

DIGITAL NETWORK LIGHTING CONTROL DEVICES Guide Specification

The NX Lighting Controls System delivers a seamless interior and exterior lighting control solution. NX manages projects from a single room to entire buildings and multi-location properties. NX offers complete flexibility in project design by offering both wired and wireless options, with a common user interface.

The NX Lighting Controls System provides lighting control solutions for virtually any application. Whether indoor or outdoor, wired, or wireless, the distributed nature of the NX architecture provides cost-effective and flexible solutions that meet energy codes, maximize energy savings, and simplify building operations.

The NX Lighting Controls System offers a broad portfolio of controllers, network devices, panels, sensors, and interfaces under one platform to address new construction and retrofit lighting applications, including: commercial, education, healthcare, hospitality, industrial, parking/site, and retail.

Section 260943 DIGITAL NETWORK LIGHTING CONTROLS (this section)

System Architecture

Digital Room Controllers

UL924 Load Controller

Fixture Control Modules

Lighting Control Panels

Sensors

Wall Stations

Network Area Controller

Network Modules

Network Accessories

Software Interfaces

Conductors and Cabling

SECTION 26 09 43
DIGITAL NETWORK LIGHTING CONTROL DEVICES

1. GENERAL
	* + 1. SUMMARY
				1. Installed system shall be comprised of stand-alone and networked control devices as indicated. System control devices shall include, but are not limited to:

Digital Room Controllers

UL924 Load Controller

Fixture Control Modules

Lighting Control Panels

Sensors

Wall Stations

Network Area Controller

Network Modules

Network Accessories

Software Interfaces

Conductors and Cabling

* + - 1. SYSTEM DESCRIPTION
				1. The contractor shall provide and install NX Lighting Controls System as shown on plans and specified herein. NX Lighting Controls System shall be designed and configured to send and receive control, monitoring, operating and maintenance signals and commands wired and or wirelessly to and from networked enabled room controllers, fixture modules, switch stations, occupancy and daylight sensors, lighting control panels and other controls devices.
			2. SUBMITTALS
				1. Prior to fabrication and shipment of lighting control components, manufacturer shall provide submittal documentation for approval.
				2. Submittal documentation shall include:

Bill of Material including a list of components to be supplied,

Device specification sheets indicating device features, certifications, dimensions, construction specifications, electrical specifications, wiring diagrams, nomenclature, and related products,

Component schedules: Indicating lighting control device types and locations

Lighting panel schedules,

Wiring diagrams,

Control cable type and routing requirements,

System riser drawings of sufficient detail to indicate relative placement of major system components and the required connections between each,

Contractor Startup Request Form – to be completed prior to factory startup,

Operating and maintenance instructions, manuals and/or videos.

* + - 1. QUALITY ASSURANCE
				1. Manufacturer Qualification: Manufacturer of lighting control devices with minimum five years record of satisfactory manufacturing and support of components comparable to basis of design system.

Approval of Comparable Products: Submit the following at least 10 days prior to submission of a proposal package. Substitution submitted without the below shall be rejected.

Submit line-by-line comparison that describes differences, if any, between each lighting control device specified and those being proposed. Comparison shall include differences in size, quantity, quality, method of control, features and functions, control software functions, and installation requirements.

Product data, including certified independent test data indicating compliance with requirements.

Samples of each component.

Project references: Minimum of 3 installations not less than 3 years old, with Owner and Architect contact information.

Sample warranty.

Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.

* + - * 1. Factory Assembly: All system components shall arrive at the job site completely pre-wired and ready for installation, requiring only the connection of lighting circuits and network terminations. All connections shall be made to clearly and permanently labeled termination points or by connectorized cable. Systems that required field assembly shall not be acceptable.
				2. Component Testing: All system components and assemblies shall be individually tested prior to assembly. Once assembled, all finished products shall be tested for proper operation of all control functions per specifications prior to shipment.
			1. SYSTEM COMPLIANCE
				1. Compliance: Where indicated, individual components shall comply with the following requirements:

NEC Compliance: All system components shall comply with all applicable sections of the National Electrical Code (NEC) NFPA 70 as required.

NEMA Compliance: All system components shall comply with all applicable portions of NEMA standards pertaining to types of electrical equipment and enclosures.

UL Approval: All applicable equipment shall be tested to and listed under UL standard 508, UL standard 916 or UL924 and shall bare labels to indicate compliance. Lighting control relays shall be tested to UL standard 508 for both safety and endurance. Systems listed under ETL or other UL sections shall provide documentation proving compliance with UL standards as listed above.

FCC Emissions: All applicable equipment shall comply with FCC emissions standards specified in Part 15, sub-part j for commercial and residential applications and shall bear labels indicating compliance testing. Equipment that does not meet these standards shall not be acceptable.

* + - 1. WARRANTY
				1. Manufacturer shall warrant the lighting control system components to be free from defects in material and workmanship for a period of five (5) years from the date of the certificate of building occupancy or proof of installation, whichever occurs first (“Warranty Period”). If the certificate of building occupancy is not available or there is no proof of installation, the Warranty Period shall begin with the Product ship date.
				2. Manufacturer’s warranty shall include the repair or replacement product(s) with the same or a functionally equivalent product(s) or component part(s).
				3. Manufacturer shall provide telephone technical support and remote diagnostics where applicable during normal business hours excluding manufacturer holidays.
				4. Upon request, Manufacturer shall provide quotation for manufacturer service contract option(s) which include on-site technician visits for service and repair.
1. PRODUCTS
	* + 1. MANUFACTURERS
				1. Acceptable Manufacturers

Current

* + - * 1. Basis-of-Design: NX Lighting Controls System manufactured by HLI Solutions, a division of Current, Greenville SC.
			1. SYSTEM ARCHITECTURE
				1. System shall consist of wired and/or wireless, distributed intelligent lighting control devices consisting of but not limited to control modules with ON/OFF, full range dimming and CCT control capabilities, and system input devices including but not limited to occupancy/vacancy sensors, daylight sensors and manual switch stations.
				2. System shall provide for automatic self-configuration of system devices. Self-configuration shall be accomplished by the devices themselves and provide for control of lighting prior to system custom configuration and programming. Systems that require configuration prior to use shall be considered unacceptable.
				3. To implement lighting control strategies, the system architecture shall facilitate the association of system input devices to control modules. The system shall use the Area/Zone/Group assignment strategy. The system shall support up to 128 Areas. Each area shall consist of up to 128 Zones and each zone shall consist of up to 16 Groups. Each device may be programmed to participate in one Area and Zone however may belong to one or more of the available 16 Groups within a Zone.
				4. System shall provide time-of-day and astronomical clock scheduling. Each Area/Zone shall support up to 99 scheduled events for use in developing time-of-day or astronomical clock sunrise/sunset automated schedules. Each schedule shall have the ability to turn a group ON or OFF or activate a preset lighting scene at a scheduled time. Schedules shall be day-of-week selectable and may be programmed to activate on any combination of days of the week (Sunday through Saturday) or to activate on a specific date/holiday.
				5. System shall support blink alerts. Relay outputs within the control modules shall be programmable to blink prior to being turned OFF. Blink alert duration time shall be adjustable. Control modules programmed for the blink alert function shall blink the controlled lighting prior to turning OFF to warn occupants of the upcoming OFF event. If an ON command is received during the blink alert time, relay output will be overridden and left ON for the override time. Override time shall be adjustable.
				6. System input devices shall be deployed in a space to monitor and broadcast changes such as occupancy, daylight levels and manual switch input.
				7. System customization and programming shall be performed from a mobile App and/or web-based configuration and system management tools.
				8. System shall have an intuitive and easy to use Graphical User Interface (GUI) to configure, control, monitor and schedule individual devices or groups of devices.
				9. System shall remain fully functional during the programming process. Lighting control systems that must be taken “OFFLINE” for programming are not acceptable. All programming changes shall take effect immediately as they are programmed.
				10. System shall be capable of being accessed from a local network or remotely using any standard Internet browser. System shall not require any special client-side software. Systems which utilize special client-side software shall not be acceptable.
				11. Systems devices shall be capable of communication with each over one or all of the below methods.

RS485 multidrop serial network

Wireless mesh network

Ethernet TCIP network

* + - * 1. Wired – RS485/Ethernet

System shall provide an Ethernet communication backbone (NX Network) for the connection of control Zones.

