



# Restaurants ASHRAE 90.1-2016 Solutions

Design Guide  
Crestron Electronics, Inc.

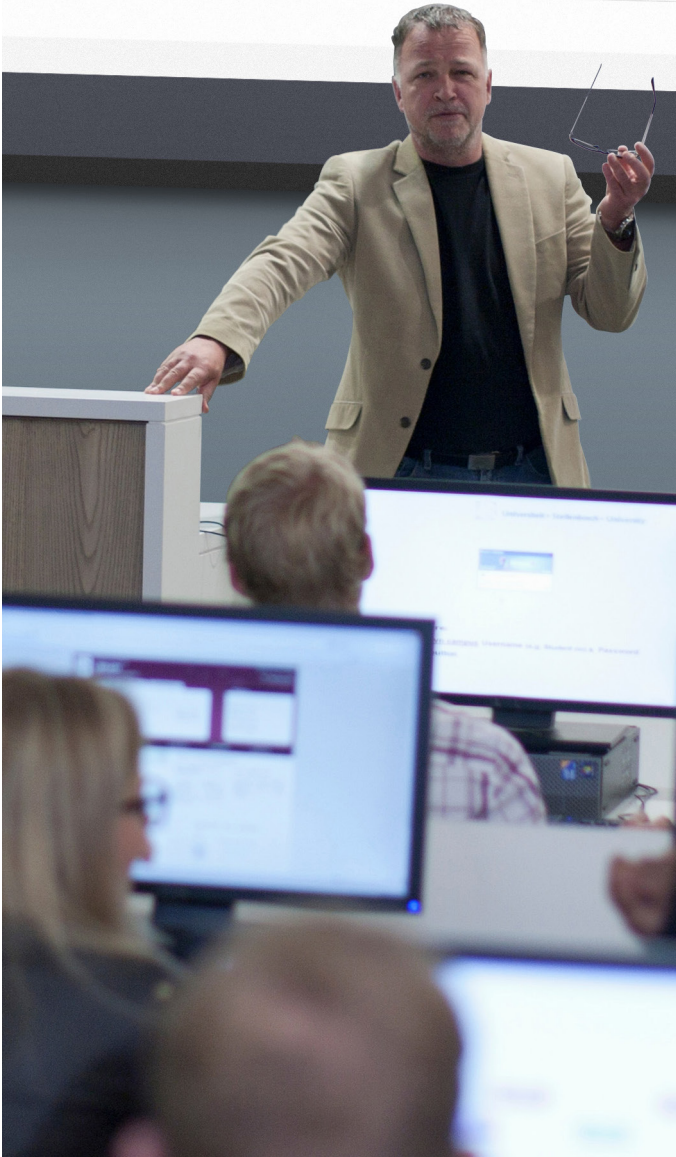
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## TOTAL ENERGY CONSUMPTION

Per capita usage; 10<sup>9</sup> BTU per person

	OIL	COAL	SOLAR
Temperate climates	2.50b	3.1b	0.25
Subtropical climates	1.23b	0.55b	1.18
Hot climates	0.09b	0.19b	3.73
Cold climates	1.15b	1.30b	2.21
	0.20b	0.82b	1.32
	<b>Total: 5.17</b>	<b>Total: 5.96</b>	<b>Total: 5.96</b>



## About ASHRAE 90.1-2016

ASHRAE 90.1-2016 is a residential and commercial building energy code that is designed to reduce energy consumption. The goal of this code is to reduce energy consumption by providing design and construction requirements for lighting controls.

Lighting controls such as occupancy status sensors, multi-level controls, and demand response provisions allow you to synchronize indoor light levels with daylight levels in accordance with ASHRAE 90.1-2016.

## Design Guide Information

Crestron® offers this Design Guide for Restaurants - ASHRAE 90.1-2016 solutions to use as a reference for typical layouts. Use it as guidance to make code compliance quick and easy. The Crestron team is also available to support with detailed design, submittal, and installation requirements. For additional information, please contact your Crestron representative at [CLCDesign@crestron.com](mailto:CLCDesign@crestron.com) or (888) 330-1502.

