

The School District of Palm Beach County

Project Name:

SDPBC project No.:

SECTION 23 09 00
ENERGY MANAGEMENT AND CONTROL SYSTEM

PART 1 GENERAL

1.1 SCOPE

- A. Provide a complete and operational Energy Management and Control System (EMCS) that incorporates Direct Digital Control (DDC) for energy management, automatic temperature control, and equipment monitoring.
- B. EMCS shall be Automated Logic's WebCTRL Building Control System.
 - 1. Automated Logic's local dealer is Wisch & Jackson Company of Florida, Inc.
 - 2. Wisch & Jackson shall furnish all control devices, under a direct purchase agreement between Automated Logic and the District, to the EMCS Contractor for installation.
- C. EMCS Contractor shall receive control devices from Wisch & Jackson and shall provide all labor and materials required to install a complete and operational EMCS unless explicitly excluded in the Contract Documents.

1.2 AUTHORIZED EMCS CONTRACTORS

- A. Automated Logic shall train and approve three or more EMCS Contractors to install the EMCS.
- B. Call Wisch & Jackson at (561) 747-0484 for the current list of authorized EMCS Contractors.
- C. List the name of the authorized EMCS Contractor in Section 26 10 00, and List of Major Subcontractors.

1.3 COORDINATION

- A. Mechanical Contractor and EMCS Contractor shall coordinate with Wisch & Jackson to establish written construction schedules for HVAC and EMCS work.
 - 1. Construction schedule shall include adequate time to commission and calibrate the EMCS prior to Substantial Completion.
 - 2. Any change in construction schedules that affect the EMCS work shall be coordinated with Wisch & Jackson.
 - 3. Mechanical Contractor's 10% retainage shall not be released until the EMCS is commissioned and operating properly.
- B. Mechanical Contractor shall furnish to Wisch & Jackson copies of mechanical submittals, architect supplemental instructions (ASI), requests for information (RFI), change orders, and critical project management (CPM) schedules.
 - 1. Any change in construction schedules or equipment that affects the installation of the EMCS shall be coordinated with Wisch & Jackson and the EMCS Contractor.
- C. For stadium elevators and elevators that open to the exterior of a building, provide a float switch in the elevator pit connected to the EMCS to send an alarm signal to the EMCS monitoring station when the water level in the pit reaches above the steel grate of the dry sump. General contractor shall coordinate the installation of the raceway system for the float switch. General contractor shall coordinate with the elevator inspector.
- D. As the School District's representative, Wisch & Jackson shall provide supervision of the EMCS installation.
 - 1. Wisch & Jackson shall initiate conference calls and/or schedule meetings to resolve EMCS issues in a timely manner and shall provide written documentation of solutions to the District.
- E. As the School District's representative, Wisch & Jackson shall coordinate EMCS design changes with the Engineer-of-Record and the School District Mechanical Engineer.

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1. Wisch & Jackson shall initiate conference calls and/or schedule meetings to resolve EMCS issues in a timely manner and shall provide written documentation of solutions to the District.
 - F. EMCS Contractor shall review Divisions 25 - 28 drawings and specifications in order to provide all labor and materials required to install a complete and operational EMCS.
 - G. Wisch & Jackson shall coordinate EMCS Sequences of Operations and any changes with the Commissioning Authority.
- 1.4 SUBMITTALS
- A. Wisch & Jackson shall submit shop drawings in accordance with Section 23 05 00 and shall be assigned to the Mechanical Contractor for the submittal process and review.
 - B. Submit the shop drawings in a timely manner and include manufacturer's specifications and engineering data for all parts, devices, and accessories used in the EMCS.
 - C. Shop drawings shall include material schedules, sequence of operations, equipment interlocks, point-to-point wiring diagrams, system configuration with peripheral devices, power supplies, etc.
- 1.5 QUALITY ASSURANCE
- A. Only competent mechanics, approved by Automated Logic, with full responsibility for proper electrical operation of the EMCS shall install the EMCS.
 1. In all cases, the installed system shall be in strict compliance with the Contract Documents.
 - B. Wisch & Jackson shall have an in-place support facility with technical staff, and all necessary test and diagnostic equipment required for basic electrical troubleshooting.
 - C. The complete EMCS installation shall be in strict accordance to the national and local electrical codes, and Divisions 25 - 28 of these specifications.
 1. All control devices designed for or used in line voltage applications shall be UL Listed.
 - D. Wisch & Jackson shall provide a warranty on all supplied equipment and a labor warranty for equipment replacement.
 1. EMCS Contractor shall provide an installation warranty for workmanship.
 2. All warranties shall be for one year from the date of Substantial Completion or acceptance by the District whichever is later.
 3. These warranties exclude any misuse or damage caused by others.
- 1.6 COMMISSIONING
- A. Commissioning of a system or systems specified in this section is part of the construction process.
 - B. Documentation and testing of these systems, as well as training of the Owner's operation and maintenance personnel, is required in cooperation with the Owner's Representative and the Commissioning Authority.
 - C. Project Closeout is dependent on successful completion of all commissioning procedures, documentation, and issue closure.
 - D. Refer to Section 01 77 00 - Contract Closeout, for substantial completion details.
 - E. Refer to Section 01 91 00, Commissioning, for detailed commissioning requirements.

