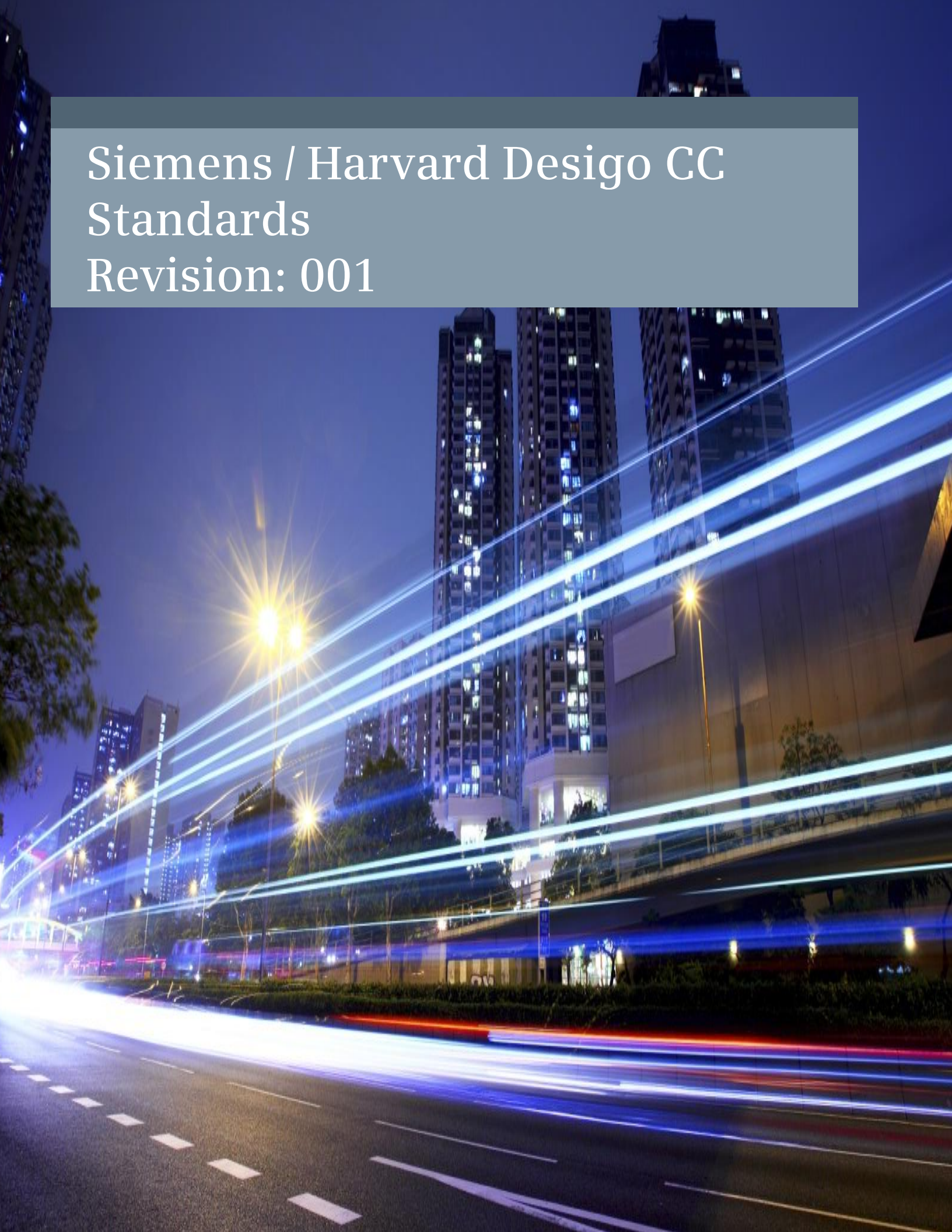


Siemens / Harvard Desigo CC Standards
Revision: 001

SIEMENS

Contents

Object / Device / Point Name:

General:

This standard is to provide a set of rules for naming any and all objects that will be defined within the Building Automation System (BAS) database. If no decisive standard is apparent for the object being added, then the new object name will conform to the majority of the existing object names. All object names should be reviewed by the Harvard team representative and approved by Harvard prior to implementation.

ALN Level Device – Field Panel:

The field panel name should be reviewed by the Harvard team representative and approved by Harvard before being added to the database. The field panel name should be representative of the building it resides in, the panel type, and a sequential numerical designation.

BuildingPanelType##

Example: EMERSONPXCM35

FLN Level Device – TEC / DXR / Application Specific Controller:

The floor level controller names (TECs/DXRs/ASCs) should be reviewed by a Harvard team representative and approved by Harvard before being added to the database. These names should be representative of the building it resides in, the controller type, and the numerical room number that is being served by this controller.

BUILDING.CONTROLLERTYPE.ROOM NUMBER

Example: HOFFMAN.CAV.101

For controller types use the following:

- .FCU. – Fan Coil Unit
- .CAV. – Constant Volume Supply Box
- .CVE. – Constant Volume Exhaust Box
- .VAV. – VAV Supply Box
- .VVE. – VAV Exhaust Box
- .RPC. – Room Pressure Controller
- .LRC. – Lab Room Controller
- .FHC. – Fume Hood Controller
- .RHC. – Reheat Coil Valve (No VAV Box)
- .RAD. – Radiation Valve

For the Room Number use the numerical number assigned and approved. This may be different than what is shown on the architectural drawings and final room number assignments must be used. If there is more than one of the same type of controller serving a given room, add a number in the controller type.

Example: HOFFMAN.FCU1.101

If a single controller serves multiple rooms, try to include all room numbers in the point name and/or descriptor. The room number with the space sensor should be in the point name directly after the controller type.

Example: HOFFMAN.FCU.301.302
Where room 101 would have the space sensor.

In some cases, there will be building specific naming that will need to be added to the controller name for further clarification of the unit type or space served.

Graphics:

General:

To establish guidelines for creating and adding graphics to a Harvard University Desigo CC project.

1. All systems shall have an informational page with relative points per system. There shall be links to each system under the first column listed as the system name.

2. All graphics shall have a title block relative to the building the graphic is for.

3. All graphics shall have the graphic name listed below the title block on the left-hand side of the page.

4. All graphics shall be structured in a folder tree format.

    a. The first folder shall be the building name.

    b. In the building name folder shall be folders for all of the relevant building systems including, but not limited to, Air Systems, Floors, Water Systems, Exhaust Systems, Miscellaneous, Freezers, etc.

    c. In the systems folder shall be all of the relevant buildings systems for that system type. Examples: Air Handler 01 in the Air Systems folder. Heat Exchanger 01 in the Water Systems folder.

Air Systems:

1. All ductwork for air systems shall be built using the 2d ductwork style.

2. All air systems graphics shall have a title block relative to the building the graphic is for.

3. All air systems graphics shall have the graphic name listed below the title block on the left-hand side of the page.

4. All air systems graphics shall have a navigation bar at the bottom of the graphic which lists all other air systems for that building.

