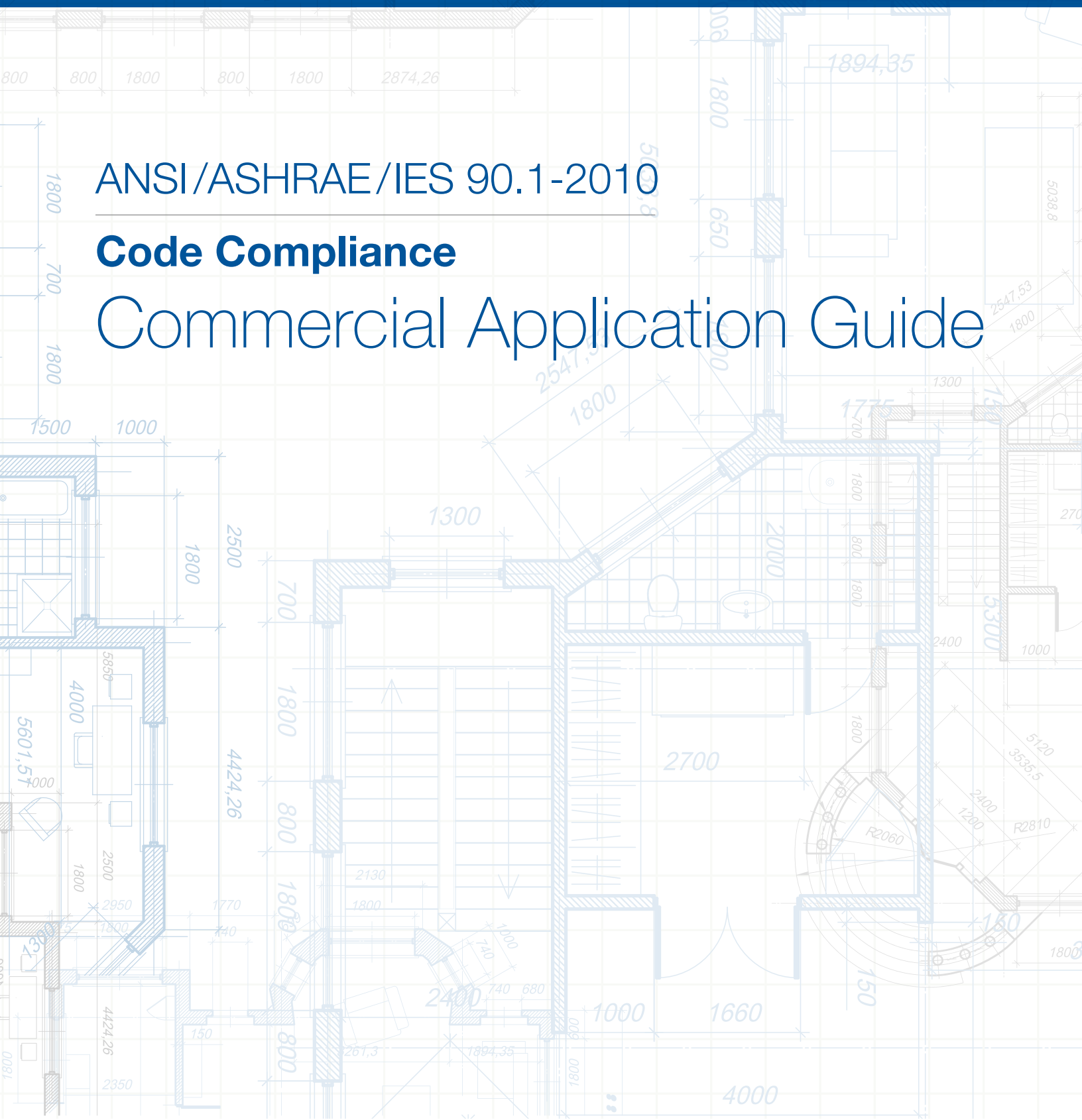
Standalone Solutions

Code Overview and Example Applications

ANSI/ASHRAE/IES 90.1-2010

Code Compliance

Commercial Application Guide



LUTRON®

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This document summarizes the lighting control requirements for commercial buildings. It is for information purposes only. It is not meant to replace your state's or local jurisdiction's official energy code. Please refer to your local building energy code or authority having jurisdiction for your precise requirements.

