STATE ELECTRIC CORPORATION

Proven Experience. Powerful Performance.

LETTER OF TRANSMITTAL

To: JOHN MORIARTY & ASSOCIATES
RYAN LEKSTROM
3 CHURCH STREET
WINCHESTER, MA 01890

Transmittal# 000057
Date 06/19/18
Job # 017020-000
JMA/NORTHEASTERN UNIVERSITY

Subject:
NON-LUTRON LIGHTING CONTROLS RESUBMITTAL REV2

We are sending you:

☐-As-Built Drawings ☐-Drawings ☐-Plans ☑-Submittals ☐-Specifications
☐-Attached

Cpy	Date	Spec# Parag SParag Page	Description
001	06/19/18	265100 1.4.1 NonLut 02	NON-LUTRON LIGHTING CONTROLS

These items are transmitted:

☐-For Correction / Re-submittal ☐-For Your Signature ☐-Per Your Request
☐-For Your Information / Use ☑-For Your Approval / Comment
☐-For Your Review

Remarks:
RESUBMITTAL REV2 INCLUDES LINE VOLTAGE OCC SENSORS FOR USE IN THE APARTMENTS.

From: ERIC J. GILL

Copy To: JOHN VUKIC

JOHN MORIARTY & ASSOCIATES, INC.
SHOP DRAWING / SUBMITTAL REVIEW

Project Name: Northeastern CASA
Submittal ID: 265100-030-02
Reviewed On: 6/21/2018
Reviewed By: Ryan Lekstrom

Action: FOR REVIEW

Submitted by Graybar Electric			
GraybaR	**Job Name:** NORTHEASTERN UNIVERSITY-CASA	**Catalog Number:** CMR PDT 10 Notes:	**Type:**

Catalog Number: | Date: | Project:

OVERVIEW

The **CMR 10** Series incorporates Passive Infrared (PIR) technology into an attractive and economical line powered sensor to provide maximum viewing from the ceiling. When mounted at 9 ft (2.74 m), this sensor views up to 28 ft (8.53 m) in all directions. Its circular coverage pattern is designed for walking motions; making it ideal for T-shaped intersections in corridors, or other areas where wall mounting a sensor is not practical. Low ceiling heights are also best covered with the **CMR 10**. For example, when mounted at only 7 ft (2.13 m), the height of pick aisles in many distribution centers, the **CMR 10** provides a 32 ft (9.75 m) diameter pattern of coverage. For detection of minor motion is also required, the **CMR PDT 10** Series Dual Technology sensor is recommended.

FEATURES

- Push- button programmable, adjustable time delays, and multiple operating modes
- 100 hr lamp burn-in timer
- No field calibration or sensitivity adjustments required

SPECIFICATIONS

Size:	4.55" diameter and 1.55" deep
Weight:	6 oz
Mounting:	3.5" octagon box, ceiling tile surface, single gang box
Color:	White
Maximum Load(per pole):	800W @ 120 VAC, 1200W @ 277 VAC, 1500W @ 347 VAC
Motor Load:	1/4 HP
Frequency:	50/60Hz
Dimming Load:	Sinks <20 mA; ~40 Ballasts @ .5 mA each

ROHS compliant

AcuityControls

Sensor Switch™

CMR 10
CMR PDT 10
Extended Range 360° Sensor

Warranty

Five-year limited warranty. Complete warranty terms located at:
www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

Note: Actual performance may differ as a result of end-user environment and application. Specifications subject to change without notice.

c UL US LISTED

ORDERING INFORMATION

CMR 10			Example: CMR 10 ADC LT
CMR	PDT	10	
Series	**Detection Technology**	**Coverage Type**	**Relay**
CMR Ceiling Mount Sensor	[blank] PIR PDT[1] Dual Technology (PIR/ Microphonics)	10 Large Motion 360°	[blank] Single Relay 2P[1] Dual Relays

Control Type	Voltage	Temp / Humidity
[blank] None D[1 2] Occupancy Controlled Dimming DZ[1 3] Dual Zone Photocell P Photocell ADC[1 2] Photocell w/ Dimming	[blank] 120/277 VAC 347 347 VAC 480[2] 480 VAC	[blank] Standard LT Low Temp/ High Humidity

[1]Not available with 480 option

[2]Not available with 2P option

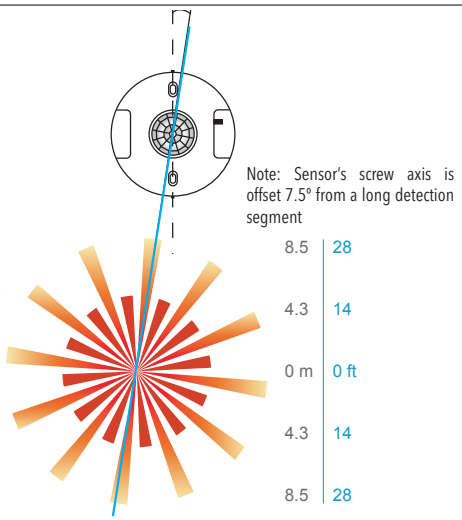
[3]Not available with single relay option

Index Page

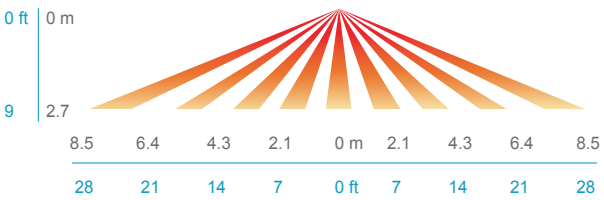
COVERAGE PATTERN

EXTENDED RANGE 360° LENS

- Best choice for large motion detection (e.g. walking)
- Viewing angle of 67° in a 360° conical shaped pattern
- Provides 28 ft (8.53 m) radial coverage when mounted to standard 9 ft (2.74 m) ceiling
- 7 to 15 ft (2.13 to 4.57 m) mounting heights provide 16 to 36 ft (4.88 to 10.97 m) radial coverage



SIDE VIEW



TOP VIEW

TYPICAL WIRING SINGLE RELAY

STANDARD WIRING

BLACK* - Line Input
BLACK* - Load Output
} *BLACK wires can be reversed

WHITE - Neutral

347 VAC OPTION (347)

Black wires are replaced w/ Red wires

DIMMING OPTIONS (D, ADC)

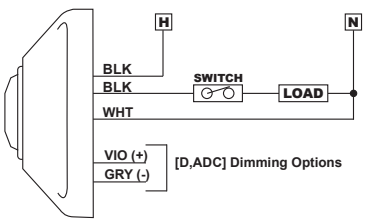
VIOLET - Connect to Violet control wire from 0-10 VDC dimmable ballast

GRAY - Connect to Gray common wire from ballast

INITIAL POWER UP

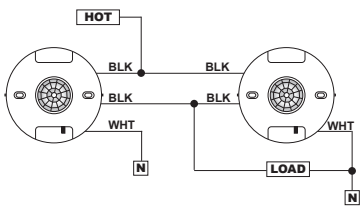
The sensor's relay is shipped in a latched closed position so the lights will come on upon initial power-up. If the lights do not immediately turn on (initial installation only) the latching relay opened during shipment and will close within 30 secs.

Note: If the sensor loses power, the internal relay will latch to on.



SENSORS IN PARALLEL

Sensors may be wired in parallel; however, the maximum load ratings stay the same. Do not wire sensors with P or ADC option in parallel.



