SECTION 25 50 00

INTEGRATED ENERGY BUILDING MANAGEMENT SYSTEM (EBMS)

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\*\* NOTE TO SPECIFIER \*\* Delta Controls Inc.; Building automation.
This section is based on the products of Delta Controls Inc., which is located at:17850 - 56th Ave.Surrey, BC, Canada V3S 1C7Tel: 604-574-9444Fax: 604-574-7793Email: [request info (sales@deltacontrols.com)](https://arcat.com/rfi?action=email&company=Delta%252BControls%252BInc.&message=RE%253A%2520Spec%2520Question%2520(13800dlt)%253A%2520&coid=46655&spec=13800dlt&rep=&fax=604-574-7793)
Web: <https://deltacontrols.com>
 [ [Click Here](https://arcat.com/company/delta-controls-inc-46655) ] for additional information.
Delta Controls is at the forefront of building automation systems. Through our network of Partners in over 80 countries, our solutions span the globe. Our focus on innovation and sustainability has made us industry leaders for over 30 years. Delta Controls manufactures all of our products just outside of Vancouver, Canada, and offers dependable and user-friendly control solutions for buildings in the commercial, healthcare, hospitality, education, and leisure markets.
As part of Delta Electronics, we are committed to leading building automation into a sustainable future.

1. GENERAL
	1. SECTION INCLUDES
		1. Integrated Building Management System (EBMS): Hardware and software.
			1. Labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, configuration, and installation as required for complete performance of the Work according to the Contract Documents.
			2. Integrated system architecture.
			3. Integrated building network.
			4. Additional building systems integration.
			5. HVAC controls.
			6. Lighting controls.
			7. Integrated security and surveillance systems.
			8. Automated analytics.
			9. IOT integration platform.
			10. Integration.
			11. Integration room lighting controls.
			12. Integrated room control.
			13. Advanced metering and reporting.
			14. Facilities support software interaction.
	2. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Delete any sections below not relevant to this project; add others as required. Applicable general requirements for the following section apply to this section

* + 1. Section 08 88 36.16 - Electronically Controlled Switchable Glass.
		2. Section 08 75 13 - Automatic Window Equipment.
		3. Section 12 25 09 - Window Treatment Control System.
		4. Section 14 20 00 - Elevators.
		5. Section 14 30 00 - Escalators and Moving Walks.
		6. Section 23 09 23.11 - Direct Digital Control System for HVAC.
		7. Section 26 09 13 - Electrical Power Management System.

\*\* NOTE TO SPECIFIER \*\* Most electrical interfaces with EBMS will be through the EPMS system (metering, energy, etc.), but the EBMS may be controlling electrical equipment directly; therefore, list the specification sections of the connected electrical equipment below when this is the case (e.g. lighting control, load control, etc.).

* + 1. Section 26 09 26 - Lighting Control Panelboards.
		2. Section 26 24 16.16 - Integrated Panelboards.
		3. Section 27 10 00 - Structured Cabling.
		4. Section 28 13 11 - Access Control and Security Management Software.
		5. Section 28 46 21 - Fire Alarm System.
	1. REFERENCES
		1. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
			1. ASHRAE 90.1-2016, "Energy Efficient Design of New Buildings"
			2. ASHRAE 62.1-2013, "Ventilation for Acceptable Indoor Air Quality"
			3. ASHRAE 189.1-2011, "Standard for the Design of High-Performance, Green Buildings"
			4. ASHRAE 135-2016 "BACnet"
			5. ASHRAE 55-2013, "Thermal Environmental Conditions for Human Occupancy"
		2. Canadian Standards Association (CSA)
			1. CAN/CSA C22.2 No. 205: Signal Equipment - Consumer and Commercial Equipment
		3. International Electrotechnical Commission (IEC)
			1. ISO 9001, "International Organization for Standardization"
		4. International Organization for Standardization (ISO)
			1. ISO 9001, "Quality Management Systems - Requirements"
		5. Underwriters Laboratories, Inc. (UL)
			1. UL / UUKL, "864 Smoke Control"
			2. UL 294, "Access Control"
			3. UL 916, "Energy Management"
	2. DEFINITIONS
		1. Words or acronyms contained within this specification are as defined below, or by the references listed within this specification.
			1. ACS: Access Control System.
			2. AFDD/CC: Automated Fault Detection and Diagnostics with Commissioning System.
			3. BM / BMS / BAS: Building Management System or Building Automation System.
			4. CCTV / VMS: Closed Circuit TV CCTV or Video Monitoring System.
			5. CMMS: Computerized Maintenance Management System.
			6. EPMS / EMS: Electrical Power Management System or Energy Management System.
			7. FAS: Fire Alarm System.
			8. GUI: Graphic User Interface.
			9. HOA: Hand, Off, Auto Position Switch.
			10. EBMS: Enterprise Building Management System.
			11. IBMS: Integrated Building Management System.
			12. LCS: Lighting Control System.
			13. MSI: Master System Integrator / EBMS System Supplier.
			14. NTP: Network Time Protocol.
			15. NSC: Network Server Controller.
			16. PDU: Power Distribution Unit.
			17. SAAS: Software as a Service.
			18. SDCU: Standalone Digital Control Units.
			19. Smart Mobile Device: Smart phone or tablet compatible with iOS or Android OS capable of running apps used for specified functionality.
			20. VAV: Variable Air Volume or Variable Air Volume Box.
			21. WAGES: Water, Air, Gas, Electrical, Steam.
	3. SUBMITTALS
		1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
		2. Submittal Data:
			1. Detailed and annotated manufacturer's data, drawings, and specification sheets for each item listed, clearly showing compliance with project specifications.
			2. Identify submittal data with the specific equipment tags and/or service descriptions to which they pertain. Submittal data shall be clearly marked to identify the specific model numbers, options, and features of equipment and work proposed.
			3. Deviations from Contract Documents: Must be indicated within the submittal.
				1. Reference each deviation to the corresponding drawing or specification number. Show the Contract Document requirement text and/or illustration and accompany it with detailed written justification for the deviation.
			4. Product data and shop drawings specific to each product and accessory proposed. Include the Following Information:
				1. System Architecture Diagram.
				2. System Network Riser Diagrams.
				3. Shop Drawings Include the Following in the Project's Control System Drawing Set:

Control system and sub-systems drawings title sheet.

List of I/O points.

Control system and sub-systems components list.

Control system and Sub-Systems schematics.

HVAC equipment electrical ladder diagrams.

Component wiring diagrams.

Terminal strip diagrams.

BACnet communication architecture schematic.

Sequence of operation.

* + 1. EBMS Software Configuration Standards and Conventions: Prepare and submit a "Software Configuration Standards and Conventions" document by the system supplier after the first EBMS Software Configuration Review Meeting. Document decisions made in the meeting. Submit document for review and comment before software configuration commences.
		2. Operation and Maintenance Manuals: In accordance with requirements specified in Section 01 78 23.19 - Preventative Maintenance Instructions.
			1. Submit data specific to products and accessory proposed. include the following:
				1. EBMS sequence of operations.
				2. Electronic configuration files for configured devices and instructions to restore backup files.
		3. Multi-System Service Contract Proposal from the EBMS System Supplier: A multi system service contract for 5 years to include all systems provided and integrated.
			1. Annual Pricing: Broken out to understand yearly price increase based on standard economic indicators and aging equipment risk.
			2. Include requirements defined in each integrated system specifications related to extended service.
			3. Single point of contact for systems issues and service response times for each system.
			4. Break out pricing for each year specific to any software as a service. SAAS or eCLOUD, offerings. Include in price breakout any yearly software licenses required to keep specified and proposed functionality active.
	1. QUALITY ASSURANCE
		1. Single EBMS System Supplier(aka Master System Integrator): For the EBMS specified. Systems products and manufacturers specified establish a standard of quality for design, function, materials, and appearance. Modify products as necessary for compliance with requirements.
			1. Provide specified products without exception, unless allowed as a substitute per the Contact's General Provisions.
		2. Contractor is responsible for the EBMS and will supplement the EBMS system supplier's Work as necessary to provide a complete and operable system.
			1. Contractor will coordinate other equipment and systems interfacing with the EBMS to ensure necessary interconnections and compatibility for required EBMS functionality.
		3. EBMS System Supplier:
			1. A firm having 5 years of successful installation, configuration and integration experience with projects utilizing equipment similar in type and scope to that required for this Project.
				1. Include LEED certification and be within 100 miles of Project site.
			2. Certified for configuration of building management systems of Section 23 09 00 - Instrumentation and Control for HVAC Direct Digital Control System for HVAC by the manufacturer's representative.
			3. Provide specified products of types and sized required from manufacturers whose products have been in satisfactory use in similar service for a minimum of 8 years.
			4. To also be the system supplier for Section 23 09 00 - Instrumentation and Control for HVAC Direct Digital Control System for HVAC.
			5. Will not duplicate Work specified in Divisions other than Division 13 but is responsible for integration, communications and functionality of systems as specified. This includes augmentation (configuration, programming, etc.) of systems provided by others to provide specified integrated cross-system functionality.
			6. System suppliers under Divisions other than Division 13 are required to provide their specified system functionality, system access to the EBMS system supplier for the purpose of providing the EBMS and interface coordination for integration specified.
		4. EBMS Software Configuration Review Meetings:
			1. Prior to configuring software and functional requirements the Contractor is to schedule an EBMS Software Configuration Review Meeting between the EBMS system supplier and system suppliers of systems being integrated at Owner's facilities. The purpose of the meeting will be to coordinate and ensure the following between systems:
				1. GUI conventions.
				2. Report formats.
				3. System coordination.
				4. Graphics Generation.
			2. EBMS System Supplier: Provide a project specific example of a specified application functional requirement in the production environment showing sequences and proposed GUI conventions for review prior to commencing work on the system.
			3. Contractor: Schedule a second meeting at Owner's facilities to review specified application functional requirements in the production environment and correct prior to onsite installation.

\*\* NOTE TO SPECIFIER \*\* Delete the following if not required.

* + - * 1. Cloud Services and Cloud Engineering tools shall be used for functional review.
		1. Work performed and materials used to comply with National Electrical Code or Canadian Electrical Code, whichever applicable. Comply with local regulations and ordinances. Equipment, assemblies, and materials are to be listed and labeled by Underwriter's Laboratories or by a testing agency acceptable to authorities having jurisdiction and marked for intended use.
	1. DELIVERY, STORAGE AND HANDLING
		1. Prior to Project Site Delivery: Ensure suitable available storage space for materials in a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity, and corrosive atmospheres.
		2. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
			1. Do not exceed manufacturer stated storage requirements.
			2. Store indoors in clean, dry space and uniform temperature to prevent condensation.
			3. Protect electronics from electrical and magnetic energy that could cause damage.
		3. Deliver materials to Project site in supplier's or manufacturer's original packaging and containers, labeled with supplier's or manufacturer's name, material or product brand name, and equipment tag number or service name as identified within the Contract Documents.
		4. Inspect and report any concealed damage or violation of delivery storage, and handling requirements to the Engineer.
	2. WARRANTY
		1. General: Refer to Section 01 77 00 - Closeout Procedures.
			1. Manufacturer: Warrant products against defects in material and workmanship provided the manufacturer performs the functional testing, commissioning and first parameter adjusting of equipment.
				1. 12 months from the date of commissioning or 18 months from the date of shipment, whichever comes first.
				2. During Warranty Period: Manufacturer will repair or replace defective products.

This warranty is in addition to any provided by the Contractor.

The warranty excludes normal wear and tear under normal usage and any damage caused by abuse, modification, or improper maintenance by entities other than the manufacturer or its approved representative.

* + 1. Additional Owner Rights: Warranty will not deprive Owner of rights the Owner may have under provisions of the Contract Documents and will be in addition to and run concurrent with warranties made by the Contractor under requirements of the Contract Documents.
	1. SPECIAL TOOLS AND SPARE PARTS
		1. Contractor will provide a recommended spare parts list with the following information.
			1. Contact Information: Closest parts stocking location to the Owner.
			2. Identify Critical Spare Parts: Parts being associated with long lead times and/or those critical to system operation.
			3. Maintenance Spares: Identified as being parts required to regularly perform scheduled maintenance on furnished equipment. Spares include, but not limited to, consumable spares required to be exchanged during scheduled maintenance periods.
		2. Spare Parts: Provided for each type and size of unit installed.
			1. Provide minimum spare parts recommended by manufacturers.
			2. Provide \_\_\_\_ set of each type of power and control fuse installed within equipment.
			3. Properly marked and packaged for long term storage.
			4. Printed circuit boards: Provided in separate anti-static containers.
		3. Special Tools: Specific tools, not normally found in an electrician's toolbox, required to remove, and install spare parts must be furnished.
		4. Provide PC-based computer configuration software, or mobile device App tool, and a minimum of one communication interface cable for each type of cable required to connect the computer/device to devices specified for configuration and programming.
		5. Provide Cloud-based SAAS configuration software and Cloud based Engineering platform required to connect and design devices specified for configuration and programming.
		6. Provide graphics generation and interface tool to improve workflow and design of system graphics.
		7. Electronic configuration files, in a media format acceptable by the Owner (e.g. CD, USB stick, etc.), updated to an as-installed and commissioned state.
1. PRODUCTS
	1. MANUFACTURERS
		1. Acceptable Manufacturer: Delta Controls Inc., which is located at:17850 - 56th Ave.Surrey, BC, Canada V3S 1C7Tel: 604-574-9444Fax: 604-574-7793Email: [request info (sales@deltacontrols.com)](https://arcat.com/rfi?action=email&company=Delta%252BControls%252BInc.&message=RE%253A%2520Spec%2520Question%2520(13800dlt)%253A%2520&coid=46655&spec=13800dlt&rep=&fax=604-574-7793);Web: <https://deltacontrols.com>
		2. Basis of Design - Delta Controls

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
		2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.
	1. GENERAL REQUIREMENTS
		1. Communication Protocols and Sub-System Interface Performance Requirements:
			1. Integration Between Systems: Run in computing environment, either on premise hardware or SAAS. Auto start integration when recovering from a power outage.
				1. Restart of integration software Host Device: Manual logon and authentication is not required at the system or network domain level for interface to function in normal mode.
			2. HeartBeat (Watchdog) Functionality: Test system-to-system communication and business functionality every five minutes. Alarm in EBMS if communication fails.
				1. Alarms: Emailed to recipient list within 60 seconds of not receiving test transactions from EBMS.
			3. EBMS Key System Features and Functionality; system is referring to all systems implemented under the MSI System GUI.
				1. Via web browsers from other core systems.

Browse objects and attributes.

Consume information.

View and acknowledge active alarms.

Consume historical Log information.

* + - 1. Data Exchange: Based on Change of Value (COV) or upon request to limit network traffic and provide data responsiveness.
		1. Time Series Data Logging; Buildings and Business Analytics Requirements:
			1. Data Storage Server (DSS) and Reporting: Provide ability to store and query large volumes of data of trends over long time periods. Compare values such as indoor and outdoor environment conditions, equipment status and energy utilization.
				1. Store large quantities of timed sequenced records limited only by the storage media capacity.
				2. DSS Data: Available for copy within the building premises, corporate data storage, or compatible cloud storage validated and approved by the EBMS system integrator.

Quantity of Data Points Stored on DSS: Equal to number of objects defined on BMS NSC and STCU building management system specified in Section 23 09 00 - Instrumentation and Control for HVAC Direct Digital Control System for HVAC.

* + - * 1. Capable of storing data from subsystems integrated to the EBMS. Subsystem's data must be convertible into usable data by EBMS DSS.
				2. Capture any point data value at 5 minute intervals and store data for a minimum of 5 years.
				3. Analytical and Reporting Tools: Able to access and analyze DSS data.
		1. EBMS Software Cyber Security Requirements:
			1. Develop using secure development life cycle best practices for software.
			2. Subject to regular and verifiable best practice cyber security testing by system supplier. Test Results: Available on request prior to system deployment.
			3. Cyber security service incident escalation via online portal on 7/24/365 basis.
			4. EBMS server level devices require access via HTTPS.
			5. EBMS AS to support SNMP V3 monitoring of network performance and stack statistics for purpose of managing denial of service attacks.
			6. Auto logoff any logon that has a predefined period of no activity.
			7. Alarm on predetermined time period until each device default password is changed from default factory setting.
			8. Active Directory for user logon credentials.
			9. Password Rules to Include: Password complexity, password history, minimum password length, password age, forced password change, invalid login alert, auto lock out after customizable: 1 to 1000 invalid attempts.
			10. EBMS manufacture must make security bulletins available.
			11. EBMS Secure Network Environment Requirements:
				1. Network Level Servers: Support encryption standard throughout the network.
				2. Network: BACnet Secure Connect for secure connection.
				3. Encrypted Password Authentication: For web browsers whether serving or consuming.
	1. INTEGRATED SYSTEM ARCHITECTURE
		1. Prior to Bidding: Contractor must ensure EBMS Project architecture specified herein and that of integrated systems specified in other Divisions are a validated system architecture of the manufacturers of those systems.
			1. List EBMS system supplier and systems manufacturers to be integrated on bid form.
		2. Architecture of EBMS provided by system supplier: Based on using the BMS for the Division 23 HVAC Direct Digital Control System as a foundation for integrating systems and as the primary GUI interface to the user.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. INTEGRATED BUILDING NETWORK
		1. EBMS Communication: Structured cabling network. Component: Network switches, patch panels, Cat6A copper wiring, and single or multimode fiber.
			1. Control Devices: IP addressable via ethernet connectivity or communicating on IP level via dedicated gateway device.
		2. EBMS System Supplier: Provide EBMS integrated building network.
			1. Include the Following: Connections to workstations, webstations, EBMS servers, and connections to subnetworks of systems being integrated.
				1. Systems to be Integrated: Responsible for their own network communications providing their specified functionality including acceptable EBMS network interface.
		3. Racks or Network Cabinets: As required by drawings or project plans. Racks to have PDU's and local UPS Backup.
		4. Network Switches: Industrial Ethernet switches.

\*\* NOTE TO SPECIFIER \*\* Delete cyber security paragraph if not required.

* + 1. Cyber Security:
			1. EBMS: Use requirements of IEC 62443 as a guideline.
			2. Integrated Building Network: Protected from outside world via configurable firewalls at each point of internet or corporate network connection.
			3. EBMS Subsystems: Configured on separate VLANs provided by the EBMS Contractor or Owner.
			4. VLANs: Separate Owner's or tenant's systems from shell and core systems.
				1. Ports on layer 3 network switches: Configured to allow transfer of necessary data between tenant and landlord shell and core systems.
			5. Ports on Firewall: Configured to only allow required information to pass through in the required direction; out of building or into buildings.
			6. Integrated Control System Devices and Controllers: Cyber security tested minimizing risk of a security breach.
			7. VPN software shall be used for any remote access into the Enterprise Building Management System.

\*\* NOTE TO SPECIFIER \*\* Delete secure connections paragraph if not required.

