Naming Approach BMS and CLF Systems

For Historian, Building Management Systems, and links to Asset ID and other data sources

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Table of Contents

1 Context

Griffith University has many disparate systems and historic complexity when it comes to naming assets and the systems/measures and information relating to them.

This document seeks to act as a basis for relating our systems approach to the approved asset naming convention to assist in the ongoing improvement of maintenance, fault finding and analysis.

The four major systems that need consistency in naming are:

- Archibus based Computerized Maintenance Management System (CMMS)
- Archibus based Space Management
- Schneider Building Management System (BMS)
- Historian (OSIsoft PI product)

As opportunity due to maintenance/refurbishment occurs, the expectation is that all systems will move toward consistency in approach for naming.

The basis for major equipment naming is maintained at:
https://teams.griffith.edu.au/sites/CLF-AM/Lists/Asset Management Asset Data Standards/Tiles.aspx
A current copy may be obtained on request.

2 Location Approach

Managing the Universities assets is all about managing space and the location of the assets and sensors within it. The naming approach is foremost about identifying the location of the asset and/or sensor within the wider university context.

To this end, the general approach should be that any name or identifying structure should begin with the Campus followed by the building, then floor and room. Once that is in place then the identifier should continue with the major asset, minor asset, process and finally process value.

In summary Big -> Small, Major -> Minor.

3 General Approach

3.1 Character use and Location Prefix

This proposition is a starting point for a consistent naming convention to aid in search and later analysis of underlying data.

Referring to for background http://eziniearticles.com/?How-to-Name-OSI-PI-Tags-For-Diverse-Audiences-and-Future-Growth&id=3172579 and https://www.archtoolbox.com/representation/abbreviations/hvacabbrev.html.

Names will by preference have no spaces, parent child relationships in the name will be indicated by “>” and breaks in text for readability (if needed) are to use the “_” character, the “.” is reserved for floor.room separation indicating location. The characters * ' ? , ; { } [ ] | \ / ` " & ~ $ + shall not be used in names as they cause difficulties with programmatic manipulation and naming within the University systems.

Where a system is unable to use the “>” character the use of “;” or “_” is acceptable to indicate a parent > child relationship. Parent to be on the left and child on the right.

The preference is camel case as a naming approach where multiple words are needed, i.e.: first letter of each word capitalised, the “_” underscore may also be used to add clarity
e.g.: CamelCaseIsThePreference.

3.1.1 Buildings

Let’s start at the same beginning point as all space management at Griffith University

The first three characters represent the campus and building, for example, N53 = Nathan Campus, Building Number 53, single numeral buildings are to have a leading zero e.g. N06.

XNN

X – as below

N	Nathan
G	Gold Coast
S	South Bank
M	Mt Gravatt
L	Logan

NN – building number noting that 00 is reserved as a whole of campus identifier

3.1.2 Floors and Rooms

Where the room is indicated it needs to have the floor associated with it

F.RR

F – Floor

RR – Room number if appropriate, this will be the physical location of the equipment or sensor even if its major equipment is located in another space. For example: a wall sensor will be given a prefix of its actual location even though the Air Handling Unit (AHU) is potentially in a different room on a different floor.

For example, 0.61 = Floor 0 (often ground floor), Room 61. Where the floor is a negative level it will be preceded by a “-“. In systems where a “negative level” is not accepted “B” is an acceptable replacement. E.g. “-1.07” or “B1.07” will be seen as equivalent.

3.2 Asset ID

If referring to an asset that is part of the CMMS there will be an asset ID that uniquely identifies the equipment for maintenance work and potentially regulatory inspections. This will be what is printed on the label on the equipment in the plant room.

If in doubt, please contact CLF for clarification of what it to use as there is a very precisely defined hierarchy that dovetails with the maintenance system.