# ASHRAE 90.1-2016 Code Standards

## Summary

### ASHRAE 90.1-2016 Code Standards

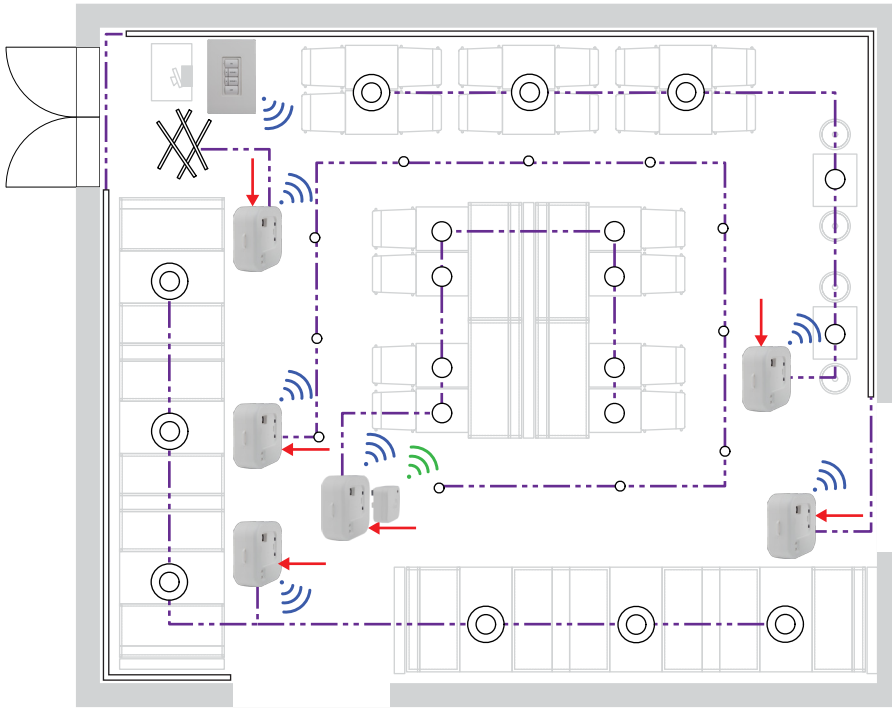
	Code Provision	Minimum Control Requirement	Code Description
ON/OFF CONTROLS	9.4.1.1	Automatic Full On (Occupancy Sensing Mode)	Lighting is permitted to automatically turn to full on.
	9.4.1.1.a	Local Control	There should be one or more readily accessible manual lighting controls in each space.
	9.4.1.1.b/c	Manual On / Partial Auto On (Vacancy Sensing Mode)	The general lighting can be manually turned on or automatically turned on up to 50%.
	9.4.1.1.g	Automatic Partial Off	Lighting power should be automatically reduced by at least 50% within 20 minutes of vacancy.
	9.4.1.1.h	Automatic Full Off	All lighting must be shut off within 20 minutes of vacancy.
	9.4.1.1.i	Scheduled Shutoff (Programmable Timeclock)	All lighting should be automatically shut off during periods when the space is scheduled to be unoccupied using a programmable timeclock or signal from another control device (i.e. security system).
LIGHT LEVEL CONTROL	9.4.1.1.d	Bi-level Control (0-10v Dimming)	The general lighting should use continuous dimming or have at least one intermediate step between 30-70% power in addition to full on and full off.
	9.4.1.1.e/f	Automatic Daylight Control (Photocontrol)	In primary side daylit general lighting zones using more than 150W (or using more than 300W within the primary and secondary daylit zones), daylight must be harvested using photocontrols. In top daylit general lighting zones using more than 150W, daylight must be harvested using photocontrols.
<b>Primary Solutions</b>			
Zūm™ Wireless Light Control			
GLPP			
GLPAC			

\* Optional

Space Type					
Dining Room	Kitchen	Small Storage / Back of House <50 sq. ft.	Medium Storage / Back of House 50-1,000 sq. ft.	Large Storage / Back of House >1,000 sq. ft.	Restroom
		✓			✓
✓	✓	✓	✓	✓	✓*
✓	✓		✓	✓	
				✓	
✓	✓	✓	✓	✓	✓
or	or	or	or	or	
✓	✓	✓	✓	✓	
✓					
✓	✓		✓	✓	✓
✓	✓	✓	✓	✓	✓
		✓	✓	✓	✓
✓					