5. All air systems graphics shall be named in the following format: “Building”_Air_“System Name”

Example: BIOLOGY_Air_Air_Handler_01

Water Systems:

1. All piping for water systems shall be built using the 2d piping style.
2. All water systems graphics shall have a title block relative to the building the graphic is for.
3. All water systems graphics shall have the graphic name listed below the title block on the left-hand side of the page.
4. All water systems graphics shall have a navigation bar at the bottom of the graphic which lists all other water systems for that building.
5. All water systems graphics shall be named in the following format: “Building”_Water_“System Name”

Example: BIOLOGY_Water_Konvecta_Water_Loop

Floors:

1. All floor graphics shall have a title block relative to the building the floor graphic is for.
2. All floor graphics shall have the graphic name listed below the title block on the left-hand side of the page.
3. All floor graphics shall have a navigation bar at the bottom of the graphic which lists all other floors for that building.
4. All floor graphics shall be named in the following format: “Building”_Floor_“Floor Number”

Example: BIOLOGY_Floor_1

Rooms:

1. If there are multiple devices for one room then a custom room graphic shall be created.

2. All FLN devices shall be associated to a symbol which is created by saving the devices function template graphic as a symbol.

3. All room graphics shall have a titleblock relative to the building the room graphic is for.

4. All room graphics shall have the graphic name listed below the title block on the left hand side of the page.

5. All room graphics shall have a navigation bar at the bottom of the graphic which lists all other floors for that building.

6. All floor graphics shall be named in the following format:
   “Building”_Floor_“Floor Number”_”Room Number”

   Example: BIOLOGY_Floor_4_4071A

FLN Devices:

1. All FLN devices shall have a function assigned and a template graphic assigned to that function.

2. All template graphics shall include the device application number and the device name.

3. All ductwork shall be in the 3d style.

4. Only relevant subpoints for maintenance and troubleshooting shall be displayed on the function template graphic.

    a. All setpoints shall be displayed including, but not limited to, minimum and maximum heating and/or cooling flow setpoint, day and night cooling and/or heating setpoint, room temperature setpoint, volume differential setpoint, etc.

b. If there are heating and or cooling valve(s) present on the device then they shall be displayed on the function template graphic.

c. If there are fan(s) and or pump(s) start/stops present on the device then they shall be displayed on the function template graphic.

d. If there are VFD speed outputs present on the device then they shall be displayed on the function template graphic.

e. If there are supply and or exhaust valve(s) present on the device then they shall be displayed on the function template graphic.

f. If a room temperature sensor is present on the device then the room temperature shall be displayed on the function template graphic.

g. If a humidity sensor is present on the device then the room humidity shall be displayed on the function template graphic.

h. If a carbon dioxide sensor is present on the device then the room c02 shall be displayed on the function template graphic.

Point Association:

1. Analogue Outputs
    a. All analogue output points shall be associated to the following symbol: Common_Data_Project_1/Data_Block_04_Harvard.
    b. This symbol shall show the bacnet priority of the point and have an in-graphic command option.

2. Analogue Inputs
    a. All analogue inputs shall be associated to the following symbol: Common_Data_Project_1/Data_Block_01_Harvard.

3. Digital Outputs
    a. Supply Fans Start/stop (**:Common_Data_Project_1\DATA_BLOCK_01_HARVARD_ON_OFF_1)**

b. Exhaust Fans Start/stop
(**:Common_Data_Project_1\DATA_BLOCK_01_HARVARD_ON_OFF_1)**

c. Mode Point
(Common_Data_Project_1\DATA_BLOCK_04_HARVARD**)**

d. Pump Star/Stop
(**:Common_Data_Project_1\DATA_BLOCK_01_HARVARD_ON_OFF_1)**

e. Air handler Enable
(**:Common_Data_Project_1\DATA_BLOCK_04_HARVARD)**

f. Chiller
(**:Common_Data_Project_1\DATA_BLOCK_04_HARVARD)**

g. Supply Fans Start/stop
(**:Common_Data_Project_1\DATA_BLOCK_01_HARVARD_ON_OFF_1)**

h. Chilled Water system Enable
(Common_Data_Project_1\DATA_BLOCK_04_HARVARD**)**

i. Hot water System Enable
Common_Data_Project_1\DATA_BLOCK_04_HARVARD**)**

j. All other Digital Output points that are not listed above use the this symbol : Common_Data_Project_1/Data_Block_01_Harvard.
k. This symbol shall show the bacnet priority.

4. Digital Inputs
   a. All digital inputs shall be associated to the following symbol: Common_Data_Project_1/Data_Block_01_Harvard.

Symbols:

1. Common_Data_Project_1\DATA_BLOCK_04_HARVARD
    A. Precision should be 0 unless more decimal places are requested by the customer

    B. Desc Color Should be white(#FFFFFFFF)

    C. Description should be blank unless a TEC/DXR subpoint is being used

    D. ChangeAmnt

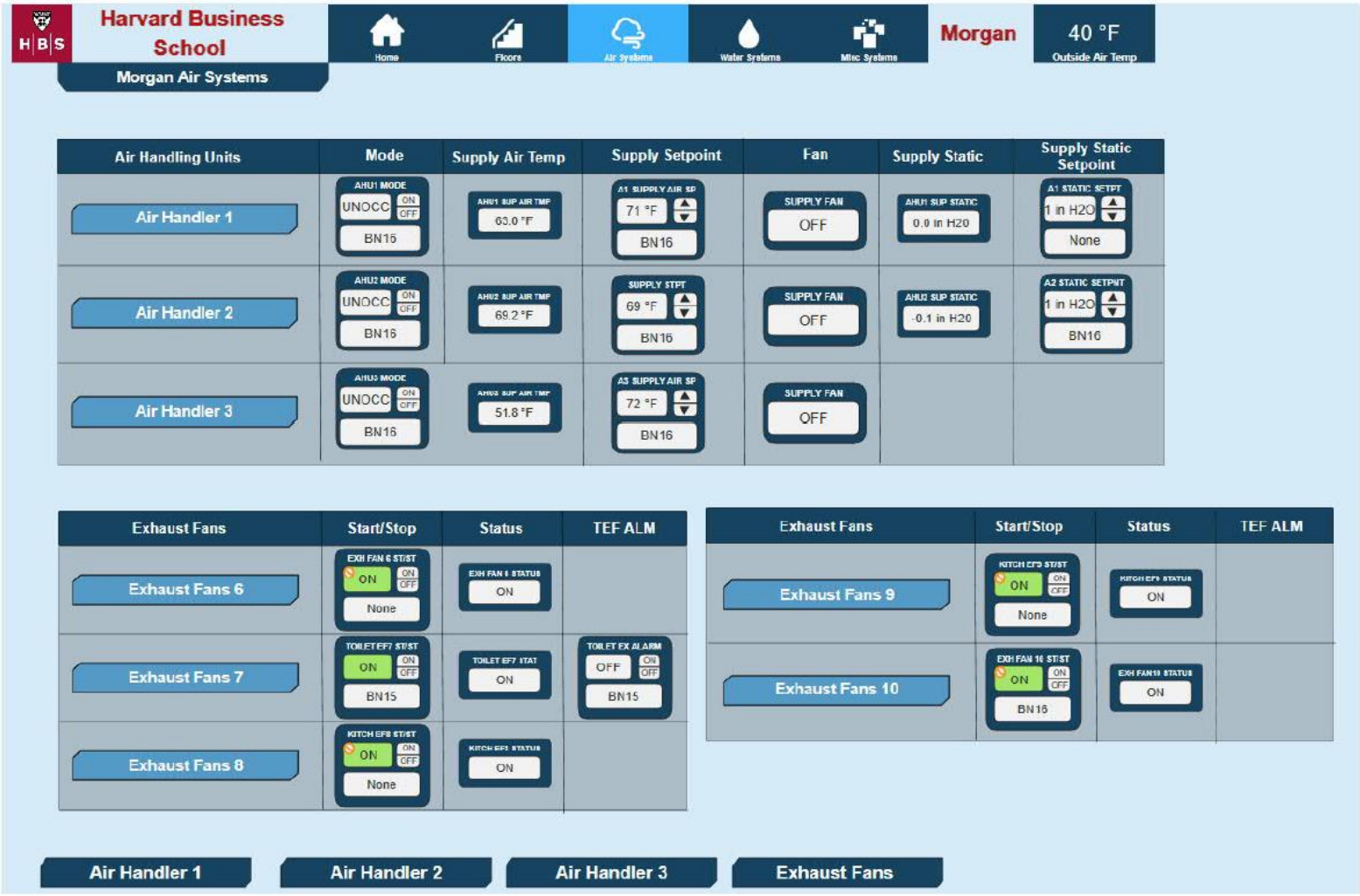
        I. Heating/Hot water Valve Output should be 10
        II. Cooling/Chilled water valve output should be 10
        III. VFD speed should be 10
        IV. Temperature Setpoints should be 1