Codes can be complicated. This commercial application guide provides examples of how Lutron products can be utilized to meet or exceed code requirements.

Lutron Product Capability: Commercial Applications

Strategies for code/standards compliance	Standalone Solutions		Networked Solutions	
	Wallbox	Energi TriPak®	Energi Savr Node™	Quantum
				
Occupancy sensing	◉	◉	◎	◎
Multi level lighting control	◉	◉	◎	◎
Daylight harvesting		◉	◎*	◎
Timeclock			◎	◎
Demand Response			◎	◎
Energy Monitoring				◎
BACNet Integration				◎
	◉ Examples of applications utilizing these products is provided in this guide.		◎ To find examples of applications on these products and more go to **www.lutron.com/app_guides**	

Looking for an application and cannot find it? Go to **www.lutron.com/app_guides**
To learn more about these products and their specifications, go to **www.lutron.com/catalogs**

* Requires QS Timeclock

Control Requirements Explained

	Control Requirements	Description	ASHRAE 90.1 2010 Code Provision*
Automatic Shutoff	Manual Control	Readily accessible device(s) to control lighting within an enclosed space.	9.4.1.2
	Programmable Timeclock	Scheduled, time-of-day operated control that turns lighting OFF at specified times when typically unoccupied. Occupancy sensors or other building system signals that turn lights OFF during vacancy also comply.	9.4.1.1[a]
	Occupancy Sensor: Automatic Full ON	Automatic full ON control with automatic OFF after vacancy of 30 minutes or less. This also meets timeclock requirements.	9.4.1.1[b]
	Occupancy Sensor: Manual ON or Automatic Partial ON	Manual ON by a local switch, or control that turns lighting automatically ON to not more than 50%. Automatic OFF after vacancy of 30 minutes or less. This also meets timeclock requirements.	9.4.1.2[b], 9.4.1
	Automatic Partial OFF	Automatically reduces lighting power in any one controlled zone by at least 50% after vacancy of 30 minutes or less.	9.4.1.6[g]
Light Level Control	Multi-level Lighting Control	At least one control device (manual or automatic) for independent control of general lighting within a space. Lighting must have at least one level between 30% and 70% of full power, in addition to ON and OFF.	9.4.1.2[a]
	Multi-level Daylight Control	Sensor to reduce lighting in response to available daylight. At least two light levels between ON and OFF (one between 50% and 70% of full power, and another no greater than 35%). Applies only to side-lit spaces >250 sq. ft. and sky-lit spaces >900 sq. ft.	9.4.1.4, 9.4.1.5
Testing	Functional Testing	Testing shall ensure that control hardware and software are calibrated, programmed, and functioning properly.	9.4.4

For specific commercial building code lighting requirements in your state, please visit **www.lutron.com/energycodes**.

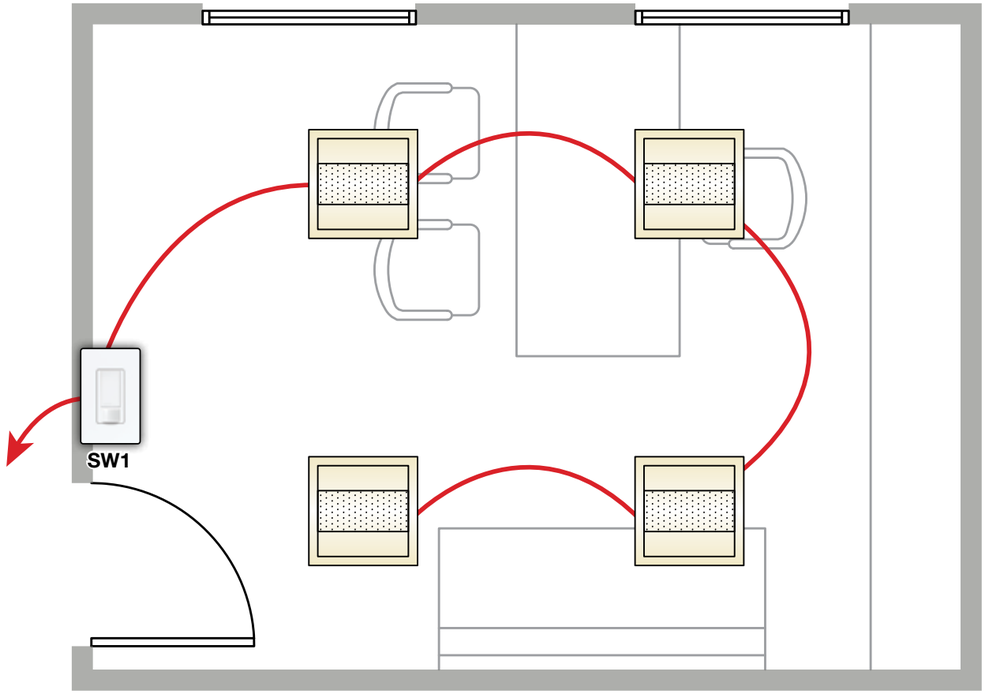
* ASHRAE 90.1 2010 can also be used as a compliance option in meeting IECC 2012 requirements.

