NATIVE SERIES™

NB-V3Tb & *NB*-V3Td
USER MANUAL

AMERICAN AUTO-MATRIX®
SMART BUILDING SOLUTIONS®

NB-V3T *User Manual*

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WORLD HEADQUARTERS

American Auto-Matrix
One Technology Lane
Export, Pennsylvania 15632-8903 USA
Tel (1) 724-733-2000
Fax (1) 724-327-6124
Email aam@aamatrix.com
www.aamatrix.com

This manual describes the installation and operation of the American Auto-Matrix *NB*-V3Tb and *NB*-V3Td controllers.

This document is divided into the following sections:

. One: Overview, describing the features of the *NB*-V3Tb and *NB*-V3Td and presenting the specifications for the controllers
. Two: Wiring & Installation, detailing the wiring and installation procedures as well as configuration information
. Three: *NB*-V3Tb Objects & Properties, listing all attributes present in each channel in the *NB*-V3Tb controller and describing their use
. Four: *NB*-V3Td Objects & Properties, listing all attributes present in each channel in the *NB*-V3Tb controller and describing their use
. Appendix A: *NB*-V3Tb Properties, enumerating the attributes in every channel along with their datatype, access, storage and default values (if any)
. Appendix B: *NB*-V3Td Properties, enumerating the attributes in every channel along with their datatype, access, storage and default values (if any)

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This document contains certain style and formatting conventions for conveying information in a clear and concise manner:

. Property names are shown in **bold**. For example: **present_value**.
. Properties with the associated Object specified are listed with the channel followed by a colon and then the attribute. For example: Zone Temperature:**present_value**.
. Menu commands appear with a ">" symbol between levels. For example: File>Open.
. *Italics* indicate a section of this manual or another publication.
. The following formats are used to highlight important information:

NOTE

Notes indicate important information and appear in boxes with this format separated from the running text.

CAUTION

Cautions indicate information that may prevent serious system or user problems and appear in boxes with this format separated from the running text.

WARNING

Warnings indicate information that may prevent personal injury or equipment damage and appear in boxes with this format separated from the running text.

Section 1 - Overview

Section 2 - Wiring & Installation

Section 3 - *NB*-V3Tb Objects & Properties

Section 4 - *NB*-V3Td Objects & Properties

Appendix A - NB-V3Tb Properties
Appendix B - NB-V3Td Properties

SECTION 1: OVERVIEW

IN THIS SECTION

1.1 WHAT IS THE NB-V3T?

The NB-V3Tb and NB-V3Td controllers enable constant volume air handler units (AHU) to supply variable volumes of air for Variable Volume Variable Temperature control. Capable of controlling based on static pressure (NB-V3Tb) and airflow (NB-V3Td), the NB-V3T controllers enable constant volume air handler units (AHU) to supply variable volumes of air.

Table 1-1 NB-*VAV Models*

NB-VAV Controller	Digital Outputs (Relay)	Analog Outputs	Universal Inputs	Real-time Clock	Airflow Sensor	Actuator
NB-V3Tb	5	4	5	Yes	Yes	Yes
NB-V3Td	0	0	1	External Option	No	Yes

1.1.1 FEATURES OF THE NB-V3T

. Can communicate with third party BACnet-MS/TP devices such as Unitary Controllers or area controllers over EIA-485 (RS-485)
. High resolution universal inputs.
. Dedicated zone temperature input with 15-bit resolution.
. Analog outputs with 0-10VDC range, 8-bit resolution. (NB-V3Tb only)
. Integrated Belimo feedback actuator.
. Motor Management Technology™ (MMT™) for monitoring, identifying, and correcting motor shorts
. Integrated high-resolution pressure sensor (NB-V3Tb only)
. Mechanical relays equipped with a tranzorb protection device to suppress transients and contact arcing. (NB-V3Tb only)
. Flash updates through *NB*-Pro™ for easy incorporation of the latest firmware and application templates.
. Real-time clock module (NB-V3Tb only)

1.2 INPUTS

1.2.1 UNIVERSAL INPUTS

The *NB*-V3T's Universal inputs are connected via terminal block TB1. They are high resolution (15-bit) inputs that can read a current, resistance or voltage signal from an input device. The controller can detect current in the range 0-20mA, resistances in the range 0-1MΩ, or voltages in the range 0-10VDC. The universal inputs may also be configured to interpret any of these signals as a digital value. The controller's circuitry provides a 10Hz low-pass filter on all input readings. Overrange protection is provided to clamp normal overrange conditions and to protect against damage from electrostatic discharge (ESD). The inputs can be configured for alarming, setup/setback, filtering, and input polarity.

1.3 OUTPUTS

1.3.1 DIGITAL OUTPUTS

The Digital Outputs on the NB-V3Tb provide ON/OFF control of output devices such as fans, valves, or cooling or reheat stages. The relay outputs have a 1A, 24VAC/DC rated load, normally open, non-polar contact. A tranzorb protection device is provided to suppress transients and contact arcing.

The *NB*-V3Tb has five (5) relay outputs at terminal block TB3 terminals 11 and 12 (K1), 13 and 14 (K2),15 and 16 (K3), 17 and 18 (K4), and 19 and 20 (K5).

The first output (marked K1 on the PCB) is the Fan Digital Output. It is dedicated for the use of series fan, parallel fan, or induction damper binary control.

The second and third outputs (marked K2 and K3 on the PCB) can control one stage of cooling each.

The fourth and fifth outputs (marked K4 and K5 on the PCB) can control one stage of heating each.

1.3.2 ANALOG OUTPUTS

The Analog Outputs on NB-V3Tb provide a 0-10V output with an 8-bit resolution. The outputs can be controlled automatically by the control loops in the controller, set manually to take a specific value, or commanded by an SPL program or external controller. Modulation of reheat valves, radiation valves, actuators, or lighting ballasts are all suitable applications for the analog outputs.

1.4 SPECIFICATIONS

1.4.1 NETWORKING

- **line signaling:** RS-485
- **wiring:** shielded, twisted pair
- **network protection:** dual tranzorbs, PTC
- **communications speed:** 9.6k, 19.2k, and 38.4k baud rate, programmable
- **network configuration:** multidrop bus, per RS-485 specification and practice
- **communications protocol:** BACnet MSTP

1.4.2 TERMINATIONS

- Pluggable terminal blocks for inputs, outputs, power, network, and STATbus connections.

1.4.3 INPUT SUPPLY

- NEC class II transformer (customer-supplied).
- 22-26VAC, 50/60Hz, 10VA maximum, 5VA typical.
- 5A fuse load protection.
- PTC control electronics protection.

1.4.4 OUTPUTS

- Analog Outputs: 0-10 VDC into 1 kΩ load or 0-20 mA into 250Ω load.
- Digital Outputs: will switch 10-29 V_{rms} 50/60 Hz at 1 A resistive or inductive load.
- Digital outputs provide varistor protection.
- 24 VAC Out: rated 24 V, 1.3 A max 50/60 Hz

1.4.5 ACTUATOR MOTOR

- LM24-10P-M Belimo feedback actuator with floating mount.
- **Torque rating:** 35in. lbs. (8Nm minimum).
- **Travel time:** approximately 85 seconds.

1.4.6 OPERATING ENVIRONMENT

- **temperature range:** 32-122°F (0-50°C)
- **humidity range:** 0-80% RH, non-condensing
- **altitude:** up to 2000m

1.4.7 DIMENSIONS

- **Size:** 8.5 in. (21.6 cm) × 4.75 in. (14.6 cm) × 2.63 in. (6.7 cm)
- **Shipping weight:** 1.80 lbs (.82 kg)

1.4.8 AGENCY APPROVALS

- UL Listed Management Equipment, Energy (PAZX) UL standard 916
- UL Recognized Temperature-Indicating and Regulating Equipment – Component (XAPX2) UL standard 873
- Complies with FCC Part 15, subpart B, for Class B Computing Device
- Complies with CE Directives and Standards

SECTION 2: WIRING & INSTALLATION

IN THIS SECTION

2.1 INSTALLATION

The installation of the *NB*-V3T model controller involves mounting, supplying power, connecting to the communications network, and connecting input and output devices. All wiring connections to the *NB*-V3T are made with the use of terminal blocks. The terminal blocks are plug (female) & socket (male) style. The plug consists of terminal ports and adjustment screws used to secure wires to the plug. The socket consists of a row of pins and is permanently mounted to the printed circuit board (PCB). When connecting/ disconnecting the two parts of the terminal block, align the holes on the plug with the pins on the socket and avoid twisting, thus damaging the assembly. Twisting or applying torque when connecting/ disconnecting the plug will result in damage that will void the product warranty.

WARNING

No operator replaceable parts exist in the product.

2.1.1 MOUNTING THE NB-V3T

CAUTION

It is essential that the metal of the NB-V3T mounting bracket touch the metal of the mounting location and that the mounting location to be grounded to a true earth ground for proper grounding. Failure to do this will likely result in electrical and communication problems.

he *NB*-V3T should be mounted to a site which provides access to a stable 24 VAC power transformer from which the controller will draw its power. The temperature of the mounting location must be between 32º F and 122º F (0º C to 50º C) with a relative humidity of 0-80% non-condensing. The mounting dimensions for the *NB*-V3T are shown in Figure 2-1.

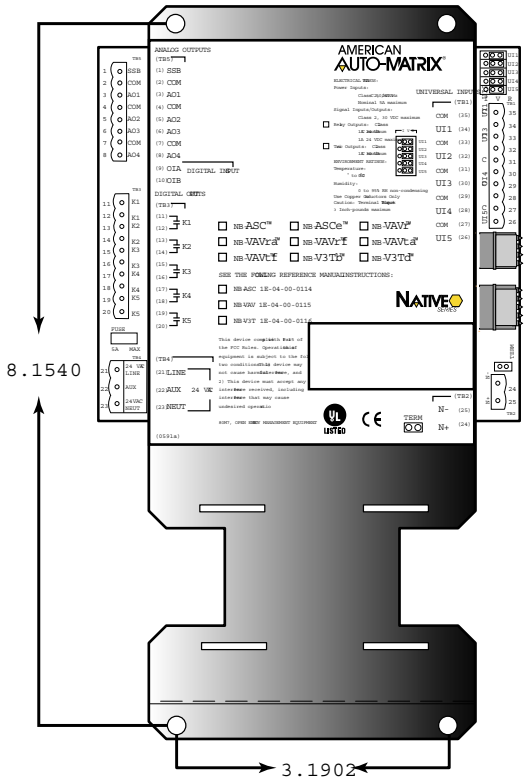


Figure 2-1 Mounting Dimensions for the NB-V3T

If you plan on mounting the NB-V3T using self-drilling screws, you must simply position the controller on the mounting surface and secure the controller by attaching the screws through the holes in the housing of the controller. If you are not using self-drilling mounting screws, use the controller backing as a template to mark the location of the mounting holes. Remove the controller and then drill pilot holes in the mounting location. AAM recommends that at least two (2) screws be used to secure the *NB*-V3T controller to the mounting location. Once the pilot holes are drilled, align the mounting holes of the *NB*-V3T controller with the pilot holes and secure the controller to the mounting location using sheet metal screws. Sheet metal screws used to secure the controller to the mounting location are not supplied with the *NB*-V3T controllers.