System shall utilize the RS485 standard for connection of and communications between Zone Devices.

System shall utilize the RS485 standard for connection of and communications between SmartPORT™ devices (e.g., Sensors, Switches and Accessories) connected within a NX Zone.

* + - * 1. Wireless – Coordinator-less, Self-Organizing/Self-Healing Mesh

System shall have a wireless architecture that utilizes wireless mesh radio technology to create a peer-to-peer, self-organizing and self-healing mesh network infrastructure.

System shall have no single point of failure. A master controller/coordinator or master node shall not be required for proper system operation. All nodes shall be capable of communicating with each other without the need of these types of single point of failure devices. Systems which utilize a master controller/coordinator shall not be acceptable.

System shall be self-organizing. The mesh network of devices shall self-organize automatically without the need to manually set device addresses via dials, DIP switches or other means.

System shall be self-healing. System devices within the mesh network shall automatically reroute messages around a failed device to ensure message delivery.

System architecture shall facilitate data transmission between wireless devices over the 2.4GHz ISM radio frequency (RF) band with a supported RF range of 100ft between wireless devices indoors and 300ft outdoors.

System shall use a wireless mesh radio communication protocol to transmit/receive and negotiate messaging among wireless devices.

System shall utilize spread spectrum frequency hopping to facilitate robust communication and prevent the unauthorized interception of messages over the air and to comply with FCC requirements.

System shall provide the ability to secure messages. When implemented, each device shall use the strong and secure AES-128 (Advanced Encryption Standard) security cipher to encrypt and decrypt messages. System shall also use the secure HTTPS/SSL protocol when users access the system using their Internet browser.

* + - * 1. System devices shall be capable of having their firmware updated or upgraded over the air through the wireless mesh network.
			1. DIGITAL ROOM CONTROLLERS
				1. NX Room Controllers

Basis of Design Product: NX Lighting Controls System, NX Room Controllers.

As indicated and where shown on the plans, install NXRC series Room Controller(s) to control the quantity of lighting and plug loads required.

NX Room Controller(s) shall integrate the functionality of connected control components including wall switch stations, occupancy sensors and daylight sensors to provide the required sequence of operation for the space.

NX Room Controller(s) and associated room control components shall operate in a totally standalone mode and not require the use of a network, software, computer, or server for local control functions.

NX Room Controller(s) shall have an embedded Time Clock and be capable of storing and running up to 99 local schedules. Schedules shall run autonomously without the need of any coordinator, gateway, or master controller.

Construction:

NX Room Controller housing shall be constructed of GSM UL rated 94 HB plastic approved for use in a return air plenum.

The housing and shall include an integral 1/2" chase nipple for external mounting to standard junction box knockout.

Two RJ45 FX Port connectors shall be accessible on the side of the enclosure for expansion of a Zone Segment to allow for an expanded number of Zone Segment devices (e.g., Room Controllers, In-Fixture Modules, and Digital Sensors). Up to 32 controllers and devices can be daisy-chained together.

Two RJ45 SmartPORT™ connectors shall be accessible on the side of the enclosure for the connection of NX room level devices.

Two recessed push buttons and associated LED indicators shall be accessible on the top of the enclosure to provide override, status, setup, and testing functions.

Electrical:

NX Room Controller(s) shall have a single power feed and shall be capable of operation at voltages between 120/277/347 volts AC, 50/60 Hz.

One or two output relays (model specific) shall provide for the following load types and ampacity (per relay):

20A, Tungsten,

20A, Magnetic Ballast,

16A, Electronic Ballast,

1 H.P. Motor @ 120V, ¾ H.P. @ 277V; ½ H.P. @ 347V

Where indicated provide one or two independent 0-10 volt dimming channels (model specific) for full range dimming control of fixtures equipped with compatible dimmable ballast or driver.

Each dimming output shall have a current sinking capacity of at least 30 mA.

NX Room Controller(s) shall be capable of supplying 250 mA of Class 2 auxiliary DC power for use by wall switch stations, occupancy sensors, and daylight sensors connected to the room controller's two RJ45 SmartPORT connectors.

NX Room Controller(s) shall be equipped with power monitoring circuitry capable of measuring and reporting the total connected load for each room controller.

Functional:

Provide an integral pushbutton and LED indicator for each load for status and to allow operation of the relays and dimmers for testing and verification without requiring other control devices to be connected.

NX Room Controller(s) shall have a default operation providing an automatic logical sequence of operation for each load as the room control devices are plugged into the SmartPORT connectors.

Default operation for occupancy sensors shall be automatic on, automatic off for all loads.

Upon connection of a switch, the operation shall automatically change to manual on, automatic off (vacancy) mode for all loads.

Provide capability to convert each load independently to automatic on or vacancy mode using only the integral push buttons and LED indicators on the room controller.

When in vacancy mode, provide a 30 second grace period after an off during which automatic on shall be temporarily enabled.

It shall be possible to connect up to thirty-two (32) room controllers together on the FX Ports using Cat5 patch cables to provide configurations up to 64 switched and dimmed loads operating as a single zone.

Provide the following set up and configuration functions without the need for additional devices or software:

Assign/reassign relays for control by wall switch station buttons,

Configure relays for occupancy or vacancy operation,

Assign/reassign dimmers to raise/lower switches,

Assign dimming channels for response to daylight sensor control,

Auto calibrate default daylight sensor sequence of operation,

Save preset scenes.

NX Room Controller(s) shall support the following specialty modes:

SpectraSync™ CCT Control

Dimmer channels can be set individually to control CCT via 0-10V.

Scheduling can be implemented to mimic the natural transition of light throughout the course of the day.

Room-based solutions can be implemented to allow occupants to tune color to task.

SpectraClean™

Ability to control SpectraClean enabled fixtures with three different modes for varying applications:

Constant On

Scheduled

Programmed Dosage

* + - 1. UL924 LOAD CONTROLLER
				1. NX UL924 Load Controller

Basis of Design Product: NX Lighting Controls System, NX UL924 Load Controller.

As indicated and where shown on the plans, install NX UL924 Load Controller to control the quantity of emergency lighting loads required.

NX UL924 Load Controller shall meet NFPA Article 700 requirements for emergency lighting.

NX UL924 Load Controller and associated room control components shall operate in a totally standalone mode and not require the use of a network, software, computer, or server for local control functions.

NX UL924 Load Controller shall provide a remote test button or fire alarm interface.

NX UL924 Load Controller shall have an embedded Time Clock and be capable of storing and running up to 99 local schedules. Schedules shall run autonomously without the need of any coordinator, gateway, or master controller.

Construction:

NX UL924 Load Controller housing shall be constructed of GSM UL rated 94 HB plastic approved for use in a return air plenum.

The housing and shall include an integral 1/2" chase nipple for external mounting to standard junction box knockout.

Two RJ45 FX Port connectors shall be accessible on the side of the enclosure for expansion of a Zone Segment to allow for an expanded number of Zone Segment devices (e.g., Room Controllers, In-Fixture Modules, and Digital Sensors). Up to 32 controllers and devices can be daisy-chained together.

Two recessed push buttons and associated LED indicators shall be accessible on the top of the enclosure to provide override, status, setup, and testing functions.

Electrical:

NX UL924 Load Controller shall have a single power feed and shall be capable of operation at voltages between 120/277/347 volts AC, 50/60 Hz.

One relay output shall provide the following load types and ampacity:

20A, Tungsten,

20A, Magnetic Ballast,

16A, Electronic Ballast,

1 H.P. Motor @ 120V, ¾ H.P. @ 277V; ½ H.P. @ 347V.

NX UL924 Load Controller shall provide two independent 0-10 volt dimming channels for full range dimming control of fixtures equipped with compatible dimmable ballast or driver.

Each dimming output shall have a current sinking capacity of at least 30 mA.

NX UL924 Load Controller shall be equipped with power monitoring circuitry capable of measuring and reporting the total connected load for each room controller.

Functional:

SmartPORT Functionality:

NX UL924 Load Controller shall automatically recognize connected devices in the Zone Segment.

NX UL924 Load Controller shall function as a standard room controller.

NX UL924 Load Controller’s RJ45 CAT5 connection shall be used as a sensing line to standard room controller only and does not support NX room devices.

Emergency Functionality:

NX UL924 Load Controller’s RJ45 CAT5 connection shall be used as a sensing line to standard room controller on normal circuit.

