

SECTION 26 09 43
PART 1 GENERAL: ENERGIO CONTROLS MASTER SPECIFICATION

1.1 SYSTEM SUMMARY

- A. This specification document details an open standard, wireless mesh network lighting controls system. System components can include any or all of the following:
 - 1. Wireless dimmers
 - 2. Wireless occupancy/vacancy sensors
 - 3. Wireless photocells
 - 4. Wireless wall stations – low voltage, line voltage, battery and self-powered
 - 5. Touchscreens
 - 6. Wireless relay devices
 - 7. Wired, line or low voltage sensors
 - 8. Wireless LED drivers
 - 9. Wired and Wireless interface devices to other systems or devices.
 - 10. Gateway devices
- B. The system should be based on an ecosystem style protocol where multiple manufacturers make compatible devices and components.

1.2 RELATED SECTIONS

- A. Section 08 75 13 - Automatic Window Equipment.
- B. Section 12 25 09 - Window Treatment Controls System.
- C. Section 12 25 13 - Motorized Drapery Rods.
- D. Section 23 09 00 - Instrumentation and Controls for HVAC.
- E. Section 26 09 00 - Instrumentation and Control for Electrical Systems.
- F. Section 25 00 00 – Integrated Automation Building integrator shall provide integration of the lighting control system with Building Automation Systems
- G. Section 26 09 13 - Electrical Power Management System.
- H. Section 26 09 23 - Lighting Control Devices.
- I. Section 26 09 23 - Occupancy Sensors Occupancy sensors are used with a central dimming control system.
- J. Section 26 27 26 - Wiring Devices/Lighting Controls
- K. Section 26 27 26 – Wiring Devices Receptacles
- L. Section 26 51 13 – Interior Lighting Fixtures, Lamps, and Ballasts Fluorescent electronic dimming ballasts
- M. Section 28 15 00 - Integrated Access Control Hardware Devices.

1.3 REFERENCE STANDARDS

- A. American National Standards Institute/ (ANSI) (www.ansi.org) C62.41-1991 – Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.
- B. Institute of Electrical and Electronics Engineers (IEEE) (www.ieee.org) 802.3af-2003 – Power over Ethernet standard
- C. International Electrotechnical Commission (www.iec.ch) IEC/EN 61000-4-2:2009 Electrostatic Discharge Testing Standard.
- D. International Organization for Standardization (ISO) (www.iso.ch) 9001:2000 – Quality Management Systems.
- E. National Electrical Manufacturers Association (NEMA) (www.nema.org) WD1 (R2005) - General Color Requirements for Wiring Devices.

- F. Underwriters Laboratories, Inc. (UL) (www.ul.com)916 – Energy Management Equipment
- G. Federal Communications Commission (FCC) (www.fcc.gov)Title 47 CFR Part 15 Class A

1.4 COORDINATION REQUIREMENTS

- A. Coordination
 - 1. Coordinate the placement of all wireless dimmers, relays and other control devices
 - 2. Coordinate the placement of sensors, wall stations, touchscreens and other user input devices
 - 3. Coordinate the placement of daylight sensors to achieve optimal daylight dimming
 - 4. Coordinate the placement of luminaires, including luminaires with integrated sensors
 - 5. Notify the architect of any conflicts or deviations from the contract documents to obtain direction before proceeding with work.
- B. Prewire meeting: conducted remotely via Google Meet, Microsoft Teams, Zoom or other per-approved virtual meeting solution provider. Attendees will be one or more representatives of the lighting control system provider or integrator or designated representatives and members of the installation team including representatives from the GC, EC, Ownership group and IT department. The meeting will take place before commencing work as part of the manufacturer's standard practice and start-up services. Provider or Intergrator to review with the installer:
 - 1. Installation of lighting area controller and supervisory controller and locations
 - 2. Control device locations
 - 3. Load circuit wiring
 - 4. Low-voltage wiring requirements
 - 5. Network IT requirements
 - 6. Lighting control integration requirements
 - 7. Installer responsibilities
 - 8. Start-up and training schedule and actions

