

SECTION 260926
LIGHTING CONTROL PANELBOARDS
EATON LIGHTING SYSTEMS CONTROLKEEPER®

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PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General specification for the relay lighting control system
2. The Electrical Contractors, as part of the work of this section, shall coordinate, receive, mount, connect and place into operation all equipment. The electrical contractor shall furnish all conduit, wire, connectors, hardware and other incidental items necessary for the complete and properly functioning relay lighting control system as described herein and shown on the plans.

B. Related Sections:

1. Section [262726 - Wiring Devices]
2. Section [260923 – Lighting Control Devices:] Occupancy sensors used in conjunction with the lighting control system.
3. Section [260943.13 – Digital-Network Lighting Controls:] Lighting control panels

1.2 REFERENCES

- A. American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE)**
1. C62.41-1991 – Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
- B. ASTM International (ASTM)**
1. D4674 -02a Standard Test Method for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Fluorescent Lighting and Window-Filtered Daylight.
- C. Canadian Standards Association (CSA) .**
1. CSA C22.2 # 14 Industrial Control Equipment
 2. CSA C22.2 # 184 Solid-State Lighting Controls
 3. CSA C22.2 # 156 Solid-State Speed Controls
- D. European Commission (CE) - Harmonized European Standard.**
1. IEC/EN 60669-2-1 Switches for household and similar fixed electrical installations - electronic switches.
- E. International Electrotechnical Commission .**
1. (IEC) 801-2 Electrostatic Discharge Testing Standard.
 2. IEC/EN 60669-2-1 Switches for household and similar fixed electrical installations - electronic switches.
- F. International Organization for Standardization (ISO)**
1. 9001:2000 – Quality Management Systems.
- G. National Electrical Manufacturers Association (NEMA)**
1. WD1 (R2005) - General Color Requirements for Wiring Devices.
- H. Norma Oficial Mexicana (NOM).**
1. NOM-003-SCFI Productos eléctricos - Especificaciones de seguridad (Electrical products - Safety Specifications)
- I. Underwriters Laboratories, Inc. (UL):**
1. 489 (2002) - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit Breaker Enclosures.
 2. 508 (1999) - Standard for Industrial Control Equipment.
 3. 924 (2003) - Emergency Lighting and Power Equipment

1.3 SYSTEM DESCRIPTION

A. Lighting Control System

1. Factory assembled switching panels. [and] [interfaces and modules]

2. Low voltage [wall stations] [and] [control interfaces] [and] [sensors].

1.4 SUBMITTALS

- A. Submit under provisions of Section [013300.]
- B. Specification Conformance Document: Indicate whether the submitted equipment either:
 1. Meets specification exactly as stated.
 2. Meets specification via an alternate means and indicate the specific methodology used.
- C. Shop Drawings; include:
 1. Load schedule indicating actual connected load, load type, and voltage per circuit, circuits and their respective control zones, circuits that are on emergency, and capacity, phase, and corresponding circuit numbers.
 2. Schematic of system.
- D. Product Data: Catalog cut sheets with performance specifications demonstrating compliance with specified requirements.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Minimum [20] years experience in manufacture of energy management lighting controls.
- B. Energy Management Lighting Control System:
 1. Listed by [CE] [CSA] [UL] specifically for the required loads. Provide evidence of compliance upon request.

1.6 PROJECT CONDITIONS

- A. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
 1. Ambient temperature: 0° to 40° C (32° to 104° F).
 2. Relative humidity: Maximum 90 percent, non-condensing.
 3. Lighting control system must be protected from dust during installation.

1.7 WARRANTY

- A. Provide manufacturer's 3 year parts warranty and a limited 10-year warranty shall be provided on all relay cards. These shall be standard warranties and will be in affect for all installations from the date of invoice.

