SECTION 260943
NETWORK LIGHTING CONTROLS

PART 1 - GENERAL

1.1 STIPULATIONS

A. The specifications sections "General Conditions to the Construction Contract", "Special Conditions" and "Division 01 - General Requirements" form a part of this Section by this reference thereto, and shall have the same force and effect as if printed herewith in full.

B. Additional Related Sections Include:

1. Section 262726 Wiring Devices
2. Section 260923 Lighting Control Devices
3. Section 265119 Interior Lighting

1.2 SUMMARY

A. Network lighting control system and components:

1. Touch panel controls.
2. Mobile Control.
3. Lighting management panels.
4. Lighting management modules.
5. Low voltage wall stations.
6. Remote Mounted Power Modules.
7. Digital sensors.

1.3 REFERENCES

A. Underwriters Laboratories (UL):

1. UL 508 - Industrial Control Equipment American National Standards Institute (ANSI).
2. UL 924 - Emergency Lighting and Power Equipment.

B. National Fire Protection Association (NFPA):

1. NFPA 70 - National Electric Code.

C. American National Standards Institute (ANSI):

1. ANSI E1.11-2008 USITT DMX512-A - Asynchronous Serial Digital Data Transmission Standard for Controlling Lighting Equipment and Accessories.
2. ANSI E1.20-2006 - Remote Device Management over USITT DMX512.

D. IEC 61000-4-2 Electromagnetic Compatibility (EMC) – Part 4-2: Testing and Measurement Techniques-Electrostatic Discharge Immunity Test; 2008.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate placement of daylight and occupancy sensors to achieve optimum performance. Proper sensor placement should be coordinated with others in order to avoid obstructions that would interfere with maintaining prescribed light levels.
2. Coordinate the work to provide luminaires and lamps that are compatible with the lighting controls to be installed.
3. Coordinate location of touch panels and keypad stations with finish work that is to be installed by others.
4. Notify architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Pre-installation meeting: Conduct on-site meeting with lighting control representative prior to starting work as part of manufacturer's standard startup service. Representative to review with the installer:

1. Low voltage wiring requirements.
2. Line voltage and low voltage separation requirements.
3. Lighting management panel locations.
4. Sensor locations.
5. Touch Panel locations.
6. Keypad locations.
7. Wall station locations.
8. Networked luminaire wiring requirements.
9. Connections to other equipment.

1.5 SUBMITTALS

A. Specification Conformance Document. Clearly define where the equipment submitted for review:

1. Meets specification exactly as specified.
2. Meets specification as an alternate with clear definition of compliance.

B. Shop Drawings include:

1. CAD renderings of the device with precise dimensions.
2. Network diagrams.
3. System schematic/typical riser diagrams.
4. Lighting management panel load schedules.

C. Product Data Sheets.

1.6 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.

1.7 QUALITY ASSURANCE

A. Manufacturer: Minimum 10 years of experience designing and assembling architectural lighting controls.

B. All devices are 100% factory function tested prior to delivery.

C. Compliant with the requirements of NFPA 70.

D. All power components UL listed for required loads.

1.8 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.

1.9 WARRANTY

A. Two year 100% parts replacement.

1.10 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 - EQUIPMENT

2.1 MANUFACTURES

A. Acceptable Manufactures:

1. Acuity Brands, Inc.
2. Wattstopper.
3. Lutron.

B. Basis of Design System: Acuity Brands, Fresco.

2.2 GENERAL

A. Provide system hardware that is designed, tested, manufactured, warranted by a single manufacturer.

B. Operational Life: At least 10 years expected life while operating within the specified ambient temperature and humidity range.

C. Standards Compliance & Compatibility: Provide architectural control product with native DMX512-A control and BACnet/IP.

D. Luminaire Compatibility: Supports RGB luminaires in 8 bit and/or 16 bit configurations also supporting MSB or LSB first luminaire settings. Support native control of Tunable White luminaires.

E. Design and test equipment to withstand electrostatic discharges without impairment when tested according to IEC 61000-4-2 Level 4.

F. Power Failure Memory: automatically store system settings and recover from a power failure without requiring user input.

