

**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Network lighting control system and components.

**1.2 RELATED DOCUMENTS**

- A. Section 26 5000 Lighting.

**1.3 SUMMARY**

- A. The lighting control system specified in this section shall provide time-based, sensor-based (both occupancy and daylight), and manual lighting control.
- B. The system shall be capable of turning lighting loads on/off as well as dimming lights (if lighting load is capable of being dimmed). Specific dimmers will be capable of "dimming lights to off".
- C. All system devices shall be networked together, enabling digital communication between devices, and shall be individually addressed.
- D. The system architecture shall be capable of enabling stand-alone groups (rooms) of devices to function in some default capacity, even if network connectivity to the greater system is lost.
- E. The system architecture shall facilitate remote operation via a computer connection.
- F. The system shall not require any centrally hardwired switching equipment.

**1.4 SUBMITTALS**

- A. Product Datasheets (general device descriptions, dimensions, electrical specifications, wiring details, nomenclature).
- B. Riser Diagrams – typical per room type (detailed drawings showing device interconnectivity of devices).
- C. Other Diagrams – as needed for special operation or interaction with other system(s).
- D. Example Contractor Startup/Commissioning Worksheet – must be completed prior to factory start-up.
- E. Hardware and Software Operation Manuals.
- F. Other operational descriptions as needed.

**1.5 PROJECT CLOSEOUT DOCUMENTATION**

- A. Provide a factory published manual.
  - 1. Warranty.
  - 2. Technical support contact.
  - 3. Electronic manual on manufacturer's website for free download.

**1.6 QUALITY ASSURANCE**

- A. All steps in sensor manufacturing process shall occur in North America; including population of all electronic components on circuit boards, soldering, programming, wiring, and housing.
- B. All components and the manufacturing facility where product was manufactured must be RoHS compliant.
- C. In high humidity or cold environments, the sensors shall be conformably coated and rated for condensing humidity and -40 degree Fahrenheit (and Celsius) operation.
- D. All applicable products must be UL / CUL Listed or other acceptable national testing organization.

**1.7 PROJECT CONDITIONS**

- A. Only install equipment after the following site conditions are maintained:
  - 1. Ambient Temperature 14 to 105 degrees F (-10 to 40 degrees C).
  - 2. Relative Humidity less than 90% non-condensing.
- B. Standard electrical enclosures are permanently installed.
- C. Equipment is protected from dust, debris and moisture.

**1.8 WARRANTY**

- A. Five (5) year 100% parts replacement.

**1.9 MAINTENANCE & SUSTAINABILITY**

- A. Provide new parts, upgrades, and/or replacements available for a minimum of 5 years available to the end user.
- B. Provide free telephone technical support.

**PART 2 PRODUCTS****2.1 MANUFACTURERS**

- A. Acceptable: Acuity Brands Lighting, Inc. – System: nLight by Acuity Controls
- B. See electrical drawings for product specifications.
- C. Substitutions: Not Permitted

**2.2 SYSTEM REQUIREMENTS**

- A. System shall have an architecture that is based upon three main concepts; 1) intelligent lighting control devices 2) standalone lighting control zones 3) network backbone for remote or time based operation.
- B. Intelligent lighting control devices shall consist of one or more basic lighting control components; occupancy sensors, photocell sensors, relays, dimming outputs, manual switch stations, and manual dimming stations. Combining one or more of these components into a single device enclosure should be permissible so as to minimize overall device count of system.

- C. System must interface directly with intelligent LED luminaires such that only CAT-5 cabling is required to interconnect luminaires with control components such as sensors and switches.
- D. Intelligent lighting control devices shall communicate digitally, require <7 mA of current to function (Graphic wall stations excluded), and possess RJ-45 style connectors.
- E. Lighting control zones shall consist of one or more intelligent lighting control components, be capable of stand-alone operation, and be capable of being connected to a higher level network backbone.
- F. Devices within a lighting control zone shall be connected with CAT-5e low voltage cabling in any order.
- G. Lighting control zone shall be capable of automatically configuring itself for default operation without any start-up labor required.
- H. Individual lighting zones must continue to provide a user defined default level of lighting control in the event of a system communication failure with the backbone network or the management software becoming unavailable.
- I. Power for devices within a lighting control zone shall come from either resident devices already present for switching (relay device) or dimming purposes, controls enabled luminaires, or from the network backbone. Standalone "bus power supplies" shall not be required in all cases.
- J. All switching and dimming for a specific lighting zone shall take place within the devices located in the zone itself (i.e. not in remotely located devices such as panels) to facilitate system robustness and minimize wiring requirements. Specific applications that require centralized or remote switching shall be capable of being accommodated.
- K. System shall have one or more primary wall mounted network control "gateway" devices that are capable of accessing and controlling connected system devices and linking into an Ethernet LAN.
- L. System shall use "bridge" devices that route communication and distribute power for up to 8 directly connected lighting zones together for purposes of decreasing system wiring requirements.
- M. System shall have a web-based software management program that enables remote system control, status monitoring, and creation of lighting control schedules and profiles.
- N. Individual lighting zones shall be capable of being segmented into several "local" channels of occupancy, photocell, and switch functionality for more advanced configurations and sequences of operation.
- O. Devices located in different lighting zones shall be able to communicate occupancy, photocell (non-dimming), and switch information via the wired backbone.
- P. System shall be capable of operating a lighting control zone according to several sequences of operation. System shall be able to change a spaces sequence of operation according to a time schedule so as to enable customized time-of-day, day-of-week, utilization of a space. Note: Operating modes should be utilized only in manners consistent with local energy codes.
  - 1. Auto-On / Auto-Off (via occupancy sensors)
    - a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
    - b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.

