SECTION 260923 - LIGHTING CONTROL DEVICES

Latest Update: 5-6-2017 See underlined text for Edits.

(Engineer shall edit specifications and blue text in header to meet project requirements. This includes but is not limited to updating Equipment and/or Material Model Numbers indicated in the specifications and adding any additional specifications that may be required by the project. Also turn off all "Underlines".)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section and all other sections of Division 26.

1.2 SUMMARY

A. This Section includes the following lighting control devices:

1. Time switches.
2. Outdoor and indoor photoelectric switches.
3. Indoor occupancy sensors.
4. Outdoor motion sensors.
5. Lighting contactors.
6. Emergency shunt relays.

1.3 DEFINITIONS

A. LED: Light-emitting diode.

B. PIR: Passive infrared.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show installation details for occupancy and light-level sensors.

1. Interconnection diagrams showing field-installed wiring.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6 COORDINATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression system, and partition assemblies.

1.7 WARRANTY/GUARANTEE

A. See Division 26 Specification Section "Basic Electrical Requirements' for warranty and guarantee requirements.

PART 2 - PRODUCTS

2.1 TIME SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the manufacturers specified.

1. Area Lighting Research, Inc.; Tyco Electronics.
2. Leviton Mfg. Company Inc.
3. Square D; Schneider Electric.
4. TORK.
5. Watt Stopper (The).

B. Electronic Time Switches: Electronic, solid-state programmable units with alphanumeric display; complying with UL 917.

1. Contact Configuration: [SPST] [DPST] [DPDT]
2. Contact Rating: [30-A inductive or resistive, 240-V ac] [20-A ballast load, 120/240-V ac].
3. Program: <Insert configuration> and an annual holiday schedule that overrides the weekly operation on holidays.

4. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels.
5. Astronomic Time: All channels.
6. Battery Backup: For schedules and time clock.

2.2 OUTDOOR PHOTOELECTRIC SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the manufacturers specified:

1. Area Lighting Research, Inc.; Tyco Electronics.
2. Intermatic, Inc.
3. Paragon Electric Co.; Invensys Climate Controls.
4. TORK.
5. Watt Stopper (The).

B. Description: Solid state, with [SPST] [DPST] dry contacts rated for [1800-VA tungsten or 1000-VA inductive], to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A.

1. Light-Level Monitoring Range: 1.5 to 10 fc, with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of photocell to prevent fixed light sources from causing turn-off.
2. Time Delay: 15-second minimum, to prevent false operation.
3. Surge Protection: Metal-oxide varistor, complying with IEEE C62.41.1, IEEE C62.41.2, and IEEE 62.45 for Category A1 locations.
4. Mounting: Twist lock complying with IEEE C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.

2.3 INDOOR PHOTOELECTRIC SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the manufacturers specified:

1. Area Lighting Research, Inc.; Tyco Electronics.
2. Intermatic, Inc.
3. MicroLite Lighting Control Systems.
4. Paragon Electric Co.; Invensys Climate Controls.
5. TORK.
6. Watt Stopper (The).

B. Ceiling-Mounted Photoelectric Switch: Solid-state, light-level sensor unit, with separate relay unit, to detect changes in lighting levels that are perceived by the eye. Cadmium sulfide photoresistors are not acceptable.

1. Sensor Output: Contacts rated to operate the associated relay, complying with UL 773A. Sensor shall be powered from the relay unit.
2. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
3. Light-Level Monitoring Range: Ten (10) fc to two hundred (200) fc, with an adjustment for turn-on and turn-off levels within that range.
4. Time Delay: Adjustable from five (5) seconds to three hundred (300) seconds to prevent cycling, with dead band adjustment.
5. Indicator: Two (2) LEDs to indicate the beginning of on-off cycles.

C. Skylight Photoelectric Sensors: Solid-state, light-level sensor; housed in a threaded, plastic fitting for mounting under skylight, facing up at skylight; with separate relay unit, to detect changes in lighting levels that are perceived by the eye. Cadmium sulfide photoresistors are not acceptable.

1. Sensor Output: Contacts rated to operate the associated relay, complying with UL 773A. Sensor shall be powered from the relay unit.
2. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
3. Light-Level Monitoring Range: One thousand (1,000) fc to ten thousand (10,000) fc, with an adjustment for turn-on and turn-off levels within that range.
4. Time Delay: Adjustable from five (5) seconds to three hundred (300) seconds to prevent cycling, with deadband adjustment.
5. Indicator: Two (2) LEDs to indicate the beginning of on-off cycles.

2.4 INDOOR OCCUPANCY SENSORS

A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the manufacturers specified:

1. Hubbell Lighting.
2. Leviton Mfg. Company Inc.
3. Lithonia Lighting; Acuity Lighting Group, Inc.
4. Novitas, Inc.
5. RAB Lighting, Inc.
6. Sensor Switch, Inc.
7. TORK.
8. Watt Stopper (The).