* + 1. Secure Connections:
			1. Communication between Sites over non-secure networks (including the internet): Use BACnet Secure Connect protocol per ASHRAE 135 Addendum 2016bj.
			2. BACnet Secure Connect Hub: For Network.
				1. Use DNS names i.e. hostname + domain name and not require a static IP address. Nodes must support DHCP and not require dedicated IP addresses.
			3. BACnet Secure Connect Nodes: At each building as shown on plans.
				1. Hubs and Nodes: Must be authorized to join Secure Connect network by system operator. Hub and Node Communication: Must be encrypted.
			4. Software tools supporting Authentication Certificates for controllers communicating on the BACnet/SC network.
			5. Communication Between Sites: Will not require BACnet Broadcast Management Devices (BBMD) with static IP addresses.
		2. Manageability:
			1. Integrated Building Network: Manageable from network management software capable of displaying network topology map, providing management, switch configuration and troubleshooting capability of VLANs.
			2. Network Switches: Configurable in an off-line mode inclusive of Switch Operating Systems, Port Assignments, VLAN Management, RSTP and DHCP Server settings. Off-Line Setting Templates: Downloadable to network of switches at time of commissioning.
			3. Hardware Failure Protection: Switch settings to be back up capable for restoration into replacement switches in event of hardware failure.
			4. Mirror traffic from a VLAN onto a switch port for network traffic analysis and troubleshooting.
		3. Resiliency: Integrated Building Network to be capable of supporting RSTP (IEEE 802.1w) ring topology for network resiliency.
		4. Structured Cabling: Refer to Division 27 for structured cabling requirements.
			1. Wire must be copper and meet minimum wire sizes and insulation classes listed.
				1. Wire Class: Power.

Wire Size: 12 ga. Isolation Class: 600 Volt.

* + - * 1. Wire Class: Class One.

Wire Size: 14 ga. Isolation Class: 600 Volt.

* + - * 1. Wire Class: Class Two.

Wire Size: 18 ga. Isolation Class: 300 Volt.

* + - * 1. Wire Class: Class Three.

Wire Size: 22 ga. Isolation Class: 300 Volt.

* + - * 1. Wire Class: Communications.

Wire Size: Per manufacturer. Isolation Class: Per manufacturer.

* + - 1. Communication and Signal Circuit Used for Integration: Not to be installed in same conduit as lighting or power circuits.
			2. Where different wiring classes terminate within the same enclosure, maintain clearances, and install barriers per the National Electric Code.
			3. Wiring to be Installed in Conduit: Galvanized 1/2 or 3/4 inch EMT is to be used.
				1. Set Screw Fittings: Acceptable for dry interior locations.
				2. Watertight Compression Fittings: For exterior locations and interior locations subject to moisture.
				3. Conduit Seal-Off Fittings: Where exterior conduits enter buildings or between areas of high temperature/moisture differential, and rooms requiring ventilation pressure differentials.
			4. Flexible Metallic Conduit: Maximum of 3 ft (914 mm). Used motor connections, actuators, controllers, and sensors mounted on vibration producing equipment.
			5. Liquid-Tight Flexible Conduit: Exterior locations and interior locations subject to moisture.
			6. Junction Boxes: At all cable splices, equipment terminations, and transitions from EMT to flexible conduit.
				1. Interior Dry Location Junction Boxes: Galvanized pressed steel, nominal four-inch square with blank cover.
				2. Exterior and Damp Location JH-Boxes: Cast alloy FS boxes with threaded hubs and gasketed covers.
			7. Wiring When Space Above Ceiling is Supply or Return Air Plenum: Plenum rated.
				1. Teflon Wiring: Can be run without conduit above suspended ceilings.
				2. Wire run in suspended ceilings used to control outside air dampers or to connect the system to the fire management system must be in conduit.
			8. Glass Fiber Optic Cable: Include the following sizes: 50/125, 62.5/125 or 100/140.
				1. Plastic Fiber Optic Cable: Is not acceptable.
				2. Must be installed and terminated by an experienced contractor.
				3. EBMS System Supplier: Submit to Engineer the name of intended contractor of fiber optic cable with his submittal documents.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. HVAC CONTROLS
		1. Software:
			1. Basis-of-Design: enteliCLOUD SaaS: Enterprise Facility and Energy Management by Delta Controls.
				1. eW200Cloud1M: Up to 200 I/O for 1 hosted instance, includes enteliVIZ Graphics.
				2. eW500Cloud1M: Up to 500 I/O for 1 hosted instance, includes enteliVIZ Graphics.
				3. eW2500Cloud1M: Up to 2500 I/O for 1 hosted instance, including enteliVIZ Graphics.
				4. eW5000Cloud1M: Up to 5000 I/O for 1 hosted instance, including enteliVIZ Graphics.
				5. BACnet Device Profile: Advanced Operator Workstation (B-AWS).
				6. Client Browser: Requires internet connection.

Windows Internet Explorer 11 and higher. Firefox 70 and higher. Google Chrome 78 and higher. Safari 13 and higher for Mac. Microsoft Edge 44 and higher.

* + - * 1. Web-based SaaS (software as a service) connecting your equipment and facilities. Gives facility managers and engineers access to building management operations and energy analytics via a web browser.
				2. Offers the same features as an on-premises solution at a lower overhead cost and with easier deployment and upgrades.
				3. Centralized Facility Management: Integrate scheduling, alarm management and operations. Connect to your buildings under a single login without networking everything together. Track building automation system (BAS) changes by service personnel, partner technicians and facility managers in enteliCLOUD.
				4. Secure: Uses TLS data encryption by employing BACnet Secure Connect for cloud-to-site connections. Two-factor authentication (2FA) for self-serve portal accounts.
				5. Scalable: Built on platforms that allow you to scale instances to match the growing number of I/O points and devices.
				6. Management Web Portal: A self-serve web portal for company administrators to view and manage cloud instances, manage operator user accounts, and review billing information.
				7. Energy Management: View your system's energy usage, set target energy goals, and compare your energy usage against historical baselines.

Local or Cloud Applications: Scales from locally installed dashboards and reports to cloud-based analytics.

Virtual Meters: Find out which building system is consuming too much energy costly wired meters. Virtual Meters utilize sensors and data already gathered by the BAS to track energy consumption of every piece of equipment in your building, giving you unprecedented visibility into your consumption profile. You can validate calculated virtual meters with upstream utility meters.

Intuitive Dashboards: Allow you to analyze and breakdown usage to find energy savings. You can also create energy reports and send and receive them by email.

Alerts and Insights: Simple alerts to analytics-based Insights warn you in advance of potential consumption overages. Both alerts and Insights are annunciated in enteliCLOUD and can also be set up for email notification.

* + - * 1. Building Visualization:

Enterprise Dashboards: Provide high level information in simple graphical formats to help manage the facility's key performance indicators (KPIs).

Personal Dashboards: Personal dashboards are an experience you create yourself. By mixing and matching widgets, each user gets their own personalized dashboard to keep an eye on things that matter.

System Dashboards: Make operating a facility easy by aggregating system graphics, alarm management, energy information and more into a single dashboard screen.

Navigator: Automatically scans the BACnet network and presents devices in a logically arranged network tree. BACnet objects can be monitored and commanded directly from Navigator or opened from Navigator to change the configuration details.

enteliVIZ Graphics: Create HTML5-based intelligent visualizations and equipment graphics in your web browser. Use them in dashboards alongside other widgets, or as full page standalone graphics.

Mobile Friendly: Dashboard and object pages are optimized for viewing on your smartphone or tablet. Whether you want an overview, or need to override a point, dashboard-driven navigation lets you drill down from high-level views to specific BACnet objects. Finger friendly buttons and large text mean you don't have to pinch and zoom to view content.

Multiple Language Display: Support stakeholders in language they are comfortable using. enteliCLOUD's user interface can be displayed in one of 22 languages by selecting language preference in each user account.

Building Automation Reports: Gather building information by querying controllers on the network and displaying them in professional reports. Reports to be converted to file types, such as .pdf and .xlsx and emailed automatically on a schedule.

* + - * 1. Centralizing Facility Management:

Single Login: Manage multiple sites using a single login. No need to worry about duplicate addresses or networking everything together. All you need is an IP address for each site.

Retain Supervisory Control of Entire Portfolio of BACnet Sites: Leave the other vendor's front end on-site while centralizing your alarm management, scheduling and energy analytics with enteliCLOUD.

Version Independent Software: Allows organizations to operate an entire WAN without having to worry about maintaining different firmware versions in the hardware.

Restore and Backup: Restore your entire BAS to an earlier state or quickly find a specific backup of a device. Schedule daily, weekly, or monthly backups across devices on multiple sites.

* + - * 1. enteliCLOUD's suite of developmental tools allow you to create mobile apps, customize user interfaces and integrate third party software.

API Documentation Available: The enteliCLOUD application programming interface (API) is well-documented, so that you can easily create custom modules, widgets, and interfaces to third-party software.

BACnet Web Services: Allow remote applications, such as mobile apps or business systems to communicate with enteliCLOUD.

Alarm Module: The alarm module allows alerts and alarms from non-BACnet systems to be annunciated and managed within enteliCLOUD.

Open Source Reporting Package: Design custom reports in enteliCLOUD using an industry standard open source report package.

* + - * 1. Alarms: enteliCLOUD has a robust alarm management system that provides a detailed look at the issues and problems that come up on all your sites.

Comprehensive Alarm Management: Includes intelligent visualizations, alarm assignments and operator comments on one screen. Powerful filtering, emailing and prioritization make enteliCLOUD alarm management effective even on your largest sites.

Alarm Widgets: Can be added to dashboards for a summary of specific data types. Maps widget uses pushpins on a map of building locations to indicate number and severity of alarms. Alarm list widget shows active alarms for equipment and can be added to system dashboards.

* + - * 1. Audit Logs: Provide ability to track changes made to system. Filtering and timeline chart to find information you're looking for, including manual changes to outputs, alarm history and other changes made by the system's users.
				2. Electronic Signatures: enteliCLOUD supports electronic record regulations like FDA Code of Regulations Title 21 Part 11 by enforcing electronic signatures on modifications made in these validated environments. Signatures are recorded in the enteliCLOUD audit log. For more information, see the enteliWEB FDA 21 CFR Part 11 Compliance white paper.
				3. User Permissions:

User/Group Permissions: Permissions give you the ability to assign roles and determine which BACnet objects and visualizations a user can see and interact with.

LDAP: Integrate users from LDAP servers so that IT can control user access to enteliCLOUD.

Multi-Language Support: Gives each user the option to select the language they want to use throughout enteliCLOUD.

SPECIFIER \*\* View your building your way by creating your own personal dashboards. Whether you are an executive, an energy manager or a building operator, the user experience in enteliWEB can be tailored to meet your exact needs. Delete options not required.

* + - 1. Basis of Design: enteliWEB. Software Enterprise Facility and Energy Management.
				1. Web-based application connecting facilities and centralizing building management operations, site engineering and energy analytics.
				2. BACnet Device Profile: Advanced Operator Workstation (B-AWS).

Options:

EV: enteliVIZ Graphics.

EM: Energy management.

VM: enteliWEB on an offline virtual machine.

API: Web services, mobile app, interface API and ODBC driver.

03 Access Dashboards:

O3ACC50: O3 Access Dashboards license up to 50 doors.

O3ACC250: O3 Access Dashboards license up to 250 doors.

O3ACC500: O3 Access Dashboards license up to 500 doors.

O3ACC1000: O3 Access Dashboards license up to 1000 doors.

O3ACCUnLtd: O3 Access Dashboards license with unlimited doors.

* + - * 1. Server Operating System:

Microsoft Windows Server 2019.

Microsoft Windows Server 2016.

Microsoft Windows Server 2012.

Microsoft Windows 10.

* + - * 1. Server Virtualization:

VMware vCenter Server.

Microsoft Hyper-V.

Microsoft Azure.

Amazon EC2.

Rackspace Cloud Server.

* + - * 1. Client Operating System:

Microsoft Windows Server 2019.

Microsoft Windows Server 2016.

Microsoft Windows Server 2012.

Microsoft Windows 10.

OS X v10.4 and higher.

* + - * 1. Client Browser:

Windows Internet Explorer 11 and higher.

Firefox 70 and higher.

Google Chrome 78 and higher.

Safari 13 and higher for Mac.

Microsoft Edge 44 and higher.

* + - * 1. Energy Analytics: Turn existing data and building sensors into virtual meters. Manage energy consumption down to zone and equipment level. No sub-meters required.
				2. Engineering Tools: Create, edit, and save objects, modify system graphics and back up databases from a single front-end.
				3. Centralize Facility Management: Integrate scheduling, alarm management, and operations. Connect buildings under a single login. Track building automation system (BAS) changes by service personnel, partner technicians and facility managers.

\*\* NOTE TO SPECIFIER \*\* enteliWEB Energy is an enterprise energy management package that makes it easy for anyone to understand the energy usage of their building. Leveraging the rich dashboard interface of enteliWEB, you have the tools to view your system's energy usage, set target energy goals and compare your energy usage against historical baselines. Delete if not required.

* + - * 1. Basis of Design: enteliWEB Energy: An enterprise energy management system.

Local or Cloud Applications: Scalable from locally installed dashboards and reports to cloud-based analytics.

Virtual Meters: Utilize sensors and data already gathered by building automation system to track energy consumption of building equipment building, to build consumption profile of equipment. Validate calculated virtual meters with upstream utility meters.

Track Energy Production: Use interactive calendar to locate periods of high and low production, and net gains from production in a comparison chart.

Intuitive Interactive Dashboards: Analyze and breakdown energy usage. Create energy reports; sent and received via email.

Alerts and Insights. Simple alerts to analytics-based Insights warn you in advance of potential consumption overages. Set up for email notification.

Building Visualization:

Enterprise Dashboards: Provide high level information in simple graphical formats to help manage the facility's key performance indicators (KPIs).

Personal Dashboards: Personal dashboards are an experience you create yourself. By mixing and matching widgets, each user gets their own personalized dashboard to keep an eye on things that matter.

System Dashboards: Make operating a facility easy by aggregating system graphics, alarm management, energy information and more into a single dashboard screen.

Navigator: Automatically scans the BACnet network and presents devices in a logically arranged network tree. BACnet objects can be monitored and commanded directly from Navigator or opened from Navigator to change the configuration details.

enteliVIZ Graphics: Create HTML5-based intelligent visualizations and equipment graphics in your web browser. Use them in dashboards alongside other widgets, or as full page standalone graphics.

Mobile Friendly: Optimized for smartphone or tablet. Dashboard-driven navigation/ Finger friendly buttons and large text. Pinch and zoom to view content is not acceptable.

Multiple Language Display: Supports 22 languages at the user account level.

Building Automation Reports: Querying building controllers on network. Display data in customized reports. Multiple File Types: PDF and XLSX. Automatically emailed on a schedule.

Centralizing Facility Management: Tools to manage multiple sites more effectively.

Single Login: Manage multiple sites using a single login. No need to worry about duplicate addresses or networking everything together. All you need is an IP address for each site.

Retain Supervisory Control of your entire portfolio of BACnet sites. Leave the other vendor's front end on-site while centralizing your alarm management, scheduling and energy analytics with enteliWEB.

Version Independent Software: Allows organizations to operate an entire WAN without having to worry about maintaining different firmware versions in the hardware.

Restore and Backup: Restore your entire BAS to an earlier state or quickly find a specific backup of a device. Schedule daily, weekly, or monthly backups across devices on multiple sites.

Platform for Innovation: Tools to create mobile apps, customize interfaces and integrate third party software.

API Documentation Available: The enteliWEB application programming interface (API) is well-documented, so that you can easily create custom modules, widgets, and interfaces to third-party software.

BACnet Web Services: Allow remote applications, such as mobile apps or business systems to communicate with enteliWEB.

Alarm Module: The alarm module allows alerts and alarms from non-BACnet systems to be annunciated and managed within enteliWEB.

Open Source Reporting Package: Design custom reports in enteliWEB using an industry standard open source report package.

ODBC Driver: Integrate the building automation system with business-level software.

Alarms: Provide a detailed look at issues and problems on all sites.

Comprehensive Alarm Management: Includes intelligent visualizations, alarm assignments and operator comments on one screen. Powerful filtering, emailing and prioritization make enteliWEB alarm management effective even on your largest sites.

Alarm Widgets: Can be added to any dashboard for a quick summary of specific data types. The maps widget uses pushpins on a map of your building locations to indicate the number and severity of alarms. The alarm list widget shows the active alarms for specific equipment and the widget can be added to system dashboards.

Electronic Signatures:

enteliWEB supports electronic record regulations like FDA Code of Regulations Title 21 Part 11 by enforcing electronic signatures on modifications made in these validated environments. Signatures are recorded in the enteliWEB audit log. For more information, see the enteliWEB FDA 21 CFR Part 11 Compliance white paper.

User Permissions:

User/Group Permissions: Permissions give you the ability to assign roles and determine which BACnet objects and visualizations a user can see and interact with.

LDAP: Integrate users from LDAP servers so that IT can control user access to enteliWEB.

Multi-Language Support: Gives each user the option to select the language they want to use throughout enteliWEB.

O3 Access Control: Intuitive user-friendly built in dashboards to manage single or multiple sites with a single-seat management interface. Enroll, provision, assign and manage access rights.

Custom User Fields: Enter user information. Conventional data fields and site-specific information.

Custom groups to provision users.

Real-Time Access to Events and Alarms: View in real-time on Event Viewer dashboard. Filter events display and access alarms by type, level of priority and time range.

Flexible O3 Access Reporting: About access system, card users and their activities.

VIVOTEK VAST 2 Integration: VIVOTEK's video surveillance cameras and video management software to enhance system. When linked, you can view live video feeds directly.

Audit Log: Track changes made to the system, including manual changes to outputs, alarm history, and changes made by the system's users.

* + 1. Management Level Control Modules:
			1. Basis of Design: Delta Niagra, JACE 8000 Controller: Compact, embedded Niagara Framework based controller and server platform. Connects multiple diverse devices and sub-systems. Requires additional core software and service maintenance licenses.
				1. Model JACE-8000-US: Unlicensed controller, 2 RS-485 ports, 2 10/100 MB Ethernet ports, USB backup and restore, Wi-Fi connectivity (US).
				2. Model JACE-8000-WW: Unlicensed controller, 2 RS-485 ports, 2 10/100 MB Ethernet ports, USB backup and restore, Wi-Fi connectivity (configurable Wi-Fi country code for worldwide use).
				3. Internet connectivity and web-serving capability.
				4. Integrated control, supervision, data logging, alarming, scheduling, and network management.
				5. Stream data and rich graphical displays to web browsers via ethernet or wireless LAN, or over the internet.
				6. Licensing Model: Standard drivers with optional IO and field bus expansion modules for flexibility and expandability.
				7. Optimized for the Niagara 4 platform. In large and multi-building applications, use Niagara 4 Supervisors with JACE 8000 controllers to aggregate information, including alarms and data: historical and real-time, creating a single, unified application.
				8. Standards Compliance and Certifications:

UL 916.

CE EN 61326-1.

RCM.

FCC Part 15 Subpart B, Class B.

FCC Part 15 Subpart C.

C-UL listed to Canadian Standards Association (CSA) C22.2 No. 205-M1983.

"Signal Equipment:"

1999/5/EC R&TTE Directive.

CCC.

SRRC.

RSS.

RoHS.

* + - * 1. Environmental:

Operating temperature: Minus 4 to 140 degrees F (Minus 20 to 60 degrees C).

Storage temperature: Minus 40 to 185 degrees F (Minus 40 to 85 degrees C).

Humidity: 5 to 95 percent, non-condensing.

Shipping and vibration: ASTM D4169, Assurance Level II.

MTTF: 10 plus years.

* + - * 1. Technical Specifications:

TI AM3352: 1000 MHz Arm Cortex-A8 1GB DDR3 SDRAM.

