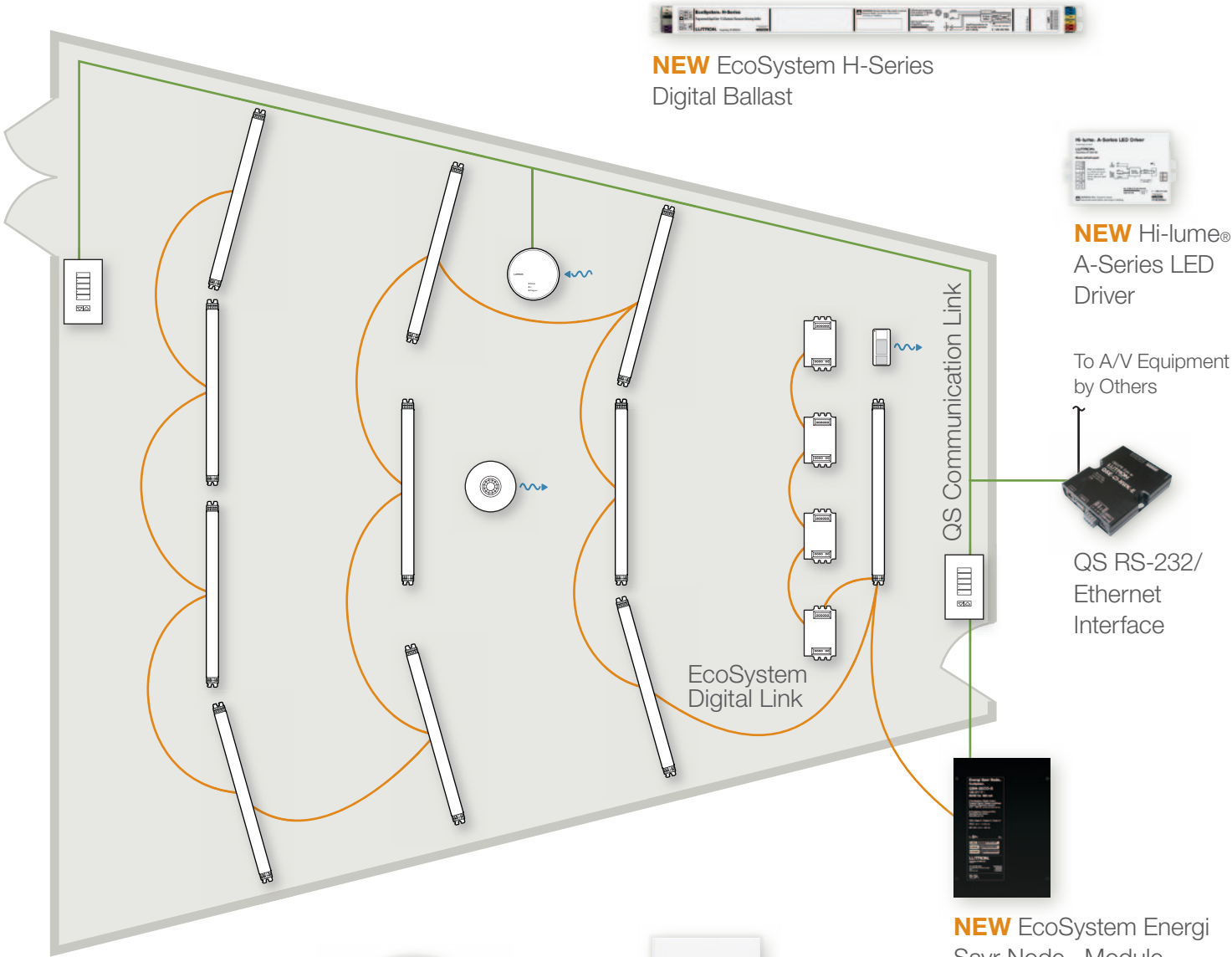
NEW EcoSystem H-Series
Digital Ballast

NEW Hi-lume®
A-Series LED
Driver

To A/V Equipment
by Others

QS Communication Link

QS RS-232/
Ethernet
Interface

EcoSystem
Digital Link

NEW EcoSystem Energi
Savr Node™ Module

NEW Pico®
Wireless Control
(Mounted to desk)

NEW Radio Powr Savr™
Wireless Occupancy/
Vacancy Sensor

seeTouch® QS
Wallstation

NEW QS Sensor
Module

seeTouch wallstation buttons

On
Lecture
A/V
Clean
Off

EcoSystem® concept drawings

Use EcoSystem and Softswitch® Energi Savr Node™ modules to control lights on an entire office floor

Design statement: Interoperability and seamless communication between EcoSystem and Softswitch Energi Savr Node modules enables control of all the lights in the space. Connected by the EcoSystem digital link—sensors, ballasts, and controls work together to provide an integrated lighting control solution.

