

SECTION 16902

ELECTRIC CONTROLS AND RELAYS

1. PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Relays.
- B. Control Panels.
- C. PS Systems.

1.2 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

- A. Control Panels.

1.3 RELATED SECTIONS

- A. Section 16903 – Programmable Logic Controllers.
- B. Section 16950 – Control System Warranty.
- C. Section 16530 – Control Lighting.
- D. Section 16742 – Cable Internet Connection.
- E. Section 16782 – Surveillance System.

1.4 REFERENCES

- A. NEMA ICS 1 - General Standards for Industrial Control Systems.
- B. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers and Assemblies.
- C. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

1.5 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01300 - Submittals.
- B. Submit shop drawings to NEMA ICS 1 indicating control panel layouts, wiring connections and diagrams, dimensions, support points.
- C. Submit product data for each component specified.

1.6 PROJECT RECORD DOCUMENTS

- A. Submit record documents under provisions of Section 01700 – Contract Closeout.
- B. Accurately record actual locations of control equipment. Revise diagrams included in the plans to reflect actual control device connections.

1.7 OPERATION AND MAINTENANCE DATA

- A. Submit operation data under provisions of Section 01700 – Contract Closeout.
- B. Submit maintenance data under provisions of Section 01700 – Contract Closeout.
- C. Include recommended preventive maintenance procedures and materials.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years documented experience.

2. PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Enclosures:
 - 1. Hoffman.
 - 2. Steel.
 - 3. Full door hinge.
 - 4. NEMA ICS 6: Type 3R or 4x, corrosion resistant.
 - 5. Steel Padlock handle.
 - 6. Side mount mid-sized air conditioner unit 33NSM 230V.
- B. Control Relays:
 - 1. Contacts: NEMA ICS 2; Form C.
 - 2. Contact Ratings: NEMA ICS 2; Class A150.
 - 3. Coil Voltage: 120 volts, 60 Hz., AC.
 - 4. Magnetic Control Relays: NEMA ICS 2; Class A300; manufactured by Square D Company.
 - 5. Undervoltage Relays: Square D Class 8430 Type DWU V24.
 - 6. Time Delay Relays: Contact: NEMA ICS 2: As specified on the plans. Contact Ratings: NEMA ICS 2: As specified on the plans. Coil Voltage: As specified on the plans, 60Hz, AC. Time-Delay Relays: NEMA ICS 2: As specified on the plans. Setting: shall be digital set point, set crew type time setting not allowed.
 - 7. Substitutions: Under provisions of Section 01600 – Material and Equipment.
- C. Touch screen computer:
 - 1. Allen-Bradley model: VersaView 1500P touch screen industrial computer. Part Number: 6181P15TPXPH Pentium IV processor, 256 MB or RAM minimum. Windows XP Professional.
 - 2. Substitutions: Not permitted.
- D. Raceways:
 - 1. Plastic.
- E. Industrial Switch:
 - 1. Cisco Catalyst 2955T12 .
 - 2. 8-port.

- F. VPN/Router
 - 1. ADTRAN: NetVanta 2050.

- G. UPS Systems:
 - 1. Size: 4 kVA.
 - 2. Input Voltage: 60 Hz. 120 VAC (96-138 VAC).
 - 3. Output Voltage: 60 Hz, 120 VAC.
 - 4. Runtime Requirements: 20 minutes.
 - 5. Lighting and Surge Protection: ANSI/IEEE C62.41 Categories A and B, UL 1449 Listed.
 - 6. Spike Attenuation: 2000 to 1.
 - 7. Galvanic Isolation: Complete from line. Output Neutral bonded to ground.
 - 8. Noise (RF) Isolation: 120 dB common-mode, 60 dB normal-mode.
 - 9. Regulation: +/- 3 percent.
 - 10. Output Waveform: Pure sine-wave, less than 5 percent THD.
 - 11. Output Protection: Current limiting ferroresonant transformer provides inherent protection.
 - 12. Safety: UL listed.
 - 13. Efficiency: 85 percent to 91 percent on line.
 - 14. Audible Noise: 52 dB maximum on line.
 - 15. Operating Environment: 32 to 104 Degree F, 0 to 95 percent relative humidity (non-condensing).
 - 16. Manufacturers:
 - Sola, Hevi-Duty.
 - Substitutions: Under Provisions of Section 01600 – Material and Equipment.

- H. Coaxial Cable Jack
 - 1. F connector type.

- I. Wire
 - 1. Control wire shall be #14 AWG unless otherwise specified.

- J. Ethernet over fiber converter (Detention Areas E Outlet Control Structure, E Inlet Control Structure, B, A only)
 - 1. ST fiber connection.
 - 2. 100MB/sec minimum speed.

2.2 FABRICATION

- A. Control Panels: Shop fabricate control panels to NEMA ICS 1.

3. PART 3 EXECUTION

3.1 FACTORY TESTING

- A. Panels and all components shall be tested during the same testing of PLCs as described in Section 16903 – Programmable Controllers.

- B. Tests shall include testing of camera, PLC controlled lights, level sensors, and all communication links.

- C. Tests shall test the system as a whole as well as individual detention area controls, including Drain Office Computer.

3.2 INSTALLATION

- A. Install devices and equipment in accordance with manufacturer's instructions and in accordance with the plans.
- B. Connect wires to terminal blocks where specified in the plans.
- C. Install uninterruptible power supply to power all items in control panel as well as alarm light.
- D. Clearly label terminal blocks for later connection of external systems in the field.
- E. Install cable jack in control panel.
- F. Connect cable modem, PC, fiber converter, and PLC to switch. Confirm connection.

END OF SECTION