1.8 MAINTENANCE

- A. Make ordering of new equipment for expansions, replacements and spare parts available to end user.
- B. Make new replacement parts available for minimum of ten (10) years from date of manufacture.
- C. Provide toll free factory direct technical support hotline.
- D. Provide on-site service support for troubleshooting within 24 hours anywhere in continental United States.
- E. Offer renewable service contract on yearly basis, to include parts, factory labor and annual training visits. Make service contracts available up to ten (10) years after date of system commissioning.

PART 2- PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Eaton Lighting Systems (Formerly Cooper Controls) – Systems: ControlKeeper
- B. Eaton Lighting Systems (Formerly Cooper Controls) Catalog Numbers:
 1. ControlKeeper Metering [CKM]
 2. ControlKeeper Metering with Breakers [CKMB]
 3. ControlKeeper TouchScreen [CKT]
 4. ControlKeeper 4A [CK4A]
 5. ControlKeeper 4 [CK4]
 6. ControlKeeper 2 [CK2]
- C. Substitutions: [Not permitted.] [Under provisions of Division 012500.]
 1. All proposed substitutions (clearly delineated as such) must be submitted in writing for approval by the design professional a minimum of 10 working days prior to the bid date and must be

made available to all bidders. Proposed substitutes must be accompanied by a review of the specification noting compliance on a line-by-line basis.

2. Any substitutions provided by the contractor shall be reviewed at the contractor's expense by the electrical engineer at a rate of [\$200.00] per hour.
3. By using pre-approved substitutions, the contractor accepts responsibility and associated costs for all required modifications to circuitry, devices and wiring. The contractor shall provide complete engineered shop drawings (including power wiring) with deviations for the original design highlighted in an alternate color to the engineer for review and approval prior to rough-in.

2.2 GENERAL

- A. Provide hardware that is designed, tested, manufactured and warranted by a single manufacturer.
- B. Lighting Controls: Ten-year operational life while operating continually at any temperature in an ambient temperature range of 0° C (32°F) to 40° C (104°F) and 90 percent non-condensing relative humidity.
- C. Designed and tested to withstand electrostatic discharges up to 15,000 V without impairment per IEC 801-2.

2.3 PANEL / RELAY PERFORMANCE REQUIREMENTS

- A. Electrolytic capacitors to operate at least 20° C below the component manufacturer's maximum temperature rating when device is under fully-loaded conditions in 40° C (104° F) ambient temperature.
- B. Capable of withstanding repetitive inrush current of 50 times operating current without impacting lifetime of dimmer/relay.
- C. Design and test relays to withstand line-side surges without impairment to performance.
 1. Panels: Withstand surges without impairment of performance when subjected to surges of 6,000 volts, 3,000 amps per ANSI/IEEE C62.41B.
- D. Utilize air gap off, activated when user selects "off" at any control to disconnect the load from line supply.
- E. Possess power failure memory such that if power is interrupted and subsequently returned, lights will automatically return to same levels (on or off) prior to power interruption within 3 seconds.
- F. Non-dim circuits to meet the following requirements:
 1. Rated life of relay: Minimum 1,000,000 cycles.
 2. Load switched in manner that prevents arcing at mechanical contacts when power is applied to load circuits.
 3. Fully rated output continuous duty for inductive, capacitive and resistive loads.
- G. Capable of controlling receptacle or plug loads with Latching Relay Option.
- H. Power Metering Relay Cards to be used with the ControlKeeper Metering lighting panels [CKM],[CKMB].
 1. Individually Replaceable
 2. Minimum UL listed Short Circuit Current Rating (SCCR) of [25,000A] [200,000A].
 3. Rated life of relay: Minimum 1,000,000 cycles.
 4. Load switched in manner that prevents arcing at mechanical contacts when power is applied to load circuits.
 5. Fully rated output continuous duty for inductive, capacitive and resistive loads.
 6. Capable of controlling receptacle or plug loads. [PM-LRC]
 7. Eaton Lighting Systems (Formerly Cooper Controls) Catalog Numbers: [PM-SRC], [PM-TPRC], [PM-LRC]
- I. Serial Latching Relay Card to be used with the ControlKeeper lighting panels [CKT],[CK4A].
 1. Rated life of relay: Minimum 1,000,000 cycles.
 2. Four 20amp relays at 120/277/347VAC
 - a. 20amp electronic ballast (LED loads) at 120/277VAC
 - b. 15amp electronic ballast (LED loads) at 347VAC
 3. Manual Override per relay
 4. Accepts up to 6 AWG wire
 5. Load switched in manner that prevents arcing at mechanical contacts when power is applied to