NEW EcoSystem Energi Savr Node

Controlling all EcoSystem H-Series digital ballasts along the perimeter of the space allowing for full range dimming as well as daylight harvesting, occupancy/vacancy sensing, and personal control.

NEW Softswitch Energi Savr Node

Controlling all interior lighting of the space allowing for switching as well as occupancy/vacancy sensing, and personal control.

Ballasts connected by EcoSystem digital link

NEW EcoSystem H-Series Digital Ballast

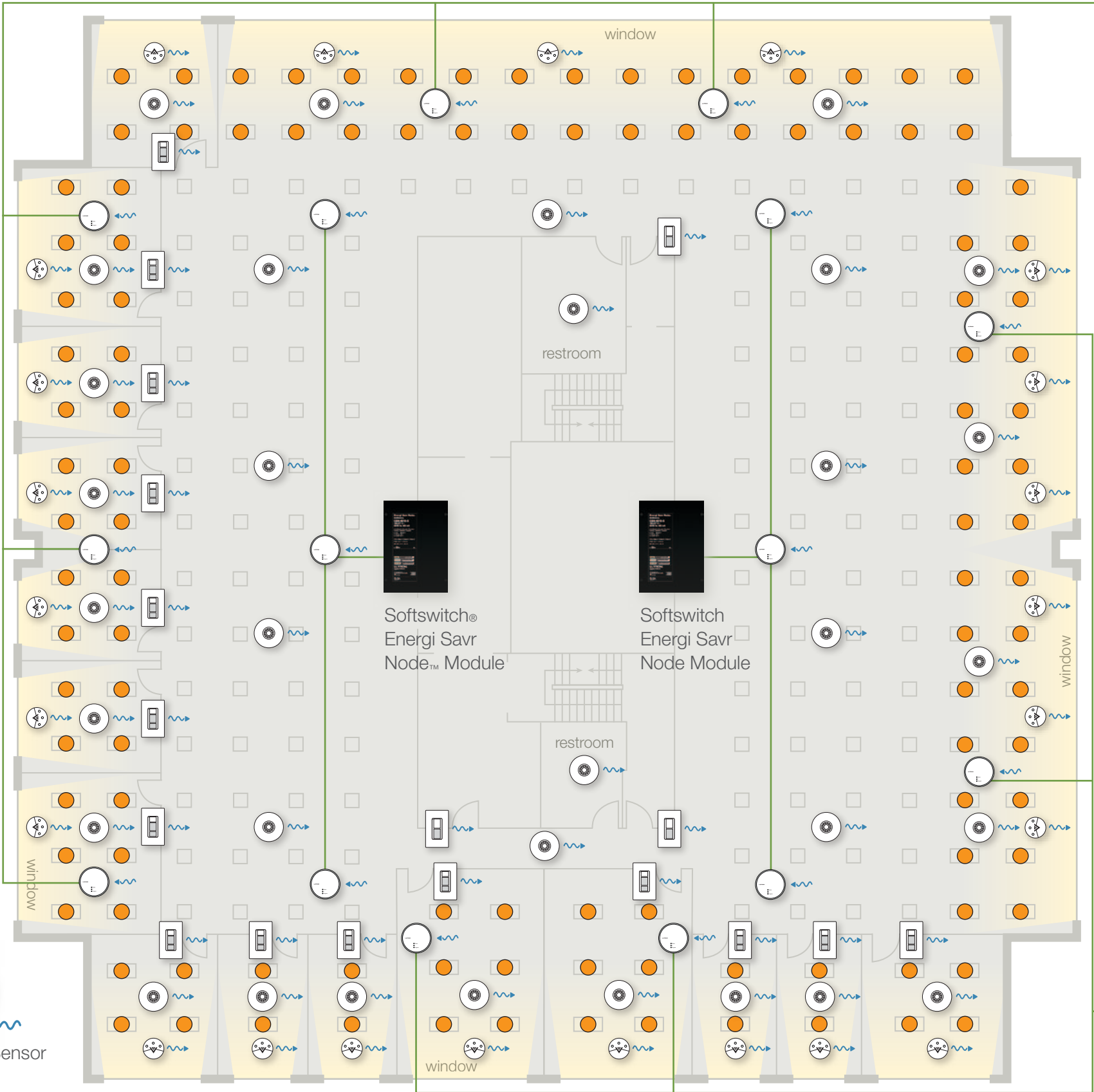**NEW** Radio Powr Savr™ Wireless Daylight Sensor

