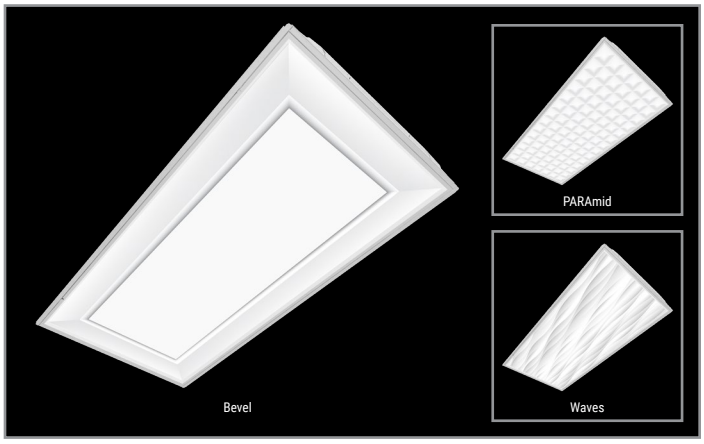
Project		**Catalog #**		**Type**	
Prepared by		**Notes**		**Date**	



Metalux

Perceive™ 24PD

2' x 4' Recessed LED Specification Series

Typical Applications

Office • Education • Healthcare • Hospitality • Retail

Interactive Menu

- Order Information page 2
- Photometric Data page 3
- Connected Systems page 6
- Product Warranty

Product Certification

Product Features

PERCEIVE · Connected Systems · Bluetooth · damp location · LINEAR DISCONNECT (Safe and convenient means of disconnecting power) · MWS MODULAR WIRING SYSTEM CLICK HERE

Top Product Features

- Proprietary optical system based on human perception of depth
- Multiple dynamic 3D optical patterns
- Glare-reducing performance provides comfortable high-quality illumination
- Available in 2x2, 2x4, and 1x4 sizes
- Thoughtfully designed wireless control options

Options



Bevel



PARAmid



Prism



Waves



Leaves



Ripple

additional product diagrams

Order Information

SAMPLE ORDER NUMBER: **24PD-40-PB1-L835-U**

Rating | Series | Lumen Output | Shielding | Voltage | Options | Emergency Options

Rating	Series	Lumen Output [1]	Shielding	Voltage	Options	Emergency Options
[Blank]=Standard **ATW-SW4**=Chicago Rated	**24PD**=2x4 Perceive, Service From Below	**30**=3000 Lumens **35**=3500 Lumens **40**=4000 Lumens **45**=4500 Lumens **50**=5000 Lumens **55**=5500 Lumens **60**=6000 Lumens **70**=7000 Lumens **80**=8000 Lumens [2], [3] **90**=9000 Lumens [2], [3]	**PB1**=Bevel **PC3**=PARAmid **PP3**=Prism **PW1**=Waves **PL1**=Leaves **PR1**=Ripple	**[Blank]**=Universal Voltage 120-277 **347V**=347 Volt [4] **48V**=48 Volt Low-voltage (Class 2) [C]	**GL**=Single Element Fuse **GM**=Double Element Fuse	**[Blank]**=No emergency **EL7W**=7-watt, 120V-277V emergency battery pack installed [5] **EL14W**=14-watt 120V-277V emergency battery pack installed [5] **ELV7W**=Low-voltage system, 7-watt emergency battery pack [5], [C] **ELV14W**=Low-voltage system, 14-watt emergency battery pack [5], [C] **EL10WSD**=Bodine 10W emergency battery pack with self diagnostic installed [5], [7] **ETRD**=Iota Emergency Transfer Relay with dimming control [6] **RRU**=LVS Controls Emergency Transfer Relay with dimming control [6]
		Notes (1) Custom lumen output available: 3000 to 10000 lumens. (2) 5LTHD driver not available on 80 and 90 lumen outputs. (3) WN WaveLinx not available on 80 and 90 lumen outputs.		**Notes** (4) 347 with emergency not available with SD driver. (C) Consult WaveLinx Low-Voltage or DLVP system pages for additional details and compatibility.		**Notes** (5) With integral test switch/indicator/laser test. For approximate delivered lumens multiply the lumens per watt of the desired fixture by the wattage of the emergency battery pack (100 lm/W x 7=700 lumens). IES-format photometry for luminaire under emergency operation available. (6) Used to bypass local control during outage. Must be used in conjunction with UL 1008 device (provided by others). Devices are universal voltage (120-277V). 347 not available. (C) Consult WaveLinx Low-Voltage or DLVP system pages for additional details and compatibility. (7) EL10WSD not available with 347V.