# Dining Room

## Zūm






### ASHRAE 90.1-2016 Code Compliance:

- ▶ Local Control (9.4.1.1.a)
- ▶ Manual On / Partial Auto On (Vacancy Sensing Mode) (9.4.1.1.b/c)
- ▶ Automatic Full Off (9.4.1.1.h)
- ▶ Bi-level Control (0-10v Dimming) (9.4.1.1.d)
- ▶ Automatic Daylight Control (Photocontrol) (9.4.1.1.e/f)

### Local Control:

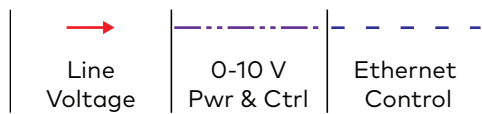
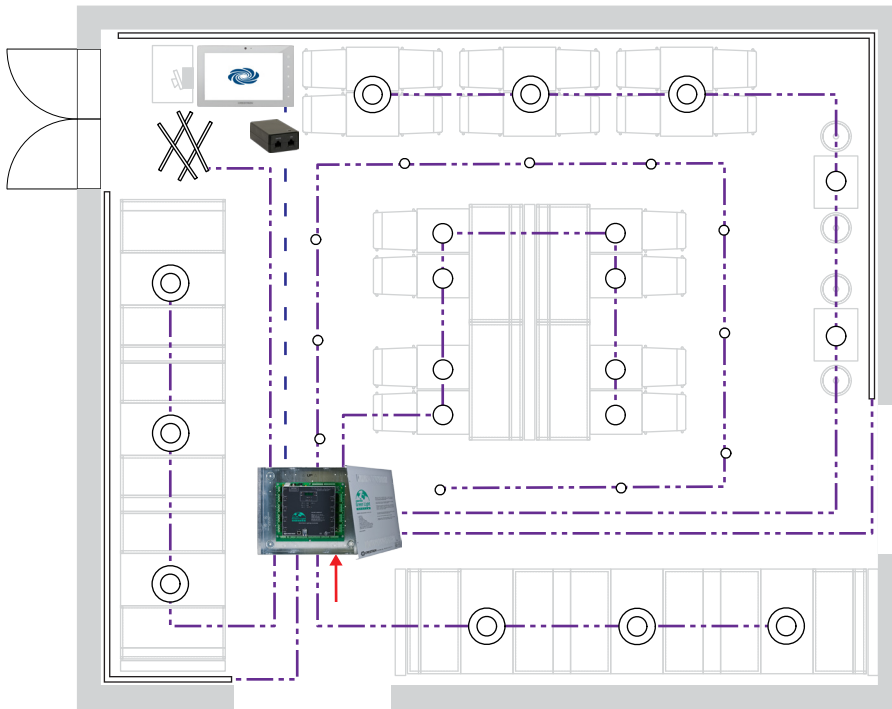


- ▶ Add a ZUM-FLOOR-HUB and ZUMNET-GATEWAY for scheduled shutoff (9.4.1.1.i).

Symbol	Qty.	Product	Description
	6	ZUMMESH-JBOX-5A-LV	Junction Box Zone Controller, 0-10V Dimming, 5A
	1	ZUMMESH-NETBRIDGE	Zūm™ Network Bridge
	1	ZUMMESH-KP10CBATT	6-Button Battery-Powered Keypad

# Dining Room

## GLPAC






## ASHRAE 90.1-2016 Code Compliance:

- ▶ Local Control (9.4.1.1.a)
- ▶ Manual On / Partial Auto On (Vacancy Sensing Mode) (9.4.1.1.b/c)
- ▶ Scheduled Shutoff (Programmable Timeclock) (9.4.1.1.i)
- ▶ Bi-level Control (0-10v Dimming) (9.4.1.1.d)
- ▶ Automatic Daylight Control (Photocontrol) (9.4.1.1.e/f)