PART 2 PRODUCTS

2.1 CONTROL WIRING

- A. All conductors shall be #18AWG unshielded stranded wire meeting all building codes and regulations for fire ratings.
 1. All conductors for analog points (inputs and outputs) and communications shall be as per manufacturer specifications.
- B. Label and land all wiring on termination strips.

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1. Properly support all wiring and conduit and run in a neat and skillful manner.
 2. All wiring and conduit exposed and in equipment, rooms shall run parallel to or at right angles to the building structure.
 3. All piping and wiring within enclosures shall be neatly bundled and anchored to prevent obstruction to devices and terminals.
- C. Do not pull bond or ground in conduit with sensor or communication wiring.

2.2 EQUIPMENT

- A. All 24-VAC power for valve actuators, damper actuators, and sensors shall be from dedicated 120/24VAC transformers.
- B. Provide surge protection for exterior EMCS points, and for communication or EMCS points that travel between equipment rooms.
- C. EMCS Contractor shall be responsible for all electrical installation required for a fully functional EMCS and not shown on the Divisions 25 - 28 plans or required by the Divisions 25 - 28.
 1. All wiring shall be in accordance to all local and national codes.
 2. Install all line voltage wiring in conduit in accordance with the Divisions 25 - 28.
 3. Install all control voltage wiring in conduit.

PART 3 EXECUTION

- 3.1 Design, install, and commission the EMCS in a fully implemental and operational manner.
 - A. In the work description below, the word, "provide" shall mean to furnish and install.
- 3.2 Wisch & Jackson shall furnish all control devices (DDC controllers, sensors, actuators, control valves, relays, current transformers, control panels, and other control devices specified on the drawings) to the appropriate Contractor (Mechanical, EMCS or Electrical) for installation.
 - A. Upon receipt of the control devices, the Contractor is responsible for the control devices until the District accepts the EMCS.
- 3.3 EMCS Contractor shall receive control devices from Wisch & Jackson and shall provide all control conduit and wiring, mounting of control devices and any other items required to install a complete and operational EMCS unless explicitly excluded in the Contract Documents.
- 3.4 Wisch & Jackson shall provide control dampers that have a 0.5" diameter external shaft for a direct mount actuator.
 - A. Wisch & Jackson shall furnish control damper actuators and the EMCS Contractor shall install it.
 - B. EMCS Contractor shall provide control conduit and wiring.
- 3.5 Mechanical Contractor shall provide smoke and/or fire/smoke dampers with factory mounted actuators with end switches.
 - A. The fire alarm system shall activate the smoke dampers.
- 3.6 Wisch & Jackson shall furnish control valves with actuators and the Mechanical Contractor shall install same. EMCS Contractor shall provide control conduit and wiring.
- 3.7 Wisch & Jackson shall furnish temperature sensors and thermowells.
 - A. Mechanical Contractor shall install thermowells.
 - B. EMCS Contractor shall install temperature sensors, and shall provide control conduit and wiring.
- 3.8 Mechanical Contractor shall install duct static pressure taps and hydronic pressure taps with gauge cocks.
 - A. Wisch & Jackson shall furnish pressure sensors and the EMCS Contractor shall mount them.
 - B. EMCS Contractor shall provide control conduit and wiring.
- 3.9 Mechanical Contractor shall provide access doors to access sensors and/or DDC devices, installed in ductwork.

