Commercial Application Guide

Code Compliance | Lighting Controls
ANSI/ASHRAE/IES 90.1 2010

LUTRON

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ASHRAE 90.1-2010

Introduction

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Atrium

Break Room

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This document summarizes the lighting and receptacle 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.

Energy-saving lighting control strategies

Codes can sometimes be complicated and difficult to navigate. This commercial application guide provides examples of how Lutron products can be used to meet or exceed code requirements. This guide focuses on Vive and Vive compatible solutions, but our other control systems offer similar features.

Strategy		Potential savings
	High-end trim/tuning sets the maximum light level based on customer requirements in each space.*	10–30% Lighting
Max: 100% Max: 80%		
	Occupancy/vacancy sensing turns lights on when occupants are in a space and off when they vacate the space.*	20–60% Lighting
Auto On Auto Off		
	Daylight harvesting dims electric lights when daylight is available to light the space.*	25–60% Lighting
Full On Dim		
	Personal dimming control gives occupants the ability to set the light level.*	10–20% Lighting
Full On Dim		
	Controllable window shading moves shades to reduce glare and solar heat gain.*	10–20% Cooling
Shade Open Shade Closed		
	Scheduling provides scheduled changes in light levels based on the time of day.*	10–20% Lighting
7am: Dim 7pm: Off		
	Demand response automatically reduces lighting loads during peak electricity usage times.*	30–50% During peak period
Full On Dim		
	Plug load control automatically turns off loads after occupants leave a space.*	15–50% of Controlled loads
Appliance On Appliance Off		
	HVAC integration controls heating, ventilation, and air conditioning systems through a contact closure.*	5–15% HVAC
Heating Cooling		

*Go to lutron.com/references for more information

Lutron Product Capabilities: Commercial Applications

	Local Solutions			Panel Solutions	
	Wallbox	Vive	Vive with wireless hub*	Energi Savr Node	Quantum
Occupancy sensing	◉	◉	◉	◉	◉
Multi-level lighting control	◉	◉	◉	◉	◉
Daylight harvesting		◉	◉	◉	◉
Receptacle control		◉	◉	◉	◉
Timeclock			◉	◉ **	◉
Demand response			◉ †	◉ †	◉
Energy monitoring			◉		◉
BACnet integration			◉		◉

Strategies for code/standards compliance

To learn more about these products and their specifications, go to **lutron.com/catalogs**

* For the latest information on products compatible with the Vive wireless hub go to lutron.com/vive
** Requires QS Timeclock
† Automated Demand Response capability requires signal from a third-party device

Interior Lighting and Receptacle Controls Requirements

ASHRAE 90.1-2010

The requirements listed below are summarized for simplicity and may have other exceptions that were omitted.

	Minimum control type	Description	Code provision
On/Off Control	Local switch	Readily accessible device(s) to control lighting within an enclosed space are required.	9.4.1.2
	Programmable timeclock	Scheduled time-of-day operated control must turn 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 is allowed 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% is required. Automatic OFF after vacancy of 30 minutes or less is also required. This also meets timeclock requirements.	9.4.1.2 (b), 9.4.1
	Automatic partial OFF	Automatic reduction of lighting power in any one controlled zone by at least 50% after vacancy of 30 minutes or less is required. This is only applicable to stairwells.	9.4.1.6 (g)
Light Level Control	Multi-level lighting control	There shall be 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	There shall be a sensor to reduce lighting in response to available daylight. There must be at least two light levels between ON and OFF (one between 50% and 70% of full power, and another no greater than 35%). This only applies to side-lit spaces >250 sq. ft. and sky-lit spaces >900 sq. ft.	9.4.1.4, 9.4.1.5
Other	Receptacle control	At least 50% of the receptacles in the space shall automatically turn OFF. This can either be achieved by switching every alternate receptacle within 6 ft. of each uncontrolled receptacle or 50% of the outlets in each receptacle.	8.4.2
	Acceptance testing (functional testing)	Testing shall ensure that control hardware and software are calibrated, programmed, and functioning properly.	9.4.4

Fixtures designated as emergency or egress do not require control.

When Retrofit Requirements Apply

ASHRAE 90.1-2010

When do you need to meet New Construction Requirements?
New Construction code requirements for ASHRAE 90.1 2010 are for all new buildings and additions to existing buildings.

When do you need to meet Retrofit Requirements?
Retrofit code requirements for ASHRAE 90.1 2010 are for spaces in existing buildings that are altering more than 10%[†] of the connected lighting load. Alterations include luminaires that are added, replaced, or removed; or the replacement of both lamps and ballasts. Alterations do not include routine maintenance or repairs. Spaces in existing buildings that increase the Lighting Power Density (LPD) regardless of the percentage of the connected lighting load being altered must also comply with New Construction Requirements.

What are the Retrofit Requirements?
For ASHRAE 90.1 2010 all spaces needing to meet retrofit requirements must comply with:
- The Lighting Power Density (LPD) requirements of Section 9.
- Automatic shut-off requirements of 9.4.1.1. Timeclock controls, occupancy/vacancy sensor controls, or a signal from another system that indicates the space is unoccupied comply with this requirement.

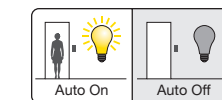## What is Best Practice for Retrofit controls even when controls are not required by code?
Below is a recommendation of lighting controls for retrofit applications that exceed the code requirements but provide value through balanced cost and functionality.
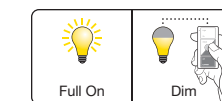
In Non-Daylit Spaces Add
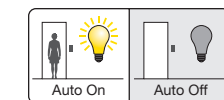
Occupancy Sensors

In Bright Daylit Spaces Add

Occupancy Sensors

Daylight Harvesting

Personal Dimming

20-60% Energy Savings

50-65% Energy Savings

[†] Spaces in existing buildings that alter less than 10% of the connected lighting load in which the alteration does not increase the Lighting Power Density in that space do not need to meet either New Construction or Retrofit Requirements.

Daylight Zone Requirements Sidelighting (Window)

ASHRAE 90.1-2010
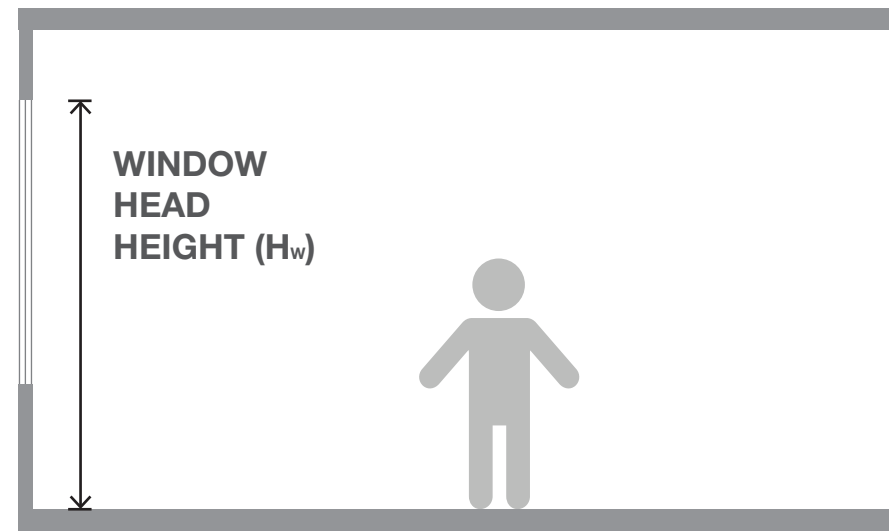
WINDOW HEAD HEIGHT (H_W)

Section View
NOT TO SCALE

2 ft   2 ft

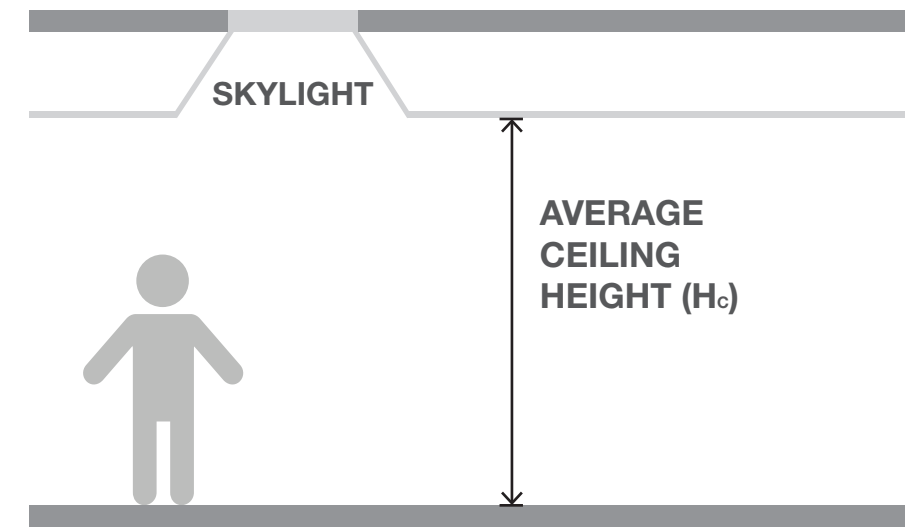$1.0 \times H_W$

DAYLIGHT ZONE
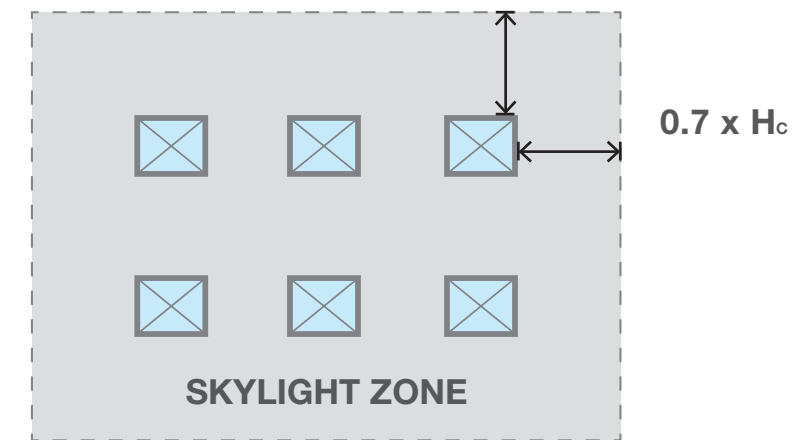
$2.0 \times H_W$

Plan View
NOT TO SCALE

Note: Fixtures in primary side-light or skylight zones must be controlled by a daylight sensor. Fixtures in daylight zone must be controlled separately from fixtures in the rest of the space.

Daylight Zone Requirements: Toplighting (Skylight)

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SKYLIGHT

AVERAGE CEILING HEIGHT (H_C)

Section View
NOT TO SCALE

$0.7 \times H_C$

SKYLIGHT ZONE

Plan View
NOT TO SCALE

Note: Fixtures in primary side-light or skylight zones must be controlled by a daylight sensor. Fixtures in daylight zone must be controlled separately from fixtures in the rest of the space.