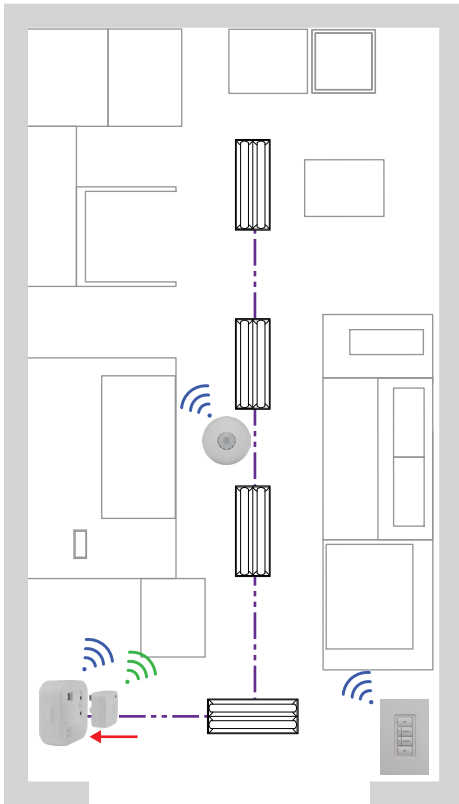
## Local Control:



Symbol	Qty.	Product	Description
	1	GLPAC-DIMFLV4	Green Light Integrated Lighting System, 4-Channel
	1	TSW-760	7" Touch Screen
	1	PWE-4803RU	PoE Injector

# Kitchen

## Züm







- ▶ Add a ZUM-FLOOR-HUB and ZUMNET-GATEWAY for scheduled shutoff (9.4.1.1.i).

### ASHRAE 90.1-2016 Code Compliance:

- ▶ Local Control (9.4.1.1.a)
- ▶ Manual On / Partial Auto On (Vacancy Sensing Mode) (9.4.1.1.b/c)
- ▶ Automatic Full Off (9.4.1.1.h)
- ▶ Automatic Daylight Control (Photocontrol) (9.4.1.1.e/f)

### Local Control:

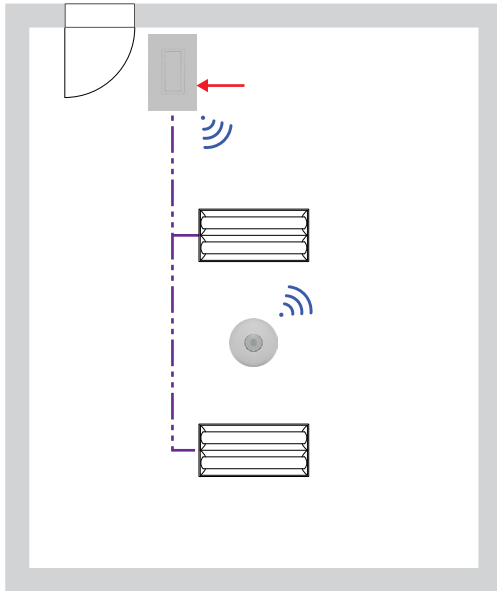


Symbol	Qty.	Product	Description
	1	ZUMMESH-JBOX-5A-LV	Junction Box Zone Controller, 0-10V Dimming, 5A
	1	ZUMMESH-NETBRIDGE	Züm™ Network Bridge
	1	ZUMMESH-KP10CBATT	6-Button Battery-Powered Keypad
	1	ZUMMESH-PIR-VACANCY-BATT	PIR Vacancy Sensor (AUTO-OFF)



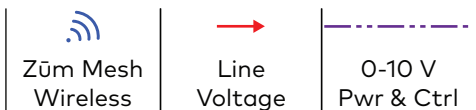
# Small Back of House / Storage

## Zūm



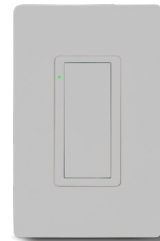
### ASHRAE 90.1-2016 Code Compliance:



- ▶ Automatic Full On (Occupancy Sensing Mode) (9.4.1.1)
- ▶ Local Control (9.4.1.1.a)
- ▶ Automatic Full Off (9.4.1.1.h)



- ▶ Automatic full on (occupancy sensing mode) (9.4.1.1) not required if the space is >50 sq. ft..
- ▶ Manual on / Partial auto on (Vacancy Mode) (9.4.1.1.b/c) required if the space is >50 sq. ft..
- ▶ Automatic partial off (9.4.1.1.g) required if the space is >1,000 sq. ft..
- ▶ Automatic daylight control (photocontrol) (9.4.1.1.e/f) may be required if windows are present and space is >50 sq. ft..
- ▶ Add a ZUM-FLOOR-HUB and ZUMNET-GATEWAY for scheduled shutoff (9.4.1.1.i)..