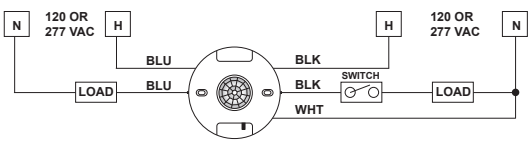
TYPICAL WIRING DUAL RELAY

STANDARD WIRING

BLACK* - Line Input 1
BLACK* - Load Output 1
} *BLACK wires can be reversed
BLUE** - Line Input 2
BLUE** - Load Output 2
} **BLUE wires can be reversed
WHITE - Neutral

347 VAC OPTION (347)

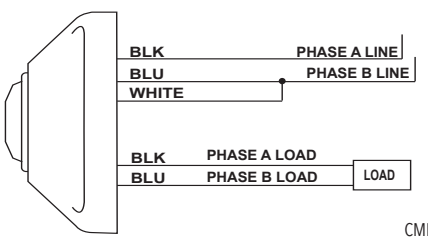
Black wires are replaced w/ Red wires



TYPICAL WIRING 480V

STANDARD WIRING

BLACK* - Phase A Line Input
BLACK* - Phase A Load Output
} *BLACK wires can be reversed
BLUE** - Phase B Line Input
BLUE** - Phase B Load Output
} **BLUE wires can be reversed
WHITE - Connect to either Line Input



CMR 10 (TS-CMR-001A)

Project: NU – CASA – Boston, MA
Proj Nmbr: 15023.02
Client: American Campus Communities
Contractor: John Moriarty & Associates

CUBE 3 STUDIO
architecture ▫ interiors ▫ planning

Northeastern Univ. Columbus Avenue Student Apartments
Boston, MA

Submittal: 265100-030-01

Submittal Title: Non-Lutron Controls R1

Returned to: Lee Burneson - Northstar
John Vukic - JMA

CUBE 3 Studio LLC
360 Merrimack Street
Building 5, Floor 3
Lawrence, MA 01843

This review is only for general conformance with the design of the project and general compliance with the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve the contractor from compliance with the requirements of the plans and specifications. This review does not authorize any changes, including, without limitation, changes involving additional cost or schedule revision, unless stated in separate letter or change order. Approval of a specific item shall not include approval of an assembly of which the item is a component.

Approved

Approved as noted

Approved as noted
(Resubmit for record)

Approved as noted
(Resubmit indicated items for approval)

Revise and Resubmit

Rejected

- Reviewed

Date: 5/24/2018 **By**: James A. Spiegel AIA LEED AP MCPPO

Contractor is responsible for dimensions to be confirmed and corrected at the job site; information that pertains solely to the fabrication process or the means, methods, techniques, sequences, and procedures of construction; coordination of the work of all trades; and for performing all work in a safe and satisfactory manner.

1. Refer to AKF remarks.
    a. Approved

MORIARTY

Submittal Transmittal

John Moriarty and Associates | 100 Guest Street Brighton MA 02135 United States

PROJECT:	Northeastern CASA 3378	DATE SENT:	5/14/2018
		RETURN BY:	5/28/2018
SUBJECT:	State Electric - Lighting - Non-Lutron Lighting Controls R1	SUBMITTAL ID:	265100-030-01
TYPE:	Submittal	TRANSMITTAL ID:	02472
PURPOSE:	For Review	VIA:	Info Exchange
SPEC SECTION:	26 50 00		

FROM

NAME	COMPANY	EMAIL	PHONE
Ryan Lekstrom	John Moriarty and Associates	rlekstrom@jm-a.com	617-987-0099

TO

NAME	COMPANY	EMAIL	PHONE
James Spiegel	CUBE 3 Studio LLC	jspiegel@cube3studio.com	978-379-8723
Steve Prestejohn	CUBE 3 Studio LLC	sprestejohn@cube3studio.com	978-989-9900

REMARKS:

Non-Lutron lighting controls to be used in all units/apartments and back of house areas including:
-Bike Storage 104
-Break room 113
-Study rooms 120-123
-Trash room 139
-Maintenance 127
-Communal restroom 124
-Loading & Service 131
-Stair 3 exit corridor

This re-submittal contains the same materials from the previous submittal.
-Acuity controls WSD single relay sensor switch
-Acuity controls CM/CM PDT occupancy sensors
-Acuity controls PP20 power pack for occupancy sensors

DESCRIPTION OF CONTENTS

QTY	DATED	TITLE	NUMBER	NOTES
1	5/11/2018	26 5100 Lighting Fixtures - Non-Lutron Lighting Controls Resubmittal (NU-		

		CASA).pdf		

COPIES:

Rick Rojas	(Bard, Rao + Athanas/BR+A)
Mark Harrison	(AKF Group)
Kerry Logue	(Northstar)
John Vukic	(John Moriarty and Associates)
Esther Puffer	(Sixthriver Architects)
Deanna Champagne	(AKF Group)
Anna Holcombe	(Sixthriver Architects)

STATE ELECTRIC CORPORATION

Proven Experience. Powerful Performance.

LETTER OF TRANSMITTAL

To: JOHN MORIARTY & ASSOCIATES
RYAN LEKSTROM
3 CHURCH STREET
WINCHESTER, MA 01890

Transmittal# 000054
Date 05/11/18
Job # 017020-000
JMA/NORTHEASTERN UNIVERSITY

Subject:
NON-LUTRON LIGHTING CONTROLS FOR APPROVAL

We are sending you:

☐-As-Built Drawings ☐-Drawings ☐-Plans ☑-Submittals ☐-Specifications
☐-Attached

Cpy	Date	Spec# Parag SParag Page	Description
001	05/11/18	265100 1.4.1 NonLut 01	NON-LUTRON LIGHTING CONTROLS

These items are transmitted:

☐-For Correction / Re-submittal ☐-For Your Signature ☐-Per Yo
☐-For Your Information / Use ☐-For Your Approval / Comment
☐-For Your Review

Remarks:
NON-LUTRON LIGHTING CONTROLS TO BE USED IN ALL UNITS/APARTMENTS AND BACK OF HOUSE AREAS. BOH AREAS INCLUDE: BIKE STORAGE 104, LEASING OFFICE 110, BREAK ROOM 113, STUDY ROOMS 120-123, TRASH ROOM 139, MAINTENANCE 127, COMMUNAL RESTROOM 124, LOADING & SERVICE 131, STAIR 3 EXIT CORRIDOR.

From: ERIC J. GILL

Copy To: JOHN VUKIC

SUBMITTAL REVIEW

[X] NO EXCEPTION TAKEN [ ] MAKE CORRECTIONS NOTED
[ ] REJECTED [ ] REVISE AND RESUBMIT
[ ] SUBMIT SPECIFIED ITEM

CHECKING IS ONLY FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR: DIMENSIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE; FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION; COORDINATION OF WORK WITH THAT OF ALL OTHER TRADES; AND THE SATISFACTORY PERFORMANCE OF WORK.

AKF

Project Name: Northeastern University: Burke Street
Project Number: B160031-000
Submittal ID: E-52.1
Received On: 5/15/2018
Reviewed On: 5/23/2018
Reviewed By: Michael Sweeney

JOHN MORIARTY & ASSOCIATES, INC.
SHOP DRAWING / SUBMITTAL REVIEW

Project Name: Northeastern CASA
Submittal ID: 265100-030-01
Reviewed On: 5/14/2018
Reviewed By: Ryan Lekstrom

Action: FOR REVIEW

BOSTON LIGHT SOURCE	Project 16-34001-10 Northeastern - Columbus Ave Student Apartments Submitted By BOSTON LIGHT SOURCE	Catalog Number WSD PDT WH Notes	Type OC W

Catalog Number: | Date: | Project:

OVERVIEW

The **WSD** is a stylish, easy to install, and simple to use Wall Switch Decorator style Passive Infrared (PIR) sensor. It is ideal for private offices, copy rooms, closets, or any small enclosed space without obstructions. A user programmable time delay ensures that once the room is vacated the sensor will time out and turn off the lights. Additionally, the **WSD** sensor has several On Modes and Switch Modes that can be programmed using the front push-button. For rooms with obstructions, the Dual Technology **WSD PDT** Series sensor is recommended. Additionally, all **WSD** Family sensors have a patent-pending wiring method that enables them to function either with or without a neutral connection. **WSD** units come pre-configured for wiring without a neutral; however, if connection to neutral is required by code, contractors can convert the unit in seconds.