Removable micro-SD card with 4GB flash total storage/2GB user storage.

Wi-Fi (Client or WAP).

IEEE802.11a/b/g/n.

IEEE802.11n HT20 at 2.4GHz.

IEEE802.11n HT20/HT40 at 5GHz.

Configurable radio (Off, WAP, or Client) WPAPSK/WPA2PSK supported.

USB Type A Connector: Back-up and restore support.

Two isolated RS-485 with selectable bias and termination.

Two 10/100MB Ethernet ports.

Secure boot.

Supply Requirements: 24 VAC rated at 24 VA minimum, or 24 VDC rated at 1A.

Power: 24 W minimum.

Runs NiagaraA: 3.8u1 and later.

Runs Niagara 4: 4.1 and later.

Niagara Analytics 1.1 requires NiagaraAX 3.8u1 or later update builds.

Niagara Analytics 2.0 requires Niagara 4.2 and later.

Real-time clock.

No battery.

* + - 1. Basis of Design: CopperCube:
				1. USB: 2 USB 2.0 ports, max 500 mA each.
				2. Processor: ARM Cortex-A15 Dual MPCore processor.
				3. Memory: 2GB DDR3L.
				4. Storage: 60GB SSD.
				5. CopperCube: Connects to BAS through BACnet/IP or BACnet Ethernet protocols. Locates trend logs and archives up to 5,000 trend logs on its local secure database. Trend log data: Accessed through built-in web interface, and through CopperTree's Kaizen and Delta Controls' enteliWEB software.

Trend log Archive Maintenance Tools:

Auto-pruning Feature: Deletes data after set time to free memory.

Schedule backups to an external location.

SQL Connector: Allows routing trend log data to external SQL database for use with third-party reporting tools.

Internal, local storage of trend log data.

Built-in web UI for feedback, operational status, and configuration. Vendor independent.

Built-in connectivity to CopperTree's Kaizen and Delta Controls' enteliWEB software.

Native BACnet device.

Industrial embedded PC with an internal 60 GB solid-state hard drive.

Configurable auto backup to external storage device.

Firmware auto-update capability.

Optional SQL connector.

Standard compliance:

CE-EMC Directive.

FCC Class A.

Listings: UL 916 Listed.

Technical Parameters:

BACnet Protocols: BACnet/IP and BACnet Ethernet.

Browser for Configuration Setup:

Windows Internet Explorer 10 and higher.

Firefox 25 and higher.

Google Chrome 34 and higher.

Mounting: 35 mm horizontal DIN rail.

Connectors: One terminal block connector for power.

Wiring Class: NEC Class 2.

Power: 24 VAC, 30 VA. 12-24 VDC, 11 W.

Technology: Arm Cortex-A15 Dual MPCore processor. 1 Mb cache, 1.5 GHz. 2 GB DDR3L memory. 60 GB solid state drive.

Communication Ports: 2 Ethernet (10/100-Base T). 2 USB 2.0, maximum 500 mA each.

Ambient Temperature: 32 to 131 degrees F (0 degrees to 55 degrees C.

Relative Humidity Non-Condensing: 10 to 90 percent.

Dimensions: 6.7 x 4.9 x 2.7 inches (169 x 125 x 68 mm).

Weight: 1.5 lbs (0.68 kg).

* + - 1. Basis of Design: enteliBUS Control System: Comprised of automation engines, pack plane expanders, and I/O modules. A fully programmable BACnet controller with expandable I/O (Input and Output points). Configurable for applications from low to high I/O density. It is a BACnet router and can join multiple BACnet network segments into one network. A Smoke Control System version is available.
				1. Automation Engines: The execution engine of an enteliBUS Control System. It monitors, stores, and executes programmed control logic and interacts with I/O modules through enteliBUS Backplane Expanders.

Automation Engine Models: eBCON, eBMGR, eBMGR-TOUCH, eBCON-2, eBMGR-2. and eBMGR-2-TOUCH.

Original automation engines only run V3.40 firmware. The two newer engines run either V3.40 or V4 firmware.

eBMGR-TOUCH: Includes an integrated LCD touchscreen for local operator interface. Operators can view, modify, and configure local I/O, variables, alarms, alarm logs and schedules.

* + - * 1. Every Automation Engine has the following features in common.

Native BACnet Building Controllers.

Fully programmable with GCL+.

Communications: BACnet/IP, BACnet over Ethernet, BACnet MS/TP, and Delta LINKnet.

Integration with Non-BACnet Systems: enOcean, M-Bus, Somfy, and Modbus.

Supports access control as an alternative to the ASM-24E.

SD Card Memory Expansion and USB Ports.

* + - 1. Backplane Expanders: Provides I/O expansion to an Automation Engine.
				1. Model eBX-04 supports 4 I/O modules.
				2. Model eBX-08 supports 8 I/O modules.
				3. Multiple Backplane Expanders can be connected to and controlled by one Automation Engine. I/O.
			2. I/O Modules: Provide exact combination of points needed for a given application.
				1. Capabilities Supported:

Eight points per I/O module.

Inputs: 0-5 VDC, 0-10 VDC, 4-20 mA, 10k thermistor, 1k RTD and dry contact.

Outputs: 0-10 VDC, 0-20 mA, 24 VAC TRIAC and relay.

Optional Monitored Overrides: 3-position HAO switches and analog 0-100 percent levers.

Auto detecting and hot-swappable.

* + 1. Building Level Controllers:
			1. Basis of Design: Delta System Controllers. Control major equipment in a building. Support BACnet/IP and BACnet over Ethernet and include I/O, real-time clock (RTC), power backup for RTC, memory, an EIA-232 serial port, and a BACnet MS/TP subnet.
				1. DSC-1616E: Ethernet device. Universal Inputs: 16. Analog Outputs: 16.

HOA switches.

* + - * 1. DSC-1212E: Ethernet device. Universal Inputs: 12. Analog Outputs: 12.

HOA switches.

* + - * 1. DSC-1146E: Ethernet device. Universal Inputs: 44. Analog Outputs: 4.

Digital TRIAC Outputs: 6.

* + - * 1. DSC-1180E: Ethernet device. Universal Inputs: 11. Analog Outputs: 8.
				2. DSC-633E: Ethernet device. Universal Inputs: 6. Analog Outputs: 3.

Digital TRIAC Outputs: 3.

* + - * 1. DSC-606E: Ethernet device. Universal Inputs: 6. Digital TRIAC Outputs: 6.
			1. Basis of Design: enteliBUS System Controllers. Made up of modular components you can select to meet exact needs of a wide range of HVAC and access control applications. A small-footprint, with I/O modules, for applications with limited mounting space. Can be used as a low-density distributed controller or expanded with additional backplanes/modules for high-density I/O applications.
				1. eBMGR-2: 2nd Gen Automation engine for V3 and V4 firmware.
				2. eBCON-2: 2nd Gen Automation engine for V3 and V4 firmware.
				3. eBMGR / eBMGR-TOUCH: 1st Gen Automation engine for V3 firmware only.
				4. eBCON: 1st Gen Automation engine for V3 firmware only.
				5. eBM I/O module.
				6. eBX Backplane expander.
				7. ADP-eBUS-DEB Wiring adapter for DCU to eBUS conversions.
		1. Application Controllers:
			1. Basis of Design: Programmable native BACnet Advanced Application Controller. communicates on twisted pair Ethernet 10-BaseT using BACnet IP and BACnet over Ethernet, or on an RS-485 LAN using BACnet MS/TP. For applications having small local I/O requirements. Supports BACstat and Delta LINKnet devices.
				1. Standards Compliance: CE, FCC, EAC.
				2. Listings: C-UL Listed, UL 916 Listed, BTL Listed, UL 864 Listed for UL 864 product numbers.
				3. Features:

Supercapacitor for real-time clock and SRAM backup on DAC-633E.

Supports 6 BACstat network sensors on LINKnet for room sensing and control or 2 Delta field modules on LINKnet for I/O expansion.

Actuator power terminal (24 VAC) for each analog output; powered internally or from an auxiliary transformer.

Firmware upgrade and database load/save over the network.

Field upgradeable to Modbus RTU with hardware key.

Service port.

Screw or DIN rail mountable.

LED indicator for each output, power, CPU and SCAN status.

* + - * 1. BACnet Device Profile: BACnet Advanced Application Controller (B-AAC).
				2. Universal Inputs (10-bit): Quantity: 6.

Jumper Configurable for: 0 to 5 VDC. 0 to 10 VDC, 10 kOhm thermistor, and dry contact (using 10 kOhm thermistor jumper setting) 4 to 40 mA.

* + - * 1. Outputs: 3 binary TRIAC outputs.

24 VAC at 0.5 A max per output.

Leakage current 100 micro A, min current 25 mA.

Jumper configured for internal or external power.

* + - * 1. Analog Outputs: Quantity: Two.

0 to 10 VDC at 20 mA per output. Software Configurable: Binary or analog.

* + - * 1. Universal Output: Quantity: One.

Configurable as either 0 to 10 V or 24 VDC FET.

* + - * 1. Device Addressing: Set via DIP switch and jumpers, or software setup.
				2. Terminal Connectors: Removable screw-type.
				3. Wiring Class: Class 2 / SELV.
				4. Power: 24 VAC 50/60 Hz at 50 VA with fully loaded binary outputs.
				5. Power complying with UL 864: 24 VAC 50/60 Hz at 12 VA, 50 VA with fully loaded binary outputs.
				6. Technology:

Non-Ethernet Version: 16-bit processor, 1 MB flash memory, and 128 KB SRAM memory for database.

Ethernet Version: 16-bit processor, 2 MB flash memory, and319 KB SRAM memory for database.

Real-time clock.

Supercapacitor for 72-hour backup of real-time clock and SRAM.

* + - * 1. Communications Ports:

Main LAN.

Ethernet (10-BaseT). BACnet IP, BACnet over Ethernet.

RS-485 NET1. BACnet MS/TP up to 76800 bps, max 99 devices per port.

* + - * 1. Sub LAN:

RS-485 NET2. Delta LINKnet up to 76800 bps.

Max 6 devices on LINKnet with no more than 2 DFM devices.

Optional Modbus up to 38400 bps, max 5 devices.

* + - * 1. Ambient:

Temperature: 32 to 131 degrees F (0 to 55 degrees C).

Relative Humidity, Non-Condensing: 10 to 90 percent.

* + - * 1. Dimensions, with Housing: 8-1/2 x 4-1/4 x 1-15/16 inches (218 x 107 x 49 mm)
				2. Weight: 0.80 lbs (360 grams).
			1. Basis of Design: Programmable, BACnet Advanced Application Controller (B-AAC) for low density I/0 applications featuring Power over Ethernet (PoE). High speed communications and device power in a single cable. No need for a local control transformer.
				1. Standards Compliance: CE, FCC, and EAC.
				2. Listings: C-UL Listed, UL 916 Listed, and BTL Listed.
				3. Features:

Power over Ethernet (PoE).

Local scheduling, trending, and alarming functions.

Fully programmable.

BACnet IP and BACnet over Ethernet Main LAN communications.

Super Capacitor for real-time clock and SRAM backup.

RS-485 subLAN supports BACstat smart network sensors, DFM I/O expansion modules or optional Modbus gateway.

Actuator power terminal (24VDC) for each analog output simplifies wiring.

Firmware upgrade and database load/ save over the network.

Service port.

Screw or DIN rail mountable.

LED indicator for each output, CPU and SCAN status.

* + - * 1. BACnet Device Profile: BACnet Advanced Application Controller (B-AAC).
				2. Universal Inputs (10-bit): Quantity: 6.

Jumper Configurable for: 0 to 5 VDC. 0 to 10 VDC, 10 kOhm thermistor, and dry contact (using 10 kOhms thermistor jumper setting) 4 to 40 mA.

Internal power monitoring input. Measures total power consumption of DAC-633PoE.

* + - * 1. Outputs:

Analog Outputs: Quantity: Two.

0 to 10 VDC at 20 mA max per output, software-configurable as binary or analog.

Binary SSR Outputs: Quantity: Three.

Internally Powered: 24 VDC.

Externally Powered: 24 VAC/DC.

Universal Output: Quantity: One.

Configurable: 0 to 10 VDC or 24 VDC SSR.

* + - * 1. Device addressing.
				2. Software addressed.
				3. Connectors: Removable screw-type terminal connectors.
				4. Wiring Class: NEC Class 2 / SELV.
				5. PoE Power In.

802.3at PoE: 53 VDC, 25.5 W max.

802.3af PoE: 48 VDC, 12.95 W max.

* + - * 1. Power Out: 24 VDC.

802.3at PoE supply: 700 mA (16.8 W) max.

802.3af PoE supply: 280 mA (6.75 W) max.

Max total power available for external field devices powered from 24 VDC out terminal and binary outputs 1 to 4.

* + - * 1. Technology:

Processor: 16 bit.

Flash Memory: 2 MB (16 megabit).

SRAM Memory for Database: 319 KB.

Real-time clock.

Super capacitor for 72-hour backup of real-time clock and SRAM.

* + - * 1. Communication Ports:

Main LAN:

Ethernet (10 BaseT).

BACnet IP, BACnet over Ethernet.

SubLAN:

RS-485 NET2.

Delta LINKnet up to 76800 bps, max.

6 devices on LINKnet with no more than 2 DFM devices.

Optional Modbus up to 38400 bps, max 5 devices.

* + - * 1. Ambient:

Temperature: 32 top 131 degrees F (0 to 55 degrees C).

Relative Humidity, Non-Condensing: 10 to 90 percent.

* + - * 1. Dimensions, with Housing: 10-5/16 x 4-1/4 x 1-15/16 inches (262 x 107 x 49 mm).
				2. Weight: 0.959 lbs (435 grams).
			1. Basis of Design: Programmable, Native BACnet Advanced Application Controller. Communicates on an RS-485 LAN with BACnet MS/TP protocol. For VAV applications. Supports Delta BACstat and LINKnet I/O. Damper actuator assembly available with position feedback. Additional configurable inputs and outputs as required.
				1. Standards Compliance: CE and FCC.
				2. Listings: UL 916 Listed, C-UL Listed, BTL Listed, UL 864 Listed for UL 864 product numbers.
				3. Features:

Native BACnet firmware.

BACnet MS/TP communications.

Supports 4 BACstat network sensors on LINKnet for room sensing and control or 2 Delta Field Modules on LINKnet for I/O expansion.

Integrated housing with damper assembly for easy, cost-effective installation.

Reliable industry standard actuator (with optional position feedback).

Fully programmable in GCL+.

True differential pressure sensor.

LED indicator for each output, communication port and SCAN status.

Application database and firmware can be flash loaded over the network.

Optional field upgrade to Modbus RTU with hardware key.

Service port.

* + - * 1. BACnet Device Profile: BACnet Advanced Application Controller (B-AAC).
				2. External Inputs:

10K Thermistor or Dry Contact: 10K. Quantity: One.

2 Universal Inputs (10-bit) supporting: 0 to 5 VDC, 0 to 10 VDC, 10 kOhm Thermistor.

Dry Contact (using 10 kOhm Thermistor jumper setting): 4 to 20 mA.

* + - * 1. Internal Inputs:

\*\* NOTE TO SPECIFIER \*\* The actuator position feedback is optional. Delete if not required.

1 Actuator position feedback.

1 Air flow sensor, true differential pressure, 0 to 1 inH2O (0 to 248.8 Pa).

* + - * 1. External Outputs: 4 Binary TRIAC Outputs.
				2. Internal Outputs: 2 Binary Outputs for damper open and close.
				3. Belimo Actuator: 45 in-lbs. (nominal torque) Less than 35 db (A) noise level.
				4. Siemens Actuator: 44 in-lbs. (nominal torque) Less than 35 db (A) noise level.
				5. Device Addressing: Set via DIP switch and jumpers or software setup.
				6. Connectors: Removable screw-type terminal connectors.
				7. Wiring Class: Class 2.
				8. Tubing: Flow sensor tubing must be 5/32 inch (4 mm) inside diameter.
				9. Power: 24 VAC 50/60 Hz at 15 VA (not including output loading, 52 VA max with fully loaded TRIAC Outputs).
				10. Power complying with UL864:

24 VAC 50/60 Hz at 15 VA (52 VA Max with fully loaded TRIAC Outputs).

* + - * 1. Technology:

16-bit processor.

1 MB (8-megabit) flash memory.

128 KB SRAM memory for database.

* + - * 1. Communications Ports:

Main LAN:

RS-485 NET1.

BACnet MS/TP up to 76800 bps, max.

99 devices per port.

SubLAN:

RS-485 NET2.

Delta LINKnet up to 76800 bps, max.

4 devices on LINKnet with no more.

than 2 DFM devices.

Optional Modbus up to 38400 bps.

max 5 devices.

* + - * 1. Ambient:

Temperature: 32 to 131 degrees F (0 to 55 degrees C).

Relative Humidity, Non-Condensing: 10 to 90 percent.

* + - * 1. Dimensions: 9-3/8 x 4-3/4 x 3-1/8 inches (238 x 120 x 80 cm) with housing.
				2. Weight: 1.85 lb. (840 g) with housing and actuator.
				3. Standards Compliance: CE and FCC.
				4. Listings: UL 916 Listed, C-UL Listed, BTL Listed, UL 864 Listed for UL 864 product numbers.
			1. Basis of Design: Programmable, BACnet, Advanced Application Controller for VAV applications featuring Power over Ethernet (PoE). High speed communications and device power in a single cable. No need for a local control transformer. Supports BACnet/IP, and BACnet over Ethernet protocols on its Ethernet port. Supports a RS-485 subLAN of Delta LINKnet devices such as BACstat line of smart network sensors and DFM I/O expansion modules.
				1. Standards Compliance: CE, FCC, and EAC.
				2. Listings: UL 916 Listed.
				3. Features:

Power Over Ethernet (PoE).

Native BACnet firmware.

Fully programmable.

BACnet/IP, BACnet over Ethernet Main LAN communications.

Supports a RS-485 subLAN of Delta LINKnet smart network sensors and I/O expansion modules.

Direct mount housing integrates controller, damper actuator, and airflow sensor into a single package for easy, cost effective installation.

Zero drift differential pressure sensor.

LED status indications for inputs, outputs, CPU Scan status, communication ports and power.

Service port.

Optional field upgrade to Modbus RTU with hardware key.

Local trending and alarming.

* + - * 1. BACnet Device Profile: BACnet Advanced Application Controller (B-AAC)
				2. External Inputs:

10 kOhms or Binary Input (10 bit): Quantity: One.

Universal Inputs (10 bit), jumper configurable for 0 to 5 VDC, 0 to 10 VDC, 10 kOhm Thermistor. Quantity: Two.

Dry Contact (using 10 ku Thermistor jumper setting): 4 to 20 mA.

* + - * 1. Internal Inputs:

Air Flow Input: True differential pressure sensor, use jumper to select 0 to 1 in H20 (0 to 248 Pa) or 0 to 2 in H2O (0 to 498 Pa). Quantity: One.

Power Monitoring Input: Quantity: One.

Actuator Position Feedback Input: Quantity: One. Optional.

