SECTION 26 09 43.13

Digital-Network Lighting Controls

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Digital-Network Lighting Controls

1. GENERAL
	1. SUMMARY
	2. Section Includes:
		* 1. Networked Central Lighting Control systems. Systems are composed of:
				1. Network integrated power switching systems.
				2. Network integrated dimming systems.
				3. Standalone power switching and dimming systems.
				4. Automation control processors.
				5. Sensors
				6. User Interfaces:

Keypad

Touch screen

Virtual touch screen

* + - 1. System Functions and Sequences
		1. Related Requirements:
			1. Section 12 24 13 Roller Window Shades
			2. Section 25 08 00 Commissioning of Integrated Automation
			3. Section 25 10 00 Integrated Automation Network Equipment
			4. Section 25 11 13 Integrated Automation Network Servers
			5. Section 25 13 13 Integrated Automation Control and Monitoring Network Supervisory Control
			6. Section 25 13 19 Integrated Automation Control and Monitoring Network Interoperability
			7. Section 25 15 16 Integrated Automation Software for Control and Monitoring Networks
			8. Section 26 05 00 Common Work Results for Electrical
			9. Section 26 27 26 Wiring Devices
			10. Section 26 51 00 Interior Lighting
			11. Section 27 15 00 Communications Horizontal Cabling
			12. Section 27 41 00 Audio-Video Systems
	1. REFERENCES
		1. Definitions
			1. Control: Effecting a change in state by one PC program onto a microprocessor or device.
			2. Scene: Predetermined light level of a single fixture of group of fixtures.
			3. DALI: Digital addressable lighting interface.
			4. RS-485: A serial network protocol complying with TIA-485-A.
			5. UTP: Unshielded twisted pair.
		2. Reference Standards
			1. California Energy Commission (CEC):
			2. CEC CCR Title 24, Part 6: California Energy Efficiency Standards for Residential and Nonresidential Buildings, California’s Appliance Energy Efficiency program: Listed for lighting control devices.
			3. National Fire Protection Association (NFPA):
			4. NFPA 70 - National Electrical Code.
			5. Underwriters Laboratories (UL)
				1. UL 508 – Industrial Control Equipment.
				2. UL924 – Emergency Lighting and power Equipment.
				3. UL1008 – Transfer Switch Equipment.
	2. Requirements
		1. Coordination
			1. Contractor shall place daylight and occupancy sensors per plans to achieve optimal performance. Proper placement shall be coordinated with others in order to avoid interference with prescribed lighting levels.
			2. Contractor shall provide luminaries and lamps that are compatible with the lighting control system to be installed.
			3. Contractor shall locate touch screen and keypad stations as per plans.
			4. Contractor shall notify engineer of record of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
	3. SYSTEM DESCRIPTION
		1. Web Accessible, network connected, lighting control system utilizing preset control software, central signal microprocessor, lighting control panel including integrated branch circuit protection, and [power switching modules and relays] [Dimming Modules] [DALI Control Modules] [Sensors User Interfaces].
		2. System Components: System includes the following addressable components:
			1. Keypad controls.
			2. Touch screen controls.
			3. Window treatment controls.
			4. Remote occupancy sensors.
			5. Lighting load shedding.
			6. Timed room lighting.
			7. Daylight compensating lighting controls.
			8. Communication interface to facility-wide room management system.
			9. Communication interface to building automation system gateway/interface.

* 1. SUBMITTALS
		1. Product Data: For each type of product required for complete network lighting control system, demonstrating compliance with requirements.
		2. Shop Drawings: Indicated the following:
			1. Schematic diagram showing complete network lighting control system and accessories.
			2. Circuits and emergency circuits with capacity and phase, control zones, load type and voltage per circuit.
	2. CLOSEOUT SUBMITTALS
		1. Operating and maintenance manuals.
	3. QUALITY ASSURANCE
		1. Manufacturer Qualification: Manufacturer of network lighting controls with minimum [five] years record of satisfactory manufacturing and support of components comparable to basis of design system.
		2. Source Requirements: Provide Network Lighting System through a single source from a single manufacturer.
		3. Manufacturer Qualifications: Approved manufacturer of network lighting controls listed in this Section with minimum [five] years record of satisfactory manufacturing and support of components comparable to basis of design system.
			1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
				1. Product data, including certified independent test data indicating compliance with requirements.
				2. Samples of each component.
				3. Sample submittal from similar project.
				4. Project references: Minimum of 5 installations not less than 5 years old, with Owner and Architect contact information.
				5. Sample warranty.
			2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.
		4. Approved manufacturers must comply with separate requirements of Submittals Article.
		5. Electrical Components, Devices, and Accessories: UL listed and labeled per NFPA 70.
		6. California Appliance Efficiency Listing: Provide products that comply with provisions of CEC CCR Title 24, Part 6.

* 1. COORDINATION
		1. Coordinate integrated lighting and dimming controls with systems and components specified in the following sections:
			1. Division 11 Section "Audio-Visual Equipment".
			2. Division 12 Section "Window Treatments".
			3. Division 23 Section "Instrumentation and Control for HVAC".
			4. Division 25 Section "Integrated Automation Control of Electrical Systems".
			5. Division 26 Section "Panelboards".
			6. Division 26 Section "Wiring Devices".
			7. Division 26 Section "Lighting Devices".
			8. Division 26 Section "Interior Lighting".
			9. Division 27 Section "Communications Horizontal Cabling".
			10. Division 27 Section “Audio-Video Systems”
			11. Division 28 Section "Electronic Access Control and Intrusion Detection".
	2. PROJECT CONDITIONS
		1. Environmental Conditions Range:
			1. Temperature: 32 – 104 deg F (0 - 40 deg C).
			2. Relative Humidity: 10 – 90 percent, noncondensing.
	3. WARRANTY
		1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of modular dimming controls system the fail in materials or workmanship within the specified warranty period following substantial completion.
			1. Warranty Period: Commercial lighting dimmers and switches, sensors, keypads, lighting enclosures, terminal blocks, power supplies, thermostats, and control processors, when dedicated for use as part of a commercial lighting control system: 5 year warranty
			2. Manufacturer's Extended Support Service: Extended telephone support: Unlimited period.
1. PRODUCTS
	1. Manufacturers
		1. MANUFACTURERS: Subject to compliance with requirements, provide products by one of the following Manufacturers:
			1. Crestron Electronics INC.
			2. [XXXXXXXX]
			3. [XXXXXXXX]
		2. Substitutions:
			1. All substitutions must be submitted in writing to the Engineer of Record within [14] days prior to bid date.
			2. Proposed substitutions must be documented with a compliance review.
	2. General
		1. Contractor shall provide system hardware that is manufactured and warranted by a single manufacturer.
		2. Provide control system with compatibility for BACNET/IP.
		3. System shall provide time clock functionality as well as support for multiple interface devices.
		4. System must automatically adjust for daylight savings time and leap year.
	3. ZUM Wired Dimming Solutions
		1. Load Controllers
			1. ZUMNET-Junction Box Zone Controllers
				1. Junction box mounted using ½” knockout.
				2. 120/277 VAC input
				3. Real-time Power monitoring
				4. Connections

ZUMLINK RJ45 ports x 2 (Cresnet)

ZUMNET RJ45 ports x 2 (Ethernet)

Occ Sensor Input (24V, G, OCC)

Photo Sensor Input (24V, G, PHO)

Override Input (OVR, G)

Integrated Ethernet Switch allowing daisy chaining (up to 20 devices)

* + - * 1. Products:

CRESTRON ZUMNET-JBOX-16A-LV (16A, 0-10V)

CRESTRON ZUMNET-JBOX-16A-DALI (16A, 1 DALI LOOP)

* + - 1. ZUMLINK-Junction Box Zone Controllers
				1. Junction box mounted using ½” knockout.
				2. 120/277 VAC input
				3. Real-time Power monitoring
				4. Connections

ZUMLINK RJ45 ports x 2 (Cresnet)

Occ Sensor Input (24V, G, OCC)

Photo Sensor Input (24V, G, PHO)

Override Input (OVR, G)

* + - * 1. Products:

CRESTRON ZUMLINK-JBOX-16A-LV (16A, 0-10V)

CRESTRON ZUMLINK-JBOX-20A-SW (20A, SWITCHED)

CRESTRON ZUMLINK-JBOX-20A-PLUG (20A, SWITCHED PLUG LOAD)

CRESTRON ZUMLINK-JBOX-DIMU. (5A UNIVERSAL PHASE DIMMING)