The compliant solutions listed below are suggested based on total installed cost, simplicity of design, and basic functional needs for the space. These solutions do not represent the only compliant options. Applications in this guide will illustrate these solutions and/or alternate solutions for advanced functionality.

	Minimum control type	Atrium†	Break Room	Classroom, Lecture Hall, Training Room	Conference, Multi-purpose Room	Corridor	Guest Room*††
On/Off Control	Local switch	●	●	●	●	●	●
	Programmable timeclock	●					
	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	●	●	●	●	●	
Other	Receptacle control			●**			
	Acceptance testing (functional testing)	●	●	●	●	●	●

†   Requirements specified for public atriums 20-40 ft. in height.
†† Local switch by the entry must control all permanently installed luminaires and switched receptacles, except those in the bathroom.
** Receptacle control is only required in classrooms designated as computer classrooms.

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	Open Office >250 sq. ft.	Private Office ≤250 sq. ft.	Restroom	Stairwell	Storage Room*	Dining, Restaurant*	Patient Room*	General Retail*
On/Off Control	●	●	●	●	●	●	●	●
						●		●
			●	●				
	●	●			●			
				●				
Light Level Control	●	●				●	●	●
	●	●	●	●	●	●	●	
Other	●	●						
	●	●	●	●	●	●	●	●

* These space types provide the suggested code compliant solutions, but do not have application pages in this guide.

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This guide offers up to three solutions per space type.

The **Retrofit Solutions** are simple and inexpensive solutions, generally suited for a basic retrofit.

The **New Construction Solutions** are value driven, generally best suited for new construction.

The **Recommended Solutions** have advanced functionality for greater comfort and energy savings.

This application guide is designed to help specifiers and contractors understand codes and Lutron controls in a simple manner. Each of the pages will lay out different spaces, the corresponding lighting control products and the way the system is setup in the space.

For Specifiers
Use this application guide for design suggestions, the way the system operates and to specify the relevant products for each space.

For Contractors
Use this application guide to understand how the system is installed, the way the system must operate and to order the correct products for each application.

Room type

Type of solution

Classroom | New Construction
ASHRAE 90.1-2010

		Line-voltage wiring
		Low-voltage wiring
		Clear Connect RF Communication

DZ 1 = Daylight Zone

Symbol	Model Number	Description	Qty	List Price Each
	RMJS-8T-DV-B	PowPak dimming module with 0-10V	3	$ 150.00
	LRF2-DCRB-WH	Radio Powr Savr wireless daylight sensor	1	$ 120.00
	LRF2-VKLB-P-WH	Radio Powr Savr wireless corner-mount vacancy sensor	1	$ 85.00
	PJ2-3BRL-GWH-L01	Pico wireless 3-button with raise/lower control	2	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	2	$ 8.00

Code Notes: For non-daylight classrooms, all general lighting can be connected to a single 0-10V dimming module.
Receptacle Control is required for Shop and Laboratory classrooms.
Want to add a Vive wireless hub for more features? Go to lutron.com/vive for complete compatibility and design details.
This solution requires 0-10V enabled ballasts and drivers by others.

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Classroom | New Construction
ASHRAE 90.1-2010

Visible System Components

Pico wireless control

Radio Powr Savr wireless corner-mount vacancy sensor and daylight sensor

Control Functionality

Occupant Enters:
Lights do not automatically turn on when an occupant enters the space; lights must be turned on manually. Maximum light level is set to 80%.

When Occupied:
Automatic: Overhead lights dim/brighten based on daylight availability. There is one perimeter daylight zone.

Manual: Occupant uses wall dimmers to set desired light levels for both general and white-board lights.

Occupant Exits:
All lights automatically turn off 15 minutes after all occupants exit.

Add a Vive wireless hub to enable simple setup and re-zoning, system monitoring, timeclock functionality, and advanced integration.

Control Strategies

| Manual On | Auto Off |
Occupancy/Vacancy

| Full On | Dim |
Daylight Harvesting

| Full On | Dim |
Personal Dimming

| Max: 100% | Max: 85% |
High-end Trim/Tuning

Lighting Energy Savings*

60%

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

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Type of solution

Learn about the products visible in the space and the different options available for these.

Learn what strategies are implemented in the space

Learn what energy savings you achieve over manual shut-off

Understand how the space functions with the installed system

Understand how the products are laid out in the space

Learn more about the products used in the space

This is a high-level overview of the local solutions layout. For individual room requirements refer to the detailed room type solutions in this guide. A single PowPak module can control a single or multiple fixtures. The products shown here are representative of local solutions. Multiple product options are available to meet the needs of the space.
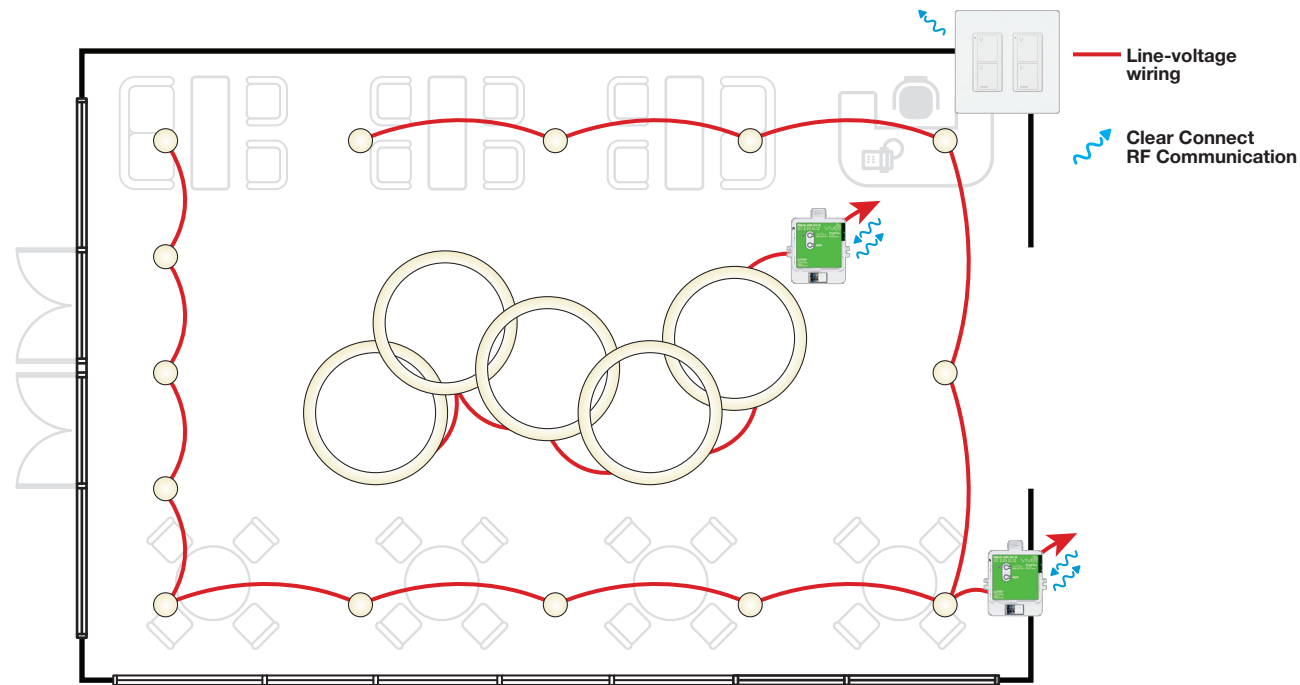
Vive wireless hub*

PowPak module

Occupancy sensor

Pico wireless remote control
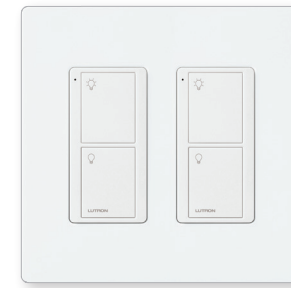
Daylight sensor

Vive wireless hub Features:

- Central control, management, and monitoring of Vive devices via web browser
- Supports astronomic and time-of-day events
- Two contact closure inputs for 3rd party integration such as Automatic Demand Response
- WiFi access for easy commissioning
- Control up to 10,000 sq. ft. with a single hub
- Optional BACnet integration

* Go to lutron.com/vive for complete compatibility and design details

Line-voltage wiring

Clear Connect RF Communication

Symbol	Model Number	Description	Qty	List Price Each
	RMJS-5R-DV-B	PowPak switching module	2	$ 109.00
	PJ2-2B-GWH-L01	Pico wireless 2-button control	2	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	2	$ 8.00
	HJS-1-FM	Vive wireless Hub	Shared	Consult your local rep for Hub pricing and service options.

Code Notes: Requirements specified for atriums 20-40 ft. in height. Go to lutron.com/vive for complete compatibility and design details.

Visible System Components

Pico wireless control

Control Functionality

When Occupied:
Manual: Occupant uses wall switches to turn on and turn off general lighting.

Timeclock:
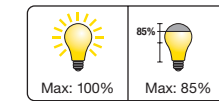Timeclock turns lights on during normally occupied hours.

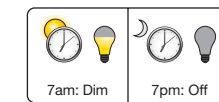Timeclock turns lights off during normally unoccupied hours.

Control Strategies

7am: Dim   7pm: Off

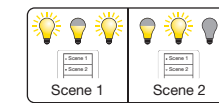**Scheduling**

Lighting Energy Savings*

10%

* Go to lutron.com/references for more information.
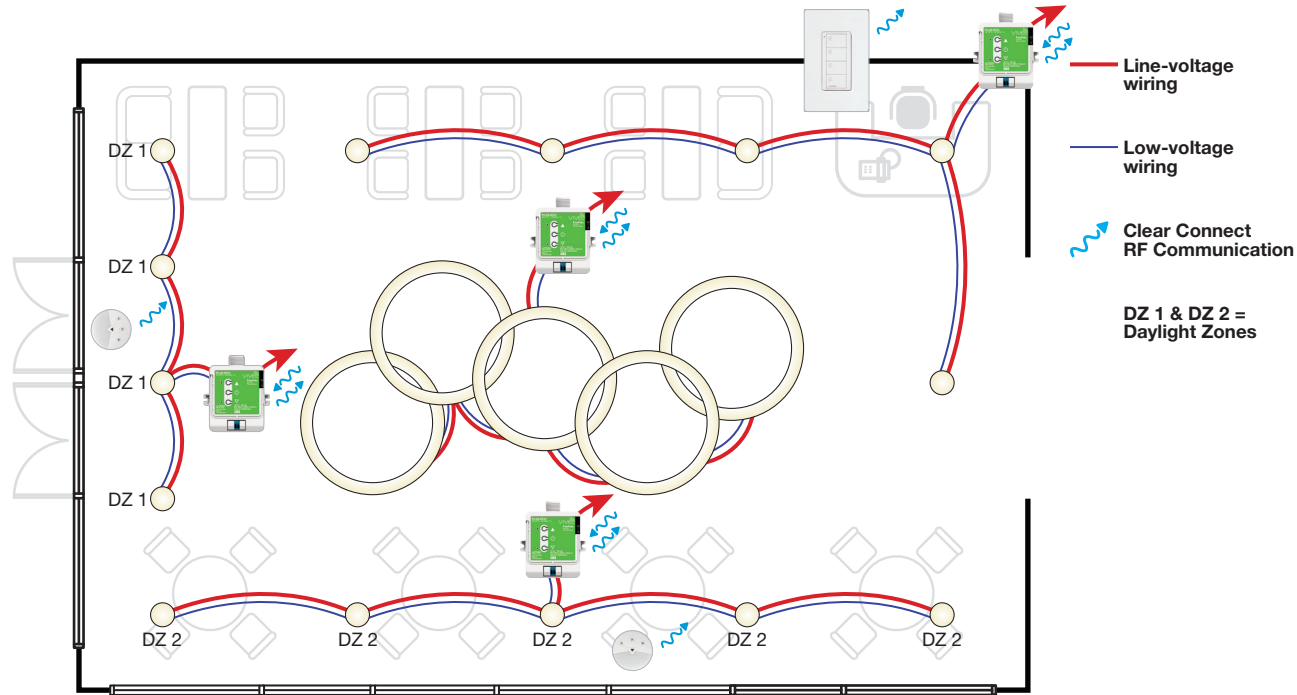
	Line-voltage wiring
	Low-voltage wiring
	Clear Connect RF Communication