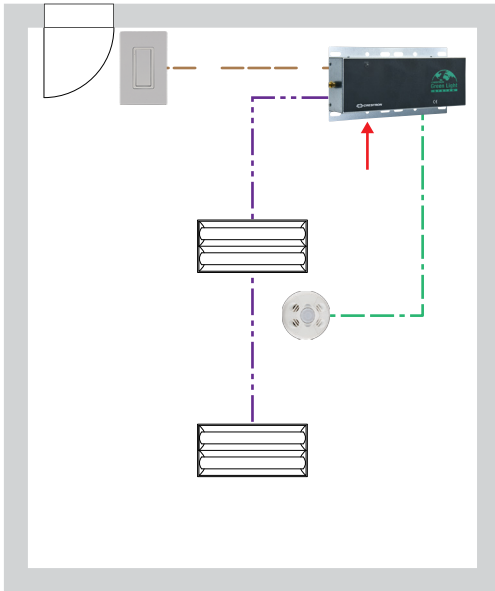
### Local Control:



Symbol	Qty.	Product	Description
	1	ZUMMESH-5A-LV	Zūm™ Wall-Box Dimmer, 5A
	1	ZUMMESH-PIR-VACANCY-BATT	PIR Vacancy Sensor (AUTO-OFF)

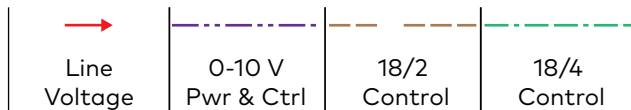
# Small Back of House / Storage

## GLPP



## ASHRAE 90.1-2016 Code Compliance:




- ▶ Automatic Full On (Occupancy Sensing Mode) (9.4.1.1)
- ▶ Local Control (9.4.1.1.a)
- ▶ Automatic Full Off (9.4.1.1.h)



- ▶ Automatic full on (occupancy sensing mode) (9.4.1.1) not required if the space is >50 sq. ft..
- ▶ Manual on / Partial auto on (Vacancy Mode) (9.4.1.1.b/c) required if the space is >50 sq. ft..
- ▶ Automatic partial off (9.4.1.1.g) required if the space is >1,000 sq. ft..
- ▶ Automatic daylight control (photocontrol) (9.4.1.1.e/f) may be required if windows are present and space is >50 sq. ft..

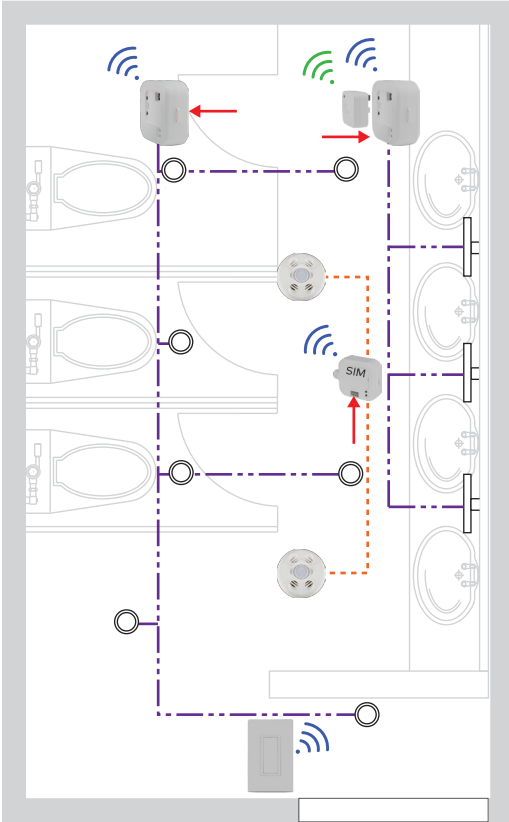
## Local Control:



Symbol	Qty.	Product	Description
	1	GLPP-DIMFLVCN-PM	1-Ch 0-10V Dimmer with Cresnet®
	1	GLPPA-KP	In-Wall Keypad for GLPP
	1	GLS-ODT-C-NS	Dual-Technology Ceiling Mount Occupancy Sensor, 2000 sq. ft.