NOTE

Use the top screws on the mounting bracket for installation on round duct mounting locations. Otherwise you can use either the top or the bottom holes on each side of the bracket.

2.1.2 CONNECTING THE RS-485 NETWORK

The RS-485 network is connected to terminal block TB6 using 14-22 AWG, shielded, twisted pair wiring making sure to maintain polarity between devices.

The shield wire run to the first controller in the network should be connected to a reliable earth ground. At each connection along the network, i.e. from the first to the second, the second to the third, etc., the shield wires should be connected together and taped back. At the last controller, the shield wire should simply be taped back.

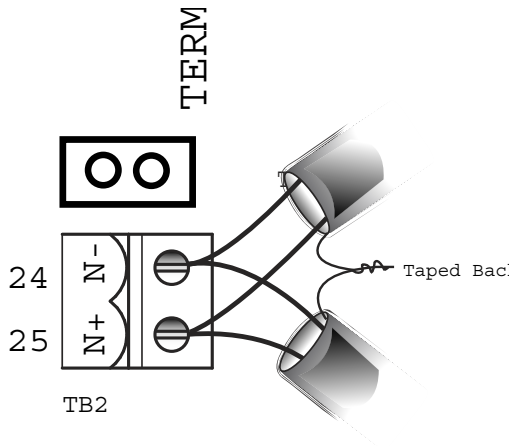


Figure 2-2: Proper Connection of the NB-V3T to an RS-485 Network

IMPORTANT

All RS-485 communications networks should be installed using shielded, twisted pair wiring. Each twisted pair must be individually shielded. Unshielded cables must be placed in metal conduit alone. Communications wiring should not be routed together with, or close to, wiring carrying DC switching, AC lines, fluorescent lighting or any other RFI/EMI emitting source. Failure to meet these requirements may result in various communications problems, such as excessive network retries, noise susceptibility, and/or a complete loss of communications.

For units that are electrically last on the network, it may be necessary to connect a termination resistor across the N+ and N- terminals to minimize unwanted communications line effects, such as signal reflection. Only the end units on the multi-drop network should be terminated. The *NB*-V3T provides the option of connecting an internal, jumper-selectable, 250 Ω termination resistor across the N+ and N-

terminals. The termination resistor is connected using the TERM jumper, located above TB2. The location of the TERM jumper is shown in Figure 2-3.

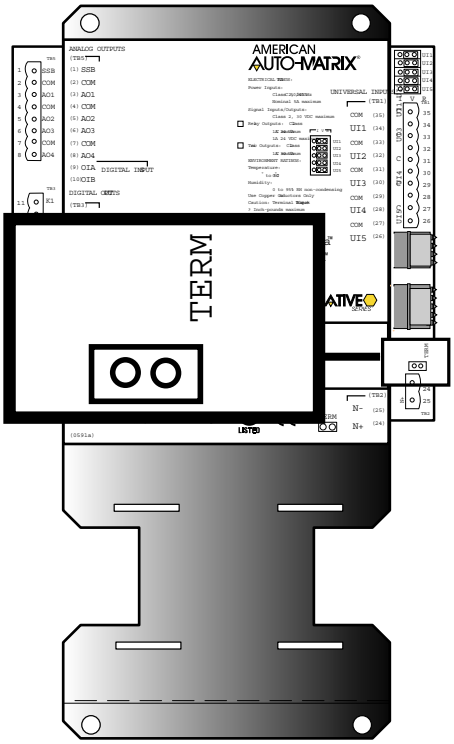


Figure 2-3. Location of the TERM Jumper

To connect the termination resistor, the TERM jumper, located above TB2, should be moved to the left two pins as shown in Figure 2-4a. To disconnect the internal termination resistor, move the TERM jumper to the right two pins as shown in Figure 2-4b. If necessary, additional termination resistance can be added by connecting a resistor between the N+ and N- pins.

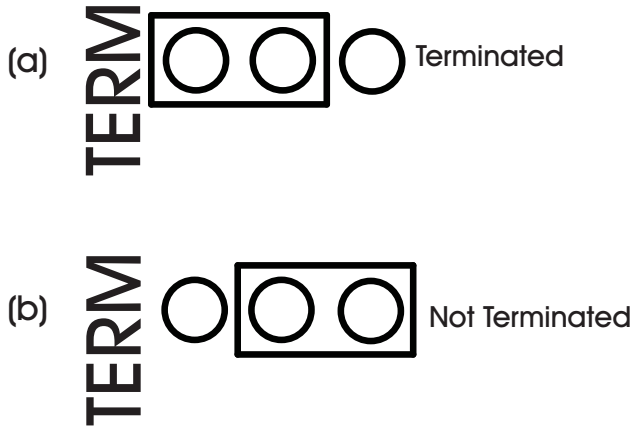


Figure 2-4: Configuring the TERM Jumper for RS-485 Communications Termination

2.1.3 POWERING THE NB-V3T

You must use a 24VAC 50/60Hz NEC class II transformer rated at 10VA maximum (5VA typical) for power supply to the *NB*-V3T. AAM recommends that at least 18AWG wiring be used, but the terminals can accommodate 14–22AWG. To supply power to the Unitary Controllers:

. Connect the 24VAC 50/60Hz NEC class II transformer rated at 10VA maximum to the 24VAC Line (TB4:Terminal 21) and 24VAC NEUT (TB4:Terminal 23) of the Unitary Controller.

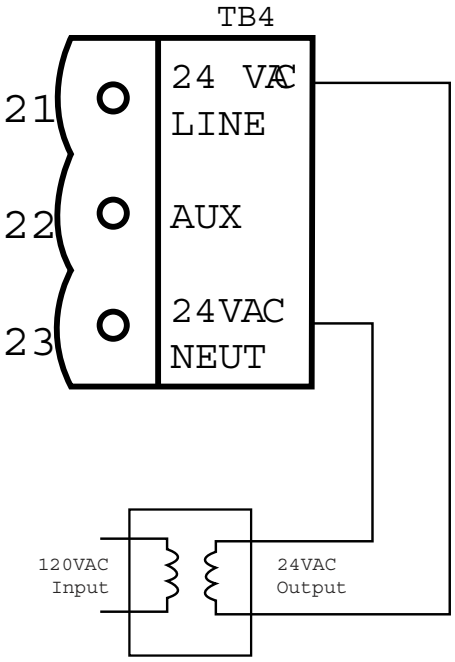


Figure 2-5: Wiring 24VAC Power

NOTE
AAM recommends that each *NB*-V3T on a network have an individual power transformer. This transformer is **not to be used with peripheral devices**.

2.2 UNIVERSAL INPUTS

The *NB*-V3Tb provides a total of five (5) universal inputs, while the *NB*-V3Td has a single (1) universal input. The universal inputs, connected to TB1, are shown in Figure 2-6.

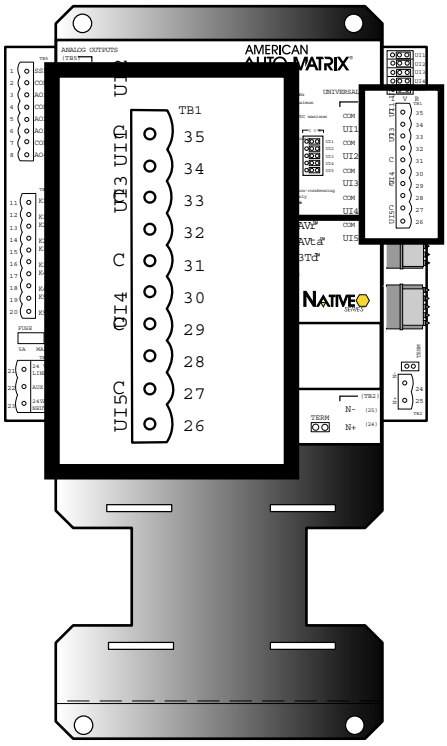


Figure 2-6: Location of the Universal Inputs on the NB-V3T

Each universal input may operate as either a digital or analog input. Each input may be configured individually to read any of the following:

. digital (on/off)
. linear inputs (0-10 V, 4-20 mA, etc.) scaled between a programmable minimum and maximum value
. thermistor (Precon type III)

2.2.1 IVR JUMPERS FOR UNIVERSAL INPUTS

The IVR jumpers are located above terminal block TB1 as shown in Figure 2-7.

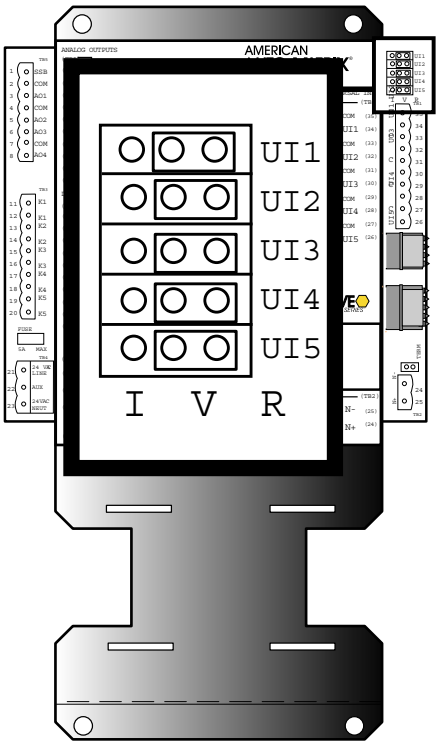


Figure 2-7: Location of the IVR Jumpers for Universal Inputs

The IVR jumpers are used to configure the *NB*-V3T for the different types of signals that can be connected to the associated universal input point. By moving the jumper to different positions the associated point can be selected as either a current, voltage, or resistance input. The possible positions for the IVR jumper are show in Figure 2-8a-c.