DZ 1 & DZ 2 = Daylight Zones

Symbol	Model Number	Description	Qty	List Price Each
	RMJS-8T-DV-B	PowPak dimming module with 0-10V	4	$ 150.00
	LRF2-DCRB-WH	Radio Powr Savr wireless daylight sensor	2	$ 120.00
	PJ2-4B-GWH-L31	Pico wireless 4-button scene control	1	$ 39.00
	PICO-WBX-ADAPT	Pico wallbox adapter	1	$ 8.00
	HJS-1-FM	Vive wireless Hub	Shared	Consult your local rep for Hub pricing and service options.

Code Notes: Requirements specified for 20-40 ft. atriums.
Go to lutron.com/vive for complete compatibility and design details.
This solution requires 0-10V enabled ballasts and drivers by others.

Visible System Components

Pico wireless 4-button scene control

Radio Powr Savr wireless daylight sensor

Control Functionality

When Occupied:
Automatic: Overhead lights dim/brighten based on daylight availability. There are two perimeter daylight zones.

Manual: Occupant selects scenes to set desired light levels for all lights.

Timeclock:
Timeclock turns lights on during normally occupied hours. Maximum light level is set to 80%.

Timeclock turns lights off during normally unoccupied hours.
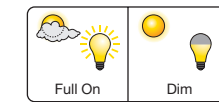
Control Strategies

Full On | Dim
Daylight Harvesting

Max: 100% | Max: 85%
High-end Trim/Tuning

7am: Dim | 7pm: Off
Scheduling

Scene 1 | Scene 2
Scene Control

Lighting Energy Savings*

60%

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

Line-voltage wiring
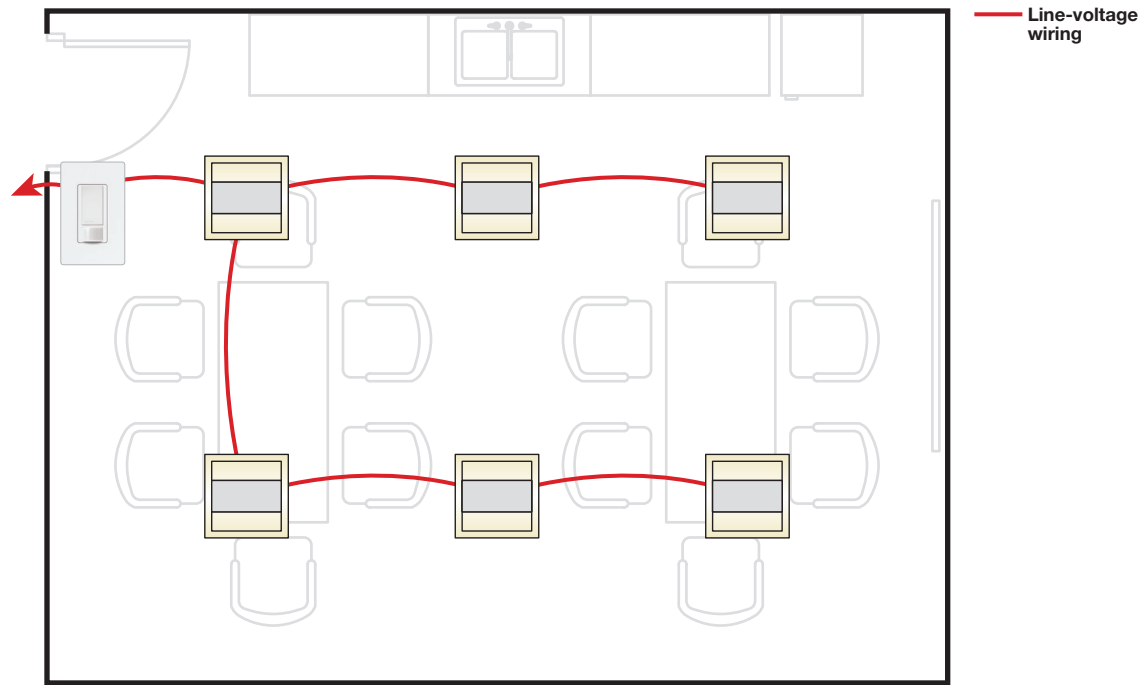
Symbol	Model Number	Description	Qty	List Price Each
	MS-VPS6M2-DV-WH	Maestro vacancy sensing switch*	1	$ 53.00

* Maestro MS-VPS6M2 is not compatible with Vive wireless hub.

Visible System Components

Maestro vacancy sensing switch

Control Functionality

Occupant Enters:
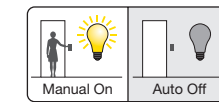Lights do not automatically turn on when an occupant enters the space; lights must be turned on manually.
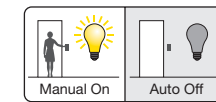
When Occupied:
Manual: Occupant uses wall switch to turn all lights off.

Occupant Exits:
All lights automatically turn off 15 minutes after all occupants exit.

Control Strategies

Manual On   Auto Off

Occupancy/Vacancy

Lighting Energy Savings*

30%

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

	Line-voltage wiring
	Low-voltage wiring
	Clear Connect RF Communication

Symbol	Model Number	Description	Qty	List Price Each
	RMJS-8T-DV-B	PowPak dimming module with 0-10V	1	$ 150.00
	LRF2-VKLB-P-WH	Radio Powr Savr wireless corner-mount vacancy sensor	1	$ 85.00
	PJ2-3BRL-GWH-L01	Pico wireless 3-button with raise/lower control	1	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	1	$ 8.00

Code Notes: For break rooms with daylight, include a 0-10V dimming module per zone and a daylight sensor.
Want to add a Vive wireless hub for more features? Go to lutron.com/vive for complete compatibility and design details.
This solution requires 0-10V enabled ballasts and drivers by others.

Visible System Components

Pico
wireless control

Radio Powr Savr
wireless corner-mount
vacancy sensor

Control Functionality

Occupant Enters:
Lights do not automatically turn on when an occupant enters the space; lights must be turned on manually. Maximum light level is set to 80%.

When Occupied:
Manual: Occupant uses wall dimmer to set desired light levels for all lights.

Occupant Exits:
All lights automatically turn off 15 minutes after all occupants exit.

Add a Vive wireless hub to enable simple setup and re-zoning, system monitoring, timeclock functionality, and advanced integration.
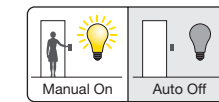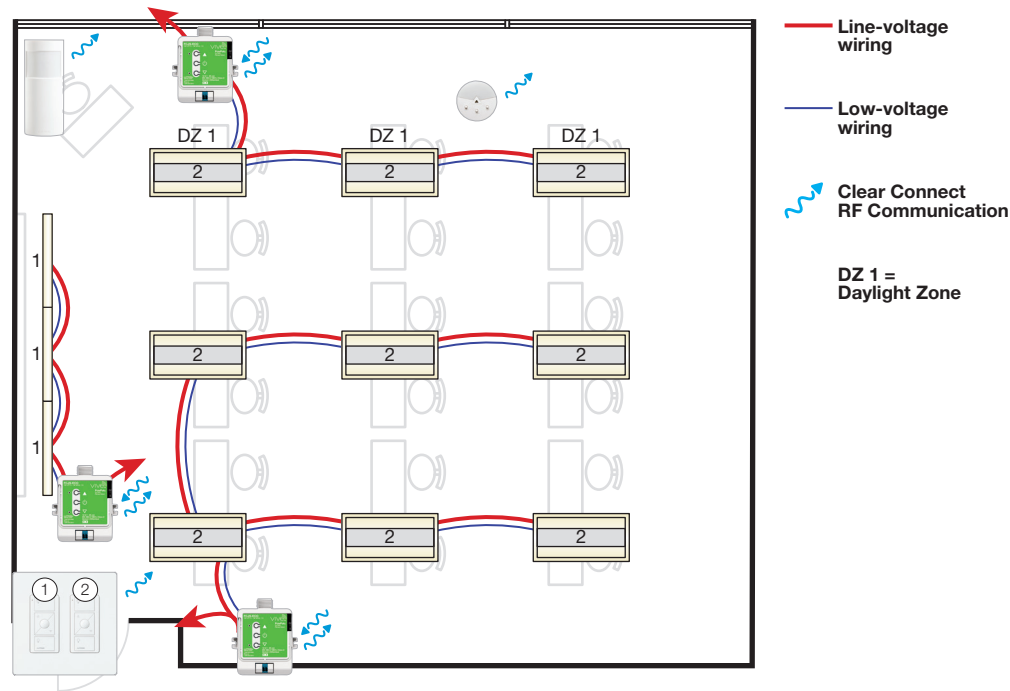
Control Strategies

Manual On	Auto Off

Occupancy/Vacancy

Max: 100%	Max: 85%

High-end Trim/Tuning

Lighting Energy Savings*

45%

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

Line-voltage wiring

Clear Connect RF Communication

Symbol	Model Number	Description	Qty	List Price Each
	RMJS-5R-DV-B	PowPak switching module	2	$ 109.00
	LRF2-VKLB-P-WH	Radio Powr Savr wireless corner-mount vacancy sensor	1	$ 85.00
	PJ2-2B-GWH-L01	Pico wireless 2-button control	2	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	2	$ 8.00

Want to add a Vive wireless hub for more features? Go to lutron.com/vive for complete compatibility and design details.

