# SECTION 230902 – BAS POINT NAMING AND TAGGING GUIDELINE

## PART 1 - GENERAL

### 1.1 INSTRUCTIONS TO VENDORS

A. Vendor is cautioned that the Owner reserves the right to reject any Vendor, which in the Owner's sole judgment, takes meaningful deviation or exception to Division 23 Direct Digital Control (DDC) Standards. The Charlotte-Mecklenburg Schools' (CMS) Energy Manager and/or designated representative of the Energy Management Department (EMD) shall review all vendor substitution submittals. Vendor substitution approval/disapproval shall be returned via the project architect in writing from Charlotte-Mecklenburg Schools' Energy Manager and designated EMD Project Manager.

B. The overriding requirement is the use of the DDC Control System to maintain design occupant comfort with optimal minimized energy consumption while maximizing equipment, component, and system design function integrity and life.

### 1.2 RELATED DOCUMENTS

A. Drawings (both mechanical and electrical project manual drawings) and general provisions (within Divisions 23, 26, 27) of the Contract, including General Conditions apply to this Section.

B. The provisions of the General Conditions, Supplementary Conditions, and the Sections included under Division 1, General Requirements, are included as a part of this Section as through bound herein.

C. ASHRAE Standard 135 (latest version)

D. Sections within Division 23 – Mechanical and Division 26 – Electrical apply, including though not limited to:

1. 23 09 00 - Instrumentation and Control for HVAC
2. 23 09 01 – BAS Graphical User Interface Guidelines
3. 23 09 93 – Sequences of Operation
4. 23 29 23 – Variable Frequency Motor Controllers
7. 23 08 00 – BAS & HVAC Commissioning
8. 26 08 00 - Electrical Commissioning

### 1.3 SUMMARY

A. An individual piece of equipment should have the same name convention regardless of where in the system the points may be defined. There should be one and only one standard point name for each distinct point and type. Abbreviations of complete point names will be permitted for GUI displays when the points geographic location is obvious on the graphic depicted.

B. An equipment point name combination should uniquely identify the piece of equipment and its geographic location in a building with the complete and unambiguous context of the point.

1.4 EQUIPMENT

A. Equipment names should be unique-and sequenced to follow a consistent logical flow and order based on its geographic location within a School; The order of the equipment name shall be; Three digit School courier number – Building/Elevation-Room number - Equipment Type - Specific Connected Device Identification

1) Example; (XXX-A1-CR123-AHU-01-SF) XXX=School Courier Code, A1=Building "A" First Floor, CR123 = ClassRoom123, AHU-01=Air Handler Unit #1, SF= Supply Fan

2) Example; (XXX-M2-CR208-FC-01) XXX=School Courier Code, M2=Building "M" Second Floor, CR208=Classroom 208, FC-01=Fan Coil Unit #1

3) Example; (XXX-MSB-BR20-BL-01-PriPmp-01) XXX=School Courier Code, MSB=Building "M" Sub-Basement, BR20=Boiler Room 20, PriPmp01=Primary Pump #1.

B. Equipment represented by a device on a bus should have a unique folder name in the BMS path. The School Courier Code and full name shall be used if possible.

D. Equipment sequence numbers should always be at the end of the equipment name with no additional underscore. Dedicated pumps for upstream Equipment such as Boilers and Chillers shall maintain the same designation as the Boiler or Chiller served. Dedicated Equipment VAVs connected to AHU's shall be enumerated with the same designation as the upstream equipment hyphenated by the room served designation.

1) Example; (XXX-MSB-BR20-BL-01-PriPmp-01) XXX=School Courier Code, MSB="M" building Sub-Basement, BR20=Boiler Room#20, Boiler "#1" shall have the Primary Pump designated PriPup "#1."

2) Example; (XXX-A1-CR123-VAV-01-123A) XXX=School Courier Code, A1="A" Building 1st Floor, Classroom 123, VAV in Room 123 is fr**o**m AHU-01.

E. Trailing Sequential Alphabetic characters should be placed at the end of the sequence number for uniquely identifying multiple parallel equipment that services the same VAV or piece of equipment.

1) Example, (XXX-MSB-BR20-BL-01-PriPmp-01A) and (XXX-MSB-BR20-BL-01-PriPmp-01B) represent two pumps in parallel servicing the Primary Loop for Boiler #1.

2) Example, (XXX-A1-CR123-VAV-01-123A) and (XXX-A1-CR123-VAV-01-123B) represent two VAV's in Room 123 supplied from AHU 01

F. Equipment software points defined in separate control routines should use the same unique name at the beginning of the point name followed by an underscore.

G. Equipment names should follow the standard abbreviations with hyphen between unique sequential characters (See STANDARD ABBREVIATIONS Tables). If more than ten units of the same equipment ID number are utilized a preceding zero shall be used;

1. Example: AHU-01, AHU-10.

2. Example: Blr-01, Chlr-02

3. Example: CHP-1A, HWP-1A, BCHP-1A, BHWP-1A

4. Example: VAV-(AHU#)-(Room number served by the VAV)

a. If multiple rooms are served by the VAV, use the room number in which the thermostat is located.

b. If multiple VAV's serve the same room, add an alpha character to designate (VAV-8-215A/B).

5. Example: FCU-(Room number served by the FCU).

a. If multiple rooms are served by the FCU, use the room number in which the thermostat is located.

b. If multiple FCU's serve the same room, add an alpha character to designate (FCU-215A/B).

1.5 POINTS:

A. Point names should follow the standard abbreviations.

B. Point name compounds should progress from left to right, most general to the left and most specific to the right.

1. Example: SaTemp, SaTempSp, SaPress, SaPressSp, RaHum, RaDeHumidifySp, RaHumidifySp

1.6 HISTORIES:

A. History names should be generated using the Niagara Bformat strings %parent.name% whenever possible.

B. History names should progress from left to right, most general to the left and most specific to the right.

C. The general format is: 3 digit Courier ID XXX, EquipName_SubEquipName_PointNamePointAttribute

1. Example: XXX_AHU01_SaFanCmd, AHU01_SaFanSpd, AHU01_SaFanSts

2. Example: XXX_AHU02_ChWVlvPos,

3. Example: XXX_Blr01_BlrEnab, XXX_Blr01_BlrIsoVlvCmd, XXX_Blr01_BlrCPCmd, XXX_Blr01_BlrETemp, XXX_Blr01_BlrLTemp

4. Example: XXX_Chlr01_ChlrEnab, XXX_Chlr01_ChlrIsoVlvCmd, XXX_Chlr01_ChlrCPCmd, XXX_Chlr01_ChlrETemp, XXX_Chlr01_ChlrLTemp

5. Example: XXX_CHWS_SupTemp, XXX_CHWS_RetTemp, XXX_CHWS_ChWP01_ChWPCmd, XXX_CHWS_ChWP01_ChWPVFDSpd, XXX_CHWS_ChWP02_ChWPSts

6. Example: XXX_MZ01_Zn03_SpcTemp, XXX_MZ01_Zn03_SpcTempEffSp

7. Example: XXX_HWS_SupTemp, XXX_WS_SupTempSp, XXX_HWS_HWRetTemp, XXX_HWS_HWP01_HWPCmd, XXX_HWS_HWP01_HWPSpd

1.6 STANDARD TERMS

A. Circulation (Pump): A pump typically within the plant that circulates a fluid through an individual piece of equipment such as a chiller, boiler, domestic water heater, cooling tower or heat exchanger. Associated with primary, secondary or recirculation hydronic loops.

B. Chilled Water System: A hydronic cold water loop with various BAS controls to provide constant or variable temperatures where global points related to the overall chilled water plant are defined. Points would include; loop entering/leaving temperatures, setpoints, loop pumps, valves, differential pressures and other global points not necessarily located within the Central Plant. This should match Hot Water System

C. Command: Indicates a piece of equipment, valve, damper, or fan has been command to a Boolean value of on/off or open/close. (See Enabled, Status and Position for related points)

D. Effective: Indicates the current temperature or pressure setpoint target given the current mode of operation. For a temperature or flow set point this value would change as a piece of equipment moves between occupied and unoccupied and heating and cooling modes.

E. Enabled/Disabled: A Boolean software point indicating an equipment's local/embedded controller is being enabled and should provide a physical output change in state to start/stop local control. It does not indicate a piece of equipment is running or not running. Points within the local controller must be monitored to indicate the actual running state. Enabled/Disabled should never be used to indicate the commanding of a point or piece of equipment on or off. (See Command and Status for related points)

F. Energy: Tracks the consumption of a unit of energy (kWh, btu, etc.). Always an accumulated value with a totalized tag.

G. Exhaust: Indicates undesired air leaving the building due to contaminants or other undesirable components like excess heat or humidity. Common areas would include bathrooms, mechanical areas, dryers, pools and laboratories.

H. History Intervals: Numeric history intervals for new projects with newer controllers and adequate memory should be 10 minutes or Change Of Value. Retrofit work should correspond with the existing intervals. In all cases the history interval should be the same for all points on a piece of equipment so that histories align on the same time boundaries.