CRI/CCT | Flex | Driver Type | Number of Drivers

CRI/CCT [8]	Flex [9]	Driver Type	Number of Drivers
L830=80CRI, 3000K **L835**=80CRI, 3500K **L840**=80CRI, 4000K **L850**=80CRI, 5000K **L930**=90CRI, 3000K **L935**=90CRI, 3500K **L940**=90CRI, 4000K **L950**=90CRI, 5000K	**[Blank]**=No Flex **A3/8-4/18GDIM**=3/8" Flex with 0-10V Dimming Leads **A3/8-2/18G**=3/8" Flex with line and common **A3/8-5/18GDIM**=Flex with 0-10V Dimming leads and Blue for alternate wiring. See below for details.	**[Blank]**=0-10V Dimming Driver (1%-100% Dimming) **WN**=WaveLinx Wireless Fixture, No Sensor. [A] **5LTD**=Fifth Light DALI Driver (5%-100% Dimming) [E] **5LTHD**=Fifth Light Dimming Driver (1%-100% Dimming) [E] **LV**=Low-voltage System Dimming Driver (0%-100% Dimming) [C] **SD**=Step Dimming Driver (50%, 100% Dimming) **LH**=Lutron HiLume (LDE1 series) 1%-100% EcoSystem Driver with Soft-on Fade to Black dimming [F] **L5**=Lutron 5 Series (LDE5-Series) 5%-100% EcoSystem Driver [F] **SR**=Sensor-ready Dimming Driver (1%-100% Dimming)	**[Blank]**=1 Driver
Notes (8) 90CRI - 2700K available - consult factory.	**Flexible Metal Conduit Options** (9) Multiple options available in online configurator. See additional notes on Flex below. Flex options available for 0-10V dimming control, DALI dimming control, emergency and night light functions. 72-inch factory-installed and pre-wired to driver, fitted to luminaire housing access plate with 90° enclosed FMC connector. Not all options may be combined and installation ratings vary by type. **A3/8-***** series notes:** Factory installed dimming option 3/8" flexible metal conduit with 2-#18 power and ground wires and 2-#18 UL-listed jacketed 0-10V +/- control wires. Meets UL 66, 83, 1479, 1569, 1581, 2556. NEC® 250.118, 300.22(C), 392, 396, 330, 501, 502, 503, 530, 504, 505, 518, 520, 530, 645, 72; Federal Specification A-A-59544 (formerly J-C-30B); all applicable OSHA and HUD Requirements. UL Classified 1-, 2-, and 3-hour through penetration with applicable fire stop product (not included). May be surface mounted, fished and/or embedded in plaster. Cable tray and approved raceway rated, install per NEC®; Environmental Air-Handling Space Installation per NEC® 300.22(C).	**Notes** Integrated options must be used in conjunction with the associated system and may not be compatible with other options or accessories. Please refer to the following: (A) Consult WaveLinx system pages for additional details and compatibility. (C) Consult WaveLinx Low-Voltage or DLVP system pages for additional details and compatibility. (E) Consult Fifth Light system pages for additional details and compatibility. (F) Consult Marketplace Options - Lutron system pages for additional details and compatibility. Compatible only with driver series shown. Requires field commissioning to operate or dim. Contact Lutron at www.lutron.com.	