Visible System Components
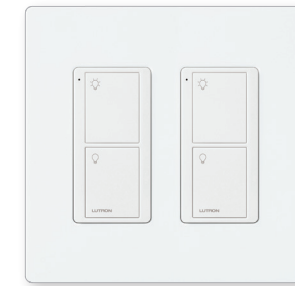
Pico wireless control

Radio Powr Savr wireless corner-mount vacancy sensor

Control Functionality

Occupant Enters:
Lights do not automatically turn on when an occupant enters the space; lights must be turned on manually.

When Occupied:
Manual: Occupant uses wall switches to turn on and turn off general and white-board lighting.
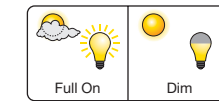
Occupant Exits:
All lights automatically turn off 15 minutes after all occupants exit.

Add a Vive wireless hub to enable simple setup and re-zoning, system monitoring, timeclock functionality, and advanced integration.
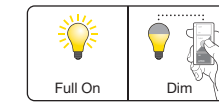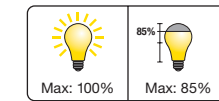
Control Strategies

Manual On   Auto Off

Occupancy/Vacancy

Lighting Energy Savings*

45%

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

Line-voltage wiring

Low-voltage wiring

Clear Connect RF Communication

DZ 1 = Daylight Zone

Symbol	Model Number	Description	Qty	List Price Each
	RMJS-8T-DV-B	PowPak dimming module with 0-10V	3	$ 150.00
	LRF2-DCRB-WH	Radio Powr Savr wireless daylight sensor	1	$ 120.00
	LRF2-VKLB-P-WH	Radio Powr Savr wireless corner-mount vacancy sensor	1	$ 85.00
	PJ2-3BRL-GWH-L01	Pico wireless 3-button with raise/lower control	2	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	2	$ 8.00

Code Notes: For non-daylight classrooms, all general lighting can be connected to a single 0-10V dimming module.
Receptacle Control is required for Shop and Laboratory classrooms.
Want to add a Vive wireless hub for more features? Go to lutron.com/vive for complete compatibility and design details.
This solution requires 0-10V enabled ballasts and drivers by others.

Visible System Components

Pico wireless control

Radio Powr Savr wireless corner-mount vacancy sensor and daylight sensor

Control Functionality

Occupant Enters:
Lights do not automatically turn on when an occupant enters the space; lights must be turned on manually. Maximum light level is set to 80%.

When Occupied:
Automatic: Overhead lights dim/brighten based on daylight availability. There is one perimeter daylight zone.

Manual: Occupant uses wall dimmers to set desired light levels for both general and white-board lights.

Occupant Exits:
All lights automatically turn off 15 minutes after all occupants exit.

Add a Vive wireless hub to enable simple setup and re-zoning, system monitoring, timeclock functionality, and advanced integration.

Control Strategies

Manual On	Auto Off

Occupancy/Vacancy

Full On	Dim

Daylight Harvesting

Full On	Dim

Personal Dimming

Max: 100%	Max: 85%

High-end Trim/Tuning

Lighting Energy Savings*

# 60%

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

Line-voltage wiring

Clear Connect RF Communication

DZ 1 & DZ 2 = Daylight Zones

1 required for each light fixture

1 required for each light fixture

Symbol	Model Number	Description	Qty	List Price Each
	Multiple	EcoSystem-enabled Hi-Lume soft-on, fade-to-black series ballasts/drivers	12	$ 67.00 - $ 81.00
	FCJS-ECO	Wireless fixture control with EcoSystem	12	$ 75.00
	LRF2-DCRB-WH	Radio Powr Savr wireless daylight sensor	1	$ 120.00
	LRF2-VKLB-P-WH	Radio Powr Savr wireless corner-mount vacancy sensor	1	$ 85.00
	PJ2-4B-GWH-L31	Pico wireless 4-button scene control	1	$ 39.00
	PJ2-3BRL-GWH-L01	Pico wireless 3-button with raise/lower control	2	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	3	$ 8.00

Want to add a Vive wireless hub for more features? Go to lutron.com/vive for complete compatibility and design details.
Go to lutron.com/BallastTool or lutron.com/findafixture to identify the correct ballast or LED fixture for your project.

Visible System Components
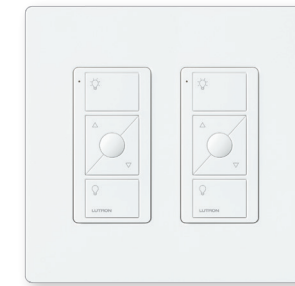
Pico wireless control

Pico wireless 4-button scene control

Radio Powr Savr wireless corner-mount vacancy sensor and daylight sensor

Control Functionality

Occupant Enters:
Lights do not automatically turn on when an occupant enters the space; lights must be turned on manually. Maximum light level is set to 80%.

When Occupied:
Automatic: Overhead lights dim/brighten based on daylight availability. There are two perimeter daylight zones.

Manual: Occupant selects scenes or uses dimmers to set desired light levels for all lights. Entry scene controller has 3 user preferred presets and 1 all off button.

Occupant Exits:
All lights automatically turn off 15 minutes after all occupants exit.

Add a Vive wireless hub to enable simple setup and re-zoning, system monitoring, timeclock functionality, and advanced integration.
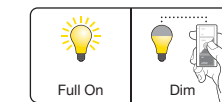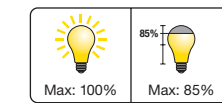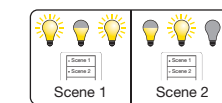
Control Strategies
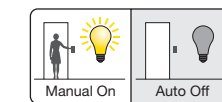
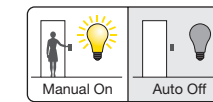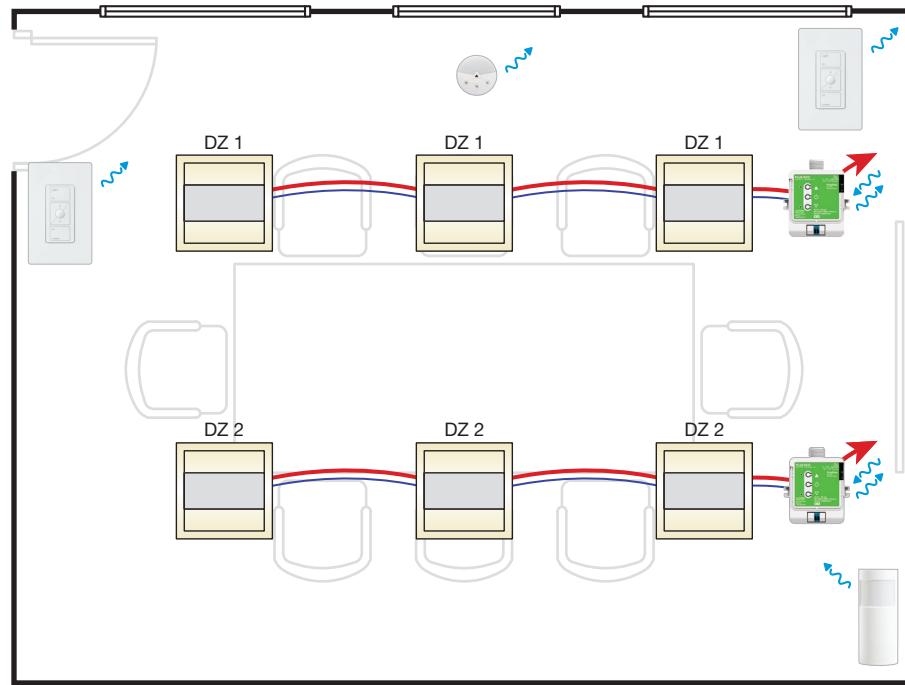**Occupancy/Vacancy**
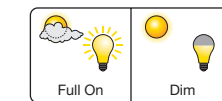
Daylight Harvesting

Personal Dimming

High-end Trim/Tuning

Scene Control

Lighting Energy Savings*

65%

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

Line-voltage wiring

Clear Connect RF Communication

Symbol	Model Number	Description	Qty	List Price Each
	RMJS-5R-DV-B	PowPak switching module	1	$ 109.00
	LRF2-VKLB-P-WH	Radio Powr Savr wireless corner-mount vacancy sensor	1	$ 85.00
	PJ2-2B-GWH-L01	Pico wireless 2-button control	1	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	1	$ 8.00

Want to add a Vive wireless hub for more features? Go to lutron.com/vive for complete compatibility and design details.

Visible System Components

Pico
wireless control

Radio Powr Savr
wireless corner-mount
vacancy sensor

Control Functionality

Occupant Enters:
Lights do not automatically turn on when an occupant enters the space; lights must be turned on manually.

When Occupied:
Manual: Occupant uses wall switch to turn all lights off.

Occupant Exits:
All lights automatically turn off 15 minutes after all occupants exit.

> Add a Vive wireless hub to enable simple setup and re-zoning, system monitoring, timeclock functionality, and advanced integration.
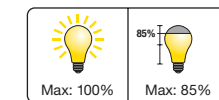
Control Strategies

Manual On Auto Off

Occupancy/Vacancy

Lighting Energy Savings*

40%

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

	Line-voltage wiring
	Low-voltage wiring
	Clear Connect RF Communication

DZ 1 & DZ 2 = Daylight Zones

Symbol	Model Number	Description	Qty	List Price Each
	RMJS-8T-DV-B	PowPak dimming module with 0-10V	2	$ 150.00
	LRF2-DCRB-WH	Radio Powr Savr wireless daylight sensor	1	$ 120.00
	LRF2-VKLB-P-WH	Radio Powr Savr wireless corner-mount vacancy sensor	1	$ 85.00
	PJ2-3BRL-GWH-L01	Pico wireless 3-button with raise/lower control	2	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	2	$ 8.00

For non-daylight conference rooms the lighting can be connected to a single 0-10V dimming module.
Want to add a Vive wireless hub for more features? Go to lutron.com/vive for complete compatibility and design details.
This solution requires 0-10V enabled ballasts and drivers by others.

Visible System Components

Pico
wireless control

Radio Powr Savr
wireless corner-mount
vacancy sensor and
daylight sensor

Control Functionality

Occupant Enters:
Lights do not automatically turn on when an occupant enters the space; lights must be turned on manually. Maximum light level is set to 80%.

When Occupied:
Automatic: Overhead lights dim/brighten based on daylight availability. There are two perimeter daylight zones.
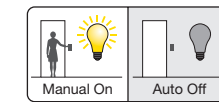
Manual: Occupant uses wall dimmer to set desired light levels for all lights.
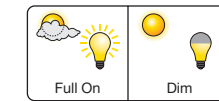
Occupant Exits:
All lights automatically turn off 15 minutes after all occupants exit.