I. Frequency: Frequency is a range of numeric values either commanding or sensing a VFD running at a specific Hz during a slice in time. See Speed for VFD percent control.

J. Hot Water System: A hydronic hot water loop with various BAS controls to provide constant or variable temperatures. Points would include: loop entering/leaving temperatures, setpoints, loop pumps, valves, differential pressure sensors, enabling values and other global points. not necessarily located within the Central Plant.

K. Pumps should be designated as either Primary, Secondary, or Recirculation. “Loop” designation should not be used as it is uncommon and non-specific.

L. Makeup Air Unit: An air handler that takes in outside air and heats, cools, humidifies, or dehumidifies for deliver to the building with no recirculation. May be a preheat unit to an AHU or general discharge into the building.

M. Mixed Air Damper: Mixed air damper should only be used when there is a specific third damper controlling mixed air separate from the outside air damper and the return air damper. An electronically linked two damper configuration of outside and return air dampers should never name the two dampers as a mixed air damper.

N. Mode: A software point indicating the current operating intent of a piece of equipment. Used to understand the current system mode (i.e. Occupancy, Humidify, Dehumidify, Economizing, IAQ, Heating, Cooling, etc.) when analyzing related points.

O. Occupancy: A state of physical presence within a building space that is detected by a device or produced by a Boolean point indicating a unit is in occupied or unoccupied mode.

P. Phase: Indicates electrical attributes (amps, volts, power or energy) as measured across an individual phase. A string value containing A, B, C, AB, BC, AC, AN, BN, CN.

Q. Power: Tracks the instantaneous value of power (kW, btu/h, etc.).

R. Position: A numeric value indicating a valve or damper open position between 0% (Closed) and 100% (Open)

S. Preheat: Preheat indicates heating coils and valves intended to heat outside air to prevent the freezing of cooling coils. Often seen in cold climates with minimum outside air damper positions or large outside air requirements.

T. Primary: The primary tag is always used in the context of the site. Primary refers to piping, valves, pumps and sensors within the heating/cooling plant that moves water between a specific piece of equipment in the central plant. Common primary equipment includes individual chillers, boilers, heat exchangers, isolation valves, pumps and sensors.

U. Radiant: Indicates hot or cold water radiant heating or cooling systems

V. Relief: Indicates a point at which excess air is leaving the building to maintain overall building static pressure and/or indoor air quality. Most commonly associated with the air handling units.

W. Room: A specific area referenced based on architectural floor plans. This term should not be used. Use "Space" instead to represent any specific area ventilated by mechanical equipment derived from the architectural floor plans.

X. Secondary: The secondary tag is always used in the context of the site. Secondary refers to equipment or points moving air or fluids away from ~~a~~ one or more individual primary source(s) to another area for use. Common sources may include chilled water or hot water plants within a building or a central or district plant on a campus. Common uses may include campus distribution of chilled water, hot water, or steam; or chilled, hot, domestic water loops which are not passing directly through primary equipment within a building. (e.g. Secondary Dual Temperature Pumps)

Y. Space: Space is the general term used to define an airtight compartmentalized indoor area ventilated by mechanical equipment such as AHU's, VAV's, UV's, FC's including ancillary Supply and Exhaust Fans and influencing ventilated equipment such as Boilers drawing air from a space. The term "Room" or "Zone" should not be used.

Z. Speed: A numeric value commanding a fan or pump to run at a percentage of capacity from 0% (Stopped) to 100% (Full speed.)

AA. Status: A Boolean point indicating proof a commanded action happened. Typically based on an input measure of flow (air, water, current) resulting from the change in state of a field devices physical reaction. Boolean Status should never be used to indicate the commanding of a point on or off. (See Command and Enabled for related points)

BB. Zone: While "zone" is the haystack tag for a space or room, point naming should use the term "space". See Space.

CC. Total Indicates the total power or energy across all phases of electricity.

## 1.7 SUBMITTALS

A. Provide summary list of BAS Controls Points following the requirements of this specification.

1. Summary list shall follow format noted in Part 2 of this specification.

PART 2 - PRODUCTS

1.

## 2.1 STANDARD ABBREVIATIONS

| Term | Abbreviation |
|---|---|
| Air | Air/a |
| Air HandlerUnit (equip) | AHU |
| Alarm | Alrm |
| Average | Avg |
| Current (Amps) | Amp |
| Backdraft Damper | BDD |
| Boiler (equip) | Blr |
| BTU | BTU |
| Building | Bldg |
| Bypass | Byp |
| Cabinet Unit Heater | CUH |
| Central Exhaust Fan (equip) | CEF |
| Carbon Dioxide | CO2 |
| Carbon Monoxide | CO |
| Chilled Water | ChW |
| Chilled Water System | CHWS |
| Chiller (equip) | Chlr/Chl/Chr |
| Circulation Pump (individual equipment) | CP |
| Cold Deck | CD |
| Command (Open/Closed/On/Off) | Cmd |
| Condenser Water | CW |
| Cooling Coil | CC |
| Cooling Tower (equip) | CT |
| Change of Value | COV |
| Damper | Dmpr |
| Day | Day |
| Dedicated Outside Air System | DOAS |
| DeHumidify (setpoint/enabled/mode) | DeHumidify |
| Dew Point | DewP |
| Differential Pressure | DP |
| Differential Temperature | DT |
| Discharge Air | Da |
| Discharge Air Fan | DaFan |
| Domestic Hot Water System | DHW |
| Dryer | Dryer |
| Dryer Exhaust Fan (equip) | DEF |
| Duct | Duct |

| | |
|---|---|
| Economize (enabled/mode) | Econ |
| Effective | Eff |
| Enable | Enab |
| Entering | Ent |
| Enthalpy | Enth |
| Exhaust Fan (equip) | EF |
| Exhaust Air | Ea |
| Exhaust Air Fan | EaFan |
| Evaporative Unit | EVAP |
| Fan (use pre qualifier: Sa, Ra, Ea) | Fan |
| Fan Coil Unit (equip) | FCU |
| Filter | Fltr |
| Flow | Flow |
| Freeze | Frz |
| Frequency | Freq |
| Fuel Oil | FO |
| Gallons | Gal |
| Glycol | Gly |
| Heat Exchanger (use qualifiers: Stm, ChW) | Hx |
| Heat Recovery Unit (equip) | HRU |
| Heating Coil Hydronic | HC |
| Heating Coil Electric | HCE |
| High | High/Hi |
| Hot Deck | HD |
| Hot Water | HW |
| Hot Water System | HWS |
| Hour | Hr |
| Humidify (setpoint/enabled/mode) | Humidify |
| Humidity (assumed relative) | Hum |
| Indoor Air Quality (mode) | IAQ |
| Interval | INT/int |
| Isolation | Iso |
| Kilowatts (power) | kW |
| Kilowatt Hours (energy) | kWh |
| Leaving | L/Lv |
| Level | Lvl |
| Limit | Lmt |
| Load | Load |
| Low | Low/Lo |
| Makeup Air Unit (equip) | MAU |

| | |
|---|---|
| Maximum | Max |
| Medium | Med |
| Millions BTU | MBTU |
| Minimum | Min |
| Mixed Air | Ma |
| Mixing (Valve) | Mix |
| Mode | Mode |
| Month | Mo |
| Multi Zone (equip) | MZ |
| Occupancy/Occupied | Occ |
| Outside Air | Oa |
| Perimeter | Per |
| Phase | Ph A/B/C |
| Position (%) | Pos |
| Power Factor | PF |
| Preheat (equip) | Preheat |
| Preheat (points) | PH |
| Preheat Coil | PHC |
| Pressure (assumed static) | Press |
| Primary | Pri |
| Pump | Pmp |
| Radiant Heat | Rad |
| Reheat | Reheat/RH |
| Relief / Return Relief | Rlf |
| Return | Ret |
| Return Air | Ra |
| Return Air Fan | RaFan |
| Room | Rm |
| Rooftop Unit | RTU |
| Runtime | Run |
| Secondary | Sec |
| Setpoint | Sp |
| Space | Spc |
| Speed | Spd |
| Stage(s) | Stg(s) |
| Standby | Stby |
| Start/Stop | S/S |
| Static Pressure | Press |
| Status | Sts |
| Steam | Stm |

| | |
|---|---|
| Supply | Sup |
| Supply Air | Sa |
| Supply Air Fan | SaFan |
| Temperature | Temp/T |
| Tons | Ton |
| Tons Refrigerant | TonRef |
| Total | Tot |
| Unit Heater (equip) | UH |
| Unit of Measure | UoM |
| UnOccupied | Unocc |
| VAV (equip) | VAV |
| VAV Cooling Only | VAVCO |
| VAV Heating Only (Dual Duct) | VAVHO |
| VAV with Reheat | VAVRH |
| Valve | Vlv/V |
| Variable Frequency Drive | VFD |
| Variable Refrigerant Flow/Volume | VRF |
| Ventilator Fan (equip) | VF |
| Volts | Volt |
| Volume | Vol |
| Water | Wtr/W |
| Week | Wk |
| Year | Yr |
| Zone (multi zone equip) | Zn |

Specific Tags can be formulated from using multiple grouped abbreviations from above starting with the equipment type designation then using underscores to drill down to the specific device function (VAV_102_Spc_Temp)

The below charts are examples of compliant configurations for systems. Follow the latest version of ASHRAE Standard 135 for values derived from Data Communication Protocol for Building Automation and Control Networks.

