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**Part 1            General**

**1.1                SUMMARY**

.1            Section Includes:

- .1            Hardware and software requirements for an Operator Work Station (OWS) in a Building Energy Monitoring and Control System (EMCS), including primary, secondary, portable and remote OWS's.

**1.2                OWS SYSTEM DESCRIPTION**

- .1            Consists of commercially available personal computer in current production, with sufficient memory and processor capacity to perform functions specified.

.2            Primary OWS to include:

- .1            Screen;
- .2            Keyboard;
- .3            Mouse;
- .4            Report printer;
- .5            Colour graphics printer.

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

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

**1.4                MAINTENANCE**

- .1            Provide maintenance in accordance with Section 25 05 03 - EMCS: Project Record Documents.

**Part 2            Products**

**2.1                OWS PC COMPONENTS**

.1            OWS: IBM PC compatible with following as minimum:

.1            General

- .1            Commercially available personal computer, currently in production.
- .2            Workstation must include the following: computer, monitor, keyboard, graphic card, networking card, mouse, alarm printer, graphic printer and operating system.

.2            Computer (minimum features)

- .1            Current operating system on Windows with all accessories required for communication with the CNP.
- .2            Minimum processor dual core E4300.

- .3 Memory (RAM) minimum of 1,0 G bytes.
- .4 DVD Writer +/- RW 16x.
- .5 Hard disk with a minimum capacity of 160 GB.
- .3 Monitor
  - .1 Provide LCD or LED monitor for systems display, information summaries, alarms and notification of the operator's entry.
  - .2 Minimum monitor of 480 mm (19"), graphic card with 256 M bytes.
- .4 Keyboard
  - .1 Alphanumeric keyboard including all standard ASCII characters, a separate keypad and operator defined 12 dedicated functions keyboard.

## **2.2 PRINTERS**

- .1 Alarm and report printer: Include following features:
  - .1 Laser printer.
  - .2 Accommodate 8.5 X 11" paper.
  - .3 Minimum 1200 by 1200 dpi resolution.
  - .4 Minimum 16 MB RAM, expandable to minimum 72 MB RAM.
  - .5 Minimum 18 pages per minute print speed.
- .2 Colour graphics printer include following features:
  - .1 Ink-jet technology capable of printing high quality colour images at speed of 4 pages per minute.
  - .2 Black cartridge to be separate cartridge from red yellow blue cartridge.
  - .3 Minimum colour resolution 2400 by 1200 dpi.
  - .4 Minimum black and white resolution 1200 by 1200 dpi.
  - .5 Minimum 8 MB RAM.
- .3 Include one box of 8.5 X 11" paper.

## **2.3 OPERATING SYSTEM (OS) OR EXECUTIVE**

- .1 OS to support complement of hardware terminals and software programs specified.
- .2 OS to be true multitasking operating environment.
  - .1 MS DOS or PC DOS based software platforms not permitted.
- .3 OWS software to operate in "Windows" based operating environment.

## **2.4 MANAGEMENT SOFTWARE**

- .1 General
  - .1 The control software must be designed to operate with Windows. The installation in the workstations falls under this Section. At the end of the warranty period, all operating and programming software as well as the graphics must be the latest available versions. Supply and install the latest version free of charge.

- .2 The operating system must support the known software such as Office.
- .3 The system must accommodate up to five (5) workstations in the future.
- .4 The software shall be equipped with energy control programs, schedules, alarms and response management.
- .5 In case of a power outage or a computer failure, the most recent setpoint value must be kept.
- .2 Operator station functions
  - .1 The operator must be able to obtain reports on the condition of different systems.
  - .2 The operator must have access to all information included in the CNP and CNA. At the operator's request, the digital control system must be able to give the status of each point, system or group items, a sector or over the entire network, on a printer or monitor, on the operator's choice. The digital control system must also:
    - .1 Represent analog values by numbers with one (1) decimal and marked by a negative sign if any;
    - .2 Update analog values and the displayed status, upon receipt of new values;
    - .3 Point out any areas where an alarm was triggered by blinking, reverse video, a different color, in parenthesis or by any other means to bring out these points compared to others;
    - .4 The update must be controlled by changes in the peripheral value. In the event that the transmissions would be invitation type to be issued, the interval should not be more than two (2) seconds.
  - .3 The operator must be able to suspend the automatic operation (operated by the control logic) and select the point value. These values or settings should remain in force until the operator returns to automatic operation (operated by the control logic).
  - .4 The operator must be able to modify the programming in whole or in parts.
- .3 Remote access module
  - .1 The operators assigned to the off-site OWSs must have access to information on the building.
  - .2 Operators at remote OWS to be able to perform control functions, report functions, data base generation and modification functions as described for OWS's connected via LAN. Provide routines to automatically archive or display information sent from remote panels.
  - .3 Local OWS may serve as host for remotely connecting OWSs, remote controllers or networks. Alarms and data file transfers must not interfere with local LAN activity. Likewise, LAN activities must not prevent the operator station to treat the incoming communication.