AcuityControls

Sensor Switch™

WSD Family

WSD
WSD PDT

WSD 2P
WSD PDT 2P

FEATURES

- Compatible w/LEDs, electronic & magnetic ballasts, CFLs, & incandescents
- 100% passive detection, no potential for interference with other building systems
- Small motion detection to 20 ft
- Push-button programmable without removing cover plate - adjustable time delays & operating modes
- Dual technology (PDT) utilizes PIR/Microphonics detection (patented)
- Self-grounding mounting strap
- Device accommodates powering over ground or neutral connection (patent pending)
- Ultra low current leakage (<0.5 mA) when connected via ground
- Fully meets NEC 2011 Section 404.2C neutral requirements - no current leakage to ground when connected to neutral
- Line power and load wires are interchangeable - impossible to wire backwards (patented)

Warranty

Five-year limited warranty. Complete warranty terms located at:
www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

Note: Actual performance may differ as a result of end-user environment and application.

Specifications subject to change without notice.

ORDERING INFORMATION

WSD SINGLE RELAY

Series		Operating Mode[1]		Voltage		Color[3]				Temp / Humidity	
WSD	Passive Infrared (PIR)	[blank]	Auto-on (default) or vacancy	[blank]	120/277VAC	WH	White	AL	Lt. Almond	[blank]	Standard
WSD PDT	Dual Technology (PIR/ Microphonics)	SA	Vacancy (default) or auto-on	347[2]	347VAC	IV	Ivory	BK	Black	LT	Low Temp/ High Humidity
		VA	Vacancy only			GY	Gray				

WSD DUAL RELAY

Series		Operating Mode[1]		Voltage		Color[3]				Temp / Humidity	
WSD 2P	Passive Infrared (PIR)	[blank]	Pole 1 auto-on Pole 2 vacancy	[blank]	120/277VAC	WH	White	AL	Lt. Almond	[blank]	Standard
WSD PDT 2P	Dual Technology (PIR/ Microphonics	2SA	Both poles vacancy (default)	347[2]	347VAC	IV	Ivory	BK	Black	LT	Low Temp/ High Humidity
						GY	Gray				

Notes:
1 Operating Modes reprogrammable via push-button except for VA version
2 Wall plates included in white or ivory only for 347 VAC units
3 Matching wall plate provided for 120/277 VAC units

BOSTON LIGHT SOURCE	Project 16-34001-10 Northeastern - Columbus Ave Student Apartments Submitted By BOSTON LIGHT SOURCE	Catalog Number WSD PDT WH Notes	Type OC W

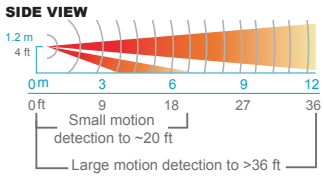
SPECIFICATIONS

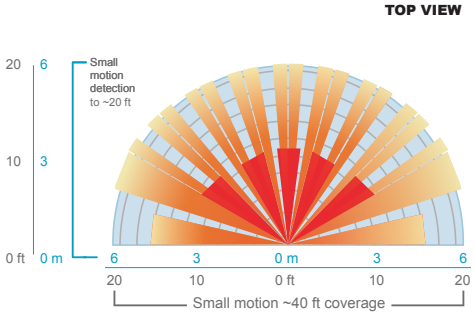
Size:	2.74"H x 1.68"W x 1.63"D (not including ground strap)
Weight:	5 oz
Mounting:	Single gang switch box
Mounting Height:	30-48 in
Maximum Load/ Pole:	(Relay) 800W @ 120VAC, 1200W @ 277VAC, 1500 W @ 347VAC
Minimum Load:	None
Motor Load:	1/4 HP
Frequency:	50/60Hz (timers are 1.2x for 50Hz)
Operating Temperature:	14° to 122°F (-10° to 50°C)
Relative Humidity:	Standard: 20 to 75% non-condensing
	LT Option: 20 to 90% non-condensing

ROHS compliant

COVERAGE PATTERNS

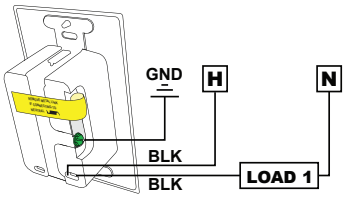
- Small motion (e.g., hand movements) detection up to 20 ft (6.10 m), ~625 ft²
- Large motion (e.g., walking) detection greater than 36 ft (10.97 m), ~2025 ft²
- Wall-to-Wall coverage
- Passive Dual Technology (Microphonics) provides overlapping detection of human activity over the complete PIR coverage area. Advanced filtering is utilized to prevent non-occupant noises from keeping the lights on.





WIRING TO GROUND (no NEUTRAL)

SINGLE RELAY



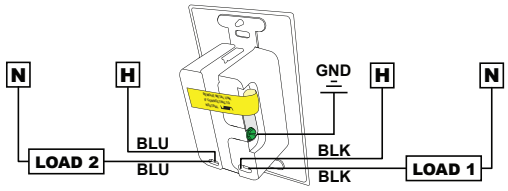
WIRE COLOR KEY

120/277 VAC WIRING

BLACK*	- Line 1 Input	*BLACK wires can be reversed
BLACK*	- Load 1 Output	
BLUE*	- Line 2 Input	*BLUE wires can be reversed
BLUE*	- Load 2 Output	

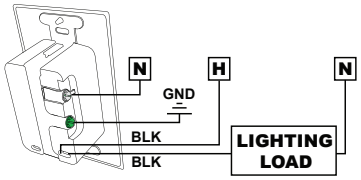
347 VAC WIRING (-347 Option)
Red wires replace Black wires.

DUAL RELAY

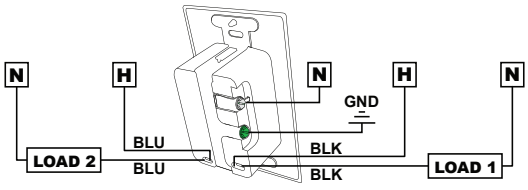


WIRING TO NEUTRAL

SINGLE RELAY



DUAL RELAY



Notes:
- Unit will draw power from either line connection.
- When switching 277 VAC or 347 VAC on both relays, the line inputs must be of the same phase.

WSD Family (TS-WSD-001A)

BOSTON LIGHT SOURCE	Project 16-34001-10 Northeastern - Columbus Ave Student Apartments Submitted By BOSTON LIGHT SOURCE	Catalog Number CM PDT 10 Notes	Type OC C

Catalog Number: | Date: | Project:

OVERVIEW

The CM family of ceiling mount occupancy sensors provide a range sensor solutions for applications with finished ceilings (e.g. ceiling tiles, sheetrock, plaster). CM family sensors utilize 100% digital Passive Infrared (PIR) detection and are available with several lens options, providing flexibility for multiple mounting height and coverage pattern requirements. Dual technology (PDT) occupancy detection can also be added as an option for applications where occupants are stationary for long periods of time.

FEATURES

- 360° coverage pattern
- Push- button programmable, adjustable time delays, and multiple operating modes
- 100 hr lamp burn-in timer
- No field calibration or sensitivity adjustments required
- Convenient test mode
- Green LED indicator

SPECIFICATIONS

Size:	4.55" diameter and 1.55" deep
Weight:	6 oz
Mounting:	3.5" octagon box, ceiling tile surface, single gang box
Color:	White
Operating Voltage:	12-24 VAC/VDC
Current Draw:	Standard, 4 mA w/ R option, 16 mA
Dimming Load:	Sinks <20 mA; ~40 Ballasts @ .5 mA each
Rcmd. Power Pack:	PP20

ROHS compliant

Warranty
Five-year limited warranty. Complete warranty terms located at:
www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

Note: Actual performance may differ as a result of end-user environment and application.
Specifications subject to change without notice.