Integrated Sensing Systems | Packaging | Accessories

Integrated Sensing Systems	Packaging	Accessories (order separately)
[Blank]=No Sensor **WAA**=WaveLinx Wireless Integrated Sensor [10], [A] **WAB**=WaveLinx Lite Wireless Integrated Sensor [11], [B] **WLA**=Low-voltage Integrated Sensor [12], [C] **SVPD1**=0-10V Stand-alone Integrated Sensor [11], [D]	**U**=Unit Pack **PAL**= Job Pack, out of carton **PALC**= Job Pack, in carton	**EQ-CLIP-U**=T-BAR Safety Earthquake Clips [13] **DF-24W-U**=2' x 4' Drywall Frame Kit **SK-24-WS**=2' x 4' Tall Surface Mount Kit [D] **ISHH-01**=Programming Remote for Integrated Sensor [D] **ISHH-02**=Personal Control Remote for Integrated Sensor [D]
Notes (10) WAA sensor to be used with CD or W2A driver. (11) WAB and SVPD1 sensor to be used with CD driver. (12) WLA sensor to be used with LV driver. Integrated options must be used in conjunction with the associated system and may not be compatible with other options or accessories. Please refer to the following: (A) Consult WaveLinx Wireless system pages for additional details and compatibility. (B) WaveLinx Lite devices are not currently compatible with the WaveLinx Wireless Area Controller. Consult WaveLinx Lite Commercial system pages for additional details and compatibility. (C) Consult WaveLinx Low-Voltage or DLVP system pages for additional details and compatibility. (D) Consult SVPD series system pages for additional details and compatibility.		**Notes** (13) An EQ Grid Clip is recommended for all 9/16" ceiling systems. (D) For use with SVPD sensor only. Consult SVPD series system pages for additional details and compatibility.

Product Specifications

Construction
- 3-1/4" Rigid housing is die formed of code gauge prime cold rolled steel
- Full length die-formed stiffeners and unibody endplate for added strength
- Four auxiliary fixture end tie-back points provided
- Endplates have integral Grid-lock feature for safety and convenience
- 1/2" Regressed extruded aluminum door

Hinging/Latching
- Door assembly hinges down for easy access from below
- Positive cam action steel latches with powder coat matte white finish
- Safety-lock T-hinges allow hinging and latching either side

Frame/Shielding
- Proprietary Perceive™ optical system enables dynamic visual depth on a flat surface
- Bottom surface can be wiped down for easy cleaning and maintenance
- Durable lens system is >.125" thick and includes diffuser, 3D elements and anti-glare

Controls
- 0-10V dimming to 1% standard
- WaveLinx wireless fixture for sensor-less wireless control
- WaveLinx wireless sensor compatible for standalone, controlled, connected, and IoT capability
- SVPD sensor compatible for out-of-the-box functionality
- Low-voltage sensor and driver compatible for WaveLinx Low-Voltage and DLVP applications
- DALI 2.0, Lutron, and step-dimming available

Light Engine / Electrical
- LED's available in 3000K, 3500K, 4000K, or 5000K at 80 CRI or 90 CRI minimum
- Color accuracy ≤3-Step MacAdam ellipse (SDCM)
- TM21 life at 72,000 hours up to L86 and calculated L70 exceeds 170,000 hrs
- Drivers available in 120-277V and 347V

Emergency Battery Pack Option
- Optional 120V-277V integral emergency battery pack available in 7-watts, 10-watt, or 14-watts
- 90-minute batteries provide constant power to the LED system
- Integrated test switch with laser point test from floor for ease of use on 7W and 14W versions
- Emergency/generator transfer options available

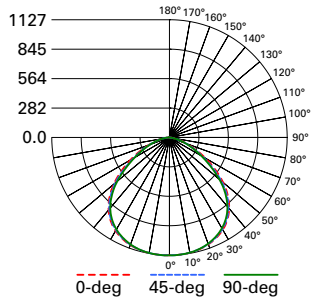
Finish
- Multistage, iron phosphate pretreatment
- Housing is high reflectance pre-paint white finish
- Frame assembly is powder coat matte white finish

