**SECTION 26 0923**

**lIGHTING CONTROL DEVICES**

PART 1 GENERAL

1.01 DESCRIPTION

* + 1. This Section describes the basic materials and installation methods that are acceptable for lighting control devices and applicable to Division 26.
    2. All work specified in this Section shall comply with the provisions of Section 26 0500.
    3. Provide lighting control devices, including their associated coverplates and covers, as specified herein.
    4. The installation of all devices within shall be fully in compliance with the manufacturer’s installation instructions.
    5. All devices within shall have standard 5 year warranty and shall be UL and CUL listed.

1.02 STANDARDS

* + 1. Lighting control devices shall comply with the following:
       1. NFPA 70 (National Electrical Code – (NEC))
       2. ASHRAE 90.1
       3. IECC, or state recognized Energy Code
       4. NEMA 410-2020 & WD 6
       5. IEC Standards
       6. U.L. Standard 20 (Switches)
       7. U.L. Standard 1472 (Solid State Dimming Controls)
       8. Federal Specification W-S-896
       9. Code of Federal regulations 28 Part 36 (American Disabilities Act; A.D.A.)

1.03 ABBREVIATIONS

* + 1. The following abbreviations shall be referenced and apply within this section:
       1. WP – Weatherproof
       2. ELV – Electronic Low-Voltage
       3. MLV – Magnetic Low-Voltage
       4. LED – Light-emitting diode
       5. CFL – Compact fluorescent
       6. PIR – Passive infrared

PART 2 PRODUCTS

2.01 LINE VOLTAGE WALL SWITCHES

* + 1. Wall switches shall be plastic, totally enclosed, quiet type, self-grounding, side wired, rated at 120/277 volts and 15 or 20A as specified by:
       1. Single Pole: Leviton CS120-2W
       2. Three-Way: Leviton CS320-2W
       3. Four-Way: Leviton CSB4-20W
    2. Pilot light switches shall be plastic, totally enclosed, quiet type, self-grounding, side wired, rated 20A as specified by:
       1. 120 volt: Leviton 1221-PLR
       2. 277 volt: Leviton 1221-7PLR
    3. Flush motor switches with red pilot light and with overload protection for fractional horsepower motors shall be Hubbell No. HBL1221PL, rated at 120/277 volts and 20A.
    4. Key-operated switches shall be Leviton 1221-2L.
    5. Single-pole, double-Throw, momentary contact, center-off switches for use with mechanically held lighting contactors shall be as follows.
       1. Leviton 1257
       2. Key-Operated: Leviton 1257L – with factory-supplied key in lieu of switch handle
    6. Single-pole, double-throw, maintained contact, center-off switches shall be Hubbell 1381.

2.02 WALL-BOX DIMMER SWITCHES

* + 1. Provide the appropriate dimmer switch matching the wattage, voltage, lamp source type, and dimming type of the luminaire being controlled. Dimmer switches shall have a continuously adjustable slider with single-pole or three-way switching and shall comply with UL 1472.
       1. 0-10V LED, 16A, 120-277V Leviton
       2. Forward Phase, 350W, 120V Leviton
       3. Reverse Phase, 250W, 120V Leviton
       4. 3-wire LED, 8A, 120V Leviton
       5. 3-wire LED, 6A, 277V Leviton
       6. C∙L 150W LED/CFL or 600W Incand. Leviton
    2. The dimmer switches shall provide full range, continuously variable control of light intensity. Fluorescent and LED lamp dimmer switches shall be compatible with dimmer ballasts or driver. Trim potentiometer to adjust low-end dimming. Dimmer-ballasts/driver combination shall be capable of consistent dimming with low-end no greater than 10% of full brightness.

