## Part 1 General

### 1.1 REFERENCES

.1 NEMA 250-2003, Enclosures for Electrical Equipment (1000 Volts Maximum).

.2 Canadian Standards Association (CSA International).

.1 CSA-C22.1-2009, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.

### 1.2 SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00 – Submittal Procedures.

## 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.

.3 Operating conditions: -40 – 55 degrees C with 5 - 95% RH (non-condensing) unless otherwise specified.

### 2.2 PUSHBUTTONS – PUSH-PULL/TWIST TO RELEASE

.1 Supply and install two-position maintained emergency stop operator stations for P-F1 and P-F2, per drawings 1-0157L-E0007 and 1-0157L-E0009.

.2 Requirements:

| | | |
|---|---|---|
| .1 | Ingress Protection: | NEMA 4X |
| .2 | Contact Life: | 1,000,000 cycles |
| .3 | Mechanical Life: | 250,000 cycles |
| .4 | Contact Rating: | 10 A |
| .5 | Contact Configuration: | As shown on the drawings |
| .6 | Illumination: | Not required unless otherwise indicated. |
| .7 | Acceptable for hazardous Class I, Zone 2 location. | |

.3 Acceptable Products:

.1 Allen-Bradley 800R/H series as shown on the drawings or approved equal in accordance with B6.

### 2.3 SELECTOR SWITCHES – 3 POSITION MAINTAINED

.1 Supply and install a three-position maintained selector switch remote operator station for SF-F1, per drawing 1-0157L-E0011.

.2 Requirements:

| | | |
|---|---|---|
| .1 | Ingress Protection: | NEMA 4X |
| .2 | Contact Life: | 1,000,000 cycles |
| .3 | Mechanical Life: | 250,000 cycles |
| .4 | Contact Rating: | 10 A |
| .5 | Contact Configuration: | As shown on the drawings |
| .6 | Illumination: | Not required. |

.3 Acceptable Products:

.1 Allen-Bradley 800H series or approved equal in accordance with B6.

## Part 3 Execution

### 3.1 INSTALLATION

.1 Install field control devices in accordance with manufacturers recommended methods, procedures and instructions.

.2 Readily accessible to allow for unhindered operation and servicing.

.3 Wall installation:

.1 Located as shown on the drawings.

.2 Securely mounted.

### 3.2 IDENTIFICATION

.1 Identify field devices with lamacoids. Install in a conspicuous location.

**END OF SECTION**

## Part 1 General

### 1.1 REFERENCES

.1 NEMA 250-2003, Enclosures for Electrical Equipment (1000 Volts Maximum).

.2 Canadian Standards Association (CSA International).

.1 CSA-C22.1-2009, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.

### 1.2 SUBMITTALS

.1 Submit shop drawings and manufacturer's installation instructions in accordance with Section 01 33 00 – Submittal Procedures.

.2 Manufacturer's Instructions:

.1 Include manufacturer's installation instructions for specified equipment and devices in O&M Manuals.

## 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.

.3 Operating conditions: 0 – 35 degrees C with 5 - 95% RH (non-condensing) unless otherwise specified.

.4 Account for hysteresis, relaxation time, maximum and minimum limits in applications of sensors and controls.

### 2.2 ROOM TEMPERATURE SWITCHES

.1 Requirements:

.1 Switch: Dual (high temperature and low temperature)
.2 Manually adjustable.
.3 Range: -10 – 50 degrees C
.4 Mounting: Wall
.5 Protection: NEMA 4 or IP65
.6 Output Signal: Independent SPDT circuits, rated at 5 A @ 120 VAC
.7 Accuracy: < 1 degrees C over range of 0 to 70 degrees C.
.8 Approvals: CSA / cUL
.9 Acceptable Products:
.1 United Electric B402-120
.2 Or approved equal in accordance with B6.

## 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 Support field-mounted panels, transmitters and sensors on pipe stands or channel brackets.