Compliance
- IC rated for insulation contact
- cULus listed for damp locations for 25ºC ambient environments
- RoHS compliant
- Tested according to IESNA LM-79 and LM-80 procedures
- Stated life per TM21 standards
- Can be used to comply with California Title 24 Non-Residential
- Meets IEEE 1789-2015 Standard Recommended Practice for LED flicker light modulation
- Contributes to meeting several WELL™ v1 and v2 Features

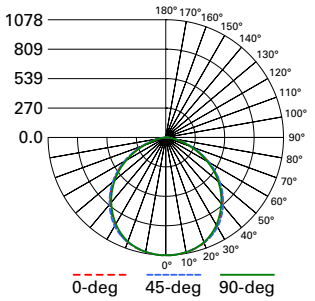
Warranty
- Five year warranty standard. Optional ten year warranty available

Photometric Data

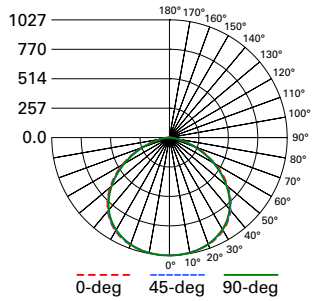
View IES files



24PD-30-PB1-L835
Electronic Driver
Linear LED 3500K
Spacing criterion: (II) 1.34 x mounting height, (⊥) 1.32 x mounting height
Lumens: 2996
Input Watts: 21.3W
Efficacy: 141 LPW
Test Report: 24PD-30-PB1-L835.IES



24PD-30-PC3-L835
Electronic Driver
Linear LED 3500K
Spacing criterion: (II) 1.28 x mounting height, (⊥) 1.26 x mounting height
Lumens: 2945
Input Watts: 21.3W
Efficacy: 138 LPW
Test Report: 24PD-30-PC3-L835.IES



24PD-30-PP3-L835
Electronic Driver
Linear LED 3500K
Spacing criterion: (II) 1.35 x mounting height, (⊥) 1.33 x mounting height
Lumens: 2986
Input Watts: 21.3W
Efficacy: 140 LPW
Test Report: 24PD-30-PP3-L835.IES

Energy and Performance Data

Electrical Performance - Perceive 2x4

Lumen Package	CCT	Delivered Lumens						Power	Efficacy (LPW)						Currrent (A)	
		Bevel (PB1)	PARAmid (PC3)	Prism (PP3)	Waves (PW1)	Leaves (PL1)	Ripple (PR1)	Watts	Bevel (PB1)	PARAmid (PC3)	Prism (PP3)	Waves (PW1)	Leaves (PL1)	Ripple (PR1)	120V	277V
3000	3500	2996	2945	2986	3011	3003	2894	21.3	141	138	140	141	141	136	0.18	0.08
3500	3500	3523	3463	3512	3541	3531	3403	25.3	139	137	139	140	140	134	0.21	0.09
4000	3500	4041	3972	4028	4061	4050	3903	29.4	138	135	137	138	138	133	0.24	0.11
4500	3500	4507	4430	4493	4529	4517	4353	33.0	137	134	136	137	137	132	0.27	0.12
5000	3500	5018	4933	5002	5043	5029	4847	37.1	135	133	135	136	136	131	0.31	0.13
5500	3500	5545	5451	5527	5573	5558	5356	41.2	135	132	134	135	135	130	0.34	0.15
6000	3500	5996	5894	5977	6026	6010	5792	44.9	134	131	133	134	134	129	0.37	0.16
7000	3500	7025	6905	7003	7060	7041	6786	51.5	136	134	136	137	137	132	0.43	0.19
8000	3500	8050	7913	8024	8090	8068	7776	61.2	132	129	131	132	132	127	0.51	0.22
9000	3500	9056	8902	9027	9101	9077	8747	69.7	130	128	130	131	130	126	0.58	0.25