* + 1. User Interfaces
			1. ZUMLINK-keypads
				1. Field configurable remote keypad , engravable programmable buttons in number indicated, with Single Green LED indicator, configured to fit in standard single-gang box.
				2. Trimmed using decorator style faceplate (not included) or Crestron decorator-style faceplates (FP-G series)
				3. RJ45 connection for power and communication (2 x RJ45 ZUMLINK ports facing up)
				4. Bluetooth connectivity
				5. Colors White, Gray, Black, Red
				6. Minimum Buttons: 2, Maximum Buttons:8. (engraving options available)

Button kits required

ZUMLINK-BTNR

ZUMLINK-BTN4

ZUMLINK-BTN6

ZUMLINK-BTN8

* + - * 1. Color shall be White
				2. Mounting: Mounts in a 1-gang or larger electrical box or mud ring
				3. Products

ZUMLINK-KP-R

* + - 1. ZUMLINK-ZAP
				1. Wireless Access Point for ZUMMESH system integration
				2. Mounting: Mounts in a 1-gang box.
				3. RJ45 connection for power and communication (2 x RJ45 ZUMLINK ports)
				4. Supports integration of ZUMMESH wireless communication products using a Wi-Fi friendly 2.4 GHz peer-to-peer mesh network topology.
				5. Supports integration of 6 zummesh battery devices and 20 AC powered devices
				6. Product: ZUMLINK-ZAP
			2. ZUMLINK-AI
				1. Control Port Expansion Module

4 x Contact Closure Inputs

2 x Contact Closure Outputs

Bi-directional RS232 for room control

* + - * 1. RJ45 ZUMLINK connection for power and communication (2 x RJ45 ZUMLINK ports)
				2. Product: ZUMLINK-AI
			1. ZUMLINK-PART
				1. Partition Sensor Integration Module
				2. Accepts signal from GLS-PART-CN Partition Sensor
				3. RJ45 connection for power and communication (4 x RJ45 ZUMLINK ports)
				4. Product: ZUMLINK-PART
		1. Networking the wired Spaces
			1. Zumwired spaces shall be networked together to enable time clock, load shedding and global management features.
			2. The space shall be networked using a ZUMNET RJ45 ports (Ethernet)
			3. Networking the space shall incorporate BMS integration as specified hereto after.
		2. Devices
			1. Processor
				1. 4‑Series control system with 2 GB SDRAM and 8 GB flash memory
				2. Embedded 4‑Series multicore CPU processor
				3. iPhone®, iPad®, and Android™ device control app support
				4. XPanel computer and web based control
				5. Modular programming architecture
				6. Onboard IR/serial, COM, I/O, relay, Cresnet® network, and high‑speed gigabit Ethernet control ports
				7. Control subnet port providing a dedicated local network for Crestron® devices
				8. High-speed USB 2.0 host port and rear panel memory card slot
				9. Crestron Fusion® software room monitoring and scheduling support
				10. Crestron XiO Cloud™ service provisioning and management support
				11. Enterprise‑class network security and authentication
				12. SNMP V3 remote IT management support
				13. Native BACnet network/IP support
				14. Installer setup via software, web browser, or cloud
				15. IPv6 ready
				16. Integrates with Apple® HomeKit® technology
				17. 1 rack unit mounted
				18. Product: CP4N
	1. ZUM Wireless Dimming Solutions
		1. Wireless technology shall be fully compatible and scalable with all manufacturer lighting control solutions
		2. All batteries shall be field replaceable with non-proprietary standard sizes
		3. Wireless device characteristics
			1. Lighting control devices shall communicate using a Wi-Fi friendly 2.4 GHz peer-to-peer mesh network topology.
			2. Devices shall be commissionable as an autonomous control system without the need for additional equipment.
			3. Each device shall auto negotiate its RF channel to avoid noisy commercial environments.
			4. Shall be secured using 128-bit encryption.
			5. Up to 32 devices can make up a space.
			6. The range within wireless devices shall be 50’.
		4. Devices
			1. Junction Box Zone Controllers
				1. ZUMMESH Wireless Communication.
				2. Junction box mounted using ½” knockout.
				3. 120/277 VAC input
				4. Products:

Crestron ZUMMESH-JBOX-16A-SW (16A, SWITCHED)

CRESTRON ZUMMESH-JBOX-5A-LV (5A, 0-10V)

CRESTRON ZUMMESH-JBOX-16A-LV (16A, 0-10V)

CRESTRON ZUMMESH-JBOX-20A-PLUG (20A, SWITCHED PLUG LOAD)

CRESTRON ZUMMESH-JBOX-DALI-1. (1 DALI LOOP)

CRESTRON ZUMMESH-EXP-JBOX-16A-DIMU. (16A UNIVERSAL PHASE DIMMING)

* + - 1. Wall Box Zone Controllers
				1. ZUMMESH Wireless Communication
				2. Trimmed using gangable decorator trim plates
				3. Mounted in 3.5” back box.
				4. Color shall be white [black] [Almond]
				5. Products:

Crestron ZUMMESH-5A-SW-W-[B][A] - S (switched load, 5A)

Crestron ZUMMESH-5A-LV-W-[B][A] - (0-10v dimmed load, 5 amps)

Crestron ZUMMESH-DIM-W-[B][A] - (forward phase load, 4 amps)

Crestron ZUMMESH-DELV-W-[B][A] - (reverse phase load, 4 amps)

* + - 1. Keypads (Battery Powered)
				1. ZUMMESH wireless communication
				2. Electrical Box, wall, or glass mount
				3. Trimmed using gangable decorator trim plates
				4. Replaceable coin cell battery (5-year life)
				5. Color shall be white [black] [Almond]
				6. 1 Button (rocker with ON/OFF/DIM UP/DIM DOWN features)

Product: Crestron ZUMMESH-KP10ABATT-W [B][A]-S

* + - * 1. 4 Button (ON/SCENE 1/SCENE 2/OFF)

Product: Crestron ZUMMESH-KP10BBATT-W-[B][A]-S

* + - * 1. 6 Button (ON/SCENE 1/SCENE 2/OFF/DIM UP/DIM DOWN)

Product: Crestron ZUMMESH-KP10CBATT-W-[B][A]-S

* + - * 1. 6 Button (ON/SCENE 1/SENSOR DISABLE/OFF/DIM UP/ DIM DOWN)

Sensor Disable – Lights will not turn off automatically for 2 hours.

Product: Crestron ZUMMESH-KP10DBATT-W-[B][A]-S

* + - 1. Keypads (AC Powered)
				1. ZUMMESH wireless communication
				2. Electrical Box Mountable
				3. Trimmed using gangable decorator trim plates
				4. 120/277 VAC input
				5. Color shall be white [Black][Almond]
				6. 1 Button (Rocker with ON/OFF/DIM UP/DIM DOWN features)

Product: Crestron ZUMMMESH-KP10A-W-[B][A]-S

* + - * 1. 4 Button (ON/SCENE 1/SCENE 2/OFF)

Product: Crestron ZUMMESH-KP10B-W-[B][A]-S

* + - 1. Dual Loop daylight sensors
				1. ZUMMESH wireless communication
				2. Uses open and closed loop technologies for auto calibration
				3. Open loop sensing technology for daily sensing
				4. Replaceable (2) lithium-ion AAA batteries (10-yr life)
				5. Product: Crestron ZUMMESH-PHOTOCELL-BATT
			2. Motion Sensors
				1. ZUMMESH wireless communication
				2. Passive infrared sensing technology
				3. Ceiling Mounted
				4. 500 SQFT. Coverage (8-12 ft. ceilings)
				5. Grace Occupancy – When lights turn off due to vacancy, a 15-second grace period starts during which the room lights can be turned on again by waving a hand to trigger the sensors.
				6. Vacancy sensors shall go to occupancy mode when keypad low battery detected.
				7. Replaceable lithium-ion 9V battery (10-Year life)
				8. Products:

Crestron ZUMMESH-PIR-OCCUPANCY-BATT (auto on, auto off)

Crestron ZUMMESH-PIR-VACANCY-BATT (manual on, auto off)