Some examples:

EQUIPMENT CATEGORY, STANDARD & DESCRIPTION	ASSET ID EXAMPLE	EQUIPMENT LABEL	DESCRIPTION	RULES
ACLV01 - Air Handling System (Normal Duty)	AHU_0.09_A	**AHU_0.09_A**	In this example the number '0.09' indicates the 'Physical Location' and the letter is the system identifying number in that location, in this case the first system in plant room 0.09.	AHU's being replaced on a like for like basis are to take on the previous AHU's 'asset id'. Where new AHU's are installed the 'asset id' is to be the next letter taken from the last AHU installed on that level. If no AHU's exist then commence from 'A' and consecutive there from.
ACMD01 - Motorised Air Damper (Normal Duty)	AHU_0.09_A>OAMD_01	**AHU_0.09_A>OAMD_01**	In this example 'AHU_0.09_A' indicates the AHU (parent) the OAMD is a component of (child). The '>' is used to signify this relationship.	OAMD's being replaced on a like for like basis are to take on the previous OAMD's 'asset id'. Where new OAMD's are installed on the same system the 'asset id' is to be the next number taken from the last OAMD installed on that system. If no OAMD's exist then commence from '1' and consecutive there from.
ACRP01 - Water-Cooled Centrifugal chiller (serving solely the housing building)	CH_01	**CH_01**	In this example the number '01' is the CH identifying number.	CH's being replaced on a like for like basis are to take on the previous CH's 'asset id'. Where new CH's are installed the 'asset id' is to be the next number taken from the last CH installed in the building. If no CH's exist then commence from '01' and consecutive there from.
ACPU01 - Pump (chilled Water)	CH_02>CHWP_01	**CH_02>CHWP_01**	In this example 'CH_02' indicates the CH (parent) the CHWP is a component of (child). The >' is used to signify this relationship.	CHWP's being replaced on a like for like basis are to take on the previous CHWP's 'asset id'. If no CHWP's exist then commence from '1' and consecutive there from.

Generally, when numbering devices, a leading zero shall be used if the number is less than 10, if you expect more than 100 devices use 2 leading zeros. Depending on the device type, and historical site complexity, indicating more than one unit may take the form of incrementing numbers (1, 2, 3 etc.) or letters (A, B, C etc.)

4 BMS Approach

The above is to be considered and the same building blocks are to be used but not all may be required depending on the part of the system being worked with. There are also subtly different approaches for Servers vs I/O vs Trends/Extended Trends.

Note: BMS naming does not support the ">" character and this has been replaced with "_" and/or "space" in this section.

4.1 Automation Server (AS) and Plant Folder Structure Naming

Automation Servers (AS) are to follow the above naming conventions to make it simple to find the building and space in which they have been installed.

For example, an AS deployed into plantroom -1.01 in N23 would be named “N23 AS_-1.01_01” (space as separator for clarity). An existing N78 AS is named N78-AS1 MSSB -1 08 this would become “N78 AS_-1.08_01” under this approach as it is located in -1.08. To support future additions a single unit installed will always be _01 to avoid confusion in case a 2nd unit is required in the future.

This conforms to the NXX>Asset_ID approach signifying the AS is the child of the building and informing all of its exact install location. The “identifier”_”location”_”nth instance” also conforms to the Asset_ID approach and will simplify adding the automation servers to the CMMS at a later date if required for obsolescence management.

Under this naming approach, if there was more than 1 Automation Server in that specific space then 01, 02 etc would be appropriate for example N78 AS_-1.08_01, and N78 AS_-1.08_02. If specific directions to the cabinet in which the AS resides are needed these are to put in the server “Description” metadata under “General Information” in the Enterprise Server tree.

Generally, when numbering devices, a leading zero shall be used if the number is less than 10, if you expect more than 100 devices use 2 leading zeros. Use of characters is also acceptable and which to use should be based on what is existing.

When dealing with systems in a building it generally makes sense to control by maintainable asset. To ease cross referencing BMS with Maintenance approach it is expected that the Asset ID will be used to group code functionality. To this end it is expected that we would see in the Automation Server Plant Application folder additional folders named such as AHU_0.09_A which match the physical Asset Labels and allow ease of grouping code for coding and diagnostic purposes.

If there are processes that apply to an entire building in a general sense they are to be grouped in an appropriately named folder.

If the level of complexity is such that division into equipment types is required, then a folder for HVAC, AHU’s, Lighting, Cooling Towers etc should be created. Inside this general folder, the naming described above will apply.