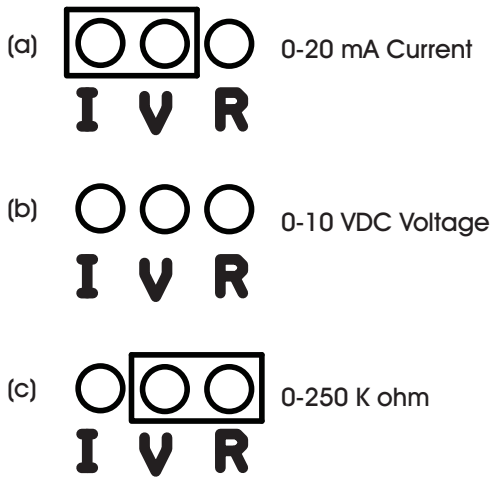


Figure 2-8: IVR Jumper Positions

When the jumper is in the left-most position, connecting the I and V pins as shown in Figure 2-8a, the associated universal input is configured as a 0-20 mA current sensor. If the jumper is removed, as shown in Figure 2-8b, then the input will be configured as a 0-10 VDC voltage sensor. When the jumper is in the right-most position, connecting the V and R pins as shown in Figure 2-8c, the associated universal input is configured as a 0-250 kΩ resistive sensor. The resistance setting should be used for thermistor inputs as well as dry contact, digital inputs. The default position for the IVR jumper is the Resistance setting.

NOTE

The IVR jumpers for unused Universal Inputs should be left in (or, if the jumper has been moved, returned to) the Resistance setting.

CAUTION

Leaving the IVR jumpers of an unused Universal Input in the Voltage position can lead to inaccuracies in other Universal Inputs.

2.2.2 CONNECTING UNIVERSAL INPUTS

Devices are connected to the universal inputs on the *NB*-V3T via terminal block TB1. On the NB-V3Tb, the connector has terminals for five universal inputs and a common connection, labelled “c” associated with each. When connecting an input device, you should use the terminal labelled for the desired universal input as well as the common terminal directly above it. For example, UI2 is located at terminal 32 an should be connected using the common ground on terminal 33.

When working with the *NB*-V3Td, there is a single universal input terminal and a single common terminal. To connect and input to the NB-V3Td, you would connect the wires from the sensor to terminals 34 and 35 on terminal block TB1.

2.2.3 UNIVERSAL INPUTS AS CURRENT INPUTS

Any sensor which generates a signal in the form of a current is classified as a current sensor. Ranges of 0-20 mA and 4-20 mA are common in sensors. The current produced by these sensors is directly proportional to the value being measured. For example, if a pressure sensor measured 0 to 5 inches of water gauge and had an output range of 0 to 20 mA, then a reading of 10 mA would correspond to a pressure of 2.5 inches of water gauge.

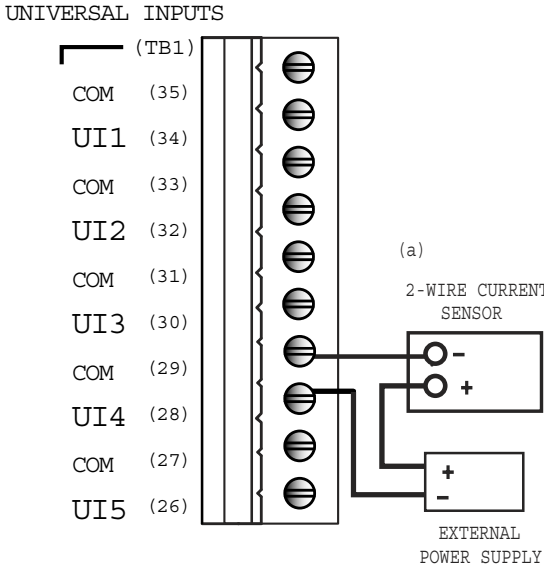
The first thing that needs to be done so that a universal input can be used as a current input is to make sure that the IVR jumper is in the correct position (See “IVR Jumpers for Universal Inputs”, Section 2.2.1). In this case, you would make sure that the IVR jumper for the input was set to the Current position with the jumper connecting the I and V pins.

Once the type of sensor has been set, you need to use *NB*-Pro or another configuration tool to configure the input. Configuration entails telling the *NB*-V3T what type of sensor is connected to an input and then specifying the range of values over which that sensors operates.

To specify the sensor type, you must open the Universal Input object corresponding to the input you are configuring. Next, you want to set the **(ST) Sensor Type** property to a value of "3= 4-20mA". That tells the *NB*-V3T that a current sensor is connected and specifies its range.

You also need to specify the range over which the sensor operates. This is necessary so that the *NB*-V3T can calculate the measured value from the input signal. The **min_pres_value** property should be set to the lowest value that your sensor can measure. This value is the sensor reading that would correspond to to a sensor output of 4 mA. The **max_pres_value** property should be set to the maximum scaled value for your input. This value is the sensor reading that would correspond to a sensor output of 20 mA.

As an example, sensors which measure relative humidity are often current sensors that operate in the 4-20 mA range. For a sensor of this type you would set **ST**=3 because the sensor measures 4-20 mA. Relative humidity ranges from 0 to 100% so you would set **min_pres_value**=0 and **max_pres_value**=100 to represent the limits of the sensor's output. In this case, a raw value of 4 mA would be scaled to a value of 0% in engineering units. The relative humidity sensor would read 100% if the input were reading a signal of 20mA. Figure 2-9 shows the proper way to connect a current sensor to the controller.



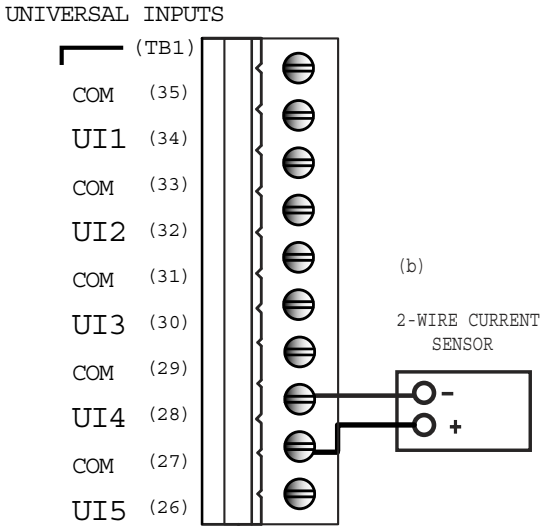


Figure 2-9: Connecting a Current Sensor to a Universal Input on the NB-V3T

2.2.4 UNIVERSAL INPUTS AS VOLTAGE INPUTS

Any sensor which puts out a voltage in response to a measured value is classified as a voltage sensor. Voltage sensors behave in very much the same way as current sensors. The primary differences have to do with the internal circuitry of the *NB*-V3T and how the signal is read.

The first thing that needs to be done so that a universal input can be used as a voltage input is to make sure that the IVR jumper is in the correct position (See "IVR Jumpers for Universal Inputs", Section 2.2.1). In this case, you would make sure that the IVR jumper for the input was set to the Voltage position. To do this, remove the jumper from the pins for the associated input.

Second, you must tell the *NB*-V3T what type of sensor is connected to an input and then specifying the range of values over which that sensors operates.

To specify the sensor type, you must to go to Universal Input object corresponding to the input you are configuring. Next, you want to set the **(ST) Sensor Type** property to a value of "2=Linear".

You also need to specify the range over which the sensor operates. This is necessary so that the *NB*-V3T can calculate the measured value from the input signal. The **min_pres_value** property should be set to the lowest value that your sensor can measure. This would correspond to the reading at zero volts. The **max_pres_value** property should be set to the maximum scaled value for your input. For example, if a 0-10 V carbon dioxide sensor measuring from 0-5000 ppm would have **min_pres_value** would be set to 0 and **max_pres_value** would be set to 5000.

Voltage sensors are wired to the *NB*-V3T in a similar fashion to a current sensor. The proper wiring for a voltage sensor is shown in

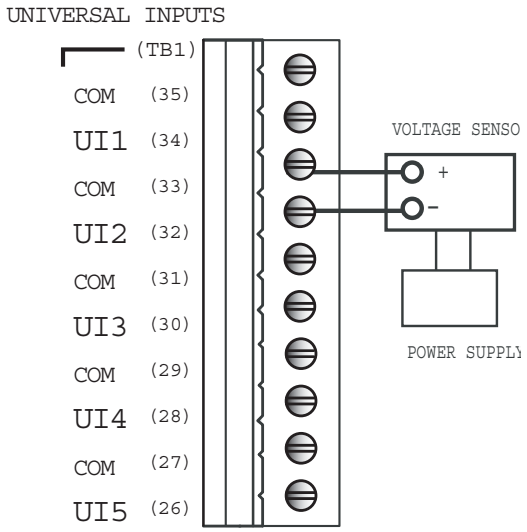


Figure 2-10: Connecting a Voltage Sensor to a Universal Input on the NB-V3T

2.2.5 UNIVERSAL INPUTS AS THERMISTOR INPUTS

The thermistor is one of the most common types of resistive sensors for temperature measurement. The thermistor's combination of high accuracy over a wide range coupled with its low cost makes it one of the most popular temperature sensors used. Because of the thermistor's popularity, the *NB*-V3T has the response curve for a **precon type III** thermistor built in.

The first thing that needs to be done to configure a universal input to be used as a thermistor input is to make sure that the IVR jumper is in the correct position (See “IVR Jumpers for Universal Inputs”, Section 2.2.1). In this example, you would make sure that the IVR jumper for the universal input was set to the Resistance position with the jumper connecting the V and R pins.

Once the jumper is properly set, the second thing that must be done is to set the sensor type. This tells the *NB*-V3T what kind of sensor is connected to the input. To set the sensor type you must open the *NB*-Pro application and select the *NB*-V3T controller. Once the controller has been opened, you want to open the Universal Input object for the chosen input. You want to set the **(ST) Sensor Type** property equal to “7=Thermistor”, the value which corresponds to a thermistor. You must then set the **min_pres_value** to -30.0 and the **max_pres_value** to 230.0, the minimum and maximum values that can be read by this type of sensor. The temperature will now be displayed in the **present_value** property of this object.

2.2.6 UNIVERSAL INPUTS AS DIGITAL INPUTS

An input that only has two signal states is considered a digital input. Any input type described above may be interpreted by the controller as a digital signal.

