



Hubbell PowerHUBB™ PoE Lighting and Control Guide Specification

Hubbell's PowerHUBB™ is an enterprise-level Power over Ethernet (PoE) lighting and control platform that seamlessly integrates luminaires, sensors, user interfaces and software for a scalable, intelligent building control solution.

Software and Controls: Hubbell Control Solutions' PowerHUBB platform delivers intelligent sensors, intuitive user interfaces and scalable PoE technology that enables a highly configurable, enterprise software solution with cloud analytics.

PoE Enabled Luminaires: Hubbell Lighting's portfolio of PowerHUBB enabled luminaires deliver quality illumination while reducing energy consumption, and total cost of ownership for PoE installations.

Infrastructure: Hubbell Premise Wiring manufactures a fully integrated system of copper and fiber network cabling, and components that are designed to meet PoE performance and reliability standards.

Hubbell Control Solutions' advanced systems and lighting controls offer a comprehensive portfolio of simple, scalable and seamless solutions for indoor and outdoor applications from a single partner. Our advanced lighting control technologies provide intuitive and flexible deployment options to meet code, enhance comfort, increase energy savings and improve operating efficiency for enterprises of any size. Hubbell Control Solutions' product suite includes partially distributed and centralized wired systems, luminaire integrated sensors, color tuning controls, occupancy sensors, photocell sensors, and emergency functionality.

Hubbell controls systems are an integral part of energy optimization provisions in sustainable design and LEED certified projects worldwide. Incorporation of targeted user-definable controls, occupancy sensors, and daylight sensors linked to lighting and HVAC daylight harvesting and load-shedding designs may contribute to several LEED credits, including LEED-NC/LEED-CI/LEED for Schools Minimum Energy Performance, Optimize Energy Performance, Controllability of Systems – Lighting, and Controllability of Systems – Thermal Comfort.

Hubbell offers a variety of products to solve business challenges, increase energy efficiency, enhance safety, operate in harsh environs, manage your wiring and improve grounding systems in and around building structures.

Contact Hubbell Lighting, Inc., Phone (800)888-8006, www.hubbell.com, email: hcstech@hubbell.com.

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SECTION 26 09 23 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 SUMMARY

Specifier: Edit paragraph and subparagraphs below to correspond to components required for this Project.

- A. Section Includes: Low voltage DC nodes for Power over Ethernet (PoE) Network system utilizing Solid State Lighting (SSL) and low voltage input devices. Optional software provides code compliance and integration capabilities. System includes:
1. PowerHUBB nodes
 2. Low Voltage control devices
 3. Power Source Equipment (PSE)
 4. Cables
 5. Software
- B. Related Information:

Specifier: Related Information paragraph is optional. If retaining, edit and coordinate list of sections below to correspond to Project requirements.

1. Division 25 Section "Integrated Automation Control of Electrical Systems" for software and integration hardware for network-based lighting controls.
2. Division 26 Section "Common Work Results for Electrical".
3. Division 26 Section "Wiring Devices" for backboxes required for PSE equipment.
4. Division 26 Section "Lighting Devices" for occupancy sensors controlled by control system.
5. Division 26 Section "Interior Lighting" for light fixtures controlled by control system.
6. Division 27 Section "Cable Trays for Communications Systems."

1.2 REFERENCES

- A. Institute of Electrical and Electronics Engineers, Inc., (IEEE):
1. IEEE 802.3 Approved Standard for Ethernet.
- B. National Fire Protection Association (NFPA):
1. NFPA 70 - National Electrical Code.

1.3 DEFINITIONS

- A. PoE: Power over Ethernet
- B. IEEE 802.3: Approved Standard for Ethernet.
- C. PD: Powered device or PowerHUBB node.
- D. PSE: Power Source Equipment such as a PoE switch.

1.4 ACTION SUBMITTALS

Specifier: Action submittals require responsive action by A/E or Owner.

- A. Product Data Sheets: For each type of product required for complete lighting control system, demonstrating compliance with requirements.
- B. Shop Drawings: Indicate the following:
 - 1. Schematic diagram of system including physical location of devices.

1.5 INFORMATIONAL SUBMITTALS

Specifier: Informational submittals require review, but not response, by A/E or Owner.