2.2 AHU
With Return Air
Equip, hvac, ahu
[rtu],
[elecHeat, hotWaterHeat, steamHeat, gasHeat, noHeat],
[chilledWaterCool, dxCool, noCool],
[directZone, vavZone, chilledBeamZone, multiZone],
[singleDuct, dualDuct, tripleDuct],
[hotDeck, coldDeck, neutralDeck],
[constantVolume, variableVolume]
[humidification, noHumid],
hotWaterPlantRef, chilledWaterPlantRef
Makeup Air
equip, hvac, ahu, mau

| Description | Point Name navName | Tags | Point Type | UoM | History |
|---|---|---|---|---|---|
| General Points | | | | | |
| AHU Enabled | AHUEnabled | enabled, cmd | Bool | Enabled/Disabled | COV, 30days |
| Occupied Command | OccCmd | occupied, cmd | Bool | Occupied/UnOccupied | COV, 30days |
| Occupied Mode | OccMode | occupied, cmd | Enum/Str | | COV, 30days |
| Building Static Pressure | BldgPress | building, air, pressure, sensor | Num, .01 | in w.c. | Int, 5 min |
| Building Static Pressure Setpoint | BldgPressSp | building, air, pressure, sp, hisMode:cov | Num, .01 | in w.c. | COV, 30days |
| Freeze Stat | FrzStat | freeze, air, temp, sensor | Bool | On/Off | COV, 30days |
| Filters | | | | | |
| Filter Alarm | FilterAlrm | filter, alarm sensor | Bool | On/Off | COV, 30days |
| Filter Status | FilterSts | filter, run, sensor | Bool | Ok/Dirty | COV, 30days |
| Filter Pressure Delta | FilterDP | filter, pressure, delta, sensor | Num, .01 | in w.c. | Int, 5 min |
| Single Direct Zone Points | | | | | |
| Space CO2 | SpcCO2 | zone, co2, sensor | Num, 0 | ppm | Int, 5 min |
| Space CO2 Setpoint | SpcCO2Sp | zone, co2, sp, hisMode:cov | Num, 0 | ppm | COV, 30days |
| Space Humidity | SpcHum | zone air, humidity, sensor | Num, 0 | % | Int, 5 min |
| Space Pressure | SpcPress | zone, air, pressure, sensor | Num, .01 | in w.c. | Int, 5 min |
| Space Pressure Setpoint | SpcPressSp | zone, air, pressure, sp, hisMode:cov | Num, .01 | in w.c. | COV, 30days |
| Space Temperature | SpcTemp | zone, air, temp, sensor | Num, 1 | F | Int, 5 min |
| Space Temperature Average (multiple spaces) | SpcTempAvg | zone, air, temp, avg, sensor | Num, 1 | F | Int, 5 min |

| | | | | | |
|---|---|---|---|---|---|
| Space  Temperature Setpoint (effective) | SpcTempSp | zone, air, temp, effective, sp, hisMode:cov | Num, 0 | F | Int, 5 min |
| Occupied Cooling Setpoint | OccCoolSp | zone, air, occ, cooling, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Occupied Heating Setpoint | OccHeatSp | zone, air, occ, heating, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Unoccupied Cooling Setpoint | UnoccCoolSp | zone, air, unocc, cooling, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Unoccupied Heating Setpoint | UnoccHeatSp | zone, air, unocc, heating, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Discharge Air Points - VAV Zones | | | | | |
| DA Fan Command (single or common) | DaFanCmd | discharge, air, fan, run, cmd | Bool | On/Off | COV, 30days |
| DA Fan Status (single or common) | DaFanSts | discharge, air, fan, run, sensor | Bool | On/Off | COV, 30days |
| DA Fan Speed (single or common) | DaFanSpd | discharge, air, fan, speed, cmd | Num, 0 | % | Int, 5 min |
| DA Fan Frequency (single or common) | DaFanFreq | discharge, air, fan, freq, sensor | Num, 0 | Hz | Int, 5 min |
| DA Humidity | DaHum | discharge, air, humidity, sensor | Num, 0 | % | Int, 5 min |
| DA Humidity High Limit | DaHumHiLmt | discharge, air, humidity, high, sp, hisMode:cov | Num, 0 | % | COV, 30days |
| DA Pressure | DaPress | discharge, air, pressure, sensor | Num, .01 | in w.c. | Int, 5 min |
| DA Pressure Setpoint | DaPressSp | discharge, air, pressure, sp, hisMode: cov | Num, .01 | in w.c. | Int, 5 min |
| DA Pressure High Limit (Alarm) | DaPressHiLmt | discharge, air, temp, high, limit, sp, hisMode:cov | Num, 0 | % | COV, 30days |
| DA Pressure Low Limit (Alarm) | DaPressLowLmt | discharge, air, temp, low, limit, sp, hisMode:cov | Num, 0 | % | COV, 30days |
| DA Temperature | DaTemp | discharge, air, temp, sensor | Num, 1 | F | Int, 5 min |
| DA Temperature Setpoint (effective) | DaTempSp<br>DaTempEffSp | discharge, air, temp, effective, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| DA Temperature High Limit | DaTempHiLmt | discharge, air, temp, high, limit, sp, hisMode:cov | Num, 0 | % | COV, 30days |
| Cold Deck DA Temp | CDDaTemp | discharge, air, temp, sensor, coldDeck | Num, 1 | F | Int, 5 min |
| Cold Deck DA Temp Setpoint | CDDaTempSp | discharge, air, temp, sp, coldDeck, hisMode:cov | Num, 0 | F | COV, 30days |
| Hot Deck DA Temp | HDDaTemp | discharge, air, temp, sensor, hotDeck | Num, 1 | F | Int, 5 min |
| Hot Deck DA Temp Setpoint | HDDaTempSp | discharge, air, temp, sp, hotDeck, hisMode:cov | Num, 0 | F | COV, 30days |
| Systems with Return Air | | | | | |
| RA CO2 | RaCO2 | return, co2, sensor | Num, 0 | ppm | Int, 5 min |
| RA CO2 Setpoint | RaCO2Sp | return, co2, sp, hisMode:cov | Num, 0 | ppm | COV, 30days |
| RA Damper Position | RaDmprPos | return, air, damper, cmd, outside, | Num, 0 | % | Int, 5 min |
| RA DeHumidify Setpoint | RaDehumidifySp | return, air, humidity, deHumidify, sp, hisMode:cov | Num, 0 | %RH | COV, 30days |
| RA Enthalpy | RaEnthalpy | return, air, enthalpy, sensor | Num, 1 | J/g or kJ/kg | Int, 5 min |
| RA Humidify Setpoint | RaHumidifySp | return, air, humidity, humidify, sp, hisMode:cov | Num, 0 | %RH | COV, 30days |
| RA Humidity | RaHum | return, air, humidity, sensor | Num, 0 | %RH | Int, 5 min |