To configure an input to be interpreted as a digital signal, you would connect the sensor and set the IVR jumper to the appropriate position for that sensor type as described above. You would then set the **(ST) Sensor Type** property to “0=Digital”.

2.3 ANALOG OUTPUTS (V3Tb ONLY)

The *NB*-V3Tb has four (4) analog outputs capable of producing a 0-10 VDC output. The *NB*-V3Td does not have any analog outputs. On the NB-V3Tb, the analog outputs are connected via terminal block TB5. The location of the analog outputs are shown in Figure 2-11. The terminal block has connections for each analog output. There are also common connections to ground located between each pair of outputs.

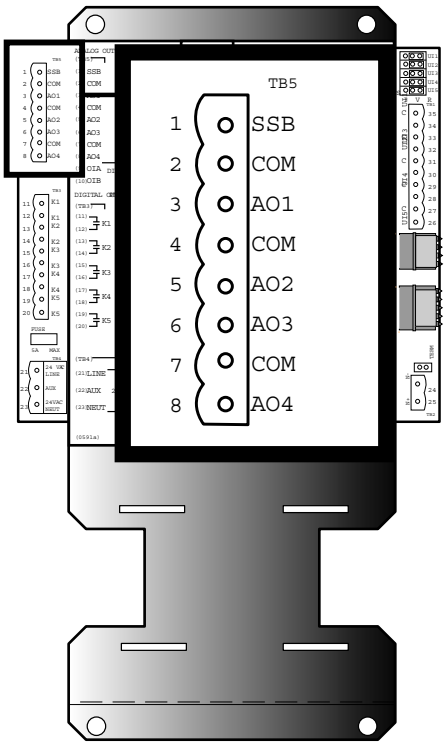


Figure 2-11: Location of the Analog Outputs on the NB-V3Tb

2.3.1 CONNECTING ANALOG OUTPUTS

To connect an output device to the output terminal, you would connect the wires from the device to the analog output terminal and the COM terminal. Analog outputs 1 and 2 would use the COM connections on pin 4 and outputs 3 and 4 would use the COM connection on pin 7.

2.3.2 CONFIGURING ANALOG OUTPUTS

The analog outputs on the *NB*-V3T can be configured to work as either normal- or reverse-acting. They can operate in automatic mode, where the output is controlled by the *NB*-V3T's control loops, or manual mode, where the value of the output is set by the user or by an SPL program.

Properties **LS** and **HS** are used to specify the low and high scaled output properties. These properties specify a range of the total output signal, specified as a percentage, that is then scaled across **min_pres_value** and **max_pres_value**. **LS** will be the output value when the **present_value** is equal to **min_pres_value** and **HS** will be the output value when the **present_value** is equal to **max_pres_value.**

For example, if the **present_value** is to be displayed as a percentage (0-100%) of a 10 VDC output range, set **min_pres_value** to 0 and **max_pres_value** to 100 (a display range of 0%-100%). Then set **LS**=0.0 and **HS**=100.0 (the full range of the output signal), because **present_value**=0 represents 0.0% of the output range and **present_value**=100 represents 100.0% of the output range. This is shown in Figure 2-12.

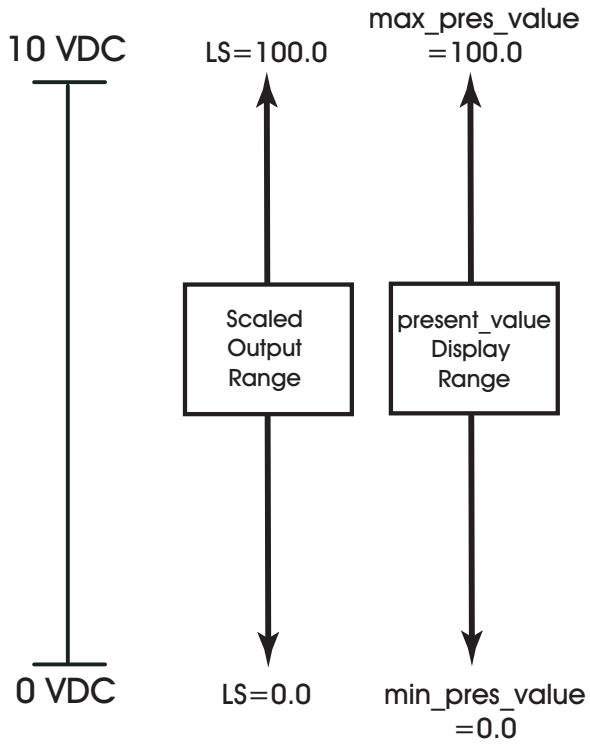


Figure 2-12: 0 to 10 V Displayed as a Percentage

If the output device in the previous example only operated from 2-10 V instead of 0-10 V, you would simply change the value of **LS** to be 20.0 (2 V= 20% of 10 V) and everything else would remain the same. This can bee seen in Figure 2-13.

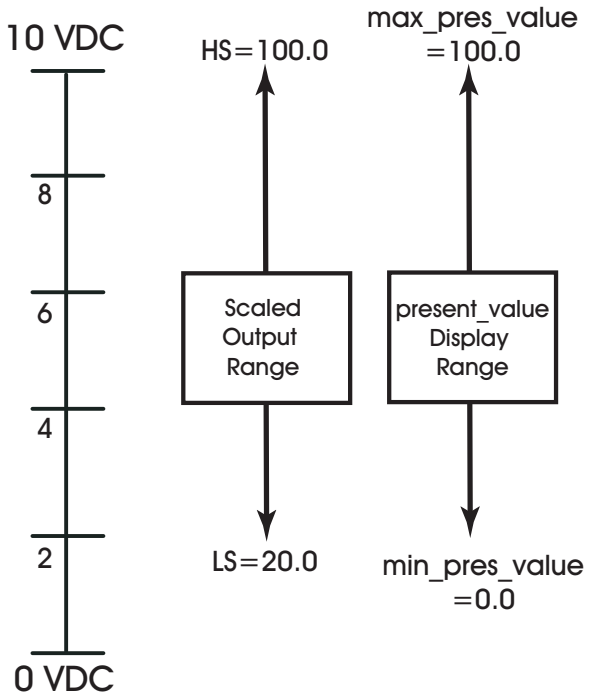


Figure 2-13: 2 to 10 V Displayed as a Percentage

This 2-10 V output could also be configured to display the actual output voltage by setting **MN**=2 and MX=10. This would display the **present_value** in the range of 2-10 as shown in Figure 2-14.

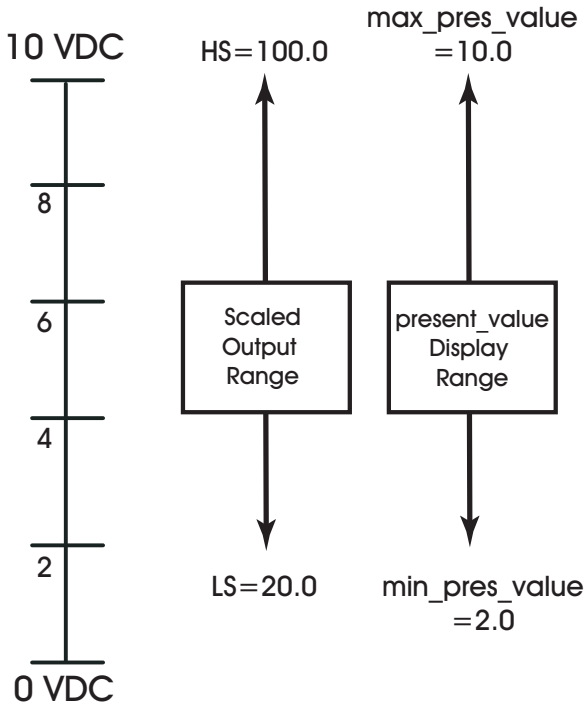


Figure 2-14: 2-10 V Displayed as a Voltage

Also, outputs can be configured to be reverse-reading. For a reverse-reading output, the value on **LS** is set greater than **HS**. For example, if a 2-10 V output is controlling an actuator that fully open at 2 V and fully closed at 10 V, you would set **HS**=20.0 (2 V = 20.0% x 10 V) and **LS**=100.0 to specify the scaled output range. If you wanted to read the percentage that the actuator was open, you would set **min_pres_value**=20.0 and **max_pres_value**=100. This is shown in Figure 2-15. Here a fully closed actuator, output at 10 V, would read 0 and a fully open actuator, output at 2 V, would read 100.

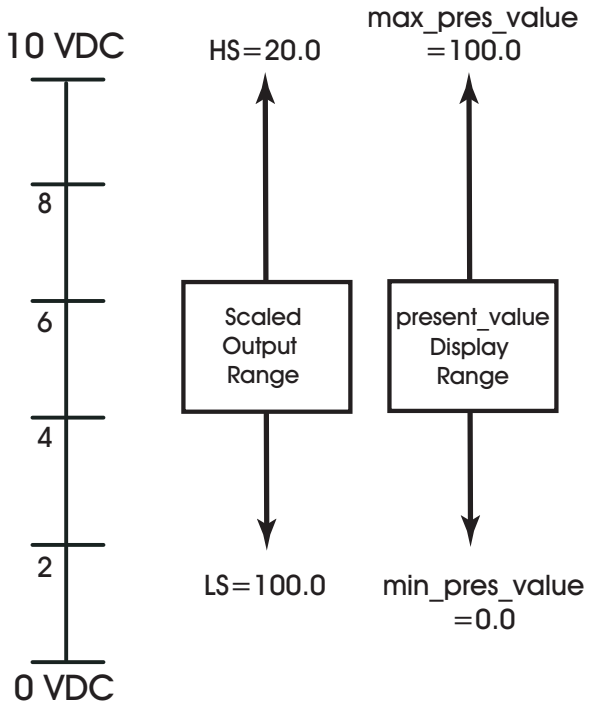


Figure 2-15:2 to 10 V Reverse Reading Input

2.4 DIGITAL OUTPUTS (V3Tb ONLY)

The *NB*-V3Tb has five (5) digital outputs while the NB-V3Td does not have any. Digital outputs are contacts that the controller can open and close based on its control loops. Digital output 1 is meant as the fan control output. Digital Outputs 2 and 3 control stages of cooling while digital outputs 4 and 5 control stages of heating. Digital outputs can be controlled automatically by the *NB*-V3T or they can have their outputs state set manually by the user, by a remote host, or by an SPL program.