# Public Restroom

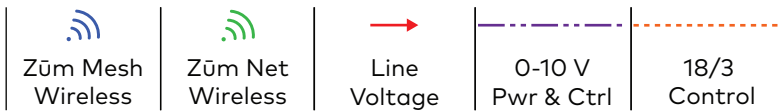
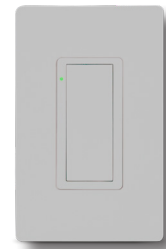
## Zūm








### ASHRAE 90.1-2016 Code Compliance:

- ▶ Automatic Full On (Occupancy Sensing Mode) (9.4.1.1)
- ▶ Local Control (9.4.1.1.a)
- ▶ Automatic Full Off (9.4.1.1.h)

### Local Control:

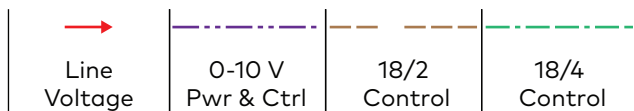
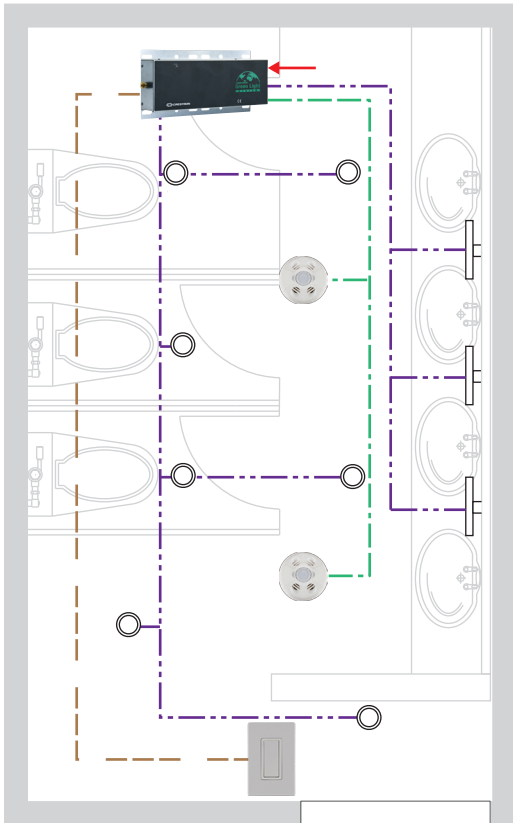


- ▶ Local control (9.4.1.1.a) is optional.
- ▶ Automatic daylight control (photocontrol) (9.4.1.1.e/f) may be required if windows are present.

Symbol	Qty.	Product	Description
	2	ZUMMESH-JBOX-5A-LV	Junction Box Zone Controller, 0-10V Dimming, 5A
	1	ZUMMESH-JBOX-SIM	Zūm™ Junction Box Sensor Integration Module
	1	ZUMMESH-NETBRIDGE	Zūm™ Network Bridge
	1	ZUMMESH-KP10ABATT	Rocker-Switch Battery Powered Keypad
	2	GLS-ODT-C-NS	Dual-Technology Ceiling Mount Occupancy Sensor

# Public Restroom

## GLPP






- ▶ Local control (9.4.1.1.a) is optional.
- ▶ Automatic daylight control (photocontrol) (9.4.1.1.e/f) may be required if windows are present.