Removal of 24VDC on CAT5 connection shall put NX UL924 Load Controller into emergency state.

NX UL924 Load Controller’s default emergency state is ON with both dimming channels to 100%

Provide an integral pushbutton and LED indicator for controlled load for status and to allow operation of the relay and dimmers for testing and verification without requiring other control devices to be connected.

Provide the following set up and configuration functions without the need for additional devices or software:

Assign/reassign relays for control by wall switch station buttons,

Configure relays for occupancy or vacancy operation,

Assign/reassign dimmers to raise/lower switches,

Assign dimming channels for response to daylight sensor control,

Save preset scenes.

NX UL924 Load Controller shall support the following specialty modes:

SpectraSync™ CCT Control

Dimmer channels can be set individually to control CCT via 0-10V.

Scheduling can be implemented to mimic the natural transition of light throughout the course of the day.

Room-based solutions can be implemented to allow occupants to tune color to task.

SpectraClean™

Ability to control SpectraClean enabled fixtures with three different modes for varying applications:

Constant On

Scheduled

Programmed Dosage

* + - 1. FIXTURE MODULES
				1. NX In-Fixture Modules

Basis of Design Product: NX Lighting Controls System, NX In-Fixture Modules.

As indicated in the specifications and as shown on the plans, install NXFM series Fixture Control Module enabled fixture(s).

NX In-Fixture Modules shall be designed to install inside the fixture they control.

NX In-Fixture Modules shall consist of a completely distributed intelligent lighting controller capable of functioning completely independently including time based and astronomical scheduling of On/Off and preset events without the need of any coordinator, gateway or master controller. Sensors and switches as well as other NX In-Fixture enabled fixtures shall be capable of being connected directly to the NX In-Fixture Module to create a fully functional lighting control system.

NX In-Fixture Module shall be provided with one SPST relay. Relay shall be supplied with “Zero Cross Switching” control to limit the effects of inrush on the relay contacts.

NX In-Fixture Module shall be compatible with incandescent, magnetic, and electronic lighting loads including LED drivers. NX In-Fixture Module shall include zero arc point switching circuitry and have the following max load ratings:

Construction:

Housing: GSM UL Rated 94 HB Plastic

Mounting: Mounts inside fixture

Electrical:

Line Voltage Versions:

Input: Universal 120-347VAC, 50-60Hz

Output: One or two relay outputs (model specific) shall provide for the following load types and ampacity (per relay):

10A, 120VAC only Incandescent

10A, 120-347VAC, Magnetic Ballast

5A, 120-277VAC, Electronic Ballast

3A, 347VAC, Electronic Ballast

Surge Withstand: 2000V

Peak Inrush: 160A for 2 ms Max

Low Voltage Versions:

Input: 12-24VDC

NX In-Fixture Modules shall be provided with two 0-10VDC control interfaces for full range dimming control of dimming ballasts and LED drivers. Interface shall be designed to continuously sink 30mA of current.

NX In-Fixture Module 0-10VDC control interfaces shall be configurable for 0-10VDC dimming, dim to off or color temperature control.

Functional:

NX In-Fixture Modules shall be designed to self-configure, automatically to meet energy code requirements as NX sensors and other NX devices are connected.

NX In-Fixture Module shall be designed such that self-configuration takes place automatically without user intervention or commissioning of any kind.

NX In-Fixture Modules shall be rated and tested for an operating temperature range of -40° to 185°F [-40° to 85°C].

NX In-Fixture Module shall be equipped with a Real Time Clock and integral backup for schedule information. Each module shall support up to 99 schedules. Schedules shall be loaded to the module via the network or locally using the NX Lighting Controls App. Once loaded, schedules shall run autonomously without the need of any coordinator, gateway, or master controller.

NX In-Fixture Module shall be capable of having its device firmware updated wirelessly over the air when connected to a NX sensor of via the NX SmartPORT.

NX In-Fixture Modules shall be supplied with one momentary pushbutton with LED for manual control and testing. Through the use of this switch, it shall be possible to test the On/Off and dimming functionality of the NX In-Fixture module or completely reset the NX In-Fixture Module to factory defaults without the need to connect any other device or testing equipment.

NX In-Fixture Module shall include non-volatile memory for retaining device settings during power outages.

NX In-Fixture Module shall be UL Listed to UL916 and Certified to CAN/CSA C22.2 NO 205-M1983.

NX In-Fixture Module shall be FCC certified.

* + - * 1. NX On-Fixture Modules

Basis of Design Product: NX Lighting Controls System, NX On-Fixture Module.

As indicated in the specifications and as shown on the plans, install NXOFM series wireless On-Fixture Control Module(s).

NX On-Fixture modules shall consist of a completely self-contained distributed intelligent wireless lighting controller capable of functioning completely independently including time based and astronomical scheduling of On/Off and preset events without the need of any coordinator, gateway or master controller.

NX On-Fixture Module shall be configurable remotely over the air utilizing built in Bluetooth radio an iOS or Android handheld device with the NX Lighting Controls App installed or via NX Wireless Network.

NX On-Fixture Module shall be capable of having its device firmware updated wirelessly over utilizing it’s built in Bluetooth radio and iOS or Android handheld device with the NX Lighting Controls App installed or via NX Wireless Network.

On-Fixture Module shall respond to scheduled events, occupancy/vacancy sensor events and manual switch station events.

On-Fixture Module shall monitor and measure energy consumption.

On-Fixture Module shall include non-volatile memory for retaining device settings during power outages.

NX On-Fixture Modules shall be rated and tested for an operating temperature range of -40° to 185°F [-40° to 85°C].

NX On-Fixture Module shall include one SPST relay for On/Off control.

NX On-Fixture Modules relay shall be supplied with “Zero Cross Switching” control to limit the effects of inrush on the relay contact.

NX On-Fixture Module shall be compatible with incandescent, magnetic, and electronic lighting loads including LED drivers.

Construction:

Housing: GSM UL Rated 94 HB Plastic

Mounting: Standard C136-41 (2013) with 5 or 7 pin twist-lock connector. Compatible with C136-10 sockets.

Electrical:

Input: 120-480VAC, 50-60Hz

Output: Relay output shall provide for the following load types and ampacity:

5A@120-347VAC,

3A@480V

Surge Withstand: 2000V

Peak Inrush: 160A for 2 ms Max

Standby Power (W):

120VAC: 1.2

277VAC: 1.5

347VAC: 1.5

480VAC: 1.3

Functional:

On-Fixture Module shall include an integrated daylight sensor with a foot candle range as shown below:

On level: 1FC to 5FC (Default: 5FC)

Off level: 4FC to 15FC (Default: 8FC)

NX On-Fixture Modules shall communicate with other NX enabled fixtures and devices via NX Wireless Network with the following characteristics:

Robust & reliable IEEE 802.15.4 2.4GHz wireless self-organizing and self-healing mesh network

Radio Range: Outdoor: ~1000 ft. (~300m) Note: Range based on clear line of site.

Security: AES-128 (Advanced Encryption Standard)

NX On-Fixture Module shall include non-volatile memory for retaining device settings during power outages.

NX On-Fixture Module shall UL Listed to UL916 and Certified to CAN/CSA C22.2 NO 205-M1983.

NX On-Fixture Module shall be FCC certified.

* + - 1. LIGHTING CONTROL PANELS
				1. NX Lighting Control Panels

Basis of Design Product: NX Lighting Controls System, NX Lighting Control Panels.

As indicated and where shown on the plans, install NX Lighting Control Panels V2 (NXP2 Series).

Panel shall be a fully distributed intelligent lighting controller with the ability to function as a stand-alone lighting control panel or as part of an NX networked system.

Panel shall provide standard capacities for 8, 16, 24, 32, or 48 relays in each panel with matching number of 0-10v dimming channels.

Panel shall be available in custom configurations. Configuration options shall include: panel shipment type (enclosure/interior shipped together, enclosure/interior shipped separately, enclosure only, and interior only), panel size, number of single pole/double pole relays, emergency control option, input voltage and enclosure mount (surface mount or flush mount).

Panels shall be factory assembled and tested. No field assembly shall be required.

Construction:

Panel shall be surface or flush wall mounted in a NEMA1 rated enclosure, based on panel configuration.