> Add a Vive wireless hub to enable simple setup and re-zoning, system monitoring, timeclock functionality, and advanced integration.
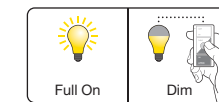
Control Strategies

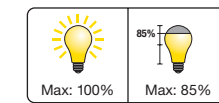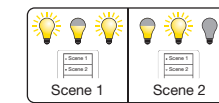**Occupancy/Vacancy**
Manual On | Auto Off

Daylight Harvesting
Full On | Dim

Personal Dimming
Full On | Dim

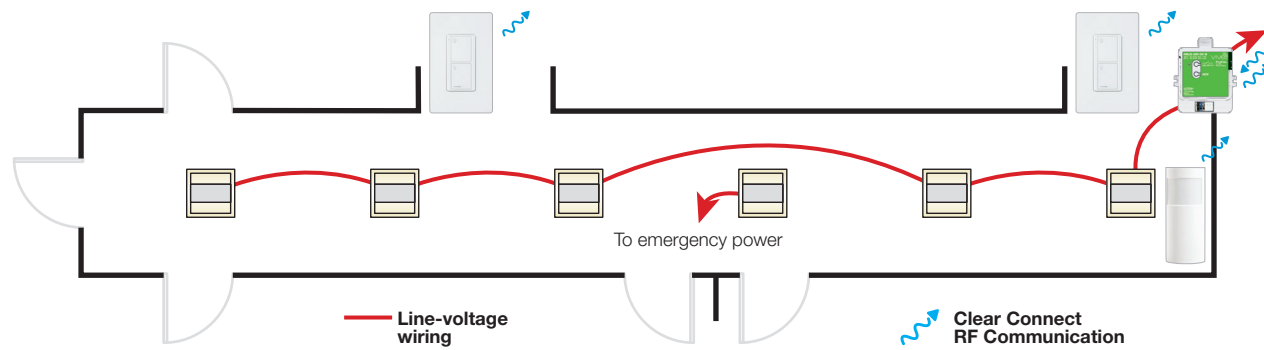**High-end Trim/Tuning**
Max: 100% | Max: 85%

Lighting Energy Savings*

60%

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

Line-voltage wiring

Clear Connect RF Communication

DZ 1 & DZ 2 = Daylight Zones

1 required for each light fixture

1 required for each light fixture

Symbol	Model Number	Description	Qty	List Price Each
	Multiple	EcoSystem-enabled Hi-Lume soft-on, fade-to-black series ballasts/drivers	10	$ 67.00 - $ 81.00
	FCJS-ECO	Wireless fixture control with EcoSystem	10	$ 75.00
	LRF2-DCRB-WH	Radio Powr Savr wireless daylight sensor	1	$ 120.00
	LRF2-VKLB-P-WH	Radio Powr Savr wireless corner-mount vacancy sensor	1	$ 85.00
	PJ2-4B-GWH-L31	Pico wireless 4-button scene control	2	$ 39.00
	PICO-WBX-ADAPT	Pico wallbox adapter	2	$ 8.00

Want to add a Vive wireless hub for more features? Go to lutron.com/vive for complete compatibility and design details.
Go to lutron.com/BallastTool or lutron.com/findafixture to identify the correct ballast or LED fixture for your project.

Visible System Components

Pico wireless 4-button scene control

Radio Powr Savr wireless corner-mount vacancy sensor and daylight sensor

Control Functionality

Occupant Enters:
Lights do not automatically turn on when an occupant enters the space; lights must be turned on manually. Maximum light level is set to 80%.

When Occupied:
Automatic: Overhead lights dim/brighten based on daylight availability. There are two perimeter daylight zones.

Manual: Occupant uses wall dimmer to set desired light levels for all lights.

Occupant Exits:
All lights automatically turn off 15 minutes after all occupants exit.

Add a Vive wireless hub to enable simple setup and re-zoning, system monitoring, timeclock functionality, and advanced integration.

Control Strategies

Occupancy/Vacancy

Daylight Harvesting

Personal Dimming

High-end Trim/Tuning

Scene Control

Lighting Energy Savings*
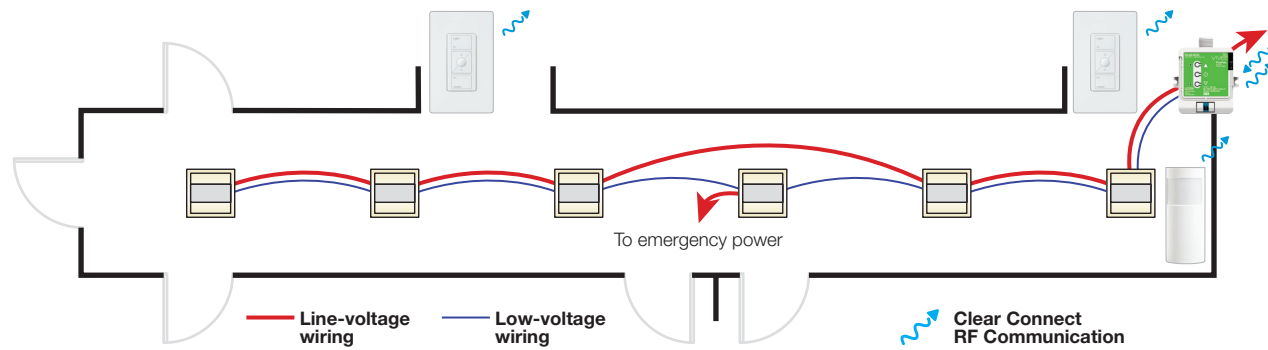
60%

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

Line-voltage wiring

To emergency power

Clear Connect RF Communication

Symbol	Model Number	Description	Qty	List Price Each
	RMJS-5R-DV-B	PowPak switching module	1	$ 109.00
	LRF2-OHLB-P-WH	Radio Powr Savr wireless hallway occupancy sensor	1	$ 85.00
	PJ2-2B-GWH-L01	Pico wireless 2-button control	2	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	2	$ 8.00

Want to add a Vive wireless hub for more features? Go to lutron.com/vive for complete compatibility and design details.

Visible System Components

Pico
wireless control

Radio Powr Savr
wireless hallway
occupancy sensor

Control Functionality

Occupant Enters:
All non-emergency lights automatically turn on to maximum light level.

When Occupied:
Manual: Occupant uses wall switch to turn all non-emergency lights off.

Occupant Exits:
All non-emergency lights automatically turn off 15 minutes after all occupants exit.

> Add a Vive wireless hub to enable simple setup and re-zoning, system monitoring, timeclock functionality, and advanced integration.

Control Strategies

Auto On   Auto Off

Occupancy/Vacancy

Lighting Energy Savings*

40%

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

To emergency power

| | Line-voltage wiring | | Low-voltage wiring | | Clear Connect RF Communication |
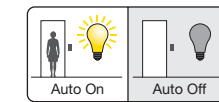
Symbol	Model Number	Description	Qty	List Price Each
	RMJS-8T-DV-B	PowPak dimming module with 0-10V	1	$ 150.00
	LRF2-OHLB-P-WH	Radio Powr Savr wireless hallway occupancy sensor	1	$ 85.00
	PJ2-3BRL-GWH-L01	Pico wireless 3-button with raise/lower control	2	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	2	$ 8.00

Code Notes: Verify that the egress fixtures go to full output upon loss of control signal. For projects that require UL 924 compliance, provide an automatic load control relay (ALCR) per load controller connected to emergency fixtures. Add a daylight sensor for corridors with daylight zones. Want to add a Vive wireless hub for more features? Go to lutron.com/vive for complete compatibility and design details. This solution requires 0-10V enabled ballasts and drivers by others.

Visible System Components

Pico wireless control

Radio Powr Savr wireless hallway occupancy sensor

Control Functionality

Occupant Enters:
All lights automatically turn on to maximum light level. Maximum light level is set to 80%.

When Occupied:
Manual: Occupant uses wall switch to turn on, adjust, or dim all lights to low end. Manual control cannot fully shut off the lights. Minimum light level is set to 10%.
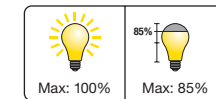
Occupant Exits:
All lights automatically go to minimum light level 15 minutes after all occupants exit.

Emergency Mode:
Lighting connected to emergency power turns on to full output.

Control Strategies

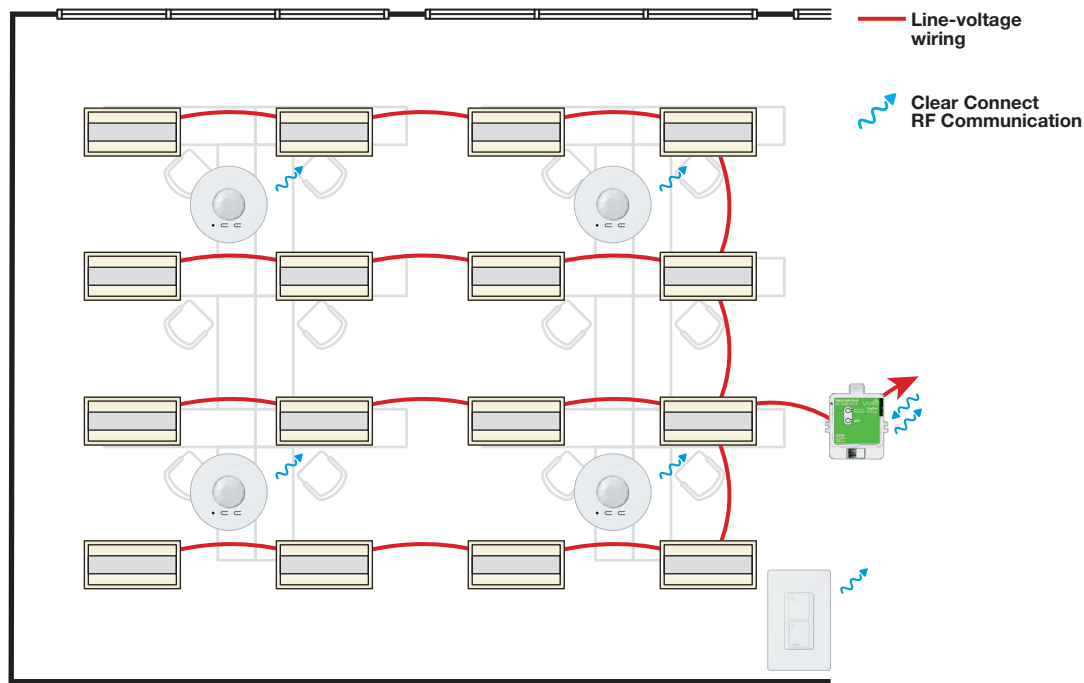| Auto On | Auto Off |

Occupancy/Vacancy

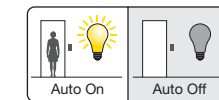| Max: 100% | Max: 85% |
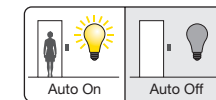
High-end Trim/Tuning

Lighting Energy Savings*

60%

For non-egress corridors, set the minimum light level to full off.