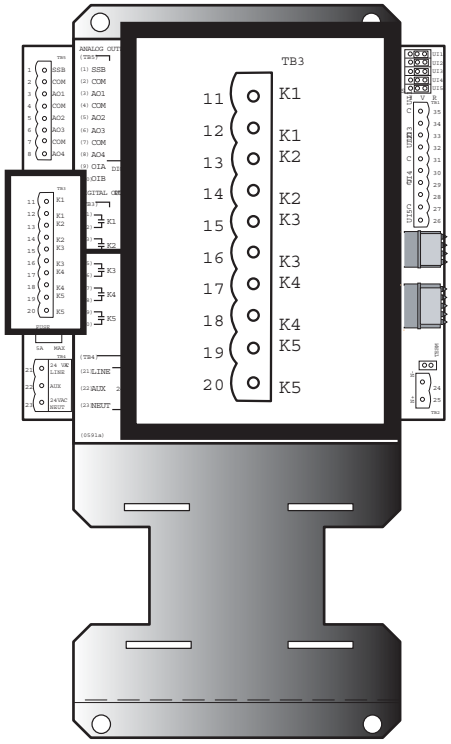


Figure 2-16: Location of the Digital Outputs on the NB-V3Tb

2.4.1 CONNECTING DIGITAL OUTPUTS

Outputs are connected to the digital outputs on the *NB*-V3T via terminal block TB3. The terminal block has connections for all five digital outputs. Output devices are connected to a digital output by connecting the wires to the terminal on the terminal corresponding to the chosen output. The outputs are labelled K1 for digital output 1, K2 for digital output 2, etc. Each output has a red LED associated with it, located next to the corresponding terminals on terminal block TB3. When an output is turned on the associated LED will light and will remain lit until the output is turned off.

2.4.2 CONFIGURING DIGITAL OUTPUTS

The digital outputs on the *NB*-V3Tb have a number of properties which allow you to configure the way in which they operate.

Using the **polarity** property, the output can be set to be either normal or reverse acting. A **polarity** value of “0=Normal” will associate a **present_value** of 1 with the “on” state of the output and a **present value** of 0 with the “off” state. Setting the **polarity** to “1=Reversed” will switch these associations such that the output will be off when the **present_value** is 1 and on when the **present_value** is 0.

The **(OI) Hand-Off-Auto Override** property is used to control how the output is commanded. If you need to set the state of the output to a certain value, for example if you were testing an output. You could command the output to "on" by setting **OI** to "1=ON". This would supersede any control loops in the controller and keep the output in the "on" state. The "0=Off" setting works the same way, only it keeps the outputs off. If you wish to have the state of the output commanded by a control loop in the controller, you should set **OI** to "2=Auto". With this setting, the **present_value** of the output can be controlled normally. Finally, if you wish to set the **present_value** manually, and not have its value determined by the controller, then you should set **OI** to "3=Manual".

NOTE

If **OI** is set to anything other than "2=Auto", the **out_of_service** property for the output will be set to True (1).

The NB-V3T can force the fan on during specific scheduled periods. Using the **(FO) Occupied Fan Mode (On/Auto)**, **(FU) Unoccupied Fan Mode**, and **(FN) Night Setback Fan Mode** properties, you can set the fan to be on during scheduled occupied, unoccupied, and night setback periods, respectively.

Using the **(FD) Shutoff Delay** property, you can configure the output to minimize short cycling thereby reducing wear and tear on the output device. **FD** is used to set the time that the output will remain on after the control deadband has been reached. By keeping the output energized, you eliminate oscillations when the measured value for the control loop is near the edge of the deadband.

The **(FX) Staging Delay** property provides a delay before the output is energized. This allows any previously energized stages to take effect before energizing this output, making sure that the output truly needs to be energized.

The **(FR) Minimum Run Time** and **(FS) Minimum Off Time** properties perform similar functions. **FR** sets the minimum amount of time that must pass once the output is energized, before it may be turned off. **FS** works the same way, except that it is the minimum time that the output must stay de-energized before it may be energized again. The settings for **FR** and **FS** will be dependent on the device connected to the output.

The **(RH) Run Hours** property stores the total number of hours that the output is energized (**present_value**=1). After a predetermined amount of time specified in the **(RL) Run Limit** property, a run limit alarm will be generated. This is used to signal regular maintenance is required. For example, if a motor needed to be lubricated after 1000 hours of use, **RL** would be set to this limit (**RL**=1000) and would generate an alarm when **RH** exceeded the value of **RL**.

2.5 SBC-STAT

Up to four (4) *SBC*-STATs may be connected to the *NB*-V3T to provide Zone Temperature measurement. To connect an *SBC*-STAT to the controller you should connect the SSB terminal of terminal block TB5 to the leftmost connection in the STAT base, labelled "B". The COM terminal of TB5 should be connected to the terminal labelled "Y", the rightmost connection, in the STAT base. The wire shield should also be connected to the COM terminal. Figure 2-17 illustrates the proper wiring of the *SBC*-STAT base to the *NB*-V3T.

If more than one *SBC*-STAT is being connected, the additional devices should be connected in the same way as just described, making sure to maintain wiring polarity between devices. The shield wires should be connected between devices to maintain the shielding for all the connections.

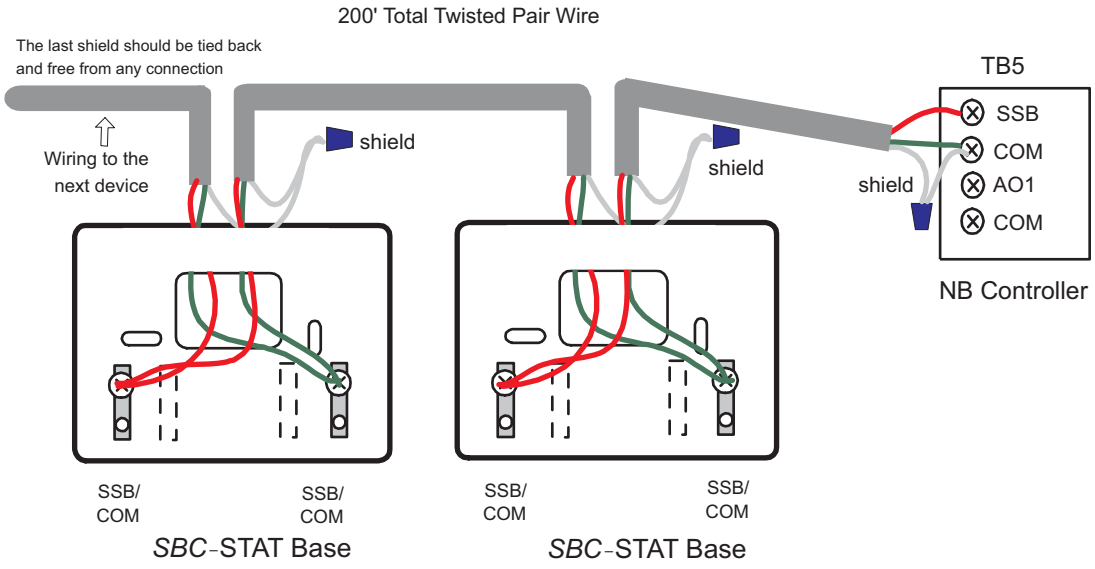


Figure 2-17: SBC-*STAT Bus Wiring*

Using the optional network jack, the *SBC*-STAT can be expanded to provide a connection to the RS-485 network. To connect the network the N+ and N- terminals on TB2 are connected to the "G" and "R" terminals in the *SBC*-STAT base, respectively. Figure 2-18 illustrates the optional network wiring of the *SBC*-STAT to the *NB*-V3T. For more information on network wiring, see the Network Kit Installation Guide (part# 1E-01-00-0033).

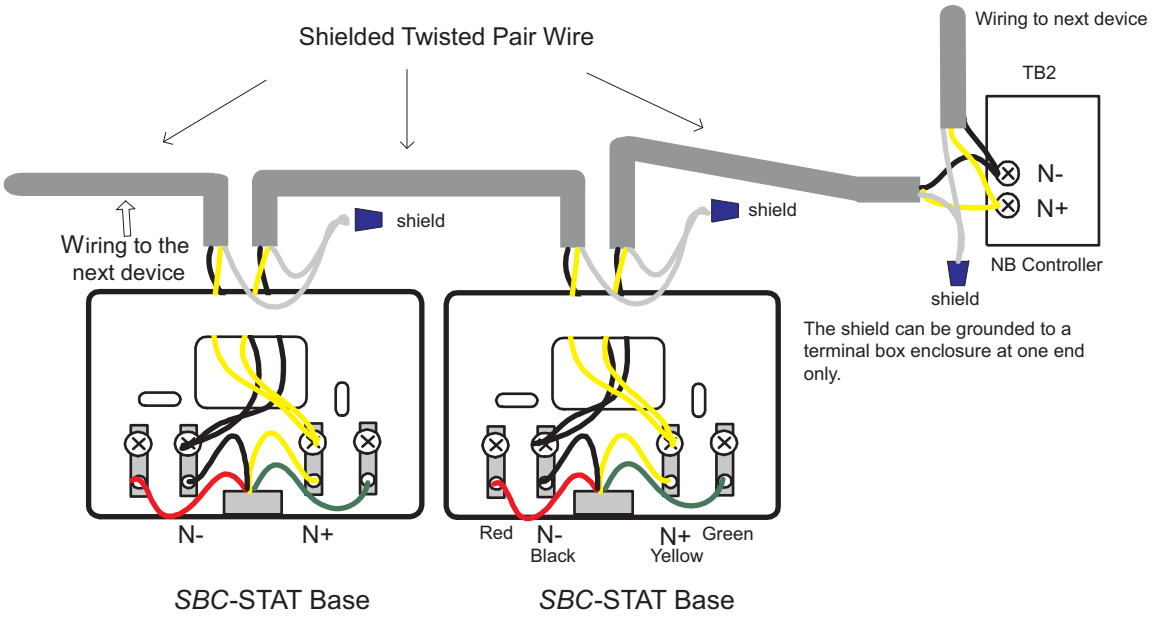


Figure 2-18: SBC-STAT Network Wiring to NB-*V3T*

Two or more *NB*-V3Ts can be wired onto the same Sensor Bus, allowing the controllers to share STATs. For this wiring structure to work properly, one *NB*-V3T must be set up as a Master (Zone Temperature:**BM**=0), and all other *NB*-V3Ts must be set up as Slaves (**BM**=1). Up to four digital *SBC*-STATs are allowed on a Sensor Bus.

NOTE
Polarity must be maintained throughout the Stat network for the controller to function properly.