Panel shall be capable of being shipped with enclosure/interior together, enclosure/interior separately, enclosure only, and interior only in appropriately designed packaging. When enclosure is shipped separately, enclosure shall enable rough-in of all electrical connections prior to receipt of the panel interior.

Panel enclosure shall have standard electrical conduit knockouts on the top, the bottom and both sides of the enclosure to allow installation flexibility. Field drilling and cutting for pipe and wire shall not be required.

Panel shall provide keyhole mounting holes in the rear of the enclosure.

Panel enclosure shall include 6” spacing running the width of the panel at the bottom of the panel to allow for line voltage accessories such as contactors or to provide a “gutter”. Space shall be separated from the low voltage area utilizing a removable metal barrier. No knockouts added to the bottom plate of the inner high voltage divider. Exterior enclosure will maintain knockouts on bottom.

Panel venting shall conform to NEMA 1 enclosure specifications to contain any local explosion and to protect the working environment.

Panel enclosure shall feature removable metal barriers that separate all high-voltage components and wiring (Class 1) from all low-voltage (Class 2) components and wiring.

Panel enclosure shall be of welded construction primed and painted with a powder coat finish. Unpainted or galvanized enclosures are not acceptable.

Panel cover shall attach to the enclosure with #10-32 x ½” truss head machine screws.

Panel cover shall employ “keyhole” style openings for the top two mounting screws to allow the panel’s cover to be temporarily hung during installation eliminating the need to completely remove all the mounting screws along with contributing to safety ensuring the cover does not swing if all screws were removed.

8 Relay panel cover – 4 mounting holes: 2 keyhole style slots, 2 slotted style slots

16/32 Relay panel cover – 6 mounting holes: 2 keyhole style slots, 4 slotted style slots

48 Relay panel cover – 8 mounting holes: 2 keyhole style slots, 6 slotted style slots

Panel cover shall be sized for either surface or recess mounting of the panel.

Panel cover shall have hinged locking door to expose only the low voltage wiring section of the panel.

Panel door hinges shall be located on the left side.

Panel shall be provided with a factory or field installable panel interior. Panel interior shall contain all controller electronics, power supplies, relays, and other required components. Panel shall arrive at the project site completely pre-wired and requiring only the connection of lighting circuits and network cable. Systems that require field assembly of controllers or chassis inserts are not acceptable

Panel interior components shall reside on a framed skeleton. When disconnected from the load circuits and necessary mounting connections, the framed skeleton can be removed taking all the electrical components intact.

Panel interior components shall be designed to not become dislodged during shipment.

Panel spacing between panel relays shall be suitable for separating any two relays in the panel to meet the NEC requirements for normal and emergency power when a metal divider is installed between relays. A metal plate barrier shall be available to separate relays - two plates per application.

Panel relays shall be of the snap-in type and be individually field replaceable.

Electrical:

Panel shall be supplied with either a 120V/277V, 347V or 480V power supply.

Panel power supply shall provide the required capacity for the operation of the panel, relays, controllers, NX Network, SmartPORTs, user interfaces and the maximum number of low voltage and/or data devices that can be connected to each panel.

Panel wire connections shall be made to labeled terminal blocks.

Panel shall have LED status/failure indicators.

Panel shall provide support for Bluetooth programming using the NX Lighting Controls App and the NX Bluetooth Radio Bridge with Clock or a SmartPORT connected NX sensor.

Panel shall include two (2) Ethernet ports for connection to the NX Network.

Panel shall include four (4) RJ45 NX SmartPORTs for the connection of all NX sensors and switches. SmartPORTs shall be capable of supplying 250 mA of Class 2 auxiliary DC power for use by wall switch stations, occupancy sensors, and daylight sensors connected to the SmartPORT connectors

Panel shall have four (4) 3-wire low voltage dry contact inputs. Removable terminal blocks shall be provided to support momentary or maintained closures from building automation systems, fire systems, demand response and security systems as well as other systems or devices including occupancy sensors, daylight sensors, and low voltage switches. Each input shall be individually programmable and provide the ability to initiate any NX switch compatible function or command. (on, off, raise, lower, preset, timed on/off). Each input will provide a connection for sourcing 24V, a common, control and pilot light functionality for low voltage switch stations.

Panel shall have two (2) SPDT (NO/NC) dry contact outputs, with removable terminal blocks, to provide a contact closure to signal out to another system that is capable of receiving a NO or NC closure to signal building automation, security or alarm system based on a schedule or a command from an input device (e.g. occupancy sensor, daylight sensor, wall switch station, etc.). Each output will have a contact rating of 24VDC@50mA minimum.

Panel shall have an easily accessible, removable coin size battery for maintaining system time during a power loss.

Panel shall, after a power loss, retain time for a minimum of 72 hours.

Panel time shall be updated when connected to a device utilizing the NX Lighting Controls App or from an NX network time server.

Panel shall feature a power sensing circuit and transformer for UL924 operation. Upon detection of loss of power, the panel shall force all relays closed and all dimming channels to full bright. Panel shall maintain this state until normal power is restored. Connected devices will not be powered.

Panel shall have a test button on the optional UL924 board to test the UL924 operation.

Panel shall have a low voltage remote test switch input on the optional UL924 to test the UL924 operation.

Panel shall provide relay/dimmer boards to expand panel capacity from 8 to 48 relay outputs in groups of 8. Relay/dimmer boards shall be completely self-configuring and shall not require manual settings to configure for use within the panel.

Panel relay/dimmer boards shall confirm relay presence and status.

Panel relay/dimmer boards shall have (8) 0-10V integrated dimming channels, each capable of sinking 50mA.

Panel dimming channels shall be software assignable.

Panel shall be capable of containing 1 to 48 robust and reliable mechanically latching lighting control relays as indicated on the drawings and schedules as specified herein. Electrically held or non-mechanically latching relays shall not be considered.

Panel relays shall be individually UL and CUL listed and shall bear labels indicating compliance. Lighting control relays shall be tested to UL standard 508 for both safety and endurances and bare labels signifying compliance.

Panel relays shall have the following load ratings:

Single Pole Relays:

General Use: 30A @ 300VAC

Tungsten: 2400W @ 120VAC

Standard Ballast: 20A @ 300VAC

Motor Starting: 1HP @ 110-125VAC; 1½ HP @ 220-277VAC

Double Pole Relays:

General Use: 20A @ 480VAC

Tungsten: 2400W @ 120VAC

Standard Ballast: 20A @ 480VAC

Motor Starting: 1HP @ 110-125VAC; 1½ HP at 220-277VAC

Panel relays shall be rated for minimum cycle life of 120,000+ operations (60,000+ cycles).

Panel relays shall have a Short Circuit Current Rating (SCCR) of 18,000A @ 277VAC.

Panel relays shall have a built-in manual override lever & ON/OFF indicator.

Panel relays shall be capable of manual activation On or Off with or without power.

Functional:

Panel shall be of the distributed intelligence type and shall not be dependent on a network connection to execute schedules or perform programmed functions.

Panel shall be programmed using the optional NXBTC Bluetooth® radio module with clock and NX Lighting Controls App. When networked, panel configurations shall be performed utilizing the NX Area Controller’s web-browser based Graphical User Interface.

Panel shall provide the ability to update panel firmware. Firmware update process shall ensure that the complete and correct firmware (e.g. via CRC check) has been downloaded before the panel is flashed with the new firmware.

Panel set up and configuration functions shall include (but are not limited to):

Assign/reassign relays for control by wall switch station buttons,

Configure relays for occupancy or vacancy operation,

Assign/reassign dimmers to raise/lower switches,

Assign dimming channels for response to daylight sensor control,

Assign names to relays/dimmers,

Auto calibrate default daylight sensor sequence of operation,

Create and save preset scenes,

Configure wall switch button types. At a minimum, button types shall include toggle on/off with pilot, preset, on only and off only,

Configure up to six zones of daylight harvesting per room with independent set points and time delays,

Include or exclude loads from occupancy sensor control,

Configure up to 16 load groups per zone,

Configure up to 16 preset scenes per zone with independent fade times,

Set independent power up conditions for relays and dimmers,

Set independent occupied and unoccupied conditions for each relay and dimmer,

Adjust dimmer high and low trim points,

Manually control lighting loads

Panel shall provide the ability to create up to ninety-nine (99) schedules per zone. Each schedule will consist of the following:

Event Time – Shall be configured as a specific set “Normal” time (hh:mm am/pm) or as an offset based on one of the following: Before Sunrise, After Sunrise, Before Sunset, After Sunset, Before Open, After Open, Before Close or After Close.