1.5 SUBMITTALS

- A. An overview of the system.
- B. Shop drawings:
 - 1. Layout showing recommended location of distributed wireless components.
 - 2. Wiring diagrams for typical application installation configurations.
 - 3. Wiring diagrams for typical device installation configurations.
- C. Product data: technical data sheets with performance specifications demonstrating compliance with specified requirements and are specific to the project.
- D. System setup and programming to be provided by installer, certified technician or factory field service personnel.
 - 1. Remote startup services will be provided by the manufacturer free of charge
 - 2. On-site startup services will involve an additional charge.

1.6 CLOSEOUT SUBMITTALS

- A. Contractor will provides a set of as-built drawings showing the location, control wire routing and circuiting of each component
- B. Manufacturer or Intergrator will record all installation documentation, drawings, network details, programming information and passwords electronically and will provide this information on demand to the building owner/operator.

1.7 QUALITY ASSURANCE

- A. The product shall conform to requirements outlined in NFPA 70
- B. System components: shall be listed by an OSHA Nationally Recognized Testing Laboratory Provide evidence of compliance upon request.
- C. Listed by FCC specifically for the required wireless communication protocols. Provide evidence of compliance upon request.
- D. Provides factory direct technical support hotline available 24 hours per day, 7 days per week.

1.8 DELIVERY, STORAGE AND HANDLING

- A. System will be delivered as a complete system, shipped from a single location with all components arriving at the same time.
- B. Ensure products are delivered as shipped, including pallet assembly and packaging, have not been damaged in shipment.
- C. Store products in a clean, dry location in the manufacturer's original packaging.
- D. Store products in an environment that meets products' ambient and storage temperature per products specification sheets.
- E. Store products in an environment that meets products' relative humidity of less than 90 percent, non-condensing as outlined on the product specification sheets.
- F. The contractor is responsible for the complete installation of the entire system according to strict factory standards and requirements.
- G. Handling: packaging will include clear installation instructions for all components with typical installation locations and connections illustrations. The installing contractor can easily match each package to the layout on the design floor plans.

1.9 FIELD CONDITIONS

- A. Do not install equipment until the following conditions can be maintained in spaces to receive equipment:
- B. Ambient temperature for indoor devices: 32°F to 104°F (0°C to 40°C)
- C. Ambient temperature for outdoor devices: -40°F to 131°F (-40°C to 55°C)
- D. Relative humidity: Maximum 90 percent, non-condensing.
- E. The wireless mesh network lighting control system must be protected from dust during installation.
- F. Ambient temperature for lighting management gateway: 32°F to 104°F (0°C to 40°C)
- G. Coordinate layout and installation of luminaires and controls with other construction.
- H. Coordinate site commissioning with manufacturer no less than 21 days prior to the required date

1.10 WARRANTY

- A. System provider or Integrator standard limited warranty from the date of product shipment:
 - 1. The complete system, as provided will have a 5 year limited warranty on all supplied components.
 - 2. The System Provider or Integrator will extend any manufacturers warranty of less than 5 years to the same 5 year period.
- B. The contractor shall provide a limited workmanship warranty from customer acceptance for one (1) year.

1.11 MAINTENANCE MATERIAL SUBMITTALS

- A. The System Provider or Integrator shall make the End-User a method of ordering new equipment for expansions, replacements, and spare parts through established distributor channels.
- B. The System Provider or Integrator shall make new replacement parts available for a minimum of 5 years from the date of manufacture.
- C. The System Provider or Integrator shall make additional software apps directly available to the owner that may be desired for a minimum of 10 years from the system's date of purchase.
- D. The System Provider or Integrator shall provide extended support that is billable at a daily rate.