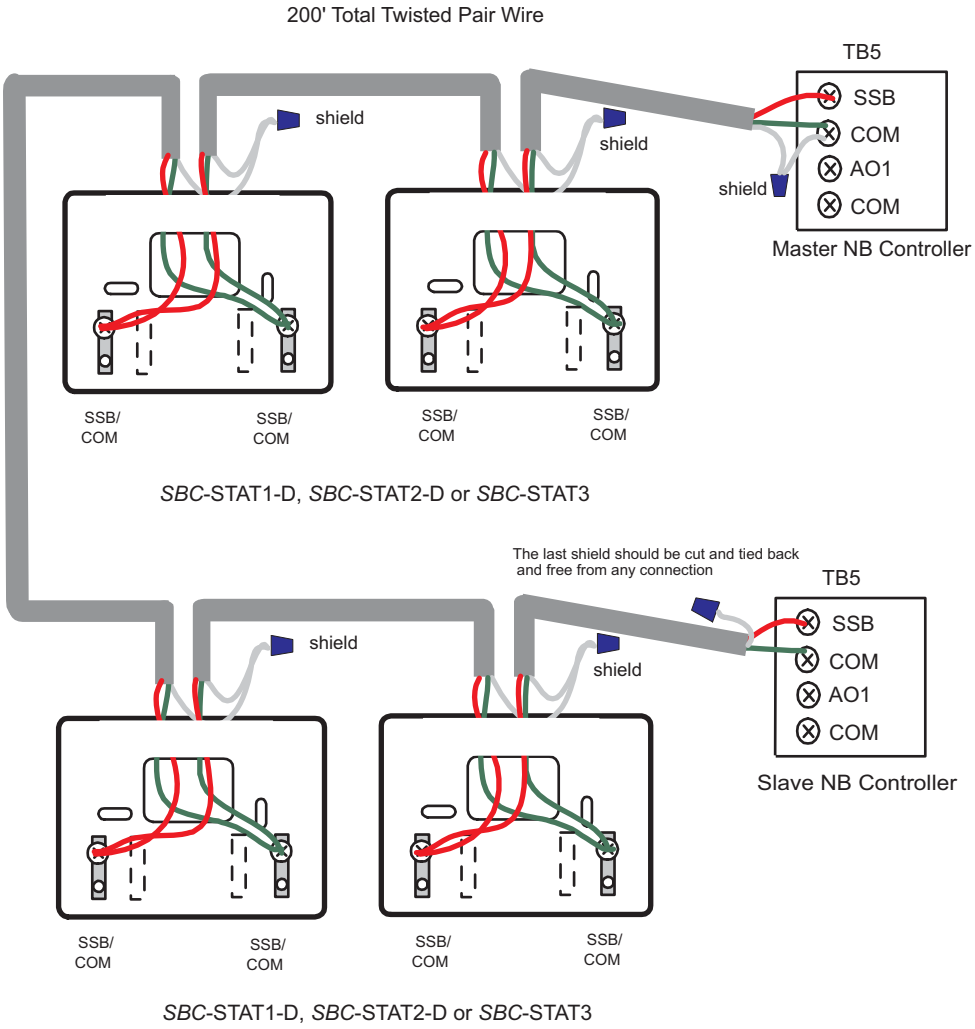


Figure 2-19: Multiple SBC-STATs on a Sensor Bus

2.6 CONFIGURING DAMPER POLLING

The *NB*-V3Tb can be configured to poll up to sixteen damper units for their demand load. These can either be *NB*-V3Td or *NB*-VAV controllers. Using the appropriate flash, the *NB*-VAV controller may be used in place of the *NB*-V3Tb as a bypass controller. The *NB*-V3Tb will collect and average the demand loads from all dampers polled to determine the total demand on the system and will control heating and cooling based on this average.

To configure the *NB*-V3Tb for damper polling you must perform the following steps:

1. Choose a Damper object in the controller to use with the chosen damper controller.
2. Set the Damper *x* :**(ID) Damper *x* Network ID** property to the MAC address/unit ID of the damper controller. (*x* is the number of the damper object selected).
3. If you wish to send the *NB*-V3Tb's Supply Temperature to the damper unit, set the Damper *x*:**(ST) Send Supply Temp Flag** property to "1=Yes". You must then set the **out_of_service** property in the Supply Temperature object in the damper controller to "True".
4. To have the damper controller use the active schedule state of the NB-V3Tb, you must set the Schedule:**(HE) Host Overrides** property in the damper controller to "1=Enabled".

NOTE
If **HE** is enabled on the damper controller, the NB-V3T's schedule will take precedence over any broadcast schedules.

5. To enable the damper controller for polling, you must set the **(OI) Zone Bypass** property to "0=Active".

SECTION 3: NB-V3Tb OBJECTS & PROPERTIES

IN THIS SECTION

3.1 DEVICE

The Device object is used to control and configure a number of general controller features of the *NB*-V3Tb. This is the place where the controller manufacturer, controller type, serial number and unit ID number can be found. It is also where the firmware version and type along with the flash release code and the flash update count are located. The Device object contains the following properties: **object_identifier**, **object_name**, **object_type**, **system_status**, **vendor_name**, **vendor_identifier**, **model_name**, **firmware_version**, **application_software_version**, **protocol_version**, **protocol_revision**, **protocol_services_supported**, **protocol_object_types_supported**, **object_list**, **max_apdu_length_accepted**, **segmentation_supported**, **local_time**, **local_date**, **database_revision**, **apdu_segment_timeout**, **apdu_timeout**, **number_of_APDU_retries**, **time_synchronization_recipients**, **max_master**, **max_info_frames**, **device_address_binding**, **BU**, **CC**, **CM**, **CP**, **CT**, **DE**, **EM**, **F1**, **F2**, **F3**, **FT**, **I1**, **I2**, **I3**, **IC**, **ID**, **IS**, **MS**, **OC**, **OS**, **PD**, **PS**, **RC**, **RI**, **RS**, **SN**, **SR**, **UP**, **VE**, **WC**, **ZN**, and **ZP**.

The **object_identifier** is a unique numeric code used to identify the object and holds the BACnet device instance, which defaults to the device's serial number.

The **object_name** is a unique name within the BACnet device that maintains it.

The **object_type** indicates the object type class. The **object_type** is Device (8).

The **system_status** indicates the current physical and logical status of the BACnet Device. The different statuses are:

. Operational
. Operational_Read_Only
. Download_Required
. Download_In_Progress
. Non_Operational.

The **vendor_name** property lists the manufacturer of the BACnet Device. All AAM devices will have a **vendor_name** of "American Auto-Matrix".

The **vendor_identifier** is a unique ID for each vendor and is assigned by ASHRAE. The **vendor_identifier** for American Auto-Matrix is 6.

The **model_name** property is the name of the controller. Each manufacturer assigns a model name of the BACnet device. The model name of the *NB*-V3Tb is "NB-V3T Bypass".

The **firmware_version** indicates which firmware revision code is currently installed in the BACnet device.

The **application_software_version** is the version of application software installed in the machine.

The **protocol_version** property displays the version of BACnet that is supported by the specific BACnet device.

The **protocol_revision** property displays the minor revision level of BACnet that is supported by the specific BACnet device.

The **protocol_services_supported** property indicates which standardized protocol services are supported by this device's protocol implementation. The device supports the following services:

. getAlarmSummary

. readProperty
. writeProperty
. deviceCommunicationControl
. reinitalizeDevice
. i-Am
. i-Have
. unconfirmedPrivateTransfer
. timeSynchronization
. who-Has
. who-Is.

The **protocol_object_types_supported** property indicates if the device supports standard or non-standard object types other than those in the protocol conformance class. The device supports the following object types:
. Analog Input
. Analog Output
. Analog Value
. Binary Output
. Calendar
. Device
. Schedule.

The **object_list** property is a list of **object_identifiers**. There is one **object_identifier** for each object within the device.

The **max_apdu_length_supported** property is a maximum number of octets that can be contained in a single application layer protocol data unit. The default is 50.

The **segmentation_supported** property indicates whether or not the BACnet device supports segmentation of messages.

The **local_time** property indicates the time of day. The time can be set through the Time Synchronization service. If you are using a Real-time Clock module, the *NB*-V3T will maintain the current time upon power failure.

The **local_date** property indicates the current date. The date can be set through the Time Synchronization service. AS the controller contains a Real-time Clock module, the *NB*-V3T will maintain the current date upon power failure.

The **apdu_segment_timeout** property indicates the amount of time, in milliseconds, between retransmissions of an APDU segment. The default is 300 milliseconds.

The **apdu_timeout** property indicates the amount of time, in milliseconds, between retransmission of an APDU. The default is 300 milliseconds.

The **number_of_APDU_retries** property allows you to enter the maximum number of times an APDU should be retransmitted. The **number_of_APDU_retries** is also the number of times the *NB*-V3Tb will retry to poll a damper unit before setting it unreliable. The default is 1. If you do not want to perform retries, set this property to 0.

The **time_synchronization_recipients** property is a list of devices that should receive Time Sync requests. If there are no recipients in the list, a Time Sync is not sent out.

The **max_master** property is active when a device is a master node on an MS/TP network. The value of this property should be the highest possible address for master nodes and must be less than or equal to 127. The default is 127.

The **max_info_frames** property is used if the device is a node on the MS/TP network. It specifies the maximum number of information frames the node may send before it must pass the token. The default is 4.

The **device_address_binding** property is the device address. The *NB*-V3T does not store a device list. When other devices try to read this property, null is returned.

The **(BU) Backup Control** property forces the backup of the digital outputs 1-5 run hours (**RH**) to EEPROM. The *NB*-V3T copies these values to EEPROM at midnight each day. However you may force a copy at any time by setting **BU** = 1. The property returns to 0 when the backup is complete. AAM recommends that you perform a backup any time that a maintenance power down is planned.

The **(CC) Count of Clock Fails** increments upon hardware failure but can also be advanced during the removal of power.

The **(CM) Controller Manufacturer Code** property is the manufacturer code for the device. For American Auto-Matrix products, the number is 255. This property is read-only. It is useful when host systems are connected to networks with unitary controllers from different manufacturers. Flash updates are rejected if **CM** is not 255.

The **(CP) Network Baud Rate** property sets the communications speed for the controller.