Action – Task to be performed: None, Group State, or activation of a Preset.

None – No action to perform

Group State – The specific relay / dim level / color temp range settings, that the select group(s) of actuators should implement.

Presets – The specific preset that should be activated.

Panel shall provide the ability to disable a schedule

Panel shall provide the ability to delete a schedule

* + - 1. CONTROLLED RECEPTACLES
				1. HCS Controlled Receptacle

Basis of Design Product: NX Lighting Controls System, HCSREC Series Controlled Receptacle.

Controlled Receptacle shall be capable of controlling other receptacles downstream in the branch circuit.

Controlled Receptacle shall be automatically controlled by a low voltage signal from an occupancy sensor or any other type of control capable of performing this task, e.g., time-of-day control device.

Controlled Receptacle shall be available in split or fully controlled 15A or 20A models.

Controlled Receptacle shall feature permanent NEC 406.3 (E) markings.

Controlled Receptacle shall be UL498B SA Listed Receptacles with integral switching that complies with Supplement SA.

* + - 1. SENSORS
				1. NX Smart Sensor Module Passive Infrared, Wireless Occupancy & Daylight Sensor

Basis of Design Product: NX Lighting Controls System, NX Smart Sensor Modules.

As indicated in the specifications and as shown on the plans, install NXSMP series sensor module enabled fixture(s).

NX Smart Sensor Module shall be designed to install directly into or on the fixture housing or lens.

NX Smart Sensor Module shall integrate seamlessly into the NX Network.

NX Smart Sensor Module shall have an RF frequency of 2.4GHz.

NX Smart Sensor Module shall include Bluetooth and provide connection to the NX Network using the NX Lighting Controls App.

NX Smart Sensor Module Occupancy/Vacancy sensor shall provide automatic or vacancy switching of lighting load(s) within an area/zone based on the presence of human activity.

NX Smart Sensor Module Occupancy/Vacancy sensor shall be microprocessor controlled and utilize IntelliSCOPE™ technology to provide real-time graphical occupancy data.

NX Smart Sensor Module Occupancy/Vacancy sensor shall not require any adjustments of any kind at the time of installation or during operation.

NX Smart Sensor Module Occupancy/Vacancy sensor shall be powered by SmartPORT™ using plenum rated SmartPORT plug and play cables.

NX Smart Sensor Module Occupancy/Vacancy sensor shall have a timer that can be adjusted manually from 1 second to 20 minutes.

NX Smart Sensor Module Occupancy/Vacancy sensor sensitivity shall be adjustable from 1 to 10.

NX Smart Sensor Module Occupancy/Vacancy sensor shall include non-volatile memory for retaining device settings during power outages.

NX Smart Sensor Module Occupancy/Vacancy sensor shall have RED real time motion indicator LED visible from the front of the unit.

NX Smart Sensor Module Occupancy/Vacancy sensor may be programmed for active and inactive times.

NX Smart Sensor Module Occupancy/Vacancy sensor shall be available with the following 360° coverage patterns:

SMI/LMI – 1:1 (mounting height to radius) up to 14 feet

OMNI – 1:1.5 (mounting height to radius) up to 14 feet

LMO – 1:3 (mounting height to radius) up to 16 feet

HMO – 1:1.4 (mounting height to radius) up to 45 feet indoors / 32 feet outdoors

NX Smart Sensor Module daylight sensor shall continually measure the amount of visible light under the lighting fixture to provide continuous On/Off and full range dimming control of fixture or group under its control.

NX Smart Sensor Module daylight sensor shall utilize a closed loop daylight harvesting algorithm to maintain the required light level in response to changes in daylight.

NX Smart Sensor Module daylight sensor shall have independently programmable ramp up and ramp down times to allow the sensor to respond quickly to decrease in daylight and respond more slowly to increase in daylight to minimize the effect of sudden changes in daylight.

NX Smart Sensor Module daylight sensor shall be capable of being programmed for active and inactive times.

NX Smart Sensor Module daylight sensor shall include non-volatile memory for retaining device settings during power outages.

* + - * 1. NX Smart Sensor Module Dual Technology, Wireless Occupancy & Daylight Ceiling Mount Sensor

Basis of Design Product: NX Lighting Controls System, NX Smart Sensor Modules.

As indicated in the specifications and as shown on the plans, install NXSMDT series sensor modules.

NX Smart Sensor Module DT shall be designed for indoor use only and to mount directly to ceilings.

NX Smart Sensor Module DT shall integrate seamlessly into the NX Network.

NX Smart Sensor Module DT shall have an RF frequency of 2.4GHz.

NX Smart Sensor Module shall include Bluetooth and provide connection to the NX Network using the NX Lighting Controls App.

NX Smart Sensor Module DT Occupancy/Vacancy sensor shall provide automatic or vacancy switching of lighting load(s) within an area/zone based on the presence of human activity.

NX Smart Sensor Module Occupancy/Vacancy sensor shall be microprocessor controlled and shall have adjustable technology detection modes including Dual Technology (Passive Infrared (PIR) and Ultrasonic (US)), Passive Infrared (PIR) only, and Ultrasonic (US) only.

NX Smart Sensor Module Occupancy/Vacancy sensor shall utilize IntelliSCOPE™ technology to enable fine-tuning of the motion detection technologies using real-time Passive Infrared (PIR) and Ultrasonic (US) graphical occupancy data.

NX Smart Sensor Module DT Occupancy/Vacancy sensor shall be powered by SmartPORT™ using plenum rated SmartPORT plug and play cables.

NX Smart Sensor Module DT Occupancy/Vacancy sensor shall have a timer that can be adjusted manually from 1 second to 20 minutes.

NX Smart Sensor Module DT Occupancy/Vacancy sensor sensitivity shall be adjustable from 1 to 10.

NX Smart Sensor Module DT Occupancy/Vacancy sensor shall include non-volatile memory for retaining device settings during power outages.

NX Smart Sensor Module DT Occupancy/Vacancy sensor shall have a Red Passive Infrared (PIR) and Green Ultrasonic (US) real time motion indicator LEDs visible from the front of the unit.

NX Smart Sensor Module DT Occupancy/Vacancy sensor may be programmed for active and inactive times.

NX Smart Sensor Module DT Occupancy/Vacancy sensor shall have the following coverage:

1:2.75 Coverage pattern (mounting height to coverage radius)

Coverage: Adjustable up to 2,000 square feet

Recommended Mounting Height: 8ft (2.44m) with a max mounting height: 12ft (3.66m)

NX Smart Sensor Module DT daylight sensor shall continually measure the amount of visible light under the lighting fixture to provide continuous On/Off and full range dimming control of fixture or group under its control.

NX Smart Sensor Module DT daylight sensor shall utilize a closed loop daylight harvesting algorithm to maintain the required light level in response to changes in daylight.

NX Smart Sensor Module DT daylight sensor shall have independently programmable ramp up and ramp down times to allow the sensor to respond quickly to decrease in daylight and respond more slowly to increase in daylight to minimize the effect of sudden changes in daylight.

NX Smart Sensor Module DT daylight sensor shall be capable of being programmed for active and inactive times.

NX Smart Sensor Module DT daylight sensor shall include non-volatile memory for retaining device settings during power outages.

NX Smart Sensor Module DT shall be available in White, Black and Gray colors.

* + - * 1. NX Occupancy Sensors, Wired

Basis of Design Product: NX Lighting Controls System, NX Occupancy Sensors.

NX Occupancy Sensors shall be ceiling or wall mounted and use dual technology (ultrasonic and passive infrared), ultrasonic and/or passive infrared (model specific) sensing technology as indicated.

NX Occupancy Sensors shall be Class 2 and connect to any room controller SmartPORT using a wiring adaptor and standard Cat5 patch cable.

NX Occupancy Sensors shall be microprocessor controlled and utilize IntelliDAPT® technology to optimize sensor behavior to adapt to space conditions and occupant usage patterns and adjust sensitivity and time delay to maximize energy savings and minimize false On and Off events

NX Occupancy Sensors shall be self-adaptive and not require manual calibration after installation. Digital circuitry and logic shall automatically adjust the sensitivity and time delay based on learned occupancy patterns and the environment in which the sensor is installed.

