

1 **GENERAL**

1.1 **RELATED SECTIONS**

- .1 Section 25 05 02 - EMCS: Submittals and Review Process.
- .2 Section 25 05 03 - EMCS: Project Records Documents.

1.2 **REFERENCES**

- .1 American National Standards Institute (ANSI)
 - .1 ANSI C12.7, Requirements for Watthour Meter Sockets.
 - .2 ANSI/IEEE C57.13, Requirements for Instrument Transformers.
- .2 Canadian Standards Association
 - .1 CSA Type 1 Enclosure
 - .2 CSA Type 4X Enclosures
 - .3 CSA Type 12 Enclosures

1.3 **SUBMITTALS**

- .1 Submit shop drawings and manufacturer's installation instructions in accordance with Section 25 05 02 - EMCS: Submittals and Review Process.
- .2 Include:
 - .1 Information as specified for each device.
 - .2 Manufacturer's detailed installation instructions.
- .3 Pre-Installation Tests
 - .1 Submit samples at random from equipment shipped, as requested by Departmental Representative, for testing before installation. Replace devices not meeting specified performance and accuracy.
- .4 Manufacturer's Instructions
 - .1 Submit manufacturer's installation instructions for specified equipment and devices.

1.4 **CLOSEOUT SUBMITTALS**

- .1 Submit operating and maintenance data for inclusion in operation and maintenance manual in accordance with Section 25 05 03 - EMCS: Project Records Documents.

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, shockproof, vibration-proof, heat resistant assembly.
- .3 Operating conditions: 0 - 32 °C with 10 - 90 % RH (non-condensing) unless otherwise specified.
- .4 Terminations: use standard conduit box with slot screwdriver compression connector block unless otherwise specified.
- .5 Transmitters to be unaffected by external transmitters (eg. 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 CSA 4X enclosures.
- .8 Devices to be installed in user occupied space must not exceed Noise Criteria (NC) of 35. Noise generated by any device must not be detectable above space ambient conditions.

2.2 **TEMPERATURE SENSORS**

- .1 Existing temperature sensors to remain or be relocated as indicated. Contractor shall confirm proper operation of existing temperature sensors, prior to completion of project.

2.3 **ELECTRICAL RELAYS**

- .1 Requirements:
 - .1 Double voltage, DPDT, plug-in type with termination base.
 - .2 Coils: rated for 24V DC. Other voltage: provide transformer.
 - .3 Contacts: rated at 1 amp at 24 V AC.
 - .4 Relay to have visual status indication

2.4 **SOLID STATE RELAYS**

- .1 Requirements:
 - .1 CSA approved.
 - .2 Suitable to the application as recommended by manufacturer.
 - .3 Voltage range: 75-265 VAC
 - .4 Panel mounting.
 - .5 Suitable for AC or DC loads.
 - .6 Output surge absorbing element for inductive on/off loads.

- .7 Input capacitor/resistor circuit for pulse noise absorption.
- .8 For input inductive noise use twisted-pair wires for electromagnetic noise and shielded cable for static noise.

2.5 CURRENT TRANSDUCERS

- .1 Requirements:
 - .1 Range: in accordance with Equipment Schedules.
 - .2 Purpose: measure line current and produce proportional signal in one of following ranges:
 - .1 4-20 mA DC.
 - .2 0-5 volt DC.
 - .3 0-10 volts DC.
 - .4 2-10 volts DC.
 - .3 Frequency insensitive from 10 - 80 hz.
 - .4 Accuracy to 0.5% full scale.
 - .5 Zero and span adjustments. Field adjustable range to suit motor applications.
 - .6 Adjustable mounting bracket to allow for secure/safe mounting inside the MCC or starter enclosure.