Optical Performance - Perceive 2x4

Lumen Package	CCT	UGR [CIE 190:2010] (1) (4H, 8H; Reflectance: 70% Ceiling, 50% Wall, 20% Ref. Plane)						Max Luminance [45-90 Deg from NADIR] (2) (CD/M^2)					
		Bevel (PB1)	PARAmid (PC3)	Prism (PP3)	Waves (PW1)	Leaves (PL1)	Ripple (PR1)	Bevel (PB1)	PARAmid (PC3)	Prism (PP3)	Waves (PW1)	Leaves (PL1)	Ripple (PR1)
3000	3500	15.1	16	16.2	16.0	15.9	15.9	2303	2091	2176	1451	1442	1395
3500	3500	15.6	16.6	16.8	16.5	16.4	16.4	2709	2458	2559	1706	1695	1640
4000	3500	16.1	17.1	17.3	17.0	16.9	16.9	3107	2820	2935	1957	1945	1882
4500	3500	16.5	17.4	17.6	17.4	17.3	17.3	3465	3145	3274	2183	2169	2099
5000	3500	16.9	17.8	18	17.8	17.7	17.7	3858	3501	3645	2430	2415	2337
5500	3500	17.2	18.2	18.4	18.1	18.0	18.0	4263	3869	4028	2685	2669	2582
6000	3500	17.5	18.4	18.6	18.4	18.3	18.3	4610	4184	4356	2904	2886	2792
7000	3500	18	19	19.2	18.9	18.8	18.8	5401	4902	5103	3402	3381	3271
8000	3500	18.5	19.5	19.7	19.4	19.3	19.3	6189	5617	5848	3899	3874	3748
9000	3500	18.9	19.9	20.1	19.8	19.7	19.7	6962	6319	6578	4386	4358	4217

Nominal Lumen Maintenance

TM-21 Lumen Maintenance (72,000 hours)	Theoretical L70 (hours) (1)
> 86%	> 170,000

Notes: (1) Theoretical values represent estimations. Refer to LED Product Lifetime Prediction, IES PS-10-18, that explains proper use of IES TM-21 and LM-80.

Lumen Adjustment Factors

CCT Multiplier	80 CRI	90 CRI
3000K	0.953	0.826
3500K	1.000	0.837
4000K	1.005	0.849
5000K	1.027	0.894