NX Occupancy Sensors using both ultrasonic and passive infrared (dual technology) shall operate such that detection by both technologies is required to initiate occupancy and continued detection by either technology will maintain occupancy.

Up to four NX Occupancy Sensors may be connected to one room controller.

* + - * 1. NX Occupancy Output Interface

Basis of Design Product: NX Lighting Controls System, NXRO Series Occupancy Output Interface Module.

NX Occupancy Output Interface shall communicate the occupancy state of an NX control zone to HVAC or other building systems using a contact closure.

NX Occupancy Output Interface shall connect to a SmartPORT™ and provide the aggregate occupancy state of the zone as reported by one or more occupancy sensors.

NX Occupancy Output Interface shall mount to a standard 4 11/16” junction box.

NX Occupancy Output Interface shall have a removable terminal block for input connection.

NX Occupancy Output Interface shall be powered by NX SmartPORT.

NX Occupancy Output Interface shall support multiple occupancy sensors in a zone.

NX Occupancy Output Interface shall feature a low voltage Form-C relay for Normally Closed / Normally Open operation.

NX Occupancy Output Interface shall be a low voltage device: 24VDC.

* + - * 1. NX Daylight Sensor, Wired

Basis of Design Product: NX Lighting Controls System, NXDS Series Daylight Sensor.

NX Daylight Sensor shall provide ambient light level information to the room controller allowing daylight responsive lighting control.

The system shall operate in an open loop sequence of operation reducing the amount of electric light as the quantity of daylight entering the room increases.

It shall be possible to configure up to six daylight zones in a room. Each zone shall be programmable to proportionally respond to the light level provided by the daylight sensor.

NX Daylight Sensor shall be mounted vertically or horizontally and positioned to provide an unobstructed view of the windows per the manufacturer's directions.

NX Daylight Sensor shall be available in indoor and outdoor models.

NX Daylight Sensor shall have an architecturally attractive design.

NX Daylight Sensor shall have a foot-candle range: 3-6,000FC

* + - * 1. NX Wall Partition Sensor

Basis of Design Product: NX Lighting Controls System, NXWPS Series Wall Partition Sensor.

NX Wall Partition Sensor shall automatically signal the NX Lighting Controls System when a moveable partition has been opened or closed. This allows the two adjacent rooms to be combined or separated into individual rooms.

NX controls shall automatically reconfigure to operate in unison when rooms are combined.

NX controls shall automatically reconfigure to operate independently when the rooms are separated.

NX system shall allow for room combine scenarios with up to 16 combinable rooms.

NX Wall Partition Sensor shall be a low voltage device: 24VDC.

* + - * 1. NX Dry Contact Closure Interface

Basis of Design Product: NX Lighting Controls System, NXCI Series Contact Closure Interface.

NX Dry Contact Closure Interface shall enable third-party devices to provide dry contact inputs to the NX Lighting Controls System.

NX Dry Contact Closure Interface shall provide switch activation using contact closures from external devices such as key switches, AV systems, photo-eye sensors or other low voltage Class 2 devices.

NX Dry Contact Closure Interface shall default to On/Off operation and can be programmed to perform alternate functions including:

Toggle On/Off

Preset

Raise

Lower

Timed On

NX Dry Contact Closure Interface shall feature a removable terminal block for input connection.

NX Dry Contact Closure Interface shall feature pilot light output terminals.

NX Dry Contact Closure Interface shall be a low voltage device: 24VDC.

* + - 1. WALL STATIONS
				1. NX SimpleTouch™ Graphic Wall Station

Basis of Design Product: NX Lighting Controls System, NX SimpleTouch Graphic Wall Station.

Graphic Wall Station shall employ a 3.5” resistive LCD-TFT, full-color touch screen with 320x480 screen resolution in portrait orientation.

Graphic Wall Station shall mount to a standard single gang switch box.

Graphic Wall Station shall utilize standard Cat5 cabling for connection to system SmartPORT. Provide two RJ45 ports to allow daisy chain connection with other NX Smart Switches.

Graphic Wall Station shall operate seamlessly with other NX Smart Switches.

Graphic Wall Station shall provide a 4GB microSD card for storing user preferences that include the quantity of controls per screen, function names, screen navigation, home screen selection, and custom screen saver graphic image.

Graphic Wall Station screens can be configured to meet project requirements for control of up to 16 groups, each with provision for On/Off and dimming, up to 16 preset scenes, or CCT color control.

Graphic Wall Station shall be capable of local control within a single space or configured for master control across spaces or building wide.

Graphic Wall Station shall have an optional password access control that will require a secure PIN to access the station.

Graphic Wall Station shall have adjustable screensaver timeout and backlight brightness.

Graphic Wall Station shall be supplied with a white bezel. Optional color change kit shall allow for Ivory, Grey, Light Almond, or Black.

* + - * 1. NX Smart Switches (Wired)

Basis of Design Product: NX Lighting Controls System, NXSW Series Smart Switches (Wired).

NX Smart Switches (Wired) shall be of the programmable type using standard Cat5 cabling for connection to system SmartPORT™.

NX Smart Switches (Wired) shall have one to six buttons and provide lighting control functions as called out and shown on the plans.

NX Smart Switches (Wired) shall be available with the following specialty versions:

OO: On/Off

ORLO: On/Raise/Lower/Off

RL: Raise/Lower

TO: Timed-On

SS: Scene

Construction:

Housing: Rugged, high impact, injection molded plastic

Mounting: Switches shall be capable of being mounted to single-gang and multi-gang wall boxes and shall be compatible with standard decorator style wall plates.

Electrical:

Class 2 Low Voltage 24VDC

Connection via two (2) RJ-45 SmartPORTs to allow for daisy chain connection of up to eight switches to each SmartPORT.

NX Smart Switches (Wired) shall be available in White, Ivory, Light Almond, Gray, Black, and Red.

* + - * 1. NX Smart Switches (Wireless)

Basis of Design Product: NX Lighting Controls System, NXSW Series Smart Switches (Wireless).

NX Smart Switches (Wireless) shall be of the programmable type using the NX Lighting Controls App.

NX Smart Switches (Wireless) shall have a single rocker switch with two momentary switches and provide lighting control functions as called out and shown on the plans.

NX Smart Switches (Wireless) shall be programmable with the following switch functions:

On/Off

On/Raise

Off/Lower

Raise

Lower

Timed-On

Scene

Construction:

Housing: Rugged, high impact, injection molded plastic

Mounting: Switches shall be capable of being mounted directly to wall surfaces using provided 3M Command™ Strip, and to single-gang and multi-gang wall boxes and shall be compatible with standard decorator style wall plates (not included).

Switches shall include a built-in level to ensure device is mounted properly.

Electrical:

Class 2 Low Voltage 24VDC

3VDC, 5.4mA

Powered using CR2032 battery only

NX Smart Switches (Wireless) shall be available in White.

* + - * 1. NX Audio Visual Interface Module

Basis of Design Product: NX Lighting Controls System, NXAVM Series Audio Visual Interface Module.

NX Audio Visual Interface Module shall enable third-party systems to digitally interface with an NX Lighting Controls System.

NX Audio Visual Interface Module shall provide an ASCII based command set to interface with third-party systems such as Audio-Visual systems to send commands to and receive query status from an NX system.

NX Audio Visual Interface Module shall feature a DB9 connector and support RS232 serial communication, providing control and status for a single zone.

NX Audio Visual Interface Module shall mount to a standard 4 11/16” junction box.

* + - 1. NETWORK AREA CONTROLLER
				1. NX Area Controller

Basis of Design Product: NX Lighting Controls System, NX Area Controller V2 (NXAC2 Series).

NX Area Controller shall provide a simple and highly intuitive graphical user interface (GUI) to the NX Lighting Controls System via a personal computer.

NX Area Controller shall enable any PC with a standard web-browser to interface with the NX system through a built-in web server.

NX Area Controller shall enable system users to easily program, monitor and control (locally or remotely) the functions of the NX system.

NX Area Controller shall connect to the NX Network providing communication with the NX Room Controllers, NX Lighting Control Panels, NX SmartPORT™ Modules and other wired NX system components.

NX Area Controller shall have the ability to communicate by means of TCP/IP over Ethernet allowing enterprise connectivity between the NX Lighting Controls System and external LAN or WAN networks.

NX Area Controller shall be capable of communicating with Building Automation System via an embedded BACnet™ client using the BACnet IP protocol.