Lutron Recommendations for Code Requirements
New Construction

	Control Requirements	Space Type: Classroom, Lectu re Hall, Training Room	Conference, Multi-purpose Room	Office <=250 sq. ft.	Office >250 sq. ft.	Corridor	Restroom	Stairwell	Storage Room
Automatic Shutoff	Manual Control	●	●	●	●				●
	Programmable Timeclock				●				
					or				
	Occupancy Sensor: Automatic Full ON				●	●	●	●	
	Occupancy Sensor: Manual ON or Automatic Partial ON	●	●	●					●
	Automatic Partial OFF							●	
Light Level Control	Multi-level Lighting Control	●	●	●	●				
	Multi-level Daylight Control	●	●		●	●	●	●	●
Testing	Functional Testing	●	●	●	●	●	●	●	●

For **fixture retrofits**** all spaces need to meet automatic shutoff requirements (timeclock or occupancy sensors will comply).

** Fixture retrofits (luminaire alterations) need to comply with lighting power density (LPD) requirements and automatic shutoff requirements if greater than 10% of the lighting load is altered or if the LPD of the space is modified. Luminaire alterations include all fixtures that are added, changed or removed.



— **Line voltage wiring**

Symbol	Model Number	Description	Qty	List Price/Unit
	MS-VPS6M2-DV-WH	Maestro® Vacancy Sensing Switch	1	$53.00
			Total Price	**$53.00**

System Setup in Space

Lights

- All lights are switching only

Occupancy

- Lights do not automatically turn on when an occupant enters the space; lights must be turned on manually
- Lights automatically turn off within 30 minutes of all occupants leaving the space

Wall Light Switch

- SW1 provides ON/OFF control for the general lighting

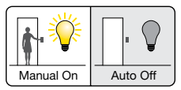
Featured Product:
Maestro® Vacancy Sensing Switch

Ideal Applications:

- Private Office
- Single Stall Restrooms
- Rooms with unobstructed view of space

To find additional solutions for this space or to explore other space types, visit **www.lutron.com/app_guides**.