PART 2 GENERAL SYSTEM REQUIREMENTS

2.1 DESCRIPTION & OPERATION

- A. The wireless mesh network lighting control system has the following features when configured with offered devices providing those capabilities:
 - 1. Continuous dimming and automatic on/off controls
 - 2. Indoor and outdoor occupancy control
 - 3. Indoor and outdoor vacancy control
 - 4. Indoor and outdoor daylight harvesting
 - 5. Outdoor load control
 - 6. Receptacle control
 - 7. Load management
 - 8. Multi-level scene control
 - 9. 7-Days scheduling
 - 10. Astronomic scheduling
 - 11. Demand Response
 - 12. Task Tuning
 - 13. Manual control via wallstations or software apps
 - 14. Energy usage data reporting
 - 15. Occupancy data reporting
 - 16. Beacons for indoor navigation, asset tracking, etc.
 - 17. Configuration and management via mobile device
 - 18. Integration with third-party systems via all of the following protocols or methods; BACnet/IP, ModBus, Lonworks, CanBus, MQTT, LoRaWAN, and Public (REST) API
 - 19. System health monitoring
- B. In addition to 0-10V signals and switching relays the wireless mesh network system shall be capable of dimming and controlling fixtures using any or all of the following protocols without the need of any type of translator or interface device; DALI, DMX, Phase Dimming (forward and reverse), ELV, Triac.
- C. The wireless mesh network lighting control system shall be programmed entirely and configured using a mobile application via a smartphone/tablet and/or a PC.
- D. The wireless mesh network lighting control system shall support standalone and networked topologies.
- E. The wireless mesh network lighting control system shall be fully functional both with and without a continuous connection to the Internet.

PART 3 PRODUCTS

3.1 MANUFACTURER OR SYSTEM INTEGRATOR

- A. Acceptable system supplier will be **CED National Accounts**, providing an integrated system by Energio Controls.
- B. Basis of design: **Energio Controls**, open standard, wireless mesh network lighting controls system.
 - 1. Pre- Approved “Equal” systems will:
 - a. be wireless and use mesh network topology
 - b. not require on-site start up
 - c. be able to use alternate devices (dimmers, relays, sensors, wall stations, etc.) manufactured by a 3rd party manufacturer.
 - 2. Communication and Control Protocols.
 - a. Protocols that are restricted to a single manufacturer or that were developed for use by a single manufacturers system are unacceptable.
 - b. Acceptable protocols include:
 - Bluetooth SIG (non-proprietary)
 - Casambi
 - Ingy
- C. Substitutions:
 - 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. The contractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring by using pre-approved substitutions. The contractor shall provide complete engineered shop drawings (including power and control wiring) with deviations from the original design, highlighted in an alternate color, to the engineer for review and approval prior to rough-in.

3.2 WIRELESS CONNECTED DEVICES

- A. Individual fixture control devices
 - 1. Small devices (nodes) capable of being factory or field installed in or on a single light fixture.
 - a. Nodes will have the ability to be wired directly to a driver and output one of the following signals or digital protocols: 0-10V, DALI, DMX, PWM, ELV, Triac
 - 2. Intelligent drivers – drivers with an integral Bluetooth Low Voltage radio/chip set factory flashed with the specified communication protocol.
 - 3. LED boards/light engines with a Bluetooth Low Voltage radio/chip set factory flashed with the specified communication protocol mounted on the board.
 - 4. Fixture mounted occupancy/vacancy sensor.
 - a. integral Bluetooth Low Voltage radio/chip set factory flashed with the specified communication protocol.
 - b. The ability to be wired directly to a driver and output one of the following signals or digital protocols: 0-10V, DALI, DMX, PWM, ELV, Triac.