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

Line-voltage wiring

Clear Connect RF Communication

Symbol	Model Number	Description	Qty	List Price Each
	RMJS-16R-DV-B	PowPak switching module	1	$ 129.00
	LRF2-OCR2B-P-WH	Radio Powr Savr wireless ceiling-mount occupancy sensor	4	$ 85.00
	PJ2-2B-GWH-L01	Pico wireless 2-button control	1	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	1	$ 8.00

Visible System Components

Pico
wireless control

Radio Powr Savr
wireless ceiling-mount
occupancy sensor

Control Functionality

Occupant Enters:
All lights automatically turn on to maximum light level.

When Occupied:
Manual: Occupant uses wall switch to turn all lights off.

Occupant Exits:
All lights automatically turn off 15 minutes after all occupants exit.

Add a Vive wireless hub to enable simple setup and re-zoning, system monitoring, timeclock functionality, and advanced integration.
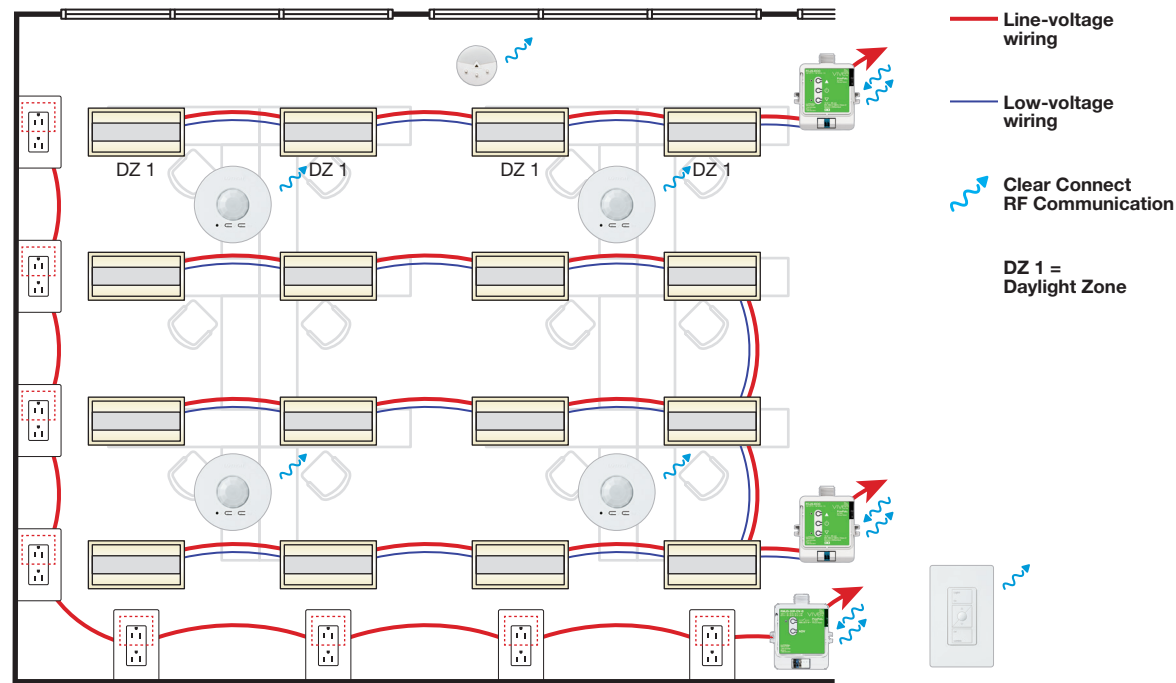
Control Strategies

Auto On   Auto Off

Occupancy/Vacancy

Lighting Energy Savings*

35%

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

Line-voltage wiring

Low-voltage wiring

Clear Connect RF Communication

DZ 1 = Daylight Zone

Symbol	Model Number	Description	Qty	List Price Each
	RMJS-8T-DV-B	PowPak dimming module with 0-10V	2	$ 150.00
	RMJS-20R-DV-B	20A PowPak relay module	1	$ 139.00
	LRF2-DCRB-WH	Radio Powr Savr wireless daylight sensor	1	$ 120.00
	LRF2-OCR2B-P-WH	Radio Powr Savr wireless ceiling-mount occupancy sensor	4	$ 85.00
	PJ2-3BRL-GWH-L01	Pico wireless 3-button with raise/lower control	1	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	1	$ 8.00

Code Notes: For non-daylight open offices, all general lighting can be connected to a single 0-10V dimming module. Want to add a Vive wireless hub for more features? Go to lutron.com/vive for complete compatibility and design details. This solution requires 0-10V enabled ballasts and drivers by others.

Visible System Components

Pico
wireless control

Radio Powr Savr wireless ceiling-mount occupancy sensor and daylight sensor

Control Functionality

Occupant Enters:
All lights automatically turn on to 50% light level. Occupant turns on lights to maximum level manually. Maximum light level is set to 80%.

Controlled receptacles automatically regain power when occupant enters.

When Occupied:
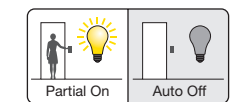Automatic: Overhead lights dim/brighten based on daylight availability. There is one perimeter daylight zone.

Manual: Occupant uses wall dimmers to set desired light levels for all lights.

Occupant Exits:
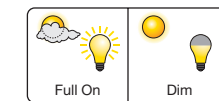All lights automatically turn off 15 minutes after all occupants exit.

50% of all receptacles automatically turn off 15 minutes after all occupants exit.

Add a Vive wireless hub to enable simple setup and re-zoning, system monitoring, timeclock functionality, and advanced integration.
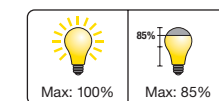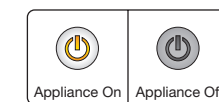
Control Strategies

Partial On — Auto Off
Occupancy/Vacancy

Full On — Dim
Daylight Harvesting

Max: 100% — Max: 85%
High-end Trim/Tuning

Appliance On — Appliance Off
Plug Load Control

Lighting Energy Savings*

50%

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

Line-voltage wiring

Clear Connect RF Communication

1 required for each light fixture

1 required for each fixture control

Symbol	Model Number	Description	Qty	List Price Each
	FCJS-010	Wireless Fixture Control with 0-10V	16	$ 75.00
	RMJS-20R-DV-B	20A PowPak relay module	1	$ 139.00
	FC-SENSOR	PowPak Fixture Sensor	16	$ 35.00
	PJ2-3BRL-GWH-L01	Pico wireless 3-button with raise/lower control	1	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	1	$ 8.00

Want to add a Vive wireless hub for more features? Go to lutron.com/vive for complete compatibility and design details.
This solution requires 0-10V enabled ballasts and drivers by others.

Visible System Components

Pico
wireless control

PowPak
fixture sensor

Control Functionality

Occupant Enters:
Each individual light automatically turns on to 50% light level as occupant approaches fixture proximity.

Controlled receptacles automatically regain power when occupant enters.

When Occupied:
Automatic: Each individual overhead light dims/ brightens based on local daylight availability.

Manual: Occupant uses wall dimmer to set desired light levels for all lights. Maximum light level is set to 80%.
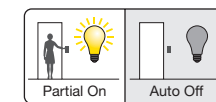
Occupant Exits:
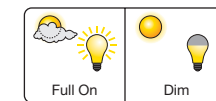Each individual light automatically turns off 15 minutes after all occupants exit fixture proximity.

50% of all receptacles automatically turn off 15 minutes after all occupants exit.

Add a Vive wireless hub to enable simple setup and re-zoning, system monitoring, timeclock functionality, and advanced integration.
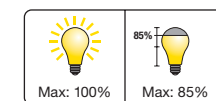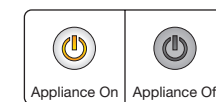
Control Strategies

Partial On	Auto Off

Occupancy/Vacancy

Full On	Dim

Daylight Harvesting

Max: 100%	Max: 85%

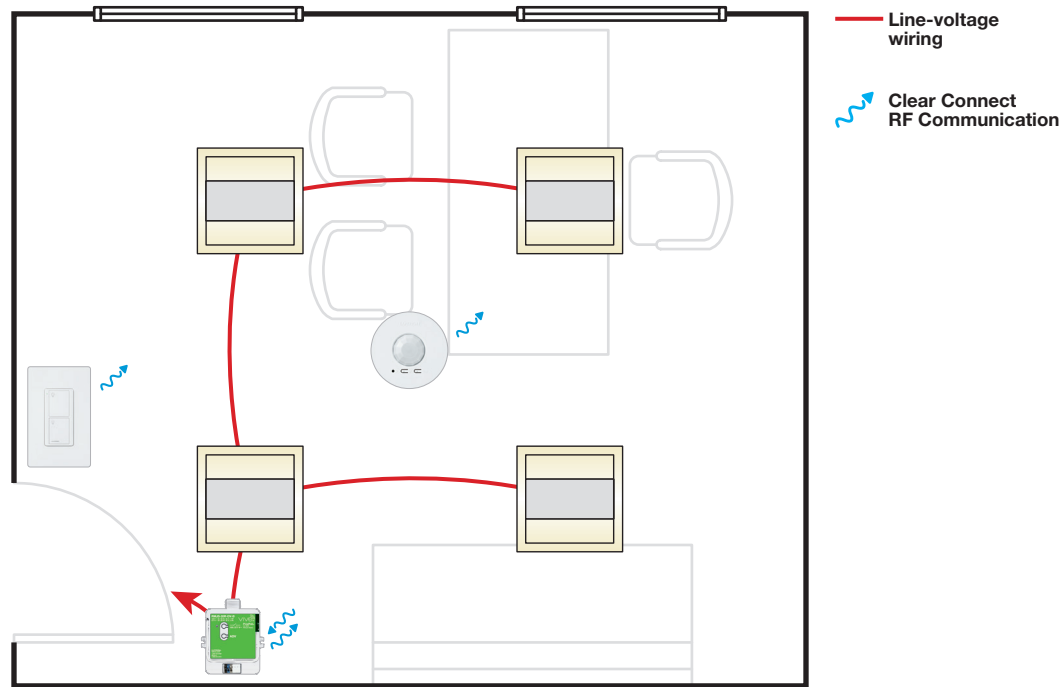**High-end Trim/Tuning**

Appliance On	Appliance Off

Plug Load Control

Lighting Energy Savings*

60%

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

| | Line-voltage wiring |
| | Clear Connect RF Communication |

Symbol	Model Number	Description	Qty	List Price Each
	RMJS-5R-DV-B	PowPak switching module	1	$ 109.00
	LRF2-VCR2B-P-WH	Radio Powr Savr wireless ceiling-mount vacancy sensor	1	$ 85.00
	PJ2-2B-GWH-L01	Pico wireless 2-button control	1	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	1	$ 8.00

Want to add a Vive wireless hub for more features? Go to lutron.com/vive for complete compatibility and design details.