AcuityControls™
Sensor Switch™

CM
CM PDT

c UL US LISTED

ORDERING INFORMATION

CM Family — Example: CM PDT 11 R LT

CM

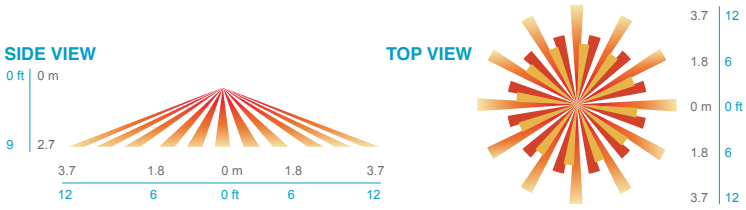
Series	Detection Technology	Coverage Type	Relay	Dimming	Visible Light Programming	Temp / Humidity
CM Ceiling Mount Sensor	[blank] PIR PDT[1] Dual Technology (PIR/Microphonics)	6 High Bay 360° 9 Small Motion 360° 10 Large Motion 360° 11 Hallway	[blank] None R Low Voltage Relay	[blank] None D Occupancy Controlled Dimming P Photocell ADC[2] Photocell w/ Dimming	[blank] None VLP Visible Light Programming[3]	[blank] Standard LT Low Temp/ High humidity

Notes
1. PDT option not available on CM 6 models
2. ADC option not available on CM 6 models
3. Must specify P or ADC if VLP is ordered and must be within 5ft of sensor to program

COVERAGE PATTERNS

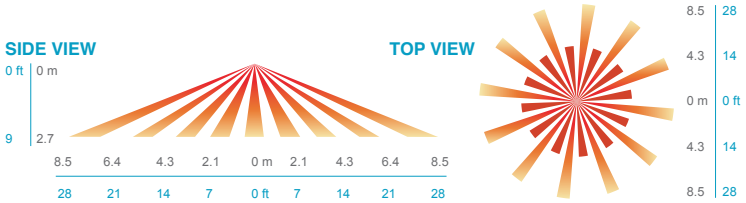
Small Motion 360° (Model # CM 9/ CM PDT 9[1])

- Best choice for small motion (e.g. hand movements) detection
- 360° conical shaped pattern
- Provides 12 ft (3.66 m) radial coverage (~500 ft2) when mounted to standard 9 ft (2.74 m) ceiling
- 8 to 15 ft (2.44 to 4.57 m) mounting heights provide 10 to 20 ft (3.05 to 6.10 m) radial coverage
- Lens assembly is marked with a gray ring around lens to differentiate versus the #10 lens



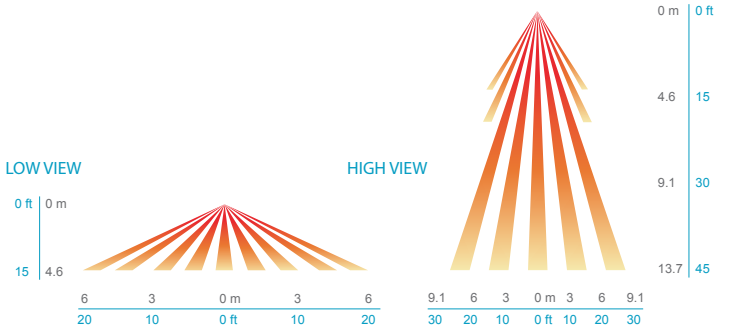
Large Motion 360° (Model # CM 10/ CM PDT 10[1])

- Best choice for large motion detection (e.g. walking)
- 360° conical shaped pattern
- Provides ~24 ft (7.32 m) radial coverage (~2000 ft2) when mounted at 9 ft (2.74 m)
- 7 to 15 ft (2.13 to 4.57 m) mounting heights provide 16 to 36 ft (4.88 to 10.97 m) radial coverage
- Detection range improves when walking across beams compared to into beams



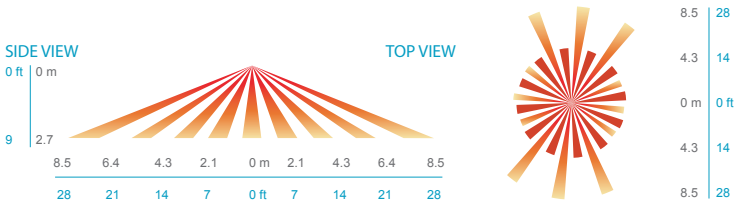
High Mount 360° (Model # CM 6)

- Best choice for 15 to 45 ft (4.57 to 13.72 m) mounting heights
- 15 to 20 ft (4.57 to 6.10 m) radial coverage overlaps area lit by a typical high bay fixture
- Excellent detection of large motion (e.g. walking) up to 35 ft (10.76 m)
- Excellent detection of extra large motion (e.g. forklifts) up to a 45 ft (13.72 m)



High Mount Hallway (Model # CM 11/ CM PDT 11[1])

- Best choice for large motion detection
- Provides 28 ft (8.53 m) of coverage when mounted to standard 9 ft (2.74 m) ceiling
- 7 to 15 ft (2.13 to 4.57m) mounting heights provide 16 to 36 ft (4.88 to 10.97m) hallway coverage



1. Sensors with Microphonics™ provides overlapping detection of human activity over the complete PIR coverage area. Advanced filtering is also utilized to prevent non-occupant noises from keeping the lights on.

WIRING (DO NOT WIRE HOT)

STANDARD WIRING

RED - Power Input (12-24 VAC/VDC)

BLACK - Common

WHITE - Occupancy State (high VDC for occupied)

PHOTOCELL / DIMMING OPTIONS (D, P, ADC)

BLUE - Direct output to power pack for providing photocell control and/or secondary dim time out. Output is high VDC with occupancy & low light. Output also held high during secondary dim time out. For multi-level control, use two power packs and connect White wire to primary load and Blue to daylight load.

VIOLET w/ WHITE STRIPE - Connect to 0-10 VDC control wire (typically Violet) from 0-10 VDC dimmable ballast

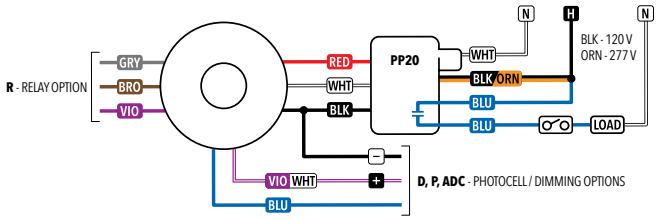
GRAY from Ballast - Connect to sensor Black wire

RELAY OPTION (R)

GRAY / BROWN - Connected during occupied state

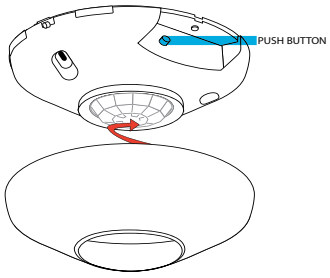
VIOLET / BROWN - Connected during unoccupied state

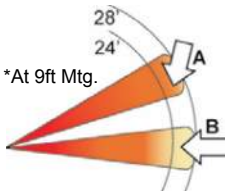
Note: Relay is energized during unoccupied state



INSTALLATION

- Mount sensor directly to a ceiling tile or a metallic grid (two self-tapping screws provided).
- Sensor's mounting holes also align with 3.5" octagon or single gang handy box (screws not provided).
- Sensor will detect motions crossing segments more effectively than motions parallel to beams.
- For optimal detection, position sensor such that segments are crossed upon entrance and unable to view outside the space.
- PDT models: For maximum Microphonics sensitivity avoid locating sensor near HVAC air diffusers





A: When walking across beam, detection will occur at approximately 28 feet. (8.53 m)

B: When walking into beam, detection will occur at approximately 24 feet. (7.32 m)

BOSTON LIGHT SOURCE	Project 16-34001-10 Northeastern - Columbus Ave Student Apartments Submitted By BOSTON LIGHT SOURCE	Catalog Number PP20 Notes	Type P PACK

Catalog Number: | Date: | Project:

OVERVIEW

Power packs are the heart of the low voltage sensor system. A PP20 Series power pack transforms Class I high voltage (120/277 VAC) to Class 2 15 VDC for powering remote sensors. The PP20 and the SP20 Series slave pack are also capable of switching lighting loads on and off using their internal relays. Class 2 wire leads connect to 18 to 22 AWG low voltage cable running to the sensors, making installation easy and clean. Power packs also have an elongated chase nipple that allows it to be mounted either directly through a ½ inch knockout into a junction box, or inside an adjacent box for meeting specific local code requirements in ceiling plenums.

The most versatile power pack is the PP20, which utilizes a patented relay contact protection and can power up to 14 sensors. Dual-circuit control can be handled by two PP20's, one PP20 2P Series 2-Pole power pack, or a PP20 power pack and a SP20 slave packs.