G. Wireless devices:

1. Automatically sync for system operation without addressing.
2. Send and receive messages for real-time operation and feedback.
3. Use industry standard RF protocols.
4. Be in compliance with FCC and IEEE standards.

H. Time Clock: automatically adjust for daylight savings time and leap year.

2.3 DIMMING AND SWITCHING PERFORMANCE REQUIREMENTS

A. Electrolytic capacitors operate at least 36 degrees F (20 degrees C) below the capacitor's maximum temperature rating when the device is under full load.

B. Inrush tolerance: Use MOSFET that has a maximum rating of six times the operating current of the dimmer/relay.

C. Surge tolerance: Panels are designed and tested to withstand surges of 6,000V, 3,000A according to IEEE C62.41.2 and IEC 61000-4-5 without impairment to performance.

D. Power failure recovery: When power is interrupted and subsequently restored, within 3 seconds lighting to automatically return to same levels prior to power failure.

E. Utilize half cycle to half cycle zero cross movement to allow for voltage compensation in order to overcome line noise and lamp flickering.

F. Incorporate electronic soft start default at initial turn-on that smoothly ramps lights to appropriate levels within 0.5 seconds.

G. Utilize air gap off to disconnect the load line from the line supply.

H. Control all light sources in smooth and continuous manner. Dimmers with visible steps are not acceptable.

I. Assign load type to each dimmer that will provide proper dimming curve for the specific light source to be controlled.

J. Minimum and maximum light levels are user adjustable on a circuit by circuit basis.

2.4 TOUCH PANEL CONTROLS

A. Product: Fresco Touch Screen (7TSN).

B. Preset lighting scene controller:

1. General Requirements:

a. 7” full color multi-touch capacitive touchscreen for controlling lighting and system components.
b. Control up to 65,000 zones of lighting/shades per system.
c. Control up to 36 lighting channels/scenes per touch screen that include on/off, dimming, tunable white, RGB, and/or shade control.
d. Link up to 24 touch screens for a possibility of 864 lighting zones/scenes.
e. Connect up to 128 network devices per touch screen.
f. On screen lighting design.
g. Lighting zones/scenes can be comprised of lighting intensity, color, color temperature, and luminaire position.
h. Modify color and color temperature using a digital color palette and dUV rating scale.
i. Proximity screen sensor for auto “wake-up”.
j. Auto dimming and user adjustable backlight.
k. User programmable screen lock limiting access to all feature control and programming.
l. Full alpha-numeric scene and zone naming.
m. Configurable interface to reflect project requirements.
n. Lighting zones/scenes support control of forward/reverse phase dimming, 0-10v, RGB, nLight® enabled luminaires, nLight® power packs, DALI, tunable white and moving fixtures.
o. Integral astronomical time clock enables lighting scenes.
p. Partition status control and visualization.
q. Connect up to 128 nLight® enabled devices.
r. Digital motion senor control.
s. Digital daylight harvesting response.
t. RS-232/contact closure capable for 3rd party integration.
u. Local wireless Bluetooth connectivity with mobile app.
v. Compatible with Fresco Lighting Management Panels (LMP).
w. Frame Color: Black, Aluminum or White.

2. Electrical:

a. Fresco Input: 24VDC.
b. Fresco Power Supply: 120-277V AC.
c. RS-485 network terminal.
d. nLight enabled RJ-45 ports (in/out).
e. CAT5e Ethernet network terminal.

3. Mounting:

a. Installs in a standard triple gang US back box.
b. Remote mounted power supply.
c. Plug in wire harness for RS-485 and DMX connections.

4. Protocols:

a. RS-485.

b. IEEE 802.15 Bluetooth® compliant.
c. Controller is compliant to industry standard ANSI E1.11 - 2008, USITT DMX512-A
d. Supports extended RDM capability as defined by ANSI E1.20.
e. IEEE 802.11 Ethernet compliant.
f. nLight Digital communication.
g. BACnet/IP ISO 16484-5.

2.5 MOBILE CONTROL

A. Fresco iPad Application.

B. Allows mobile control and programming of the Fresco Touchscreen:

1. General Requirements: Mobile Apple device supports Bluetooth® communication protocol:

a. Provides user control and edit capability of lighting scenes and zones.
b. Edit intensity, color, color temperature, and movement.
c. Edit lighting schedules.
d. Restrict number of users able to connect to touchscreen.
e. Restrict access to making system changes.
f. No PC required for mobile operation.