- load circuits.
- 6. Fully rated output continuous duty for inductive, capacitive and resistive loads.
- 7. Capable of controlling receptacle or plug loads.
- 8. Eaton Lighting Systems (Formerly Cooper Controls) Catalog Numbers: [sLRC]
- J. Serial Standard Relay Card to be used with the ControlKeeper lighting panels [CKT],[CK4A].
 - 1. Rated life of relay: Minimum 1,000,000 cycles.
 - 2. Four 20amp relays at 120/277VAC
 - a. 10amp electronic ballast (LED loads)
 - 3. Manual Override per relay
 - 4. Accepts up to 10 AWG wire
 - 5. Load switched in manner that prevents arcing at mechanical contacts when power is applied to load circuits.
 - 6. Fully rated output continuous duty for inductive, capacitive and resistive loads.
 - 7. Eaton Lighting Systems (Formerly Cooper Controls) Catalog Numbers: [sSRC-NO]
- K. Serial Two Pole Relay Card to be used with the ControlKeeper lighting panels [CKT],[CK4A].
 - 1. Rated life of relay: Minimum 1,000,000 cycles.
 - 2. Two 20amp relays at 208/240/480VAC (two pole)
 - 3. Manual Override per relay
 - 4. Accepts up to 6 AWG wire
 - 5. Load switched in manner that prevents arcing at mechanical contacts when power is applied to load circuits.
 - 6. Fully rated output continuous duty for inductive, capacitive, and resistive loads.
 - 7. Eaton Lighting Systems (Formerly Cooper Controls) Catalog Numbers: [sTPRC-NO]

2.4 POWER PANELS

- A. Product: Eaton Lighting Systems (Formerly Cooper Controls) ControlKeeper Relay Panel with Breakers [CKMB]
- B. Mechanical:
 - 1. Listed to UL 508 as industrial control equipment.
 - 2. Delivered and installed as a [UL] [CSA] listed factory assembled panel.
 - 3. Field wiring accessible from front of panel without need to remove relay assemblies or other components.
 - 4. Panels passively cooled via free-convection, unaided by fans or other means.
 - 5. All panels include individual relay override and status LED as well as a Master Override switch. This allows the relays to be individually controlled without using the circuit breaker.
 - 6. [Surface mounted].
- C. Electrical:
 - 1. Panels contain branch circuit protection for each circuit unless the panel is a dedicated feed-through type panel or otherwise indicated on the drawings.
 - 2. Branch circuit breakers; meet following performance requirements:
 - a. Listed to UL 489 as molded case circuit breaker for use on lighting circuits.
 - b. Contain visual trip indicator; rated at up to 25,000 AIC.
 - c. Thermal-magnetic construction for overload, short circuit and over-temperature protection. Use of breakers without thermal protection requires dimmers/relays to have integral thermal protection to prevent failures when overloaded or ambient temperature is above rating of panel.
 - d. Accept tag-out/lock-out devices to secure circuit breakers in off position when servicing loads.
 - e. Replaceable without moving or replacing relay assemblies or other components in panel.
 - f. UL listed as switch duty (SWD) so that loads can be switched on and off by breakers.
 - 3. Minimum UL listed Short Circuit Current Rating (SCCR) of [25,000A] [200,000A].
 - 4. Rated life of relay: Minimum 1,000,000 cycles.
 - 5. Load switched in manner that prevents arcing at mechanical contacts when power is applied to

load circuits.