Shipping Data

Series Catalog No.	Weight (lbs)	Units per Pallet 49"L x 52"W x 55"H
24PD	23	9

Example of Lumen Adjustment Calculation

24PD-40-PB1-L835 at 80CRI at 5000K

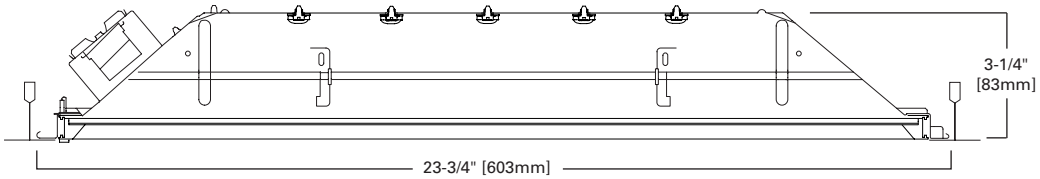
Lumen Adjustment Factor = 1.027

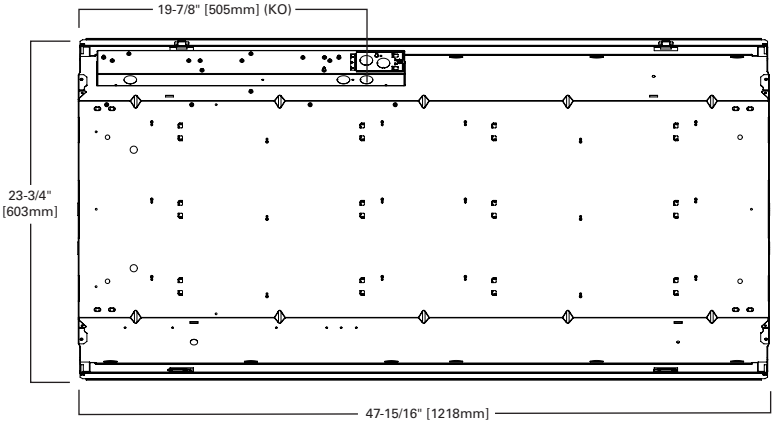
Total Light Output =

4,041 lm x 1.027 = 4,150 lm

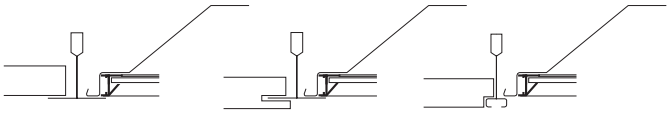
$$\textit{Efficacy} = \frac{4{,}150\ lm}{29.4W} = 141\ lm/W$$

Dimensional and Mounting Details





Ceiling Compatibility



9/16"or 15/16" Grid/Lay-in Standard

9/16"or 15/16" Concealed T

9/16"or 15/16" Slot Grid

Ceiling Mounting Choices

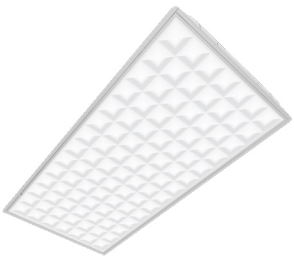
Application	Catalog	UPC	Description
Hard Ceiling Recessed	DF-24W-U	662401232970	2x4 Dry Wall Frame Kit
Surface Mount	SK-24-WS	080083719389	2x4 Shallow Surface Mount Kit

Perceive Optic Patterns

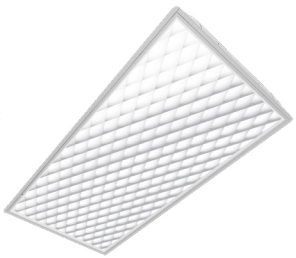
Cooper Lighting Solutions' Perceive™ technology enables a wide-variety of 3D visual forms; all on an easy-to-clean flat surface.



Bevel (PB1):
Distinct regressed coffer appearance



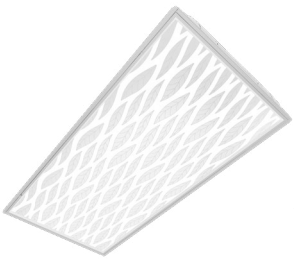
PARAmid (PC3):
Dynamic pyramid stud 3" cells



Prism (PP3):
Diamond prismatic geometry



Waves (PW1):
Energetic flowing waves, sculpted appearance



Leaves (PL1):
Subtle organic leaves



Ripple (PR1):
Soft undulating form

Control Systems

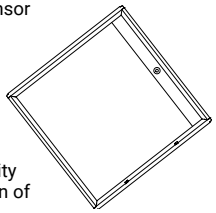
- WaveLinx Wireless
- WaveLinx Wired
- WaveLinx Lite
- DLVP

Connected Systems
CLICK HERE

The Perceive with Integrated Sensor technology provides automatic energy savings without sacrificing performance. The Perceive delivers superior lighting with integrated occupancy and daylighting controls.

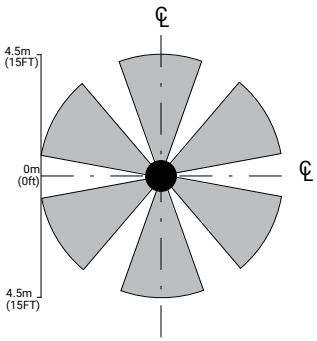
For standalone and controlled applications, the WaveLinx Lite integral sensor provides out-of-the-box functionality with no gateways required and factory startup is not needed.