* + - * 1. External Outputs: Binary FET Outputs, 24 VDC, internally powered switching to ground. Quantity: Four.
				2. Internal Outputs: Binary Outputs for damper open/close, one jumper selectable for analog damper control. Quantity: Two.
				3. Belimo Actuator: Analog and tri-state options 45 in-lbs. Less than 35 db (A) noise level.
				4. Device Addressing: Software addressed.
				5. Connectors: Removable screw-type terminal connectors.
				6. Wiring Class: NEC Class 2 / SELV.
				7. Tubing: Flow sensor tubing must be 5/32 inches (4 mm) inside diameter.
				8. PoE Power In:

802.3at PoE: 53 VDC, 25.5 W max.

802.3af PoE: 48 VDC, 12.95 W max.

* + - * 1. 24 VDC Power Out: Max total power available for external field devices powered from either 24 VDC out terminal or binary outputs 1 to 4.

802.3at PoE supply: 16.8 W (700 mA) max.

802.3af PoE supply: 7.2 W (300 mA) max.

* + - * 1. Technology:

16-bit processor.

Flash Memory: 2 MB.

SDRAM Memory: 319 KB.

Real-time clock.

Super Capacitor for 72-hour backup of real-time clock and SRAM.

* + - * 1. Communications Ports:

Ethernet (10-BaseT).

BACnet/IP, BACnet over Ethernet.

* + - * 1. RS-485 NET2:

Delta LINKnet up to 76800 bps, max. 4 devices on LINKnet with no more than 2 DFM devices.

Optional Modbus up to 38400 bps, max 5 devices.

* + - * 1. Ambient:

Temperature: 32 top 131 degrees F (0 to 55 degrees C).

Relative Humidity, Non-Condensing: 10 to 90 percent.

* + - * 1. Dimensions 9.3 x 5.0 x 3.7 inches (236 x 126 x 93 mm).
				2. Weight: 1.7 lbs (772 grams).
			1. Basis of Design: Dual Port Ethernet Controller (eZVPE):
				1. With dual Ethernet ports, the eZVPE gives you the power to build network segments without the need for running new Ethernet cable for each controller. By linking multiple eZVPE controllers in your system, you will not only save on installation cost but create an easy to troubleshoot networked solution.
				2. Flexibility: With multiple actuator options and I/O configurations, the eZVPE can handle any configuration of VAV.
				3. Dual Ethernet: Connect a chain of multiple eZVPE controllers using high-speed, dual Ethernet ports.

\*\* NOTE TO SPECIFIER \*\* Suitable for controlling various packaged units and equipment with medium I/O requirements such as small air handling units, boilers, and chillers.

* + - * 1. Can be tailored to specific applications by creating and modifying BACnet objects and GCL+ programs.
			1. Basis of Design: Fully programmable, Native BACnet Advanced Application Controller, designed for applications having medium local I/O requirements. Supports BACstat and other Delta LINKnet devices.
				1. Model: RS-485 LAN using the BACnet MS/TP.
				2. Model: Twisted-Pair Ethernet 10-BaseT using BACnet

Super Capacitor for real-time clock and SRAM backup which requires no maintenance (DAC-1146E).

* + - * 1. Fully programmable in GCL+.
				2. Supports 10 eZNS network sensors on LINKnet for room sensing and control, or 2 Delta Field Modules on LINKnet for I/O expansion.
				3. Actuator power terminal (24 VAC) for each analog output (can be powered internally or from an auxiliary transformer).
				4. Firmware upgrade and database load/ save over the network.
				5. Optional field upgrade to Modbus RTU with hardware key.
				6. Service port.
				7. Screw or DIN rail mountable.
				8. LED indicator for each output, power, CPU and SCAN status.
			1. BACnet Device Profile: BACnet Advanced Application Controller (B-AAC)
				1. Inputs: Eleven Universal Inputs (10-bit) supporting:

0 to 5 VDC.

0 to 10 VDC.

10 kOhm Thermistor.

Dry Contact (using 10 kOhm Thermistor jumper setting)

4 to 20 mA.

* + - * 1. Outputs:

Binary TRIAC Outputs: Quantity of 6. Jumper configured for internal or external power).

Analog Outputs (0-10 VDC) Quantity of 4.

* + - * 1. Device Addressing: Set via DIP switches and jumpers, or software setup.
				2. Connectors: Removable screw-type terminal connectors.
				3. Wiring Class: Class 2 / SELV.
				4. Power: 24 VAC 50/60 Hz at 14 VA, 86 VA with fully-loaded Binary Outputs.

\*\* NOTE TO SPECIFIER \*\* An application-specific controller for VAV and includes an actuator and true differential pressure sensor with integrated housing. The fully programmable DVC-V304 allows GCL+ programs and BACnet objects to be tailored to any VAV application.

* + - 1. Basis of Design: Fully programmable, Native BACnet Advanced Application Controller. Communicates on RS-485 LAN using BACnet MS/TP protocol. For VAV applications. Supports Delta BACstat and LINKnet I/O. Damper actuator assembly is available with or without position feedback. Additional inputs and outputs can be configured as required.
				1. Native BACnet firmware.
				2. BACnet MS/TP communications.
				3. Supports 4 BACstat network sensors on LINKnet for room sensing and control or 2 Delta Field Modules on LINKnet for I/O expansion.
				4. Integrated housing with damper assembly for easy, cost-effective installation.
				5. Reliable industry standard actuator (with optional position feedback).
				6. Fully programmable in GCL+.
				7. True differential pressure sensor.
				8. LED indicator for each output, communication port and SCAN status.
				9. Application database and firmware can be flash loaded over the network.
				10. Optional field upgrade to Modbus RTU with hardware key.
				11. Service port.
				12. BACnet Device Profile: BACnet Advanced Application Controller (B-AAC)
				13. External Inputs:

1 10K Thermistor or Dry Contact.

2 Universal Inputs (10 bit) supporting:

0 to 5 VDC.

0 to 10 VDC.

10 kOhm Thermistor.

4 to 20 mA.

Dry Contact (using 10 kOhm Thermistor jumper setting).

* + - * 1. Internal Inputs:

\*\* NOTE TO SPECIFIER \*\* The actuator position feedback is optional. Delete if not required.

1 Actuator position feedback.

1 Air flow sensor, true differential pressure, 0 to 1 inH2O (0 to 248.8 Pa).

* + - * 1. External Outputs: 4 Binary TRIAC Outputs.
				2. Internal Outputs: 2 Binary Outputs for damper open and close.
				3. Belimo Actuator:
				4. 45 in-lbs. (nominal torque) Less than 35 dbA noise level.
				5. Siemens Actuator: 44 in-lbs. (nominal torque) Less than 35 dbA noise level.
				6. Device Addressing: Set via DIP switch and jumpers or software setup.
				7. Connectors: Removable screw-type terminal connectors.
				8. Wiring Class: Class 2.
				9. Tubing: Flow sensor tubing must be 5/32 inch (4 mm) inside diameter.
				10. Power: 24 VAC 50/60 Hz at 15 VA (not including output loading, 52 VA max with fully loaded TRIAC Outputs).
				11. Power Complying with UL864: 24 VAC 50/60 Hz at 15 VA (52 VA Max with fully loaded TRIAC Outputs).
				12. Technology:

16-bit processor.

1 MB (8-megabit) flash memory.

128 KB SRAM memory for database.

* + - * 1. Communications Ports:

Main LAN:

RS-485 NET1.

BACnet MS/TP up to 76800 bps, max.

99 devices per port.

SubLAN:

RS-485 NET2.

Delta LINKnet up to 76800 bps, max 4 devices on LINKnet with no more than 2 DFM devices. Optional Modbus up to 38400 bps, max 5 devices.

* + - * 1. Ambient: 32 to 131 degrees F (0 to 55 degrees C). 10 to 90 percent RH (non-condensing).
				2. Dimensions: 9-3/8 x 4-3/4 x 3-1/8 inches. (239 x 120 x 80 mm) with housing.

Weight: 1.85 lb. (840 g) with housing and actuator.

* + - * 1. Compliance: CE. FCC.
				2. Listings: UL 916 Listed. C-UL Listed. BTL Listed.

UL 864 Listed for UL 864 model numbers.

* + - * 1. Model: Binary board (4 BOs), DP sensor for flow, integrated housing.
				2. Model: Binary board (4 BOs), DP sensor for flow, integrated housing and Siemens actuator.
				3. Model: Binary board (4 BOs), DP sensor for flow, integrated housing and Siemens actuator with actuator feedback.
				4. Model: Binary board (4 BOs), DP sensor for flow, integrated housing and Siemens actuator and Belimo actuator.
				5. Model: Binary board (4 BOs), DP sensor for flow, integrated housing and Siemens actuator with actuator feedback and Belimo actuator option.
				6. Model: Binary board (4 BOs), DP sensor for flow, integrated housing and Siemens actuator, and Dual duct option (separate sensor for flow, integrated housing, and actuator).
				7. Model: Binary board (4 BOs), DP sensor for flow, integrated housing and Siemens actuator with actuator feedback, and Dual duct option (separate sensor for flow, integrated housing, and actuator).
				8. Model: Binary board (4 BOs), DP sensor for flow, integrated housing and Siemens actuator with UL 864 listing.
				9. Model: Binary board (4 BOs), DP sensor for flow, integrated housing and Siemens actuator with actuator feedback with UL 864 listing.
				10. Model: Binary board (4 BOs), DP sensor for flow, integrated housing and Siemens actuator and Belimo actuator. with UL 864 listing.
				11. Model: Binary board (4 BOs), DP sensor for flow, integrated housing and Siemens actuator with actuator feedback and Belimo actuator option. with UL 864 listing.
				12. Accessories:

RS-485 BACnet MS/TP, 4-port network repeater.

Delta Network Terminator for BACnet MS/TP.

Delta Network Converter.

Delta Network Bluetooth Converter.

Siemens actuator shaft insert. 3/8 inch (9.5 mm). 24 per package.

Additional 50 credit blocks for the Modbus flash key.

Modbus flash upgrade key with 50 credits pre-loaded.

\*\* NOTE TO SPECIFIER \*\* A fully programmable, Native BACnet Advanced Application Controller that communicates on an RS-485 LAN using BACnet MS/TP protocol. Direct 240 VAC line voltage terminal connections are provided for 1, 2 or 3 speed fans. Room temperature can be a standard 10 KOhm sensor or BACstat II, connected via a secondary LINKnet network and a 24 VAC power out connection.

* + - 1. Basis of Design: For fan coil control. 2 triac outputs and 2 analog 0 to 10 V outputs. Covers a wide-range of fan coil unit applications. Allows sequence modifications as required by the design engineer or building owner.
			2. Features
				1. Native BACnet firmware.
				2. BACnet MS/TP communications.
				3. Stand alone operation or on BACnet.
				4. Fully programmable in GCL+.
				5. Pre-loaded fan coil application database.
				6. Direct connection to BACstat II (DNS-24 or DNS-L24).
				7. Quantity of 2 tri-state and 2 analog outputs for relay actuation.
				8. Relays: Quantity of 3. Rated for motor loads to control 1, 2 or 3 speed fans, complete with interlocks and time delays for equipment protection.
				9. Slim design fits into narrow fan coil units.
				10. Power supplied by power mains (on-board 24 VAC transformer included).
				11. Derived Network Addressing (DNA) for simple integration into a standard network architecture.
				12. Service port.
			3. BACnet Device Profile: BACnet Advanced Application Controller (B-AAC).
			4. Inputs:
				1. Universal inputs: 10 bit (supporting 0 to 5 v, 0 to 10 v, 10 kOhm, 4 to 20 mA). Quantity: 2.
				2. 10 kOhm or dry contact input - 10 bit. Quantity: 1.
			5. Outputs:
				1. Analog outputs (0-10v) . Quantity: 2.
				2. Binary triac outputs. Quantity: 2.
				3. Binary relay outputs for fan speed control. Quantity: 3.
				4. 240 VAC, 1HP (60 LRA/10 FLA).
				5. LED status indication of each output.
			6. Technology:
				1. 1 MB (8 megabit) Flash memory.
				2. 127 KB SRAM memory for database.
				3. CPU status LED.
			7. Device Type: Pre-configured as a subnet device.
			8. Device Address: Set via DIP switch and jumpers or software setup.
			9. Communication Ports:
				1. Main LAN (NETI).
				2. BACnet MS/TP at 9600, 19200, 38400 or 76800 bps (default) (maximum of 99 devices per BACnet MS/TP segment).
				3. SubLAN (NET2).
				4. Delta LINKnet at 76800 bps (maximum 4 devices on LINKnet, with no more than 2 DFM/DNT devices per controller).
				5. Note: On board transformer only provides enough power for 1 BACstat.
			10. Connectors:
				1. Fixed screw-type terminal connectors (Class 1).
				2. Removable screw-type connectors (Class 2).
			11. Wiring Class
				1. NEC Class 1 (power in).
				2. NEC Class 2, SELV (power out).
			12. Power In:
				1. 240 VAC, 50/60 Hz.
				2. 2000 VA maximum.
				3. (30 VA for internal circuitry).
			13. Power Out (for DNS-24L):
				1. 24 VAC, 50/60 Hz, 3 VA.
			14. Ambient: 32 to 113 degrees F (0 to 45 degrees C). 10 to 90 percent RH (non-condensing).
			15. Dimensions: 9.5 x 3.94 x 3.75 inches (241 x 100 x 696 mm.
				1. Weight: 2.1 lbs (955 grams).
			16. Compliance: CE - EMC Directive 89/336/EEC and IEC 61010-1. FCC Class B. ICES Class B.
		1. Sensors and IO Modules:
			1. Basis of Design: O3 Room Controllers as manufactured by Delta Controls.
				1. Native BACnet platform for controlling all aspects of a room: Fully programmable.
				2. HVAC, lighting, blinds, access/security, and audiovisual equipment, via a single-point controller.
				3. Modular design offers expandable I/O, eases servicing, and reduces upgrade cost.
				4. Communication: BACnet/IP, BACnet over Ethernet, BACnet MS/TP, and Delta LINKnet communications.
				5. Integration: Non-BACnet systems such as Modbus, EnOcean, DALI, and SMI.
				6. Components:

O3-DIN-CPU Controller: Has 3 NET ports and 3 power outputs and excels at control of multiple rooms.

O3-DIN-SRC Controller: Has 2 NET ports and 1 power output and excels at single room control.

O3-DIN-ACCESS Module: Provides fully programmable door access control and a combination of universal and door-specific I/O points.

O3-DIN Controller : Holds the access user database (up to 100,000 records) and provides access granted/denied decision-making intelligence. It also provides the communications network interface to the facility BACnet network and the front-end computer.

Part of the O3 Access Control system.

O3-DIN-DALI Gateway Module: Allows the O3 to communicate with DALI (Digital Addressable Lighting Interface) lighting groups and can control up to 64 dimmable ballasts or LED drivers. Designed for in-ceiling mounting, control is situated close to devices and results in more efficient wire runs.

O3-DIN-SMI Gateway Module: Allows the O3 to communicate with SMI (Standard Motor Interface) motors controlling motorized blinds and shades. A single O3-DIN-SMI can manage up to 16 SMI drives and integrate up to 16 groups.

O3-DIN-8xP universal I/O module: Comes with 8 universal points that can be configured as inputs or outputs to control or read from field equipment.

O3-DIN-4F4xP: Comes with 4 universal points as well as 4 binary FET outputs for driving high-current relay coils and switching AC or DC power. In a lighting.

controller application, a single O3-DIN-4F4xP module can drive 2 bi-stable relays, power 0 to 10 V dimming ballasts, and provide input points for sensors or switches.

O3-DIN-PoE module: Adds Power over Ethernet (PoE) capabilities to the O3 system, providing not only lighting control over PoE but also HVAC and integration.

O3-DIN-PWRINJ Power Injector: Expands the number of O3-DIN modules that can be controlled by a single O3-DIN-CPU and distributes I/O closer to where it is needed. Up to 8 power injectors can be connected to an O3-DIN-CPU controller's O3BUS network, with each power injector supporting up to 4 I/O or gateway modules. The additional modules can be located up to 70 m (230 ft) away from the controller.

O3-HUB: The ceiling-mounted sensor hub replaces multiple room sensors with a one-per-room competitive cost solution when installed together with an O3-DIN room controller. Combining humidity, composite temperature, passive infrared motion and light sensors in a single device, the sensor hub provides occupant- and location-based control for the modern office or meeting space. Models equipped with EnOcean radios (868 MHz and 902 MHz) are also available.

O3 App: A room control application for mobile devices. The app communicates with the O3-DIN controller and enteliWEB to execute preconfigured comfort settings for different room activities (meetings, presentations, desk work, etc.). The settings are configured in enteliWEB by an administrator. Since the app uses the Bluetooth beacon in the sensor hub to locate rooms, the app is only available with rooms or spaces using sensor hubs. enteliWEB is a web-based application that connects facilities and centralizes building management operation, site engineering, and energy analytics.

* + - 1. Sensors and Thermostats:
				1. Basis of Design: O3 Sensor Hub as manufactured by Delta Controls.

Model: Delta Controls O3-HUB2-2xP.

Model: Delta Controls O3-HUB2.

Ceiling-mounted, UL 916 Listed, 24 VDC, 1W typical, 8W max, Class 2 device with removable screw-type terminal connectors. Complies with CE, EAC, and FCC/IC.

Infrared Space Temperature Sensor: Plus or minus 1.8 degrees F (1 degree C).

Relative Humidity Sensor: Plus or minus 3 percent from 20 to 80 percent, at 59 to 86 degrees F ( degrees C).

Digital Space Temperature: Plus or minus 1.8 degrees F (1 degree C)

Passive Infrared (PIR) Motion Sensor: At 10 ft (). Minimum Diameter Coverage: 22 ft.

Audio Sensor: Acoustic occupancy detection.

Light Sensor: 0 to 2500 lumens range. Accuracy at 77 degrees F (25 degrees C): Plus or minus 5 lumens + 2 percent of value.

LED Ring: Fully color articulated.

1.0 Watt Monospeaker: For tones and audio output.

* + - * 1. Basis of Design: Programmable thermostat with EnOcean wireless connectivity and onboard Wi-Fi option. Temperature sensor with humidity, CO2, and motion options. Backlit colors provide additional user feedback. Allows NFC-enabled mobile devices to configure the thermostat. Delivers custom solutions specific to needs of each market. Provides occupants with a touch-interface to adjust individual comfort levels.

Features:

BACnet/IP over Wi-Fi, BACnet MS/TP, Delta LINKnet communication.

EnOcean wireless for zone-level control, including sensors and outputs.

Programmable: Button layout, display, backlit colors, EnOcean wireless control for HVAC and room peripherals like door contact, motion sensor, lighting, and blinds control.

RGB backlight with large LCD screen allows choice of colors to indicate conditions, alarms, and night mode.

Capacitive touch zones allow custom button sizes.

Slider to quickly adjust setpoint or tap for precise changes.

USB Service port, software enabled or disabled. Service tool not required.

Easy network set up using NFC with smartphone, or configuration page in web browser.

Inputs: 1 to 10 kOhm input (12 bit A/D).

LCD: 2-line custom segmented display with icons.

Buttons: 2 rows of 4 capacitive touch zones, allowing up to 8 individual buttons or combined to form larger buttons.

Backlight: RGB LED backlight for multicolor LCD and button illumination

Temperature: Digital Temperature Sensor: Plus or minus 0.36 degrees F (0.2 degrees C).

\*\* NOTE TO SPECIFIER \*\* Digital humidity sensor, CO2 sensor, and occupancy sensor are both optional. Delete if not required.

Digital Humidity Sensor: Accuracy to be plus or minus 3 percent.