4.2 Sensor or I/O Naming

Sensors or I/O will be named for the space in which they are installed/measuring and conform to the same “identifier”_”location”_”nth instance”.

Where the Automation Server the I/O is attached to already has the building identifier that does not need repeating in the point name.

The intent of the I/O name at GU is that it provides a link to the asset name in the drawings as well as specific information about the location of the field device to assist is fault finding and calibration by maintenance.

The first portion of the name is to be constructed as per the Asset_ID approach. As the I/O will be referenced via a binding to either an internal variable or a piece of code it does not need to completely adhere to the exact specifics of being used in code.

For example, a Wall Mounted temperate sensor in N78 0.11 being fed by AHU_0.09_A would be expected to be named AHU_0.09_A ZnTmp_0.11_A. (Space showing parent -> child)

This approach gives the exact location of the sensor and associates it with the major equipment it controls using the parent > child relationship, the > is replaced by a “space” in this instance.

Now if a return air temperature sensor for N78>AHU_0.09_A is located in the 0.09 plant room it would be named AHU_0.09_A RaTmp_0.09_A, we already know the building from the AS. A second sensor in the space for the same AHU would be AHU_0.09_A RaTmp_0.09_B. This gives the exact space the sensor is installed and associates it with the major equipment using it for control.

The combination of the parent and child is the unique identifier. If there were a second AHU in the same plant room with multiple sensors they would be named AHU_0.09_B RaTmp_0.09_A and AHU_0.09_B RaTmp_0.09_B

If a combination sensor is used in a space that contains multiple sense heads e.g. temp, humidity, C02, then each variable in code will be named as above. The location label to affix to the unit may be designated with just “Sens”. For example, an integrated humidity and temperature sensor in room 2.20 providing information to AHU_2.19_A, would use “AHU_2.19_A Sens_2.20_A” as the physical label.

This is an outgrowth of the space location based approach to assets.

A fan fault input for an exhaust fan in N78 level 5.01 should be formed as PEF_5.01_A Flt_5.01_A. If there are multiple fans, then the fan would be incremented as for AHU’s. For example,
PEF_5.01_A ExFlt_5.01_A, and PEF_5.01_B ExFlt_5.01_A.

Note: these particular fans are standalone and exhaust room 5.01 so in accordance with our Asset ID they get PEF for plant exhaust fan.

If there is only 1 of a particular asset it should still have the “_A” or “_01” suffix in case of future addition of the same type of equipment.

By leading with the Equipment designator, the convention of starting point names with a character is preserved.

Similarly, any equipment such as pumps should have the location of the unit included as part of the I/O name. This is to be updated if the equipment changes location or the location name changes due to construction or refurbishment.

The approach is generally, as far as possible to name in accordance with the general approach.

At an I/O level to meet character constraints it is permissible to drop the Asset ID if absolutely required.

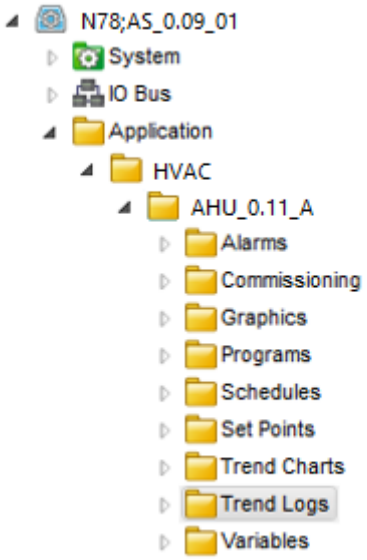
If other information is needed in the point I/O name it is acceptable to add it as a suffix using a “ – “ (space-space) separator.