- A. Electronic Files of Following Manufacturer Resources:
 - 1. Installation instructions
 - 2. Connectivity diagrams of control input devices: (Upon request).
 - 3. Sample of manufacturer's warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operating and maintenance instructions: Electronic files.
- B. Record drawings of physical location of each fixed device and list with serial numbers of portable devices: Electronic files.

1.7 MAINTENANCE AND OPERATIONS MATERIAL SUBMITTALS

- A. System software and manuals: Electronic files.

1.8 QUALITY ASSURANCE

- A. Source Requirements: Provide controls hardware and software through a single source from a single manufacturer.
- B. Installer Qualifications: Experienced Installer meeting requirements of authorities having jurisdiction and trained and approved by manufacturer to install specified products.
- C. Manufacturer Qualifications: Approved manufacturer of control system listed in this Section with minimum five years record of satisfactory manufacturing and support of components comparable to basis of design system.

Specifier: Retain paragraph below if Owner allows substitutions but requires strict control over qualifying of substitutions.

- 1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Product data indicating compliance with requirements.
 - b. Samples of each component.
 - c. Sample submittal from similar project.

- d. Project references: Minimum of 5 completed installations, with Owner and Architect contact information.
 - e. Sample warranty.
2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.
 3. Approved manufacturers must comply with separate requirements of Submittals Article.
- D. Electrical Components, Devices, and Accessories: UL listed and labeled.
 - E. Regulatory Requirements: Provide components and systems that comply with requirements of the following:
 1. NFPA 70.
 2. Underwriters Laboratory (UL) standards.

Specifier: Retain paragraph below when Project requirements include compliance with California Title 24 provisions.

- F. California Appliance Efficiency Listing: Provide products that comply with provisions of CEC CCR Title 24, Part 6.

1.9 PROJECT CONDITIONS

- A. Environmental Conditions Range:
 1. Temperature: 32 – 104 deg. F (0 - 40 deg. C).
 2. Relative Humidity: 10 – 90 percent, noncondensing.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of dimming and environmental controls system that fail in materials or workmanship within the specified warranty period following substantial completion.
 1. Warranty Period: Five years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products of **HUBBELL Control Solutions**, (800) 888-8006, www.hubbell.com [or comparable products from a single manufacturer approved by Architect/Engineer of record prior to bidding], with the following components and characteristics.

2.2 PoE LIGHTING, DIMMING AND ENVIRONMENTAL CONTROL SYSTEM

Hubbell Control Solutions' PowerHUBB node provides power distribution architecture and data connectivity to create a fully functioning Power over Ethernet (PoE) lighting control system. Programming is performed using the Gateway software, which communicates bi-directionally over a CAT5e/6A Cable that connects directly to the PowerHUBB node. The distribution architecture consists of Master/Control Nodes, Master Nodes, Satellite/Control Nodes, and Satellite Nodes. Control Nodes receive and send local

control information from sensors and wall switches. Daisy chaining of nodes and use of satellite nodes allows a significant reduction in the number of additional cable runs back to the data closet.

Master/Control Nodes receive data and power from the PoE network switch. These nodes then pass along the power and data downstream to any daisy-chained Satellite node(s), while receiving/sending local control data via sensor input/output connections and wall switch connections.

- A. Master/Control Node: Plenum-rated Class 2 electrical device suitable for indoor applications; replaces standard electronic AC driver in luminaire, providing dimming function down to one percent; programmed for optimized performance of LED; DHCP-enabled. Includes sensor input/output connections and wall switch connections.
1. Basis of Design Product: **Hubbell Control Solutions, PowerHUBB Node – Master/Control [PHM1PC] [PHM1PC (-EM)] [PHM4PC] [and] [PHM4PC (-EM)].**
 2. Mounting: Within luminaire or remotely, as indicated on Drawings.
 3. LED Driver Outputs:
 - a. Channels: Single LED driver channel.
 - b. Driver Design: Constant current LED driver design, programmable in 10mA increments from 100mA to 1750mA.
 - c. Dimming: Full range 1 to 100 percent dimming control in 1 percent increments via CCR, PWM or Hybrid mode.
 - d. Output Voltage Range: 12VDC - 48VDC.
 - e. Rated Output Power: 53W max.
 - f. Protection: Short circuit and open circuit protection.
 - g. Connections: Screw terminals, accept 14-26 AWG conductors.
 4. Sensor I/O Connections:
 - a. Power Supply: One 24VDC terminal for powering external sensors, 500 mA total capacity.
 - b. Occupancy Sensor Input.
 - c. Analog Sensor Inputs: 2.
 - d. Connections: Screw terminals, accept 16-26 AWG conductors.