## ASHRAE 90.1-2016 Code Compliance:

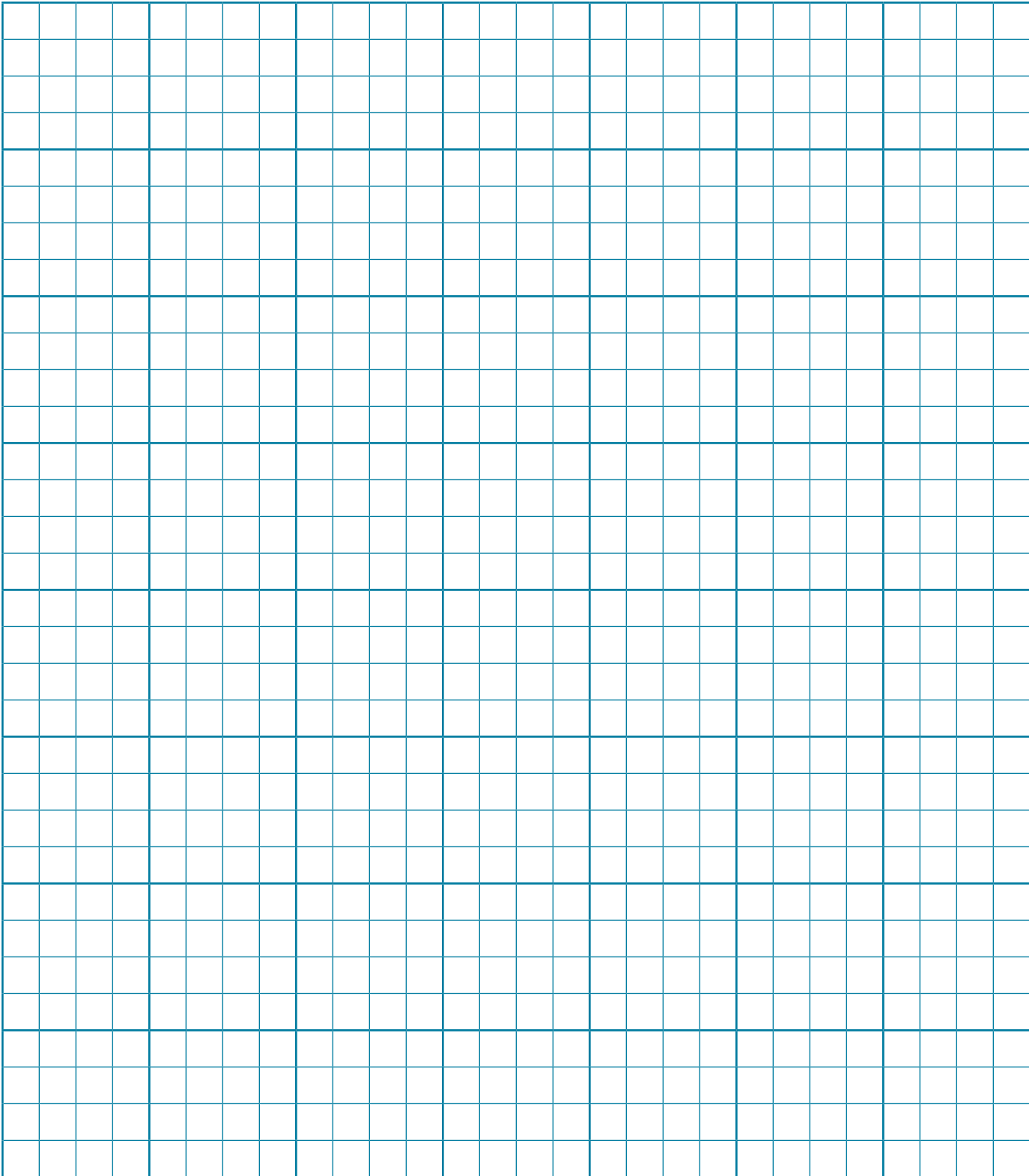
- ▶ Automatic Full On (Occupancy Sensing Mode) (9.4.1.1)
- ▶ Local Control (9.4.1.1.a)
- ▶ Automatic Full Off (9.4.1.1.h)

