

1 General

1.1 RELATED SECTIONS

- .1 Section 21 05 01 – Common Work Results - Mechanical.
- .2 Section 25 05 01 – EMCS: General Requirements.
- .3 Section 25 05 02 – EMCS: Submittals and Review Process.
- .4 Section 25 05 54 – EMCS: Identification.

1.2 REFERENCES

- .1 American National Standards Institute (ANSI).
 - .1 ANSI C12.7, Requirements for Watt-hour Meter Sockets.
 - .2 ANSI/IEEE C57.13, Standard Requirements for Instrument Transformers.
- .2 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM B148, Standard Specification for Aluminum-Bronze Sand Castings.
- .3 National Electrical Manufacturer's Association (NEMA).
 - .1 NEMA 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
- .4 Air Movement and Control Association, Inc. (AMCA).
 - .1 AMCA Standard 500-D, Laboratory Method of Testing Dampers for Rating.
- .5 Canadian Standards Association (CSA International).
 - .1 CSA-C22.1-2012, Canadian Electrical Code, Safety Standard for Electrical Installations.

1.3 SUBMITTALS

- .1 Submit shop drawings and manufacturer's installation instructions in accordance with Section 01 33 00 - Submittal Procedures, Section 21 05 01 – Common Work Results - Mechanical, and Section 25 05 02 – EMCS Submittals and Review Process.

1.4 ACCEPTABLE CONTROLS CONTRACTOR

- .1 Controls and Equipment Ltd.

2 Products

2.1 GENERAL

- .1 Control devices of each category to be of same type and manufacturer.
- .2 Operating conditions: -10 – 44 degrees C with 10 - 90 % RH (non-condensing) unless otherwise specified.
- .3 Terminations: use standard conduit box with slot screwdriver compression connector block unless otherwise specified.

- .4 Transmitters and sensors to be unaffected by external transmitters including walkie talkies.
- .5 Account for hysteresis, relaxation time, maximum and minimum limits in applications of sensors and controls.
- .6 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.
- .7 Cutting and Patching: Restore work areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas.
- .8 Use the existing "global" outside air temperature (OAT) sensor for pump control. Refer to the new in-line duplex pump sequence of operation on the Drawings.

2.2 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 degrees C to 70 degrees C.
 - .5 Relays to be CSA Certified.
 - .6 Input/output Isolation Voltage to be 4000 VAC at 25 degrees 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.

2.3 A/C ELECTRICAL CURRENT SENSORS

- .1 Requirements:
 - .1 Solid Core construction, compact, self-powered (no external electrical required),
 - .2 Range: to suit application. Operating point ideally at mid-span of range.
 - .3 Purpose: measure line current and produce proportional signal in one of following ranges:
 - .1 4-20 mA.
 - .2 0-10 volts DC.
 - .4 Frequency: 60 Hz.
 - .5 Zero and span adjustments. Field adjustable range to suit motor applications.
 - .7 Accuracy: 2% (+/-) FSO (5-100% of range)
 - .8 Signal Output: 0-5 VDC.
 - .9 Insulation Class: 600 VAC, insulated conductors.
 - .10 Response Time: 200 mS, Typical, 0-90 %.

- .11 Output Load: 1 MΩ.
- .12 Loading Error: add 5% error with 100KΩ.
- .13 Operating Temperature: -15 to 60 °C.
- .14 Operating Humidity: 5 to 90% RH (non-condensing).
- .15 Terminal Block: 14 to 22 AWG.
- .16 Dimensions: 67 x 68.6 x 24.1 mm.
- .17 Sensor Aperture: 20.3 mm.
- .18 Enclosure Material: ABS/PC, UL94 V-0.
- .19 Agency Approvals: cULus Listed.
- .20 Acceptable Materials: Greystone Energy Systems Inc., Model CS-650.

2.4 WIRING

- .1 In accordance with CSA-C22.1-2012, Canadian Electrical Code, Safety Standard for Electrical Installations.
- .2 Wiring must be continuous without joints.
- .3 All controls wiring shall be run in 13 mm diam. galvanized steel EMT conduit.
- .4 Sizes:
 - .1 Field wiring to digital device: #18 AWG copper, 105°C, 300V.
 - .2 Analog input and output: shielded #18 minimum copper, 105°C, 300V.

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 Controllers, valves, and 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 Fire-stopping: provide space for fire-stopping where required. Maintain fire-rating integrity of structure.
- .6 Electrical:
 - .1 CSA-C22.1-2012, Canadian Electrical Code, Safety Standard for Electrical Installations.
 - .2 Refer to control schematics included as part of control design on drawings. Trace existing control wiring installation and provide updated wiring schematics including additions, deletions to control circuits for review by the Departmental Representative before beginning Work.

- .3 Terminate wires with screw terminal type connectors suitable for wire size, and number of terminations.
- .4 Install all wiring in EMT conduit: Make final connection to field devices using flexible metal conduit. Install conduit in accordance with CEC 12-1999 through 12-1014 and 12-1400 through 12-1410.
 - .1 Provide complete conduit system to link any new Building Controllers, field panels, etc. to the existing Controls infrastructure.
 - .2 Maximum conduit fill not to exceed 40%.
 - .3 Design drawings do not show conduit layout.
- .5 Communications wiring to be in separate EMT.
- .6 Do not run exposed conduits in normally occupied spaces unless otherwise indicated or unless impossible to do otherwise. Departmental Representative to review before starting Work.
- .7 Repair surfaces damaged during execution of Work.
- .8 Turn over to the Departmental Representative existing materials removed from Work not identified for re-use.

3.2 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.

3.3 IDENTIFICATION

- .1 Identify field devices in accordance with Section 25 05 54 - EMCS: Identification.

3.4 TESTING AND COMMISSIONING

- .1 Calibrate and test field devices for accuracy and performance in accordance with Section 25 01 11 - EMCS: Start-up, Verification and Commissioning.

END OF SECTION