* + - 1. Partition Sensor
				1. ZUMMESH wireless communication
				2. 24 VDC Input
				3. Sensor Technology: Diffuse reflective
				4. Light Source: Pulse modulated infrared LED
				5. Mounts in a 1-gang US electrical box
				6. Product: ZUMMESH-PART
			2. Sensor Interface Device
				1. ZUMMESH wireless communication
				2. Junction box mounted using ½” knockout
				3. 120/277 VAC Input
				4. Supplies 24 VDC, 250MA to connected sensors wired in parallel
				5. Product: ZUMMESH-JBOX-SIM
		1. Networking the Wireless Spaces
			1. Wireless spaces shall be networked together to enable time clock, load shedding and global management features.
			2. The space shall be networked using a Wi-Fi friendly 2.4 GHz mesh network topology.
			3. The range between the wireless devices shall be no more than 150’
			4. The wireless technology shall be Crestron zūm Net.
			5. Networking the space shall incorporate BMS integration as specified hereto after.
			6. Wireless solutions shall be fully compatible with all other lighting control solutions specified herein.
		2. Devices
			1. Wireless Bridge
				1. Each space shall have minimum one wireless bridge that links the space with the network connection.
				2. Wireless bridge shall enable IOS or Android app to configure space using Bluetooth technology.
				3. Crestron Zūm wireless bridge shall have communication with up to 32 MESH devices.
				4. Product: ZUMMESH-NETBRIDGE
			2. Wireless Gateway
				1. Crestron Zūm NET gateway shall have bi-directional MESH communication with up to 50 ZUMMESH-NETBRIDGE devices.
				2. Powered via IEEE 802.3 at Type 1.
				3. Product: Crestron ZUMNET-GATEWAY
			3. Floor Hub
				1. Connects up to 1000 Crestron ZUMMESH-NETBRIDGE devices.
				2. Contains astronomical time clock.
				3. Maintenance is performed via standard web browser.
				4. 1 rack unit mounted
				5. Product: Crestron ZUM-FLOOR-HUB
	1. Wired Load Controllers
		1. Product Family: Crestron Spacebuilder GLPP
			1. Characteristics:
				1. Provide 1, 2, or 3 zone lighting controllers for 0-10v zones.
				2. Shall operate as an autonomous lighting controller for the space.
				3. All sensors and zones within the space shall be controlled without additional equipment.
				4. Lighting controller shall be surface-mounted. Industrial control enclosure mounts directly on two side by side 4” square electrical junction boxes, suitable for concealed locations.
				5. Circuit Input: 100 – 277 VAC, 50/60 Hz. Input, one 16 amp.
				6. [Lighting controller shall be networked as part of the building wide lighting control system using Cresnet communication]
			2. Zone Outputs
				1. 1,2, or 3 high inrush mechanically held relays for switching loads.
				2. 1,000,000 cycle mechanically latching relays
				3. Zero-cross arc-less high inrush
				4. Air gap off protection on each channel
				5. 0-10v dimming models shall include 0-10v 4 wire dimming for each channel.
			3. Products
				1. Crestron GLPP-SWCN (1 Zone Switching)
				2. Crestron GLPP-1SW2CN (2 Zone switching)
				3. Crestron GLPP-1SW3CN (3 Zone switching)
				4. Crestron GLPP-DIMFLVCN-PM (1 ZONE 0-10v with Power Monitoring)
				5. Crestron GLPP-1DIMFLV2CN-PM (2 ZONE 0-10v with Power Monitoring)
				6. Crestron GLPP-1DIMFLV3CN-PM (3 ZONE 0-10v with Power Monitoring)
		2. Product Family: Crestron GLPAC
			1. Characteristics
				1. Provide 4 or 8 zone lighting controller for switching or 0-10v zones.
				2. Unit shall operate as an autonomous lighting controller for the space.
				3. Up to 4 occupancy sensors and photocells per space
				4. Up to 10 devices can connect without additional power
				5. [Lighting controller shall be networked as part of the building wide lighting control system using ethernet communication]
				6. Lighting controller shall be a surface-mounted NEMA 1 industrial control enclosure, suitable for concealed locations.
			2. Zone Outputs
				1. 4 or 8 circuit inputs
				2. 100 – 277 VAC, 50/60 HZ. 16amps each.
				3. [Barriered 4 normal and 4 emergency relays (-4E models only)]
				4. 4 or 8 zone outputs
				5. 100,000 cycle mechanically latching relays
				6. Air gap off protection on each channel.
				7. 0-10v 4-wire dimming for each channel (60mA max current sink)
				8. Override port for UL924 life safety applications
				9. [Real time power monitoring on all channels (-PM models only)]
				10. [4 normally open isolated relays (-PM models only)]
				11. [Chicago Plenum rated enclosure (-CP models only)]
			3. Products
				1. Crestron GLPAC-DIMFLV4 [-CP] [-PM] (4-CH controller)
				2. Crestron GLPAC-DIMFLV8 [-CP] [-PM] (8-CH controller)
				3. Crestron GLPAC-DIMFLV8-4E [-CP] [-PM] (4-ch NORMAL & 4-ch emergency controller)
		3. Product Family: Crestron GL-IPAC
			1. Characteristics
				1. Provide 8 zone lighting controller for switching
				2. Unit shall operate as an autonomous lighting controller for the space.
				3. Up to 4 occupancy sensors and photocells per space
				4. Up to 15 devices can connect without additional power
				5. [Lighting controller shall be networked as part of the building wide lighting control system using ethernet communication]
				6. Lighting controller shall be a surface-mounted NEMA 1 industrial control enclosure, suitable for concealed locations.
			2. Zone Outputs
				1. 8 circuit inputs
				2. 100 – 277 VAC, 50/60 HZ. 16amps each.
				3. 8 zone outputs
				4. 100,000 cycle mechanically latching relays
				5. Air gap off protection on each channel.
				6. Override port for UL924 life safety applications
			3. Products
				1. Crestron GL-IPAC-SW8
		4. Product Family: CAEN, CAEN MLO
			1. Characteristics
				1. Panel shall be digitally addressable using serial or Ethernet communication from Control Processor Panel specified here to after.
				2. Lighting dimmers shall be compatible with drivers / ballasts and LEDs / lamps as listed in SS26 50 00 LIGHTING.
				3. Dimmers shall be provided in quantities, control types, and rated for the connected load as shown on the Contract Drawings.
				4. Line and load phases shall be coordinated per manufacturers recommendations.
				5. Dimming modules shall be field replaceable.
				6. Dimming panels shall be listed to UL508.
				7. Emergency Override: Remote override capability.
				8. Microprocessor based control for time clock override and remote dimming.
				9. Lighting control panels shall comply with NEMA PB 1 and UL 50 (CAN/CSA C22.2, No. 94), UL 67 (CSA C22.2, No. 29), UL 489 (CAN/CSA C22.2, No. 65), and UL 916 (CSA C22.2, No. 205).
				10. Panel may contain Crestron 4-Series Control Processor

Product: Crestron DIN-AP4

* + - * 1. Panel may contain 24V power supply

Product: Crestron DIN-PWS60

* + - * 1. Panel may contain ethernet to serial converter

Product: Crestron DIN-CENCN-2

* + - 1. FEED TYPES
				1. Reference contract drawing schedules for required feed types and breaker ratings
				2. FEED-THROUGH (FT)

No Branch circuit overcurrent protection.

* + - * 1. Main Lug Only (MLO)

120vac 3-phase; 120/240 VAC split-phase

20 AMP thermal magnetic BREAKER

AIC rated to 10,000A

20 breakers max per enclosure.

* + - 1. Control Modules
				1. GL-CAEN-4HSW4-KIT

(4) 16A High Inrush Switching Outputs

Arc-less high inrush, lifetime rated minimum 1,000,000 on/off cycles, with air gap off protection.

120V AC, 50/60 Hz.

32 degrees to 104 degrees Fahrenheit

UL924 for emergency lighting control.

* + - * 1. GL-CAEN-2DIMFLV8- [277]-KIT

(8) 4A 0-10V LED, fluorescent or switching outputs

[120] – [277] V, 50/60Hz.

32 to 104 degrees Fahrenheit

UL924 for emergency lighting control.

* + - * 1. GL-CAEN-2DIMU8-[277]-KIT

(8) 4A Forward, Reverse Phase or switching outputs

[120] – [277] V, 50/60Hz.

32 to 104 degrees Fahrenheit

UL924 for emergency lighting control.

* + - * 1. CLX-1DIMU4-HP

(4) Forward, Reverse Phase or switching outputs.

Up to 16A total, 10A Max per output.

120 V, 50/60Hz.

32 to 104 degrees Fahrenheit.

UL924 for emergency lighting control.

* + - * 1. GL-CAEN-2DIM8-[277]-KIT

(8) 4A Forward, Reverse Phase or switching outputs

[120] – [277] V, 50/60Hz.

32 to 104 degrees Fahrenheit

UL924 for emergency lighting control.

* + - * 1. CLX-1FAN4

 4 Fan Control Channels

2 Amps Per Channel

Module Total 8 Amps

Load Types Ceiling Fan Motors

32 to 104 degrees Fahrenheit

120 Volts AC, 50/60Hz, single-phase

* + - 1. Enclosures CAEN-FT
				1. CAEN-2x1

16AWG Galvanized steel backbox

Height: 23.50 in (596.9 mm)

Width: 14.38 in (365.1 mm)

Depth: 4.00 in (101.6 mm)

120-277 VAC.