NX Area Controller shall enable the connection of multiple users simultaneously.

NX Area Controller shall enable secure remote connections over a cellular network.

NX Area Controller shall have a physical modem switch that can turn off remote cellular and Wi-Fi radios.

NX Area Controller shall feature user account/password management.

Construction:

Design: Solid State – No moving parts

7.32” W x 2.6” H x 4.9” D (186mm x 66mm x 126mm)

2.9 LB (1.21 KG)

Mounting: Wall or DIN rail mounting

Housing Color: Black

Electrical:

100-240VAC, 50/60 Hz (AC Adapter included)

Ethernet 10 base-T via NX Network cable, integral 2-port ethernet hub.

Functional:

NX Area Controller shall function as a web server allowing the user interface to be accessible through a standard web browser.

The installation of software shall not be required. At a minimum, the user interface shall provide the following functions:

Automatic discovery of NX system devices

Commissioning of devices into logical Areas and Zones, provide a minimum of 128 areas each with 128 zones

Display the entire system in a logical navigation tree view

Allow the user to name Zones, Groups, Presets, Schedules and individual loads

Set up control functions for system inputs and outputs

Monitor status and override individual relays and dimmers

Set up and download schedules to panels and room controllers

Monitor real-time power use at each room controller

* + - 1. NETWORK MODULES
				1. NX Network Bridge Module

Basis of Design Product: NX Lighting Controls System, NX Network Bridge Module.

NX Network Bridge Module shall allow multiple room controller zones to be networked with other NX system devices for whole building administration of lighting control functions.

NX Network Bridge Module housing shall measure 5.75" X 3.85" X 1.3"and be constructed of GSM UL rated 94 HB plastic approved for use in a return air plenum.

NX Network Bridge Module shall connect to and be powered from a room controller SmartPORT via a standard Cat5 cable.

NX Network Bridge Module shall provide RJ-45 ports for in and out connection points for an Ethernet based network.

NX Network Bridge Module shall provide a communication link between the room control devices and the NX system Area Controller via an Ethernet based network. At a minimum, the network link shall provide the following functionality through a web browser user interface:

Report the current occupancy status for each lighting control zone

Indicate the status of each relay and dimming channel

Allow reconfiguration of system device input and output parameters

Report the real time power consumption for each Room Controller

Set up daylight harvesting for zones equipped with photocells

Configure and download schedules to panels and Room Controllers

* + - * 1. NX Network Radio Module

Basis of Design Product: NX Lighting Controls System, NXRM2 Series Radio Module.

NX Network Radio Module shall allow a luminaire equipped with the NXFM In-Fixture Module to be promoted wirelessly from standalone operation to full network participation.

NX Network Radio Module shall plug into the SmartPORT™ connector on the NXFM In-Fixture Module and is mounted through a 1.25” aperture in the luminaire housing.

NX Network Radio Module shall feature a low-profile housing for minimal visual impact.

NX Network Radio Module shall feature an O-ring gasket to provide watertight seal to luminaire housing.

NX Network Radio Module shall have an integrated and compact PCB F antenna and shall not require an external antenna.

NX Network Radio Module shall integrate seamlessly into the NX Network.

NX Network Radio Module shall have an RF frequency of 2.4GHz.

NX Network Radio Module shall include Bluetooth and provide connection to the NX Network using the NX Lighting Controls App.

* + - * 1. NX Network Interface Module:

Basis of Design Product: NX Lighting Controls System, NXHDI Series Device Network Interface Module.

NX Network Interface Module shall provide network connection and power to accessory components including NX Dry Contact Interface and NX SmartPORT Modules.

NX Network Interface Module shall be discoverable by the NX Area Controller and controllable through web browser interface.

NX Network Interface Module shall repeat network communication signal to extend network length.

NX Network Interface Module shall feature integral link indicators confirming network segment status.

NX Network Interface Module shall feature a power LED indicator confirming presence of accessory DC power on NX Network segment.

NX Network Interface Module shall feature dual RJ45 NX Network input and output jacks to enable module to be inserted anywhere along the NX Network as needed.

Construction:

Extruded and sheet aluminum

Weight: 6 oz (170.1g)

Mounting: 1.38” (35mm) DIN rail

Electrical:

Input: 24VDC, 800mA max current via NX Network cable

Output: 24VDC power supplied to connected accessory modules

NX Network Interface Module shall be Title 24 Compliant.

* + - * 1. NX SmartPORT Module

Basis of Design Product: NX Lighting Controls System, NX SmartPORT Module.

NX SmartPORT Module shall provide the ability to easily connect smart switch stations, motion detectors, and daylight sensors into the NX network system.

NX SmartPORT Module shall have (4) SmartPORTs each with (2) RJ45 connectors for convenient connection of multiple devices.

Devices connected to the SmartPORT module shall be network visible and configurable to operate with panels and room controllers via the web browser user interface.

NX SmartPORT Module shall be compatible with all NX Smart Switch Stations, NX Occupancy Sensors and NX Daylight Sensor.

NX SmartPORT Module shall feature DIN rail mounting.

NX SmartPORT Module shall be a low voltage device: 24VDC.

* + - * 1. NX Dry Contact Interface Module

Basis of Design Product: NX Lighting Controls System, NXDCIO Series Dry Contact Interface Module.

NX Dry Contact Interface Module shall provide a simple way to incorporate standard dry contact inputs and outputs into the NX Lighting Controls System.

NX Dry Contact Interface Module shall accommodate dry contact input closures from building automation, fire, security, and many other types of systems.

NX Dry Contact Interface Module shall be programmable from the NX Area Controller.

NX Dry Contact Interface Module shall feature (6) individually programmable dry contact inputs with or without pilots.

NX Dry Contact Interface Module shall accommodate 2 and 3 wire inputs (momentary or maintained).

NX Dry Contact Interface Module shall feature (6) individually programmable Form-C dry contact outputs.

NX Dry Contact Interface Module shall have removable terminal blocks for easy connections.

NX Dry Contact Interface Module shall feature DIN rail mounting.

NX Dry Contact Interface Module shall be a low voltage device: 24VDC.

* + - 1. NETWORK ACCESSORIES
				1. NX Bluetooth® Radio Bridge with Real Time Clock

Basis of Design Product: NX Lighting Controls System, NXBTC Series Bluetooth Radio Controller.

NX Bluetooth Radio Bridge with Real Time Clock shall provide a wireless communication bridge for communications via iOS® or Android™ smart device apps.

NX Bluetooth Radio Bridge with Real Time Clock shall connect to and be powered by an NX SmartPORT™.

NX Bluetooth Radio Bridge with Real Time Clock shall use Bluetooth technology allowing the radio to easily pair with a smart phone or tablet.

NX Bluetooth Radio Bridge with Real Time Clock shall communicate with the NX system for setup and control from a smart device.

NX Bluetooth Radio Bridge with Real Time Clock shall feature a real time clock and allow schedules to be downloaded and run in stand-alone NX Room Controller applications without a network.

NX Bluetooth Radio Bridge with Real Time Clock shall provide password protections for user access preventing unauthorized Bluetooth connection of a smart device.

NX Bluetooth Radio Bridge with Real Time Clock shall use Bluetooth Version 4.1.

NX Bluetooth Radio Bridge with Real Time Clock shall feature an LED status indicator for successful connections.

NX Bluetooth Radio Bridge with Real Time Clock shall have a RJ45 plug-in connection to NX SmartPORT.

NX Bluetooth Radio Bridge with Real Time Clock shall be a low voltage 24VDC device.

NX Bluetooth Radio Bridge with Real Time Clock shall be rated for return air plenum

* + - * 1. NX Media Converter

Basis of Design Product: NX Lighting Controls System, NXEOF Series Media Converter.

NX Media Converter shall allow a transition from copper based ethernet to fiber.

NX Media Converter shall support 10BASE-T, 100BASE-TX, 100BASE-FX and IEEE 802.3 specifications.

NX Media Converter shall be a multimode converter and support up to 5km distance.

NX Media Converter shall include and RJ45 port that supports full/half-duplex auto-negotiation and MDI/MDIX auto-crossover.

NX Media Converter shall include LED indicators for RJ45 and fiber port status.

NX Media Converter shall include a wall mounting kit.

* + - * 1. NX Network PoE Switch

Basis of Design Product: NX Lighting Controls System, NXPOE Series PoE Switch/Power Injector.