FEATURES

- Powers Low Voltage Sensors (PP20/PP20 2P only)
- Self-Contained Relay(s) Switch Line Voltage Loads
- Relay Contact Protection
- Plenum Rated

SPECIFICATIONS

Size:	(not including chase nipple) **PP20 / SP20**: 3.00" H x 2.25" W x 1.88" D (7.62 cm x 5.72 cm x 4.78 cm) **PP20 2P**: 4.13"H x 3.00"W x 1.88"D (10.49 cm x 7.62 cm x 4.78 cm)
Weight:	6 oz
Mounting:	1/2" knockout
Color:	Black
Operating Voltage:	120, 240, 277
Relay Current Reqs:	40 mA
Switching Load:	20Amps/ Pole
Output Voltage/Current:	15 VDC, 150 mA (PP20/PP20 2P only)
Motor Load:	1 HP

ROHS Compliant, Title 24 System Component

Warranty
Three-year limited warranty. Complete warranty terms located at:
www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

Note: Actual performance may differ as a result of end-user environment and application.
Specifications subject to change without notice.

AcuityControls™

Sensor Switch™

PP20
PP20 2P
SP20
Power Pack

LISTED

ORDERING INFORMATION

PP20							Example: PP20 2P LT
Series		**# of Poles**		**Voltage**		**Temperature/Humidity**	
PP20	Power/ Relay Pack	[blank]	1	[blank]	120/277 VAC	[blank]	Standard
SP20	Secondary Relay Pack	2P	2[1]			LT	Low Temp/High Humidity

Note:
1. Not available for SP20.

Submittal Transmittal

Bard, Rao + Athanas Consulting Engineers | 10 Guest St., 4th Floor Boston MA 02135 United States

PROJECT:	NU - New Student Housing Lighting Design 15937.00	DATE SENT:	5/14/2018
SUBJECT:	State Electric - Lighting - Non-Lutron Lighting Controls R1	SUBMITTAL ID:	E-0033r01
TYPE:	Submittal	TRANSMITTAL ID:	00124
PURPOSE:	For Information Only - Reference Comments	VIA:	Info Exchange
SPEC SECTION:	E		

FROM

NAME	COMPANY	EMAIL	PHONE
Abby Dath	Bard, Rao + Athanas Consulting Engineers	adath@brplusa.com	617.925.8286

TO

NAME	COMPANY	EMAIL	PHONE
James Spiegel		jSpiegel@cube3studio.com	
Rick Rojas	Bard, Rao + Athanas Consulting Engineers	erojas@brplusa.com	617.925.8395

CONTENTS

QUANTITY: 1 DATED: 5/14/2018 NUMBER:

DESCRIPTION:
265100-030-01 (E-0033r01) Non-Lutron Lighting Controls.pdf

ACTION:
REMARKS:

BARD, RAO + ATHANAS
CONSULTING ENGINEERS, LLC
10 Guest Street, 4th Floor
Boston, Massachusetts 02135
617 254-0016 (P) 617 924-9339 (F)

Architect/Engineers' Submittal Review Stamp & Notations

STAMP

BR+A Consulting Engineers, LLC.
SHOP DRAWING REVIEW

DATE May 14, 2018 BY ER/RSR

PROJECT / SUBMITTAL # **15937 E-0033r01**

_____ NO EXCEPTIONS TAKEN

_____ REVISE AS INDICATED, NO RESUBMITTAL REQUIRED

_____ DOES NOT CONFORM W/DOCUMENTS REVISE AND RESUBMIT

X **NOT REVIEWED**

THE ABOVE REVIEW IS FOR ADHERENCE TO CONTRACT DOCUMENTS ONLY. ABOVE REVIEW DOES NOT RELIEVE CONTRACTOR OF RESPONSIBILITY FOR COORDINATION, SPATIAL COMPATIBILITY WITH BUILDING AND OTHER TRADES OR OMISSIONS OR NONCOMPLIANCE WITH SPECIFICATIONS OR DRAWINGS WHETHER INDICATED IN THE REVIEW OF THESE SHOP DRAWINGS OR NOT.

PROJECT

Northeastern University CASA

New Student Housing Lighting

Submittal: 265100-030-01 - Non-Lutron Lighting Controls

General Comments:

1. The Electrical Engineer is to review all electrical aspects of the lighting fixtures system including voltage, emergency requirements, dimming and lighting controls.

Received 05/14/2018

MORIARTY BR+A

Submittal Transmittal

John Moriarty and Associates | 100 Guest Street Brighton MA 02135 United States

PROJECT:	Northeastern CASA 3378	DATE SENT:	5/14/2018
		RETURN BY:	5/28/2018
SUBJECT:	State Electric - Lighting - Non-Lutron Lighting Controls R1	SUBMITTAL ID:	265100-030-01
TYPE:	Submittal	TRANSMITTAL ID:	02472
PURPOSE:	For Review	VIA:	Info Exchange
SPEC SECTION:	26 50 00		

FROM

NAME	COMPANY	EMAIL	PHONE
Ryan Lekstrom	John Moriarty and Associates	rlekstrom@jm-a.com	617-987-0099

TO

NAME	COMPANY	EMAIL	PHONE
James Spiegel	CUBE 3 Studio LLC	jspiegel@cube3studio.com	978-379-8723
Steve Prestejohn	CUBE 3 Studio LLC	sprestejohn@cube3studio.com	978-989-9900

REMARKS:

Non-Lutron lighting controls to be used in all units/apartments and back of house areas including:
-Bike Storage 104
-Break room 113
-Study rooms 120-123
-Trash room 139
-Maintenance 127
-Communal restroom 124
-Loading & Service 131
-Stair 3 exit corridor

This re-submittal contains the same materials from the previous submittal.
-Acuity controls WSD single relay sensor switch
-Acuity controls CM/CM PDT occupancy sensors
-Acuity controls PP20 power pack for occupancy sensors

DESCRIPTION OF CONTENTS

QTY	DATED	TITLE	NUMBER	NOTES
1	5/11/2018	26 5100 Lighting Fixtures - Non-Lutron Lighting Controls Resubmittal (NU-		

		CASA).pdf		

COPIES:

Rick Rojas	(Bard, Rao + Athanas/BR+A)
Mark Harrison	(AKF Group)
Kerry Logue	(Northstar)
John Vukic	(John Moriarty and Associates)
Esther Puffer	(Sixthriver Architects)
Deanna Champagne	(AKF Group)
Anna Holcombe	(Sixthriver Architects)

STATE ELECTRIC CORPORATION

Proven Experience. Powerful Performance.

LETTER OF TRANSMITTAL

To: JOHN MORIARTY & ASSOCIATES
RYAN LEKSTROM
3 CHURCH STREET
WINCHESTER, MA 01890

Transmittal# 000054
Date 05/11/18
Job # 017020-000
JMA/NORTHEASTERN UNIVERSITY

Subject:
NON-LUTRON LIGHTING CONTROLS FOR APPROVAL

We are sending you:

☐-As-Built Drawings ☐-Drawings ☐-Plans ☑-Submittals ☐-Specifications
☐-Attached

Cpy	Date	Spec# Parag SParag Page	Description
001	05/11/18	265100 1.4.1 NonLut 01	NON-LUTRON LIGHTING CONTROLS

These items are transmitted:

☐-For Correction / Re-submittal ☐-For Your Signature ☐-Per Your Request
☐-For Your Information / Use ☐-For Your Approval / Comment
☐-For Your Review

Remarks:
NON-LUTRON LIGHTING CONTROLS TO BE USED IN ALL UNITS/APARTMENTS AND BACK OF HOUSE AREAS. BOH AREAS INCLUDE: BIKE STORAGE 104, LEASING OFFICE 110, BREAK ROOM 113, STUDY ROOMS 120-123, TRASH ROOM 139, MAINTENANCE 127, COMMUNAL RESTROOM 124, LOADING & SERVICE 131, STAIR 3 EXIT CORRIDOR.