| | | | | | |
|---|---|---|---|---|---|
| RA Fan Command (single or common) | RaFanCmd | return, air, fan, run, cmd | Bool | On/Off | COV, 30days |
| RA Fan Status (single or common) | RaFanSts | return, air, fan, run, sensor | Bool | On/Off | COV, 30days |
| RA Fan Speed (single or common) | RaFanSpd | return, air, fan, speed, cmd | Num, 0 | % | Int, 5 min |
| RA Fan Frequency (single or common) | RaFanFreq | return, air, fan, freq, sensor | Num, 0 | Hz | Int, 5 min |
| RA Pressure | RaPress | return, air, pressure, sensor | Num, .01 | in w.c. | Int, 5 min |
| RA Pressure Setpoint | RaPressSp | return, air, pressure, sp, hisMode: cov | Num, .01 | in w.c. | COV, 30days |
| RA Temperature | RaTemp | return, air, temp, sensor | Num, 1 | F | Int, 5 min |
| RA Temperature Setpoint | RaTempSp | return, air, temp, sp, hisMode: cov | Num, 1 | F | Int, 5 min |
| RA Temperature High Limit (Alarm) | RaTempHiLmt | return, air, temp, high, limit, sp | Num, 1 | F | COV, 30days |
| Systems with Relief Air | | | | | |
| Relief Air Damper Position | RlfDmprPos | relief, air, damper, cmd | Num, 0 | % | Int, 5 min |
| Relief Fan Command (single or common) | RlfFanCmd | relief, air, fan, run, cmd | Bool | On/Off | COV, 30days |
| Systems with Outside Air | | | | | |
| Outside Air Damper Command (open/closed) | OaDmprCmd | outside, air, damper, cmd | Bool | Open/Closed | COV, 30days |
| Outside Air Damper Position | OaDmprPos | outside, air, damper, cmd | Num, 0 | % | Int, 5 min |
| Outside Air Enthalpy | OaEnthalpy | outside, air, enthalpy, sensor | Num, 1 | J/g or kJ/kg | Int, 10min |
| Outside Air Fan Command (single or common) | OaFanCmd | outside, air, fan, run, cmd | Bool | On/Off | COV, 30days |
| Outside Air Fan Status (single or common) | OaFanSts | outside, air, fan, run, sensor | Bool | On/Off | COV, 30days |
| Outside Air Fan Speed (single or common) | OaFanSpd | outside, air, fan, speed, cmd | Num, 0 | % | Int, 10 min |
| Outside Air Flow | OaFlow | outside, air, flow, sensor | Num, 0 | cfm | Int, 10 min |
| Outside Air Humidity | OaHum | outside, air, humidity, sensor | Num, 0 | %RH | Int, 10 min |
| Outside Air Temperature | OaTemp | outside, air, temp, sensor | Num, 1 | F | Int, 10 min |
| Mixed Air Points | | | | | |
| Mixed Air Temp | MaTemp | mixed, air, temp, sensor | Num, 1 | F | Int, 10min |
| Mixed Air Temp Setpoint | MaTempSp | mixed, air, temp, sp | Num, 1 | F | COV, 30days |
| Mixed Air Damper Position | MaDmprPos | mixed, air, damper, cmd | Num, 0 | % | Int, 10min |
| Mixed Air Damper High Position | MaDmprHiPos | mixed, air, damper, high, sp | Num, 0 | % | COV, 30days |
| Systems with Heating | | | | | |
| Hot Water Coil Circulation Pump Command | HWCPCmd | hot, water circ, pump, run, cmd | Bool | On/Off | COV, 30days |
| Hot Water Coil Circulation Pump Status | HWCPSts | hot, water circ, pump, run, sensor | Bool | On/Off | COV, 30days |
| Hot Water Coil Isolation Valve Command | HWCPIsoCmd | hot, water Isolation, valve, cmd | Bool | On/Off | COV, 30days |
| Hot Water Valve Position | HWVlvPos | hot, water, valve, cmd | Num, 0 | % | Int, 5min |
| Heating Coil Air Leaving Temp | HCAirLTemp | heat, air, temp, leaving, sensor | Num, 1 | F | Int, 5min |

| | | | | | |
|---|---|---|---|---|---|
| Heating Coil Air Leaving Temp Setpoint | HCAirLTempSp | heat, air, temp, leaving, sp | Num, 1 | F | COV, 30days |
| Preheat Valve Position | PHVlvPos | preheat, water, valve, cmd | Num, 0 | % | Int, 10min |
| PreHeat Coil Air Leaving Temp | PHCAirLTemp | preheat, air, temp, leaving, sensor | Num, 1 | F | Int, 10min |
| PreHeat Coil Air Leaving Temp Setpoint | PHCAirLTempSp | preheat, air, temp, leaving, sp | Num, 1 | F | COV, 30days |
| Heating Stages | HtgStage1-n | heating, stage, cmd | Bool | On/Off | COV, 30days |
| Systems with Cooling | | | | | |
| Chilled Water Coil Circ Pump Command | ChWCPCmd | chilled, water, pump, run, cmd | Bool | On/Off | COV, 30days |
| Chilled Water Coil Circ Pump Status | ChWCPSts | chilled, water, pump, run, sensor | Bool | On/Off | COV, 30days |
| Chilled Water Coil Isolation Valve Command | ChWCPIsoCmd | chilled water Isolation, valve, cmd | Bool | On/Off | COV, 30days |
| Chilled Water Valve Position | ChWVlvPos | chilled, water, valve, cmd | Num, 0 | % | Int, 5 min |
| Chilled Water Valve Status | ChWVlvSts | chilled, water, valve, sensor | Num, 0 | % | Int, 5 min |
| Chilled Water Temp Leaving | ChWLTemp | chilled, water, temp, leaving, sensor | Num, 1 | F | Int, 5 min |
| Chilled Water Flow | ChWFlow | chilled, water, flow, sensor | Num, 0 | gpm | Int, 5 min |
| Cooling Coil Air Leaving Humidity | CCAirLHum | cool, air, humidity, leaving, sensor | Num, 1 | F | Int, 5 min |
| Cooling Coil Air Leaving Temp | CCAirLTemp | cool, air, temp, leaving, sensor | Num, 1 | F | Int, 5 min |
| Cooling Coil Air Leaving Temp Setpoint | CCAirLTempSp | cool, air, temp, leaving, sp | Num, 1 | F | COV, 30days |
| Cooling Stage Status | ClgStage(1-n)Sts | cooling, stage, sensor | Bool | On/Off | COV, 30days |
| Cooling Stages Status | ClgStg | cooling, stage, sensor | Num, 0 | None | Int, 5 min |
| Systems that Economize | | | | | |
| Economize Mode | EconMode | economize, run, cmd | Bool | On/Off | COV, 30days |
| Minumum Outside Air Setpoint | EconOaMinSp | economize, outside, air, min, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Systems with Direct Evaporative Cooling | | | | | |
| Direct EVAP Drain Command | DirEvapDrainCmd | directEvap, drain, run, cmd | Bool | On/Off | COV, 30days |
| Direct EVAP Fill Command | DirEvapFillCmd | directEvap, fill, run, cmd | Bool | On/Off | COV, 30days |
| Direct EVAP Flush Command | DirEvapFlushCmd | directEvap, flush, run, cmd | Bool | On/Off | COV, 30days |
| Direct EVAP Pump Command | DirEvapPumpCmd | directEvap, pump, run, cmd | Bool | On/Off | COV, 30days |
| Systems that Humidify | | | | | |
| Humidify Mode | HumidifyMode | humidify, run, cmd | Bool | On/Off | COV, 30days |
| Humidifier Enable | HumidifierEnab | humidifier, enable, cmd | Bool | Enabled/Disabled | COV, 30days |
| Humidifier Command | HumidifierCmd | humidifier, run, cmd | Bool | On/Off | COV, 30days |
| Humidifier Status | HumidifierSts | humidifier, run, sensor | Bool | On/Off | COV, 30days |

| | | | | | |
|---|---|---|---|---|---|
| Humidifier Valve/Output/Level | HumidifierVlv | humidifier, valve, cmd | Num, 0 | % | Int, 5 min |
| See Return Air Humidity & Humidify Setpoint | | | | | |
| Systems that Dehumidify | | | | | |
| DeHumidify Mode | DehumidifyMode | dehumidify, run, cmd | Bool | Active/Inactive | COV, 30days |
| See Return Air Humidity & Dehumidify Setpoint | | | | | |
| Systems Managing Indoor Air Quality | | | | | |
| Indoor Air Quality Mode | IAQMode | iaq, run, cmd | Bool | Active/Inactive | COV, 30days |
| VAV Load and Demand Points | | | | | |
| VAV Damper Position Maximum | VAVDmprPosMax | vav, damper, max, sensor | Num, 0 | % | Int, 5 min |
| VAV Damper Position Minimum | VAVDmprPosMin | vav, damper, min, sensor | Num, 0 | % | Int, 5 min |
| VAV Damper Position Average | VAVDmprAvg | vav, damper, avg, sensor | Num, 0 | % | Int, 5 min |
| VAV Cooling Terminal Load Maximum | VAVCoolTermLoadMax | vav, cooling, terminalLoad, max, sensor | Num, 0 | % | Int, 5 min |
| VAV Cooling Terminal Load Minimum | VAVCoolTermLoadMin | vav, cooling, terminalLoad, min, sensor | Num, 0 | % | Int, 5 min |
| VAV Cooling Terminal Load Average | VAVCoolTermLoadAvg | vav, cooling, terminalLoad, avg, sensor | Num, 0 | % | Int, 5 min |
| VAV Heating Terminal Load Maximum | VAVHeatTermLoadMax | vav, heating, terminalLoad, max, sensor | Num, 0 | % | Int, 5 min |
| VAV Heating Terminal Load Minimum | VAVHeatTermLoadMin | vav, heating, terminalLoad, min, sensor | Num, 0 | % | Int, 5 min |
| VAV Heating Terminal Load Average | VAVHeatTermLoadAvg | vav, heating, terminalLoad, avg, sensor | Num, 0 | % | Int, 5 min |
| Energy Points - Heat Recovery Water | | equip, water, meter, hru | | | |
| Heat Recovery Water Temp Entering | HRUWEtemp | water, temp, entering, sensor | Num, 1 | F | Int, 5 min |
| Heat Recovery Water Temp Leaving | HRUWLTemp | water, temp, leaving, sensor | Num, 1 | F | Int, 5 min |
| Heat Recovery Water Volumertic Flow | HRUWFlow | water, flow, sensor | Num, 1 | gal/min | Int, 5 min |
| Heat Recovery Water Energy (accumulated) | HRUWEnergy | water, energy, hisTotalized, sensor | Num, 0 | MMbtu | Int, 5 min |
| Heat Recovery Water Power | HRUWPower | water, power, sensor | Num, 0 | MMbtu/h | Int, 5 min |
| Heat Recovery Pump Command | HRUCPCmd | hru, circ, pump, run, cmd | Bool | On/Off | COV, 30days |
| Heat Recovery Air Leaving Temp | HRUALTemp | hru, air, temp, leaving, sensor | Num, 1 | F | Int, 5 min |