B. General Description: Wall- or ceiling-mounting mounted, solid-state units with a separate relay unit.

1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of one (1) minute to fifteen (15) minutes.
2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
3. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, and Class 2 power source as defined by NFPA 70.
4. Mounting:

    a. Sensor: Suitable for mounting in any position on a standard outlet box.
    b. Relay: Externally mounted through a one half (1/2) inch knockout in a standard electrical enclosure.
    c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

5. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
6. Bypass Switch: Override the on function in case of sensor failure.
7. Automatic Light-Level Sensor: Adjustable from two (2) fc to two hundred (200) fc; keep lighting off when selected lighting level is present.

C. Dual-Technology Type: Ceiling mounting; detect occupancy by using a combination of PIR and ultrasonic detection methods in area of coverage. Particular technology or combination of technologies that controls on-off functions shall be selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of six (6) inch minimum movement of any portion of a human body that presents a target of not less than thirty six (36) sq. in., and detect a person of average size and weight moving not less than twelve (12) inches in either a horizontal or a vertical manner at an approximate speed of twelve (12) inches.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of one thousand (1,000) sq. ft. when mounted on a ninety six (96) inch high ceiling.

2.5 OUTDOOR MOTION SENSORS (PIR)

A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the manufacturers specified:

1. Hubbell Lighting
2. Paragon Electric Co.; Invensys Climate Controls.
3. TORK.

4. Watt Stopper (The).

B. Performance Requirements: Suitable for operation in ambient temperatures ranging from minus 40^0F to plus 130^0F, rated as raintight according to UL 773A.

1. Operation: Turn lights on when sensing infrared energy changes between background and moving body in area of coverage; with a time delay for turning lights off, adjustable over a minimum range of one (1) minute to fifteen (15) minutes.
2. Mounting:

   a. Sensor: Suitable for mounting in any position on a standard outdoor junction box.
   b. Relay: Internally mounted in a standard weatherproof electrical enclosure.
   c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

3. Bypass Switch: Override the on function in case of sensor failure.
4. Automatic Light-Level Sensor: Adjustable from one (1) fc to twenty (20) fc; keep lighting off during daylight hours.

C. Detector Sensitivity: Detect occurrences of six (6) inch minimum movement of any portion of a human body that presents a target of not less than thirty six (36) sq. inches.

D. Detection Coverage: [Up to 35 feet, with a field of view of 90 degrees] [Up to 100 feet, with a field of view of 60 degrees] [Up to 35 feet, with a field of view of 180 degrees] [Up to 52.5 feet, with a field of view of 270 degrees] <Insert coverage area>.

E. Individually Mounted Sensor: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.

1. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
2. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.

2.6 LIGHTING CONTACTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the manufacturers specified:

1. ASCO Power Technologies, LP; a division of Emerson Electric Co.
2. Eaton Electrical Inc.; Cutler-Hammer Products.
3. Hubbell Lighting.
4. MicroLite Lighting Control Systems.

5. Square D; Schneider Electric.
6. TORK.
7. Touch-Plate, Inc.
8. Watt Stopper (The).

B. Description: Electrically operated and mechanically held, combination type with [fusible switch] [nonfused disconnect] <Insert switch or disconnect>, complying with NEMA ICS 2 and UL 508.

1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15% or less total harmonic distortion of normal load current).
2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
3. Enclosure: Comply with NEMA 250.
4. Provide with control and pilot devices as indicated on Drawings, matching the NEMA type specified for the enclosure.

C. BAS Interface: Provide hardware interface to enable the BAS to monitor and control lighting contactors.

1. Monitoring: On-off status, <Insert monitoring point>.
2. Control: On-off operation, <Insert control point>.

2.7 EMERGENCY SHUNT RELAY

A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the manufacturers specified:

1. Lighting Control and Design, Inc.
2. Nine 24, Inc.
3. Watt Stopper / Legrand

B. Description: Normally closed, electrically held relay, arranged for wiring in parallel with manual [or automatic] switching contacts; complying with UL 924.

1. Coil Rating: 120 and/or 277 V.

2.8 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

3.1 SENSOR INSTALLATION

A. Install and aim sensors in locations to achieve not less than 90% coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

3.2 CONTACTOR INSTALLATION

A. Mount electrically held lighting contactors with elastomeric isolator pads, to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

3.3 WIRING INSTALLATION

A. Wiring Method: Comply with Division 26 Section "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size shall be.

B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.

C. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.4 IDENTIFICATION

A. Identify components and power and control wiring according to Division 26 Section "Identification for Electrical Systems."

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaries controlled by photoelectric and occupancy sensors at each sensor.

B. Label time switches and contactors with a unique designation.

3.5 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
2. Operational Test: Verify operation of each lighting control device, and adjust time delays.

B. Lighting control devices that fail tests and inspections are defective work.

3.6 ADJUSTING

A. Occupancy Adjustments: When requested within twelve (12) months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.7 DEMONSTRATION

A. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control system specified in Division 26 Section "Network Lighting Controls."

B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 260923