2. Common_Data_Project_1\DATA_BLOCK_01_HARVARD_ON_OFF_1
    A. Desc Color Should be white(#FFFFFFFF)

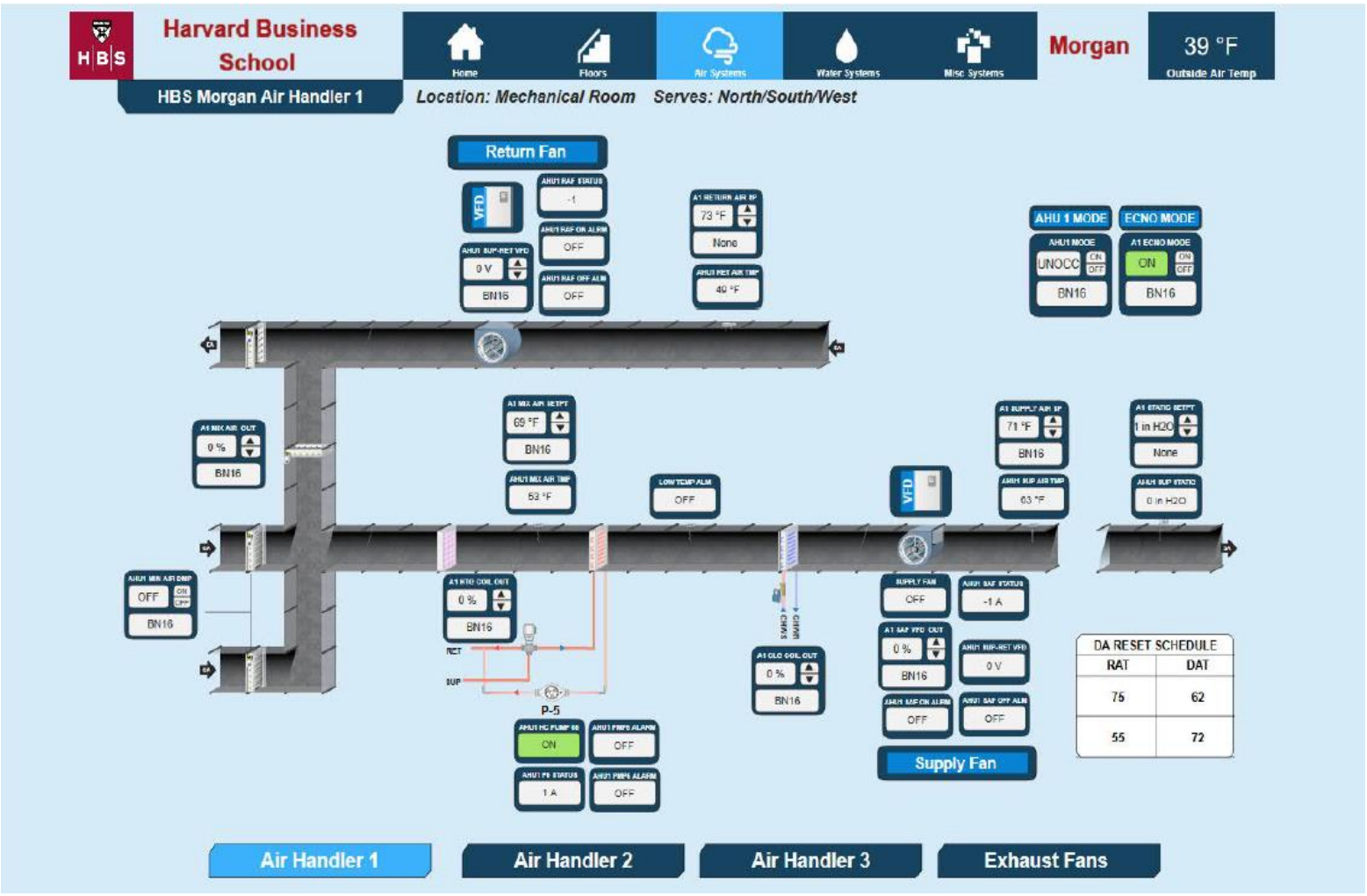
3. Common_Data_Project_1\DATA_BLOCK_01_HARVARD

4. Common_Data_Project_1\XXXX_Title_Block
    A. Desc Color Should be white(#FFFFFFFF)

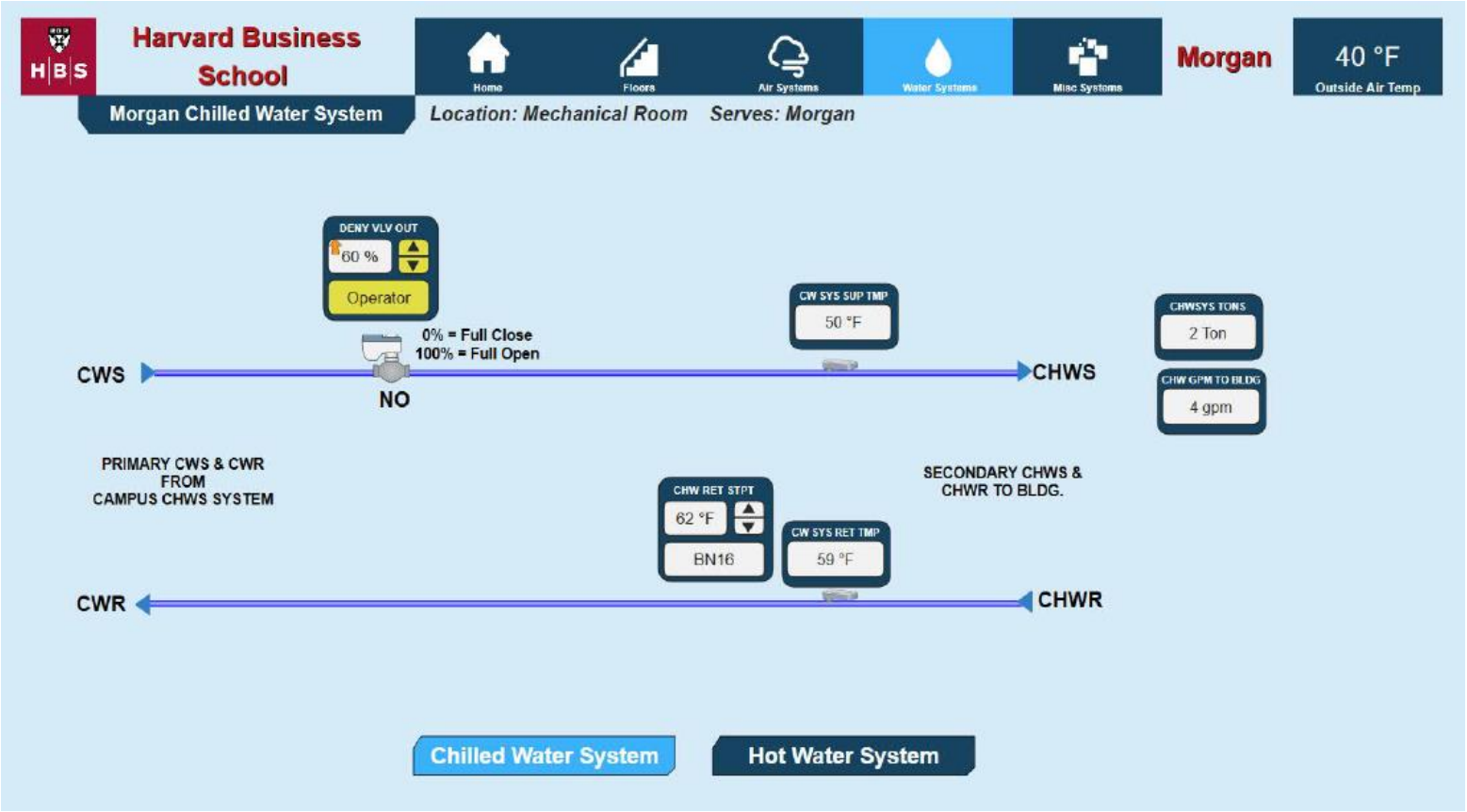
Example Air System Overview:



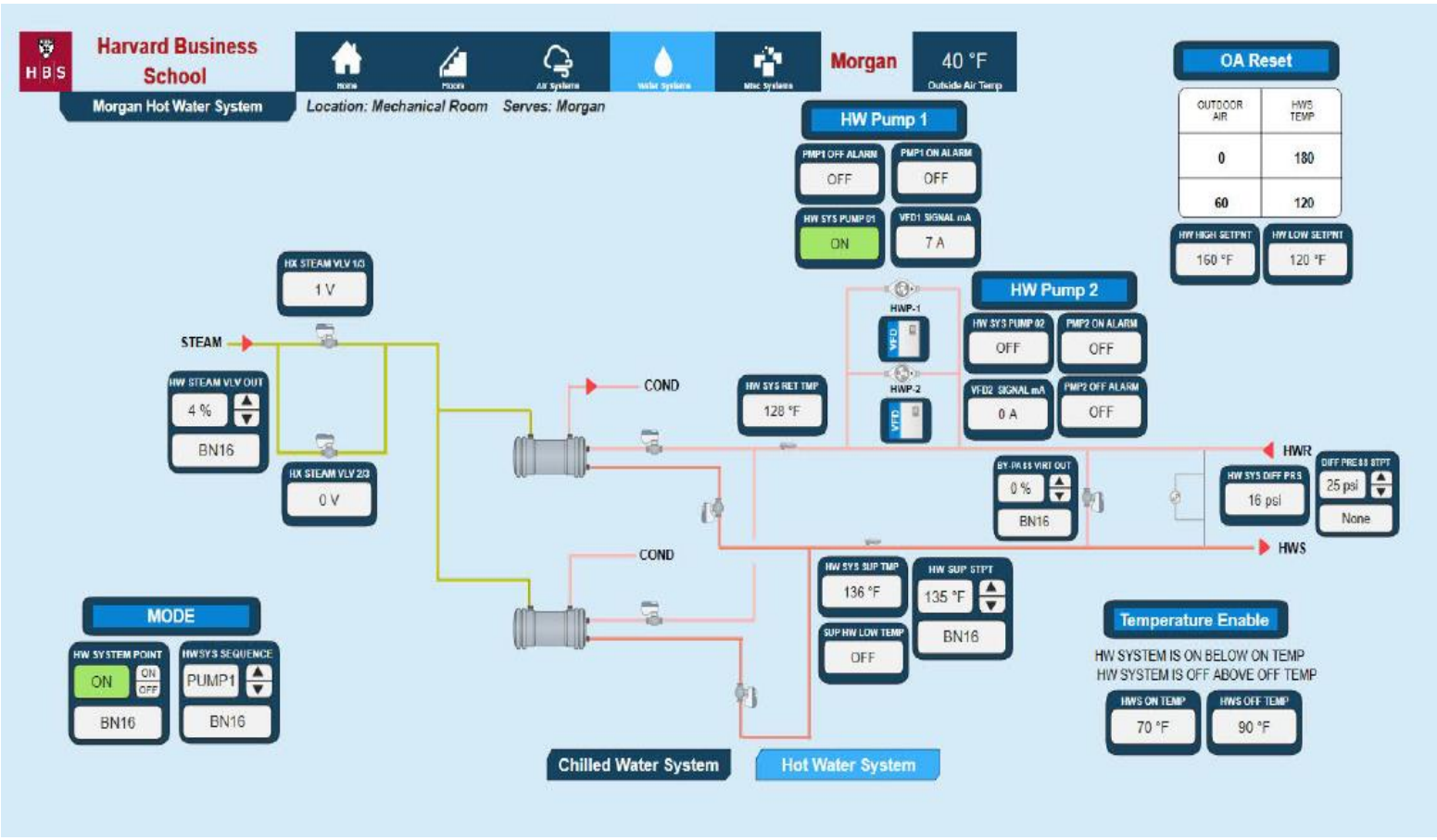
Example AHU:


Harvard Business School
Home
Floors
Air Systems
Water Systems
Misc Systems
Morgan
39 °F
Outside Air Temp
HBS Morgan Air Handler 1
Location: Mechanical Room
Serves: North/South/West
Return Fan
VFD
AHU 1 MODE
ECNO MODE
UNOCC
ON
BN16
73 °F
None
40 °F
69 °F
52 °F
OFF
71 °F
63 °F
1 in H2O
0 in H2O
0 %
0 V
-1
-1 A
P-5
DA RESET SCHEDULE
RAT
DAT
75
62
55
72
Supply Fan
Air Handler 1
Air Handler 2
Air Handler 3
Exhaust Fans