Lighting Control Strategies

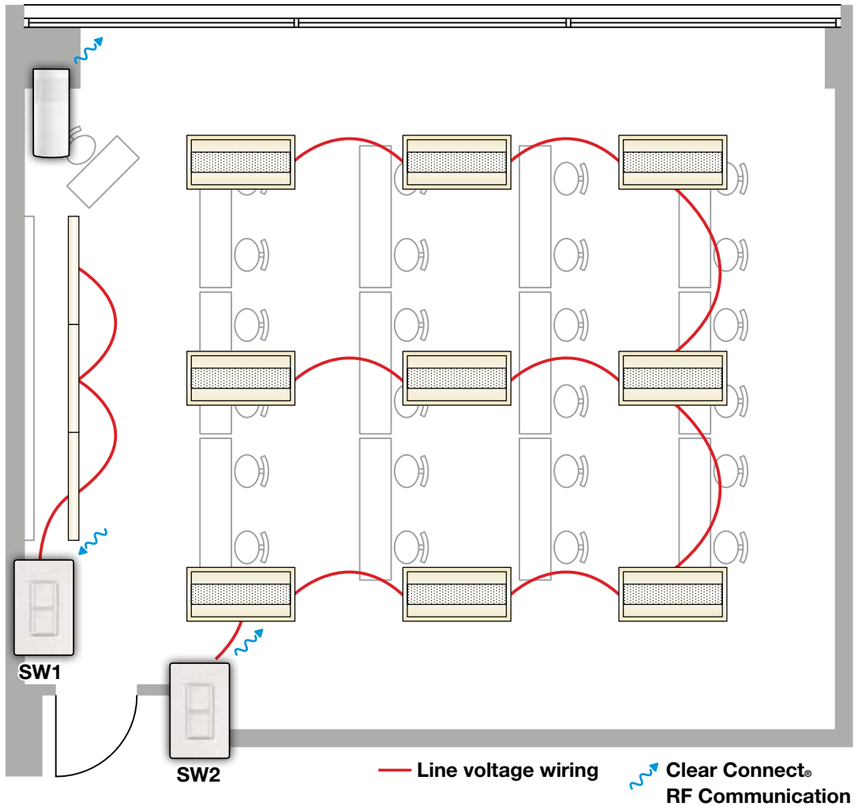


Occupancy/Vacancy Sensing

Lighting Energy Savings*

30%

*Go to www.lutron.com/references for more information.



System Setup in Space

Lights

- All lights are switching only

Occupancy

- Lights do not automatically turn on when an occupant enters the space; lights must be turned on manually
- Lights automatically turn off within 30 minutes of all occupants leaving the space

Manual Wall Light Control

- SW1 provides ON/OFF control for the whiteboard lighting
- SW2 provides ON/OFF control for the general lighting

Featured Product:
5A 2 Button RF Switch

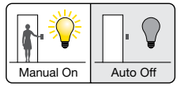
Ideal Applications:

- Classrooms
- Rooms with two or more switched zones
- Retrofits without additional wiring

To find additional solutions for this space or to explore other space types, visit **www.lutron.com/app_guides**.

Symbol	Model Number	Description	Qty	List Price/Unit
	LRF2-VKLB-P-WH	Radio Powr Savr™ Wireless Corner-Mount Vacancy Sensor	1	$85.00
	PD-5S-DV-WH	5A 2 Button RF Switch	2	$89.00
			Total Price	**$263.00**

Lighting Control Strategies

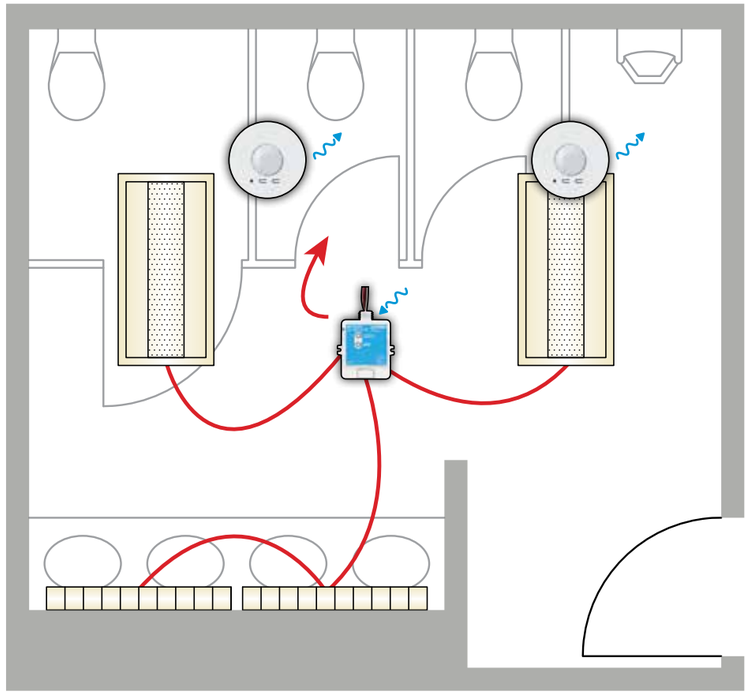


Occupancy/Vacancy Sensing

Lighting Energy Savings*

45%

*Go to www.lutron.com/references for more information.



— Line voltage wiring

Clear Connect® RF Communication

Symbol	Model Number	Description	Qty	List Price/Unit
	RMJ-5R-DV-B	PowPak® Switching Module	1	$89.00
	LRF2-OCR2B-P-WH	Radio Powr Savr™ Wireless Ceiling Occupancy Sensor	2	$85.00
		Total Price		**$259.00**

System Setup in Space

Lights

- All lights are switching only

Occupancy

- Lights automatically turn on when an occupant enters the space
- Lights automatically turn off within 30 minutes of all occupants leaving the space

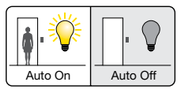
Featured Product:
Radio Powr Savr™ Wireless Occupancy Sensor

Ideal Applications:

- Restrooms
- Corridors/Hallways
- Any simple retrofits

To find additional solutions for this space or to explore other space types, visit **www.lutron.com/app_guides**.