2.3 VAV
equip, vav, ahuRef,
[fanPowered, series, parallel],
[singleDuct, dualDuct],
[hotWaterReheat, elecReheat, coolOnly]

| Description | Point Name navName | Tags | Point Type | UoM | History |
|---|---|---|---|---|---|
| Bypass Time | BypTime | bypass, time, sensor | Num, 0 | h | Int, 10min |
| Occupied Mode | Occ | occupied, cmd | Bool | Occ/UnOcc | COV, 30days |
| HVAC Mode | HVACMode | hvac, sensor | Str | Heating/Cooling/Bypass | COV, 30days |
| Discharge Air Flow | DaFlow | discharge, air, flow, sensor | Num, 0 | cfm | Int, 10min |
| Discharge Air Flow Setpoint | DaFlowEffSp | discharge, air, flow, effective, sp | Num, 0 | cfm | Int, 10min |
| Damper Position | DmprPos | air, damper, cmd | Num, 0 | % | Int, 10min |
| Reheat Valve | RHVlvlPos | reheat, water, valve, cmd | Num, 0 | % | Int, 10min |
| Discharge Air Temperature | DaTemp | discharge, air, temp, sensor | Num, 1 | F | Int, 10min |
| Space Temperature | SpcTemp | zone, air, temp, sensor | Num, 1 | F | Int, 10min |
| Space Temperature Setpoint (effective) | SpcTempSp | zone, air, temp, effective, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Occupied Cooling Setpoint | OccCoolSp | occ, cooling, zone, air, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Occupied Heating Setpoint | OccHeatSp | occ, heating, zone, air, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Unoccupied Cooling Setpoint | UnoccCoolSp | unocc, cooling, zone, air, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Unoccupied Heating Setpoint | UnoccHeatSp | unocc, heating, zone, air, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Standby Cooling Setpoint | StbyCoolSp | standby, cooling, zone, air, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Standby Heating Setpoint | StbyHeatSp | standby, heating, zone, air, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Effective Cooling Setpoint | EffCoolSp | cooling, zone, air, temp, effective, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Effective Heating Setpoint | EffHeatSp | heating, zone, air, temp, effective, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Space Humidity | SpcHum | zone, air, humidity, sensor | Num, 0 | %RH | Int, 10min |
| Spcae Humidity Setpoint | SpcHumSp | zone, air, humidity, sp, hisMode:cov | Num, 0 | %RH | Int, 10min |
| Space CO2 | SpcCO2 | zone, air, co2, sensor | Num, 0 | ppm | Int, 10min |
| Space CO2 Setpoint | SpcCO2Sp | zone, air, co2, sp, hisMode:cov | Num, 0 | ppm | Int, 10min |
| Dual Duct Systems | | | | | |
| Cold Deck Damper Position | CDDmprPos | air, damper, cmd, coldDeck | Num, 0 | % | Int, 10min |
| Cold Deck Discharge Air Flow | CDDaFlow | discharge, air, flow, sensor, coldDeck | Num, 0 | cfm | Int, 10min |
| Cold Deck Discharge Air Flow Setpoint | CDDaFlowSp | discharge, air, flow, effective, sp, coldDeck | Num, 0 | cfm | Int, 10min |

| | | | | | |
|---|---|---|---|---|---|
| Hot Deck Damper Position | HDDmprPos | air, damper, cmd, hotDeck | Num, 0 | % | Int, 10min |
| Hot Deck Discharge Air Flow | HDDaFlow | discharge, air, flow, sensor, hotDeck | Num, 0 | cfm | Int, 10min |
| Hot Deck Discharge Air Flow Setpoint | HDDaFlowSp | discharge, air, flow, effective, sp, hotDeck | Num, 0 | cfm | Int, 10min |
| Total Discharge Air Flow | TotDaFlow | discharge, air, flow, sensor, coldDeck | Num, 0 | cfm | Int, 10min |
| Commissioning Points | | | | | |
| Single PID Throttling Range | VavPIDTr | vav, pid, throttlingRange, sp | Num, 0 | % | COV, 30days |
| Single PID Integral | VavPIDInt | vav, pid, integral, sp | Num, 0 | % | COV, 30days |
| Cooling Max Flow | CoolMaxFlow | cooling, max, flow, sp | Num, 0 | cfm | COV, 30days |
| Cooling Min Flow | CoolMinFlow | cooling, min, flow, sp | Num, 0 | cfm | COV, 30days |
| Cooling PID Throttling Range | CoolPIDTr | cooling, pid, throttlingRange, sp | Num, 0 | % | COV, 30days |
| Cooling PID Integral | CoolPIDInt | cooling, pid, integral, sp | Num, 0 | % | COV, 30days |
| Cooling Terminal Load | CoolTermLoad | cooling, load, sensor | Num, 0 | % | Int, 10min |
| Heating Max Flow | HeatMaxFlow | heating, max, flow, sp | Num, 0 | cfm | COV, 30days |
| Heating Min Flow | HeatMinFlow | heating, min, flow, sp | Num, 0 | cfm | COV, 30days |
| Heating PID Throttling Range | HeatPIDTr | heating, pid, throttlingRange, sp | Num, 0 | % | COV, 30days |
| Heating PID Integral | HeatPIDInt | heating, pid, integral, sp | Num, 0 | % | COV, 30days |
| Heating Terminal Load | HeatTermLoad | heating, load, sensor | Num, 0 | % | Int, 10min |
| Fan Powered Boxes | | | | | |
| Fan Command | FanCmd | fan, run, cmd | Bool | On/Off | COV, 30days |
| Fan Speed | FanSpd | fan, speed,  cmd | Num, 0 | % | Int, 10min |
| Fan High Speed | FanSpdHigh | fan, speed, high, run, cmd | Bool | On/Off | COV, 30days |
| Fan Medium Speed | FanSpdMed | fan, speed, med, run, cmd | Bool | On/Off | COV, 30days |
| Fan Low Speed | FanSpdLow | fan, speed, low, run, cmd | Bool | On/Off | COV, 30days |

2.4 FCU
equip, hvac, fcu,
[elecHeat, hotWaterHeat, noHeat]
[chilledWaterCool, noCool]

| Description | Point Name navName | Tags | Point Type | UoM | History |
|---|---|---|---|---|---|
| Occupied Mode | Occ | occupied, cmd | Bool | Occ/UnOcc | COV, 30days |
| Chilled Water Valve | ChWVlvPos | chilled, water, valve, cmd | Num, 0 | % | Int, 10min |
| Common Water Valve (Seasonal Chilled/Hot) | ChWHWVlvPos | common, water, valve, cmd | Num, 0 | % | Int, 10min |
| Discharge Air Temperature | DaTemp | discharge, air, temp | Num, 1 | F | Int, 10min |
| Fan Command | FanCmd | fan, run, cmd | Bool | On/Off | COV, 30days |
| Fan Status | FanSts | fan, run, sensor | Bool | On/Off | COV, 30days |
| Fan Speed | FanSpd | fan, speed, cmd | enum | Off/Low/Med/High | COV, 30days |
| Hot Water Valve | HWVlvPos | hot, water, valve, cmd | Num, 0 | % | Int, 10min |
| HVAC Mode | HVACMode | hvac, run, cmd | enum | Heat/Cool | COV, 30days |
| Space Temperature | SpcTemp | zone, air, temp, sensor | Num, 1 | F | Int, 10min |
| Space Temperature Setpoint (effective) | SpcTempSp | zone, air, effective, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Occupied Cooling Setpoint | OccCoolSp | occ, cooling, zone, air, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Occupied Heating Setpoint | OccHeatSp | occ, heating, zone, air, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Unoccupied Cooling Setpoint | UnoccCoolSp | unocc, cooling, zone, air, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Unoccupied Heating Setpoint | UnoccHeatSp | unocc, heating, zone, air, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| While the four occ/unocc heating/cooling setpoints above rarely change, their histories are needed in analytics to determine when temperatures have drifted too high or low. | | | | | |

2.5 EF (Exhaust Fans)
equip, exhaust, fan

| Description | Point Name navName | Tags | Point Type | UoM | History |
|---|---|---|---|---|---|
| Occupancy | Occ | occupied, cmd | Bool | Occ/UnOcc | COV, 30days |
| Exhaust Fan Enable | EFEnab | enable, cmd | Bool | Enabled/Disabled | COV, 30days |
| Exhaust Fan Command | EFCmd | fan, run, cmd | Bool | On/Off | COV, 30days |
| Exhaust Fan Status | EFSts | fan, run, sensor | Bool | On/Off | COV, 30days |
| Exhaust Fan Speed | EFSpd | fan, speed, cmd | Num, 0 | % | Int, 10min |
| Exhaust Damper Command (open/closed) | EFDmprCmd | damper, cmd | Bool | Open/Closed | COV, 30days |
| Exhaust Damper Position | EFDmprPos | damper, cmd | Num, 0 | % | Int, 10min |
| Exhaust Damper Status | EFDmprSts | damper, sensor | Bool | On/Off | COV, 30days |
| Energy Points - Electric | | equip, elec, meter, exhaust, fan [siteMeter, submeterOf] | | | |
| VFD Energy Total (accumulated) | EFVFDEnergy | exhaust, fan, elec, energy, total, sensor, hisTotalized | Num, 0 | kWh | Int, 10min |
| VFD Power Total | EFVFDPower | exhaust, fan, elec, power, total, active, sensor | Num, 0 | kW | Int, 10min |