2.03 LINE-VOLTAGE WALL OCCUPANCY SENSOR SWITCHES

* + 1. The passive infrared sensor shall be a completely self-contained control system that replaces a standard toggle switch. Sensor shall include a secondary detection method for fine motion sensing. Sensor shall have ground wire for safety. Switching mechanism shall be a zero cross type latching air gap relay, compatible with the following load types: LED, electronic fluorescent ballasts, CFL, ELV, MLV and fractional horsepower fan loads.
    2. Sensor shall cover up to 900 sq. ft. for major motion and up to 400 sq. ft. for minor motion, with a field of view of 180 degrees.
    3. Sensor shall operate at 120 VAC or 277 VAC, 60Hz.
    4. Sensor shall be capable of switching up to 6 amps of lighting load and 3 amps of fan load (120V only).
    5. For accuracy and consistency, sensor shall have a DIP switch controlled, digital time delay adjustable from 1 minute to 30 minutes, having intervals of at least 1, 5, 15, & 30 minutes. Default time delay shall be 15 minutes.
    6. Sensor shall be capable of being set to either occupancy mode (auto on/auto off) or vacancy mode (manual on/auto off).
    7. Sensor shall contain high and low sensitivity adjustment option.
    8. Sensor shall be provided with a crush/tamper resistant lens.
    9. Sensor shall be as follows:
       1. Occupancy/Vacancy w/ switch Acuity, Cooper or Lutron
       2. Occupancy/Vacancy w/ dual switch Acuity, Cooper or Lutron
       3. Vacancy Only w/ Switch Acuity, Cooper or Lutron
       4. Occupancy/Vacancy w/ 0-10V dimmer Acuity, Cooper or Lutron
       5. Dual Tech Sensor w/ switch Acuity, Cooper or Lutron
       6. Dual Tech Sensor w/ dual switch Acuity, Cooper or Lutron

2.04 LOW-VOLTAGE CEILING OCCUPANCY SENSORS

* + 1. The dual-technology sensor with passive infrared and ultrasonic sensing shall be a standalone system with accompanying power pack(s) that operate in tandem with a local wall switch. The power pack’s switching mechanism shall be a zero cross type latching air gap relay, compatible with the following load types: LED, electronic fluorescent ballasts, CFL, ELV, MLV and fractional horsepower fan loads.
    2. Sensor shall cover up to 2000 sq. ft. for major motion and up to 1000 sq. ft. for minor motion, with a field of view of 360 degrees.
    3. Sensor shall operate at 24VDC and be supplied by a power pack with an input of 120 VAC or 277 VAC, 60Hz.
    4. Power pack shall be capable of switching up to 16 amps of lighting load. The power pack housing and any associated class 2 wiring shall be rated for installation in an environmental-air plenum.
    5. For accuracy and consistency, sensor shall have a dial controlled, digital time delay adjustable from 8 minutes to 30 minutes.
    6. Sensor shall contain high and low sensitivity adjustment option.

2.05 COVERPLATES

* + 1. Coverplates for flush mount devices shall be standard size polycarbonate type, with color/finish to match the corresponding device. Coverplates shall be compatible with provided switch. Basis of design shall be Leviton, Acuity, Cooper or Lutron.
    2. Coverplates for surface mount devices shall be stainless steel type matching the junction box size and device type being installed on.
    3. Provide while-in-use covers for all devices being installed in damp & wet locations. Cover to be Hubbell WP26 series, or approved equal.

2.06 DAYLIGHT SENSORS

* + 1. Provide a daylight harvesting control system where specified to include the daylight sensor, control module, and any associated dimming control wiring. The control module shall provide continuous dimming of all lights within the daylit zone such that a constant total light level, measured in ft-candles, is maintained in a given space. The target light levels for a space shall be made up of Natural Light + Artificial Light = Total Light Level.
    2. Provide a corresponding Acuity dimming power pack, matching the dimming protocol of the light fixtures served. Coordinate with the project’s lighting fixture schedule for any associated fixture lamp source and dimming type.
    3. The dimming module housing and any associated class 2 wiring shall be rated for installation in an environmental-air plenum.
    4. The daylight sensor shall be by Acuity, Cooper or Lutron.

2.07 EMERGENCY LIGHTING AUTOMATIC LOAD RELAY

* + 1. Where emergency generator backed light fixtures are to be controlled with the other light fixtures in the room or area, provide a UL 924 listed bypass/shunt relay device for that fixture or zone of fixtures.
    2. The device shall contain LED light indicators to visually annunciate whether the device is on normal utility power or the alternate emergency power source.
    3. The device shall include an integral test switch.
    4. The UL924 control relay shall be by LVS EPC series, or equal by Functional Devices, Inc. or Bodine. Provide the appropriate device type for the load being controlled (e.g. switched, 0-10V dim, and other low-voltage dimming protocols)
    5. The device shall be suitable and listed for installation in an environmental air plenum.
    6. Provide auxiliary fire alarm relay such that upon initiation of fire alarm system, lighting controls fail to emergency mode.