Lighting Control Strategies

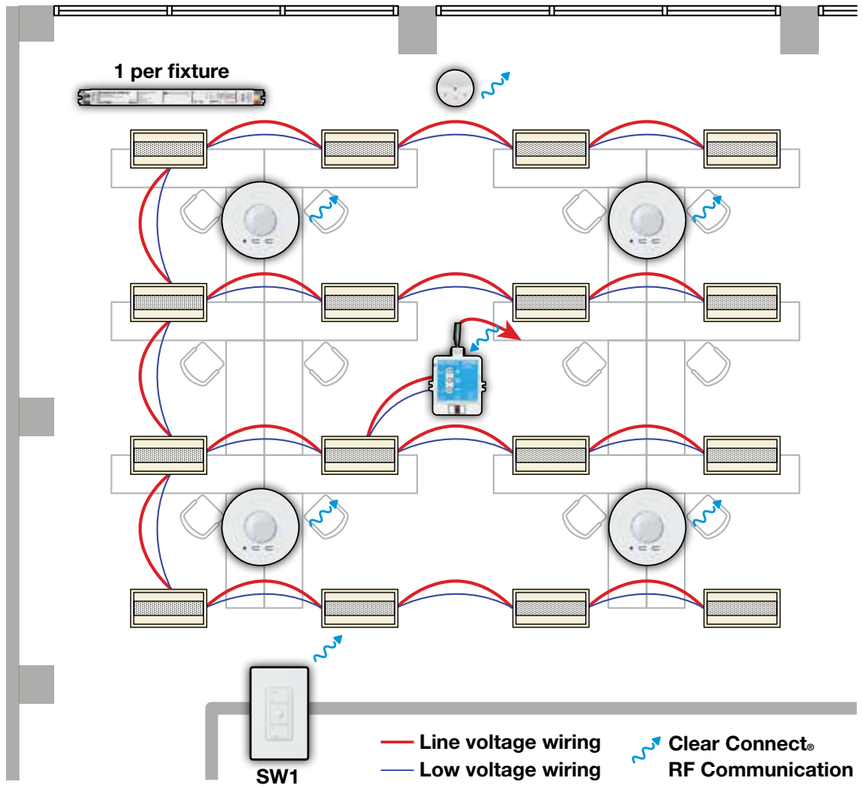


Occupancy/Vacancy Sensing

Lighting Energy Savings*

50%

*Go to www.lutron.com/references for more information.



Symbol	Model Number	Description	Qty	List Price/Unit
	Multiple	EcoSystem® Enabled Ballast/Driver**	16	Variable
	RMJ-ECO32-DV-B	PowPak® EcoSystem Dimming Module	1	$170.00
	LRF2-OCR2B-P-WH	Radio Powr Savr™ Wireless Ceiling Occupancy Sensor	4	$85.00
	LRF2-DCRB-WH	Radio Powr Savr Wireless Daylight Sensor	1	$120.00
	PJ2-3BRL-GWH-L01	Pico® Wireless Remote	1	$21.00
	PICO-WBX-ADAPT	Pico Faceplate Adapter	1	$8.00
		Total Price		**$659.00 +**

System Setup in Space

Lights
- All lights are dimmable
- The maximum light level has been set to 80%

Occupancy
- Lights automatically turn on when an occupant enters the space.
- Lights automatically turn off within 30 minutes of all occupants leaving the space

Daylight
- All of the lights are controlled by the daylight sensor and automatically brighten and dim to maintain the required light level in the space
- The daylight sensor can be manually overridden by wall switch SW1

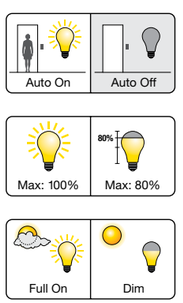
Wall Light Switch
- SW1 is programmed to all of the lights and provides ON/OFF control, BRIGHTEN/DIM control, and allows for one preset light level

Featured Product:
PowPak® EcoSystem Dimming Module

Ideal Applications:
- Open Offices
- Conference Rooms
- Any spaces with multiple zones of dimming

To find additional solutions for this space or to explore other space types, visit **www.lutron.com/app_guides**.