6. Fully rated output continuous duty for inductive, capacitive and resistive loads.
- D. TouchScreen Panel Processor
1. Language selection: [English] [French] [Spanish]
 2. Integral contact closure inputs.
 3. Integral 0-10V analog inputs
 4. Integral digital switch port
 5. Integral Serial Communication Port
 6. Integral USB Communication Port
 7. Integral Ethernet Communication Port
 8. Programming and system operation:
 - a. Digital Switches, Network Commands and contact closure inputs
 - 1) Assign functionality of each input
 - a) Select Relays or Groups of Relays
 - b) Independent On/Off command functions (On/ Off/ No Command)
 - c) Independent priorities per command (up to sixteen priority levels)
 - d) Sixteen Mask features per panel
 - . Masking features include No On, No Off, Ignore, Reevaluate, No Timer based on time schedules and day of week programming.
 - e) Up to 999 minute timer
 - f) Ability to issue and cancel Warn Off events
 - 2) Serial interface or Ethernet interface
 - a) Communications protocol provided at no charge
 - b) Any lighting panel can be monitored, programmed or controlled from any RS-232 or Ethernet connection
 - 3) Network Commands
 - a) Any input can be programmed to broadcast its state or reading to the lighting control network
 - b) Any input can be programmed as a Network Listener to receive state or reading from a broadcasted input.
 - 4) Contact closure output: Momentary, Maintained, Toggle
 - a) Select Relays or Groups of Relays
 - b) Independent On/Off command functions (On/ Off/ No Command)
 - c) Independent priorities per command (up to sixteen priority levels)
 - d) Sixteen Mask features per panel
 - . Masking features include No On, No Off, Ignore, Reevaluate, No Timer based on time schedules and day of week programming.
 - e) Up to 999 minute timer
 - f) Ability to issue and cancel Warn Off events
 - b. Time clock
 - 1) Integral astronomical time clock
 - a) Geographic location (city or latitude/longitude).
 - b) Adjustable astronomic Offset (+) or (-)
 - c) Adjustable date and time format.
 - d) Adjustable starting and ending of daylight savings time.
 - e) Selectable day of week time event programming
 - f) Select Relays or Groups of Relays
 - g) Independent On/Off command functions (On/ Off/ No Command)
 - h) Independent priorities per command (up to sixteen priority levels)
 - i) Review and modify time clock schedule to add, copy, modify and delete events.

E. Diagnostics and Service:

1. Replacing relay does not require re-programming of system or processor.
 2. Relays: Include diagnostic LED's to verify proper operation and assist in system troubleshooting.
 3. Relay panels: Include tiered control scheme for dealing with component failure that minimizes loss of control for occupant.
 - a. Failures on the lighting control system network are localized to the failed product. All other lighting control panels continue to fully function without additional action. Systems that have a single point of failure on the network shall not be acceptable.
 4. If lighting control system fails, lights to remain at current level. Individual relay overrides provides local control of lights until system is repaired. Each lighting control panel include a master override to override the entire lighting panel.
- F. Real Time Energy Meter per circuit
1. Real Time Energy Metering data shall be supported via integral power metering circuitry on certain ControlKeeper Lighting Panels. [CKM], [CMKB]
 - a. Electrical device to provide real time power metering of voltage and current shall be provided with each relay.
 - b. Metered data can be polled via public command string from the on board Ethernet input.
 - c. Metered data shall be reported based on actual connected relay load.

2.5 LOW VOLTAGE WALL STATIONS

- A. Product: [Greengate Digital Switch.] [Momentary Switch]
- B. Electronics:
 1. Use Eaton Lighting Systems (Formerly Cooper Controls) LCCP or LCCNP wire for low voltage communication wiring for the Greengate Digital Switch.
 2. Use 18 AWG wire for low voltage dry contact switches. Number of conducts is based on type of switch.
- C. Functionality:
 1. Upon button press, LEDs to immediately illuminate.
 2. LEDs to reflect the true system status. LED state is programmable to reflect either relay state or button push state.
 3. Allow for easy reprogramming without replacing unit.
 4. Replacement of units does not require reprogramming.
- D. Provide faceplates with Low Voltage Wall Stations
- E. Engrave wall stations with appropriate button, zone and scene engraving descriptions furnished prior to fabrication.