2.6 Chiller
equip, chiller, chilledWaterPlantRef,
[absorption, reciprocal, screw, centrifugal],
[waterCooled, airCooled]

| Description | Point Name<br>navName | Tags | Point Type | UoM | History |
|---|---|---|---|---|---|
| Chiller Enable | ChlrEnab | chiller, enable, cmd | Bool | Enabled/Disabled | COV, 30days |
| Chiller Command | ChlrCmd | chiller, run, cmd | Bool | On/Off | COV, 30days |
| Chiller Status | ChlrSts | chiller, run, sensor | Bool | On/Off | COV, 30days |
| Chiller Compressor Stage Command | ChlrStg(1-n)Cmd | chiller, stage, cmd | Bool | On/Off | COV, 30days |
| Chiller Compressor Stage Status | ChlrStg(1-n)Sts | chiller, stage, sensor | Bool | On/Off | COV, 30days |
| Chiller Compressor Stage | ChlrStg | chiller, stage, sensor | Num, 0 | | Int, 10min |
| Chiller Load | ChlrLoad | chiller, load, sensor | Num, 0 | % | Int, 10min |
| Tons | ChlrTons | chilled, water, power, sensor | Num, 0 | tonref | Int, 10min |
| Condenser Water Isolation Valve | CWIsoVlvCmd | condenser, isolation, valve, cmd | Bool | Open/Closed | COV, 30days |
| Condesner Water Circulation Pump | CWCPCmd | condenser, circ, pump, cmd | Bool | On/Off | COV, 30days |
| Condenser Water Entering Temperature | CWETemp | condenser, water, entering, temp, sensor | Num, 1 | F | Int, 10min |
| Condenser Water Leaving Temperature | CWLTemp | condenser, water, leaving, temp, sensor | Num, 1 | F | Int, 10min |
| Chilled Water Isolation Valve | ChWIsoVlvCmd | chilled, isolation, valve, cmd | Bool | Open/Closed | COV, 30days |
| Chilled Water Entering Temperature | ChWETemp | chilled, water, entering, temp, sensor | Num, 1 | F | Int, 10min |
| Chilled Water Leaving Temperature | ChWLTemp | chilled, water, leaving, temp, sensor | Num, 1 | F | Int, 10min |
| Chilled Water Setpoint | ChWSp | chilled, water, leaving, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Chilled Water Pump Command | ChWP(1-n)Cmd | chilled, water, pump, run, cmd | Bool | On/Off | COV, 30days |
| Chilled Water Pump Speed | ChWP(1-n)Spd | chilled, water, pump, speed, cmd | Num,0 | % | Int, 10min |
| Chilled Water Flow | ChWFlow | chilled, water, flow, sensor | Num, 0 | gal/min | Int, 10min |
| Chilled Water Differential Presssure | ChWDP | chilled, water, delta, pressure, sensor | Num, 0 | gal/min | Int, 10min |
| Oil Temp | ChlrOilTemp | oil, temp, sensor | Num, 1 | F | Int, 10min |
| Oil Heater Command | ChlrOilHeatCmd | oil, heater, run, cmd | Bool | On/Off | COV, 30days |
| Oil Heater Status | ChlrOilHeatSts | oil, heater, run, sensor | Bool | On/Off | COV, 30days |

| Energy Points - Electric | | equip, elec, meter, chiller | | | |
|---|---|---|---|---|---|
| Current | ChlrAmp | mag, current, sensor | Num, 0 | A | Int, 10min |
| Volts | ChlrVolts | volt, mag, sensor | Num, 0 | V | Int, 10min |
| Energy Total (accumulated) | ChlrEnergyTot | elec, energy, total, sensor, hisTotalized | Num, 0 | kWh | Int, 10min |
| Power Total | ChlrPower | elec, power, total, active, sensor | Num, 0 | kW | Int, 10min |
| Power Factor Total | ChlrPF | pf, total, sensor | Num, 0.01 | unitless | Int, 10min |
| | | | | | |

| Energy Points - Water | | equip, water, meter, chiller | | | |
|---|---|---|---|---|---|
| Chilled Water Temperature Entering | ChWEtemp | water, temp, entering, sensor | Num, 1 | F | Int, 10min |
| Chilled Water Temperature Leaving | ChWLTemp | water, temp, leaving, sensor | Num, 1 | F | Int, 10min |
| Chilled Water Flow | ChWFlow | water, flow, sensor | Num, 1 | gal/min | Int, 10min |
| Chilled Water Volume (accumulated) | ChWVol | water, volume, total, sensor | Num, 0 | gal | Int, 10min |
| Chilled Water Energy (accumulated) | ChWEnergy | water, energy, hisTotalized, sensor | Num, 0 | btu | Int, 10min |
| Chilled Water Power | ChWPower | water, power, sensor | Num, 0 | btu/h | Int, 10min |

2.7 Boiler
equip, boiler, hotWaterPlantRef,
[condensing, automospheric]
[hot water, steam]
[oil, gas]

| | | | | | |
|---|---|---|---|---|---|
| Description | Point Name navName | Tags | Point Type | UoM | History |
| Boiler Enable | BlrEnab | boiler, enable, cmd | Bool | Enabled/Disabled | COV, 30days |
| Boiler Command | BlrCmd | boiller, run, cmd | Bool | On/Off | COV, 30days |
| Boiler Status | BlrSts | boiller, run, sensor | Bool | On/Off | COV, 30days |
| Entering Water Temperature | BlrETemp | entering, water, temp, sensor | Num, 1 | F | Int, 10min |
| Leaving Water Temperature | BlrLTemp | leaving, water, temp, sensor | Num, 1 | F | Int, 10min |
| Boiler Leaving Setpoint | BlrLTempSp | leaving, water, temp, sp, hisMode:cov | Num, 0 | F | COV, 30days |
| Boiler Isolation Valve | BlrIsoVlvCmd | isolation, valve, cmd | Bool | Open/Closed | COV, 30days |
| Boiler Circulation Pump | BlrCPCmd | pump, circ, run, cmd | Bool | On/Off | COV, 30days |
| Firing Rate | BlrFiringRate | boiler,firingRate, sensor | Num, 0 | % | Int, 10min |
| Hot Water Pump Command | HWP(1-n)Cmd | hot, water, pump, run, cmd | Bool | On/Off | COV, 30days |
| Hot Water Pump Speed | HWP(1-n)Spd | hot, water, pump, speed, cmd | Num,0 | % | Int, 10min |
| Systems with Heat Recovery | | | | | |
| Heat Recovery Circulation Pump Command | HRUCPCmd | pump, circ, run, cmd | Bool | On/Off | COV, 30days |
| Heat Recovery Circulation Pump Status | HRUCPSts | pump, circ, run, sensor | Bool | On/Off | COV, 30days |
| | | | | | |
| Energy Points - Gas | | equip, gas, meter, boiler | | | |
| Gas Flow | BlrGasFlow | gas, flow, sensor | Num, 0 | ccf/h | Int, 10min |
| Gas Volume (accumulated) | BlrGasVol | gas, volume, sensor, hisTotalized | Num, 0 | ccf | Int, 10min |
| Gas Energy (accumulated) | BlrGasEnergy | gas, energy, sensor, hisTotalized | Num, 0 | Mmbtu | Int, 10min |
| Gas Power | BlrGasPower | gas, power, sensor | Num, 0 | MMbtu/h | Int, 10min |
| | | | | | |
| Energy Points - Water | | equip, water, meter, boiler | | | |
| Boiler Water Temperature Entering | BlrETemp | water, temp, entering, sensor | Num, 1 | F | Int, 10min |
| Boiler Water Temperature Leaving | BlrLTemp | water, temp, leaving, sensor | Num, 1 | F | Int, 10min |
| Boiler Water Flow | BlrFlow | water, flow, sensor | Num, 1 | gal/min | Int, 10min |
| Boiler Water Volume (accumulated) | BlrVol | water, volume, hisTotalized, sensor | Num, 0 | gal | Int, 10min |
| Boiler Water Energy (accumulated) | BlrWEnergy | water, energy, hisTotalized, sensor | Num, 0 | MMbtu | Int, 10min |
| Boiler Water Power | BlrWPower | water, power, sensor | Num, 0 | MMbtu/h | Int, 10min |
| | | | | | |
| Energy Points - Heat Recovery Water | | equip, water, meter, boiler, hru | | | |

| | | | | | |
|---|---|---|---|---|---|
| Heat Recovery Water Temp Entering | HRUWEtemp | water, temp, entering, sensor | Num, 1 | F | Int, 10min |
| Heat Recovery Water Temp Leaving | HRUWLTemp | water, temp, leaving, sensor | Num, 1 | F | Int, 10min |
| Heat Recovery Water Flow | HRUWFlow | water, flow, sensor | Num, 0 | gal/min | Int, 10min |
| Heat Recovery Water Volume (accumulated) | HRUWVol | water, volume, hisTotalized, sensor | Num, 0 | gal | Int, 10min |
| Heat Recovery Water Energy (accumulated) | HRUWEnergy | water, energy, hisTotalized, sensor | Num, 0 | MMbtu | Int, 10min |
| Heat Recovery Water Power | HRUWPower | water, power, sensor | Num, 0 | MMbtu/h | Int, 10min |
| | | | | | |
| | | | | | |