B. Area control devices

1. 0-10V/relay area controller
 - a. Plenum-rated
 - b. Version with a relay will be rated for switching no less than a 2 amp lighting load.
 - c. Version with a relay rated for 20 amps for the switching of a complete 16 amp lighting circuit or on demand electrical outlets. Relays rated less than 20 amps are not acceptable for this purpose
 - d. 0-10V outputs will provide a minimum of 100 mA output
2. DALI
 - a. Plenum-rated
 - b. DALI area controller does NOT require a DALI master device
 - c.
3. Trailing Edge
 - a. Plenum-rated
 - b. Capable of switching a minimum of a 2 amp load
4. PWM
 - a. Plenum-rated
 - b. 4 channel output for dimming RGBW fixtures

C. Wireless Occupancy/Vacancy/Daylight Sensors

1. Stand alone ceiling mounted sensors
 - a. Plenum-rated
 - b. Line-Voltage, low-voltage or self-powered. Battery-powered sensors are not acceptable.
 - c. To reduce false triggers dual technology sensors are not acceptable. PIR only.
 - d. Can be set to occupancy or vacancy mode via onsite or remote programming.
 - e. Ability to detect ambient light levels.
2. Stand alone switch mounted sensor
 - a. Mounted in a standard switch box and finished with a decorator style plate.
 - b. Can be set to occupancy or vacancy mode via onsite or remote programming.
 - c. Must have manual override button.
 - d. Must have manual dimming control.
 - e. Ability to detect ambient light levels.

D. Wall Stations

1. Self-Powered wall stations
 - a. 2-4 buttons per single gang stations
 - b. Mounting in either a standard single gang switch box or directly to the wall via provided mounting bracket.
 - c. Powered via the kinetic energy of pushing each button.
 - d. Capable of on/off control, scene activation and manual dimming.
2. Wireless switch input device and momentary wall stations
 - a. Input device can be line-voltage or low-voltage powered.
 - b. A minimum of 4 momentary inputs.
 - c. Work with any type or style of momentary push-button or other momentary signal.
3. Wireless 120V wall stations
 - a. 1-6 buttons
 - b. LED indicator lights for each button
 - c. Mounting in either a standard single gang switch box

- d. Wall stations that can be removed without tools are not acceptable.
- e. 7" full color
- f. Wall mounting bracket in black or white.
- g. Android operating system

PART 4 Execution

4.1 PRE-INSTALLATION

- A. Full review of system provider created project submittal, manuals and product technical sheets.
- B. Pre-installation meeting with Energio Controls installation advisor. Meeting will be conducted via online meeting system and scheduled at least a week in advance by the installer.

4.2 INSTALLATION

- A. All system devices will be installed as close to the location shown on the submittal layout drawing as possible.
- B. System devices are not to be grouped and centrally located.
- C. Install the work of this section in accordance with the manufacturer's printed instructions unless otherwise indicated.
- D. 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.
- E. Provide written or computer-generated documentation showing the exact location of each device in the system.
- F. Provide completed commissioning form provided by Energio Controls for each area of control. Information on this form will include:
 - 1. End user requested sensor parameters, time delays, sensitivities, and daylighting setpoints.
 - 2. End user requested sequence of operations, (e.g. manual ON, Auto OFF. etc.).
 - 3. End user requested automatic and manually activated lighting scenes.
 - 4. Code required functions (e.g. timed off sweeps, demand response, etc.)

4.3 PRODUCT SUPPORT AND SERVICE

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

4.4 FACTORY COMMISSIONING (OPTIONAL)

- A. Upon completion of the installation, the system shall be commissioned by the System Provider or Integrator's 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 (21) working days' written notice of the system start-up 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.

4.5 CLOSEOUT ACTIVITIES (OPTIONAL)

- A. Training Visit
- B. Lighting control system manufacturer to provide one (1) day of additional on-site system training to site personnel. This shall be a part of the second visit by field service to the site. A separate third visit will require an additional charge.
- C. For LEED projects, the manufacturer shall conduct an on-site walk-through to demonstrate system functionality to a Commissioning Agent.
- D. During this visit, the manufacturer's Field Service Engineer will perform tasks at the request of the facility representative or Commissioning Agent, such as demonstrating wall control functions explain or describing occupancy and/or daylight sensor functionality.
- E. On-site Walk-through
- F. Lighting control system manufacturer to provide a factory-certified Field Service Engineer to demonstrate system functionality to the Commissioning Agent.

END OF SECTION