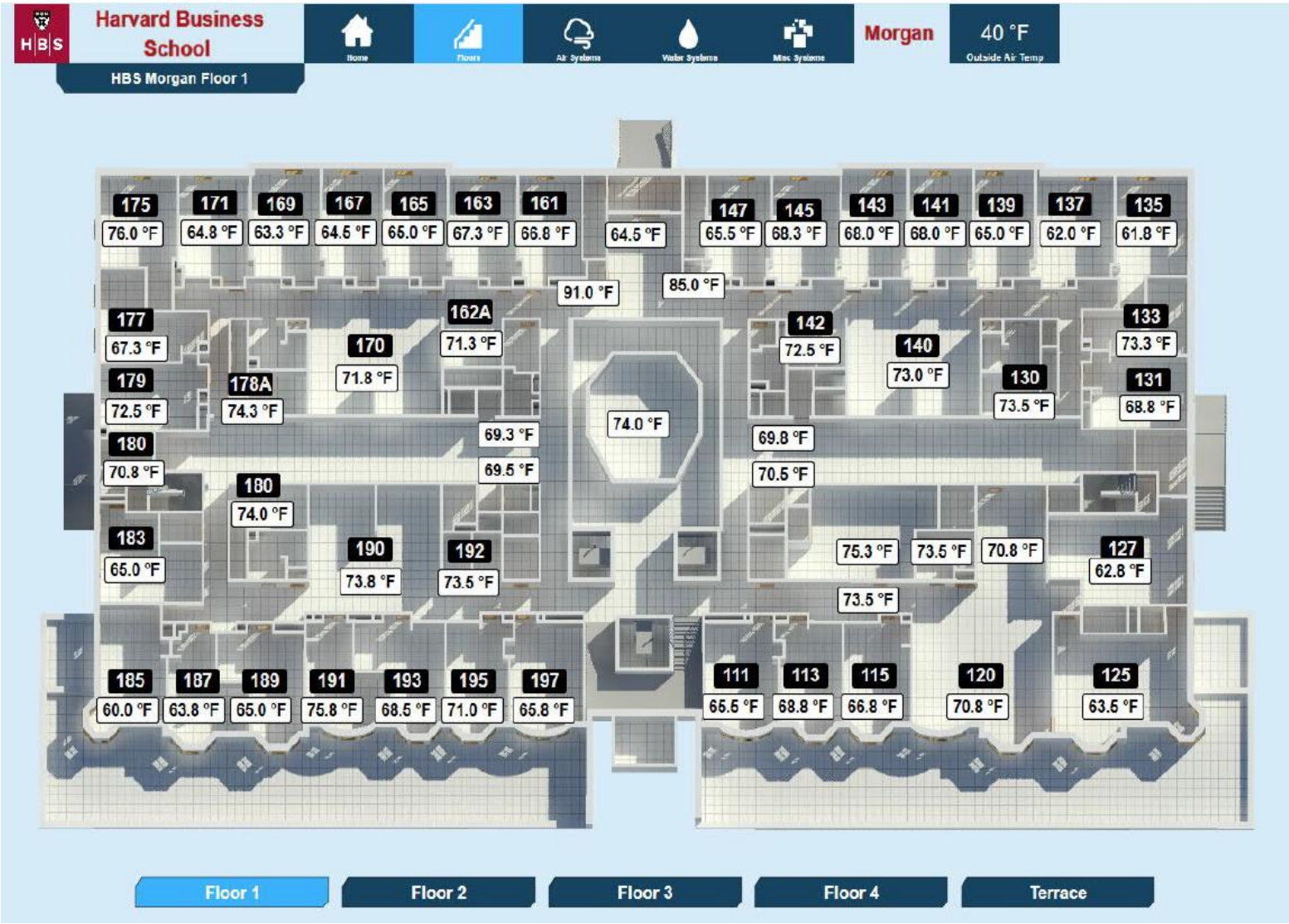
Example Chilled Water System:



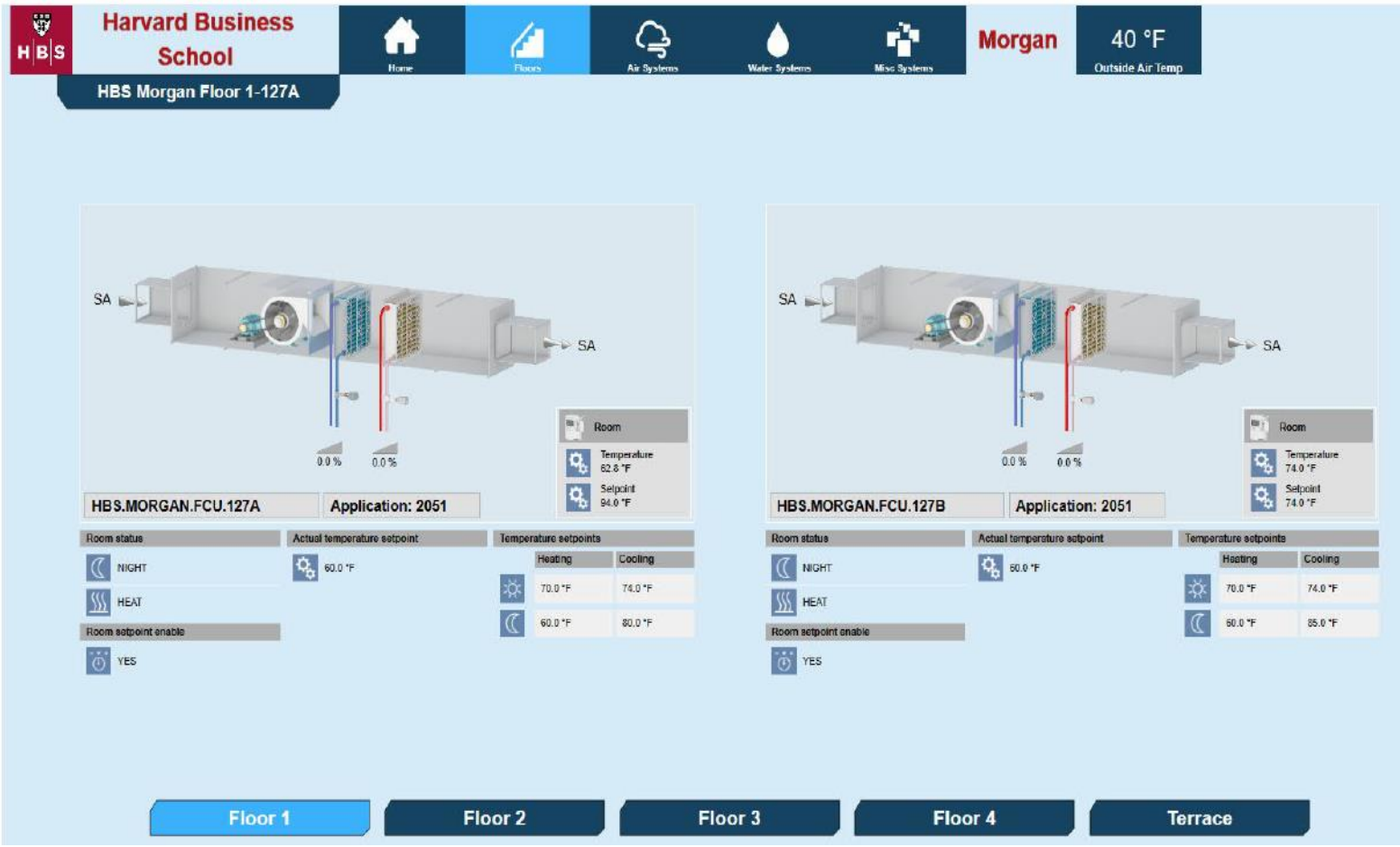
Example Hot Water System:



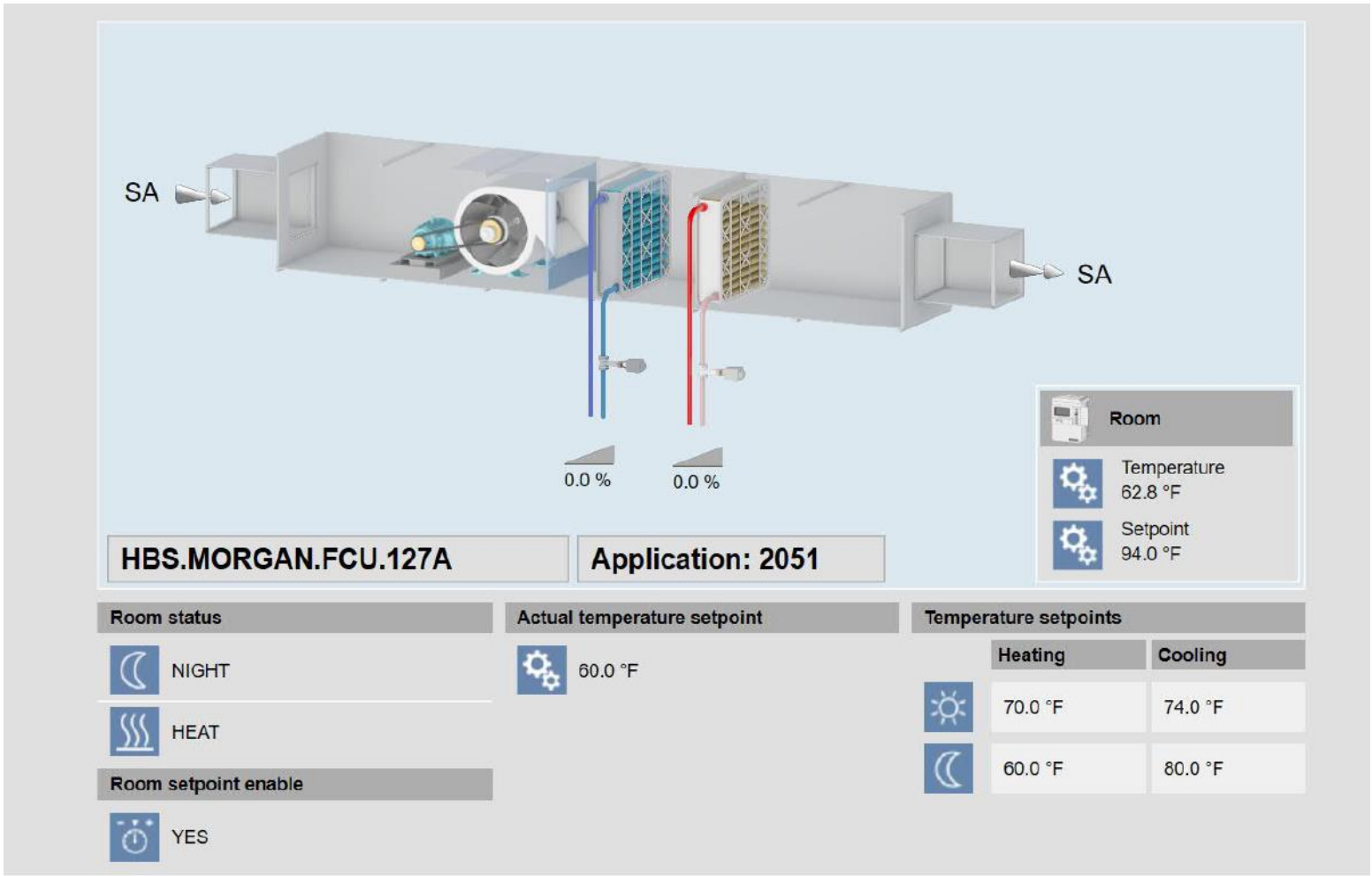
Example Floor Overview:



Example Room:



Example FLN Device Template:



Trending:

General:

To establish guidelines for defining and adding BACnet point trend definitions to the database.

BACnet Trending Overview:

The Trend Log object, the heart of BACnet trending, monitors the present value of a point. When the predefined conditions are met, the Trend Log object writes the following to its Log Buffer for subsequent retrieval: the present value of the point, a time stamp, and certain status flags. Errors that prevent the acquisition of the data, as well as changes in the status or operation of the logging process are also recorded. The data may be logged at regular intervals, or upon a change of value (COV). The COV used comes from either the defined trend log COV increment, or the trended point's COV increment. Each time-stamped buffer entry is called a trend log record.

Each Trend Log object maintains this internal buffer that fills, or grows, as log records are added. If the buffer becomes full, there are two options: the oldest record is overwritten when a new record is added, or the properties of the Trend Log may be set to stop once full. Trend logging may also be enabled and disabled at dates and times specified.

Collection of this Trend Log object that is located in the field panel must be collected (uploaded) to the storage device (computer) periodically based on a trend collection schedule. This can be in addition to the automatic notification and uploading that occurs through the notification_Class and Notification_Threshold properties in the Trend Log object. When points are trended by the interval method, the trend buffer fill at a predictable rate, so the collection of trend data can be easily scheduled.

BACnet Trending Methods:

A BACnet point can be trended two different ways, and not exclusively. Each point can be trended by Change Of Value (COV) and/or by a predefined time based interval. A single point can be defined for trending with up to five different trend definitions; however, only one of these definitions can be by COV. Both methods can be used for analog type and digital (binary) type points, though it is recommended to exclusively trend analog type points by interval, and digital (binary) points by COV.

Interval Trending:

> Uses a specified interval of time to record values for the point when the interval is reached. Minimum interval sample time is one minute, though the recommended default interval is 15 minutes.

Change Of Value (COV) Trending:

Uses a change in the value or state of a point when that point changes by at least one pre-defined COV limit. The trend COV limit specifies the amount of change an analog point can encounter before the field panel collects and reports the change. The trend COV limit is an override to the point COV limit defined for the point. The point COV limit is established for an analog point when the point is defined. You decide which of the two limits you will use when creating a COV trend definition for an analog point.

BACnet Trend Guidelines:

- Datamate's Trend Wizard tool should not be used to create trend log objects, rather use Trend Grid, or the Desigo CC trend editor.
- Analog points will be trended by a 15-minute default interval unless otherwise noted.
- Digital points will be trended by COV, unless otherwise noted.
- Panel sample size should be configured to store at least two days' worth of data. 15-minute analog example: panel sample size = 200 samples.
- Trend buffer notification class will be defined for NC 7.
- Trend Logs will be collected (uploaded) to the application server on a defined schedule.

BACnet Trend Log Names:

All trend log objects will be named with the actual point name designation, followed by the trending method acronym.

Trending method acronyms:

- Five-minute interval trend: "Point.Name"_TL_5
- Ten-minute interval trend: "Point.Name"_TL_10
- Fifteen -minute interval trend: "Point.Name"_TL_15
- Change of valve trend: "Point.Name"_TL_C

Trend Configuration Examples

Point Example	Type	Interval	Trend Log Suffix	Panel Samples	NC
AHU LTD	COV	N/A	_TL_C	100	7
AHU SMK	COV	N/A	_TL_C	100	7
AHU SAT	Interval	15	_TL_15	200	7
AHU FAN Status	COV	N/A	_TL_C	100	7
AHU LEAK	COV	N/A	_TL_C	100	7
AHU FLTR	COV	N/A	_TL_C	100	7
RMT (TEC / DXR)	Interval	15	_TL_15	200	7

Alarming:

General:

To establish guidelines for defining and adding BACnet point alarming to the database.

BACnet Alarming Overview:

A critical component of the BACnet alarm processing is the BACnet Notification Class Object. Any device capable of generating and forwarding BACnet alarms must have at least one Notification Class object defined. When a new alarm / event occurs the Notification Class send a message to all subscribed devices / clients. BACnet devices / clients can contain one or more Notification Class objects.

BACnet Alarm Categories:

There are two different BACnet object (point) alarming categories:

- Intrinsic Alarming – BACnet standard alarming, where the object (point) itself can be configured to generate an alarm / event notification based on object specific rules. Analog objects (points) are based on a Low and High limit, a time delay, and a dead band. Binary objects (points) create notifications based on a change in the binary state of the object.
- Event Enrolment – BACnet enhanced alarming, where the object (point) can be configured to reference any property from any object (point) located in any BACnet device. The Event Enrollment object executes selected algorithms to evaluate alarm conditions on the configured data source. If these conditions are met, an event notification is sent to the chosen Notification Class object.