2.6 LOW VOLTAGE CONTROL INTERFACES

- A. Contact Closure
 1. Integral contact closures to accept both momentary and maintained contact closures.
 2. Systems that do not include integral contact closures shall not be acceptable.
- B. Serial Interface
 1. Provide ability to communicate by means of serial communication by means of user-supplied PC or digital audiovisual equipment. Control to be located within 50 feet (15 meters) of source.
 2. Communications protocol to provide access to:
 - a. Individual Relay Commands
 - b. Individual Relay Status
 - c. Input Status
 - d. Network Override Commands
 3. Provide full programming, monitoring and override control using Keeper Enterprise Programming software.
- C. Ethernet Interfaces; Eaton Lighting Systems (Formerly Cooper Controls) Model Ethernet Interface Module
 1. Provide ability to communicate by means of TCP/IP over Ethernet to ControlKeeper lighting control system by means of user-supplied PC or digital audiovisual equipment.

- Control to be located within 300 feet (100 meters) of Ethernet source.
2. Communications protocol to provide access to:
 - a. Individual Relay Commands
 - b. Individual Relay Status
 - c. Input Status
 - d. Network Override Commands
 3. (Optional) Provide full programming, monitoring and override control using Keeper Enterprise Programming software.
 4. (Optional) The lighting zones may be controlled through a graphical representation software package called VisionTouch®. The software permits up to 255 floors or site plans to be illustrated for intuitive control. The software provides real-time feedback to the operator of network control overrides and relay status.
 - a. Web-based user interface – Software that is not accessed through standard web browsers shall not be acceptable.
 - b. Interactive floor plan – Floor plan software that does not provide immediate area status via defined color code or other readily visible indication shall not be acceptable. Software that requires selecting an area to check overall status shall not be acceptable.
 - c. Up to 500 simultaneous users – Software that is limited to less than 100 active users shall not be acceptable.
 - d. Up to 10 simultaneous facility managers – Software that provides access for less than 5 facility managers or administrator accounts shall not be acceptable.
 - e. Import AutoCAD (DXF) or jpeg files
 5. (Optional) The lighting zones may be controlled using standard calendar based scheduling software. Create events which include individual and groups of relays and link them to any time and day on the calendar. This software package for lighting control event scheduling is called Event Manager. This software requires a SQL Server for operation connected to the lighting control system via the Ethernet Interface Module.
- D. BACnet Interface; Eaton Lighting Systems Model ProtoNode FPC-N34:
1. The ControlKeeper® network shall permit data protocol translation through a building automation interface Gateway. The BACnet Gateway shall permit BACnet communication protocol to operate individual relays, relay groups and read the status of those relays. The ControlKeeper® network shall respond efficiently to the requested information from the BACnet network.
 2. The ProtoNode provides up to 10,000 points of control and can communicate to multiple panel types.
 3. Provide PIC list definition and object model to other system manufacturers.
- E. LonWorks Interface; Eaton Lighting Systems Model FPC-N35:
1. Provide ability to communicate by means of LonWorks FTT-10 communication to centralized lighting system from user-supplied LonWorks FTT-10 twisted pair network.
 2. The ControlKeeper® network shall permit data protocol translation through a building automation interface Gateway. The LON Gateway shall permit LonWorks communication protocol to operate individual relays, relay groups and read the status of those relays. The ControlKeeper® network shall respond efficiently to the requested information from the LonWorks network.
 3. The ProtoNode provides up to 4,096 points of control and can communicate to multiple panel types.
 4. Provide LonWorks interface object model specification to secondary equipment manufacturers.
- F. Emergency Lighting Interface; Eaton Lighting Systems (Formerly Cooper Controls) Model [LRM120] [LRM277] [LRM347][RRU-1-120][RRU-1-277]
1. Provides total system listing to UL 924 when used with ControlKeeper system.
 2. Senses the loss of normal power.
 3. Provides an output to override the ControlKeeper lighting panels to the all On state.
 4. Accepts a contact closure input from a fire alarm control panel.