* + - * 1. CAEN-4x1

16AWG Galvanized steel backbox

Height: 38.25 in (971.6 mm)

Width: 14.38 in (365.1 mm)

Depth: 4.00 in (101.6 mm)

120-277 VAC.

* + - * 1. CAEN-7x1

16AWG Galvanized steel backbox

Height: 62.00 in (1574.8 mm)

Width: 14.38 in (365.1 mm)

Depth: 4.00 in (101.6 mm)

120-277 VAC.

* + - * 1. CAEN-4x2

16AWG Galvanized steel backbox

Height: 38.25 in (971.6 mm)

Width: 25.50 in (647.7 mm)

Depth: 4.00 in (101.6 mm)

120-277 VAC.

* + - * 1. CAEN-7x2

16AWG Galvanized steel backbox

Height: 62.00 in (1574.8 mm)

Width: 25.50 in (647.7 mm)

Depth: 4.00 in (101,6 mm)

120-277 VAC.

* + - 1. Enclosures CAEN-MLO
				1. CAEN-3x1-MLO-120/3P

16AWG Galvanized steel backbox

Height: 39.65 in (1008 mm);

Width: 16.10 in (409 mm);

Depth: 4.98 in (127 mm)

120/208 AC, 225 Amps MAX.

* + - * 1. CAEN-5x1-MLO-120/3P

16AWG Galvanized steel backbox

Height: 62.75 in (1594 mm);

Width: 16.10 in (409 mm);

Depth: 4.98 in (127 mm)

120/208 AC, 225 Amps MAX.

* + - * 1. CAEN-5x2-MLO-120/3P

16AWG Galvanized steel backbox

Height: 62.75 in (1594 mm);

Width: 27.25 in (693 mm);

Depth: 4.98 in (127 mm)

120/208 AC, 225 Amps MAX.

* + 1. Product Family: GLEX-FT, GLEP-MLO
			1. Characteristics: GLEX-FT
				1. Panel shall be digitally addressable using serial or Ethernet communication from Control Processor Panel specified here to after.
				2. Lighting dimmers shall be compatible with drivers / ballasts and LEDs / lamps as listed in SS26 50 00 LIGHTING.
				3. Dimmers shall be provided in quantities, control types, and rated for the connected load as shown on the Contract Drawings.
				4. Line and load phases shall be coordinated per manufacturers recommendations.
				5. Dimming modules shall be field replaceable.
				6. Dimming panels shall be listed to UL508.
				7. Dimming panels shall be listed to UL924.
				8. Emergency Override: Remote override capability.
				9. Microprocessor based control for time clock override and remote dimming.
				10. Lighting control panels shall comply with NEMA PB 1 and UL 50 (CAN/CSA C22.2, No. 94), UL 67 (CSA C22.2, No. 29), UL 489 (CAN/CSA C22.2, No. 65), and UL 916 (CSA C22.2, No. 205).
				11. No Branch circuit overcurrent protection.
				12. All SpaceBuilder panels will be UL508 factory assembled.
				13. Panels may contain 4-series control processor.

Product: Crestron DIN-AP4

* + - * 1. Panel may contain 24V power supply

Product: Crestron DIN-PWS60

* + - * 1. Panel may contain ethernet to serial converter

Product: Crestron DIN-CENCN-2

* + - 1. Control Modules
				1. GLXP-DIMFLV8-LP

(8) 16A 0-10V LED, fluorescent or switching outputs.

Arc-less high inrush, lifetime rated minimum 1,000,000 on/off cycles, with air gap off protection.

120-277 VAC, 50/60 Hz.

32 degrees to 104 degrees Fahrenheit

UL924 for emergency lighting control.

* + - * 1. GLXP-SW16-LP

(16) 16A switching outputs

120-277 VAC, 50/60 Hz.

32 to 104 degrees Fahrenheit

UL924 for emergency lighting control.

500,000 on/off cycles

* + - * 1. GLXP-HSW12-LP

(12) 16A High-Inrush switching outputs.

120-277 VAC, 50/60 Hz.

32 to 104 degrees Fahrenheit

Arc-less high inrush, lifetime rated minimum 1,000,000 on/off cycles, with air gap off protection.

UL924 for emergency lighting control.

* + - * 1. GLXX-2DIM8

(8) (4A) Forward Phase, 2-wire or switching outputs.

4 channels of 3-wire fluorescent dimming.

120 – 277 VAC, 50/60Hz.

32 to 104 degrees Fahrenheit.

* + - * 1. GLXX-HDSW8

Up to 8 channels of heavy duty modular relays

Relays: GLR-HD-1P and GLR-HD-2P

Supports 120, 230, 277 & 347 Volt applications

Requires 24 Volts DC, delivered via 16 pin GLXX-CTRL

* + - * 1. GLXX-HDSW16

Up to 8 channels of heavy duty modular relays

Relays: GLR-HD-1P and GLR-HD-2P

Supports 120, 230, 277 & 347 Volt applications

Requires 24 Volts DC, delivered via 16 pin GLXX-CTRL

* + - 1. Enclosures GLEX-FT
				1. GLEX-FT-24

16AWG Galvanized steel backbox. Surface Mount.

Height: 124.25 in (616 mm)

Width: 16.13 in (409 mm)

Depth: 4.44 in (113 mm)

120-277 VAC.

* + - * 1. GLEX-FT-56

16AWG Galvanized steel backbox

Height: 39.66 in (1007 mm)

Width: 16.13 in (409 mm)

Depth: 4.44 in (113 mm)

120-277 VAC.

* + - * 1. GLEX-FT-84-HC

16AWG Galvanized steel backbox

Height: 63 in (1600.2 mm)

Width: 15.25 in (387.35mm)

Depth: 4.5 in (114.3 mm)

120-277 VAC.

* + - 1. Enclosures GLEP-MLO
				1. GLEP-277-30

16AWG Galvanized steel backbox

Height: 70 in (1778 mm)

Width: 20.25 in (514 mm)

Depth: 6.63 in (168 mm)

30 Zone cabinet @ 277V VAC

* + - * 1. GLEP-120-30

16AWG Galvanized steel backbox

Height: 70 in (1778 mm)

Width: 20.25 in (514 mm)

Depth: 6.63 in (168 mm)

30 Zone cabinet @ 120V VAC

* + - * 1. GLEP-277-42

16AWG Galvanized steel backbox

Height: 78 15/16 in (2005 mm)

Width: 20.25 in (514 mm)

Depth: 6.63 in (168 mm)

42 Zone cabinet @ 277V VAC

* + - * 1. GLEP-120-42

16AWG Galvanized steel backbox

Height: 78.93 in (2005 mm)

Width: 20.25 in (514 mm)

Depth: 6.63 in (168 mm)

42 Zone cabinet @ 120V VAC

* + - * 1. Branch Circuit Breakers

120V/10K AIC

120 VAC 20 AMP

Product: GLE/GLEPB-120-20A-10K

120V/22K AIC

120 VAC 20 AMP

Product: GLE/GLEPB-120-20A-22K

120V/65K AIC

120 VAC 20 AMP

Product: GLE/GLEPB-120-20A-65K

277V/18K AIC

277 VAC 20 AMP

Product: GLE/GLEPB-277-20A-18K

277V/35K AIC

277 VAC 20 AMP

Product: GLE/GLEPB-277-20A-35K

277V/65K AIC

277 VAC 20 AMP

Product: GLE/GLEPB-277-20A-65K

* + 1. Product Family: DIN
			1. Characteristics
				1. Panel shall be digitally addressable using serial or Ethernet communication from Control Processor Panel specified here to after.
				2. Lighting dimmers shall be compatible with drivers / ballasts and LEDs / lamps as listed in SS26 50 00 LIGHTING.
				3. Dimmers shall be provided in quantities, control types, and rated for the connected load as shown on the Contract Drawings.
				4. Dimming modules shall be field replaceable.
				5. Dimming panels shall be listed to UL508.
				6. Dimming panels shall be listed to UL924.
				7. Emergency Override: Remote override capability.
				8. Microprocessor based control for time clock override and remote dimming.
				9. Lighting control panels shall comply with NEMA PB 1 and UL 50 (CAN/CSA C22.2, No. 94), UL 67 (CSA C22.2, No. 29), UL 489 (CAN/CSA C22.2, No. 65), and UL 916 (CSA C22.2, No. 205).
				10. Panel may contain 4-series control processor.