2.6 LIGHTING MANAGEMENT PANELS

A. Product: Fresco Lighting Management Panel (FCS LMP):

1. General Requirements:

a. Comply with UL508.
b. Universal voltage operation 120V-277V (MVOLT).
c. Available as {Factory-assembled} or {Rough-in enclosure}.
d. Available as {Feed-Through} {4-wire Main Lug} {3-wire Main Lug}.
e. Configurable for site conditions with certain modules and circuit breakers {small} {medium} {large}.
f. Oversized field wiring channel to separate line voltage and low voltage.
g. Available voltage barrier.
h. Locking breaker cover.
i. Convection cooled, no fans required.
j. Available with UL924 listed phase loss sensor device (FCS LMPE).

2. Factory installed bypass circuit jumpers on each dimming circuit .
3. Provide main lugs and branch circuit protection for each power module unless panel is indicated as feed-through type.
4. Branch circuit rating:

a. 120V: 2,000W (20A).
b. 277V: 2,700W (10A).

5. Branch circuit breakers (when supplied) UL listed thermal magnetic :

a. 120V: 14Kaic.
b. 277V: 14kAIC.

6. Integrated LCD push button controller for addressing panels, system override, modules and systems diagnostics.
7. Integral USB port for PC based panel programming which is accessible behind locking door.
8. Mounting: Recessed or surface mounted NEMA type 1 enclosure.

2.7 PANEL INSTALLED LIGHTING MANAGEMENT MODULES

A. 4 channel phase adaptive dimming module (LM4A MVOLT):

1. General Requirements:

a. Compatible lighting loads: incandescent, magnetic low voltage, electronic low voltage, 2 and 3 wire fluorescent, forward and reverse phase LED dimming.
b. Phase independent.
c. Power management reports status and power consumption.
d. Zero minimum load required.
e. Load types are configured per channel.
f. 165µ rise and fall times.
g. Field replaceable without requiring re-programming.

2. Ratings:

a. Module: 16.6A maximum at 120V~/7.2A maximum at 277~.
b. Channel: 8.3A continuous at 120V~/3.6A continuous at 277V~.

B. 4 channel phase selectable dimming module (LM4D MVOLT):

1. General Requirements:

a. Compatible lighting loads: forward and reverse phase LED dimming module for electronic low voltage, 2 wire fluorescent and LED lighting.
b. Phase independent.
c. Zero minimum load required.
d. Load types are configured per channel.
e. 10µ rise and fall times.

2. Ratings:

a. Module: 16.6A maximum at 120V~/7.2A maximum at 277V~.
b. Channel: 8.3A continuous at 120V~/3.6A continuous at 277V~.

C. 4 channel 0-10v dimming module with mechanically latching relays (LM4L MVOLT):

1. General Requirements:

a. Compatible with 0-10V load types that are IEC60929 compliant.
b. 50A mechanically latching relays.

2. Ratings:

a. 0-10V: 100mA maximum sink per output.
b. Relay: 16A continuous at 120V~/16A continuous at 277V~.

D. Dual Loop DALI Controller (LM2B MVOLT):

1. General Requirements:

a. Digital ballast/LED driver controller.
b. Compatible with DALI load types that are IEC60929 compliant.
c. 2 DALI loops (64 ballasts/drivers max per loop).
d. Integrated DALI bus power supply supplies power to loops.

2. Ratings:

a. DALI: 150mA maximum.

E. 4 channel relay module (LM4R MVOLT):

1. General Requirements:

a. 50A rated relay per channel with override switch.
b. Suitable for switching compatible non dimming lighting loads.

2. Ratings:

a. Relay: 16A continuous at 120V~/16A continuous at 277V~.

2.8 LOW VOLTAGE WALL STATIONS

A. Push button lighting scene controller (nPODM by nLight):

1. General Requirements:

a. Use Cat5 wiring with RJ45 adapters for connection between devices.
b. Recess into single gang junction box.
c. Allows control of any lighting fixtures part of the lighting control system.
d. Upon button press, LED to immediately illuminate.
e. Controller can be setup as scene recall, toggle, or raise/lower.
f. Controller station LED’s track system status logic.
g. Replacement of unit does not require reprogramming.
h. Allows connection to additional stations, sensors, or power packs.
i. Custom button engraving.
j. Colors White, Ivory, Lt Almond, Gray, Black or Red.