CO2 Sensor: Dual Beam, Self-Calibrating NDIR Detection.

Occupancy Sensor: Passive infrared motion (PIR) sensor

Range: 0 to 2000 ppm.

Accuracy at 77 degrees F (25 degrees C): Plus or minus 50 ppm + 2 percent of value.

Temperature Dependence: 1 ppm per degree F (2 ppm per degrees C).

Pressure Dependence: 0.13 percent of reading per mm Hg.

Stability: 20 ppm/year, typical.

Range: 16.4 ft. (5 m)

Coverage: 100 degrees horizontal.

Connectors: Screw-type terminal connectors.

Wiring Class: Class 2 / SELV.

Power:

With Wi-Fi: 24 V AC/DC, 10 VA / 3 W max.

Without Wi-Fi: 24 V AC/DC, 8 VA / 2 W max.

Technology: 32 bit processor Internal A/D, Flash and RAM.

Communications: BACnet/IP over Wi-Fi (802.11b/g/n at 2.4 GHz).

Typical Output Power: 802.11b/g/n +17 dBm/ +15 dBm/ +14 dBm.

EnOcean: (902 MHz or 868 MHz).

Max Power at Antenna:

902 MHz: Plus 3.0 dBm.

868 MHz: Plus7.0 dBm.

RS-485 Port:

With Wi-Fi: Delta LINKnet (up to 76800 bps) Supports up to 4 LINKnet devices, max 2 DFM devices.

Without Wi-Fi Option: BACnet MS/TP (up to 76800 bps).

USB Service Port:

Near Field Communication (NFC): Passive 2-way short range.

Ambient:

Temperature: 32 to 131 degrees F (0 to 55 degrees C).

Relative Humidity: 10 to 90 percent RH, non-condensing.

Dimensions:

With SM Backplate: 5.3 x 3.6 x 0.9 inches (13.3 x 9.3 x 2.3 cm)

With SC (CO2) Backplate: 5.3 x 3.6 x 1.7 inches (13.3 x 9.3 x 4.3 cm).

Mounted Surface Profile: Surface Mount (SM, SC backplates): 0.9 inches (2.3 cm).

Weight: 0.37 lbs (168 g).

IP Rating: IP20.

Compliance: CE, FCC Class B.

Listings: UL 916 Listed.

\*\* NOTE TO SPECIFIER \*\* . The enteliZONE Temperature Sensor is a hardwired, 10kOhm wall-mounted temperature sensor. The precision temperature sensor is placed in the same plastic enclosure used by the eZNx product line, providing a consistent aesthetic with other enteliZONE sensor family devices in your building.

* + - * 1. Basis of Design: RTS Hardwired Sensors as manufactured by Delta Controls.

A non-communicating temperature sensor for sites requiring a remote hardwired temperature sensor like hallways, mechanical rooms, and data centers. Uses a standard 10 kOhm type 3 sensor. Can be wired to external input of an eZNS sensor for temperature averaging, or to a 10k input of any Delta Controller. White, black, and grey overlays.

* + - * 1. Basis of Design: Network Sensors as manufactured by Delta Controls. Gives building occupants an intuitive touch-interface to adjust comfort levels while tailoring to their specific needs. A temperature sensor with humidity, CO2, and motion options. Offers a choice of backlit colors to provide additional user feedback. The sensor's NFC technology allows installers to use NFC-enabled mobile devices to configure the eZNS and enable enteliWEB integration.

Features:

RGB backlight allows choice of colors to indicate conditions, alarms, and night mode.

Large easy-to-read LCD screen. Onscreen visual feedback on button selection.

Capacitive touch zones allow custom button sizes.

Multiple button layout options. Simple one-touch buttons, or two-touch buttons for added functionality.

Slider to quickly adjust setpoint or tap for precise changes.

Fully programmable in GCL+.

USB Service port, software enabled or disabled. Service tool not required.

Smartphone and tablet integration and setup using NFC technology.

Recessed mount for minimal profile or surface mount backplate options.

Fits most electrical boxes worldwide.

2-piece design with tamper set screw lock.

Inputs: 1 to 10 kOhm input (16 bit A/D).

\*\* NOTE TO SPECIFIER \*\* The LCD and backlight are optional. Delete options not required.

LCD: 2-line custom segmented display with icons.

Backlight: Optional RGB LED backlight for multicolor LCD and button illumination.

\*\* NOTE TO SPECIFIER \*\* Humidity, CO2, and occupancy sensors are optional. Delete options not required.

Humidity Sensor: Accuracy to be plus or minus 3 percent.

CO2 Sensor: Dual Beam, Self-Calibrating NDIR Detection

Occupancy Sensor: Passive infrared motion (PIR) sensor

Buttons: 2 rows of 4 capacitive touch zones, allowing up to 8 individual buttons or combined to form larger buttons.

Temperature: Digital Temperature Sensor to be plus or minus 0.36 degrees F (plus or minus 0.2 degrees C).

Range: 0 to 2000 ppm.

Accuracy at 77 degrees F (25 degrees C): plus or minus 50ppm + 2 percent of value.

Temperature Dependence: 1 ppm per degrees F (2 ppm per degrees C).

Pressure Dependence: 0.13 percent of reading per mm Hg

Stability: 20 ppm per year.

Range: 16.4 ft (5 m).

Coverage: 100 degrees horizontal.

Connectors: Screw-type terminal connectors.

Wiring Class: Class 2 / SELV.

Power: 24 V AC/DC.

2 VA no backlight.

4 VA with backlight.

6 VA with backlight and CO2 sensor.

Technology: 32-bit processor. Internal A/D, Flash and RAM.

Communications:

RS-485 port.

Delta LINKnet (up to 76800 bps).

USB Service Port: Used as virtual Com port to connect the BACnet network to a workstation.

Near Field Communication (NFC): Passive 2-way short range.

Ambient: 32 to 131 degrees F (0 to 55 degrees C). 10 to 90 percent RH (non-condensing).

Dimensions:

With R (non-CO2) and SM Backplate: 5.3 x 3.6 x 0.9 inches (13.3 x 9.3 x 2.3 cm).

With R (CO2) Backplate: 5.3 x 3.6 x 1.7 inches (13.3 x 9.3 x 4.3 cm).

Mounted Surface Profile Recessed (both R backplates): 0.75 inches (1.9 cm).

Surface Mount (SM backplate): 0.9 inches (2.3 cm).

Weight: 0.36 lbs (165 g).

IP Rating: IP20.

Compliance: CE, FCC Class B.

Listings: UL 916 Listed.

* + - * 1. Basis of Design: Network Thermostats as manufactured by Delta Controls. Gives building occupants an intuitive touch-interface to adjust comfort levels while tailoring to their specific needs. A universal input and temperature sensor with humidity, CO2, and motion options. Offers choice of backlit colors providing additional user feedback The eZNT NFC technology allows installers to use NFC-enabled mobile devices to configure the sensor on the wall or in its shipped box.

Features:

Native BACnet firmware.

Standard RGB backlight allows choice of colors to indicate conditions, alarms, and night mode.

Large easy-to-read LCD screen. Onscreen visual feedback on button selection.

Multiple button and slider layout options. Custom button design available through Partner Applications Services (PAS).

Support for custom button and screen interactions through GCL+ programming.

Support for local scheduling, trending, and alarming.

USB Service port, software enabled or disabled. Service tool not required.

Smartphone and tablet integration and setup using NFC technology.

Fits most electrical boxes worldwide.

2-piece design with tamper set screw lock.

Input: Universal Input (12-bit), software configurable for: 0 to 5 VDC, 0 to 10 VDC, 10 kOhm Thermistor Dry Contact. Quantity: One.

LCD: 2-line custom segmented display with icons.

Buttons: 2 rows of 4 capacitive touch zones, allowing up to 8 individual buttons or combined to form larger buttons.

Backlight: RGB LED backlight for multicolor LCD and button illumination.

Temperature: Digital Temperature Sensor, plus or minus 0.36 degrees F (0.2 degrees C).

\*\* NOTE TO SPECIFIER \*\* Humidity, CO2, and occupancy sensors are optional. Delete options not required.

Digital Humidity Sensor: Accuracy plus or minus 3 percent.

CO2 Sensor: Dual Beam, Self-Calibrating NDIR Detection.

Range: 0 to 2000 ppm.

Accuracy 77 degrees F (25 degrees C):

Plus or minus 50 ppm plus 2 percent of value.

Temperature Dependence: 1 ppm per degree F (2 ppm per degree C) typical.

Pressure Dependence: 0.13 percent of reading per mm Hg.

Stability: 20 ppm per year (typical)

Occupancy Sensor: Passive infrared motion (PIR) sensor.

Range: 16.4 ft (5 m).

Coverage: 100 degrees horizontal.

Connectors: Screw-type terminal connectors

Wiring Class: mClass 2 / SELV.

Power:

24 VAC/DC.

4 VA / 1.2 W.

Communications:

RS-485 port.

BACnet MS/TP (up to 76800 bps).

USB Service Port: Used as virtual Com port to connect the BACnet network to a workstation.

Near Field Communication (NFC): Passive 2-way short range.

Ambient:

Temperature: 32 top 131 degrees F (0 to 55 degrees C).

Relative Humidity, Non-Condensing: 10 to 90 percent.

Dimensions:

With SM backplate: 5.3 x 3.6 x 0.9 inches (133 x 93 x 23 mm).

With SC (CO2) backplate: 5.3 x 3.6 x 1.7 inches (133 x 93 x 43 mm).

Mounted Surface Profile Surface Mount (SM, SC backplates): 0.9 inch (23 mm).

Weight: 175 g (0.39 lbs).

IP Rating: IP20.

Compliance.

CE.

FCC Class B.

UL 916 Listed.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. LIGHTING CONTROLS
		1. Centralized Lighting Controllers:
			1. DLC-P Delta Lighting Controllers: Controls 36 lighting zones, switching a maximum of 144 Panasonic lighting relays. Mounts in various Panasonic relay enclosures for new and retrofit construction projects. Fully programmable: GCL+ programs and BACnet objects can be created and/or modified for specific lighting applications.
				1. Features:

Native BACnet firmware.

BACnet IP and BACnet over Ethernet communications.

Supports switching a maximum of 4 Panasonic relays per relay output.

Software monitoring of switch activity.

Supports a subnet of up to 12 BACstats.

Up to 9 Panasonic relay switches or dry contact master inputs.

One universal analog input.

Individual output status indication via LED.

Supports a master override switch with built-in sequencing.

Fully programmable in GCL+.

Application database and controller firmware can be flash loaded over the network.

Easy-to-mount housing.

* + - * 1. BACnet Device Profile: BACnet Advanced Application Controller (B-AAC).
				2. Inputs:

Binary inputs (Panasonic 2-wire relay switch or dry contact inputs with status feedback and LED status indication). Quantity: 6 to 9.

Universal input, with LED status indication: Quantity: 1.

* + - * 1. Outputs:

Panasonic Lighting Relays: 4, 8, 12, 24 or 36.

Outputs: Maximum 4 relays or 6 switches per output.

Uses Panasonic WR-61 - relays.

* + - * 1. Sweeper Ports:

Sweeper input port with LED status indication master override or sweeper input port, with command sequencer.

Sweeper output port with LED status indication connects to another lighting controller's sweeper input port to continue the sweeper sequence.

* + - * 1. On-board Overrides:

ON scan button provides ALL ON override control.

OFF scan button provides ALL OFF override control.

* + - * 1. Communications Ports:

Twisted-Pair Ethernet: (10-BaseT) at 10 MB, BACnet IP, BACnet over.

Ethernet:

Main LAN (NET1).

BACnet MS/TP at 9600, 19200, 38400 or 76800 bps (default) (maximum of 99 devices per BACnet MS/TP segment).

SubLAN (NET2).

Delta LINKnet at 76800 bps (maximum 12 network sensors on LINKnet).

* + - * 1. Connectors: Removable screw-type terminal connectors.
				2. Technology:

32-bit Processor.

2 MB (16 megabit) Flash memory.

512 KB SRAM memory.

CPU status LED.

Real-time clock with battery backup.

* + - * 1. Device Type: Configured as either System or Subnet.
				2. Device Address: Set via DIP switch and jumpers or software setup.
				3. Wiring Class: Class 2.
				4. Power:

24 VAC.

50 VA including Panasonic relays and switches; 4 per output.

* + - * 1. Ambient: 32 to 131 degrees F (0 to 55 degrees C). 10 to 90 percent RH (non-condensing).
				2. Dimensions: 11.05 x 4 x 1.9 inches (289 x 100 x 48 mm).

Weight: 1.9 lbs (861 grams) with housing.

* + - * 1. Compliance: CE and FCC.
				2. Listings: UL 916 Listed. BTL Listed.
			1. DLC-G1212 - Delta Lighting Controllers: For controlling 12 lighting zones, switching a maximum of 48 GE lighting relays. Can be mounted in various GE relay enclosures for both new and retrofit construction projects. Fully programmable: GCL+ programs and BACnet objects can be created and or modified for specific lighting applications.
			2. Features:
				1. Native BACnet firmware.
				2. BACnet MS/TP communication.
				3. Supports switching a maximum of 48 RR7P or RR9P GE Lighting Relays (4 parallel relays per output) per controller.
				4. Supports a Subnet of up to 12 BACstats (DNS-14/24).
				5. Supports a Master Override Switch with built-in sequencing.
				6. Fully programmable in GCL+.
				7. Application database can be loaded over the network.
				8. Controller firmware can be flash loaded over the network.
				9. Supports Modbus capability via flash loading in the field.
				10. Supports flash loading Modbus upgrades via hardware key.
				11. Easy-to-mount housing.
				12. External binary inputs for motion detectors.
			3. BACnet Device Profile: BACnet Advanced Application Controller (B-AAC).
			4. Inputs:
				1. 12 external binary inputs with LED status indication.
				2. 12 internal inputs for relay status built into relay connector.
			5. Outputs:
				1. 12 GE lighting outputs.
				2. RR7P 3-wire relays. Control only, no status.
				3. RR9P 5-wire relays. Control and status, including LED indication.
			6. Relay Switches: 12 terminals for wiring local GE switches directly to relay output.
			7. Sweeper Ports:
				1. Sweeper input port master override or sweeper input port with command sequencer.
				2. Sweeper output port with LED status indication, which connects to another lighting controller's sweeper input port to continue the sweep sequence.
			8. Communications Ports:
				1. Main LAN (NET1) with LED status indication.
				2. BACnet MS/TP at 9600, 19200, 38400, 76800 bps (default) (maximum of 99 devices per BACnet MS/TP segment).
				3. SubLAN (NET2) with LED status indication.
				4. Delta LINKNet at 76800 bps (maximum 12 network sensors on LINKnet).
			9. Technology:
				1. 32-bit processor.
				2. 2 MB (16 megabit) Flash memory.
				3. 319 KB SRAM database memory.
				4. LED indication of CPU and SCAN status.
			10. Device Address: Set via DIP switch and jumpers, or software setup.
			11. Connectors:
				1. Network power inputs: removable screw-type terminal connectors.
				2. Relays: removable MTA156 AMP connectors.
			12. Wiring Class: Class 2.
			13. Power:
				1. 24 VAC.
				2. 50 VA including GE relays.
			14. Ambient: 32 to 131 degrees F (0 to 55 degrees C). 10 to 90 percent RH non-condensing.
			15. Dimensions: 3.94 x 11.51 x 1.81 inches (100 x 292 x 46 mm) with housing.
				1. Weight: 1.18 lbs (540 g) with housing.
			16. Compliance: CE and FCC Class B.
			17. Listings: UL 916 Listed. BTL Listed.
		1. DALI Lighting Controllers:
			1. O3 DALI - DALI Lighting Controllers.
			2. Basis of Design: O3 Room Controllers as manufactured by Delta Controls.
				1. Native BACnet platform for controlling all aspects of a room: Fully programmable.
				2. HVAC, lighting, blinds, access/security, and audiovisual equipment, via a single-point controller.
				3. Modular design offers expandable I/O, eases servicing, and reduces upgrade cost.
				4. Communication: BACnet/IP, BACnet over Ethernet, BACnet MS/TP, and Delta LINKnet communications.
				5. Integration: Non-BACnet systems such as Modbus, EnOcean, DALI, and SMI.
				6. Components:

O3-DIN-CPU Controller: Has 3 NET ports and 3 power outputs and excels at control of multiple rooms.

O3-DIN-SRC Controller: Has 2 NET ports and 1 power output and excels at single room control.

O3-DIN-ACCESS Module: Provides fully programmable door access control and a combination of universal and door-specific I/O points.

O3-DIN Controller : Holds the access user database (up to 100,000 records) and provides access granted/denied decision-making intelligence. It also provides the communications network interface to the facility BACnet network and the front-end computer.

Part of the O3 Access Control system.

O3-DIN-DALI Gateway Module: Allows O3 to communicate with DALI (Digital Addressable Lighting Interface) lighting groups and can control up to 64 dimmable ballasts or LED drivers. Designed for in-ceiling mounting. Control is situated close to devices and results in more efficient wire runs.

O3-DIN-SMI Gateway Module: Allows the O3 to communicate with SMI (Standard Motor Interface) motors controlling motorized blinds and shades. A single O3-DIN-SMI can manage up to 16 SMI drives and integrate up to 16 groups.

O3-DIN-8xP Universal I/O Module: Comes with 8 universal points that can be configured as inputs or outputs to control or read from field equipment.

O3-DIN-4F4xP: Comes with 4 universal points as well as 4 binary FET outputs for driving high-current relay coils and switching AC or DC power. In a lighting.

controller application, a single O3-DIN-4F4xP module can drive 2 bi-stable relays, power 0 to 10 V dimming ballasts, and provide input points for sensors or switches.

O3-DIN-PoE module: Adds Power over Ethernet (PoE) capabilities to the O3 system, providing not only lighting control over PoE but also HVAC and integration.

O3-DIN-PWRINJ Power Injector: Expands the number of O3-DIN modules controlled by a single O3-DIN-CPU and distributes I/O closer to where it is needed. Up to 8 power injectors can be connected to an O3-DIN-CPU controller's O3BUS network, with each power injector supporting up to 4 I/O or gateway modules. The additional modules can be located up to 70 m (230 ft) away from the controller.

O3-HUB: The ceiling-mounted sensor hub replaces multiple room sensors with a one-per-room competitive cost solution when installed together with an O3-DIN room controller. Combining humidity, composite temperature, passive infrared motion and light sensors in a single device, the sensor hub provides occupant- and location-based control for the modern office or meeting space. Models equipped with EnOcean radios (868 MHz and 902 MHz) are also available.