E.g.: a chiller primary pump has an asset ID of CH_01>PCHWP_01 and additional text to expand or be used by other parts of the BMS code was needed the I/O would become

“CH_01 PCHWP_01 – extra text – with more extra text as needed”

4.3 Folder Hierarchy

- Tier 1¦AS Naming
- Tier 2¦System (As appropriate and if required for clarity)
- Tier 3¦Plant Identification
- Tier 4¦Sensor Naming



4.3.1 Tier 1¦AS Naming

Campus & Building;AS_Location_No

X(N)NN AS_(F)F.(R)RR_NN

i.e. **N78 AS_1.08_01, Space as separator for clarity**

4.3.2 Tier 2¦System

System Type/Category

Zzzzz
i.e. **HVAC, as needed for clarity in more complex systems**

4.3.3 Tier 3¦Plant Identification

System_Location_Identification/Number

MMM_(F)F.(R)RR_(N)N
i.e. **AHU_0.09_A**

4.3.4 Tier 4¦Sensor Naming or I/O

Campus&Building;System_Location_Identification;DeviceActionAttribute_Location_Id/Num

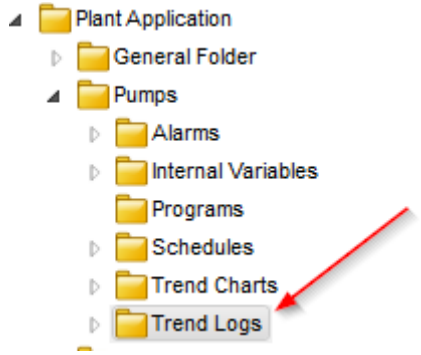
MMM_(F)F.(R)RR_N BbbCccDdd_(F)F.(R)RR_(N)N

i.e.
AHU_0.09_A ZnTmp_0.11_A
AHU_0.09_A RaTmp_0.09_A
PEF_5.01_B Flt_5.01_A

Some Standard Names for systems and sensors are in Appendix A

4.4 Trend Logs

Trend logs/charts for a specific piece of equipment on an Automation Server are to be collected in a subfolder of the equipment. Trend logs are to be named for the I/O point or named variable they are recording. Suffix is the choice of the person creating the log/chart.



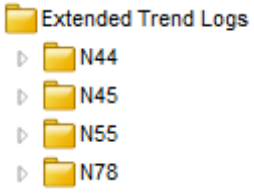
4.5 Equipment

Naming for equipment under the Automation Server is to follow the general naming convention as far as possible. Folders for AHU control for example will use the Asset ID of the AHU that under control.

If there is equipment that applies to an entire building in a general sense these are to be grouped in an appropriately named folder. Individual programs and controls are to use Asset ID to be grouped.

If there is equipment from more than one building in a system, it is to be arranged under a folder structure that use the XNN format described above

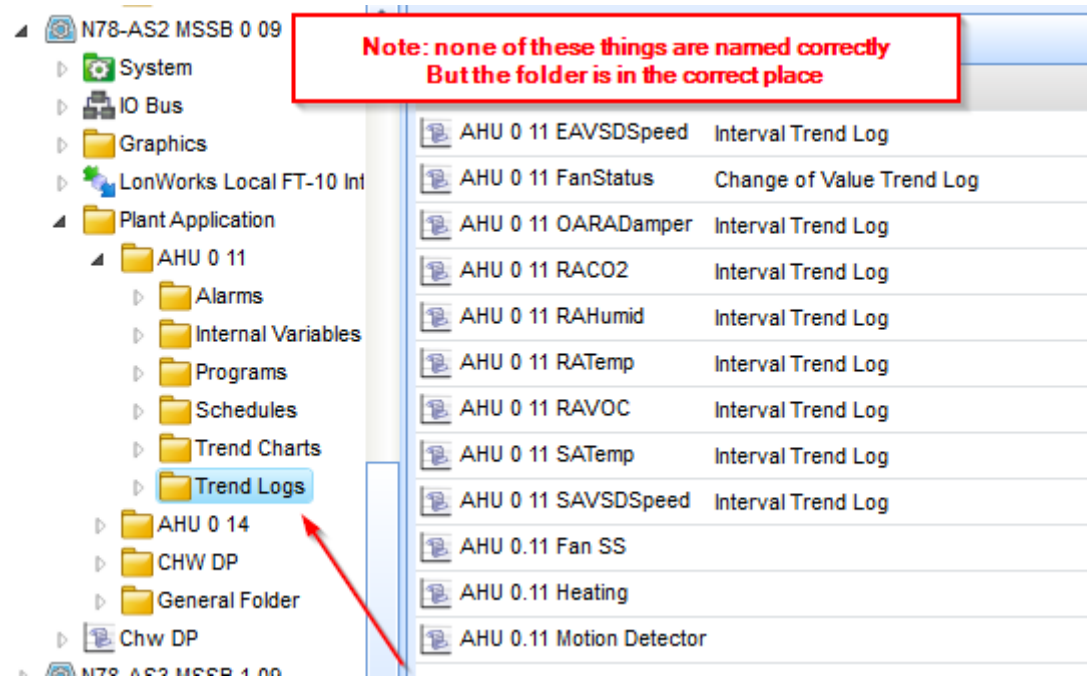
E.g.:



4.6 Trends and Trend Logs

On each Automation Server there is to be a Trend Log Folder under each item of equipment with Trends for that particular unit contained in that location.

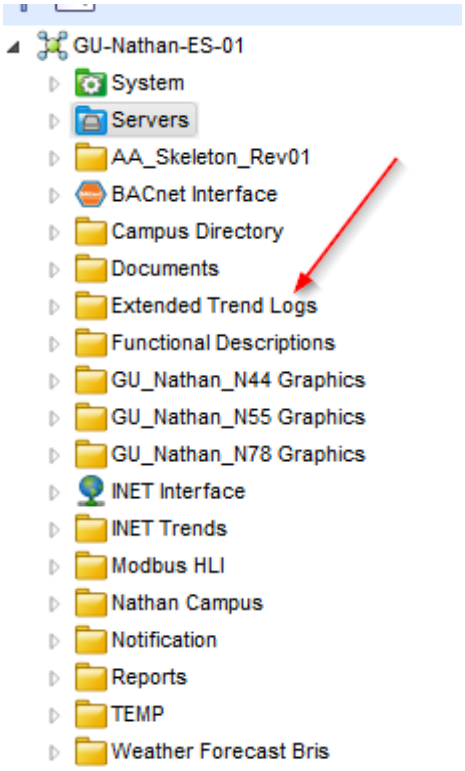
The first portion of the naming of the Trend Log is to take the same Asset ID approach as I/O naming with the suffix beyond " – " free text as needed.



The expectation is that the trend at this level should capture up to several months of data at most, exceptions are allowable for fault finding and diagnostics – if very long term needed discuss with GU and have the value passed to the GU historian.

4.7 Extended Trend logs

On the Enterprise Server all extended trend logs are to be arranged in one location under the Extended Trend Logs folder

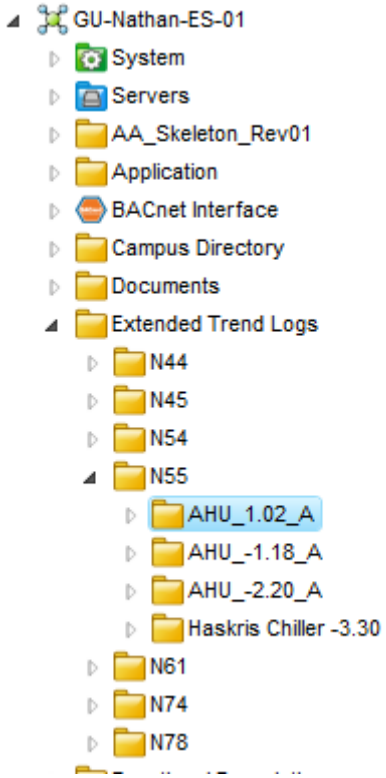


The structure is to be arranged in a clear and concise manner reflecting the naming conventions above. E.g.: Buildings by Campus and Number and equipment by Asset ID.

Extended Trend Logs are expected to capture up to 6 months of data, longer if required.

The first portion of the naming of the Extended Trend Log is to take the same Asset ID approach as I/O naming with the suffix beyond a " – " separator being free text as needed.

It is permissible in the extended trend log structure to break down to assets and then place the trends for that asset in the folder for the asset. If this approach is taken then the building and asset ID are not required in the trend name. Trends, as above, are to be named as per the I/O points to ease the transfer of values to other GU systems.