B. Push button architectural finish lighting controller (FCS RB):

1. General Requirements:

a. Recess into single gang junction box.
b. No visible fasteners on faceplate.
c. Backlit button labels.
d. Allows control of any lighting fixtures part of the lighting control system.
e. Upon button press, LED to immediately illuminate.
f. Controller can be setup as scene recall, toggle, or raise/lower.
g. Controller station LED’s track system status logic.
h. Replacement of unit does not require reprogramming.
i. Allows connection to additional touchscreens, button stations, or AVI.

j. Custom button engraving, including icons.
k. Field changeable button assemblies.
l. Colors White, Lt Almond or Black.

2.9 REMOTE MOUNTED POWER MODULES

A. Networked relay and dimming power packs.

B. Products: nLight.

1. nPP16 (Power pack with 16A relay).
2. nEPP5D (Power pack with 5A relay and 0-10VDC output).
3. nSP16 (Secondary power pack with 16A relay).
4. nSP52P (Secondary power pack with 2 5A relays).
5. nSP5D (Secondary power pack with 5A relay and 0-10VDC dimming output).
6. nPP16ER (UL924 listed secondary power pack with 16A relay for switching emergency lighting circuit.
7. nSP5PCD2W (Secondary power pack with 5A relay and incandescent dimming or 2-wire fluorescent dimming output).
8. nSP5PCD3W (Secondary power pack with 5A relay and 3-wire fluorescent dimming output).
9. nSP5PCDMLV (Secondary power pack with 5A relay and magnetic low voltage dimming output).
10. nSP5PCDELV (Secondary power pack with 5A relay and electronic low voltage dimming output).

C. General requirements:

1. Power pack will incorporate one or more Class 1 relays and contribute low voltage power to the rest of the system.
2. Secondary power packs incorporate the relay(s), 0-10VDC dimming output, or line voltage dimming output.
3. Accept 120/277VAC and plenum rated.
4. All devices have two RJ-45 ports.
5. Parameters available and configurable remotely from software and locally via device push-button.
6. Power pack to be securely mounted to junction box with ½ inch threaded chase nipple or mounted within luminaire ballast channel.
7. Power (secondary) packs that provide up to 16A switching of all load types.
8. Power (secondary) packs that provide up to 5A switching of all load types as well as 0-10VDC dimming or fluorescent ballasts/LED drivers.
9. Specific secondary packs provide up to 5A of switching and can dim 120VAC incandescent or 120/277VAC line voltage dimmable fluorescent (2-wire and 3-wire versions).
10. Specific secondary packs provide up to 5A of switching and can dim 120/277VAC magnetic low voltage transformers.
11. Specific secondary packs provide up to 5A of switching and can dim 120VAC electronic low voltage.
12. Specific power/secondary are UL924 listed for switching of emergency power circuits.

2.10 DIGITAL SENSORS

A. Wired Networked Occupancy/Vacancy Sensors/Photocells.

B. Products: Network Wall Switch Sensors:

1. nWSD or nWSX (PIR, 1 Relay).
2. nWSD PDT or nWSX PDT (Dual Tech, 1 Relay).
3. nWSD NL (PIR w/Night Light, 1 Relay).
4. nWSD PDT NL (Dual Tech w/Night Light, 1 Relay).
5. nWSX NL LV (PIR w/Night Light, No Relay).
6. nWSD PDT NL LV (Dual Tech w/Night Light, No Relay).
7. nWSD LV or nWSX LV (PIR, No Relay, Raise/Lower Dim Control).
8. nWSD PDT LV or nWSX PDT LV (Dual Tech w/Night Light, No Relay, Raise/Lower Dim Control).

C. Products: Network Fixture Embedded Sensors:

1. nES 7 (PIR, No Relay).
2. nES 7 ADCX (PIR w/Photocell, No Relay).
3. nES PDT 7 (Dual Tech, No Relay).
4. nES PDT 7 ADCX (Dual Tech w/Photocell, No Relay).
5. nES ADCX (Dimming photocell).