2.7 SENSORS

- A. Refer Section [260923 – Lighting Control Devices:] Occupancy sensors used in conjunction with the

lighting control system.

B. Exterior Daylight Sensors:

1. Calibrated with independent turn-on and turn-off thresholds; minimum 2 foot-candles difference between the turn-on and turn-off thresholds.
2. Enclosed in weatherproof housing with shading and lens protection visor.

2.8 OPEN ADR VIRTUAL END NODE (VEN) FOR DEMAND RESPONSE

A. The ControlKeeper shall be capable of receiving a signal from a Demand Response or OpenADR Virtual End Node device. When received the ControlKeeper will automatically adjust lighting to provide optimal energy savings and comply with Demand Response code requirements. Systems that do not support Demand Response capability shall not be acceptable.

1. Automatically adjust the target lighting level by at least 15% but not more than 50%.
2. System does not permit user override of the Demand Response system except in the cases of emergency or normal power loss. Systems that allow the user to adjust the lights higher than the demand response target light level shall not be acceptable.
3. Each ControlKeeper shall be configurable for individual Demand Response reduction levels. Systems that only support global Demand Response reduction levels shall not be acceptable.

B. Eaton Lighting Systems (Formerly Cooper Controls) Catalog Number:

1. [EBOX-2B-DC],[EBOX-ASF]

1.2 EMERGENCY LIGHTING

A. Emergency Power Control – A UL 924 listed device installs down line of an output that monitors a switched or dimmed circuit providing normal lighting to an area. The unit provides normal ON/OFF or 0-10V dimming control of emergency lighting along with the normal lighting. Upon normal power failure the emergency lighting circuit will close, forcing the emergency lighting ON until normal power is restored. Features include:

1. 120/277 volts, 50/60 Hz., 20 amp ballast rating.
2. Push to test button.
3. Eaton Lighting Systems (Formerly Cooper Controls) Catalog Numbers:
 - a. [CEPC-1] (switching)
 - b. [CEPC-1-D] (0-10V dimming)

1.

2.9 ACCESSORIES

A. The ControlKeeper® has several hardware accessories that may be utilized to enhance your lighting control application. Select from the network hardware accessories which accessories will be utilized for your application.

1. ControlKeeper® TouchScreen (CKT)
 - a. The CKT shall provide additional flexibility by providing up to 48 - 20 amp @ 277 VAC rated relays that are addressable and fully programmable from the network. The relay wire terminations shall be able to accept 10 AWG. The CKT controllers, although accessible through the network, shall be fully stand-alone in their control capability. The CKT provides full status indication of CPU status, network communication, power, and HOA overrides. The controller shall provide thirty-two, 3-wire or 2-wire dry contact inputs that may be configured as maintained or momentary inputs. The controller shall provide four analog inputs. The controller shall provide up to 64 digital buttons for overrides. The controller shall provide 128 additional global commands for network control and shall reside in the CKT. Networks that rely on a single time clock for system operation shall not be