Specifier: Retain paragraph below for 4PC node versions.

- e. Relay control outputs: Two relay control outputs for actuating (1) latching relay or (2) electromechanical relays (24VDC coils).
5. Wall Switch Connections:
 - a. Switch Inputs: Five momentary dry contact pushbutton inputs.
 - b. Pilot Light Outputs: Five pilot light outputs, 24 VDC at 7.5 mA each.
 - c. Connections: Screw terminals, accept 16-26 AWG conductors
6. User Set-up Characteristics:
 - a. Performed using Gateway software communicating bi-directionally over CAT5e/6a cable connected to node.
7. Electrical Characteristics:
 - a. PoE Interface: IEEE 802.3at-2009 PD Type 2, Class 4, Compliant Input

- b. Input: 48-57VDC
 - c. Peak operating power: 60W
 - d. Nominal standby power: 2.0W
8. Safety and EMC Characteristics:
- a. Safety Standards: UL 2108, CAN/CSA C22.2 No. 9; UL 1598C, CAN/CSA C22.2 No. 250.0-08, CSA B-79A,
 - b. UL 2043, Suitable for Use in Air Handling Spaces (Plenum rated).
 - c. EMC Emissions: Compliance to EN 55015:2013.
 - d. EMC Immunity: Compliance to EN 61547:2009.
 - e. FCC: Compliance to Title 47 Part 15 Subpart B Section 15.109.
 - f. EU: RoHS Compliant.
 - g. UL 924, CAN/CSA C.22.2 No. 141-15-Emergency Lighting: For -EM version nodes.

Master Nodes receive data and power from the PoE network switch. These nodes then pass along the power and data downstream to any daisy-chained Satellite node(s).

- B. Master Nodes: Plenum-rated Class 2 electrical device suitable for indoor applications; replaces standard electronic AC driver in luminaire, providing dimming function down to one percent; programmed for optimized performance of LED. DHCP-enabled.
- 1. Basis of Design Product: **Hubbell Control Solutions, PowerHUBB Master Node [PHM1P] [and] [PHM1P (-EM)]**.
 - 2. Characteristics: Same as described for Master/Control Node above, less Sensor I/O Connections and Wall Switch Connections.

Satellite/Control Nodes extend the functionality and reach of a Master node by allowing Satellite nodes to be connected in a daisy-chain manner from the Master node via common Ethernet patch cables. These nodes then pass along the power and data downstream to any daisy-chained node(s), while receiving/sending local control data via sensor input/output connections and wall switch connections.

- C. Satellite/Control Node: Plenum-rated Class 2 electrical device suitable for indoor applications; replaces standard electronic AC driver in luminaire, providing dimming function down to one percent; programmed for optimized performance of LED. Satellite/Control node connects to a master node via Ethernet patch cable. Includes sensor input/output connections and wall switch connections
- 1. Basis of Design Product: **Hubbell Control Solutions, PowerHUBB Satellite/Control Node [PHS1PC] [PHS1PC (-EM)] [PHS4PC] [and] [PHS4PC (-EM)]**.
 - 2. Characteristics: Same as described for Master/Control Node above.

Satellite Nodes receive data and power from a Master node or Satellite Control node. These nodes then pass along the power and data downstream to any daisy-chained Satellite node(s).

- D. Satellite Node: Plenum-rated Class 2 electrical device suitable for indoor applications; replaces standard electronic AC driver in luminaire, providing dimming function down to one percent; programmed for optimized performance of LED. Satellite node connects to a master node via Ethernet patch cable.
- 1. Basis of Design Product: **Hubbell Control Solutions, PowerHUBB Satellite Node [PHS1PC] [and] [PHS1P (-EM)]**.

2. Characteristics: Same as described for Satellite/Control Node above, less Sensor I/O Connections and Wall Switch Connections.