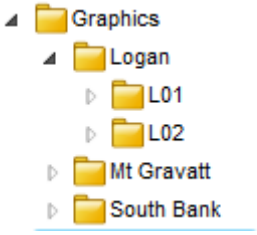


Extended trend logs are the connection used for data transfer to the historian and maintaining the first portion of the name (or placing in folder) as the Asset_ID approach will significantly reduce the work of passing data between systems.

4.8 Graphics

Graphics navigation links and front pages should conform to the above approach and be all contained in one Root Folder on the enterprise server called Graphics. Control graphics are to reside on the individual automation servers

Under this site folders will exist for all campuses that are controlled by that enterprise server.



Under each campus will be the buildings named in accordance with NXX general approach

Each building will then have graphics iaw GU guidelines (which have precedence) and Schneider internal standards.

The campus level navigation overview and linking navigation should reside in the “Graphics” directory. All graphics pages and links to be functional in the web client / web station view of the system.

4.9 BacNet and Lon devices

The devices are to be named in the structure as per the Asset ID approach.

There is no need to rename all their I/O. This approach is to minimise rework on device replacement as it will allow a faulty device to quickly be replaced as necessary with minimal code rework.

If at all possible the description field should be populated with a meaningful text for each device I/O to aid in future changes or additions to control and monitoring.

5 Historian Tag Name Approach

5.1 General Approach

Historian tags and Asset Frame work naming/structures should conform as far as possible with general approach outlined in sections 2 and 3.

The Parent > Child left to right Major to Minor should be applied where ever possible.

A recent example for water pressure measurement for incoming supply at the Gold Coast

“G00>Water>SmithSt>Pressure”

G00 – indicates whole of campus

Water – the major bit, water measures exist in multiple places

SmithSt – this specific location

Pressure – the process measurement

There are 3 process measurements at this location – the Raw suffix on the flow indicates a non standard input stream that needs conversion to a standard Unit of Measure. In this case it is an accumulating pulse count of 10 litres per pulse.

G00>Water>SmithSt>Flow_Raw
G00>Water>SmithSt>Pressure
G00>Water>SmithSt>Temp

All new historian tags are to be constructed in this manner. Existing ones will renamed as required and as time permits with consideration to systems that may be reliant on existing naming.

5.2 Historian Tags from BMS

Where BMS I/O and or Trends have been named in accordance with the approach of this document the name is to be maintained in the matching tag with the “>” greater than substituted for any alternate separator that may have been used.

If the BMS measure is not compliant then a Tag that is as compliant as possible is to be created and used.

6 Appendix A – Some help on abbreviations

6.1 Tier 02 – System

System Names (Tier 02)	
Name	**Examples**
Air Handling Units	• _Common • Air Conditioners • Pre-Conditioners
Chilled Water	• Common • Chillers • PCHWP • SCHWP
Heating Water	• _Common • Hot Water Boilers • Hot Water Pumps
Fan Coil Units	
Packaged AC Units	
VAV Boxes	
Metering	• Water • Gas • Electricity • Thermal
Chilled Beams	
Condenser Water	• _Common • Condenser water pumps • Cooling Tower Fans
CRAC Units	
Fire Systems	• FIP • Fire detection/suppression system • Stair pres fans • Smoke exhaust fans
Electrical Distribution	• Main Switchboard • Mechanical Services Switchboard
Hydraulics	• Sump Pit, Sewer plant
Ventilation	• _Common • Outside Air Fans • Supply Air Fans • Exhaust Air Fans • Toilet Exhaust Air Fans • Car park Ventilation • CO Control
Steam Systems	
Medical Systems	• Medical gas panels • Medical suction plant
Process Systems	• Reverse osmosis plant
UPS	
Data Centre	• Rack PDU • Rack Cooling
Lighting	
Security	

6.2 Tier 03 – Plant Identification

Tier 03 of the folder structure is used to define the individual plant of service connected to the AS.

The format is free text, but must clearly identify the item of plant.

6.3 Tier 04 – Content

Tier 04 of the folder structure is used for database content.

The folders in this tier have fixed names and all folders are to be included regardless of whether they contain objects or not.