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- .4 Access Levels
    - .1 Manager, two access levels depending on the tasks to be performed
      - .1 All access privileges to the system, including changing the parameters, set points and programming;
      - .2 Rights for operating the systems including the modification of parameters and set points. No programming changes privilege.
    - .2 Operator
      - .1 Rights for operating the systems including the modification of parameters and set points. No programming changes privilege.
    - .3 Security guard
      - .1 No viewing privilege or access to systems or programming. He will only receive critical alarms to his workstation and his printer.
  - .5 Access Control Module.
    - .1 Password access with a minimum of 5 levels of protection to limit control, display, or data base manipulation capabilities. The recommended access hierarchy is as follow:
      - .1 Guest: access only to display data that does not require password.
      - .2 Operator Level: full operational commands including automatic override.
      - .3 Technician: data base modifications.
      - .4 Programmer: data base generation.
      - .5 Highest Level: system administration - password assignment addition and, modification.
  - .6 Graphical Symbols
    - .1 The software must display the graphic illustrating the building systems, floor plans, animation, etc., accepting graphic files (PCX, TIF, BMP), sound (WAV), Acrobat files (PDF) and other pre-sets.
    - .2 The dynamic objects must incorporate analogic and binary values, text, and animation files while changing the image file according to the state.
  - .7 Alarm Management
    - .1 Buffering of all alarm messages to prevent data loss.
    - .2 On alarm, window or icon should appear on the screen to notify the alarm. This indication should appear on the screen regardless of the current application, regardless of whether the current window is the control system or any other Windows window of the station. A visual and audible signal will also be used to notify the operator.
    - .3 The alarm message must indicate the identifier of the item and the alarm activation time.
    - .4 The software must notify the operator of each alarm activation.

- .5 When the operator acknowledges an alarm, the visual indicator stops flashing and the audible signal is interrupted. The alarm acknowledgment must be time stamped by the system and stored in the event log. The visual indicator remains fixed until the situation that caused the alarm is corrected; it is activated again if a new alarm is triggered. A current alarm should not prevent a subsequent reporting alarm, or interfere with the operation of the control logic of the controller. The triggering of false alarms shall not cause the loss of any alarm or overload the system. The acknowledgment of an alarm should not constitute an acknowledgment of another signal.
- .6 Alarm messages must be accompanied by the identification of their own. For each alarm, an operator instruction file is assigned. The operator can easily and quickly view to the file screen. The instructions in the files will be listed by the Owner.
- .7 The program should allow cancelling alarms in case of power failure or fire and allowing an automatic reset in a programmable sequence after a return failure. Each alarm point must be bypassed.
- .8 The system allows the segregation of alarms to control the routing to a workstation, a user assigned to a workstation or a given output devices such as a printer.
- .9 Controller network alarms: system supervision of controllers and communications lines to provide following alarms as minimum:
  - .1 Controller not responding - where possible delineate between controller and communication line failure.
  - .2 Controller responding - return to normal.
  - .3 Bad controller communications - high error rate or bad communication.
  - .4 Normal controller communications - return to normal.
- .8 Schedule Management
  - .1 Each day of the year must be programmed.
  - .2 Special schedules can be set for each day of the week.
  - .3 Special event or holiday schedules can be inserted into the schedule and repeated every year.
- .9 Historical data collection utility:
  - .1 Each CNP must be able to record and save 200 historical values per object. The operator can program the sample time intervals. These values are then transferred to the operator station hard disk.
  - .2 Collect concurrently operator selected real or calculated point values at operator selectable rate 5 to 480 minutes. Samples to include for each time interval (time-stamped), minimum value, maximum value, and average value for point selected. Rate to be individually selectable for each point. Data collection to be continuous operation, stored in temporary storage until removed from historical data list by operator. Temporary storage to have at least 6 month capacity.