## Local Control:

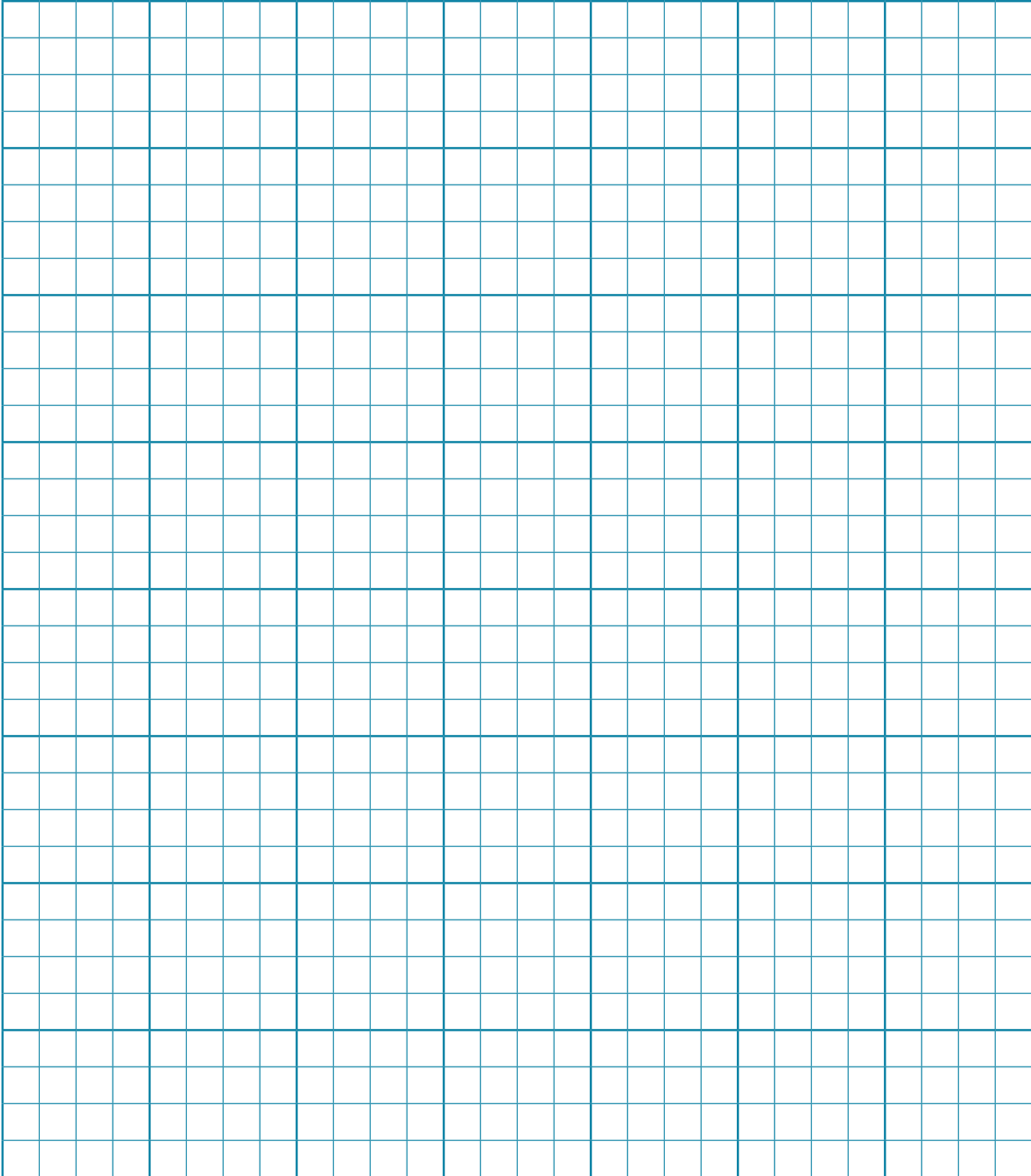


Product	Qty.	Product	Description
	1	GLPP-1DIMFLV2CN-PM	2-Ch 0-10V Dimmer with Cresnet®
	1	GLPPA-KP	In-Wall Keypad for GLPP
	2	GLS-ODT-C-NS	Dual-Technology Ceiling Mount Occupancy Sensor

Notes



**Notes**



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