Visible System Components

Pico
wireless control

Radio Powr Savr
wireless ceiling-mount
vacancy sensor

Control Functionality

Occupant Enters:
Lights do not automatically turn on when an occupant enters the space; lights must be turned on manually.
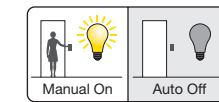
When Occupied:
Manual: Occupant uses wall switch to turn all lights off.

Occupant Exits:
All lights automatically turn off 15 minutes after all occupants exit.

Add a Vive wireless hub to enable simple setup and re-zoning, system monitoring, timeclock functionality, and advanced integration.
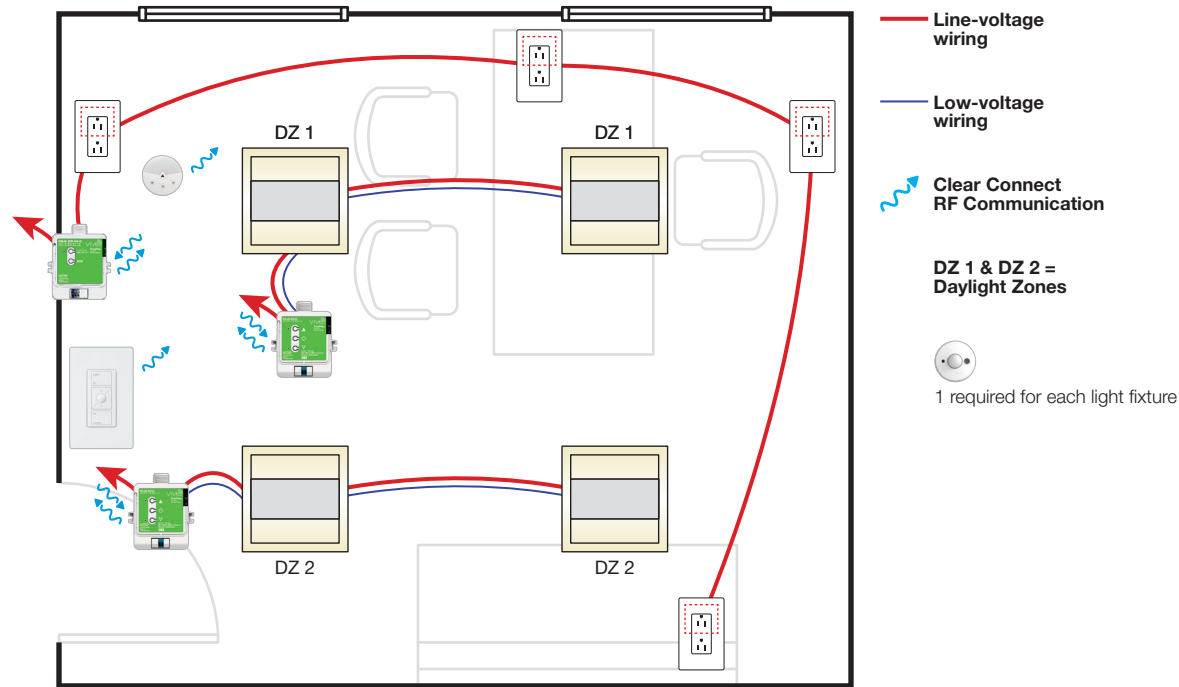
Control Strategies

| Manual On | Auto Off |

Occupancy/Vacancy

Lighting Energy Savings*

30%

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

Line-voltage wiring

Low-voltage wiring

Clear Connect RF Communication

DZ 1 & DZ 2 = Daylight Zones

1 required for each light fixture

Symbol	Model Number	Description	Qty	List Price Each
	FCJS-010	Wireless Fixture Control with 0-10V	2	$ 75.00
	RMJS-20R-DV-B	20A PowPak relay module	1	$ 139.00
	FC-SENSOR	PowPak Fixture Sensor	2	$ 35.00
	PJ2-3BRL-GWH-L01	Pico wireless 3-button with raise/lower control	1	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	1	$ 8.00

FCJS models are capable of controlling up to 3 ballasts or drives. Review the "Vive PowPak Fixture Controls" submittal document for more design details.
Want to add a Vive wireless hub for more features? Go to lutron.com/vive for complete compatibility and design details.
This solution requires 0-10V enabled ballasts and drivers by others.

Visible System Components

Pico
wireless control

PowPak
fixture sensor

Control Functionality

Occupant Enters:
Lights do not automatically turn on when an occupant enters the space; lights must be turned on manually. Maximum light level is set to 80%.

Controlled receptacles automatically regain power when occupant enters.

When Occupied:
Automatic: Overhead lights dim/brighten based on daylight availability. There are two perimeter daylight zones.

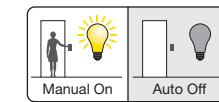Manual: Occupant uses wall dimmer to set desired light levels for all lights.

Occupant Exits:
All lights automatically turn off 15 minutes after all occupants exit.

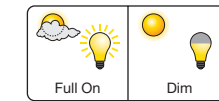50% of all receptacles automatically turn off 15 minutes after all occupants exit.

Add a Vive wireless hub to enable simple setup and re-zoning, system monitoring, timeclock functionality, and advanced integration.
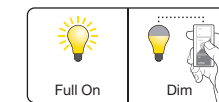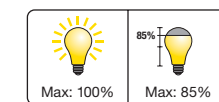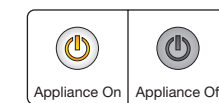
Control Strategies

Manual On	Auto Off

Occupancy/Vacancy

Full On	Dim

Daylight Harvesting

Full On	Dim

Personal Dimming

Max: 100%	Max: 85%

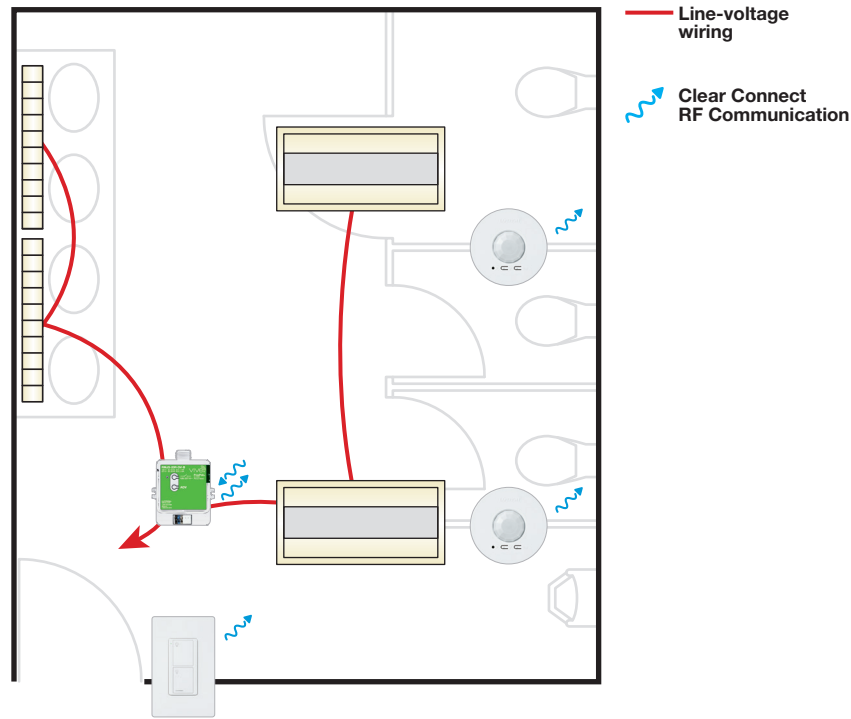**High-end Trim/Tuning**

Appliance On	Appliance Off

Plug Load Control

Lighting Energy Savings*

60%

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

Line-voltage wiring

Clear Connect RF Communication

Symbol	Model Number	Description	Qty	List Price Each
	RMJS-5R-DV-B	PowPak switching module	1	$ 109.00
	LRF2-OCR2B-P-WH	Radio Powr Savr wireless ceiling-mount occupancy sensor	2	$ 85.00
	PJ2-2B-GWH-L01	Pico wireless 2-button control	1	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	1	$ 8.00

Want to add a Vive wireless hub for more features? Go to lutron.com/vive for complete compatibility and design details.

Visible System Components

Pico
wireless control

Radio Powr Savr
wireless ceiling-mount
occupancy sensor

Control Functionality

Occupant Enters:
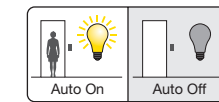All lights automatically turn on to maximum light level.

When Occupied:
Manual: Occupant uses wall switch to turn all lights off.

Occupant Exits:
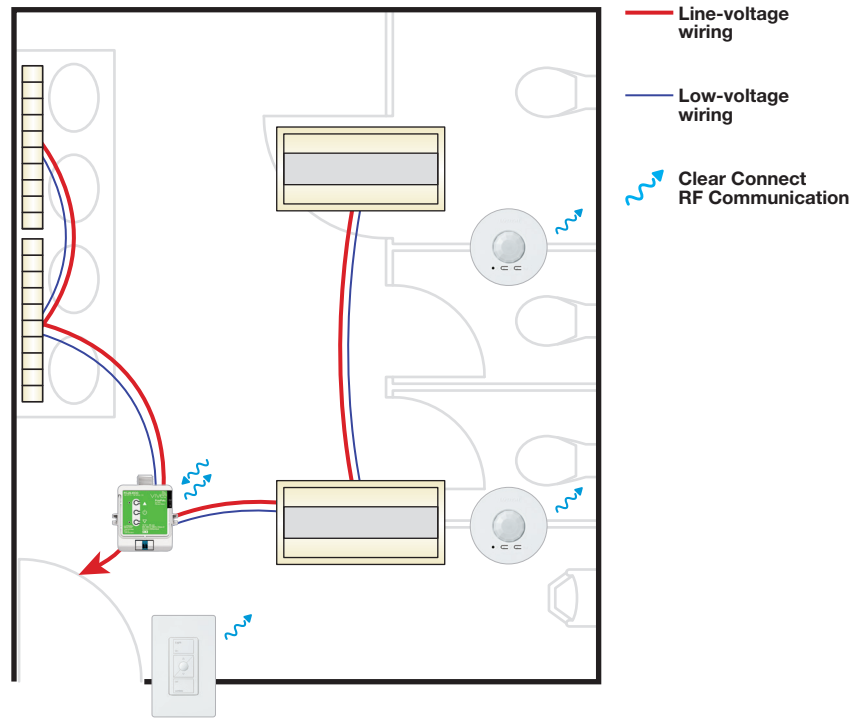All lights automatically turn off 15 minutes after all occupants exit.