D. Products: Network Standard Range 360° Ceiling Mount Sensors:

1. nCM PDT 9 (Low Voltage, Dual Tech).
2. nCMR PDT 9 (Line Voltage, Dual Tech).
3. nCMR 9 2P (Line Voltage, PIR, 2-Pole).
4. nCMR PDT 9 2p (Line Voltage, Dual Tech, 2-Pole).
5. nCM 9 2P (Low Voltage, PIR, 2 Channels).
6. nCMR 9 (Line Voltage, PIR).
7. nCM 9 (Low Voltage, PIR).
8. nCM PDT 9 2P (Low Voltage, Dual Tech, 2 Channels).

E. Products: Network Standard Range 360° Recessed Mount Sensors:

1. nRMR 9 2P (Line Voltage, PIR, 2-Pole).
2. nRMR PDT 9 (Line Voltage, Dual Tech).
3. nRMR 9 (Line Voltage, PIR).
4. nRM 9 (Low Voltage, PIR).
5. nRM PDT 9 (Low Voltage, Dual Tech).
6. nRM 9 2P (Low Voltage, 2 Channels).
7. nRM PDT 9 2P (Low Voltage, Dual Tech, 2 Channels).

F. Products: Network Standard Range 360° Fixture Mount Sensors:

1. nCMRB 9 (Line Voltage, PIR).
2. nCMB PDT 9 2P (Low Voltage, Dual Tech, 2 Channels).
3. nCMB 9 (Low Voltage, PIR).
4. nCMRB PDT 9 (Line Voltage, Dual Tech).
5. nCMRB PDT 9 2P (Line Voltage, Dual Tech, 2-Pole).
6. nCMRB 9 2P (Line Voltage, PIR, 2-Pole).
7. nCMB 9 2P (Low Voltage, PIR, 2 Channels).
8. nCMB PDT (Low Voltage, Dual Tech).

G. General requirements:

1. Occupancy sensors sense presence of human activity within the desired space and control on/off function of the lights.
2. Utilize passive infrared (PIR) technology which detects occupant motion.
3. Sensors are available for ceiling, wall, corner, recessed, and fixture mounting conditions.
4. Dual technology sensors utilize PIR/Microphonics (also known as Passive Dual Technology or PDT) .
5. Sensors utilizing Microwave or Ultrasonic technology will not be accepted.
6. Sensors are available with zero, one, or two Class 1 switching relays, and up to one 0-10VDC dimming output.
7. Provide multiple lens options which are interchangeable for specific applications.
8. Communication and Class 2 low voltage power is delivered to each device with CAT-5 cabling and terminate with RJ-45 connectors.
9. All sensors have two RJ-45 ports for purpose of daisy chain wiring method.
10. Sensors are equipped with automatic override for 100 burn-in of lamps.
11. Wall switch sensors have optional features for photocell/daylight override, vandal resistant, and low temperature/high humidity option.
12. Sensors capable of being embedded into luminaire.
13. Photocells provide on/off set-point and deadband to prevent artificial light from cycling.
14. Photocell and dimming sensor set-point is automatically calibrated using sensor microprocessor.
15. Photocell min/max thresholds may be manually configured.
16. Dimming sensors control 0-10VDC dimmable ballasts by sinking up to 20mA of Class 2 current.

2.11 DEVICE QUALITY

A. Perform 100% function testing of all devices.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Follow manufacturer’s instructions for all installation steps.

B. Provide a complete installation per Contract Documents.

C. Properly terminate all DMX wiring per installation instructions.

D. Use only recommended DMX cable and follow local codes.

E. Properly terminate all CAT5 wiring per installation instructions.

F. Properly terminate all RS-485 connections per installation instructions.

3.2 STARTUP AND PROGRAMMING

A. Provide telephone support via toll free line.

B. Engage a factory-authorized service representative to train Client Agency's maintenance personnel to adjust, operate, maintain network lighting controls.

3.3 MAINTENANCE

A. Offer integrated help on-screen and via online videos.

B. Factory telephone support via toll free line.

END OF SECTION