NX Network PoE Switch shall provide the splitting of the Network network from the NX Area Controller into multiple segments.

NX Network PoE Switch shall provide seven powered RJ45 ports for connection of NX network devices.

NX Network PoE Switch shall provide multiple dimming options including DMX to less than 0.1%.

NX Network PoE Switch shall expand the capacity of the NX Area Controller to 448 bridges suitable for large commercial and architectural interiors.

* + - * 1. NX Energy Dashboard

Basis of Design Product: NX Lighting Controls System, NX Energy Dashboard.

NX Energy Dashboard shall provide real-time monitoring of energy consumption for the NX Lighting Controls System.

NX Energy Dashboard shall provide monitoring for up to 300 zones.

NX Energy Dashboard shall report out power and energy consumption for a specific, user selected zone.

NX Energy Dashboard shall be able to export out consumption data in .csv format for third party applications.

NX Energy Dashboard shall provide a wide range of reporting & monitoring intervals from less than an hour to multiple years.

NX Energy Dashboard shall be able to manage user rights & permissions to access the dashboard portal.

NX Energy Dashboard shall be able to manage system configuration changes and network settings.

Construction:

NX Energy Dashboard electronics shall be housed in a NEMA 1 polycarbonate enclosure suitable for surface wall mounting.

NX Energy Dashboard enclosure shall measure 13.41"H x 11.41" W x 7.38" D and include a hinged locking door.

NX Energy Dashboard enclosure shall be IP66 rated.

NX Energy Dashboard components shall be mounted inside the enclosure on flat panel, 35mm DIN rail.

Electrical:

Input: 120-240VAC, 60Hz hard wired supply connection.

Networking & Software:

N4 Niagara Operating System.

10-Base T Ethernet via (2) RJ-45 ports.

(1) Micro USB for serial shell access.

(1) Mini-B USB port

4GB Internal flash memory for storage

* + - * 1. NX Forward and Reverse Phase Dimming Converter

Basis of Design Product: NX Lighting Controls System, NX Forward and Reverse Phase Dimmer Converter.

NX Forward and Reverse Phase Dimmer shall auto-sense forward and reverse phase dimming.

NX Forward and Reverse Phase Dimmer shall dim standard 120V or 277V lighting loads.

NX Forward and Reverse Phase Dimmer shall support up to 1300W max load.

NX Forward and Reverse Phase Dimmer shall provide dual 0-10V input and output ports.

NX Forward and Reverse Phase Dimmer shall provide an integrated 6.5ft flexible conduit.

NX Forward and Reverse Phase Dimmer shall be compatible with NX Room Controllers, NX Lighting Control Panels and Low Voltage Dimming Switches.

Construction:

Housing: Anodized aluminum

Size: 4.01” L x 5.52” W x 1.88” H

Complies with requirements for use in a plenum area

Mounting: Surface mount with screws

Electrical:

Input: 120/277VAC, 60Hz – Single feed input connection

Output: 120/277VAC, 60Hz – Single feed output connection

Low Voltage: Class 2, 0-10V Input and output

Max Load Rating:

120VAC: 700W

277VAC – 1300W

Min Load Rating: 24W

Standby Power:

120VAC: 0.75W

277VAC: 1.87W

Dimming:

Class 2 / Class 1 (NOTE: Installation as Class 1 requires 600 volt insulation on dimming conductors sharing a conduit with line voltage conductors)

* + - 1. SOFTWARE INTERFACES
				1. NX Area Controller Graphical User Interface (GUI):

NX Area Controller GUI shall serve as a primary interface for the networked lighting system, providing communication with lighting control panels, room controllers, fixture modules, and other wired system components and through wireless access point to wireless room controllers and fixture modules.

NX Area Controller GUI shall be accessible via conventional PC web browser through the NXAC Series Area Controller’s built-in web server.

NX Area Controller GUI shall enable users to program, monitor, and administer the NX Lighting Controls System from any location without additional software.

NX Area Controller GUI shall include an embedded BACnet IP client that is field configurable, enabling integration of the NX Lighting Controls System and a building automation system.

* + - * 1. NX Lighting Controls App

NX Lighting Controls App shall provide Bluetooth® wireless setup and configuration of NX system devices and luminaires equipped with an NX In-Fixture Module and smart sensor.

NX Lighting Controls App shall be available in Android and iOS versions for free download from Google Play™ or Apple® App Store.

NX Lighting Controls App shall connect to NX devices via NXBTR/NXBTC modules, NXSMP/NXSMP2 sensors and radio modules via Bluetooth BLE.

NX Lighting Controls App shall enable easy setup and configuration of NX room devices and NX panels.

NX Lighting Controls App shall enable users to create custom schedules and presets.

NX Lighting Controls App shall be able to configure SpectraSync™ or SpectraClean™ enabled luminaires.

NX Lighting Controls App shall globally discover wireless enabled luminaires and devices.

NX Lighting Controls App shall include the IntelliSCOPE™ visual diagnostic tool for real-time calibration and testing of NX digital smart sensors.

* + - * 1. Digital Room Lighting Controller: Distributed intelligent lighting controller panel with the ability to function as stand-alone lighting control panel or as part of networked system. Automatically configures smart switch stations, occupancy sensors, and manual control switches for energy efficient room control solution. Configuration and power monitoring using Bluetooth-enabled apps and through area controller. Conforms with UL916 and Certified to CAN/CSA C22.2; IC Approved; Title 24 compliant. Factory assembled and tested.

Basis of Design Product: **Hubbell Control Solutions, NXRC Series Room Controller**.

[Single] [and] [dual] relay for on/off and bi-level control.

Receptacle control.

0-10VDC full range dimming control interface.

Notification: Override push button and LED status/failure indicators for each relay.

Housing: GSM UL-rated 94 HB plastic.

Plenum rated.

Input: 120/277/347VAC, 50-60Hz.

Output:

20A, Tungsten, 120VAC only.

20A, Magnetic Ballast.

16A, Electronic Ballast.

1 H.P. Motor @120V, 3/4 H.P. @277V; 1/2 H.P.@347V

Output, Low Voltage Ports:

Class 2

24VDC, 250mA MAX (all outputs combined)

RS485 digital communication

Dimming: Class 2 / Class 1.

* + - 1. CONDUCTORS AND CABLING
				1. Power Supply Side of Remote-Control Power Sources: Comply with network manufacturer's requirements and requirements of Division 26 Section "Low-Voltage Electrical Power Conductors."
1. EXECUTION
	* + 1. EXAMINATION
				1. Prior to installation, contractor shall examine work area to verify measurements, all wire type and routing requirements, and that commencing installation complies with manufacturer's requirements.
				2. Where variations from the general specifications or drawings exist, the contractor shall request a clarification prior to rough in or installation
			2. INSTALLATION
				1. Lighting controls shall be installed in accordance with manufacturer’s instructions, guidelines and submittal documents provided by the lighting control manufacturer.
				2. Lighting control system components shall only be installed in spaces that meet the following environmental conditions:

Temperature: 32 – 104 deg F (0 - 40 deg C).

Relative Humidity: 10 – 90 percent, noncondensing.

* + - * 1. All stored and installed lighting control system components shall be adequately protected from dust and dirt.
			1. SYSTEM STARTUP
				1. The system manufacturer shall provide a factory authorized field engineer to the project site after installation has been completed and prior to system energization for the purpose of testing and adjustment of the system.
				2. Factory field engineer shall test and verify all system functions and ensure proper operation of the system components in accordance with the specifications and on-site conditions. The installing contractor shall notify the system manufacturer in writing that the system is completely wired and ready to be energized and tested 2 weeks prior to scheduling a field engineer for start-up of the system. Should the field engineer arrive on the job site and find the installation incomplete, the installing contractor shall pay the cost of any future visits by the field engineer required to complete the system start-up.
				3. Factory field engineer shall provide a written report of test and outcomes.
			2. DEMONSTRATION AND TRAINING
				1. Factory field engineer shall instruct owner's staff on how to adjust, operate and maintain lighting systems; and provide instruction using the system software.

Allow for up to 4 hours of on-site training on the use and maintenance of the lighting control system to be scheduled at the completion of startup and programming of the system.

* + - 1. TECHNICAL SUPPORT
				1. Manufacturer shall provide reasonable access to factory direct telephone technical support during normal business hours.

END OF SECTION