When more connectivity is required, the WaveLinx Wireless sensor meets modern code and utility requirements, delivers energy and cost savings, while enabling buildings to become smart buildings.

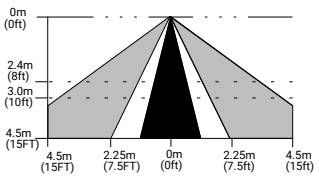


The WaveLinx Wireless Connected Lighting System combined with Trellix provides an open IoT platform and infrastructure that connects intelligent sensors leveraging the real-estate of the physical light fixture to solve higher complexity problems to deliver actionable insights through the aggregation of valuable data.

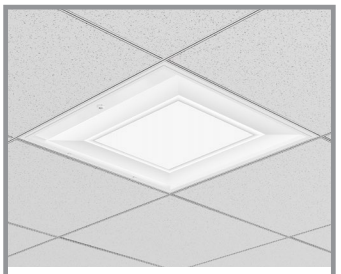
TOP VIEW:



SIDE VIEW:



***Note**: Installation of integrated sensors within 3-ft (1m) of HVAC air vents is not recommended. The pattern shown is intended solely as a general guide and is not to scale.*



Perceive PD Series with Integrated Sensor

Systems comparison chart

Cooper Lighting Solutions provides many lighting system solutions designed to satisfy code requirements and meet the unique needs of any project.









	Standalone	Controlled WaveLinx Lite	Connected WaveLinx Wireless	Enterprise Trellix
Occupancy	Yes	Yes	Yes	Yes
Daylighting	Yes	Yes	Yes	Yes
Gateways	–	–	1 WAC	300 WACs
Devices	–	50 per Area (1400 per site)	150 per WAC	45,000 per Core Enterprise
Software	–	WaveLinx Lite Mobile App	WaveLinx Mobile App	Trellix Core
Areas	–	28 per Site	16 per WAC	up to 4,800
Zones	–	16 per Area	16 per Area	up to 76,800
Scheduling	–	–	Local	Global
VividTune™	–	–	Yes	Yes
Plug-Load Control	–	–	Yes	Yes
Low-Voltage Power	–	–	Yes	Yes
Integration	–	–	–	BACnet, API
Dashboards	–	–	–	Energy, Occupancy
Configuration	–	Installer	Technician	Technician / IT

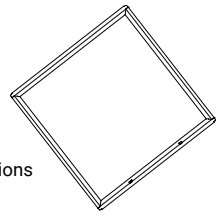
SCALABILITY

devices → areas → floors → buildings

Control Systems

- WaveLinx Wireless
- WaveLinx Wired
- WaveLinx Lite
- DLVP

The Wavelinx Wireless Perceive (WN option) provides the benefits of a traditional control solution without the need for additional control wiring or sacrificing aesthetics due to integrated sensors.



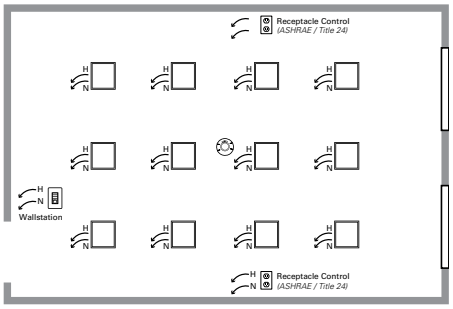
Ideal for new construction or retrofit, Wavelinx Wireless Perceive delivers a code compliant controls solution without complicated controls planning. Using the Wavelinx system and the WN driver option, Perceive can be fully dimmed to OFF and eliminate the low voltage installation costs.

The Wireless Perceive communicates with other Wavelinx enabled products to form a wireless network designed to meet today's complex code standards.

For sensing control and code compliance where required, the WaveLinx (wireless) and Greengate options are provided below. All options shown below have recommended ceiling height 8-12 feet. Coverage patterns vary. Consult spec sheets to ensure compatibility.