Product: Crestron DIN-AP4

* + - * 1. Panel may contain 24V power supply

Product: Crestron DIN-PWS60

* + - * 1. Panel may contain serial hub capable of 3 subnets

Product: Crestron DIN-HUB

* + - * 1. Panel may contain ethernet to serial converter

Product: Crestron DIN-CENCN-2

* + - * 1. Cabinet may contain POE Switch

Product: CEN-SW-POE-5

* + 1. Enclosures
			1. Enclosure Family: DIN-EN
				1. DIN-EN-2X18

16AWG Galvanized steel backbox

Height: 12.32 in (323 mm)

Width: 14.13 in (359 mm)

Depth: 4.38 in (111 mm)

120-277 VAC.

DIN Rail Detail: (2) 342 mm x 35 mm rails

* + - * 1. DIN-EN-3X18

16AWG Galvanized steel backbox

Height: 23.50 in (597 mm)

Width: 14.38 in (366 mm)

Depth: 4.44 in (113 mm)

120-277 VAC.

DIN Rail Detail: (3) 342 mm x 35 mm rails

* + - * 1. DIN-EN-6X18

16AWG Galvanized steel backbox

Height: 38.88 in (989 mm)

Width: 14.38 in (366 mm)

Depth: 4.44 in (113 mm)

120-277 VAC.

DIN Rail Detail: (6) 342 mm x 35 mm rails

* + - * 1. GLEX-FT-84-HC

16AWG Galvanized steel backbox

Height: 63 in (1600.2 mm)

Width: 15.25 in (387.35mm)

Depth: 4.5 in (114.3 mm)

120-277 VAC.

DIN Rail Detail: (10) 342 mm x 35 mm rails

* + - 1. Control Modules
				1. DIN-DALI-2

Din-rail mount Module shall contain 2 channels of digital DALI loop containing 64 devices per channel.

Sensors and user interfaces shall not reside on the DALI bus. These accessories shall be networked to the DALI interface controller as part of the turnkey solution. Reference specifications hereto after for more details on sensor and user interface selections that shall be compatible with the turnkey DALI solution.

The DALI bus shall be class 2 (1) twisted pair #18 AWG or larger and be shielded. Install in free air per DIV 26.

Module shall contain an override input to allow an external contact closure to override the control system program and force each device to its “System failure level”

Module shall contain an internal power supply

32 to 104 degrees Fahrenheit operating temperature

DIN-DALI-2 module is utilized in GL-DALI spacebuilder

* + - * 1. DIN-DMX- [1][2] UNIVERSE

DIN-rail mountable module shall contain [1] or [2] universe of DMX control.

Controller shall allow individually controllable and independently running timelines and scenes.

Controller shall be scalable allowing multiple units to connect via ethernet.

Programmed and configured using proprietary system software.

Shall support RDM, SACN, and ART-NET.

DIN-DMX module is utilized in GL-DMX spacebuilder

* + - * 1. GLA-ISP-4R-RJ45A

DIN-rail mountable module shall contain 4 optically isolated DMX outputs

Shall support RDM, SACN, and ART-NET.

Terminations utilize convenient RJ45 568B connections

* + - * 1. DIN-AO8

Eight 0-10V analog output control ports

Interface for 3rd-party lighting and heating/cooling

Fully programmable functionality via DIN-AP2

Setup via front panel or software

Override input

Cresnet communications

6M wide DIN rail mounting

* + - * 1. DIN-IO8

8 Versiport I/O ports

Interface for 3rd-party sensors, detectors, contact closures, and alarms

Fully programmable functionality via DIN-AP2

Cresnet communications

6M wide DIN rail mounting

* + - * 1. DIN-4DIMFLV4

Provides 4 channels of 0-10 Volt dimming control

Supports 120 and 220 to 240 Volt, 50/60 Hz applications

Allows switching of lighting and exhaust fans[1]

Includes an override input

Communicates using Cresnet®

Sets up via the front panel or through software

Offers programmable functionality via DIN-AP4

Mounts on a 9M wide DIN rail

CEC Title 24 2013 Compliant

* + - * 1. DIN-1DIM4

4 channels of dimming

120 to 277 Volt 50/60 Hz operation

Selectable non-dim mode

Master air-gap relay

Override input

Cresnet® communications

Setup via front panel or software

Programmable functionality via DIN-AP4

12M wide DIN rail mounting

CEC Title 24 2013 Compliant

* + - * 1. DIN-1DIMU4

4 channels of forward or reverse phase dimming

Auto load detection

120 to 240 Volt 50/60 Hz operation

Selectable non-dim mode

Extreme stability in noisy environments

Short circuit and overload protection

Master air-gap relay

Override input

Cresnet® communications

Setup via front panel or software

Programmable functionality via DIN-AP4

12M wide DIN rail mounting

CEC Title 24 2013 Compliant

* + - * 1. DIN-8SW8-I

8 channels of power switching

8 voltage-driven isolated digital inputs

Support for 120 to 240 Volt 50/60 Hz lighting and motor loads

Override input

Cresnet® communications

Setup via front panel or software

Programmable functionality

9M wide DIN rail mounting

* + - * 1. DIN-SACN-DMX

Converts between DMX512A and sACN, Art-Net, or ESP protocols

Enables distribution of DMX over Ethernet or Wi-Fi®

Enables Crestron® control of DMX lighting fixtures and systems

Supports a single universe Ethernet to DMX node in output mode

Supports a single universe DMX to Ethernet node in input mode

Supports broadcast or unicast (unicast in input mode only)

Supports HTP/LTP merging of up to 2 DMX sources (output mode only)

Supports RDM over Art-Net

Easy web browser based setup and firmware update

4U 35 mm DIN rail mountable

PoE or 7-24 Volt DC powered (power supply not included)

* 1. USER INTERFACES
		1. Product: Crestron C2N-CBD-P-W [B][A]-S
			1. Provide keypad quantities and locations as specified herein and shown on the contract drawings.
			2. Field configurable remote keypad with auto-adjusting backlight illuminating replaceable, engravable programmable buttons in number indicated, with white LED indicators, configured to fit in standard single-gang box.
			3. Trimmed using decorator style faceplate (not included) or Crestron decorator-style faceplates (FP-G series)
			4. Cresnet connected for power and communication
			5. Minimum Buttons: 2, Maximum Buttons: 8.
			6. Color shall be White [black][almond].
			7. Mounting: Mounts in a 1-gang or larger electrical box or mud ring
		2. Product: Crestron GLPPA-KP[1][2][3][4]-W [B][A]-S
			1. Connects to lighting controller with class II (2) #18 AWG or greater conductors.
			2. Colors shall be white [black] [almond].
			3. Scene Functions
				1. Rocker (ON/OFF/hold to dim) or 4 Button (ONSCENE 1/SCENE 2/OFF)

Product: Crestron GLPPA-KP-W [B][A]-S

* + - 1. Zone Functions
				1. Rocker controlling zone 1 (ON/OFF/hold to dim)

Product: Crestron GLPPA-KP1-W[B][A]-S

* + - * 1. Rocker controlling zone 2 (ON/OFF/hold to dim)

Product: Crestron GLPPA-KP2-W[B][A]-S

* + - * 1. Rocker controlling zone 3 (ON/OFF/hold to dim)

Product: Crestron GLPPA-KP3-W[B][A]-S

* + - * 1. 4 Button controlling zones 1-3 (ZONE 1 toggle/ZONE 2 toggle/ZONE 3 toggle/OFF)

