Part 1 General

1.1 REFERENCES

.1 American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc. (ASHRAE).

.1 ASHRAE 2003, Applications Handbook, SI Edition.

.2 Canadian Standards Association (CSA International).

.1 C22.2 No.205, Signal Equipment.

.3 Institute of Electrical and Electronics Engineers (IEEE).

.1 IEEE C37.90.1, Surge Withstand Capabilities (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus.

.4 Public Works and Government Services Canada (PWGSC)/Real Property Branch/Architectural and Engineering Services.

.1 IM 250005, Energy Monitoring and Control System (EMCS) Design Guidelines, 2009.

1.2 DESCRIPTION

.1 General: Network of controllers comprising of CNP('s) or CNA('s) to be provided as indicated in System Architecture Diagram to support building systems and associated sequence(s) of operations as detailed in these specifications.

.1 Provide sufficient controllers to meet intents and requirements of this section.

.2 Controller quantity, and point contents to be approved by Departmental Representative at time of preliminary design review.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures and Section 25 05 02 - EMCS: Shop Drawings, Product Data and Review Process.

.1 Submit product data sheets for each product item proposed for this project.

1.4 MAINTENANCE

.1 Provide manufacturers recommended maintenance procedures for insertion in Section 25 05 03 - EMCS: Project Record Documents.

Part 2 Products

2.1 PROGRAMMABLE DIGITAL CONTROLLER (CNP)

.1 General

.1 Programmable digital controller (hereinafter CNP) taking charge of the systems direct control to which it is connected.

.2 This controller must have the C-UL and UL916 approval and compliant testing (B-BC) BACnet laboratory (BTL).

.3 This controller should at least support the following BACnet services:

.1 Read/write for objet types : analog input (AI), analog output (AO), analog value (AV), digital input (DI), digital output (DO), digital value (BV), multi-input state (MI), multi-state variable (MV), PID loop (CO), schedule (SCH), calendar (CAL), historical (TL) and event-alarms (EV, EVC);

.2 Multiple properties read/write (DS-RPM-A, DS-RPM-B, DS-WPM-B) of an object using a single query;

.3 Change of value read/write (DS-COV-A, DS-COV-B);

.4 Viewing and editing schedules (SCHED-IB, SCHED-EB);

.5 Backup database (DM-BR-B);

.6 A consultation list of services (BIBBs-BACnet Interoperability Building Blocks) shall be available.

.4 This controller must, by itself, carry out the regulation and energy management of systems.

.5 This controller must be built so that it can be connected to one or more controllers and operator stations and be an active organ. In the event that the transmission is interrupted between the controllers and operator stations, the controller must be able to take care of all control functions and power management functions as usual.

.6 Equip each CNP with a clock in real time and a secular calendar, in order to automatically execute functions that are dependent on time. This clock must be synchronized with the other controller and operator stations clocks.

.2 Power supply

.1 The panel may be supplied by the local current, 120 Vac, 60 Hz. For 24 Vac, 60 Hz supply, supply and install a transformer inside the local control panel. The panel must keep the active memory alive for a period of at least 72 hours, in the event of a power failure or a shut down in order to maintain the special programs defined by the operator and the operation parameters of the control loops.

.3 Inputs and outputs

.1 The panel must be capable of accepting the following inputs: thermistor, potentiometer, continuous modulating voltage, binary contact, accumulator and impulsion counter. The signals at the output of the panel must be matched to the controlled equipment, according to each equipment specific application. Where converters or other auxiliary components are necessary, provide and install, inside the control panel (PCL) all the required equipment to ensure a proper operation of the panel and the entire regulation system. The inputs and outputs (voltage or current) of the following types are accepted: 4 to 20 mA; 0 to 100 mA; 0 to 1 V d.c.; 0 to 5 V d.c.; 0 to 10 V d.c.; 2 to 10 V d.c.

.2 This controller must execute its logical and control operations with its primary inputs / outputs (inputs or outputs in direct interaction) connected directly to its terminals or its slave devices without having to interact with another controller; secondary inputs used for adjustment or modification of a set point, as the outside temperature, can be on the other controllers.

.4 Regulation

.1 The controller must provide the following algorithms:

.1 Proportional control (P);

.2 Proportional and integral control (PI);

.3 Proportional control, integral with the derivative function (PID);

.4 Two position control.

.5 Software

.1 The software must contain at least an operating system supervisor, the transmission controller, application programs, the operator interface and the control logic which control the sequence of operations of the entire system.

.2 Control logic must have access to all values and states of all the control points connected to the controller, including global and shared values in order to ensure cascade or interconnection control.

.3 Programs must be automatically executed without any intervention from the operator and be flexible enough to be customized.

.4 The control logic of the software must be programmed using a high level language (Basic, "Plain English", etc.) or a general graphical control high-level language with modifiable logical blocks if needed.

.5 The language should support conditional instructions (IF, THEN, ELSE, ELSE-IF), boolean values (AND, OR, NOT) and comparison (EQUAL, LESS THAN, GREATER THAN, NOT EQUAL).

.6 The language accept mathematical operators (+, -, x, /, square root and power "x" to "y", absolute value, maximum value, minimum value, etc.).

.6 Energy Management

.1 Provide this controller of all power-saving features in its resident program to enable for it to apply to one or more HVAC systems to reduce the energy input. These pre-programmed functions include at least the remote temperature reset, the outdoor air economizer cycle, the optimal start, stop / start and programmed control of the outdoor air enthalpy.

.7 Totalization of the events/functioning cycles

.1 This controller to accumulate and store automatically run-time for binary input and output points.

.2 This controller to automatically sample, calculate and store consumption totals on daily, weekly or monthly basis for user-selected analog or binary pulse input-type points.

.3 This controller to automatically count events (number of times pump is cycled off and on) daily, weekly or monthly basis.

.4 Totalization to provide calculations and storage of accumulations up to 99,999.9 units (eg. kWH, litres, tonnes, etc.).

.5 User to be able to define warning limit and generate user-specified messages when limit reached.

2.2 DIGITAL CONTROLLERS FOR SPECIFIC APPLICATIONS (CNA)

.1 Digital controllers for specific applications (customizable) (hereinafter CNA) having the CNP characteristics except at programming level, it is limited for the CNA. These controllers are usually customizable type, with pre-programmed algorithms for direct control of the systems which they are connected by adjusting operating parameters.

.2 In case of a transmission breakage, the controller must operate independently.

Part 3 Execution

3.1 LOCATION

.1 Location of controllers to be approved by Departmental Representative.

3.2 INSTALLATION

.1 Install controllers in secure locking enclosures as directed by Departmental Representative.

.2 Provide necessary power from local 120V branch circuit panel for equipment.

.3 Install tamper locks on breakers of circuit breaker panel.

.4 Use Uninterruptible Power Supply (UPS) and emergency power when equipment must operate in emergency and co-ordinating mode.

END OF SECTION