2.3 EMERGENCY LIGHTING NODES

- A. Emergency Node versions of products noted and described above and designated by (EM)
- B. Emergency Lighting Note Additional Characteristics: During normal operation the Gateway establishes a heartbeat to the –EM nodes. Upon loss of normal power and the absence of the heartbeat, -EM nodes will go to full light output (100 percent) and local control will not be possible until the heartbeat is re-established.
- C. The full light output (100 percent) emergency value can be field adjusted during commissioning to meet code and requirements of the installation

2.4 WALL STATIONS

- A. Low Voltage Wall Switches: 24 VDC low voltage device supported by I/O connections on control system nodes.
 1. Buttons: [1] [2] [3] [4] [As indicated on Drawings].
 2. Button Action: [Momentary] [Latching].
 3. LED Pilot Lights: [Required] [Not required] [Required where indicated on Drawings].
 4. Color: [White] [Ivory] [Light Almond] [Gray].
 5. Basis of Design Product: **Hubbell Control Solutions, LV Series Low Voltage Switches.**
- B. Low Voltage Wall Switches, RJ45 Enabled: 24 VDC low voltage device supported by I/O connections on control system nodes.
 1. 2: RJ45 ports in rear.
 2. Buttons: [2] [3] [As indicated on Drawings] with built-in LED pilot lights.
 3. Color: White.
 4. Basis of Design Product: **Hubbell Control Solutions, LVS Series Low Voltage Switches.**

2.5 LOW-VOLTAGE SENSORS

- A. Occupancy/Vacancy Sensors:
 1. Ceiling Mount Sensors: Capable of self-learning and self-adjusting false trigger prevention technology
 - a. [Passive infrared (PIR)] [Ultrasonic [US] [Combination passive infrared (PIR) and ultrasonic (US)] type.
 - b. Basis of Design Product: **Hubbell Control Solutions, Omni.**
 2. Wall Mount Sensors: Capable of self-learning and self-adjusting false trigger prevention technology
 - a. [Passive infrared (PIR)] [Combination passive infrared (PIR) and ultrasonic (US)] [Combination passive infrared and acoustic sensor] type.
 - b. Basis of Design Product: **Hubbell Control Solutions, LightOWL.**

B. Occupancy/Vacancy/Daylight Sensors:

1. Wall Switch/ Sensor: With false trigger prevention technology.
 - a. [Passive infrared (PIR)] [Ultrasonic [US] [Combination passive infrared (PIR) and ultrasonic (US)] type.
 - b. [Manual-ON (vacancy sensor)] [Automatic-ON (occupancy sensor)].
 - c. Built-in photo sensor for automatic daylight harvesting.
 - d. [Single relay] [Dual relay].
 - e. Basis of Design Product: **Hubbell Control Solutions, LightHawk.**

C. Daylight Sensors:

1. Open Loop Sensors.
2. Range include: 3-300fc.
3. 3 wire connection to node with control inputs.

2.6 NETWORK AND POWER SOURCING EQUIPMENT

- A. Power Sourcing Equipment (PSE): Control systems manufacturer-approved network switch, emergency network switch, and midspan equipment sized for required number of ports indicated plus 20 percent future expansion allowance. IEEE 802.3 or Cisco uPoE.
- B. Uninterrupted Power Supply: UL924 and sized in accordance with system requirements and selective coordination of designated emergency (EM) nodes.

2.7 GATEWAY SOFTWARE

- A. General: Software communicates bi-directionally with control system nodes to control lighting levels for each space as well as receiving incoming commands from sensors and other devices. Software is installed on Owner-furnished Windows-based computer with operating system, processor, memory, hard disc space, and Ethernet compatible network interface card meeting control system manufacturer's specifications.
 1. Required Software: Microsoft SQL Server Express and Microsoft .NET Framework, versions as indicated in control system manufacturer's specifications.
- B. Control System Software: Browser-based open-platform software suite with configurable options for customized energy saving strategies, building automation integration, and IoT solutions. Scalable application ranging from simple lighting control to software and cloud-based energy management analytics, including the following control software packages:
 1. Basis of Design Product: **Hubbell Control Solutions, PowerHUBB Software Suite.**
 2. Lighting Control Software Package:
 - a. Supports lights, wall controls On/Off/Dim, motion sensors, and daylight sensors.
 - b. Lighting system commissioning, rapid-commissioning, and diagnostic tools.
 - c. Occupancy control, software-defined.
 - d. Lighting scheduling.