Product: Crestron GLPPA-KP4-W[B][A]-S

* + 1. Configuration Remote Control
			1. Lighting controller shall be adjustable using the handheld battery-operated configuration remote.
			2. Pre-programmed at the factory, no configuration or programming required.
			3. Remote shall provide features:
				1. Zone control
				2. Scene setting
				3. Motion sensor mode select and timeout
				4. Daylight sensor calibration
			4. Product: Crestron GLPPA-REMOTE-PROG
	1. Faceplates
		+ 1. keypad devices Provide decorator faceplates for all keypad devices.
			2. Multiple devices adjacent to door jams shall be ganged together.
			3. Decorator faceplates shall be white [Black][Almond] and shall match in texture and color of the
			4. Products:
				1. FP-G1-W [B][A]-S
				2. FP-G2-W [B][A]-S
				3. FP-G3-W [B][A]-S
				4. FP-G4-W [B][A]-S
		1. Touch Screens
			1. widescreen active-matrix color display
				1. TSW-1070: 1920 x 1200 WUXGA display resolution
				2. TSW-770: 1280 x 800 WXGA display resolution
				3. TSW-570: 280 x 720 HD 720 display resolution
				4. TSW-570P: 720 x 1280 HD 720 display resolution
			2. Capacitive touch screen display
			3. Custom-programmable virtual control buttons
			4. Supports Crestron HTML5 and Smart Graphics® software custom user projects
			5. Built-in Rava® SIP intercom
			6. Built-in speakers and microphone
			7. H.265, H.264, or MJPEG streaming video display
			8. Native apps for Crestron Home™ OS, Sonos® home sound control, Zoom Rooms™ conferencing control, Microsoft Teams® online meeting solution, and various room scheduling services
			9. Built-in Bluetooth® communications beacon
			10. Built-in web browsing
			11. Single wire Ethernet connection with PoE or PoE+ power
			12. Wi‑Fi® network connectivity (only available on 1070 and 770 models)
			13. Dual USB 2.0 ports for room availability accessories
			14. Enterprise grade security and authentication
			15. Web, cloud, or device-based configuration
			16. Electrical box mounting with provided mounting bracket Color: [Black] [White]. Mountable with a 1-3 gang mounting box
			17. Products
				1. Crestron TSW-770-W-S (7” white, 2-gang mounted)
				2. Crestron TSW-1070-W-S (10” white, 3-gang mounted)
				3. Crestron TSW-570P-W-S (5” white, 1-gang mounted)
				4. Crestron TSW-770-B-S (7” black, 2-gang mounted)
				5. Crestron TSW-1070-B-S (10” black, 3-gang mounted)
				6. Crestron TSW-570P-B-S (5” black, 1-gang mounted)
		2. XPANEL Interface: Virtual Touch Screen
			1. Touch screen user interface, network-connected lighting management interface running on Crestron lighting control processor to provide lighting control, daylight harvesting, occupancy sensing, lighting schedules and overall adjustment to system functionality
			2. Virtual touch screen is to be accessible via computer or laptop interface furnished by other.
			3. Access to XPanel shall be via browser-based IP address or .EXE file application.
			4. Product: Crestron XPANEL
		3. Mobile App Interface: Virtual Touch Screen via Crestron Mobile Pro® Control App for iPhone® and Android™
			1. Mobile phone application for network-connected lighting management interface configured with any Crestron 4-Series lighting control processor to provide lighting control, daylight harvesting, occupancy sensing, lighting schedules and overall adjustment to system functionality, as setup and configured by certified Crestron programmer / service provider (CSP).
			2. Virtual touch screen is to be accessible via iPhone® and Android™ (furnished by others)
			3. Access to a modified XPanel via application interface configuration settings.
			4. Product: CRESTRON-MOBILE-PRO as provided by app store associated with iPhone® and Android™ devices.
1. Sensors
	1. Dual-Technology Motion Sensors
		1. Product: Crestron GLS-ODT-C-CN
			1. Characteristics
			2. Detects movement within space while reducing false triggering or shutoffs while space is occupied.
			3. Both technologies shall be trigged to force on, one or the other must be triggered to reset time.
			4. Combination of ultrasonic motion detection and passive infrared detection with internal microprocessor.
			5. Sensitivity is independently adjustable for installed conditions.
			6. Delayed time off adjustment.
			7. Walk-through mode.
			8. Equipped with 4-wire interface for direct connection to control bus.
			9. Includes connection port for remote mount photocell.
			10. Coverage: 360 deg. 2000 SQFT.
			11. Setup and commissioning parameters shall be configurable via handheld wireless remote.
			12. Mounts to a 3” octagon box.
		2. Product: Crestron GLS-ODT-C-NS
			1. Characteristics
				1. Detects movement within space while reducing false triggering or shutoffs while space is occupied.
				2. Both technologies shall be trigged to force on, one or the other must be triggered to reset time.
				3. Combination of ultrasonic motion detection and passive infrared detection with internal microprocessor.
				4. Sensitivity is independently adjustable for installed conditions.
				5. Delayed time off adjustment.
				6. Walk-through mode.
				7. Equipped with 4-wire interface for direct connection to control bus.
				8. Includes connection port for remote mount photocell.
				9. Coverage: 360 deg. 2000 SQFT.
				10. Setup and commissioning parameters shall be configurable via handheld wireless remote.
				11. Mounts to a 3” octagon box.
		3. Product: Steinel GLA-DT-QUATTRO-COM1[2]-24
			1. Characteristics
				1. Sensing Technology: Passive infrared (PIR), single pyro, 11 detection levels, 520 switching zones, ultrasonic 40 kHz.
				2. Mounts to a 4” octagon box.
				3. Time Delay Setting
				4. Light Level Setting: 1 - 100 fc (10 - 1000 lux)
				5. Dip Switch Settings
				6. HVAC dry contacts: (COM2 Version only)
				7. Test Mode: Dip switch setting or programming remote
				8. Ultrasonic Coverage at 9 feet (2.7 m):

Presence: Maximum 20 feet by 20 feet (6 by 6 m) or 400 sf (36 sm).

Radially and Tangentially: Maximum 32 feet by 32 feet (10 by 10 m) or 1,000 sf (100 sm).

* + - * 1. PIR Detection Zones:

Presence: Maximum 10 feet by 10 feet (3 by 3 m) or 100 sf (9 sm).

Radially: Maximum 13 feet by 13 feet (4 by 4 m).

Tangentially: Maximum 26 feet by 26 feet (8 by 8 m).

* + 1. Product: Steinel GLA-DT-CM-COM1[2]-24
			1. Characteristics
				1. Sensing Technology: Passive infrared (PIR), single pyro, 11 detection levels, 520 switching zones, ultrasonic 40 kHz
				2. Mounting:

Direct to the wall or ceiling with anchor bolts

Ceiling mounted with 1/2 inch snap in chase nipple, washer and lock nut. Time Delay Setting

* + - * 1. Light Level Setting: 1 - 100 fc (10 - 1000 lux)
				2. Dip Switch Settings
				3. HVAC dry contacts: (COM2 Version only)
				4. Test Mode: Dip switch setting or programming remote
				5. Ultrasonic Coverage at 9 feet (2.7 m):

Presence: Maximum 22 feet (7 m) or 426 sf (130 sm).

Radially: Maximum 38 feet (11.5 m) or 1,236 sf (376 sm).

Tangentially: Maximum 26 feet (8 m) or 718 sf (218 sm).

* + - * 1. PIR Detection Zones:

Presence: Maximum 22 feet (7 m) or 440 sf (134 sm).

Radially: Maximum 26 feet (8 m) or 655 sf (200 sm).

Tangentially: Maximum 82 feet (25 m) or 5290 sf (1612 sm).

* + 1. PIR Motion Sensors
			1. Product: Steinel GLA-IR-QUATTRO-COM1[2]-24
				1. Characteristics

Sensing Technology: Passive infrared (PIR)

Mounts to a 4” octagon box.

Delay Setting

Light Level Setting: 1 - 100 fc (10 - 1000 lux)

Dip Switch Settings

HVAC dry contacts: (COM2 Version only)

Test Mode: Dip switch setting or programming remote

Coverage at 9 feet (2.7 m): 360 deg square mechanically scalable detection zones.

Presence: Maximum 15 feet by 15 feet (4.7 by 4.7 m) or 225 sf (21.2 sm).

Radially: Maximum 15 feet by 15 feet (4.7 by 4.7 m) or 225 sf (21.2 sm).

Tangentially: Maximum 23 feet by 23 feet (7 by 7 m) or 529 sf (50.4 sm).

* + - 1. Product: Steinel GLA-IR-QUATTRO-HD-COM1[2]-24
				1. Characteristics

Sensing Technology: Passive infrared (PIR)

Mounts to a 4” octagon box.

Delay Setting

Light Level Setting: 1 - 100 fc (10 - 1000 lux)

Dip Switch Settings

HVAC dry contacts: (COM2 Version only)

Test Mode: Dip switch setting or programming remote

Coverage at 9 feet (2.7 m): 360 deg square mechanically scalable detection zones.

Presence: Maximum 25.5 feet by 25.5 feet (7.9 by 7.9 m) or 650.25 sf (62.4 sm).

Radially: Maximum 25.5 feet by 25.5 feet (7.9 by 7.9 m) or 650.25 sf (62.4 sm).

Tangentially: Maximum 65.5 feet by 65.5 feet (20 by 20 m) or 4,290.25 sf (400 sm).

* + - 1. Product: Steinel GLA-IR-CM-COM1[2]-24
				1. Characteristics

Sensing Technology: Passive infrared (PIR)

Mounting:

Direct to the wall or ceiling with anchor bolts

Ceiling mounted with 1/2 inch snap in chase nipple, washer and lock nut. Time Delay Setting

Light Level Setting: 1 - 100 fc (10 - 1000 lux)

Dip Switch Settings

HVAC dry contacts: (COM2 Version only)

Test Mode: Dip switch setting or programming remote

Coverage at 9 feet (2.7 m): 360 deg square mechanically scalable detection zones.