PART 3 EXECUTION

3.01 LINE-VOLTAGE WALL SWITCHES

* + 1. Coordinate the device color required with the architect. Refer to the architectural finish plans and details for special finishes and notes.
    2. Coordinate the exact mounting height and location of all devices with the architect. Refer to architectural plans, details, and elevations for additional notes. Devices shall be aligned with nearby devices, both vertically and horizontally, where possible. Where devices are to be located at or near furniture, ensure coordination with the furniture installer is done such that devices aren’t unintentionally concealed. All switches intended for general occupant use shall be installed within the minimum and maximum ranges allowed by A.D.A., between 15” & 48” above finished floor.
    3. All devices shall be mounted vertically unless otherwise specified.
    4. Where more than one device is indicated at a location, the devices shall be gang-mounted in combined multi-gang boxes and covered jointly by a common coverplate. Provide barriers as required by the devices and voltages being used.

3.02 LINE-VOLTAGE DIMMER SWITCHES

1. Dimmer switches shall comply with section 3.01 A. through D. above.
2. Where multiple dimmer switches are to be ganged together, coordinate any side fin removal requirements with the manufacturer and confirm any required wattage de-rating as a result.
3. Review the dimmer type used with the project’s lighting fixture schedule to coordinate lamp source and corresponding dimming technology being used. The dimmer switch installed must match the light fixtures power and control inputs.

3.03 LINE-VOLTAGE WALL OCCUPANCY SENSOR SWITCHES

* + 1. Occupancy sensor switches shall comply with section 3.01 A. through D. above.
    2. Locate sensors such that line-of-sight coverage is not obstructed. Ensure sensors aren’t located behind the room’s door, furniture, or other equipment.
    3. Refer to the project’s lighting control sequence of operation for sensor timeout and mode. Set to occupancy sensor mode with a timeout of 15 minutes, unless noted otherwise.

3.04 LOW-VOLTAGE CEILING OCCUPANCY SENSORS

* + 1. Coordinate the device color required with the architect. Refer to the architectural reflected ceiling plans and details for special ceiling finishes and notes.
    2. Coordinate placement of ceiling mount occupancy sensors with the architectural reflected ceiling plans and details. Ensure device placement is in the center of any ceiling tile and inline with surrounding light fixtures, sprinkler heads, and similar. Ensure the sensor is installed tight to the ceiling surface.
    3. Any sensors installed in an exposed to structure ceiling area shall be suspended and supported from the structure above with a EMT conduit stem and end mounted junction box. Locate sensor such that the bottom of the lens is in line with the bottom of the light fixtures or other ceiling elements in the area as to not restrict direct line-of-sight.
    4. Refer to the project’s lighting control sequence of operation for sensor timeout and mode. Set to occupancy sensor mode with a timeout of 15 minutes, unless noted otherwise.
    5. Coordinate placement with division 23 to avoid placement of sensors directly adjacent to HVAC supply diffusers. Coordinate exact separation distance with the manufacturer.
    6. The specified coverage ranges are typical for ceiling heights between 8 – 12ft. For mounting heights exceeding this range adjust the

3.05 COVERPLATES

* + 1. Coverplates shall be installed after final painting. Ensure the plate is installed to fully cover the junction box opening and is seated against the finished surface for flush mount installations.
    2. Fully secure the coverplate to the junction box while ensuring that the screw is not over tightened such that it causes the plate to crack. Orient all screw slots such that they are horizontal and level.
    3. All metal faceplates shall be bonded to the device equipment grounding conductor.

3.06 DAYLIGHT SENSORS

* + 1. Install the sensor per the manufacturer’s requirements and installation instructions. Locate a sensor within each daylit exterior enclosed space and in each daylit exterior open office area or public space at a minimum of at least every 30ft of perimeter façade. Locate the sensor at approximately 1-2 times the effective window height away from the perimeter façade. Ensure the sensing window of the sensor is pointed towards the exterior window.
    2. Setup the daylight harvesting system such that the sensor wirelessly connects to the dimming module serving the daylit area. Provide all necessary wiring to allow for dimming of all fixtures within the given daylit zone. The daylight zone shall be considered all light fixtures within 15ft of the building perimeter, unless noted or specified otherwise.
    3. Coordinate exact placement in the ceiling with the architectural reflected ceiling plan.
    4. Calibrate the sensor’s settings such that the room or area’s target light levels are maintained through continuous dimming in response to measured light levels. Utilize a light meter instrument at setup to ensure target light levels are being achieved at the desktop or table surface.

3.07 EMERGENCY LIGHTING AUTOMATIC LOAD RELAY

* + 1. To each emergency lighting control relay provide both a normal power control circuit as well as an unswitched emergency circuit. Refer to the manufacturer’s installation instructions and wiring diagrams for further details.
    2. Upon loss of normal utility power, the device shall bypass or shunt all normal local control and default to 100% full brightness powered by the generator backed emergency source.

**END OF SECTION**