From: ERIC J. GILL

Copy To: JOHN VUKIC

JOHN MORIARTY & ASSOCIATES, INC.
SHOP DRAWING / SUBMITTAL REVIEW

Project Name: Northeastern CASA
Submittal ID: 265100-030-01
Reviewed On: 5/14/2018
Reviewed By: Ryan Lekstrom

Action: FOR REVIEW

BOSTON LIGHT SOURCE	Project 16-34001-10 Northeastern - Columbus Ave Student Apartments Submitted By BOSTON LIGHT SOURCE	Catalog Number WSD PDT WH Notes	Type OC W

Catalog Number: | Date: | Project:

OVERVIEW

The **WSD** is a stylish, easy to install, and simple to use Wall Switch Decorator style Passive Infrared (PIR) sensor. It is ideal for private offices, copy rooms, closets, or any small enclosed space without obstructions. A user programmable time delay ensures that once the room is vacated the sensor will time out and turn off the lights. Additionally, the **WSD** sensor has several On Modes and Switch Modes that can be programmed using the front push-button. For rooms with obstructions, the Dual Technology **WSD PDT** Series sensor is recommended. Additionally, all **WSD** Family sensors have a patent-pending wiring method that enables them to function either with or without a neutral connection. **WSD** units come pre-configured for wiring without a neutral; however, if connection to neutral is required by code, contractors can convert the unit in seconds.

AcuityControls

Sensor Switch™

WSD Family

WSD
WSD PDT

WSD 2P
WSD PDT 2P

FEATURES

- Compatible w/LEDs, electronic & magnetic ballasts, CFLs, & incandescents
- 100% passive detection, no potential for interference with other building systems
- Small motion detection to 20 ft
- Push-button programmable without removing cover plate - adjustable time delays & operating modes
- Dual technology (PDT) utilizes PIR/Microphonics detection (patented)
- Self-grounding mounting strap
- Device accommodates powering over ground or neutral connection (patent pending)
- Ultra low current leakage (<0.5 mA) when connected via ground
- Fully meets NEC 2011 Section 404.2C neutral requirements - no current leakage to ground when connected to neutral
- Line power and load wires are interchangeable - impossible to wire backwards (patented)

Warranty

Five-year limited warranty. Complete warranty terms located at:
www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

Note: Actual performance may differ as a result of end-user environment and application.

Specifications subject to change without notice.

ORDERING INFORMATION

WSD SINGLE RELAY

Series		Operating Mode[1]		Voltage		Color[3]				Temp / Humidity	
WSD	Passive Infrared (PIR)	[blank]	Auto-on (default) or vacancy	[blank]	120/277VAC	WH	White	AL	Lt. Almond	[blank]	Standard
WSD PDT	Dual Technology (PIR/ Microphonics)	SA	Vacancy (default) or auto-on	347[2]	347VAC	IV	Ivory	BK	Black	LT	Low Temp/ High Humidity
		VA	Vacancy only			GY	Gray				

WSD DUAL RELAY

Series		Operating Mode[1]		Voltage		Color[3]				Temp / Humidity	
WSD 2P	Passive Infrared (PIR)	[blank]	Pole 1 auto-on Pole 2 vacancy	[blank]	120/277VAC	WH	White	AL	Lt. Almond	[blank]	Standard
WSD PDT 2P	Dual Technology (PIR/ Microphonics	2SA	Both poles vacancy (default)	347[2]	347VAC	IV	Ivory	BK	Black	LT	Low Temp/ High Humidity
						GY	Gray				

Notes:
1 Operating Modes reprogrammable via push-button except for VA version
2 Wall plates included in white or ivory only for 347 VAC units
3 Matching wall plate provided for 120/277 VAC units

BOSTON LIGHT SOURCE	Project 16-34001-10 Northeastern - Columbus Ave Student Apartments Submitted By BOSTON LIGHT SOURCE	Catalog Number WSD PDT WH Notes	Type OC W

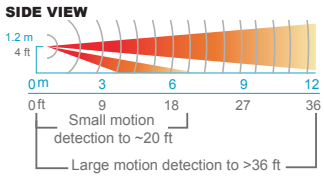
SPECIFICATIONS

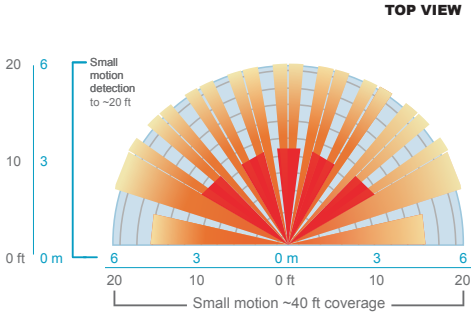
Size:	2.74"H x 1.68"W x 1.63"D (not including ground strap)
Weight:	5 oz
Mounting:	Single gang switch box
Mounting Height:	30-48 in
Maximum Load/ Pole:	(Relay) 800W @ 120VAC, 1200W @ 277VAC, 1500 W @ 347VAC
Minimum Load:	None
Motor Load:	1/4 HP
Frequency:	50/60Hz (timers are 1.2x for 50Hz)
Operating Temperature:	14° to 122°F (-10° to 50°C)
Relative Humidity:	Standard: 20 to 75% non-condensing
	LT Option: 20 to 90% non-condensing

ROHS compliant

COVERAGE PATTERNS

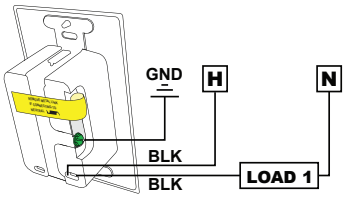
- Small motion (e.g., hand movements) detection up to 20 ft (6.10 m), ~625 ft²
- Large motion (e.g., walking) detection greater than 36 ft (10.97 m), ~2025 ft²
- Wall-to-Wall coverage
- Passive Dual Technology (Microphonics) provides overlapping detection of human activity over the complete PIR coverage area. Advanced filtering is utilized to prevent non-occupant noises from keeping the lights on.





WIRING TO GROUND (no NEUTRAL)

SINGLE RELAY



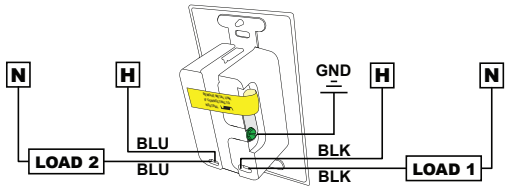
WIRE COLOR KEY

120/277 VAC WIRING

BLACK*	- Line 1 Input	*BLACK wires can be reversed
BLACK*	- Load 1 Output	
BLUE*	- Line 2 Input	*BLUE wires can be reversed
BLUE*	- Load 2 Output	

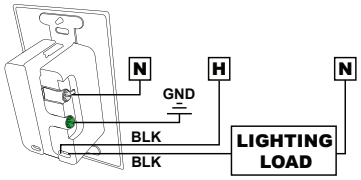
347 VAC WIRING (-347 Option)
Red wires replace Black wires.

DUAL RELAY

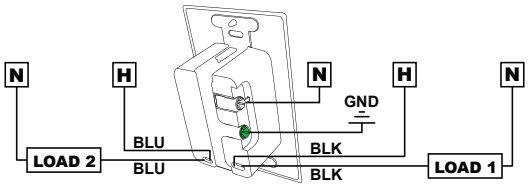


WIRING TO NEUTRAL

SINGLE RELAY



DUAL RELAY



Notes:
- Unit will draw power from either line connection.
- When switching 277 VAC or 347 VAC on both relays, the line inputs must be of the same phase.

WSD Family (TS-WSD-001A)

BOSTON LIGHT SOURCE	Project 16-34001-10 Northeastern - Columbus Ave Student Apartments Submitted By BOSTON LIGHT SOURCE	Catalog Number CM PDT 10 Notes	Type OC C

Catalog Number: | Date: | Project:

OVERVIEW

The CM family of ceiling mount occupancy sensors provide a range sensor solutions for applications with finished ceilings (e.g. ceiling tiles, sheetrock, plaster). CM family sensors utilize 100% digital Passive Infrared (PIR) detection and are available with several lens options, providing flexibility for multiple mounting height and coverage pattern requirements. Dual technology (PDT) occupancy detection can also be added as an option for applications where occupants are stationary for long periods of time.