O3 App: Room control application for mobile devices. Communicates with O3-DIN controller and enteliWEB to execute preconfigured comfort settings for different room activities. Settings are configured in enteliWEB by an administrator. The app uses a Bluetooth beacon in the sensor hub to locate rooms. The app is only available with rooms or spaces using sensor hubs. enteliWEB is a web-based application that connects facilities and centralizes building management operation, site engineering, and energy analytics. Provides services that define and coordinate rooms in a building.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. INTEGRATED SECURITY AND SURVEILLANCE SYSTEMS
	2. After Hours and Demand Based Ventilation Control - When a building is in an after-hour's mode and the lighting levels, temperature and ventilation set points have been changed to save energy, it should be able to use existing card readers connected to the Access Control System (ACS) integrated into the Enterprise Building Management System (EBMS) to temporarily change the status of the entire building or specific zones back to an occupied mode.
		1. Occupancy Status from the Security Access Control System (ACC) Card Readers: Share with EBMS through a web services interface capable of sharing the following data:
			1. System events including but not limited to door open and door closed.
			2. System alarms including but not limited to intruder detection.
			3. Badge holder information.
			4. Real time status information.
		2. Occupancy Status: Used by EBMS to control; lighting, plug-loads, space temperature and ventilation at the facility, floor, room, and zone level.
		3. Entry and Exit Security System Badge Readers: Installed to count the number of facility occupants.
			1. Occupant Count: Shared with EBMS in real time.
			2. In Lieu of Badge Swipes: Exiting occupancy count may be derived from turnstiles, video surveillance or dedicated people counting sensors.
				1. Share data EBMS in real time through an open web service or API interface.
		4. Swiping a Card at a Designated Card Reader during Off hours:
			1. After-Hours HVAC Setback Periods: Division 23 HVAC control system will set specific zones into occupancy mode for a predetermine period.
				1. Card Swipe Record: Logs Identity of the person and their department, and stores data in the ACS with monthly reporting capability.
			2. When required the card reader / keypad may capture a department code / billing code and length of time in override. Data is to be made available to the reporting systems and the Division 23 HVAC control system for time scheduling.
			3. At any given time during the override process a card swipe with a predetermined code will set the Division 23 HVAC control system back to setback mode.
			4. System will notify all employees 5 minutes prior to changing status back to after-hour's mode. This notification will be by the best method available such as blinking the lights, audible message, email, or SMS.
		5. Communication Protocols and Interface Performance:
			1. Integration Between the Security System and EBMS: Via web services, or open protocol of the EBMS.
		6. Basis of Design: O3 Access Control System as manufactured by Delta Controls.
			1. Extends Delta's BAS by integrating seamlessly with Delta Controls HVAC and Lighting application. The system is native BACnet, providing the flexibility of interoperability with other BACnet products in a facility.
			2. Installation sizes from a few doors to hundreds of doors and thousands of users.
			3. Basic access control functions are bundled into a highly flexible system. The access control system grants or denies access for individual users for a specific access point such as a door or elevator floor. Decision are based on identifying the user and determining their access rights.
			4. Components:
				1. O3-DIN-CPU or O3-DIN-SRC: Access system manager.
				2. O3-DIN-ACCESS: Access door module.

When connected to an O3-DIN controller on the O3 system, the module provides remote, fully programmable, door access control and expanded I/O capabilities.

Access Modules: Up to 24 can be connected to an O3-DIN-CPU controller with 8, O3-DIN power injector modules.

Access Modules: Up to 4 can be connected to an O3-DIN-SRC controller.

System Options:

VIVOTEK VAST 2 Integration. Video surveillance cameras and video management software; VIVOTEK Surveillance license enteliWEB add-on. Requires enteliWEB 4.16 or later.

VIVOTEK People Counting Integration: O3 firmware 4.8 or later, and enteliWEB 4.13 or later.

OSDP Support: Open Supervised Device Protocol Card Access Readers: O3 firmware 4.9 or later, and enteliWEB 4.14 or later.

* + - * 1. O3-DIN-PWRINJ: Power injector O3 expansion module; with O3-DIN-CPU.
				2. enteliWEB and enteliSYNC: Operator workstation software.
				3. enteliSYNC: Alarm and event archiving software.
		1. Basis of Design: V4 Access Systems by Delta Components. V4 Access Controllers.

\*\* NOTE TO SPECIFIER \*\* Delete article if required or delete basis of design not required.

* 1. AUTOMATED ANALYTICS

\*\* NOTE TO SPECIFIER \*\* enteliWEB Energy is an enterprise energy management package that makes it easy for anyone to understand the energy usage of their building. Leveraging the rich dashboard interface of enteliWEB, you have the tools to view your system's energy usage, set target energy goals and compare your energy usage against historical baselines. Delete if not required.

* + 1. Basis of Design: enteliWEB Energy: An enterprise energy management system.
			1. Local or Cloud Applications: Scalable from locally installed dashboards and reports to cloud-based analytics.
			2. Virtual Meters: Utilize sensors and data already gathered by building automation system to track energy consumption of building equipment building, to build consumption profile of equipment. Validate calculated virtual meters with upstream utility meters.
			3. Track Energy Production: Use interactive calendar to locate periods of high and low production, and net gains from production in a comparison chart.
			4. Intuitive Interactive Dashboards: Analyze and breakdown energy usage. Create energy reports; sent and received via email.
			5. Alerts and Insights. Simple alerts to analytics-based Insights warn you in advance of potential consumption overages. Set up for email notification.
			6. Building Visualization:
				1. Enterprise Dashboards: Provide high level information in simple graphical formats to help manage the facility's key performance indicators (KPIs).
				2. Personal Dashboards: Personal dashboards are an experience you create yourself. By mixing and matching widgets, each user gets their own personalized dashboard to keep an eye on things that matter.
				3. System Dashboards: Make operating a facility easy by aggregating system graphics, alarm management, energy information and more into a single dashboard screen.
				4. Navigator: Automatically scans the BACnet network and presents devices in a logically arranged network tree. BACnet objects can be monitored and commanded directly from Navigator or opened from Navigator to change the configuration details.
				5. enteliVIZ Graphics: Create HTML5-based intelligent visualizations and equipment graphics in your web browser. Use them in dashboards alongside other widgets, or as full page standalone graphics.
				6. Mobile Friendly: Optimized for smartphone or tablet. Dashboard-driven navigation/ Finger friendly buttons and large text. Pinch and zoom to view content is not acceptable.
				7. Multiple Language Display: Supports 22 languages at the user account level.
				8. Building Automation Reports: Querying building controllers on network. Display data in customized reports. Multiple File Types: PDF and XLSX. Automatically emailed on a schedule.
			7. Centralizing Facility Management: Tools to manage multiple sites more effectively.
				1. Single Login: Manage multiple sites using a single login. No need to worry about duplicate addresses or networking everything together. All you need is an IP address for each site.
				2. Retain Supervisory Control of your entire portfolio of BACnet sites. Leave the other vendor's front end on-site while centralizing your alarm management, scheduling and energy analytics with enteliWEB.
				3. Version Independent Software: Allows organizations to operate an entire WAN without having to worry about maintaining different firmware versions in the hardware.
				4. Restore and Backup: Restore your entire BAS to an earlier state or quickly find a specific backup of a device. Schedule daily, weekly, or monthly backups across devices on multiple sites.
			8. Platform for Innovation: Tools to create mobile apps, customize interfaces and integrate third party software.
				1. API Documentation Available: The enteliWEB application programming interface (API) is well-documented, so that you can easily create custom modules, widgets, and interfaces to third-party software.
				2. BACnet Web Services: Allow remote applications, such as mobile apps or business systems to communicate with enteliWEB.
				3. Alarm Module: The alarm module allows alerts and alarms from non-BACnet systems to be annunciated and managed within enteliWEB.
				4. Open Source Reporting Package: Design custom reports in enteliWEB using an industry standard open source report package.
				5. ODBC Driver: Integrate the building automation system with business-level software.
			9. Alarms: Provide a detailed look at issues and problems on all sites.
				1. Comprehensive Alarm Management. Includes intelligent visualizations, alarm assignments and operator comments on one screen. Powerful filtering, emailing and prioritization make enteliWEB alarm management effective even on your largest sites.
				2. Alarm Widgets: Can be added to any dashboard for a quick summary of specific data types. The maps widget uses pushpins on a map of your building locations to indicate the number and severity of alarms. The alarm list widget shows the active alarms for specific equipment and the widget can be added to system dashboards.
			10. Electronic Signatures:
				1. enteliWEB supports electronic record regulations like FDA Code of Regulations Title 21 Part 11 by enforcing electronic signatures on modifications made in these validated environments. Signatures are recorded in the enteliWEB audit log. For more information, see the enteliWEB FDA 21 CFR Part 11 Compliance white paper.
			11. User Permissions:
				1. User/Group Permissions: Permissions give you the ability to assign roles and determine which BACnet objects and visualizations a user can see and interact with.
				2. LDAP: Integrate users from LDAP servers so that IT can control user access to enteliWEB.
				3. Multi-Language Support: Gives each user the option to select the language they want to use throughout enteliWEB.
			12. O3 Access Control: Intuitive user-friendly built in dashboards to manage single or multiple sites with a single-seat management interface. Enroll, provision, assign and manage access rights.
				1. Custom User Fields: Enter user information. Conventional data fields and site-specific information.
				2. Custom groups to provision users.
				3. Real-Time Access to Events and Alarms: View in real-time on Event Viewer dashboard. Filter events display and access alarms by type, level of priority and time range.
				4. Flexible O3 Access Reporting: About access system, card users and their activities.
				5. VIVOTEK VAST 2 Integration: VIVOTEK's video surveillance cameras and video management software to enhance system. When linked, you can view live video feeds directly.
			13. Audit Log: Track changes made to the system, including manual changes to outputs, alarm history, and changes made by the system's users.
		2. Basis of Design: Earthright Energy Dashboard from Delta Controls. Attractive, easy-to understand interactive dashboard for large screen displays, kiosks, and the Web. Simple charts and gauges provide daily feedback to occupants to encourage behavior adjustments to reduce individual energy use.
			1. Features:
				1. Display utility consumption summary and live data readings from enteliWEB Energy Management System.
				2. Green Facts Screen available as self-running slideshow to highlight a building's energy-saving features and initiatives.
				3. Comparison Screen provides detailed charts of utility usage and savings between time periods.
				4. Report current weather and forecasts for your locations.
				5. Lists capital projects, the generated cash savings, and payback.
				6. Support multiple languages; user can select the language they want to use on the dashboard.
				7. Customized energy equivalencies make it easy to relate energy usage to everyday items like car travel distances and bottles of water.
				8. Display multiple locations, buildings, and campuses.
				9. Embed graphics created in enteliVIZ HTML5 Designer.
				10. Ability to add your company logo to the dashboard. Contact Delta Controls about custom dashboards to match your organizational branding.
				11. Upgrade to Campus license to display Home Campus Screen and select which locations are displayed on the Building and Comparison Screens, track energy savings competitions between locations or buildings on the Competition Screen.
			2. Server Operating System:
				1. Microsoft Windows Server 2016, 2012, 2008 R2, and Standard Edition.
				2. Microsoft Windows 7, and 10.
			3. Client Browser:
				1. Windows Internet Explorer 11 and higher. Firefox 59 and higher. Google Chrome 66 and higher. Safari 10 and higher for Mac. Microsoft Edge 41 and higher.
			4. Software: enteliWEB 4.6 and higher and PAS Plug-In Manager.
		3. CopperCube Verge Trend Log Archiver from Delta Controls:
			1. Embedded industrial computer that connects to BAS through BACnet/IP or BACnet Ethernet protocols. Solid State Hard Drive: 60 GB. Auto-update capability.
			2. Locates trend logs in BAS and archives 5,000 individual trend logs on its local secure database. Trend log data is accessed through a built-in web interface, and through CopperTree's Kaizen and Delta Controls' enteliWEB software.
			3. An auto pruning feature deletes data after a set time period in order to free memory. Backups can be scheduled to an external location. An optional SQL connector allows you to route trend log data to an external SQL database for use with third-party reporting tools while still maintaining integrity of original information.
			4. BACnet Protocols: BACnet/IP and BACnet Ethernet.
			5. Browser for Configuration Setup: Windows Internet Explorer 10 and higher. Firefox 25 and higher. Google Chrome 34 and higher.
			6. Mounting: 1-3/8 inch (35 mm) horizontal DIN rail Includes rubber feet for flat surface mounting
			7. Connectors: 1 terminal block screw connector for power.
			8. Wiring Class: NEC Class 2.
			9. Power: 24 VAC, 30 VA or 12-24 VDC, 11 W.
			10. Technology: Arm Cortex-A15 Dual MPCore processor. 1 Mb cache, 1.5 GHz. 2 GB DDR3L memory. 60 GB solid state drive.
			11. Communication Ports: 2 Ethernet (10/100-Base T). 2 USB 2.0, maximum 500 mA each.
			12. Ambient: 32 to 131 degrees F (0 to 55 degrees C), 10 to 90 degrees RH,non-condensing.
			13. Dimensions: 6.7 x 4.9 x 2.7 inches (169 x 125 x 68 mm).
			14. Weight: 1.5 lbs (0.68 kg).
			15. Standards Compliance: CE-EMC Directive, FCC Class A.
			16. Listings: UL 916 Listed.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. IOT INTEGRATION PLATFORM
		1. Basis-of-Design: enteliCLOUD SaaS: Enterprise Facility and Energy Management by Delta Controls.
			1. eW200Cloud1M: Up to 200 I/O for 1 hosted instance, includes enteliVIZ Graphics.
			2. eW500Cloud1M: Up to 500 I/O for 1 hosted instance, includes enteliVIZ Graphics.
			3. eW2500Cloud1M: Up to 2500 I/O for 1 hosted instance, including enteliVIZ Graphics.
			4. eW5000Cloud1M: Up to 5000 I/O for 1 hosted instance, including enteliVIZ Graphics.
			5. BACnet Device Profile: Advanced Operator Workstation (B-AWS).
			6. Client Browser: Requires internet connection.
				1. Windows Internet Explorer 11 and higher. Firefox 70 and higher. Google Chrome 78 and higher. Safari 13 and higher for Mac. Microsoft Edge 44 and higher.
			7. Web-based SaaS (software as a service) connecting your equipment and facilities. Gives facility managers and engineers access to building management operations and energy analytics via a web browser.
			8. Offers the same features as an on-premises solution at a lower overhead cost and with easier deployment and upgrades.
			9. Centralized Facility Management: Integrate scheduling, alarm management and operations. Connect to your buildings under a single login without networking everything together. Track building automation system (BAS) changes by service personnel, partner technicians and facility managers in enteliCLOUD.
			10. Secure. Uses TLS data encryption by employing BACnet Secure Connect for cloud-to-site connections. Two-factor authentication (2FA) for self-serve portal accounts.
			11. Scalable. Built on platforms that allow you to scale instances to match the growing number of I/O points and devices.
			12. Management Web Portal. A self-serve web portal for company administrators to view and manage cloud instances, manage operator user accounts, and review billing information.
			13. Energy Management: View your system's energy usage, set target energy goals, and compare your energy usage against historical baselines.
				1. Local or Cloud Applications. Scales from locally installed dashboards and reports to cloud-based analytics.
				2. Virtual Meters. Find out which building system is consuming too much energy costly wired meters. Virtual Meters utilize sensors and data already gathered by the BAS to track energy consumption of every piece of equipment in your building, giving you unprecedented visibility into your consumption profile. You can validate calculated virtual meters with upstream utility meters.
				3. Intuitive Dashboards. Allow you to analyze and breakdown usage to find energy savings. Create energy reports and send and receive them by email.
				4. Alerts and Insights. Simple alerts to analytics-based Insights warn you in advance of potential consumption overages. Both alerts and Insights are annunciated in enteliCLOUD and can also be set up for email notification
			14. Building Visualization:
				1. Enterprise Dashboards: Provide high level information in simple graphical formats to help manage the facility's key performance indicators (KPIs).
				2. Personal Dashboards: Personal dashboards are an experience you create yourself. By mixing and matching widgets, each user gets their own personalized dashboard to keep an eye on things that matter.
				3. System Dashboards: Make operating a facility easy by aggregating system graphics, alarm management, energy information and more into a single dashboard screen.
				4. Navigator: Automatically scans BACnet network and presents devices in a logically arranged network tree. BACnet objects can be monitored and commanded directly from Navigator or opened from Navigator to change configuration details.
				5. enteliVIZ Graphics: Create HTML5-based intelligent visualizations and equipment graphics in your web browser. Use them in dashboards alongside other widgets, or as full page standalone graphics.
				6. Mobile Friendly: Dashboard and object pages are optimized for viewing on your smartphone or tablet. Whether you just want an overview, or you need to override a point, dashboard-driven navigation makes it easy to drill down from high-level views to specific BACnet objects. Finger friendly buttons and large text mean you don't have to pinch and-zoom to view content.
				7. Multiple Language Display: Support your stakeholders in the language that they are most comfortable using. enteliCLOUD's user-interface can be displayed in one of 22 world languages by selecting the language preference in each user account.
				8. Building Automation Reports. Gather information about your building by querying controllers on the network and displaying them in professional-looking reports. Reports can be converted to multiple file types, such as .pdf and .xlsx and emailed automatically on a schedule.
			15. Centralizing Facility Management:
				1. Single Login. Manage multiple sites using a single login. No need to worry about duplicate addresses or networking everything together. All you need is an IP address for each site.
				2. Retain Supervisory Control of your entire portfolio of BACnet sites. Leave the other vendor's front end on-site while centralizing your alarm management, scheduling and energy analytics with enteliCLOUD.
				3. Version Independent Software. Allows organizations to operate an entire WAN without having to worry about maintaining different firmware versions in the hardware.
				4. Restore and Backup. Restore your entire BAS to an earlier state or quickly find a specific backup of a device. Schedule daily, weekly, or monthly backups across devices on multiple sites.
			16. enteliCLOUD's suite of developmental tools allow you to create mobile apps, customize user interfaces and integrate third party software.
				1. API Documentation Available: The enteliCLOUD application programming interface (API) is well-documented, so that you can easily create custom modules, widgets, and interfaces to third-party software.
				2. BACnet Web Services: Allow remote applications, such as mobile apps or business systems to communicate with enteliCLOUD.
				3. Alarm Module: The alarm module allows alerts and alarms from non-BACnet systems to be annunciated and managed within enteliCLOUD.
				4. Open Source Reporting Package: Design custom reports in enteliCLOUD using an industry standard open source report package.
			17. Alarms: enteliCLOUD has a robust alarm management system that provides a detailed look at the issues and problems that come up on all your sites.
				1. Comprehensive Alarm Management: Includes intelligent visualizations, alarm assignments and operator comments on one screen. Powerful filtering, emailing and prioritization make enteliCLOUD alarm management effective even on your largest sites.
				2. Alarm Widgets: Can be added to any dashboard for a quick summary of specific data types. The maps widget uses pushpins on a map of your building locations to indicate the number and severity of alarms. The alarm list widget shows the active alarms for specific equipment and the widget can be added to system dashboards.
			18. Audit Log: Audit logs provide the ability to track changes made to the system. The powerful filtering and timeline chart make it easy to find the information you're looking for, including manual changes to outputs, alarm history and any other changes made by the system's users.
			19. Electronic Signatures: enteliCLOUD supports electronic record regulations like FDA Code of Regulations Title 21 Part 11 by enforcing electronic signatures on modifications made in these validated environments. Signatures are recorded in the enteliCLOUD audit log. For more information, see the enteliWEB FDA 21 CFR Part 11 Compliance white paper.
			20. User Permissions:
				1. User/Group Permissions: Permissions give you the ability to assign roles and determine which BACnet objects and visualizations a user can see and interact with.
				2. LDAP: Integrate users from LDAP servers so that IT can control user access to enteliCLOUD.
				3. Multi-Language Support: Gives each user the option to select the language they want to use throughout enteliCLOUD.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. INTEGRATION
		1. Basis of Design: Delta Niagra, JACE 8000 Controller: Compact, embedded Niagara Framework based controller and server platform. Connects multiple diverse devices and sub-systems. Requires additional core software and service maintenance licenses.
			1. Model JACE-8000-US: Unlicensed controller, 2 RS-485 ports, 2 10/100 MB Ethernet ports, USB backup and restore, Wi-Fi connectivity (US).
			2. Model JACE-8000-WW: Unlicensed controller, 2 RS-485 ports, 2 10/100 MB Ethernet ports, USB backup and restore, Wi-Fi connectivity (configurable Wi-Fi country code for worldwide use)
			3. Accessories:
				1. NPB-8000-2X-485: Dual port RS-485 module add-on.
				2. NPB-8000-LON: Single port LON FTT10A module add-on.
				3. NPB-8000-232: Single port RS-232 module add-on.
				4. WPM-8000: Universal power supply for JACE-8000 controller.
				5. IO-R-16: Optional 16 point I/O RS-485 module, 8 Universal Inputs, 4 Form A Relay Outputs, 4 0-10 VDC Analog Outputs.
				6. IO-R-34: Optional 34 point I/O RS-485 module, 16 Universal Inputs, 10 Form A Relay Outputs, 8 0-10 VDC Analog Outputs.
			4. Internet connectivity and web-serving capability.
			5. Integrated control, supervision, data logging, alarming, scheduling, and network management.
			6. Stream data and rich graphical displays to web browsers via ethernet or wireless LAN, or over the internet.
			7. Licensing Model: Standard drivers with optional IO and field bus expansion modules for flexibility and expandability.
			8. Optimized for the Niagara 4 platform. In large and multi-building applications, use Niagara 4 Supervisors with JACE 8000 controllers to aggregate information, including alarms and data: historical and real-time, creating a single, unified application.
			9. Standards Compliance and Certifications:
				1. UL 916.
				2. CE EN 61326-1.
				3. RCM.
				4. FCC Part 15 Subpart B, Class B.
				5. FCC Part 15 Subpart C.
				6. C-UL listed to Canadian Standards Association (CSA) C22.2 No. 205-M1983.
				7. "Signal Equipment"
				8. 1999/5/EC R&TTE Directive.
				9. CCC.
				10. SRRC.
				11. RSS.
				12. RoHS.
			10. Environmental:
				1. Operating temperature: Minus 4 to 140 degrees F (Minus 20 to 60 degrees C).
				2. Storage temperature: Minus 40 to 185 degrees F (Minus 40 to 85 degrees).
				3. Humidity: 5 to 95 degree, non-condensing.
				4. Shipping and Vibration: ASTM D4169, Assurance Level II.
				5. MTTF: 10 plus years.
			11. Technical Specifications:
				1. TI AM3352: 1000 MHz Arm Cortex-A8 1GB DDR3 SDRAM.
				2. Removable micro-SD card with 4GB flash total storage/2GB user storage
				3. Wi-Fi (Client or WAP).