*Table 3-1 **CP** Values for Network Baud Rate*

Value of **CP**	baud
AS = 0	9600
AS = 6	38.4k
AS = 7	19.2k
AS = 9	57.6k

The **(CT) Controller Type** property identifies the type of device. An *NB*-V3Tb is type 204. This property is read-only, and its value is established at the American Auto-Matrix factory. Flash updates for the *NB*-V3T are rejected if **CT** is not 204.

The **(DE) Default Enable Command** property restores configuration settings to factory defaults. To set the defaults, enter a value of 197 (a value that is unlikely to occur randomly). It may take several seconds to complete the reset. Note that this will not alter the unit **ID** or selected communications baud rate.

The **(EM) English/Metric** property specifies the type of engineering units (U.S./English or Metric) to be used for temperatures. If **EM** is set to 0, degrees are specified in Fahrenheit. If **EM** is set to 1, degrees are specified in Celsius. A change in this property automatically converts setpoints to the appropriate units. The display mode for digital thermostats also changes but can be set separately. English (**EM** = 0) is the default setting.

NOTE
If the value of **EM** changes, make sure any properties set prior to the change have been recalculated and reprogrammed to reflect the **EM** type chosen. Then reset the *NB-V3T*. Failure to correct these entries will result in display and calculating errors.

The **(F1) Interlock 1 Trips Fan (Y/N)** property determines how interlocking of the fan will be handled. When **F1** is set to 0, Interlock 1 will not trip the fan. When set to 1 and Interlock 1 is active, the fan is shut down.

The **(F2) Interlock 2 Trips Fan (Y/N)** property determines how interlocking of the fan will be handled. When **F2** is set to 0, Interlock 2 will not trip the fan. When set to 1 and Interlock 2 is active, the fan is shut down.

The **(F3) No Flow Trips Fan (Y/N)** property determines how interlocking of the fan will be handled. When **F3** is set to 0, Interlock 3 will not trip the fan. When set to 1 and Interlock 3 is active, the fan is shut down.

The **(FT) Firmware Type** property defines the class of firmware operating system used in this controller. This property is read-only.

The **(I1) Interlock 1 Input Channel** property specifies the input to be used for Interlock 1. Disabling this input disables the PID Interlock 1.

*Table 3-2 **I1** Values for Interlock 1 Input Channel*

Value of **I1**	Input Channel
I1 = 0	Disabled
I1 = 1	UI1
I1 = 2	UI2
I1 = 3	UI3
I1 = 4	UI4
I1 = 5	UI5

The **(I2) Interlock 2 Input Channel** property specifies the input to be used for Interlock 2. Disabling this input disables the PID Interlock 2.

*Table 3-3 **I2** Values for Interlock 1 Input Channel*

Value of **I2**	Input Channel
I2 = 0	Disabled
I2 = 1	UI1
I2 = 2	UI2
I2 = 3	UI3
I2 = 4	UI4
I2 = 5	UI5

The **(I3) Fan Status Interlock Input Channel** property is used as a Proof of Flow interlock. Settings are 0=Disabled and 1=Fan Status.

The **(IC) EEPROM Default Count** is a counter which increments whenever the EEPROM is restored to factory default settings (see Device:**(DE) Default Enable** for more on restoring the controller to factory defaults).

The **(ID) Unit ID** property is used to set a unique network address for each controller connected on a multidrop. Each **ID** is factory set to the last two digits of the board serial number. Valid values are 0 to 127. For example, if the serial number is 100072, the Unit ID is 72. If the serial number is 498765, the Unit ID is 65.

The **(IS) Interlock Status** property displays the status of all of the interlocks. Bit 0 of **IS** corresponds to Interlock 1, bit 1 = Interlock 2, and bit 2 = Interlock 3.

The **(MS) Master/Slave Mode** property determines whether the controller will behave as a Master or Slave device on the network. By default, the controller is configured as a Master device. Changing **MS** to "1=Slave" will cause the controller to act as a Slave device. Slave devices will receive time syncs and broadcasts but will never be passed the token. This means that the slave device may never send a broadcast and cannot respond to BACnet services such as WhoIs, WhoHas, etc.

WARNING

The NB-V3Tb should never be configured as a Slave device as this would prevent it from polling dampers and sending the supply temperature to the individual damper controllers.

NOTE
Slave devices should have their IDs set to values greater than 127 as per the BACnet standard.

The **(OC) Count of Illegal Opcodes** property is a counter which increments upon firmware failure but can also be advanced during the removal of power.

The **(OS) Kernel Version** property displays the version number of the kernel firmware in the controller. This property is read-only.

The **(PD) Power-On Delay** property determines how long, in seconds (0–255), an *NB*-V3T waits before energizing its outputs after a power loss or soft reset. During this time, all output control and alarm functions stop after cycling of power or *NB*-V3T reset. This property defaults to a value of 5. Any setting ≤ 2 seconds will receive a value of 2 seconds.

The **(PS) Power-Up State** property determines which schedule state the *NB*-V3T uses after a power loss and before its time is synchronized.

*Table 3-4 **PS** Values for Power-up State*

Value of **PS**	State
I2 = 0	unoccupied
I2 = 1	warm-up
I2 = 2	occupied (default)
I2 = 3	night setback

NOTE
You can also set the time through the optional Real-time Clock module. Manual time setting is also possible.

The **(RC) Count of Resets** property is a counter which increments each time power is applied to the controller. This counts power outages and noise related resets as well as resets initiated through the Reset property (**RS**).

The **(RI) Reset Fan Status Interlock** property is used to reset the fan when an interlock has shut it off. When the flow interlock is enabled by setting Device:**F3**=1, setting **RI**=1 allows the fan to restart.

The **(RS) Reset** property allows a host or operator to reset the controller by giving **RS** a value of 1, after which **RS** returns to 0 (the default).

The **(SN) Serial Number** property displays the serial number of the *NB*-V3T controller. This property is read-only.

The **(SR) Software Time Stamp** property uniquely defines each flash firmware image. You can access updated firmware images through *NB*-Pro. The numerically higher the firmware image, the more recent it is. We recommend that all controllers be updated periodically to use the latest available firmware. This property is read-only.

The **(UP) Flash Update Count** property is a counter which increments each time a new flash firmware image is accepted by the controller.

The **(VE) Software Version** property indicates the version number of the active firmware.

The **(WC) Count of Watchdog Cop** property is a counter which increments upon firmware failure but can also be advanced during the removal of power.

The **(ZN) Zone Number** property is a number (from 0 to 65,535) which is used to group controllers together so that they can be addressed as a logical group. For example, you can set a group of controllers to enter Warm-Up Mode all at the same time. This property defaults to 0.

The **(ZP) Count of High Current Pulses** property is a counter which advances when Motor Management Technology (MMT) takes action to maintain the operation of the actuator. When several counts are tallied over a period of a few days, the actuator is reaching its end of life. Low level count activity is normal.

Device Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
system_status	indicates the current physical and logical status of the BACnet Device.
vendor_name	identifies the manufacturer of the BACnet Device.
vendor_ identifier	a unique vendor identification code, assigned by ASHRAE, which is used to distinguish proprietary extensions to the protocol.
model_name	indicates the vendor's name used to represent the model of the device.
firmware_ revision	indicates the level of firmware installed in the device.
application_ software_ version	identifies the version of application software installed in the device.
protocol_ version	indicates the version of the BACnet protocol supported by this BACnet Device.
protocol_ revision	indicates the minor revision level of the BACnet standard.
protocol_ services_ supported	indicates which standardized protocol services are supported by this device's protocol implementation.
protocol_ object_ types_ supported	indicates which standardized object types are supported by this device's protocol implementation.
object_list	a list of each object within the device that is accessible through BACnet services.
max_apdu_ length_ accepted	specifies the maximum number of information frames the node may send before it must pass the token.
segmentation_ supported	indicates whether the device supports segmentation of messages and, if so, whether it supports segmented transmission, reception, or both.
local_time	indicates the time of day to the best of the device's knowledge.
local_date	indicates the date to the best of the device's knowledge.

Property	Description
database_ revision	
apdu_timeout	indicates the amount of time, in milliseconds, between retransmissions of an APDU requiring acknowledgment for which no acknowledgment has been received.
number_of_ apdu_retries	indicates the maximum number of times that an APDU shall be retransmitted.
time_ synchronization _recipients	a list of devices to which the device may automatically send a TimeSynchronization request.
max_master	specifies the highest possible address for master nodes and shall be less than or equal to 127.
max_info_ frames	specifies the maximum number of information frames the node may send before it must pass the token.
device_ address_ binding	a list of the device addresses that will be used when the remote device must be accessed via a BACnet service request.
BU	**Backup Control** **BU** = 1 forces backup of **AE** and digital outputs 1-5 **RH** to EEPROM.
CC	**Count of Clock Fails** increments upon hardware failure but can also be advanced during the removal of power.
CM	**Controller Manufacturer Code**
CP	**Network Baud Rate** 0=9600 6=38.4K 7=19.2K 9=57.6K
CT	**Controller Type** factory-set controller type identifies the type of unitary controller. **CT** for the *NB*-V3T is 204.
DE	**Default Enable Command** restores configuration settings to factory defaults. Enter 197 to set the defaults.
EM	**English/Metric** specifies which units of measurement to use in returning temperature values. 0 = English 1 = Metric Units
F1	**Interlock 1 Trips Fan (Y/N)** 0=Interlock 1 will not trip the fan. 1= the fan is shut down when Interlock 1 is active.

Property	Description
F2	**Interlock 2 Trips Fan (Y/N)** 0=Interlock 2 will not trip the fan. 1= the fan is shut down when Interlock 2 is active.
F3	**No Flow Trips Fan (Y/N)** 0=Interlock 3 will not trip the fan. 1= the fan is shut down when Interlock 3 is active.
FT	**Firmware Type** defines the class of firmware operating system used in this controller.
I1	**Interlock 1 Input Channel** specifies the input to be used for Interlock 1. Disabling this input disables the PID Interlock 1. 0=Disabled 1=UI1 2=UI2 3=UI3 4=UI4 5=UI5
I2	**Interlock 2 Input Channel** specifies the input to be used for Interlock 2. Disabling this input disables the PID Interlock 2. 0=Disabled 1=UI1 2=UI2 3=UI3 4=UI4 5=UI5
I3	**Fan Failure Interlock** used as a Proof of Flow interlock 0=Disabled 1=Fan Status
IC	**EEPROM Default Count** increments whenever the EEPROM is restored to factory default settings
ID	**Unit ID** This value is used to set a unique network address for each controller connected on a multidrop. Each ID is factory set to the last two digits of the board serial number.
IS	**Interlock Status** displays the status of all of the interlocks. bit #0=Interlock 1 bit #1=Interlock 2 bit #2=Interlock 3
MS	**Master/Slave Mode** used to select a mode for the controller with 0=Master (default) 1=Slave
OC	**Count of Illegal Opcodes** increments upon firmware failure but can also be advanced during the removal of power.