Specifier: The following advanced software service packages are also available to support PowerHUBB installations. Select required packages in consultation with Owner and Hubbell Control Systems representative.

3. Connectivity Software Package:
 - a. Application Program Interface access and test suite.
 - b. Multi-IP network binding management.
4. Automation Access Software Package:
 - a. Accepts BACnet commands and inquiries.
 - b. Manufacturer to provide command PICS list for review and approval.
5. Service Package:
 - a. Access to service via cloud portal.
 - b. Near real-time system monitoring.
 - c. System status, analytics, statistics, and dashboards.
 - d. Advanced multi-recipient email alerts for critical system status.
 - e. Daily backups of configuration.
6. Advanced Energy Software Package:
 - a. Requires Service Package.
 - b. Access to service via cloud portal.
 - c. Energy analytics, statistics, dashboards, and interactive reports.
 - d. Energy data repository.
7. Energy Management Software Package:
 - a. Requires Service Package.
 - b. Access to service via cloud portal.
 - c. Require Service Package.
 - d. Access to service via cloud portal.
 - e. Multi-site enterprise performance and service dashboard.
 - f. Advanced log dashboard and analyzer.

2.8 PoE NETWORK INFRASTRUCTURE

- A. Cables supplied shall meet at least the following requirements:
 1. ANSI/TIA-568-C.2 AND ISO/IEC 11801 component compliance.
 2. IEEE 802.3af (PoE), IEEE 802.3at (PoE+), IEEE 802.3bt (4PPoE Type 3 and 4).
 3. 10BASE-T through 1000BASE-T.
 4. NEC Article 800 compliant.
 5. Third party verified.
 6. UL/c(UL) Listed, LP listed for product safety in high heat/high power PoE applications.
 7. HDBaseT Certified, Class A and B.
 8. RoHS/RoHS 2 compliant.
- B. Power Source Equipment supplied shall meet at least the following minimum requirements:

1. Standards:
 - a. IEEE 802.3 (Ethernet).
 - b. IEEE 802.3u (100Base-TX Fast Ethernet).
 - c. IEEE 802.3ab (1000Base-TX).
 - d. IEEE 802.3az (Energy Efficient Ethernet).
 - e. IEEE 802.3x (Flow Control and Back Pressure)
 - f. IEEE 802.3af and at (Power over Ethernet).
 - g. IEEE 802.1D Spanning Tree Protocol.
2. Regulatory Compliance:
 - a. IEEE802.3at (PoE).
 - b. CE.
 - c. RoHS-compliant.
3. Refer to Network and Infrastructure specifications in Section xxxx

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to installation of system, examine work area to verify measurements, and that work area complies with manufacturer's requirements.

3.2 INSTALLATION

- A. Comply with requirements of Division 26 Sections "Common Work Results for Electrical."
- B. Comply with requirements of Division 27 Section "Cable Trays for Communications Systems."
- C. Do not install system until all networking cables, terminations and related connections are complete and tested.
- D. Do not install system until the entire space is enclosed, HVAC systems are running and all unrelated overhead and wet work in work spaces is complete.
- E. Install control systems in accordance with manufacturer's instructions.
- F. Grounding: Provide electrical grounding in accordance with NFPA 70.
- G. Verify network connectivity, network switch and related Power Supply Equipment (PSE) is functional and configured according to manufacturer's instructions and as specified in:
- H. Perform [field] [factory] configuration and setup for space and node.

3.3 SYSTEM STARTUP

- A. Comply with requirements of Division 25 Section "Integrated Automation Control of Electrical Systems" for software and integration hardware for network-based lighting controls.

- B. Provide system programming, startup, and adjustment in accordance with manufacturer's recommendations and Owner's requirements.
- C. Perform operational testing to verify compliance with Specifications. Adjust as required.
- D. Measure and record load on each controlled circuit. Submit report of load measurements.

3.4 CLOSEOUT ACTIVITIES

- A. Demonstration: Provide control systems demonstration with Owner to allow verification that systems function as required.
- B. Training: Train Owner's personnel to operate, maintain, and program control systems.
 - 1. Furnish set of approved submittals and record drawings of actual installation for Owner's personnel in attendance at training session.

END OF SECTION 260936