FEATURES

- 360° coverage pattern
- Push- button programmable, adjustable time delays, and multiple operating modes
- 100 hr lamp burn-in timer
- No field calibration or sensitivity adjustments required
- Convenient test mode
- Green LED indicator

SPECIFICATIONS

Size:	4.55" diameter and 1.55" deep
Weight:	6 oz
Mounting:	3.5" octagon box, ceiling tile surface, single gang box
Color:	White
Operating Voltage:	12-24 VAC/VDC
Current Draw:	Standard, 4 mA w/ R option, 16 mA
Dimming Load:	Sinks <20 mA; ~40 Ballasts @ .5 mA each
Rcmd. Power Pack:	PP20

ROHS compliant

Warranty
Five-year limited warranty. Complete warranty terms located at:
www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

Note: Actual performance may differ as a result of end-user environment and application.
Specifications subject to change without notice.

AcuityControls™
Sensor Switch™

CM
CM PDT

c UL US LISTED

ORDERING INFORMATION

CM Family — Example: CM PDT 11 R LT

CM

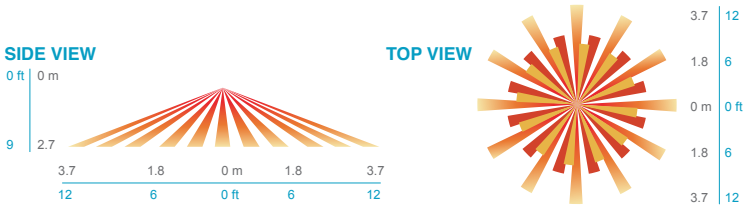
Series	Detection Technology	Coverage Type	Relay	Dimming	Visible Light Programming	Temp / Humidity
CM Ceiling Mount Sensor	[blank] PIR PDT[1] Dual Technology (PIR/Microphonics)	6 High Bay 360° 9 Small Motion 360° 10 Large Motion 360° 11 Hallway	[blank] None R Low Voltage Relay	[blank] None D Occupancy Controlled Dimming P Photocell ADC[2] Photocell w/ Dimming	[blank] None VLP Visible Light Programming[3]	[blank] Standard LT Low Temp/ High humidity

Notes
1. PDT option not available on CM 6 models
2. ADC option not available on CM 6 models
3. Must specify P or ADC if VLP is ordered and must be within 5ft of sensor to program

COVERAGE PATTERNS

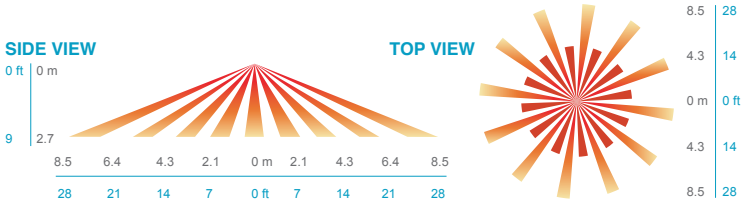
Small Motion 360° (Model # CM 9/ CM PDT 9[1])

- Best choice for small motion (e.g. hand movements) detection
- 360° conical shaped pattern
- Provides 12 ft (3.66 m) radial coverage (~500 ft2) when mounted to standard 9 ft (2.74 m) ceiling
- 8 to 15 ft (2.44 to 4.57 m) mounting heights provide 10 to 20 ft (3.05 to 6.10 m) radial coverage
- Lens assembly is marked with a gray ring around lens to differentiate versus the #10 lens



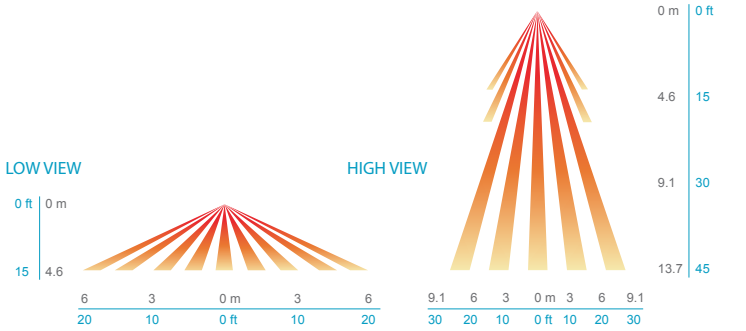
Large Motion 360° (Model # CM 10/ CM PDT 10[1])

- Best choice for large motion detection (e.g. walking)
- 360° conical shaped pattern
- Provides ~24 ft (7.32 m) radial coverage (~2000 ft2) when mounted at 9 ft (2.74 m)
- 7 to 15 ft (2.13 to 4.57 m) mounting heights provide 16 to 36 ft (4.88 to 10.97 m) radial coverage
- Detection range improves when walking across beams compared to into beams



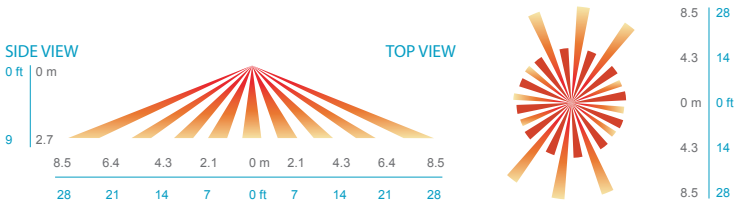
High Mount 360° (Model # CM 6)

- Best choice for 15 to 45 ft (4.57 to 13.72 m) mounting heights
- 15 to 20 ft (4.57 to 6.10 m) radial coverage overlaps area lit by a typical high bay fixture
- Excellent detection of large motion (e.g. walking) up to 35 ft (10.76 m)
- Excellent detection of extra large motion (e.g. forklifts) up to a 45 ft (13.72 m)



High Mount Hallway (Model # CM 11/ CM PDT 11[1])

- Best choice for large motion detection
- Provides 28 ft (8.53 m) of coverage when mounted to standard 9 ft (2.74 m) ceiling
- 7 to 15 ft (2.13 to 4.57m) mounting heights provide 16 to 36 ft (4.88 to 10.97m) hallway coverage



1. Sensors with Microphonics™ provides overlapping detection of human activity over the complete PIR coverage area. Advanced filtering is also utilized to prevent non-occupant noises from keeping the lights on.

WIRING (DO NOT WIRE HOT)

STANDARD WIRING

RED - Power Input (12-24 VAC/VDC)

BLACK - Common

WHITE - Occupancy State (high VDC for occupied)

PHOTOCELL / DIMMING OPTIONS (D, P, ADC)

BLUE - Direct output to power pack for providing photocell control and/or secondary dim time out. Output is high VDC with occupancy & low light. Output also held high during secondary dim time out. For multi-level control, use two power packs and connect White wire to primary load and Blue to daylight load.

VIOLET w/ WHITE STRIPE - Connect to 0-10 VDC control wire (typically Violet) from 0-10 VDC dimmable ballast

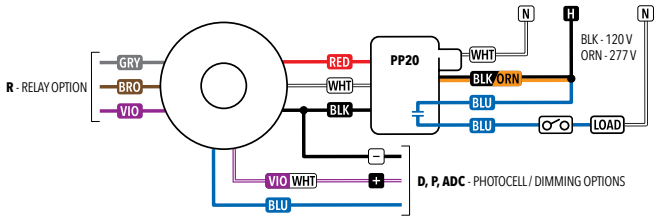
GRAY from Ballast - Connect to sensor Black wire

RELAY OPTION (R)

GRAY / BROWN - Connected during occupied state

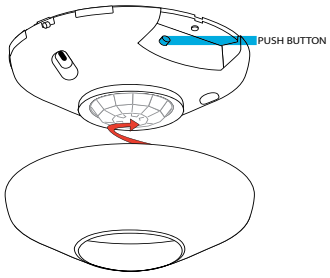
VIOLET / BROWN - Connected during unoccupied state

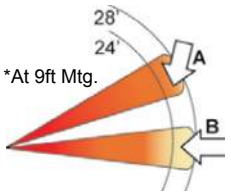
Note: Relay is energized during unoccupied state



INSTALLATION

- Mount sensor directly to a ceiling tile or a metallic grid (two self-tapping screws provided).
- Sensor's mounting holes also align with 3.5" octagon or single gang handy box (screws not provided).
- Sensor will detect motions crossing segments more effectively than motions parallel to beams.
- For optimal detection, position sensor such that segments are crossed upon entrance and unable to view outside the space.
- PDT models: For maximum Microphonics sensitivity avoid locating sensor near HVAC air diffusers





A: When walking across beam, detection will occur at approximately 28 feet. (8.53 m)

B: When walking into beam, detection will occur at approximately 24 feet. (7.32 m)

BOSTON LIGHT SOURCE	Project 16-34001-10 Northeastern - Columbus Ave Student Apartments Submitted By BOSTON LIGHT SOURCE	Catalog Number PP20 Notes	Type P PACK

Catalog Number: | Date: | Project:

OVERVIEW

Power packs are the heart of the low voltage sensor system. A PP20 Series power pack transforms Class I high voltage (120/277 VAC) to Class 2 15 VDC for powering remote sensors. The PP20 and the SP20 Series slave pack are also capable of switching lighting loads on and off using their internal relays. Class 2 wire leads connect to 18 to 22 AWG low voltage cable running to the sensors, making installation easy and clean. Power packs also have an elongated chase nipple that allows it to be mounted either directly through a ½ inch knockout into a junction box, or inside an adjacent box for meeting specific local code requirements in ceiling plenums.