Lighting Control Strategies



Occupancy/Vacancy Sensing

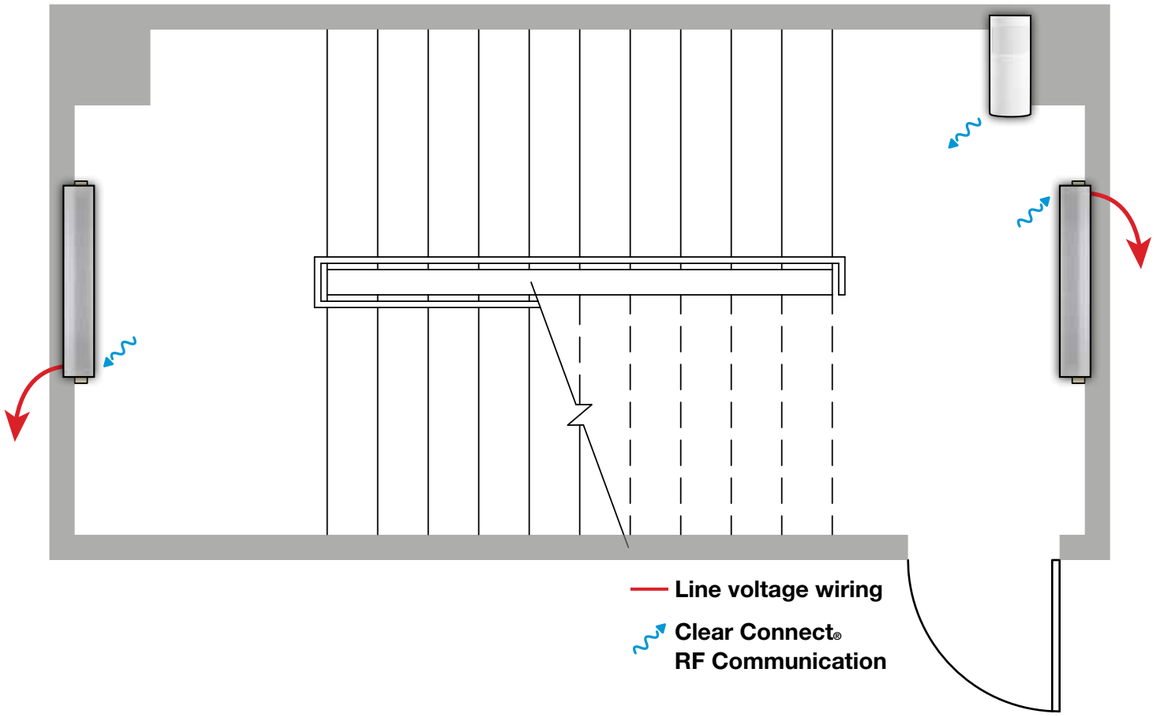
High-End Trim/Tuning

Daylight Harvesting

Lighting Energy Savings*

60%

*Go to www.lutron.com/references for more information.
**Go to www.lutron.com/BallastTool or www.lutron.com/LEDBuildAModel to identify the correct ballast or driver for your project.



System Setup in Space

Lights

- All lights are dimmable
- The maximum light level has been set to 80%

Occupancy

- Lights automatically turn on to 80% when an occupant enters the space
- Lights dim to 20% within 30 minutes of all occupants leaving the space

Featured Product:
Lutron Fluorescent Stairwell Fixture

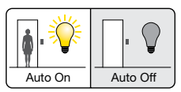
Ideal Applications:

- Stairwells
- Any space where lights need to be on 24/7

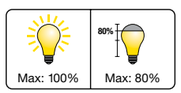
To find additional solutions for this space or to explore other space types, visit **www.lutron.com/app_guides**.

Symbol	Model Number	Description	Qty	List Price/Unit
	FXSWXX14SL232U 82XXWH	Lutron 4' Two-Lamp T8 Fluorescent Stairwell Fixture	2	$390.00
	LRF2-OKLB-P-WH	Radio Powr Savr™ Wireless Corner Occupancy Sensor	1	$85.00
			Total Price	**$865.00**

Lighting Control Strategies



Occupancy/Vacancy Sensing



High-End Trim/Tuning

Lighting Energy Savings*

70%

*Go to www.lutron.com/references for more information.

www.lutron.com

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