2.8 Fans (individual)
Discharge Fan
equip, discharge, fan
Return Fan
equip, return, fan
Exhaust Fan
equip, exhaust, fan
Relief Fan
equip, relief, fan
FCU Fan
equip, fcu, fan
Cooling Tower
equip, coolingTower, fan

| Description | Point Name navName | Tags | Point Type | UoM | History |
|---|---|---|---|---|---|
| Fan Command | FanCmd | fan, run, cmd | Bool | On/Off | COV, 30days |
| Fan Status | FanSts | fan, run, sensor | Bool | On/Off | COV, 30days |
| Fan Speed | FanSpeed | fan, speed cmd, hisMode:cov | enum | Off/Low/Med/High | COV, 30days |
| Fan VFD Speed | FanVFDSpd | fan, speed, cmd | Num, 0 | % | Int, 10min |
| Fan VFD Frequency | FanVFDFreq | fan, freq, sensor | Num, 0 | Hz | Int, 10min |
| Fan Speed Low | FanSpdLow | fan, speed, low, run, cmd | Bool | On/Off | COV, 30days |
| Fan Speed Medium | FanSpdMed | fan, speed, medium, run, cmd | Bool | On/Off | COV, 30days |
| Fan Speed High | FanSpdHigh | fan, speed, high, run, cmd | Bool | On/Off | COV, 30days |

| | | | | | |
|---|---|---|---|---|---|
| VFD Energy Total (accumulated) | VFDEnergy | fan, elec, energy, total, sensor, hisTotalized | Num, 0 | kWh | Int, 10min |
| VFD Power Total | VFDPower | fan, elec, power, total, active, sensor | Num, 0 | kW | Int, 10min |

Pumps (individual)
Chiller Circ Pump
equip, pump, chiller, circ, primary
ChW Pump
equip, pump, chilled, secondary
Boiler Circ Pump
equip, pump, boiler, circ, primary
HW Loop Pump
equip, pump, hot, secondary
DHW Loop Pump
equip, pump, domestic, hot
GHW Pump
equip, pump, glycol, hot
CT Pump
equip, pump, coolingTower
CW Pump
equip, pump,  condenser

| Description | | Tags | Point Type | UoM | History |
|---|---|---|---|---|---|
| Pump Enable | PumpEnab | pump, enable, cmd | Bool | Enabled/Disabled | COV, 30days |
| Pump Command | PumpCmd | pump, run, cmd | Bool | On/Off | COV, 30days |
| Pump Status | PumpSts | pump, run, sensor | Bool | On/Off | COV, 30days |
| Pump VFD Speed | PumpVFDSpd | pump, speed, cmd | Num, 0 | % | Int, 10min |
| Pump VFD Frequency | PumpVFDFreq | pump, freq, sensor | Num, 0 | Hz | Int, 10min |
| Energy Points - Electric | | equip, elec, meter, pump | | | |
| VFD Energy Total (accumulated) | VFDEnergy | pump, elec, energy, hisTotalized, sensor | Num, 0 | kWh | Int, 10min |
| VFD Power Total | VFDPower | pump, elec, power, active, hisTotalized, sensor | Num, 0 | kW | Int, 10min |
| Energy Points - Water | | equip, water, meter, chiller | | | |
| Water Temperature Entering | Etemp | water, temp, entering, sensor | Num, 1 | F | Int, 10min |
| Water Temperature Leaving | LTemp | water, temp, leaving, sensor | Num, 1 | F | Int, 10min |
| Water Flow | Flow | water, flow, sensor | Num, 1 | gal/min | Int, 10min |
| Water Volume (accumulated) | Vol | water, volume, hisTotalized, sensor | Num, 0 | gal | Int, 10min |
| Water Energy (accumulated) | WtrEnergy | water, energy, hisTotalized, sensor | Num, 0 | MMbtu | Int, 10min |
| Water Power | WtrPower | water, power, sensor | Num, 0 | MMbtu/h | Int, 10min |

2.9 Electric Meter
equip, elec, meter,
[siteMeter, submeterOf]

| Description | Point Name navName | Tags | Point Type | UoM | History |
|---|---|---|---|---|---|
| Energy Points - Electric | | | | | |
| Energy Total (accumulated) | EnergyTot | elec, total, energy, sensor, hisTotalized | Num, 0 | kWh | Int, 10min |
| Power Total | Power | elec, total, power, active, sensor | Num, 0 | kW | Int, 10min |
| Power Factor Total | PF | elec, total, pf, sensor | Num, 0.01unitless | unitless | Int, 10min |
| Power Quality Points | | | | | |
| Current A | Current_A | elec, phase, current, sensor | Num, 1 | A | Int, 10min |
| Current B | Current_B | elec, phase, current, sensor | Num, 1 | A | Int, 10min |
| Current C | Current_C | elec, phase, current, sensor | Num, 1 | A | Int, 10min |
| Volts AN | Volts_AN | elec, phase, volts, sensor | Num, 0 | V | Int, 10min |
| Volts BN | Volts_BN | elec, phase, volts, sensor | Num, 0 | V | Int, 10min |
| Volts CN | Volts_CN | elec, phase, volts, sensor | Num, 0 | V | Int, 10min |
| Volts AB | Volts_AB | elec, phase, volts, sensor | Num, 0 | V | Int, 10min |
| Volts BC | Volts_BC | elec, phase, volts, sensor | Num, 0 | V | Int, 10min |
| Volts CA | Volts_CA | elec, phase, volts, sensor | Num, 0 | V | Int, 10min |
| Power Factor A | PF_A | elec, phase, pf, sensor | Num, 0.01 | unitless | Int, 10min |
| Power Factor B | PF_B | elec, phase, pf, sensor | Num, 0.01 | unitless | Int, 10min |
| Power Factor C | PF_C | elec, phase, pf, sensor | Num, 0.01 | unitless | Int, 10min |
| Energy A (accumulated) | Energy_A | elec, phase, energy, sensor, hisTotalized | Num, 0 | kWh | Int, 10min |
| Energy B (accumulated) | Energy_B | elec, phase, energy, sensor, hisTotalized | Num, 0 | kWh | Int, 10min |
| Energy C (accumulated) | Energy_C | elec, phase, energy, sensor, hisTotalized | Num, 0 | kWh | Int, 10min |
| Power A | Power_A | elec, phase, power, active, sensor | Num, 0 | kW | Int, 10min |
| Power B | Power_B | elec, phase, power, active, sensor | Num, 0 | kW | Int, 10min |
| Power C | Power_C | elec, phase, power, active, sensor | Num, 0 | kW | Int, 10min |

2.10Gas Meter
equip, gas, meter,
[siteMeter, submeterOf]

| Description | Point Name navName | Tags | Point Type | UoM |
|---|---|---|---|---|
| Gas Flow | GasFlow | gas, flow, sensor | Num, 0 | ccf/h |
| Gas Volume (accumulated) | GasVol | gas, volume, sensor, hisTotalized | Num, 0 | ccf |
| Gas Energy (accumulated) | GasEnergy | gas, energy, sensor, hisTotalized | Num, 0 | MMbtu |
| Gas Power | GasPower | gas, power, sensor | Num, 0 | MMbtu/h |

| Energy Points - Electric | | equip, elec, meter, pump, hotWaterPlant, [siteMeter, submeterOf] | | | |
|---|---|---|---|---|---|
| VFD Energy Total (accumulated) | HWPVFDEnergy | hot, water, pump, elec, energy, total, sensor, hisTotalized | Num, 0 | kWh | Int, 10min |
| VFD Power Total | HWPVFDPower | hot, water, pump, elec, power, total, active, sensor | Num, 0 | kW | Int, 10min |