Battery Occupancy and Open Loop Daylight





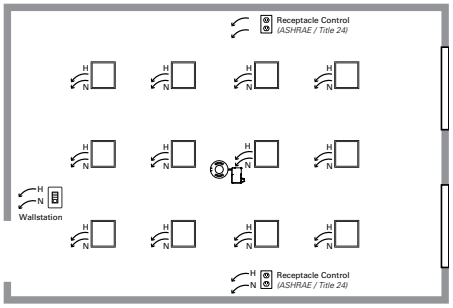
Example Bill of Material		
Quantity	Catalog #	Description
1	WAC-POE	Wireless Area Controller
2	WR-20	WaveLinx Receptacle (IECC / ASHRAE)
1	CWPD-1500	WaveLinx ceiling sensor
1	W4S-RL-W	WaveLinx Wallstation
12	22PD-35-PB1-L835-WN-U	Perceive with WN (wireless option)

The CWPD-1500 battery powered wireless ceiling sensor has a 7 year battery life and is used to detect occupancy and open loop daylighting in large spaces. The sensor can be mapped to other integrated sensors, Wavelinx fixtures (WN option), WTA tile mount sensors or relay switch packs for maximum coverage and control. The wireless ceiling sensor is typically used to control several luminaires improving the control and installation costs for each space. See System pages on CWPD for more details.

WaveLinx Ceiling Sensor

Wired Dual Tech Occupancy





Example Bill of Material		
Quantity	Catalog #	Description
1	WAC-POE	Wireless Area Controller
1	W4S-RL-W	WaveLinx Wallstation
1	OAC-DT-2000-R	Low voltage dual tech sensor includes relay for HVAC (other options for coverage, sensing technology and non-realy versions are available.)
1	WSP-CA-010	Wavelinx 120-347V dimming switchpack wirelessly controls fixtures in space
2	WR-20	WaveLinx Receptacle (IECC / ASHRAE)
12	22PD-35-PB1-L835-WN-U	Perceive with WN (wireless option)

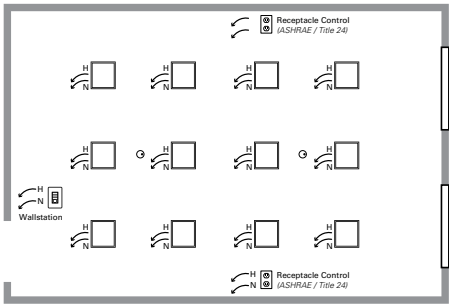
The Greengate Low-Voltage Occupancy Sensors (Passive Infrared or Dual-Tech) and the WaveLinx 120-347V Dimming Switchpack can be used for large spaces up to 2,000 square feet of motion sensing with no batteries to replace and enable Wavelinx system control. These MicroSet self-adjusting Dual Technology sensors drastically simplify and reduce a contractor's installation and have fully adjustable time periods.

Greengate Low-Voltage Occupancy Sensors spec sheet

WaveLinx 120-347V Dimming Switchpack

Wired - Occupancy





Example Bill of Material		
Quantity	Catalog #	Description
1	WAC-POE	Wireless Area Controller
1	CWPD-1500	WaveLinx ceiling sensor
2	WR-20	WaveLinx Receptacle (IECC / ASHRAE)
2	WTA	Wireless tile-mount sensor kit
1	W4S-RL-W	WaveLinx Wallstation
12	22PD-35-PB1-L835-WN-U	Perceive with WN (wireless option)

The WTA wireless tile-mount sensor kit when combined with the WN wireless drives provides occupancy sensing in spaces and can be mapped to other sensors in an area for maximum coverage and control. The WTA can be installed and powered separate from the luminaire. The kit includes: Sensor, Control module, 54" Plenum rated cable, Tile trim with retention springs and 4" octagon J-box mounting trim. See System pages on WTA for more details. See System pages on WTA for more details.

WaveLinx Wireless Tilemount Sensor Kit

Cooper Lighting Solutions
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.cooperlighting.com

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Specifications and dimensions subject to change without notice.