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- 3.10 Mechanical Contractor shall provide VAV boxes.
- A. Wisch & Jackson shall furnish control devices to VAV Box Supplier for factory mounting of it prior to VAV box delivery to the site.
 - B. EMCS Contractor shall provide control conduit and wiring from the air-handling unit EMCS Cabinet to each VAV box for that air-handling unit.
- 3.11 Wisch & Jackson shall furnish EMCS Cabinets.
- A. Electrical Contractor shall install EMCS Cabinets and shall provide dedicated 120VAC circuit adjacent to each EMCS Cabinet.
 - B. Connect power for EMCS panel to the optional standby power of the generator.
 - C. EMCS Contractor shall provide 120vac switch and outlet inside EMCS Cabinet.
 - D. EMCS Contractor shall extend the same 120vac circuit to power the control transformers for the actuators.
- 3.12 Wisch & Jackson shall furnish Variable Frequency Drives (VFD) to the Electrical Contractor.
- A. Electrical Contractor shall install the VFDs and provide power wiring.
 - B. EMCS Contractor shall provide control conduit and wiring.
- 3.13 Wisch & Jackson shall furnish Airflow Measuring Stations.
- A. EMCS Contractor shall provide control conduit and wiring.
- 3.14 EMCS Contractor shall provide control conduit and wiring from the specified EMCS panels to the gas water heaters for the kitchen and/or gymnasium, as specified by the Engineer.
- 3.15 Electrical Contractor shall provide conduit with pull string and Class 1 earth grounding for the Network Conduit as shown by the Electrical Riser Diagrams and/or as specified below.
- A. Connection of each EMCS Cabinet within the same building and between buildings.
 - B. Connection from the specified EMCS Cabinet to the main switchgear.
 - C. Connection from the Gateway Communication EMCS Cabinet to the specified Phone Closet.
 - D. Connection from the specified EMCS Cabinet to the nearest Fire Alarm Relay that has a spare set of contacts for fire alarm status.
 - 1. Fire Alarm Contractor provides fire alarm wiring.
 - 2. Otherwise, there shall be no interface between the EMCS and the Fire Alarm System.
 - E. For the air-cooled chillers and chilled water-pumps, located in the chiller enclosure, connections from the chiller EMCS Cabinet, located within the building, and to the EMCS junction box in the chiller enclosure.
 - F. For split systems, controlled by EMCS, provide connection from EMCS Cabinet to the condensing unit control panel.
 - G. For rooftop units, provide connection from the rooftop unit EMCS Cabinet (located within the building) to the rooftop-unit control panel.
 - H. For split systems controlled by an electric thermostat or remote controller, connection from the indoor AHU control panel to the condensing unit control panel.
 - I. EMCS Contractor provides control wiring.
 - 1. School District Telephone Staff provides telephone wiring.
- 3.16 Electrical Contractor shall furnish Duct Smoke Detectors and the Mechanical Contractor shall install.
- A. Electrical Contractor shall provide all conduit and wiring from the Duct Smoke Detectors to the Fire Alarm System and from the Fire Alarm System to the Fan Starters.
 - B. Except for fire alarm status, there shall be no interface between the EMCS and the Fire Alarm System.
- 3.17 Electrical Contractor shall provide all 120VAC and above power wiring.

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- A. This work includes fans and/or other equipment that are manually controlled by toggle switches, push buttons and/or light switches which interrupt line voltage power and that are automatically controlled by line voltage thermostats.
 - B. Electrical Contractor shall install fan speed controllers.
- 3.18 Where a relay or contactor controlled by the EMCS controls multiple pieces of equipment and/or lighting circuits, provide:
- A. Electrical Contractor shall provide the relay or contactor and the power wiring to the coil.
 - B. Electrical Contractor shall coordinate locations and voltages of the relays or contactors with the EMCS Contractor.
 - C. EMCS Contractor provides the control conduit and wiring.
- 3.19 For VAV boxes without electric heaters, Electric Contractor shall provide power wiring to and with a disconnect switch at each VAV box.
- 3.20 Wisch & Jackson shall program and calibrate the EMCS in coordination with the Test and Balance Contractor.
- 3.21 At least 15 days prior to Functional Performance Testing, Wisch & Jackson shall electronically provide continuous 72-hour Trends to the Commissioning Authority and School District Mechanical Engineer.
- A. Trends shall consist of all chilled water temperatures, cooling coil leaving air temperatures, space temperatures, space relative humidity, fan status, and other points controlled by PID strategies.
 - B. Group all of the Trends together by AHU zone.
- 3.22 Within one month after Substantial Completion, Wisch & Jackson shall provide one set of preliminary as-built drawings and O&M manuals, and training to the EMCS Section of the School District of Palm Beach County Department of Maintenance and Plant Operations, M&PO.
- A. See Section 01 91 00 – Commissioning for additional requirements.
- 3.23 Within one month after acceptance of EMS System by the District project manager, Wisch & Jackson shall provide hard and electronic copies of final as-built drawings and O&M manuals.
- A. See Section 01 91 00 – Commissioning for additional requirements.
 - B. The sets shall be distributed as follows:
 - 1. One electronic file in PDF format to the Commission Agent
 - 2. One electronic file in PDF format to Building Codes Services
 - 3. One electronic file in PDF format to Utilities Manager
- 3.24 Within one month after completion of test and balance, Wisch & Jackson shall reconcile the actual project cost and the original purchase order amount.
- 3.25 FUNCTIONAL PERFORMANCE TESTING
- A. System Functional Performance Testing is part of the Commissioning Process.
 - 1. The Contractor shall perform the Functional Performance Testing and the Commissioning Authority shall witness and document the test.
 - 2. Refer to Section 01 91 00, Commissioning, for functional performance tests and commissioning requirements.
 - B. Systems Readiness Checklists shall be completed and submitted for each piece of equipment included in this section.
 - C. Perform the functional performance testing of HVAC pumps as part of the Chilled Water System Functional Performance testing.
- 3.26 DEMONSTRATION AND TRAINING
- A. Training of the Owner's operation and maintenance personnel is required in cooperation with the Owner's Representative.

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1. Provide competent, factory-authorized personnel to provide instruction to District personnel concerning the location, operation, and troubleshooting of the installed systems.
 2. Schedule the instruction in coordination with the Owner's Representative after submission and approval of formal training plans.
 3. Refer to Section 01 91 00, Commissioning, for further contractor training requirements.
- B. Provide demonstration and training for all equipment covered by this section and installed in this project.
1. Demonstration and Training shall specifically address Sequences of Operation and setpoints for this specific project.

END OF SECTION