NEW Radio Powr Savr Wireless Occupancy/ Vacancy Sensor

NEW Pico® Wireless Control (Wall-mounted)
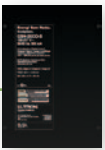
NEW QS Sensor Module

window

restroom

restroom

window

window

window

EcoSystem® Energi Savr Node Module

Softswitch® Energi Savr Node™ Module
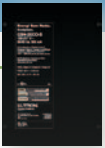
Softswitch Energi Savr Node Module

EcoSystem Energi Savr Node Module

QS Communication Link

Emergency system integration

Design statement: EcoSystem offers several options for easily integrating emergency lighting control into EcoSystem applications. Choose battery backup within the EcoSystem fixture, or power EcoSystem ballasts via emergency power.
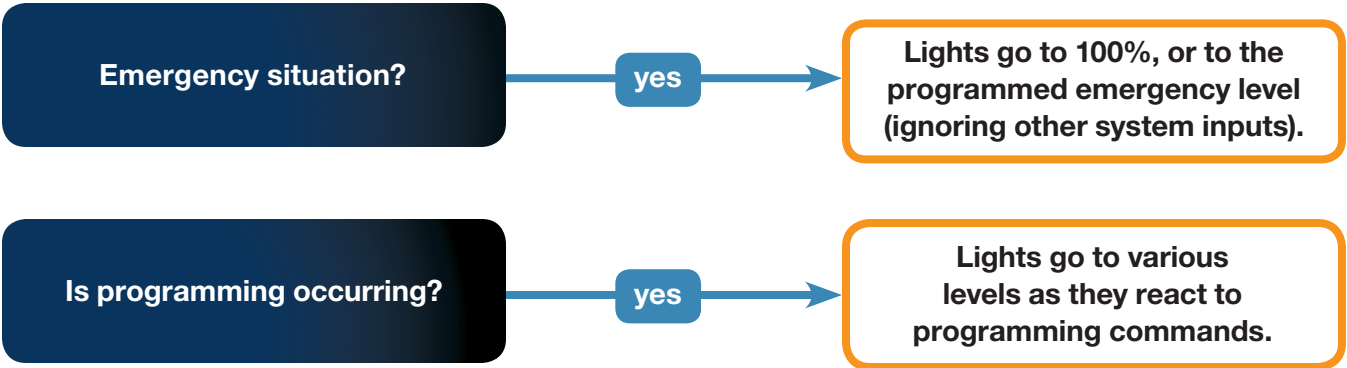
System hierarchy: description of how system decisions are made

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

Emergency   Normal

Energi Savr Node module

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 backup ballast drives the lamp(s)

Power EcoSystem ballasts via emergency/essential power and power the Energi Savr Node™ module from normal power.
• Loss of normal power causes the EcoSystem digital link to turn off
• This signals emergency-powered EcoSystem or EcoSystem-compatible ballasts and drivers to operate at their emergency levels (100% by default)

Note:
• 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

Multi-phase lighting system or UL924 compliance
The following design consideration should be met to achieve this performance:
1. Power emergency fixtures with EcoSystem ballasts or LED drivers via emergency/essential power.
2. Power the Energi Savr Node module and 24 V DC power pack via emergency/essential power.
3. Install and connect LUT-ELI-3PH to the EcoSystem Energi Savr Node module via installation instructions.

For more information please see **Lutron Application Note 140** at www.lutron.com.