IEEE802.11a/b/g/n.

IEEE802.11n HT20 at 2.4GHz.

IEEE802.11n HT20/HT40 at 5GHz.

Configurable radio (Off, WAP, or Client) WPAPSK/WPA2PSK supported.

* + - * 1. USB Type A Connector: Back-up and restore support.
				2. Two isolated RS-485 with selectable bias and termination.
				3. Two 10/100MB Ethernet ports.
				4. Secure boot.
				5. Supply Requirements: 24 VAC rated at 24 VA minimum, or 24 VDC rated at 1A.
				6. Power: 24 W minimum.
				7. Runs NiagaraA: 3.8u1 and later.
				8. Runs Niagara 4: 4.1 and later.
				9. Niagara Analytics 1.1 requires NiagaraAX 3.8u1 or later update builds.
				10. Niagara Analytics 2.0 requires Niagara 4.2 and later.
				11. Real-time clock.
				12. No battery.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required or delete paragraphs not required.

* 1. INTEGRATION ROOM LIGHTING CONTROLS

\*\* NOTE TO SPECIFIER \*\* Delete paragraphs not required.

* + 1. Integrated Lighting and Room Control:
		2. The Enterprise Building Management System (EBMS) shall incorporate individual room controllers with lighting and window treatment and / or shade controls to increase tenant comfort and decrease energy usage. Combining these systems will streamline facility operations by providing more flexibility in remote and local access to lighting schedules, diagnosing problems, and overriding zones.
			1. EBMS System Supplier: Provide BTL Listed, Advanced Application Controllers dedicated to interfacing to and controlling subsystems within designated rooms, as shown on the plans.
				1. Sensors: Match those provided in Division 23 HVAC Division 26 Electrical and Division 28 Security where possible.
				2. Room Controllers: Match those provided in Division 23 HVAC control system where possible.
				3. Interface to Electrical Equipment: Lighting and room control.
				4. Window treatment and/or Shade Control: Coordinated with Division 8 and Division12.
			2. Space Parameters: Adjustable via room controller, with mobile occupant app, or touchscreen user interface:
				1. Minimum Monitoring: Room temperature, relative humidity, lighting illuminance in LUX, lighting color rendition (light temperature in degrees Kelvin), motion detection and noise level.
				2. If indicated on point list, interface with window shade system via Standard Motor Interface).
				3. If indicated on point list, include an Infra-Red control interface to in-room audio-visual equipment.
				4. Interface with room's HVAC equipment. Temperature and humidity control of space.
				5. Occupied/unoccupied status of room, determined by controller, based upon passive infrared sensors, and noise level.
			3. Daylight Harvesting Sensors: Measure outside light level reaching occupied space. Integrate this data with lighting and blinds control system to balance artificial light levels with incoming natural light.
			4. Corridor Lighting: Reduce after hours. Turn off entire fixtures or individual bulbs based on predefined schedules. Overrides based on occupancy status or occupant command.
			5. Lighting Occupancy Sensors: Used with Division 28 security system access events and integrate with Division 23 HVAC mechanical systems, triggering energy saving strategies. Use lighting occupancy sensors in unoccupied mode to alarm on occupancy status to security system.
			6. Occupancy Signal: From Division 28 integrated security system. User enters a space; lights in user assigned space are set to occupied mode. Signal is available for entire facility and specific zones where user has been assigned access.
			7. Room Controller's Onboard Occupancy Sensor: Disable lights and set HVAC system to unoccupied mode if room is flagged as unoccupied; no motion or occupant noise in the space (adjustable).
			8. Lighting and Shade Control: Occupied Mode: Controlled in conjunction with daylighting controls in space per ASHRAE 90.1-2016, LEED, and Well Community energy and sustainability standards.
			9. Integrate occupancy schedules from user scheduling systems including Google Schedule and Microsoft Outlook. Activate control sequences for comfort, wellness, and energy as defined within Division 23 HVAC mechanical systems.
			10. Communication Protocols and Interfaces Performance: Via BACnet IP, SMI, Web Service API or inherent protocol of the EBMS.
			11. Basis of Design: O3 Room Controllers as manufactured by Delta Controls.
				1. Native BACnet platform for controlling all aspects of a room: Fully programmable.
				2. HVAC, lighting, blinds, access/security, and audiovisual equipment, via a single-point controller.
				3. Modular design offers expandable I/O, eases servicing, and reduces upgrade cost.
				4. New generation V4 controllers, O3 system is engineered exclusively with
				5. Communication: BACnet/IP, BACnet over Ethernet, BACnet MS/TP, and Delta LINKnet communications.
				6. Integration: Non-BACnet systems such as Modbus, EnOcean, DALI, and SMI.
				7. Components:

\*\* NOTE TO SPECIFIER \*\* Delete the following control options not required.

O3-DIN-CPU Controller: Has 3 NET ports and 3 power outputs and excels at control of multiple rooms.

O3-DIN-SRC Controller: Has 2 NET ports and 1 power output and excels at single room control.

O3-DIN-ACCESS Module: Provides fully programmable door access control and a combination of universal and door-specific I/O points.

O3-DIN Controller : Holds the access user database (up to 100,000 records) and provides access granted/denied decision-making intelligence. It also provides the communications network interface to the facility BACnet network and the front-end computer.

Part of the O3 Access Control system.

O3-DIN-DALI Gateway Module: Allows the O3 to communicate with DALI (Digital Addressable Lighting Interface) lighting groups and can control up to 64.

Dimmable bBllasts or LED Drivers. Designed for in-ceiling mounting, control is situated close to devices and results in more efficient wire runs.

O3-DIN-SMI Gateway Module: Allows the O3 to communicate with SMI (Standard Motor Interface) motors controlling motorized blinds and shades. A single O3-DIN-SMI can manage up to 16 SMI drives and integrate up to 16 groups.

O3-DIN-8xP Universal I/O Module: Comes with 8 universal points that can be configured as inputs or outputs to control or read from field equipment.

O3-DIN-4F4xP: Comes with 4 universal points as well as 4 binary FET outputs for driving high-current relay coils and switching AC or DC power. In a lighting controller application, a single O3-DIN-4F4xP module can drive 2 bi-stable relays, power 0 to 10 V dimming ballasts, and provide input points for sensors or switches.

O3-DIN-PoE Module: Adds Power over Ethernet (PoE) capabilities to the O3 system, providing not only lighting control over PoE but also HVAC and integration.

O3-DIN-PWRINJ Power Injector: Expands the number of O3-DIN modules that can be controlled by a single O3-DIN-CPU and distributes I/O closer to where it is needed. Up to 8 power injectors can be connected to an O3-DIN-CPU controller's O3BUS network, with each power injector supporting up to 4 I/O or gateway modules. The additional modules can be located up to 70 m (230 ft) away from the controller.

O3-HUB: The ceiling-mounted sensor hub replaces multiple room sensors with a one-per-room competitive cost solution when installed together with an O3-DIN room controller. Combining humidity, composite temperature, passive infrared motion and light sensors in a single device, the sensor hub provides occupant- and location-based control for the modern office or meeting space. Models equipped with EnOcean radios (868 MHz and 902 MHz) are also available.

O3 App: A room control application for mobile devices. The app communicates with the O3-DIN controller and enteliWEB to execute preconfigured comfort settings for different room activities (meetings, presentations, desk work, etc.). The settings are configured in enteliWEB by an administrator. Since the app uses the Bluetooth beacon in the sensor hub to locate rooms, the app is only available with rooms or spaces using sensor hubs. enteliWEB is a web-based application that connects facilities and centralizes building management operation, site engineering, and energy analytics. New with the O3 system, enteliWEB also provides services that define and coordinate rooms in a building.

* + 1. Integrated Lighting and Room Control with Sensor Hub:
			1. Basis of Design: O3 Sensor Hub as manufactured by Delta Controls.

\*\* NOTE TO SPECIFIER \*\* Delete model option not required.

* + - * 1. Model: Delta Controls O3-HUB2-2xP.
				2. Model: Delta Controls O3-HUB2.
				3. Ceiling-mounted, UL 916 Listed, 24 VDC, 1 W typical, 8 W max, Class 2 device with removable screw-type terminal connectors. Complies with CE, EAC, and FCC/IC.
				4. Infrared Space Temperature Sensor: Plus or minus 1.8 degrees F (1 degree C)
				5. Relative Humidity Sensor: Plus or minus 3 percent from 20 to 80 percent, at 59 to 86 degrees F ( degrees C).
				6. Digital Space Temperature: Plus or minus 1.8 degrees F (1 degree C).
				7. Passive Infrared (PIR) Motion Sensor: At 10 ft (). Minimum Diameter Coverage: 22 ft (6706 mm).
				8. Audio Sensor: Acoustic occupancy detection.
				9. Light Sensor: 0 to 2500 lumens range. Accuracy at 77 degrees F (25 degrees C): Plus or minus 5 lumens + 2 percent of value.
				10. LED Ring: Fully color articulated.
				11. 1.0 Watt Monospeaker: For tones and audio output.
			1. Support the Following Communication:
				1. Capable of incorporating EnOcean (902 MHz or 868 MHz), supporting 32 wireless devices.
				2. Bluetooth Low Energy Beacon: Broadcasts identifier to Bluetooth enabled smartphones. Bluetooth 2-way Communication: Support hub setup from Android or iOS devices directly.
				3. BLE API must be available for custom app development.
				4. BACnet/IP, BACnet/Ethernet, and BACnet/SC: BACnet Protocol Rev 18 or later. Dual-port Ethernet connections with failsafe Ethernet pass-through to support daisy chain topology.
				5. IR Transmitter/Blaster: 12 Proto IR Codes support.
				6. MQTT: Available external MQTT broker.
				7. Near Field Communication (NFC) for Setup: Lock NFC Read/Writes after configuration.
				8. Input/Output Support: Include support for 2 software configurable universal I/O. Support inputs of 10k thermistor, 0-5V, 0-10V, and/or 4-20 mA and outputs of 0-10V at 20mA sourcing and/or 1-10V at 10 mA sinking.
			2. Hardware:
				1. NFC: Supports Android and iOS.
				2. Dual Port Ethernet: Star and Daisy chain configurations with failsafe Ethernet pass-through supporting 30 HUBs.

Power loss to any hub in daisy chain will not take other HUBs off-line.

Daisy Chain: Supports HUBs with 100 meters between them. During power loss this distance is reduced to 15 meters.

* + - * 1. Bluetooth 5.0: BLE Beacon and Bi-directional communication.
				2. Power: 24 VDC, External PoE splitter can be used.

\*\* NOTE TO SPECIFIER \*\* A hardening guide is available. Delete if not required.

* + - 1. Security:
				1. Bluetooth Low Energy (BLE): Customizable passcode.
				2. NFC: Ability to lock NFC Read/Writes after configuration.
				3. MQTT: TLS Security. Encrypted connection between the MQTT broker and MQTT client using a trusted certificate on the Client.
			2. iOS and Android Sensor HUB Setup:
				1. App based configuration tool to configure network information, set security options, perform firmware updates, calibrate sensors, and view diagnostic data.
				2. Network Parameters, Communication Options, and Operating Parameters: Adjustable with this tool without the use of a third-party software program or Building Automation System.
			3. Embedded Diagnostics:
				1. Metrics must be calculated automatically. No additional setup shall be required.
				2. Metrics Table - MQTT and BACnet AV objects.
				3. MQTT and BACnet AV Timestamped Objects:

Space Utilization: Daily, weekly, and monthly.

Average Start and End Time: Weekly.

Busiest Hour: Of workday and week.

Average Sound Levels: Occupied, unoccupied, and mean.

* + - * 1. Average Temperatures: Occupied, unoccupied, and mean.
				2. Average Light Level: Occupied, unoccupied, and mean.
		1. System to System Integrated Lighting Room Control:
		2. The EBMS incorporates individual room controllers, increasing tenant comfort and decreasing energy usage. Combining systems streamlines facility operations providing flexibility in remote and local access to lighting schedules, diagnosing problems, and overriding zones.
			1. EBMS Supplier: Provide Work for integrated lighting control per the following for functionality.
				1. Match sensors in Divisions 23 HVAC, 26 Electrical, and 28 Security, where possible.
				2. Match room controllers provided in Division 23 HVAC control system where possible.
				3. Interface to electrical equipment providing lighting and room control.
				4. Coordinate window treatment and/or shade control with Division 8 and Division12.
			2. Adjustable Room Controller Parameters: Via mobile occupant app or touchscreen user interface:
				1. Space Comfort HVAC Control: Temperature adjustment.
				2. Lighting Control: On / Off, Presets, Raise/Lower support.
				3. Motorized Shade Control: Open / Closed and Raised / Lower, Presets and Stop if moving.
				4. Receptacle Control: On/Off.
			3. EBMS Integration with Networked Lighting and Shade Control System:
				1. Trend Reports: Light scenes, light levels, light sensor levels, window sensors, shade position, room occupancy, lamp and light engine failure for digital ballasts and drivers, digital ballast and driver failure, partition wall state, battery health, and light sources nearing end of life.
				2. Failure Alarms: Batteries, light sources near end of life, light engines, digital ballasts, and drives.
				3. Room-level load shed lighting goals and load shed lighting shall be allowed as well as load shed enable shall be supported.
				4. Override and Schedule: Scenes, light levels, shade position, room occupancy mode in occupied and unoccupied levels, daylight harvesting setpoint, daylight harvesting mode in relationship to room thermal load.
				5. Functionalities: Independent in event of communication loss between two systems. The EBMS shall provide the mater schedule between systems.
				6. Override Daylight Autonomy Mode: Maximize occupant comfort while balancing and maintaining energy savings through reduction in glare in occupied mode.
			4. Lighting Occupancy Sensors: Use in combination with security system badge access events. Integrate this information with Division 23 HVAC mechanical systems to enact energy saving setback strategies. Use in unoccupied mode to alarm on status per building schedule.
			5. Room Occupancy Sensor: Room Vacancy Detected: Switch off \_\_\_ percent of lights. Reset HVAC system to unoccupied setpoint.
			6. EBMS Occupancy Schedules Integration: Common user scheduling system such as Google Calendar and Microsoft Outlook as master schedule. Use data to activate automatic control sequences for comfort, wellness, and energy as defined in Division 23 HVAC mechanical systems and Division 26 Lighting Controls.
			7. Communication Protocols and Interfaces Performance:
				1. Integration via BACnet IP, Web Service API or inherent protocol of EBMS.
				2. If using BACnet IP, only integrations supporting Device Change of Value ("COV") Subscriptions, Description, Location, and Profile Name are to be accepted.
			8. Lighting, Shading and Security Response: By EBMS System Supplier:
				1. Provide necessary Work for Integrated Security, Lighting, Room and Blind Control and include the following as required for specified functionality.
				2. Match sensors provided in Division 15 HVAC, 16 Electrical, and 16 Security where possible.
				3. Match room controllers provided in Division 15 HVAC control system where possible.
				4. Interface with electrical equipment providing lighting and room control.
				5. Coordinate window treatment and/or shade control with Division 8 and 12.
			9. Communication Protocols and Interfaces Performance:
				1. This integration to be done via BACnet IP, Web Service API or the inherent protocol of the Enterprise Building Management System.
				2. If using BACnet IP, only integrations that support Device Change of Value ("COV") Subscriptions, Description, Location, and Profile Name shall be accepted.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. INTEGRATED ROOM CONTROL
		1. Basis of Design: O3 Room Controllers as manufactured by Delta Controls.
			1. Native BACnet platform for controlling all aspects of a room: Fully programmable.
			2. HVAC, lighting, blinds, access/security, and audiovisual equipment, via a single-point controller.
			3. Modular design offers expandable I/O, eases servicing, and reduces upgrade cost.
			4. New generation V4 controllers, O3 system is engineered exclusively with enteliWEB.
			5. Communication: BACnet/IP, BACnet over Ethernet, BACnet MS/TP, and Delta LINKnet communications.
			6. Integration: Non-BACnet systems such as Modbus, EnOcean, DALI, and SMI.
			7. Components:
				1. O3-DIN-CPU Controller: Has 3 NET ports and 3 power outputs and excels at control of multiple rooms.
				2. O3-DIN-SRC Controller: Has 2 NET ports and 1 power output and excels at single room control.
				3. O3-DIN-ACCESS Module: Provides fully programmable door access control and a combination of universal and door-specific I/O points.
				4. O3-DIN controller : Holds the access user database (up to 100,000 records) and provides access granted/denied decision-making intelligence. It also provides the communications network interface to the facility BACnet network and the front-end computer.

Part of the O3 Access Control system.

