
PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 25 05 01 - EMCS: General Requirements.
- .2 Section 25 90 01 - EMCS: Site Requirements Applications and Systems Sequences of Operation.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI).
 - .1 ANSI C12.7-1993 (R1999), Requirements for Watthour Meter Sockets.
 - .2 ANSI/IEEE C57.13-1993, Standard Requirements for Instrument Transformers.
- .2 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM B148-97(03), Standard Specification for Aluminum-Bronze Sand Castings.
- .3 National Electrical Manufacturer's Association (NEMA).
 - .1 NEMA 250-03, Enclosures for Electrical Equipment (1,000 Volts Maximum).
- .4 Canadian Standards Association (CSA).
 - .1 CSA-C22.1SB-F02, Canadian Electrical Code, Part 1 (19th Edition) Safety Standard for Electrical Instalaltions.

1.3 DEFINITIONS

- .1 Acronyms and Definitions: Refer to Section 25 05 01 - EMCS: General Requirements.

1.4 SUBMITTALS

- .1 Submit shop drawings and manufacturer's installation instructions in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions for specified equipment and devices.
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1.5 EXISTING CONDITIONS

- .1 Cutting and Adjusting: In accordance with the Architectural Section.
- .2 If needed, repair surfaces that were damaged during Work execution.
- .3 Hand over to the Departmental Representative all removed material that cannot be reused.

PART 2 - PRODUCTS

2.1 GENERAL

- .1 Control devices of each category to be of same type and manufacturer.
- .2 External trim materials to be corrosion resistant. Internal parts to be assembled in watertight, vibration-proof assembly.
- .3 Operating conditions: 0 - 32°C with 10 - 90% relative humidity (RH) (non-condensing) unless otherwise specified.
- .4 Terminations: Use standard conduit box with slot screwdriver compression connector block unless otherwise specified.
- .5 Transmitters and sensors to be unaffected by external transmitters including walkie-talkies.
- .6 Account for hysteresis, relaxation time, maximum and minimum limits in applications of sensors and controls.
- .7 Outdoor Installations: Use weatherproof construction in NEMA 4 enclosures.
- .8 Devices installed in user occupied space not exceed Noise Criteria (NC) of 35. Noise generated by any device must not be detectable above space ambient conditions.
- .9 Measure Range: As required by each system.

2.2 PRESSURE TRANSMITTERS

- .1 Characteristics:
 - .1 Combined pressure transmitters.
 - .1 Internal materials: Suitable for continuous contact with industrial standard instrument air, compressed air, water, steam, as applicable.
 - .2 Output signal: 4 - 20 mA into 500 ohms maximum load.

- .3 Output variations: Less than 0.2% full scale for supply voltage variations of $\pm 10\%$.
- .4 Combined non-linearity, repeatability, and hysteresis effects: Not to exceed $\pm 0.5\%$ of full scale output over entire range.
- .5 Temperature effects: Not to exceed $\pm 1.5\%$ full scale/50 °C.
- .6 Over-pressure input protection to at least twice rated input pressure.
- .7 Output short circuit and open circuit protection.
- .8 Precision in the order of $\pm 1\%$ on the full scale.

2.3 SOLID STATE RELAYS

- .1 General:
 - .1 Relays to be socket or rail mounted.
 - .2 Relays to have LED indicator.
 - .3 Input and output barrier strips to accept 14 to 28 AWG wire.
 - .4 Operating temperature range to be -20 °C to 70 °C.
 - .5 Relays to be CSA certified.
 - .6 Input/output Isolation Voltage to be 4,000 VAC at 25 °C for 1 second maximum duration.
 - .7 Operational frequency range, 45 to 65 HZ.
- .2 Input:
 - .1 Control voltage: 3 to 32 VDC.
 - .2 Drop out voltage: 1.2 VDC.
 - .3 Maximum input current to match AO (Analog Output) board.
- .3 Output:
 - .1 AC or DC Output Model to suit application.

2.4 CURRENT TRANSDUCER

- .1 Requirements:
 - .1 Purpose: Combined sensor/transducer, to measure line current and produce proportional signal in one of following ranges:
 - .1 4-20 mA DC.
 - .2 0-1 VDC.
 - .3 0-10 VDC.
 - .4 0-20 VDC.
 - .2 Frequency insensitive from 10 - 80 Hz.
 - .3 Accuracy to 0.5% full scale.
 - .4 Zero and span adjustments. Field adjustable range to suit motor applications.
 - .5 Adjustable mounting bracket to allow for secure/safe mounting inside MCC.

2.5 CONTROL PANELS

- .1 Install new equipment in the existing panels. Provide new panels as required.
- .2 Wall mounted enamelled steel cabinets with hinged and key-locked front door.
- .3 Multiple panels as indicated to handle requirements with additional space to accommodate 25% additional capacity as required by Departmental Representative without adding additional cabinets.
- .4 Panels to be lockable with same key.

2.6 TOUCH-SENSITIVE LCD USER INTERFACE

- .1 Completely integrated interface communicating with controller.
- .2 Wall mounted.

2.7 WIRING

- .1 In accordance with Section 26 27 26 - Wiring Devices.
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- .2 For wiring under 70 V use FT6 rated wiring where wiring is not run in conduit. Other cases use FT4 wiring.
- .3 Wiring must be continuous without joints.
- .4 Sizes:
 - .1 Field wiring to digital device: #18 AWG twisted pairs.
 - .2 Analog input and output: Shielded #18 minimum solid copper twisted pair.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install equipment, components so that manufacturer's and CSA labels are visible and legible after commissioning is complete.
- .2 Install field control devices in accordance with manufacturers recommended methods, procedures and instructions.
- .3 Temperature transmitters, humidity transmitters, current-to-pneumatic transducers, solenoid air valves, controllers, relays: Install in NEMA I enclosure or as required for specific applications. Provide for electrolytic isolation in cases when dissimilar metals make contact.
- .4 Support field-mounted panels, transmitters and sensors on pipe stands or channel brackets.
- .5 Electrical system:
 - .1 Complete installation in accordance with Section 26 05 00 - Common Work Results - Electrical.
 - .2 Modify existing starters to provide for EMCS as indicated in I/O Summaries and as indicated.
 - .3 Refer to electrical control schematics included as part of control design schematics on drawings mentioned in section 25 90 01 EMCS: Site Requirements, Applications and Systems Sequences of Operation. Trace existing control wiring installation and provide updated wiring schematics including additions, deletions to control circuits for review by Departmental Representative before beginning Work.
 - .4 Terminate wires with screw terminal type connectors suitable for wire size, and number of terminations.

- .5 Install communication wiring in conduit.
 - .1 Provide complete conduit system to link Building Controllers, field panels and OWS(s).
 - .2 Conduit sizes to suit wiring requirements and to allow for future expansion capabilities specified for systems.
 - .3 Conduit filling should not exceed 40% of their capacity.
 - .4 Design drawings do not show conduit layout.
- .6 Do not run exposed conduits in normally occupied spaces unless otherwise indicated or unless impossible to do otherwise. Departmental Representative review before beginning Work. Wiring in mechanical rooms and in service rooms, and exposed wiring must be in conduit.

3.2 CONTROL PANELS

- .1 Arrange for conduit and tubing entry from top, bottom or either side.
- .2 Wiring and tubing within panels: Locate in trays or individually clipped to back of panel.
- .3 Identify wiring and conduit clearly.

END OF SECTION