- acceptable.
2. ControlKeeper® 4A (CK 4A)
 - a. The CK 4A shall provide additional flexibility by providing four 20 amp @ 277 VAC rated relays that are addressable and fully programmable from the network. The relay wire terminations shall be able to accept 10 AWG. The CK 4A shall optionally provide four, 0-10VDC outputs to control dimming ballasts. The CK 4A controllers although accessible through the network shall be fully stand-alone in their control capability. The CK 4A provides full status indication of CPU status, network communication, power and HOA overrides. The controller shall provide four, 3-wire or eight, 2-wire dry contact inputs that may be configured as maintained or momentary inputs. The controller shall provide four analog inputs. The controller shall provide up to 64 digital buttons for overrides. The controller shall provide 64 additional global commands for network control and shall reside in the CK 4A. Networks that rely on a single time clock for system operation shall not be acceptable.
 3. ControlKeeper® 4 (CK 4)
 - a. The CK 4 shall provide additional flexibility by providing four normally open or normally closed 20 amp @ 277 VAC rated relays that are addressable and fully programmable from the network. The relay wire terminations shall be able to accept 10 AWG. The CK 4 controllers although accessible through the network shall be fully stand-alone in their control capability. The CK 4 provides full status indication of CPU status, network communication, power and HOA overrides. The controller shall provide four dry contact inputs that may be configured as maintained or momentary inputs. The controller shall provide up to 64 digital buttons for overrides. The controller shall provide 64 additional global commands for network control and shall reside in the CK 4. Systems that utilize the master slave topology shall not be acceptable.
 4. ControlKeeper® 2 (CK 2)
 - a. The CK 2 shall provide additional flexibility by providing two normally open or normally closed 20 amp @ 277 VAC rated relays that are addressable and fully programmable from the network. The relay wire terminations shall be able to accept 10 AWG. The CK 2 controllers although accessible through the network shall be fully stand-alone in their control capability. The CK 2 provides full status indication of CPU status, network communication, power, and HOA overrides. The controller shall provide two dry contact inputs that may be configured as maintained or momentary inputs. The controller shall provide up to 64 digital buttons for overrides. The controller shall provide 64 additional global commands for network control and shall reside in the CK 2. Systems that utilize the master slave topology shall not be acceptable.
 5. Room Controller Network
The Room Controller Network shall provide additional flexibility by providing three relays, three 0-10V dimmer functionality to the ControlKeeper Network. Room Controllers are fully functional out-of-the-box to the connected devices in the space without commissioning or the use of any tools. Room Controllers shall be provided to match the room lighting load and control requirements. The controllers will be simple to install and will include line voltage wiring space and will not require additional electrical junction boxes

2.10 SOURCE QUALITY CONTROL

- A. Perform full-function testing on completed assemblies at end of line. Statistical sampling is not acceptable.

PART 3- EXECUTION

3.01 – EQUIPMENT INSTALLATION AND DOCUMENTATION

- A. Installation
The control system shall be installed and fully wired as shown on the plans by the installing contractor. The contractor shall complete all electrical connections to all control circuits and override wiring.
- B. Documentation
The contractor shall provide accurate “as-built” drawings to the owner for correct programming and

proper maintenance of the control system. The “as-builts” shall indicate the load controlled by each relay and the relay panel number.

- C. Operation and Service Manuals
The factory shall supply all operation and service manuals.

3.02 – PRODUCT SUPPORT AND SERVICE

- A. Factory Support
Factory telephone support shall be available at no cost to the owner. Factory assistance shall consist of solving programming or application questions concerning the control equipment.

3.03 – SYSTEM DELIVERY AND ACCEPTANCE

- A. Delivery
The contractor is responsible for complete installation of the entire system according to strict factory standards and requirements. The following items shall constitute factory standards and requirements:
 1. All system equipment shall operate in accordance with specification and industrial standard procedures.
 2. An operational user program shall exist in the control system. The program shall execute and perform all functions required to effectively operate the site according to the requirements.
 3. Demonstration of program integrity during normal operation and pursuant to a power outage.
 4. Contractor shall provide a minimum of two training hours on the operation and use of the control system. Additional support services shall be negotiated between the contractor and the building owner or manager.

3.04 – FACTORY COMMISSIONING (OPTIONAL)

- A. Upon completion of the installation, the system shall be commissioned by the manufacturer's factory authorized representative who will verify a complete fully functional system.
- B. The electrical contractor shall provide both the manufacturer and the electrical engineer with twenty one working days written notice of the system startup and adjustment date.
- C. Upon completion of the system commissioning the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.

3.04 – WARRANTY

- A. Warranty
Manufacturer shall supply a 3-year warranty on all hardware and software. A limited 10-year warranty shall be provided on all relay cards. These warranties will be in affect for all installations. Systems that provide special warranties based on installation shall not be acceptable.

END OF SECTION