- c. Pressing a switch will turn lights off. The lights will remain off regardless of occupancy until switch is pressed again, restoring the sensor to Automatic On functionality.
2. Manual-On / Auto-Off (also called Semi-Automatic)
  - a. Pushing a switch will turn lights on.
  - b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
3. Manual-On to Auto-On/Auto-Off
  - a. Pushing a switch will turn lights on.
  - b. After initial lights on, zones with occupancy and/or photocell sensors turn lights on/off according to occupancy/vacancy and/or daylight conditions.
  - c. Sequence can be reset via scheduled (ex. daily each morning) events.
4. Auto-to-Override On
  - a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
  - b. Zone lighting then goes into an override on state for a set amount of time, or until the next time event returns the lighting to an auto-off style of control.
  - c. Sequence can be reset via scheduled (ex. daily each morning) events.
5. Manual-to-Override On
  - a. Pushing a switch will turn lights on.
  - b. Zone lighting then goes into an override on state for a set amount of time or until the next time event returns the lighting to an auto-off style of control.
  - c. Sequence can be reset via scheduled (ex. daily each morning) events.
6. Auto On / Predictive Off
  - a. Zones with occupancy sensors automatically turn lights on when occupant is detected.
  - b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.
  - c. Pressing the switch will turn the lights off and a short "exit timer" begins. After the timer expires, sensor scans the room to detect whether occupant is still present. If no occupancy is detected, zone returns to auto-on. If occupancy is detected, lights must be turned on via the switch.
7. Multi-Level Operation (multiple lighting levels per manual button press)
  - a. Operating mode designed specifically for bi-level applications.
  - b. Enables the user to cycle through up to four potential on/off/dim low/dim high lighting states using only a single button.
  - c. Eliminates user confusion as to which of two buttons controls which load.
  - d. Three different transition sequences are available in order to comply with energy codes or user preference).
  - e. Mode available as a setting on all devices that have single manual on/off switch (ex. nPODM, nPODM-DX, nWSX LV).
  - f. Depending on the sequence selected, every button push steps through relay/dimming states according to below table.
  - g. In addition to achieving bi-level lighting control by switching loads with relays, the ability to command dimming outputs to "step" in a sequence that achieves bi-level operation is present.

## 2.4. LIGHTING CONTROL PROFILES

- A. Changes to the operation of the system shall be capable of being made in real-time or scheduled via lighting control profiles. These profiles are outlines of settings that direct how a collection of devices function for a defined time period.
- B. Lighting control profiles shall be capable of being created and applied to a single device, zone of devices, or customized group of zones.
- C. All relays and dimming outputs shall be capable of being scheduled to track or ignore information regarding occupancy, daylight, and local user switches via lighting control profiles.

- D. Specific device parameters (e.g. sensor time delay and photocell set-point) shall be configurable via a lighting control profile.
- E. All lighting control profiles shall be stored on the network control gateway device, with a system backup on the software's host server.
- F. Lighting control profiles shall be capable of being scheduled to run according to the following calendar options: start date/hour/minute, end date/hour/minute, and sunrise/sunset +/- timed offsets.
- G. Sunrise/sunset times shall be automatically derived from location information using an astronomical clock.
- H. Daylight savings time adjustments shall be capable of being performed automatically, if desired.
- I. Lighting control profile schedules shall be capable of being given the following recurrence settings: daily, weekday, weekend, weekly, monthly, and yearly.

## **2.8. START-UP & SUPPORT FEATURES**

- A. To facilitate start-up, all devices daisy-chained together (using CAT-5) shall automatically be grouped together into a functional lighting control zone.
- B. All lighting control zones shall be able to function according to default settings once adequate power is applied.
- C. System shall be able to auto-discover all system devices without requiring any commissioning.
- D. All system devices shall be capable of being given user defined names.
- E. All devices within the network shall be able to have their firmware upgraded remotely and without being physically uninstalled for purposes of upgrading functionality at a later date.
- F. All sensor devices shall have the ability to detect improper communication wiring and blink it's LED in a specific cadence as to alert installation/startup personnel.

**END OF SECTION**