Alarm / Event Characteristics:

Each point defined for either intrinsic or event enrolment alarming must be configured to alert on a change in characteristic. These are defined as:

- Annunciate to Normal Transitions – When enabled a notification of a point returning to normal from an alarm or fault condition is sent.

- Annunciate to Off Normal Transitions - When enabled a notification of a point going into an alarm condition is sent.

- Annunciate to Fault Transitions - When enabled a notification of a point going into a fault / failed condition is sent.

Notification Class (NC):

Contains a list of BACnet devices or recipients that receive alarms and alarm acknowledgements. This list is available when a point enters an alarm condition from BACnet field panels and allows BACnet field panels to send alarms to other BACnet devices / clients.

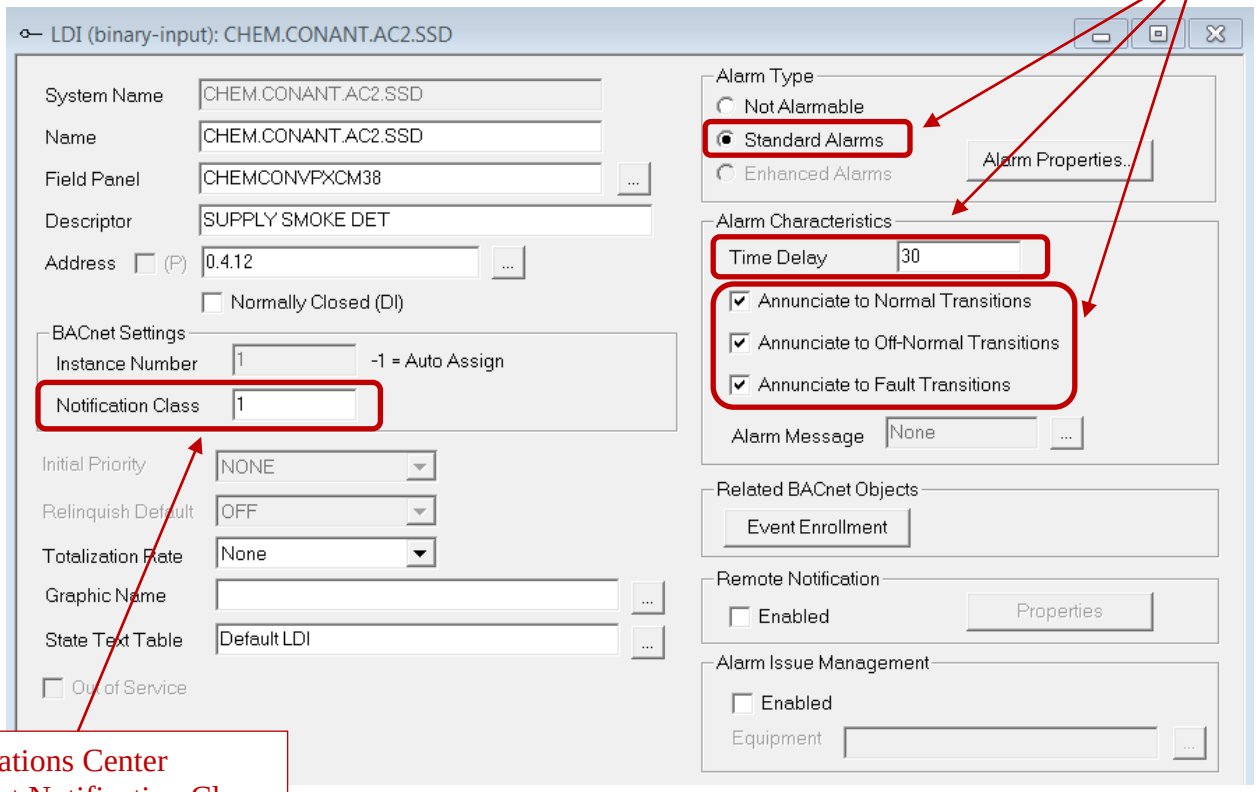
The Siemens BACnet field panels will be configured with four “default” Notification Classes (NC).

Name	NC Instance #	Desigo CC Lamps
BLN Messages	0	Status
Operations Center Alarm	1	Operations
Local Building Alarm	2	Local
Trend Buffer	7	N/A

The two alarm categories, the status messages, and the system faults will be presented on the Desigo CC Alarm Bar (lamps) as shown.

Intrinsic / Standard Alarm Example:

Digital Input - AHU Smoke Detector



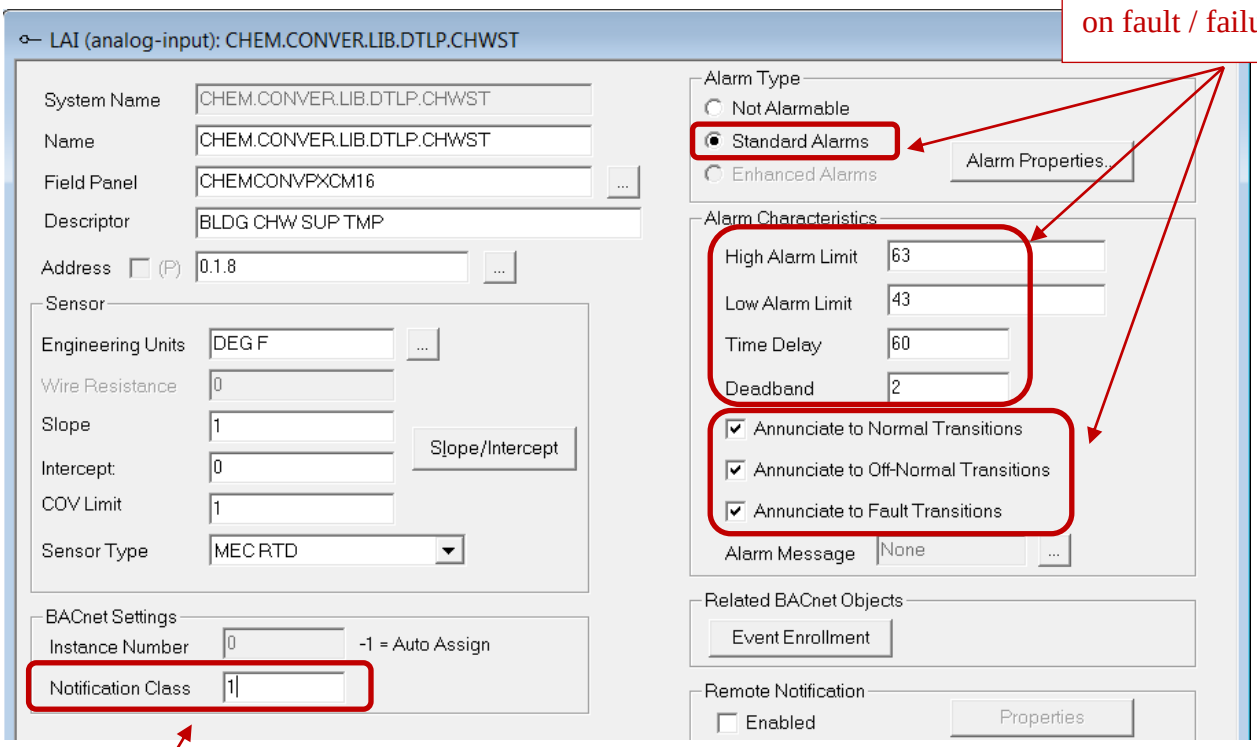
- Alarm enabled
- 30 second delay
- Notify on alarm, on return to normal, and on fault / failure.