* + - * 1. O3-DIN-DALI Gateway Module: Allows O3 to communicate with DALI (Digital Addressable Lighting Interface) lighting groups and can control up to 64 dimmable ballasts or LED drivers. Designed for in-ceiling mounting, control is situated close to devices and results in more efficient wire runs.
				2. O3-DIN-SMI Gateway Module: Allows O3 to communicate with SMI (Standard Motor Interface) motors controlling motorized blinds and shades. A single O3-DIN-SMI can manage up to 16 SMI drives and integrate up to 16 groups.
				3. O3-DIN-8xP Universal I/O module: Comes with 8 universal points that can be configured as inputs or outputs to control or read from field equipment.
				4. O3-DIN-4F4xP: 4 universal points and 4 binary FET outputs for driving high-current relay coils and switching AC or DC power. In a lighting controller application, a single O3-DIN-4F4xP module can drive 2 bi-stable relays, power 0 to 10 V dimming ballasts, and provide input points for sensors or switches.
				5. O3-DIN-PoE module: Adds Power over Ethernet (PoE) capabilities to O3 system, providing lighting control over PoE but also HVAC and integration.
				6. O3-DIN-PWRINJ Power Injector: Expands number of O3-DIN modules that can be controlled by an O3-DIN-CPU and distributes I/O closer to where it is needed. 8 power injectors can be connected to an O3-DIN-CPU controller's O3BUS network, with each power injector supporting 4 I/O or gateway modules. Additional modules can be located 70 m (230 ft) away from controller.
				7. O3-HUB: The ceiling-mounted sensor hub replaces multiple room sensors with a one-per-room competitive cost solution when installed together with an O3-DIN room controller. Combining humidity, composite temperature, passive infrared motion and light sensors in a single device, the sensor hub provides occupant- and location-based control for the modern office or meeting space. Models equipped with EnOcean radios (868 MHz and 902 MHz) are also available.
				8. O3 App: Room control application for mobile devices. The app communicates with the O3-DIN controller and enteliWEB to execute preconfigured comfort settings for different room activities (meetings, presentations, desk work, etc.). Settings are configured in enteliWEB by an administrator. The app uses the Bluetooth beacon in the sensor hub to locate rooms. The app is only available with rooms or spaces using sensor hubs. enteliWEB is a web-based application that connects facilities and centralizes building management operation, site engineering, and energy analytics. New with the O3 system, enteliWEB also provides services that define and coordinate rooms in a building.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. ADVANCED METERING AND REPORTING

\*\* NOTE TO SPECIFIER \*\* This article is focused on integrating the EBMS to the EPMS. The EPMS will aggregate data from the metering infrastructure through a network of energy meters, power quality meters, Integrated switchgear, panelboards etc. as specified in Division 26 electrical specifications. The EBMS will then expose key applications from the EPMS in integrated views. Benefits to this approach are avoiding unnecessary duplication of metering infrastructure and effort to re-engineer applications best served by the EPMS.

* + 1. The following key EPMS applications are recommended to be exposed through the EBMS.
			1. Energy usage and benchmarking:
				1. Energy dashboards.
				2. Reporting and categorization by process type (HVAC, lighting etc.).
				3. Help operators analyze usage patterns and drive efficiency initiatives.

\*\* NOTE TO SPECIFIER \*\* The following three paragraphs are not built-in functions of the actual controllers but can be derived through the professional development services group at Delta Controls for additional fees.

* + - 1. Energy cost allocation: Gaining visibility into departmental, cost-center, or other allocations of energy costs.
				1. Improve energy accountability.
				2. Allocate tenant energy costs.
				3. Identify savings opportunities and facilitate compliance with energy codes and standards such as ISO50001, ASHRAE 90.1 etc.
			2. Utility Bill Verification: Mimicking utility bill and verifying it with its energy rate characteristics such as time-of-use, peak demand charges, power factor penalties etc.
				1. Locate billing errors, incorrect applied rates etc. and provide a basis for dispute with utilities.
			3. EPMS Sub-System: Integrated into EBMS per specification Section - to be an ISO 50001 certified Energy Data Management System and facilitate building sites acquiring ISO 50001 Site Certification and maintaining ASHRAE 90-1 compliance.
				1. EPMS Sub-System Software Platform: Comply with cybersecurity standard IEC62443 at the component level: IEC62443-4-1 and IEC62443-4-2 (SL1) per specification Section - .
			4. Metered Energy Data for Utilities: Such as water, air, gas, electricity, and steam (WAGES) from the following sub-systems; to be made available to the EBMS via web service, Modbus, BACnet or other supported open standard communication protocols.
				1. VFD Drives: HVAC, and mechanical systems as specified in Division 15.
				2. Electrical circuit breakers, power/energy meters, and power quality meters from the EPMS as specified in Division 16.
				3. Integration of Metered Energy Data with the EBMS:

Categorization including but not limited to the following load types.

Lighting loads.

HVAC loads.

IT Equipment loads.

Special purpose loads like manufacturing equipment, medical equipment, etc.

Ancillary electrical loads.

Categorization by the associated logical entity such as building, facility, floor, zone, etc. using the appropriate data tags.

* + - 1. Implementation Details: Specified in the "Software Configuration Standards and Conventions" document.
				1. Energy Metering Points: List for points to be integrated into the EBMS, with associated metadata tags to indicate location and load type as specified.
				2. Electrical Quantities: For each metering point in the point list including but not limited to energy per phase, real power per phase, apparent power per phase, reactive power per phase, current per phase, voltage, power factor.
				3. The following EPMS applications are specified in detail in Division 26 09 13 with design criteria and functional requirements. Note that the EBMS is \*not\* duplicating this functionality but merely making the underlying EPMS applications available through the integrated interface.
			2. The EBMS must provide functionality to expose the following EPMS applications per specification Section - .
				1. Energy usage and benchmarking.
				2. Energy cost allocation.
				3. Utility bill verification.
				4. Power quality monitoring.
				5. Power events recording and analysis.
			3. System Integration:
				1. All direct polling of metering devices shall be done by sub-systems like EPMS, and the data shall be shared with the EBMS via open protocols and web services.
				2. Web interfaces to sub-systems may be exposed to the EBMS through standard web mechanisms such as HTTP and HTTPS.

\*\* NOTE TO SPECIFIER \*\* enteliWEB Energy is an enterprise energy management package that makes it easy for anyone to understand the energy usage of their building. Leveraging the rich dashboard interface of enteliWEB, you have the tools to view your system's energy usage, set target energy goals and compare your energy usage against historical baselines. Delete if not required.

* + - * 1. Basis of Design: enteliWEB Energy: An enterprise energy management system.

Local or Cloud Applications: Scalable from locally installed dashboards and reports to cloud-based analytics.

Virtual Meters: Utilize sensors and data already gathered by building automation system to track energy consumption of building equipment building, to build consumption profile of equipment. Validate calculated virtual meters with upstream utility meters.

Track Energy Production: Use interactive calendar to locate periods of high and low production, and net gains from production in a comparison chart.

Intuitive Interactive Dashboards: Analyze and breakdown energy usage. Create energy reports; sent and received via email.

Alerts and Insights. Simple alerts to analytics-based Insights warn you in advance of potential consumption overages. Set up for email notification.

Building Visualization:

Enterprise Dashboards: Provide high level information in simple graphical formats to help manage the facility's key performance indicators (KPIs).

Personal Dashboards: Personal dashboards are an experience you create yourself. By mixing and matching widgets, each user gets their own personalized dashboard to keep an eye on things that matter.

System Dashboards: Make operating a facility easy by aggregating system graphics, alarm management, energy information and more into a single dashboard screen.

Navigator: Automatically scans the BACnet network and presents devices in a logically arranged network tree. BACnet objects can be monitored and commanded directly from Navigator or opened from Navigator to change the configuration details.

enteliVIZ Graphics: Create HTML5-based intelligent visualizations and equipment graphics in your web browser. Use them in dashboards alongside other widgets, or as full page standalone graphics.

Mobile Friendly: Optimized for smartphone or tablet. Dashboard-driven navigation/ Finger friendly buttons and large text. Pinch and zoom to view content is not acceptable.

Multiple Language Display: Supports 22 languages at the user account level.

Building Automation Reports: Querying building controllers on network. Display data in customized reports. Multiple File Types: PDF and XLSX. Automatically emailed on a schedule.

Centralizing Facility Management: Tools to manage multiple sites more effectively.

Single Login. Manage multiple sites using a single login. No need to worry about duplicate addresses or networking everything together. All you need is an IP address for each site.

Retain Supervisory Control of your entire portfolio of BACnet sites. Leave the other vendor's front end on-site while centralizing your alarm management, scheduling and energy analytics with enteliWEB.

Version Independent Software. Allows organizations to operate an entire WAN without having to worry about maintaining different firmware versions in the hardware.

Restore and Backup. Restore your entire BAS to an earlier state or quickly find a specific backup of a device. Schedule daily, weekly, or monthly backups across devices on multiple sites.

Platform for Innovation: Tools to create mobile apps, customize interfaces and integrate third party software.

API Documentation Available: The enteliWEB application programming interface (API) is well-documented, so that you can easily create custom modules, widgets, and interfaces to third-party software.

BACnet Web Services: Allow remote applications, such as mobile apps or business systems to communicate with enteliWEB.

Alarm Module: The alarm module allows alerts and alarms from non-BACnet systems to be annunciated and managed within enteliWEB.

Open Source Reporting Package: Design custom reports in enteliWEB using an industry standard open source report package.

ODBC Driver: Integrate the building automation system with business-level software.

Alarms: Provide a detailed look at issues and problems on all sites.

Comprehensive Alarm Management. Includes intelligent visualizations, alarm assignments and operator comments on one screen. Powerful filtering, emailing and prioritization make enteliWEB alarm management effective even on your largest sites.

Alarm Widgets: Can be added to any dashboard for a quick summary of specific data types. The maps widget uses pushpins on a map of your building locations to indicate the number and severity of alarms. The alarm list widget shows the active alarms for specific equipment and the widget can be added to system dashboards.

Electronic Signatures:

enteliWEB supports electronic record regulations like FDA Code of Regulations Title 21 Part 11 by enforcing electronic signatures on modifications made in these validated environments. Signatures are recorded in the enteliWEB audit log. For more information, see the enteliWEB FDA 21 CFR Part 11 Compliance white paper.

User Permissions:

User/Group Permissions: Permissions give you the ability to assign roles and determine which BACnet objects and visualizations a user can see and interact with.

LDAP: Integrate users from LDAP servers so that IT can control user access to enteliWEB.

Multi-Language Support: Gives each user the option to select the language they want to use throughout enteliWEB.

O3 Access Control: Intuitive user-friendly built in dashboards to manage single or multiple sites with a single-seat management interface. Enroll, provision, assign and manage access rights.

Custom User Fields: Enter user information. Conventional data fields and site-specific information.

Custom groups to provision users.

Real-Time Access to Events and Alarms: View in real-time on Event Viewer dashboard. Filter events display and access alarms by type, level of priority and time range.

Flexible O3 Access Reporting: About access system, card users and their activities.

VIVOTEK VAST 2 Integration: VIVOTEK's video surveillance cameras and video management software to enhance system. When linked, you can view live video feeds directly.

Audit Log: Track changes made to the system, including manual changes to outputs, alarm history, and changes made by the system's users.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. FACILITIES SUPPORT SOFTWARE INTERACTION

\*\* NOTE TO SPECIFIER \*\* With the EBMS based on network-level PLC and software and having enterprise capability, it makes sense to program certain conditions to automatically generate work tickets.

* + 1. Computerized Maintenance Management System (CMMS): Is beyond the scope of this specification. The Contractor and EBMS system supplier will coordinate with Owner and Owner's CMMS system supplier to provide the necessary interface and functionality specified herein.
		2. Work Ticket Management: Can be within an enterprise-level or cloud-based Computerized Maintenance Management System (CMMS). The same integration with work ticket management allows run-time information to be reported, increasing staff efficiency on reoccurring tasks.
			1. Integration to Third Party Equipment via Open Protocols: To generate work tickets when designated with these same requirements.
		3. Communication Protocols and Interfaces Performance: Integration to be done with IP based secure web services at an enterprise level or in the cloud.
		4. Facility Schedular:
			1. Basis of Design: Delta Facility Schedular (DFS) as supplied by Delta Controls.
			2. An enteliWEB PAS Plug-In add-on module. Synchronizes Event Management Systems (EMS) and Building Automation Systems (BAS). Events booked through the EMS are sent to BACnet schedules in the BAS to control HVAC, lighting, access control and other systems in each room. The DFS saves energy by setting schedules to run HVAC and lighting equipment only when a space is occupied. Reduces labor costs, complexity, and potential errors that may result when schedule information is manually entered from a booking system.
				1. Calendar-to-BACnet conversion engine. Operates on-demand and at recurring set time periods.
				2. Automatic operation after initial configuration. Software runs unattended.
				3. Version independent. Use with Delta Controls BACnet controllers version 3.33 and higher as well as third-party BACnet devices.
				4. Supports revision 4 and 6 BACnet schedules: Binary, multistate and analog data types. Transfers event name information.
				5. Configurable pre-event and post-event time offsets.
				6. Email notification.
				7. Complete history log of all schedule update attempts.
				8. Scalable system to suit different site sizes.
				9. Integrates with these room booking and facilities management solutions:

Astra Schedule.

AIMS Airline Software.

Chroma.

Dean Evans EMS.

eBASE Software.

EventBooking.

Facilities Management eXpress.

Google.

Microsoft Exchange 2010/2013/2016.

R25.

Scientia Syllabus Plus.

WebCalendar.

* + - * 1. Custom integration available through Delta Controls Professional Application Services.
1. EXECUTION
	1. GENERAL
		1. Examine equipment exterior and interior prior to installation. Report any damage. Do not install equipment that is structurally, moisture, or mildew damaged.
		2. Verification of Conditions: Examine areas and conditions under which the Work is to be performed, and notify the Contractor in writing, copying the Owner and Engineer, of conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.
		3. Pre-Installation Conference: Prior to installation, review material selections, installation procedures, and coordination with other trades.
			1. Attendees: Include, but not limited to the Contractor, Installer, manufacturer's representatives, and trades requiring coordination with the Work.
		4. Beginning of the Work: Indicates acceptance of the areas and conditions as satisfactory by the Installer.
		5. Install equipment in accordance with reviewed product data, final shop drawings, manufacturer's written instructions, recommendations, and as indicated on the Drawings.
		6. Provide final protection and maintain conditions in a manner acceptable to the manufacturer that ensures equipment is without damage at time of Substantial Completion.
	2. PERFORMANCE TESTING

\*\* NOTE TO SPECIFIER \*\* For smart buildings with integrations across systems Delta Controls recommends factory acceptance testing of the integration. It is highly recommended to perform this testing in a controlled environment prior to installation and commissioning.

* + 1. Performance Testing: Performed on integrations prior to installation on site.
		2. Testing is to include a written description and block diagram describing the integration.
		3. Testing is to Include the Following:
			1. Functional description of integration including intended usage.
			2. Data definition of data elements to be transferred.
			3. Data throughput performance of data to be transferred.
			4. Failure and recovery mode documentation and testing.
			5. Data access and permissions for machine to machine connection set up and maintenance.
			6. Review of configuration steps needed to commission integrations.
			7. Review of administrative tools needed to commission integrations and monitor operation performance of integrations.
			8. Cyber security analysis and testing.
			9. Physical cabling and connectors required between systems prior to installation.
			10. Review and test of logical network configurations including switches, routers, VLANs and network address assignment.
	1. FIELD QUALITY CONTROL

\*\* NOTE TO SPECIFIER \*\* Delta Controls extends the warranty of most equipment by 1 year at no additional cost when their service technicians perform functional testing, commissioning and first parameter adjusting of the installed equipment.

* + 1. Functional testing, commissioning, and first parameter adjusting is to be carried out by a factory-trained manufacturer's field service representative.
			1. Provide material, equipment, labor, and technical supervision to perform inspection, testing and adjustments ensuring equipment is installed, adjusted, and tested in accordance with the manufacturer's recommendations and is ready for operation.
			2. Replace damaged or malfunctioning equipment and report to the Engineer any discrepancies or issues with the installation.
			3. Monitor stability of system integrations and adjust HeartBeat (Watchdog) alarms sequences to limit nuisance alarms.
			4. 3rd Party Equipment Suppliers: To be present during startup and commissioning process and responsible for specified sequences of operations specified.
		2. Manufacturer's Representative: Upon satisfactory completion of inspection and testing, attach a label to serviced devices indicating the date serviced and testing company responsible.

\*\* NOTE TO SPECIFIER \*\* Delete article of not required.

* 1. FIELD TESTING AND COMMISSIONING
		1. Operational Readiness Testing:
			1. Contractor will inspect and test furnished equipment and associated systems for conformance to the contract documents, including equipment manufacture's recommendations, and readiness for operation. Tests will include the following:
				1. Visually inspect for physical damage and proper installation.
				2. Perform tests in accordance with manufacturer's instructions.
				3. Perform tests to ensure compliance with Contract Documents.
				4. Perform tests that equipment is ready for operation
				5. Touch-Op Paint: All chips and scratches with manufacturer-supplied paint and transfer remaining paint to Owner.
			2. Contractor: Submit an operational readiness test report documenting test results, including assumptions, conditions, allowances, and corrections made during the test.
				1. List all modifications and adjustments made onsite to include settings and parameters not identified as factory defaults within equipment's O&M documentation.
				2. Test report is to include a signed statement from the Contractor, installers and factory-trained manufacturer's representatives certifying the furnished equipment and associated system have been installed, configured, and tested in accordance with the manufacturer's recommendations, completely conforms to the requirements of the Contract Documents and is ready for operation.
		2. Functional Demonstration Testing:
			1. Prior to Scheduling: Contractor is to submit a signed statement from the Contractor, Installers, and factory-trained manufacturer's representatives certifying the furnished equipment and associated system have been installed, configured, and tested in accordance with manufacturer's recommendations, completely conforms to Contract Document requirements, and is ready for operation.
			2. Contractor will demonstrate functionality and performance of equipment and systems in the presence of the Owner and Engineer, who will document the complete compliance with the Contract Documents.
				1. Demonstrate critical applications and demonstrate \_\_\_ percent of all other applications to validate proper configuration and object naming.

If a failure rate of greater than 5 percent is found, the EBMS system supplier is responsible for certifying all points related to the application use case for proper functionality and performance.

* + - 1. Contractor is to submit a written report documenting successful completion of functional demonstrating testing including all assumptions, conditions, allowances, and corrections made during testing.
	1. TRAINING
		1. O and M Training: Onsite training specific to equipment furnished to be provided to Owner's staff by a factory-trained manufacturer's representative. Training Duration: Adequate to cover operation and maintenance of equipment and consist of onsite classroom and hands-on instruction for a minimum of \_\_\_ attendees per session. Number of session: \_\_\_\_ Within one 24 hour period.
			1. Instructor: Provide sufficient time and detail in each session to cover the following
				1. Theory of operation.
				2. Major components of equipment.
				3. Operation of equipment.
				4. Configurations of equipment.
				5. Maintenance, troubleshooting and repair.
				6. Replacement of component level parts.
			2. Use submitted O and M manuals for training. Manuals and Documentation: Provided to each training participant.
		2. Alternatively, furnish to the Owner, at no additional cost, a comprehensive factory training program including how-to videos and testing. Manufacturer to track student progress and report participation to the designated owner's representative. Furnish program during the warranty period and an additional 1 year at no extra cost to the owner.

END OF SECTION