Control Strategies

Auto On   Auto Off

Occupancy/Vacancy

Lighting Energy Savings*

50%

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

- Line-voltage wiring
- Low-voltage wiring
- Clear Connect RF Communication

Symbol	Model Number	Description	Qty	List Price Each
	RMJS-8T-DV-B	PowPak dimming module with 0-10V	1	$ 150.00
	LRF2-OCR2B-P-WH	Radio Powr Savr wireless ceiling-mount occupancy sensor	2	$ 85.00
	PJ2-3BRL-GWH-L01	Pico wireless 3-button with raise/lower control	1	$ 21.00
	PICO-WBX-ADAPT	Pico wallbox adapter	1	$ 8.00

Code Notes: Add a daylight sensor for restrooms with daylight zones.
Want to add a Vive wireless hub for more features? Go to lutron.com/vive for complete compatibility and design details.
This solution requires 0-10V enabled ballasts and drivers by others.

Visible System Components

Pico
wireless control

Radio Powr Savr
wireless ceiling-mount
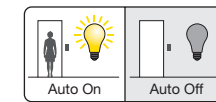occupancy sensor

Control Functionality

Occupant Enters:
All lights automatically turn on to maximum light level. Maximum light level is set to 80%.

When Occupied:
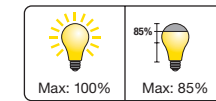Manual: Occupant uses wall dimmer to set desired light levels for all lights.

Occupant Exits:
All lights automatically turn off 15 minutes after all occupants exit.

Add a Vive wireless hub to enable simple setup and re-zoning, system monitoring, timeclock functionality, and advanced integration.

Control Strategies

Auto On | Auto Off
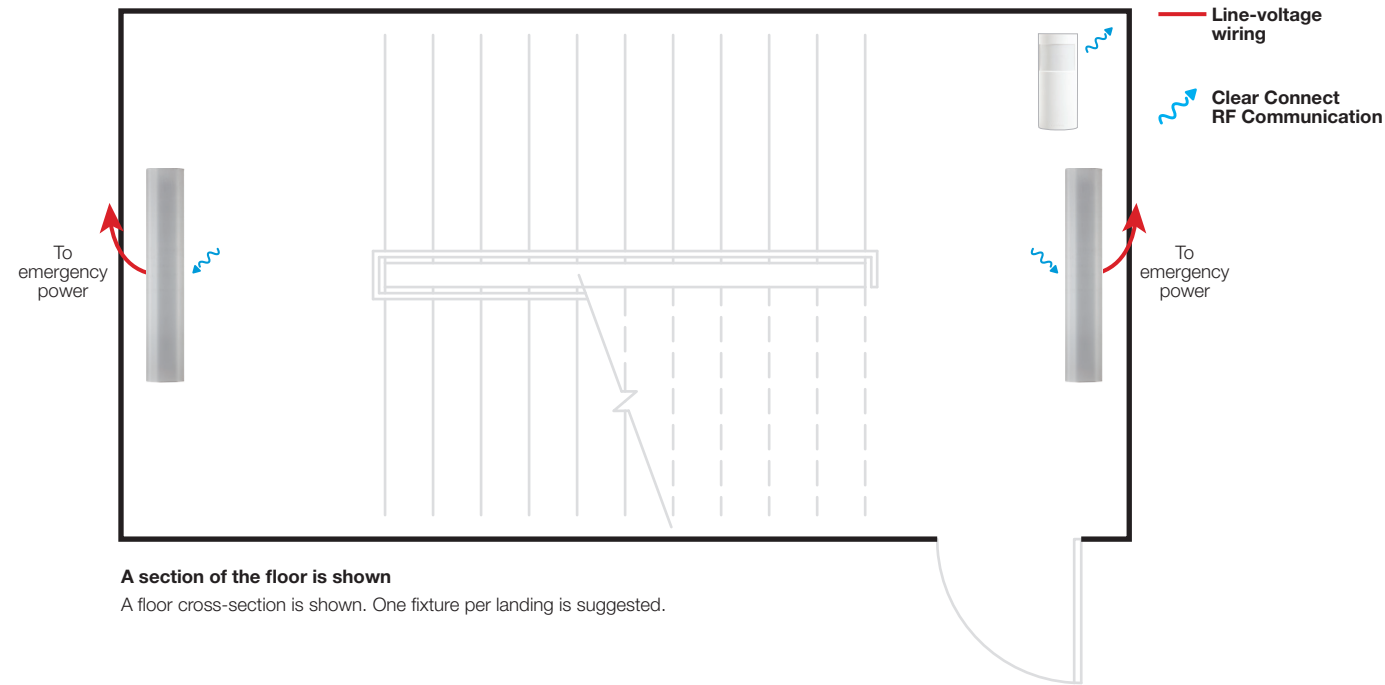**Occupancy/Vacancy**

Max: 100% | Max: 85%
High-end Trim/Tuning

Lighting Energy Savings*

60%

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

Line-voltage
wiring

Clear Connect
RF Communication

To
emergency
power

To
emergency
power

A section of the floor is shown
A floor cross-section is shown. One fixture per landing is suggested.

Symbol	Model Number	Description	Qty	List Price Each
	FXSWLX4H	Lutron 4 ft. stairwell LED fixture	2 (per floor)	$ 540.00
	LRF2-OKLB-P-WH	Radio Powr Savr wireless corner-mount occupancy sensor	1 (per floor)	$ 85.00

Code Notes: Verify that the egress fixtures go to full output upon loss of control signal. For projects that require UL 924 compliance, provide an automatic load control relay (ALCR) per load controller connected to emergency fixtures. Add a daylight sensor for stairwells with daylight zones. Lutron Stairwell Fixture (FXSWLX44) is not currently compatible with Vive wireless hub. A new model number is coming soon that will include Vive compatibility. Go to lutron.com/vive for the latest compatibility details.

Visible System Components

Radio Powr Savr
wireless corner-mount
occupancy sensor
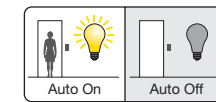
Control Functionality

Occupant Enters:
All lights automatically turn on to maximum light level. Maximum light level is set to 80%.

Occupant Exits:
All lights dim to the minimum light level 15 minutes after all occupants exit. Minimum light level is set to 10%.
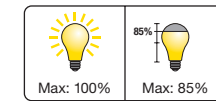
Emergency Mode:
Lighting connected to emergency power turns on to full output.

Control Strategies

Auto On   Auto Off

Occupancy/Vacancy

Max: 100%   Max: 85%

High-end Trim/Tuning

Lighting Energy Savings*

80%

Code Notes: For non-egress stairwells, see the recommended solution and set the minimum light level to full off.
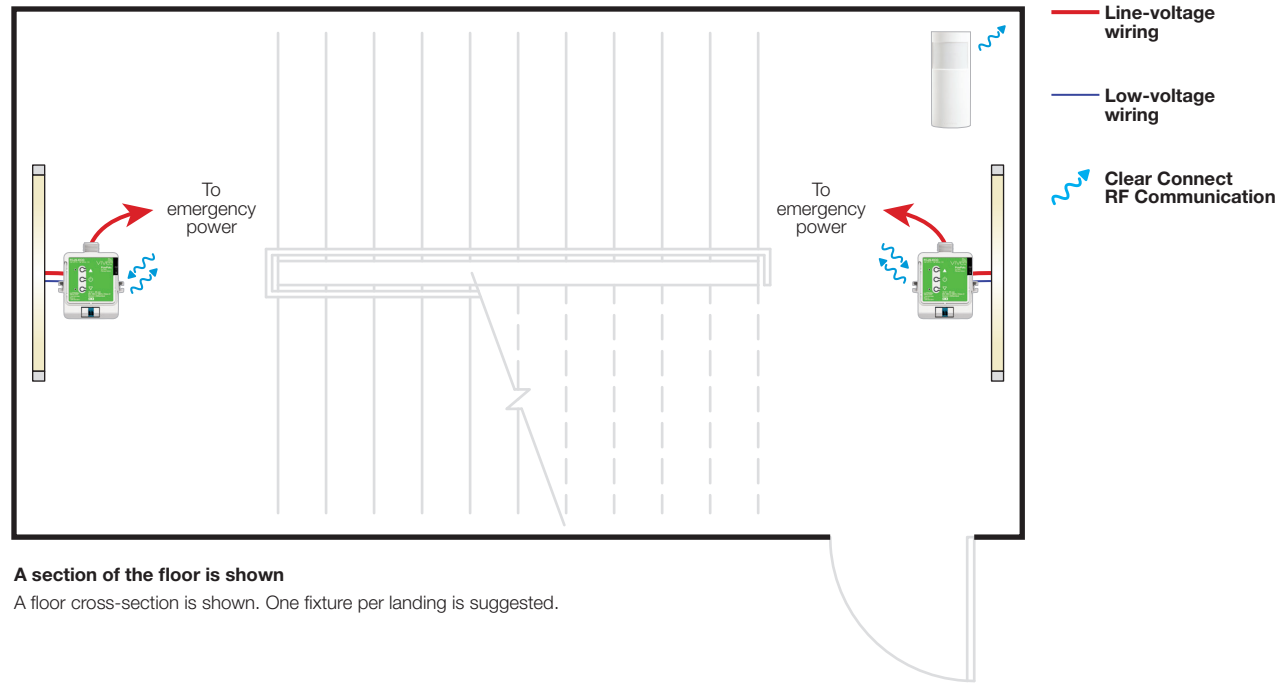
* Go to lutron.com/references for more information.

Line-voltage wiring

Low-voltage wiring

Clear Connect RF Communication

To emergency power

To emergency power

A section of the floor is shown
A floor cross-section is shown. One fixture per landing is suggested.

Symbol	Model Number	Description	Qty	List Price Each
	FCJS-010	Wireless Fixture Control with 0-10V	2 (per floor)	$ 75.00
	LRF2-OKLB-P-WH	Radio Powr Savr wireless corner-mount occupancy sensor	1 (per floor)	$ 85.00

Code Notes: Verify that the egress fixtures go to full output upon loss of control signal. For projects that require UL 924 compliance, provide an automatic load control relay (ALCR) per load controller connected to emergency fixtures. Add a daylight sensor for stairwells with daylight zones. This solution requires 0-10V enabled ballasts and drivers by others.

Visible System Components

Radio Powr Savr
wireless corner-mount
occupancy sensor

Control Functionality

Occupant Enters:
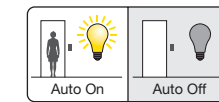All lights automatically turn on to maximum light level. Maximum light level is set to 80%.

Occupant Exits:
All lights dim to the minimum light level 15 minutes after all occupants exit. Minimum light level is set to 10%.

Emergency Mode:
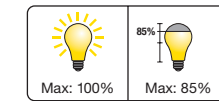Lighting connected to emergency power turns on to full output.

Control Strategies

Auto On   Auto Off

Occupancy/Vacancy

Max: 100%   Max: 85%

High-end Trim/Tuning

Lighting Energy Savings*

80%

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

Code Notes: For non-egress stairwells, set the low end to full off.

lutron.com
Lutron Electronics Co., Inc., 7200 Suter Road, Coopersburg, PA 18036-1299

Customer Assistance
Online: lutron.com/help
Email: support@lutron.com
Phone: 1.844.LUTRON1 (588.7661) — includes 24/7 technical support

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