2.14Domestic Hot Water
equip, domestic, hotWaterPlant

| Description | Point Name navName | Tags | Point Type | UoM | History |
|---|---|---|---|---|---|
| Water Flow | DHWFlow | domestic, hot, water, flow, sensor | Num, 0 | gal/min | Int, 10min |
| Water Volume (accumulated) | DHWVol | domestic, hot, water, volume, sensor, hisTotalized | Num, 0 | gal | Int, 10min |
| Supply Temperature | DHWSupTemp | domestic, hot, water, leaving, temp, sensor | Num, 1 | F | Int, 10min |
| Supply Temperature Setpoint | DHWSupTempSp | domestic, hot, water, leaving, temp, sp | Num, 0 | F | Int, 10min |
| Return Temperature | DHWRetTemp | domestic, hot, water, entering, temp, sensor | Num, 1 | F | Int, 10min |
| Differential Pressure | DHWDP | domestic, hot, water, pressure, delta, sensor | Num, 1 | psi | Int, 10 min |
| Differential Pressure Setpoint | DHWDPSp | domestic, hot, water, pressure, delta, sp | Num, 1 | psi | COV, 24 hr |
| | | | | | |
| DHW Building Loop Pumps | | equip, domestic, secondary, hot, water, pump | | | |
| Building Loop Pump Enable | DHWPEnab | domestic, hot, water, pump, enable, cmd | Bool | Enabled/Disabled | COV, 30days |
| Building Loop Pump Command | DHWPCmd | domestic, hot, water,  pump, run, cmd | Bool | On/Off | COV, 30days |
| Building Loop Pump Status | DHWPSts | domestic, hot, water, pump, run, sensor | Bool | On/Off | COV, 30days |
| Building Loop Pump VFD Speed | DHWPVFDSpd | domestic, hot, water, pump, speed, cmd | Num, 0 | % | Int, 10min |
| Building Loop Pump VFD Frequency | DHWPVFDFreq | domestic, hot, water, pump, freq, sensor | Num, 0 | Hz | Int, 10min |
| | | | | | |
| Heat Exchanger | | equip, domestic, hot water, heatExchanger | | | |
| DHW Heat Exchanger Enabled | HxDHWEnab | domestic, heatExchanger, enable, cmd | Bool | Enabled/Disabled | COV, 30days |
| DHW Heat Exchanger Command | HxDHWCmd | domestic, heatExchanger, run, cmd | Bool | On/Off | COV, 30days |
| DHW Heat Exchanger Runtime | HxDHWRun | domestic, heatExchanger, total, sensor | Num, 1 | | Int, 10min |
| DHW Water Entering Temperature | HxDHWETemp | domestic, heatExchanger, entering, water, temp | Num, 1 | F | Int, 10min |
| DHW Water Leaving Temperature | HxDHWLTemp | domestic, heatExchanger, leaving, water, temp | Num, 1 | F | Int, 10min |
| DHW Water Isolation Valve | HxDHWIsoVlvCmd | domestic, heatExchanger, isolation, valve, cmd | Bool | Open/Closed | COV, 30days |
| DHW Circulation Pump Command | HxDHWCPCmd | domestic, heatExchanger, water, circ, pump, cmd | Bool | On/Off | COV, 30days |
| DHW Circulation Pump Status | HxDHWCPSts | domestic, heatExchanger, water, circ, pump, sensor | Bool | On/Off | COV, 30days |
| HWS Water Entering Temperature | HxHWSETemp | domestic, heatExchanger, primary, entering, water, temp | Num, 1 | F | Int, 10min |
| HWS Water Leaving Temperature | HxHWSLTemp | domestic, heatExchanger, primary, leaving, water, temp | Num, 1 | F | Int, 10min |
| HWS Water Isolation Valve | HxHWSIsoVlvCmd | domestic, heatExchanger, primary, isolation, valve, cmd | Bool | Open/Closed | COV, 30days |
| HWS Circ Pump Command | HxHWSCPCmd | domestic, heatExchanger, primary, water, circ, pump, cmd | Bool | On/Off | COV, 30days |
| HWS Circ Pump Status | HxHWSCPSts | domestic, heatExchanger, primary, water, circ, pump, sensor | Bool | On/Off | COV, 30days |

| Energy Points - Water | | equip, water, meter, domestic, hot | | | |
|---|---|---|---|---|---|
| Domestic Hot Water Temperature Entering | DHWEtemp | domestic, water, temp, entering, sensor | Num, 1 | F | Int, 10min |
| Domestic Hot Water Temperature Leaving | DHWLTemp | domestic, water, temp, leaving, sensor | Num, 1 | F | Int, 10min |
| Domestic Hot Water Flow | DHWFlow | domestic, water, flow, sensor | Num, 1 | gal/min | Int, 10min |
| Domestic Hot Water Volume (accumulated) | DHWVol | domestic, water, volume, sensor, hisTotalized | Num, 0 | gal | Int, 10min |
| Domestic Hot Water Energy (accumulated) | DHWEnergy | domestic, water, energy, sensor, hisTotalized | Num, 0 | MMbtu | Int, 10min |
| Domestic Hot Water Power | DHWPower | domestic, water, power, sensor | Num, 0 | MMbtu/h | Int, 10min |

| Energy Points - Heat Recovery Water | | equip, water, domestic, meter, hru | | | |
|---|---|---|---|---|---|
| Heat Recovery Water Temperature Entering | HRUWEtemp | domestic, water, temp, entering, sensor | Num, 1 | F | Int, 10min |
| Heat Recovery Water Temperature Leaving | HRUWLTemp | domestic, water, temp, leaving, sensor | Num, 1 | F | Int, 10min |
| Heat Recovery Water Flow | HRUWFlow | domestic, water, flow, sensor | Num, 1 | gal/min | Int, 10min |
| Heat Recovery Water Volume (accumulated) | HRUWVol | domestic, water, volume, total, sensor | Num, 0 | gal | Int, 10min |
| Heat Recovery Water Energy (accumulated) | HRUWEnergy | domestic, water, energy, sensor, hisTotalized | Num, 0 | MMbtu | Int, 10min |
| Heat Recovery Water Power | HRUWPower | domestic, water, power, sensor | Num, 0 | MMbtu/h | Int, 10min |

2.15Cooling Tower
equip, coolingTower
[openLoop, closedLoop]

| Description | Point Name navName | Tags | Point Type | UoM | History |
|---|---|---|---|---|---|
| Cooling Tower Enabled | CTEnab | enable, cmd | Bool | Enabled/Disabled | COV, 24 |
| Condenser Water Entering Temperature | CTCWETemp | condenser, water, entering, temp, sensor | Num, 1 | F | Int, 10min |
| Condenser Water Leaving Temperature | CTCWLTemp | condenser, water, leaving, temp sensor | Num, 1 | F | Int, 10min |
| Sump Temperature | CTSumpTemp | sump, temp, sensor | Num, 1 | F | Int, 10min |
| Sump Heater Command | CTSumpHtrCmd | sump, heating, run, cmd | Bool | On/Off | COV, 24 |
| Sump Heater Status | CTSumpHtrSts | sump, heating, run, sensor | Bool | On/Off | COV, 24 |
| Fan Enabled | CTFanEnab | fan, enable, cmd | Bool | Enabled/Disabled | COV, 24 |
| Fan Command | CTFanCmd | ran, run, cmd | Bool | On/Off | COV, 24 |
| Fan Status | CTFanSts | fan, run, sensor | Bool | On/Off | COV, 24 |
| Fan VFD Speed | CTFanSpd | fan, speed, cmd | Num, 0 | % | Int, 10min |
| Fan VFD Freqency | CTFanVFDFreq | fan, freq, sensor | Num, 0 | Hz | Int, 10min |
| Pump Enabled | CTCPEnab | circ, pump, enable, cmd | Bool | Enabled/Disabled | COV, 24 |
| Pump Command | CTCPCmd | circ, pump, run, cmd | Bool | On/Off | COV, 24 |
| Pump Status | CTCPSts | circ, pump, run, sensor | Bool | On/Off | COV, 24 |
| Pump VFD Speed | CTCPVFDSpd | circ, pump, speed, cmd | Num, 0 | % | Int, 10min |
| Pump VFD Frequency | CTCPVFDFreq | circ, pump, freq, sensor | Num, 0 | Hz | Int, 10min |
| Pump Isolation Valve | CTIsoVlvCmd | isolation, valve, cmd | Bool | On/Off | COV, 24 |
| Bypass Valve | CTBypVlvPos | bypass, valve, cmd | Num, 0 | % | Int, 10min |
| Energy Points - Electric | | equip, elec, meter, coolingTower, fan [siteMeter, submeterOf] | | | |
| Fan VFD Energy Total (accumulated) | CTFanVFDEnergy | fan, elec, energy, total, sensor, hisTotalized | Num, 0 | KWh | Int, 10min |
| Fan VFD Power Total | CTFanVFDPower | fan, elec, power, total, active, sensor | Num, 0 | kW | Int, 10min |
| Energy Points - Electric | | equip, elec, meter, coolingTower, pump [siteMeter, submeterOf] | | | |
| Pump VFD Energy Total (accumulated) | CTPVFDEnergy | pump, elec, energy, total, sensor, hisTotalized | Num, 0 | KWh | Int, 10min |
| Pump VFD Power Total | CTPVFDPower | pump, elec, power, total, active, sensor | Num, 0 | kW | Int, 10min |

PART 3 - EXECUTION

3.1 INTEGRATION

**1.** Approved Summary list shall be incorporated into the BAS system, including controls logic trees and Graphics User Interface

2.

END OF SECTION 230902