Presence: Maximum 22 feet (7 m) or 440 sf (134 sm).

Radially: Maximum 26 feet (8 m) or 655 sf (200 sm).

Tangentially: Maximum 82 feet (25 m) or 5290 sf (1612 sm).

* + 1. Ultra Sonic Motion Sensors
			1. Product: Steinel GLA-US-QUATTRO-COM1[2]-24
				1. Characteristics

Sensing Technology: Ultrasonic

Mounts to a 4” octagon box.

Delay Setting

Light Level Setting: 1 - 100 fc (10 - 1000 lux)

Dip Switch Settings

HVAC dry contacts: (COM2 Version only)

Test Mode: Dip switch setting or programming remote

Coverage at 9 feet (2.7 m):

Presence: Maximum 20 feet by 20 feet (6 by 6 m) or 400 sf (36 sm).

Radially and Tangentially: Maximum 32 feet by 32 feet (10 by 10 m) or 1,000 sf (100 sm).

* + - 1. Product: Steinel GLA-US-HALLWAY-COM1[2]-24
				1. Characteristics

Sensing Technology: Ultrasonic

Mounts to a 4” octagon box.

Delay Setting

Light Level Setting: 1 - 100 fc (10 - 1000 lux)

Dip Switch Settings

HVAC dry contacts: (COM2 Version only)

Test Mode: Dip switch setting or programming remote

Coverage at 9 feet (2.7 m): Maximum 6.5 feet by 65 feet (2 by 20 m) or 422.5 sf (40 sm).

* + - 1. Product: Steinel GLA-US-ONEWAY-COM1[2]-24
				1. Characteristics

Sensing Technology: Ultrasonic

Mounts to a 4” octagon box.

Delay Setting

Light Level Setting: 1 - 100 fc (10 - 1000 lux)

Dip Switch Settings

HVAC dry contacts: (COM2 Version only)

Test Mode: Dip switch setting or programming remote

Coverage at 9 feet (2.7 m): Maximum 6.5 feet by 33 feet (2 by 10 m) or 214.5 sf (20 sm).

* 1. Daylight Sensors
		1. Indoor Daylight Sensor (Open/Closed loop)
			1. Open Loop Function
				1. Continually monitors daylight entering window or skylight to enable daylight harvesting applications to provide control of room lighting based on presence of daylight.
				2. Light sensitivity sliders:

OL: 3-300 foot-candles (factory setting)

OL: 30-3000 foot-candles

OL: 60-6000 foot-candles

* + - * 1. Center Axis OL:90°
			1. Closed Loop Function
				1. Continually monitors daylight at work station location to enable daylight harvesting or lumen maintenance applications to provide control of room lighting based on lighting level at workstation.
				2. Light sensitivity slider:

CL: 3 to 300 foot-candles

* + - * 1. Center Axis CL:45°
			1. Equipped with 3-wire interface for direct connection to control system utilizing control processor; 24 VDC power from network control bus.
			2. Mounting: Surface or flush ceiling mount directly to drywall or drop-tile
			3. Product: Crestron GLA-LDL-PC-0-10
		1. Outdoor Daylight and Color Temperature Sensor
			1. Measures true color temperature and intensity of natural sunlight.
			2. Communicates over serial to control system to match indoor lighting with the outdoors.
			3. Outdoor rated for rooftop installation.
			4. IP67 for watertight operation.
			5. CCT of 2,000K to 25,000K.
			6. 0 to 100,000 lux.
			7. 360 degree semispherical.
			8. Product: GLS-LCCT
		2. Partition Sensors
			1. Single sided diffuse reflective sensing technology.
			2. Digital device with control bus connectivity.
			3. Surface mounted to 1-gang back box.
			4. Trim using decorator face plate to match mounting surface.
			5. Product: Crestron GLS-PART-CN
		3. Sensor Interface Module
			1. Sensor Interface Device: Integrates occupancy sensors and related sensors with control network. In separate enclosure. 4-wire bus providing 24 VDC power to network devices, with two independent sensing inputs.
			2. Product: Crestron GLS-SIM
	1. Control Processor Panel and Distribution Panels
		1. Product Family – GLNET and CLP
		2. Control processor Panels shall be provided in quantities and locations per the contract drawings, or as required for a fully networked lighting control system.
		3. Control processor panels shall be factory assembled in a UL508 Panel shop
		4. Shall include the following equipment to support lighting control devices
			1. Cabinets
				1. Made of 16AWG galvanized steel
				2. NEMA 1 rated
				3. Product: DIN-EN
			2. Processors
				1. Crestron 4-series control system
				2. Modular architecture supports multiple simultaneous running programs.
				3. Ethernet 10/100Base-T and Cresnet Connected
				4. Astronomical time clock with events stored in non-volatile RAM
				5. Native BACnet/IP with support for up to 500 BACnet objects
				6. Built-In Web Server: IIS v.6.0
				7. SNMP remote management.
				8. Active Directory support.
				9. IPv6 ready.
				10. DHCP and DNS Support
				11. Native Email Client
				12. Remote Diagnostics
				13. Remote Program Loading and Administration
				14. SSL security plug in
				15. Support user assigned or dynamic IP address.
				16. Product: Crestron DIN-AP4
			3. Power Supplies
				1. Provide regulated 24 VDC power supplies as required to support lighting control equipment
				2. 120 VAC input
				3. Product: Crestron DIN-PWS60
			4. Cresnet to Ethernet Bridge
				1. 24v DC Input
				2. IEEE 802.3 Power of ethernet connection.
				3. Serial communication
				4. USB 2.0 for setup.
				5. Product: DIN-CENCN-2-POE
			5. Ethernet Distribution
				1. 48V DC Input, 100-240 VAC 50/60 Hz Supply
				2. (5) [16] IEEE 802.3 Ethernet Ports
				3. 32 to 104 degrees Fahrenheit
			6. Floor Hub
				1. Connects up to 200 Crestron ZUMMESH-NETBRIDGE devices.
				2. Contain astronomical time clock.
				3. Maintenance is performed via standard web browser.
				4. 1 rack unit mounted
				5. Product: Crestron ZUM-FLOOR-HUB
			7. GLNET-CN
				1. Enclosure: DIN-EN-2X18

16AWG Galvanized steel backbox

120 Volts AC, 60 Hz

Height: 12.32 in (323 mm)

Width: 14.13 in (359 mm)

Depth: 4.38 in (111 mm)

DIN Rail Detail: (2) 342 mm x 35 mm rails

* + - 1. GLNET-ZUM
				1. Enclosure: DIN-EN-3X18

16AWG Galvanized steel backbox

120 Volts AC, 60 Hz

Height: 23.50 in (597 mm)

Width: 14.38 in (366 mm)

Depth: 4.44 in (113 mm)

DIN Rail Detail: (3) 342 mm x 35 mm rails

* + - 1. GLNET-ZUM-CN
				1. Enclosure: DIN-EN-6X18

16AWG Galvanized steel backbox

120 Volts AC, 60 Hz

Height: 38.88 in (989 mm)

Width: 14.38 in (366 mm)

Depth: 4.44 in (113 mm)

DIN Rail Detail: (6) 342 mm x 35 mm rails

* + - 1. CLP-HUB-SW-POE-5
				1. Enclosure: DIN-EN-2X18

16AWG Galvanized steel backbox

120 Volts AC, 60 Hz

Height: 12.32 in (323 mm)

Width: 14.13 in (359 mm)

Depth: 4.38 in (111 mm)

DIN Rail Detail: (2) 342 mm x 35 mm rails

* + - 1. CLP-HUB-SW-POE-10
				1. Enclosure: DIN-EN-2X18

16AWG Galvanized steel backbox

120 Volts AC, 60 Hz

Height: 23.50 in (597 mm)

Width: 14.38 in (366 mm)

Depth: 4.44 in (113 mm)

DIN Rail Detail: (3) 342 mm x 35 mm rails

* + - 1. CLP-HUB-SW-POE-16
				1. Enclosure: DIN-EN-6X18

16AWG Galvanized steel backbox

120 Volts AC, 60 Hz

Height: 38.88 in (989 mm)

Width: 14.38 in (366 mm)

Depth: 4.44 in (113 mm)