Tier 04 Content Folders	
Folder	**Examples**
Alarms	
Commissioning	• PID p-value • Co-efficient factor • Open all valves
Documents	• Sequence of operation • Data sheets
Graphics	
Programs	• FB program • Script Program
Schedules	• Time Charts • Calendars
Set Points	• Zone temperature set point
Trends	• Zone Temperature
Variables	• Plant isolated for service • Reset fault

6.3.1 Points Naming

This standard applies to the data points as programmed into the system by the engineer. The naming convention is to be used on things like:

- Network variables
- IO Points
- Graphic tag names
- Program points

The point name will be logically represented with the use of the following abbreviations:

System_Location_Identification DeviceActionAttribute_Location_Identification

6.3.2 *System/Location*

The system name of the equipment or the location of the system/equipment:

- System: Chilled Water, Hot Water, Smoke, Oil, Multi-zone

Abbr. Name	Description
Ac##	Air Conditioner
Ahu##	Air Handling Unit
Aux	Auxiliary
Bldg	Building
Blr##	Boiler
Ch##	Chiller
Chw	Chilled Water
ChwP##	Chilled Water Pump
HwP##	Hot Water Pump
Raf##	Return Air Fan
Rtu##	Roof Top Unit
Saf##	Supply Air Fan
Schw	Secondary Chilled Water
SchwP##	Secondary chilled water pump
TchwP##	
Vav####	VAV box or system
Zn###	Zone

6.3.3 *Device/Service*

The device being controlled or the service that it performs:

- Device: Fan, Damper, Valve, Freezer, Pump, Filter
- Service: Supply, Return, Heating, Setback, Time Schedule, Isolation

Abbr. Name	Description
Byp	Bypass
ChwVlv	Chilled Water Valve
Clg	Cooling
Dmp	Damper
Fil	Filter
HwVlv	Hot Water Valve
Ht	Heat
Htg	Heating
Iso	Isolation
Ma	Mixed Air
Mix	Mixing
Nml	Normal
Oa	Outside Air
Occ	Occupied
Opt	Optimized
Ra	Return Air
Raf	Return Air Fan
Rht	Reheat
Sa	Supply Air
Saf	Supply Air Fan
Sched	Time Schedule
Unoc	Unoccupied
Vlv	Valve
VsdSpd	VSD Speed

6.3.4 *Action/Measurement*

The action on or the measurement from the controlled device:

- Action: Command, Enable, Open, Position, Lead/Lag, Mode, Reset
- Measurement: Temperature, Humidity, Level, Average, High Static Pressure

Abbr. Name	Description
Alm	Alarm (hardwired)
Amp	Amperage or Current
Avg	Average
Clg	Cooling
Ctrl	Control
Cntlr	Controller
Co	Carbon Monoxide
Co2	Carbon Dioxide
Deg	Degrees
DewPtTmp	Dewpoint
Dp	Differential Pressure
Dryb	Dry Bulb
Eco	Economy
EntTmp	Entering Temperature
Ena	Enable
Enth	Enthalpy
Fb	Feedback
Flt	Fault
HrsRun	Equipment Hours Run
Htg	Heating
Kw	Kilowatts
Kwh	Kilowatt-hours
LvgTmp	Leaving Temp
Press	Pressure
Rh	Relative Humidity
St	Static
Tl	Terminal Load
Tmp	Temperature
ZnTmp	Zone Temperature

6.3.5 *Attributes/Properties/Parameters*

Other descriptive attributes that clarify the purpose of the point:

- Base,
- Delay on,
- Dead zone,
- Set Point,
- Low Limit, High Alarm,
- Switch,
- Raw Value

Abbr. Name	Description
Al	Alarm (software)
Alm	Alarm (hardware)
Avg	Average Value
Cl	Cool
Clg	Cooling
Dif	Differential
DlyOffTm	Delay Off Time
DlyOnTm	Delay On Time
Db	Dead Band
Err	Error
Fbo	Forced by Operator
HrsRun	Run Time
Ht	Heat
Htg	Heating
Ld	Lead
Lg	Lag
Man	Manual
Max	Maximum
Md	Mode
Min	Minimum
Pb	Proportional Band
Pos	Position
Rst	Reset
Sp	Setpoint
Stg	Stage
Sts	Status