SECTION 23 09 00 – BUILDING AUTOMATION SYSTEM AND CONTROL FOR HVAC

This is supplemental language for a spec. This is not an all inclusive spec. This is language that is meant to be copied and pasted into an existing spec.

PART 1 - GENERAL

PART 2 - PRODUCTS

2.1 GRAPHICAL INTERFACE FEATURES

A. All workstation(s) shall be provided with color graphics. All workstation(s) software shall include a graphical viewing and control environment and definition and construction of dynamic color graphic displays.

B. Provide a main default screen showing the basic layout of the building. Each color graphic screen shall have transfer links to allow the building operator to transfer between system associated screens (both forward and backward), as well as a transfer link back to the main default screen.

C. Basic CAD floor plans with layers for walls, windows, low pressure ductwork only, supply diffusers and room numbers shall be provided for all CV, VAV, and FPVAV terminal units. Floor plans shall show the location of each space temperature sensor with a dashed line to the associated terminal unit. Display in real time the difference between the space temperature and the current setpoint.
   1. Display the
      a. cooling %,
      b. heating % (if applicable)
      c. current CFM of each terminal unit.
   2. Provide a transfer link for each terminal unit to allow the operator to access the flow graphic for each individual terminal unit. Use a different color to shade the background area for each part of a floor plan graphic served by a different air handling unit.

D. Floor plan maps
   1. show heating and cooling zones throughout the building in a range of colors (minimum 5) that provide a visual display of temperatures relative to their respective setpoints. The colors shall be updated dynamically as zones' comfort conditions change. Locations of space sensors shall also be shown for each zone. Floor plan humidity's shall be represented similarly to zone temperatures. Setpoint adjustment and color band displays shall be provided as a tool for user adjustment.

E. All control set points shall be easily adjustable from the system's color graphic screen by operators with the proper access level. Each controlled point on the BAS operator workstation color graphic screens shall have the set point indicated along with the actual controlled variable reading (preferred set point on top and actual reading on bottom). All points shall indicate the associated engineering unit. All analog outputs points shall indicate engineering units such as

"%-open" or "%-closed" as required by the application. All normally-closed or normally-open points shall indicate the normal position (such as "N.C." or "N.O." next to the controlled device).

F. Provide system color graphics for each HVAC system and for each electrical, plumbing and/or piping system that is monitored and/or controlled by the BMS. Provide scaled floor plans indicating equipment location, service, and system data as required.

G. Provide color graphic floor plan displays and system schematics for each piece of mechanical equipment, including but not limited to air handling units, chilled water systems and hot water systems to optimize system performance analysis and speed alarm recognition.

H. The operator interface shall allow users to access the various system schematics and floor plans via a graphical penetration scheme, menu selection or text-based commands.

I. Dynamic temperature values, humidity values, flow values and status indication shall be shown in their actual respective locations and shall automatically update to represent current conditions without operator intervention.

J. The windowing environment of the PC operator workstation(s) shall allow the user to simultaneously view several graphics at a time to analyze total building operation or to allow the display of a graphic associated with an alarm to be viewed without interrupting work in progress.
   1. Graphic generation software shall be provided to allow the user to add, modify or delete system graphic displays via an off the shelf graphics package similar to MicroGraphix Designer.
   2. Provide libraries of pre-engineered screens and symbols depicting standard air handling unit components (e.g., fans, cooling coils, filters, dampers, etc.), complete mechanical systems (e.g., constant volume-terminal reheat, VAV, etc.) and electrical symbols.
   3. Graphical displays can be created to represent any logical grouping of system points or calculated data based upon building function, mechanical system, building layout or any other logical grouping of points which aids the operator in the analysis of the facility.

K. Provide an automatically updated, dynamic display of the site-specific BMS architecture indicating the status of primary and secondary controllers, PC workstation(s) and networks.

L. Provide a separate dynamic display page of each HVAC (AHU, AC, chiller, cooling tower, fuel oil, etc.), electrical, and/or plumbing system connected to the BMS.

M. Provide a separate dynamic display page of each piece of terminal equipment (VAV box, fan coil unit, etc.) connected to the BMS.

N. Provide an additional (10) separate dynamic, graphic display pages at each workstation as required by the operating staff to further assist in daily system operations.

O. Graphics shall incorporate all system integration points communicated via hardware or software gateways and/or interfaces. Origin of information shall be transparent to the operator and shall be controlled, displayed, trended, etc. as if the points were hardwired to the BMS.

P. Each graphic shall have a "BACK" button and a "HOME" or "MAIN" button located in the same location on all graphics.

Q. The operator shall be able to clearly distinguish the difference between the following types of points on a graphic either by color, shape, icon or text lable:
   1. Real-time sensor reading
   2. Setpoint
   3. Manually set vs. program set Setpoint
   4. Real-time output reading
   5. Manually Overridden or commanded output vs program set output
   6. Status feedback from a piece of equipment vs the output command

R. When the operator selects a graphic from a menu or a hyperlink, the system shall also make the following adjustments for the operator:
   1. Highlight the system name on the system tree
   2. Highlight the controller name on the network tree
   3. Make appear links to additional information associated with the data on the graphic, such as:
      a. Adjustable modes of operation
      b. Setpoints
      c. Alarm statuses
      d. Trend logs
   4. Make appear links to additional information associated with the system on the graphic, such as:
      a. Controls as-built schematics and wiring diagrams
      b. As-built Sequence of Operation
      c. Mechanical drawings
      d. Electrical drawings

S. For control loops that have a 4-point setpoint reset schedule, the operator shall have access to adjust the 4 points in the graphics. Provide a separate graphic with the 4 adjustable data points and a line graph with labels vertices showing the scale of the reset ramp. Display the current calculated output setpoint.

T. Integration graphics shall be representative of personnel standing in front of equipment. The graphics for equipment specified in the Building Systems Integration paragraph shall be representative of the manufacturers' local display panel and each shall be completely operable from the computer workstation.

PART 3 - EXECUTION