2.6 CURRENT SENSING RELAYS

- .1 Requirements:
 - .1 Complete with metering transformer ranged to match load, plug-in base and shorting shunt to protect current transformer when relay is removed from socket.
 - .2 Suitable for single or 3 phase metering into single relay.
 - .3 To have adjustable latch level, adjustable delay on latch and minimum differential of 10 % of latch setting between latch level and release level.
 - .4 3-Phase application: provide for discrimination between phases.
 - .5 To have adjustable latch level to allow detection of worst case selection. To be powered from control circuit of motor starter being metered. Relay and base to be mounted in adjacent auxiliary cabinet only if control circuit power to be brought into auxiliary cabinet. Adjustments to be acceptable from auxiliary cabinet.
 - .6 Relay contacts: capable of handling 10 amps at 240 V AC.

2.7 SURFACE WATER DETECTORS

- .1 Requirements:
 - .1 Provide alarm on presence of water in drain pan.
 - .2 Expendable cartridge sensor.
 - .3 Internal waterproof switch.
 - .4 One set of dry contacts 2 amps at 24 V.
 - .5 Unaffected by moisture in air.

- .6 Self-powered.

2.8 PANELS

- .1 Either free-standing or wall mounted enameled steel cabinets with hinged and key-locked front door.
- .2 To be modular multiple panels as required to handle requirements with additional space to accommodate future capacity as required by Departmental Representative without adding additional cabinets.
- .3 Panels to be lockable with same key.

3 EXECUTION.

3.1 INSTALLATION

- .1 Install field control devices, conduit and wire in accordance with manufacturers recommended methods, procedures and instructions. Wiring and conduit above 50 volts by electrical Division. Coordinate requirements with Electrical Contactor.
- .2 Temperature transmitters, humidity transmitters, current-to-pneumatic transducers, solenoid air valves, controllers, relays: install in CSA 2 enclosures or as required for specific applications. Provide for electrolytic isolation in all cases when dissimilar metals make contact.
- .3 Support field-mounted transmitters, sensors on pipe stands or channel brackets.
- .4 Install wall mounted devices on plywood panel properly attached to wall.

3.2 TEMPERATURE AND HUMIDITY SENSORS

- .1 Stabilize to ensure minimum field adjustments or calibrations.
- .2 To be readily accessible and adaptable to each type of application so as to allow for quick easy replacement and servicing without special tools or skills.
- .3 Outdoor installation:
 - .1 Protect from solar radiation and wind effects by stainless steel shields.
 - .2 Install in CSA 4X enclosures.
- .4 Duct installations
 - .1 Do not mount in dead air space.
 - .2 Location to be within sensor vibration and velocity limits.
 - .3 Securely mount extended surface sensor used to sense average temperature.
 - .4 Thermally isolate elements from brackets and supports so as to respond to air temperature only.

- .5 Support sensor element separately from coils, filter racks.
- .5 Averaging duct type temperature sensors:
 - .1 Sensor length to be not less than 1000 mm per square metre of duct cross-sectional area.
 - .2 Use multiple sensors where single sensor does not meet minimum length ratio. Wire multiple sensors in series for freeze protection applications.
 - .3 Wire multiple sensors separately for temperature measurement.
 - .4 Use either software averaging algorithm to derive overall average for control purposes or separate inputs, based on site requirements.
- .6 Thermowells: install for piping installations. Where pipe diameter is less than well insertion length, locate well in elbow. Thermowell to restrict flow by less than 30%.

3.3 PANELS

- .1 Arrange for conduit and tubing entry from top, bottom or either side.
- .2 Use modular multiple panels if necessary to handle all requirements, with space for additional 20% PCU or FID if applicable without adding additional panels. Space to accommodate maximum capacity of associated controller (MCU, TCU).
- .3 Wiring and tubing within panels: locate in trays or individually clipped to back of panel.
- .4 Identify wiring and conduit clearly.

3.4 IDENTIFICATION

- .1 Identify field devices properly.
- .2 Refer to Section 25 05 54 - EMCS: Identification.

3.5 TESTING

- .1 Calibrate and test field devices for accuracy and performance. Submit report detailing tests performed, results obtained to Departmental Representative for approval. Departmental Representative will verify results at random. Provide testing equipment and manpower necessary for this verification.

3.6 COMMISSIONING

- .1 Refer to Section 25 01 11 – EMCS: Start-up, Verification and Commissioning.

END OF SECTION