.4 Electrical:

.1 Complete installation in accordance with Section 26 05 01 - Common Work Results - Electrical.

.2 Install communication wiring in conduit or utilizing ACIC cabling if shown on the drawings.

.1 Provide complete conduit /cable system to link instrumentation and the control panel(s).

.2 Conduit sizes to suit wiring requirements and to allow for future expansion capabilities specified for systems.

.3 Maximum conduit fill not to exceed 40%.

.4 Design drawings do not show conduit layout.

### 3.2 TEMPERATURE SENSORS

.1 Stabilize to ensure minimum field adjustments or calibrations.

.2 Readily accessible and adaptable to each type of application to allow for quick easy replacement and servicing without special tools or skills.

.3 Duct installations:

.1 Do not mount in dead air space.

.2 Locate 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 to respond to air temperature only.

.5 Support sensor element separately from coils, filter racks.

### 3.3 IDENTIFICATION

.1 Identify field devices with lamacoids. Install in a conspicuous location.

**END OF SECTION**

## Part 1 General

### 1.1 SUMMARY

.1 Section Includes:

.1 Process Control Devices including damper actuators.

### 1.2 REFERENCES

.1 Association (NEMA).

.1 NEMA 250-2003, Enclosures for Electrical Equipment (1000 Volts Maximum).

.2 Canadian Standards Association (CSA International).

.1 CSA-C22.1-2009, Canadian Electrical Code, Part 1, 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.

.2 Manufacturer's Instructions:

.1 Include manufacturer's installation instructions for specified equipment and devices in O&M Manuals.

## 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 assembly.

.3 Operating conditions: 0 – 32 degrees C with 5 - 95% 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.

**2.2 ELECTRONIC ON-OFF DAMPER ACTUATORS**

.1 Requirements:

.1 Direct mount on-off type.

.2 Spring return type for "fail-safe" in Normally Open or Normally Closed position as indicated.

.3 Torque: 4 Nm (35 lb-in) minimum.

.4 Damper actuator to drive damper from full open to full closed in less than 90 seconds.

.5 Spring return to drive damper from full open to full closed in less than 60 seconds at normal room temperature.

.6 Angle of Rotation: 90° minimum, adjustable with mechanical stops.

.7 Direction of Rotation: Configurable via switch mounted on the actuator.

.8 Shaft Diameter: 8.0mm to 16.0mm (3/8” to 1/2”).

.9 Electrical Connection: 0.9 meter (3 ft), 18 AWG, plenum rated cable.

.10 Overload protection: Required.

.11 Auxiliary Switches: One SPDT, adjustable operation between 0 and 95°.

.12 Power requirements: 7.5 VA maximum at 120 VAC, 60Hz.

.13 Operating Temperature: -30 °C to 50 °C.

.14 Housing: NEMA 2 or IP54 or better.

.15 CSA listing or equivalent.

.16 Acceptable Products: Belimo LF120-S or approved equal in accordance with B6

**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 Support field-mounted panels, transmitters and sensors on pipe stands or channel brackets.

.4 Electrical:

.1 Complete installation in accordance with Section 26 05 01 - Common Work Results - Electrical.

.2 Install communication wiring in conduit or utilizing ACIC cabling.

.1 Provide complete conduit /cable system to link instrumentation and the control panel(s).

.2 Conduit sizes to suit wiring requirements and to allow for future expansion capabilities specified for systems.

.3 Maximum conduit fill not to exceed 40%.

.4 Design drawings do not show conduit layout.

.5 Terminate devices with leads in junction boxes with terminals.

.1 Wire nuts are not permitted.

.2 Protect leads in flexible conduit.

## 3.2 IDENTIFICATION

.1 Identify devices with lamacoids. Mount in a conspicuous location.

## 3.3 TESTING AND COMMISSIONING

.1 Calibrate and test control devices for accuracy and performance.

**END OF SECTION**