- Operations Center BACnet Notification Class

Intrinsic / Standard Alarm Example:

Analog Input – Building Chilled Water Supply Temperature

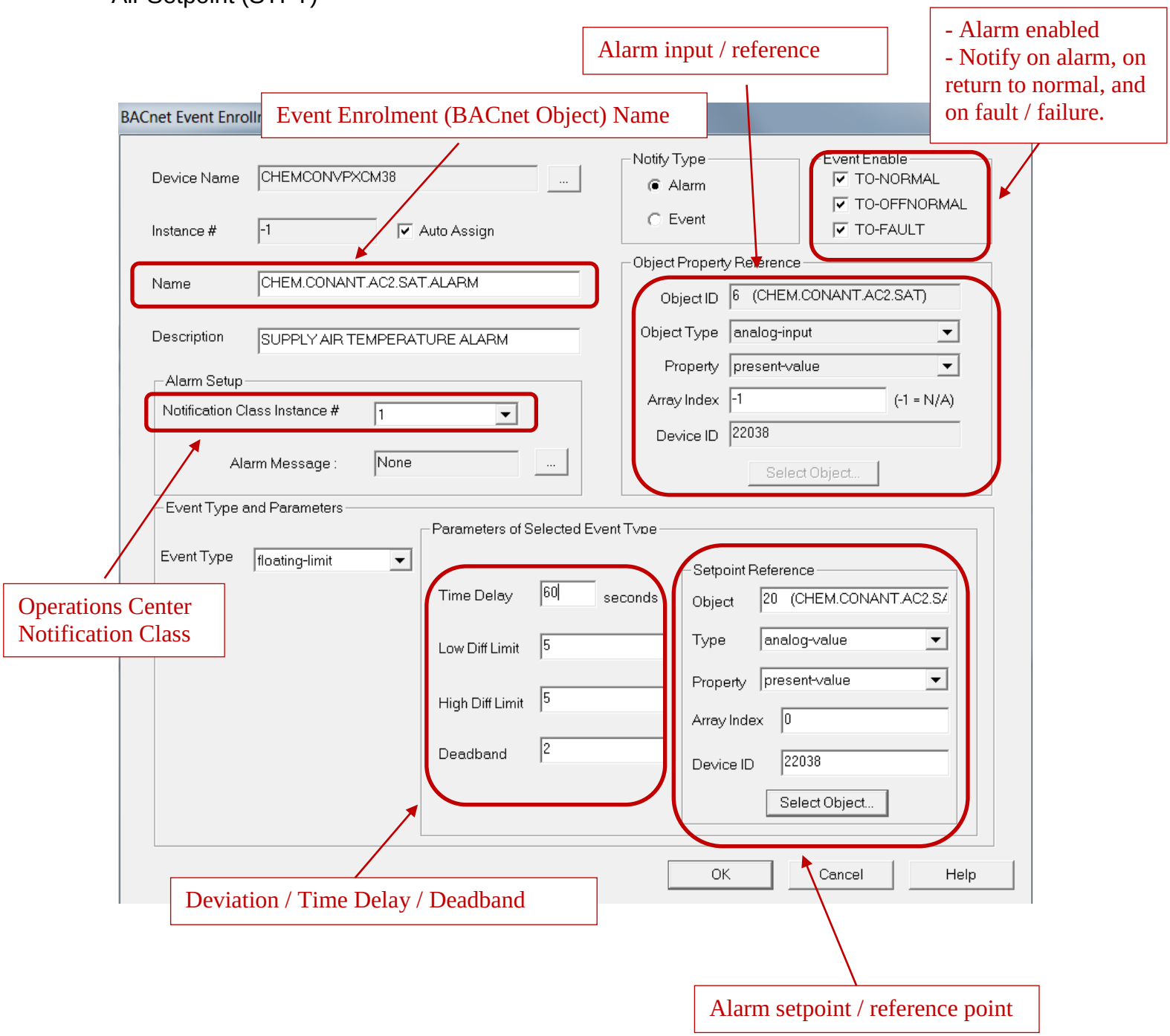
- Alarm enabled
- High & Low Limits
- Time Delay
- Deadband
- Notify on alarm, on return to normal, and on fault / failure.



- Operations Center BACnet Notification Class

Event Enrolment / Enhanced Alarm Example:

Analog Input vs. Analog Setpoint – AHU Supply Air temperature (SAT) and AHU Supply Air Setpoint (STPT)



Event Enrolment Transition Delay / Mode Disable Programming:

If a system transition (mode point) alarm delay is required, or to disable an alarm when the system is not running, then programming will need to be added to achieve this functionality.

New points will need to be added to complete the programming:

- System / Unit / Mode “TIMER” point – virtual analog value
- “ALM.STPT” point – virtual analog value

Example programming:

Establish a counter when the system / unit is on.

SAMPLE (60) IF (“EQUIPEMENT”.EQ.ON) THEN (TIMER = TIMER +1) ELSE (TIMER = 0)

If the system / unit is off, then disable the alarm by setting the STPT equal to the input reading. Once the system / unit starts, wait 5 minutes before enabling the alarming by setting the STPT equal to what it should be.

IF (“TIMER”.GE.5) THEN (“ALM.STPT” = “UNIT.ACTUAL.STPT”) ELSE (“ALM.STPT” = “UNIT.INPUT.VALUE”)

Note: “ALM.STPT” must also be used in the BACnet Event Enrolment as the Alarm setpoint / reference point.

Application Specific Devices – TECs & DXR Device Alarming:

These device points can only be alarmed with either the BACnet Event Enrollment functionality, or through the use of virtual points and panel programing (PPCL).

A digital output TEC point (fan enable) can be alarmed against its digital input status point (fan proof) by using a “command failure” event enrollment.
An analog input TEC point (room temperature) can be alarmed against its setpoint with the use of a “floating limit” event enrollment or by using an “out of range” event enrollment. A floating limit event enrollment allows the input value to be alarmed against a setpoint deviation, where an out of range event enrollment utilizes a fixed high and low alarm threshold.

Operations Center Alarm Monitoring:

- When commissioning or testing of alarm points, notify the Operations Center before tripping alarms. Control center telephone number is 617-495-5560. At any campus phone, dial 5-5560.

- Points being added to the system should not be made alarmable until they been approved and verified. A notification letter and a spreadsheet of all new points being added to the system must be sent through the proper channels so “Harvard” can select which points should be setup as “Operations Center” alarms. Operations Center alarms are those alarms that require an action on their part. The form letter and sample spreadsheet can be found in “T-Harvard-Support Documents” folder. These points will need to be configured to report to alarm Notification Class 1.

- Points not identified as being “Operations Center” alarmable, can be set up and defined to report as alarmable to the “local” building operator group, Notification Class 2.

Alarm Configuration Examples

Point Example	Type	NC	Delay	High	Low	DB
AHU LTD	Intrinsic	1	10	N/A	N/A	N/A
AHU SMK	Intrinsic	1	30	N/A	N/A	N/A
AHU SAT	EE	1	60	Offset 5	Offset 5	2
AHU FAN	Intrinsic	1	60	N/A	N/A	N/A
AHU LEAK	Intrinsic	1	30	N/A	N/A	N/A
AHU FLTR	Intrinsic	2	120	N/A	N/A	N/A
RMT (TEC / DXR)	EE	2	60	80	60	2