- .3 Trend data collection utility program must continuously collect point type objects data from building controller variables as chosen by the operator, including at least; current digital I/O values, analog I/O values, set points and calculated values. The trend data collection utility program must concurrently establish tendencies with 5 to 3600 seconds interval chosen by the operator or detect changes of state or value.
  - .4 Trend data Module to include display of historical or trend data to OWS screen in X Y plot presentation. Plot utility to display minimum of 6 historical points or 6 trend points concurrently. For display output of real time trend data, display to automatically index to left when window becomes full. Provide plotting capabilities to display collected data based on range of selected value for Y component against time/date stamp of collected data for X component.
  - .5 Running time can be calculated to generate maintenance messages.
- .10 Reports
- .1 The workstation must produce the following reports: alarm summary, alarm limits, historical values, schedule, actual values and status.
  - .2 The workstation must also produce special reports associated with energy management programs, the operating cycle's totalization, analog signals/pulses totalization and the events totalization.
  - .3 Reports to include time, day, month, year, report title, and operator's initials.
  - .4 Software to provide capability to:
    - .1 Generate and format reports for graphical and numerical display from real time and stored data.
    - .2 Print and store reports as selected by operator.
    - .3 Select and assign points used in such reports.
    - .4 Sort output by area, system, as minimum.
  - .5 Generate specified report(s) automatically including options of start time and date, interval between reports (hourly, daily, weekly, monthly), output device. Software to permit modifying periodic/automatic reporting profile at any time.
- .11 Online Help
- .1 Depending on the context, the software includes an online help system to assist the operator.
- .12 Archiving and Restoration Module.
- .1 OWS to include services to store back-up copies of controller databases. Perform complete backup of OWS software and data files at time of system installation and at time of final acceptance. Provide backup copies before and after Controller's revisions or major modifications.
  - .2 Ensure data base back-up and downloading occurs over LAN without specialized operator technical knowledge. Provide operator with ability to manually download entire controller data base, or parts thereof as required.

.13 Energy Consumption Follow-up.

- .1 The EMCS must allow the energy consumption monitoring for the entire building (and for some sub-system) by displaying the effective energy consumption compare to the theoretical estimation for each public service.
- .2 Data must be displayed on the OWS in a continuous evolution of trends table, which must provide with warning message to the manager when normal tolerances are not respected.

**2.5 GRAPHICS**

- .1 Each modified or added system, program a color graphic with all the elements, the set points and dynamic readings of all variables according to building standards. Also set a table in graphics mode for all inputs, outputs and set points connected to the electronic control room. By sets of colors and flashes, the elements in normal operation or alarm are identified. For each system, include equipment nomenclature, service area, and the equipment room.
- .2 The graphical utility must include a pre-set of screens and symbols library, describing the standard components of an air handling system (fan, hot and cold coils, filters, dampers, VAV systems), mechanical systems devices (chillers, boilers, pumps, etc.) and symbols used in electricity.
- .3 The entree or access to the graphics mode is done via a drawings of the building on which the concerned mechanical room can be selected with a mouse. The associated system list then appears, always with the mouse, the system to visualise is chosen. On a system's technical page, an icon allows the user to return to the list of systems and the same way can, can return to the drawing of the building.
- .4 Program a graphics mode summary page to view the overall status of all systems. For a system where a parameter is in alarm, a red light is on. In other cases, a green light indicates that the system is in normal mode. Via this page, the user can directly access the desired system.
- .5 The first graphic thus entry mode or access to graphics, a typical ventilation system and a typical control room must be validated by the owner and the engineer before the production of all graphics.
- .6 The graphic interface should allow the operator to start and stop the equipment, change set points, change the alarm limits and have priority over the functions and points of the system by means of a mouse or other pointing device.
- .7 Dynamic data (p. eg. temperature, humidity, flow, state) should be displayed on the diagrams representing the actual locations of the measurement points and must be updated automatically, without operator intervention.

**Part 3            Execution**

**3.1                INSTALLATION REQUIREMENTS**

- .1            Provide necessary power as required from local 120 V emergency power branch circuit panels for OWS's and peripheral equipment.
  - .1            Install tamper locks on breakers of circuit panels.

**END OF SECTION**