DIN Rail Detail: (6) 342 mm x 35 mm rails

* 1. UL924 EMERGENCY OVERIDE
		1. Phase Loss Sensor
			1. Lighting control panels shown on the contract drawings as emergency life safety shall contain UL924 listed modules and OVR inputs.
			2. Provide phase loss sensor with sense for all 3 phases.
			3. Upon loss of any of the 3 phases, the phase loss sensor shall trigger the emergency life safety panel’s override port(s).
			4. Product: Crestron GLS-PLS-120/277.
		2. Bypass Relays
			1. Switched and 2-wire dimmed loads
				1. The UL924 listed 2-wire Emergency Shunt Relay shall allow emergency power to go around the control device to bring emergency power to the load.
				2. Product: GLA-ESR

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* + 1. Automatic Load Control Relays (ALCR)
			1. Switched Loads
				1. UL924 listed 2-wire automatic load control relay shall bring emergency life safety lights on to 100% upon loss of power
				2. Upon the loss of normal power, the ALCR shall bypass the control device allowing emergency power to access the loads regardless of switch position.
				3. Products:

Crestron GLA-EPC-PM

Crestron GLA-EPC-2

* + - 1. 4-Wire dimming loads
				1. UL924 listed 4-wire automatic load control relay shall bring emergency life safety lights on to 100% upon loss of power
				2. Upon the loss of normal power, the ALCR shall bypass the control device allowing emergency power to access the load regardless of switch position.
				3. The ALCR shall contain a normally open relay to open the control wires allowing the lights to come to full bright.
				4. The ALCR shall allow for integration with fire alarm.
				5. Product: Crestron GLA-EPC-FLV
		1. UL1008 Emergency Override
			1. Automatic transfer switch (ATS)
			2. All dimming and switching loads
				1. UL1008 listed automatic transfer device shall transfer emergency power to the load upon 100% loss of power.
				2. Upon loss of normal power, the ATS shall allow the flow of emergency power from the emergency circuit regardless of switch position.
				3. The ATS shall operate on the branch side of the circuit
				4. The ATS shall allow integration with fire alarm
				5. Product: Crestron GLA-EPC-D-F-ATS
	1. Programming and Configuration Software
		1. Lighting system configuration software shall allow custom programming for lighting control system.
		2. Lighting system configuration software shall generate custom software control interface modules for communication with compatible remote integrated systems.
		3. The lighting system configuration software shall be GUI based for programming and development.
		4. The custom software control interface shall include the following control data:
			1. Complete lighting system control functions.
			2. System specific control sets for sub systems and supervisory systems
			3. Bidirectional digital and analog data communication.
			4. Bidirectional serial data communication.
	2. Conductors and Cabling
		1. Power Supply Side of Remote-Control Power Sources: Comply with requirements of Division 26 Section "Low-Voltage Electrical Power Conductors."
		2. UTP Cable: 100-ohm, UTP. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
		3. Communications Control Cable, Non-Plenum Rated: 22 AWG data pair stranded bare copper, and 18 AWG power pair stranded bare copper, Type CM.
			1. Product: Crestron CRESNET-NP.
		4. Communications Control Cable Plenum Rated: 22 AWG data pair, stranded bare copper and 18 AWG power pair, stranded bare copper, Type CMP, complying with NFPA 262.
			1. Product: Crestron CRESNET-P.
		5. Communications High-Power Control Cable, Non-Plenum Rated: 22 AWG stranded bare copper data pair, and 12 AWG stranded bare copper power pair, Type CM.
			1. Product: Crestron CRESNET-HP-NP.
1. EXECUTION
	1. FIXTURE TESTING
		1. Contractor shall provide lighting control factory test reports for each fixture specified on this project
		2. Test report shall include
			1. Confirmation of compatibility with control device
			2. Dimming Range
			3. Performance notations
	2. Plug Load Control
		1. Plug load controls as shown on the contract drawing shall be part of the lighting control system.
		2. Plug loads shall operate in occupancy mode (Auto-on, Auto-off).
	3. Engraving
		1. Keypad buttons shall be factory engraved using laser technology
		2. Initial shipment of keypads shall be factory engraved per the sequence of operations specified herein and shown on the contract documents
		3. Custom keypad engravings shall be provided as part of the close out procedures.
	4. BMS Integration
		1. The lighting control system shall be integrated with the BMS system as specified in DIV. 25.
		2. Communication shall occur using BACNET/IP Protocol.
		3. Contractor shall provide licenses for each of the following objects and shared amongst the BMS system
			1. Occupancy Status
			2. Zone On/Off/Dim
			3. Photocell reading
		4. The lighting control system shall also accept time clocked events from the BMS system
		5. Provide necessary coordination labor for integration of all BACNET objects listed.
	5. AV Integration
		1. The lighting control system shall be integrated with the AV solutions as specified in DIV.26
		2. The lighting and AV systems shall interface via Ethernet communication or RS232.
		3. Contractor shall provide ethernet drops as required for the lighting control system to connect to the AV system.
		4. The following objects shall be shared with the AV system:
			1. Occupancy Status
			2. Zone On/Off/Dim
			3. Photocell reading
			4. Scene preset recalls
		5. Provide necessary coordination labor for integration of all AV objects listed hereto before.
	6. System Functions and Sequences
		1. The system shall be capable of the following lighting control functions:
			1. Scene Creation: Store levels of selected fixture circuits in preset groups.
			2. Scene Recall: recall previous stored scenes.
			3. All zones off
			4. Raise/lower level of all zones
			5. Password entry for touchscreen access
			6. Room/Zone selection
			7. Raise/lower room shades
			8. Schedule events to be automatically recalled
		2. Circadian lighting control system shall be capable of the following lighting control functions:
			1. Adjust light that can cycle close to 24 hours
			2. Manage color temperature and intensity
				1. Automatic adjustment of color and intensity throughout the day
				2. Intensity range meeting or exceeding – 1500 – 2200 lumens
				3. Color range meeting or exceeding – 2700 – 6000 kelvins
			3. Manual override for users
			4. Optional user interfaces for circadian control:
			5. Touchscreen and virtual touchscreen interfaces
			6. Keypad
			7. Astronomical timeclock adjustments
			8. Color temperature and intensity sensor

User Interface Control Functions

* + 1. The keypad interface shall be capable of the following system control functions:
			1. Scene Recall
			2. Raise/Lower
			3. Off
		2. Touchscreen and Virtual touch screen interfaces shall be capable of the following system control functions:
			1. Password Entry
			2. Multiple levels
			3. Room/Zone selection
			4. Scene Recall
			5. Raise/Lower
			6. Shade Control
			7. Timeclock Events
			8. Customer logo and color scheme
		3. Optional control sequences for advanced control:
			1. Occupancy adjustments
			2. Sensor Timeout
			3. Control logic (occupancy or vacancy)
			4. Lighting Scenes
			5. Individual zone control override
			6. Timeclock adjustments
			7. Modify timeclock activation schedule
			8. Select/unselect pre-programmed timeclock events
			9. Display all timeclock events
			10. Daylight Harvesting Adjustments
			11. Low end trim
			12. Response time
			13. Zone control
			14. Scene Recall
			15. Fade time
			16. Color scene recall
	1. Time Clock Events
		1. The lighting control system shall have astronomical time clocked events. 6-time clock events shall be provided.
		2. End user shall have the option to create additional time clock events via touch screen or XPANEL interfaces.
	2. Installation
		1. Prior to installation, examine work area to verify measurements, and that commencing installation complies with manufacturer's requirements.
		2. Comply with requirements of Division 26 Sections "Common Work Results for Electrical."
		3. Do not install network power controls until space is enclosed, HVAC systems are running, and overhead and wet work in space are complete.
		4. Install network power switching controls in accordance with manufacturer's instructions.
		5. Grounding: Provide electrical grounding in accordance with NFPA 70.
	3. Manufacturer Supported Services
		1. Pre-wire
			1. Manufacturer trained and authorized personnel shall provide on-site visit during the rough-in stage of the installation. At this time wiring topologies and terminations shall be reviewed with the Contractor.
		2. Startup
			1. Provide manufacturer's certified system startup and adjustment.
			2. Switch each load on and off with manual line test feature of the power switching module before installing processors.
			3. Perform operational testing to verify compliance with Specifications. Adjust as required.
		3. Tuning
			1. Within 3 months of the date of Substantial Completion provide onsite service to adjust the system to account for actual occupied conditions.
		4. Training
			1. Within 30 days, Factory authorized service representative to instruct owner's staff to adjust, operate and maintain network power switching systems; and provide instruction using the system software.
			2. Demonstration: Schedule demonstration with Owner.
			3. Training: Train Owner's personnel to operate, maintain, and program network power switching systems.
			4. Furnish set of approved submittals, and record drawings of actual installation for Owner's personnel in attendance at training session.