The most versatile power pack is the PP20, which utilizes a patented relay contact protection and can power up to 14 sensors. Dual-circuit control can be handled by two PP20's, one PP20 2P Series 2-Pole power pack, or a PP20 power pack and a SP20 slave packs.

FEATURES

- Powers Low Voltage Sensors (PP20/PP20 2P only)
- Self-Contained Relay(s) Switch Line Voltage Loads
- Relay Contact Protection
- Plenum Rated

SPECIFICATIONS

Size:	(not including chase nipple) **PP20 / SP20**: 3.00" H x 2.25" W x 1.88" D (7.62 cm x 5.72 cm x 4.78 cm) **PP20 2P**: 4.13"H x 3.00"W x 1.88"D (10.49 cm x 7.62 cm x 4.78 cm)
Weight:	6 oz
Mounting:	1/2" knockout
Color:	Black
Operating Voltage:	120, 240, 277
Relay Current Reqs:	40 mA
Switching Load:	20Amps/ Pole
Output Voltage/Current:	15 VDC, 150 mA (PP20/PP20 2P only)
Motor Load:	1 HP

ROHS Compliant, Title 24 System Component

Warranty
Three-year limited warranty. Complete warranty terms located at:
www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

Note: Actual performance may differ as a result of end-user environment and application.
Specifications subject to change without notice.

AcuityControls™

Sensor Switch™

PP20
PP20 2P
SP20
Power Pack

LISTED

ORDERING INFORMATION

PP20							Example: PP20 2P LT
Series		**# of Poles**		**Voltage**		**Temperature/Humidity**	
PP20	Power/ Relay Pack	[blank]	1	[blank]	120/277 VAC	[blank]	Standard
SP20	Secondary Relay Pack	2P	2[1]			LT	Low Temp/High Humidity

Note:
1. Not available for SP20.

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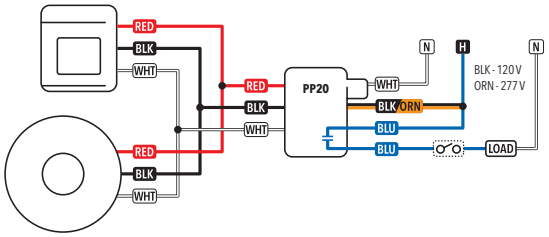
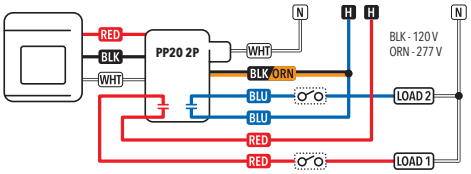
WIRING (DO NOT WIRE HOT)

Note: The Power Pack must be connected to a single phase Hot and Neutral System. For 120 VAC, connect teh Black wire to Hot, White wire to Neutral, and Cap off the Orange/ Red wire. For 240-277 VAC, connect the Orange to Hot, White to Neutral, and Cap off the Black Wire. **Never connect both the Black and Orange wires!** Low Voltage wire can be 18 to 22 AWG; shielding is not necessary. Class II terminal block on PP20 2P only accepts one conductor,18 AWG stranded or smaller, per terminal. The relays on PP20 2P are isolated allowing for connection of 120 VAC on one relay, and 277 VAC on the other.

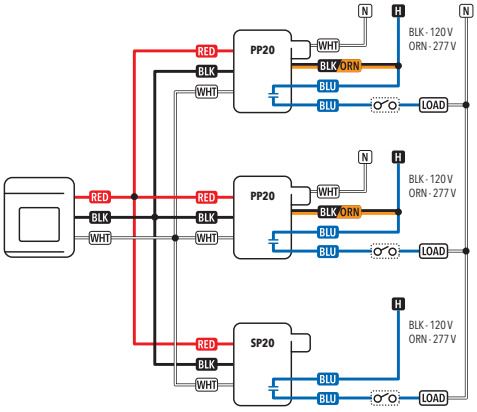
Multiple Sensors Controlling One Circuit



One Sensor Controlling Two Circuits



Wiring Multiple Power Packs Together



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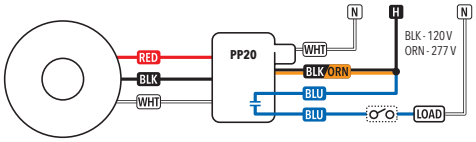

POWERING CAPACITY

A power pack's transformers can supply up to 150 mA of power. Each relay requires 40 mA during the on state. Low voltage remote sensors typically require 3 mA when detecting occupants, and 0.15 mA when in standby. Therefore, each transformer can handle up to 3 relays (including the relay(s) inside the power pack). For example, one PP20 can power its relay (40 mA) and 110 mA of external devices. Because of the ultra low current design of the sensors, up to 14 or more sensors can be connected to a single power pack! If multiple power packs are used together, an additional 110 mA is available.

Note:
Only three relays may be controlled with one Power Pack. If more than three circuits are required, multiple power packs must be used. The R option adds an isolated low voltage relay to a sensor. Only one sensor with this option is typically needed in a room.

	Sensors	Sensors w/ R option
1 PP20	14	8
1 PP20 2P	7	6
1 PP20 w/SP20	7	6
1 PP20 2P w/SP20	5	5
2 PP20	28	16
2 PP20 2P	14	12

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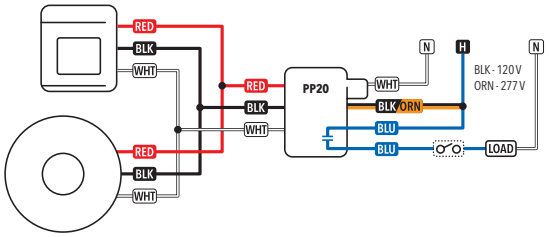

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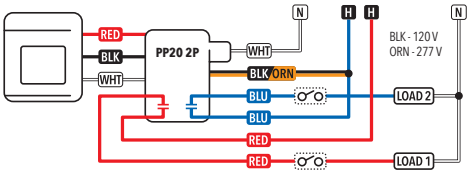

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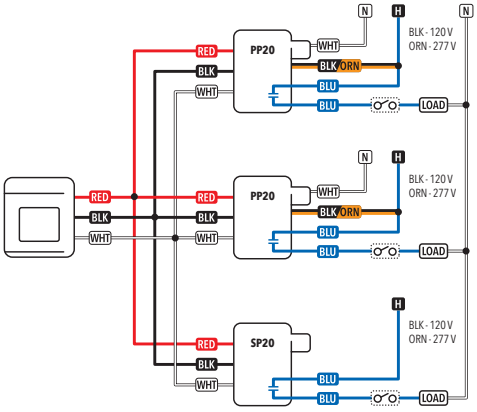

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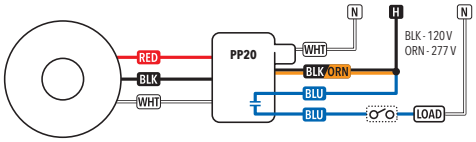

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