Emergency situation? — yes → **Lights go to 100%, or to the programmed emergency level (ignoring other system inputs).**

Is programming occurring? — yes → **Lights go to various levels as they react to programming commands.**

Typical usage

Is space occupied? — yes → **Lights go to the programmed "occupied" light level (100% by default).**

no ↓

Lights go to "unoccupied" light level (off by default)

Is daylight present?

yes → **Light proportionally dims, high end is capped.**

no → **Manual dimming via wallstations and remote control devices**

Energy-saving, Buy American compliant light control solutions
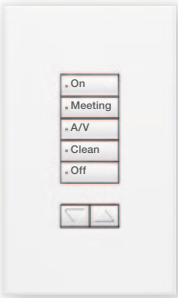
Buy American Act

In 2009, the American Recovery and Reinvestment Act (ARRA) was enacted by Congress to stimulate the American economy. Within the ARRA, Section 1605 specifies that any stimulus-funded construction, alteration, maintenance, or repair project must utilize products manufactured in the United States (referred to as the Buy American provision). Lutron makes it easy for you to comply with the Buy American Act and the Buy American provisions in the American Recovery and Reinvestment Act (ARRA). We offer hundreds of light control products that are manufactured in the United States including:

• EcoSystem® digitally addressable fluorescent dimming ballasts
• Occupancy/vacancy sensors, daylight sensors and wall controls
• GRAFIK Eye® and GRAFIK Eye QS preset controls
• seeTouch® wallstations
• Quantum® total light management solutions

Targeted to both new and retrofit markets, Lutron ballasts and controls install easily into new construction or existing spaces. Lutron has offered solutions manufactured in the United States since our first product introduction in 1961. With the expansion of our ballast lines, we offer a complete lighting control system for virtually any project requiring products manufactured in the United States.

Digital fluorescent dimming ballasts **manufactured in the United States for your energy-saving needs.**

Total light management solutions

System controls

Daylight sensors and occupancy/vacancy sensors

Custom ballast factor

FACTORY-TUNED BALLAST FACTOR REQUEST FORM

If you cannot find a Lutron EcoSystem or Hi-lume 3D ballast that accommodates your needs, you can request a factory-tuned ballast with a lower ballast factor than a standard model. Please fill out this form, indicating your specific ballast factor requirements, and e-mail it to customballast@lutron.com. Once approved, you will be contacted with the price, lead time, and model number of your requested custom ballast.

Required information			
Requestor:		Company:	
Email:		Phone Number:	
Job Name and Location:		Date of Request:	
Base Model #:		Required Agency Approval:	☐UL ☐NOM ☐CSA ☐Oth
Quantity Needed:		Requested Ship Date:	

Optional information (please provide all known parameters)			
Voltage:		Desired Lumen Output:	
Desired Input Power:		Desired Ballast Factor (min 0.50):	
Notes:			

Please email your completed form to customballast@lutron.com by clicking here

To be filled in by Lutron Engineering			
Base Model #:		Voltage:	
Lamp Type and Wattage:		Measured Lumen Output:	
Measured Power: Measured Voltage:		Ballast Factor:	
Custom Model #:		Approved:	☐ Yes ☐ No
Price:		Approved by:	
Lead Time from receipt of order:		Date:	

Note: Cut Sheet available upon request only after engineering approval of model.

Rev. 10/02/09

Customize the output of any EcoSystem®, Hi-lume® 3D, or EcoSystem H-Series ballast to meet the design requirements of the various building codes, EPAct legislation, and LEED® standards.

Details of the Program:

• Lutron's custom ballast factor program offers ballasts with ballast factors ranging from Lutron's standard offering down to a 0.50 ballast factor
• Each ballast with a custom ballast factor is UL listed and marked with lower input power
• Ballasts with a custom ballast factor have a unique model number for easy re-order and replacement
• Longer shipping lead times apply

For more information or to order ballasts with custom ballast factors contact your local Lutron sales representative or visit **www.lutron.com/ballasts/custom**

EcoSystem® H-Series
Programmed Rapid Start 1% Electronic Fluorescent Dimming Ballast

LUTRON. Coopersburg, PA 18036 USA

WARNING: Shock hazard. May injury or death. Disconnect pow servicing or installing.

LEED is a registered trademark of the United States Green Building Council.
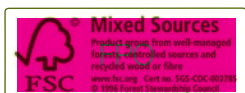
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