Property	Description
OS	**Kernel Version**
PD	**Power-on Delay** determines how long the *NB*-V3T waits before energizing its outputs after power loss or soft reset. **PD** defaults to 5 seconds.
PS	**Power-up State** determines which schedule state to use after a power loss and before time sync. 0=unoccupied 1=warmup 2=occupied 3=night setback
RC	**Count of Resets** increments each time power is applied to the controller.
RI	**Reset Fan Failure Interlock** When Fan Failure Interlock is enabled to shut down the fan (FF00;**F3**=1), setting Reset Fan Failure Interlock (FF00;**RI**=1) allows the fan to restart.
RS	**Reset** allows a host or operator to reset the controller by setting RS = 1. 0 = disabled (default), 1 = reset controller
SN	**Serial Number** displays the serial number of the *NB*-V3T controller
SR	**Software Time Stamp** uniquely defines each flash firmware image. The numerically higher the firmware image, the more recent it is.
UP	**Flash Update Count** increments each time a new flash firmware image is accepted by the controller.
VE	**Software Version** contains the version number of the active firmware.
WC	**Count of Watchdog Cop** increments upon firmware failure but can also be advanced during the removal of power.
ZN	**Zone Number** used to group controllers together so that they can be controlled simultaneously.
ZP	**Count of High Current Pulses** advances when MMT takes action to maintain the operation of the actuator. The activity on this count should be low. If it is high, the actuator is reaching the end of its life.

3.2 ZONE TEMPERATURE

The Zone Temperature object includes the configuration information for zone temperature measurement and control. Thermostat readings and configuration information is included as well as alarming options are found in this object. The Zone Temperature object contains the following properties: **object_identifier**, **object_name**, **object_type**, **present_value**, **status_flags**, **event_state**, **out_of_service**, **units**, **high_limit**, **low_limit**, **deadband**, **AE**, **AS**, **BM**, **BT**, **CC**, **CH**, **DF**, **DL**, **DM**, **DS**, **DV**, **ED**, **ER**, **G0**, **G1**, **G2**, **G3**, **OF**, **PB**, **PG**, **PI**, **PS**, **PU**, **RD**, **RM**, **SE**, **SU**, **T0**, **T1**, **T2**, **T3**, **TM**, **TP**, **TR**, **TS**, **TT**, and **ZS**.

Property **object_identifier** is a unique numeric code that is used to identify the object. This property is read-only.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters. This property is read-only.

Property **object_type** indicates which object type class the property belongs to. In this case, Object_Type is Analog Input.

Property **present_value** indicates the current value of the input being measured. It is represented in engineering units.

Property **status_flags** uses four flags to indicate the state of the analog input. The four flags are:

. In_Alarm
. Fault
. Overridden
. Out_Of_Service.

Property **event_state** indicates whether or not the object has an active event state associated with it.

Property **out_of_service** can be set to True or False. If it is True, the **present_value** will not track changes to the physical input. Also, when this property is true, the **present_value** can be changed to create specific conditions for testing purposes.

Property **units** property indicates the measurement units of this object.

Property **high_limit** is a limit by which the **present_value** must exceed before an event is generated.

Property **low_limit** is a limit by which the **present_value** must fall below before an event is generated.

The **deadband** property is the amount by which the **present_value** must be below the **high_limit** or above the **low_limit** for a return-to-normal event to be generated.

The **(AE) Alarm Enable** property specifies the type of alarm checking to be done on the present_value. A value of 0 indicates that alarming is disabled; a nonzero number indicates one of several alarm functions. Table 3-5 defines alarm options for **AE**.

To demonstrate how limit alarming operates, let the High Alarm Limit (**high_limit**) = 80.5°F while alarming is enabled for high limit alarming (**AE** = 5). Then the zone temperature changes from 72.0°F to 83.0°F because someone opened an outside door in the summertime. A high limit alarm is generated because 83.0°F > **high_limit**. This also causes the alarm status property (**AS**) to equal 6 (high limit alarm). Once

the zone temperature drops below **high_limit** and the offset defined by **deadband**, the alarm state returns to normal (**AS** = 0).

*Table 3-5 **AE** Alarm Enable Options*

Value of **AE**	Alarm Type Enabled
AE = 0	disabled
AE = 4	low limit alarm
AE = 5	high limit alarm
AE = 6	low and high limit

The **(AS) Alarm Status** property displays the current alarm condition. A value of 0 indicates a normal condition; a nonzero number indicates alarm generation. Table 3-6 explains the status for each value.

*Table 3-6 **AS** Values for Alarm Status*

Value of **AS**	Alarm Condition
AS = 0	normal (no alarm)
AS = 5	low limit alarm
AS = 6	high limit alarm

The **(BM) SSB Bus Mode** property specifies whether the *NB*-V3T will behave as a master or slave on the SSB bus. By default this should be set to “0=Master Bus Mode” unless multiple controllers are wired onto a single Sensor Bus (SSB). All additional controllers on the SSB must be configured as Slaves (**BM**=”1=Slave Bus Mode”). Masters control and communicate with digital thermostats. Slaves receive their information from the Master unit. Slaves receive the following Zone Temperature property values from the master: **present_value**, **(TS) Setpoint Offset**, **(TR) User Adjust Remaining**, and **(ER) Extended Occupancy Remaining**.

The **BT Application (Box Type)** property determines how the NB-V3T will control temperature.

*Table 3-7 **BT** Values for Application (Box Type)*

Value of **BT**	Box Type
BT = 0	none
BT = 1	cooling only

*Table 3-7 **BT** Values for Application (Box Type)*

Value of **BT**	Box Type
BT = 2	heating only
BT = 3	supply dependent

The supply dependant setting requires source/duct air temperature and automatically selects cooling and heating modes as required.

The **(CC) Current Cooling Setpoint** property displays the current cooling temperature control setpoint, including setbacks and user adjustments. This property mirrors the value of the Cool Setpoint:**present_value** property. This property is read-only.

The **(CH) Current Heating Setpoint** property displays the current heating temperature control setpoint, including setbacks and user adjustments. This property mirrors the value of the Heat Setpoint:**present_value** property.The point is read-only.

The **(DF) Thermostat Display Format** property defines the format used to display the current temperature on the digital thermostat. The display of the tenths digit and the Fahrenheit/Celsius character are options. Also, the display may be eliminated. Table 3-8 display the options for **DF**.

*Table 3-8 **DF** Values for Display Format*

Value of **DF**	Display Format
DF = 0	##d
DF = 1	##.#d
DF = 2	##dF
DF= 3	##.#dF
DF = 4	None

The **(DL) Total Zone Demand Load** property indicates the heating/cooling demand in terms of temperature separation from setpoints. A cooling demand will be indicated by a negative value and a heating demand by a positive value. If the zone is satisfied, then the **DL** will be 0.

The **(DM) Demand Mode Cool/Heat/Vent** property indicates the demand for the zone. A satisfied zone will indicate “vent.” If the *NB*-V3T is in cooling mode and the zone temperature exceeds the cooling

setpoint, “cool” is indicated. If the controller is in heating mode and the zone temperature falls below the heating setpoint, “heat” is indicated. Table 3-9 display the options for **DM**.

*Table 3-9 **DM** Values for Zone Demand*

Value of **DM**	Zone Demand
DM = 0	Vent
DM = 1	Cool
DM = 2	Heat

The **(DS) Thermostat Display Mode** property specifies whether the digital thermostat display on the *SBC*-STAT3 is shown using Fahrenheit or Celsius. This mode is automatically altered as appropriate when the Device:**(EM) English/Metric** property is set but may be modified later if required to display the alternate units.

The **(DV) Thermostat Display Value** property specifies what value to display when multiple Stats are connected to the controller. By default (**DV**=0) each digital thermostat will display the identical temperature value, which is the average of all readings. With **DV**=1 each thermostat will display its own temperature (including any offset).

The **(ED) Extended Occupancy Time** property specifies the amount of time (in minutes) to extend occupancy.

The **(ER) Extended Occupancy Remaining** property displays the amount of time remaining in extended occupancy. This value is set to the Extended Occupancy Duration (**ED**) when either push-button on an *SBC*-STAT2 is pressed. The *SBC*-STAT3 digital thermostat employs its User Menu for this function. The point **ER** is a read-only property that cannot be changed directly.

NOTE

Properties **ED** and **ER** will override the power-up default schedule mode.

Properties **(G0) Global ID for Device** through **(G3) are Global ID for Device** display the Global Identification for the Sensor Bus device 0 through device 3 respectively.

The **(OF) Temperature Adjustment** property defines an optional correction to the temperature reading that may be required as an adjustment for the thermostat location and any possible measurement errors.

The **(PB) Balance P.I.N.** property specifies the Personal Identification Number which controls access to the Balance Menu. A value of 0 makes the menu always accessible. Values inclusively from 0001 to 9999 are used to control access to the menu. A matching number must be entered by the Balancer. Values of 10,000 or greater will hide the menu. Entered P.I.N. numbers remain valid for only a short time after their use.

The **(PG) Primary GID** property specifies the GID of the Primary *SBC*-STAT in Primary GID mode Reading Mode (**RM**=8). If this *SBC*-STAT is not available then the Average temperature mode (**RM**=0) is used.

The **(PI) Installer P.I.N.** property is the Personal Identification Number which controls access to all menus. A value of 0 makes all of the menus always accessible. Values inclusively from 0001 to 9999 are used to control access. A matching number must be entered by the Installer. Values of 10,000 or greater will hide the Install Menu. An authenticated Installer can access all menus. Entered P.I.N.s remain valid for only four minutes after the last button press.

The **(PO) Present Occupancy Status** provides feedback on the current schedule status based on any host or occupancy overrides.

The **(PS) Service P.I.N.** property is the Personal Identification Number which controls access to the Service Menu. A value of 0 makes the menu always accessible. Values inclusively from 0001 to 9999 are used to control access to the menu. A matching number must be entered by the Servicer. Values of 10,000 or greater will hide the menu. Entered P.I.N.s remain valid for only a short time after their use.

The **(PU) User P.I.N.** property is the Personal Identification Number which controls access to the User Menu. A value of 0 makes the menu always accessible. Values from 0001 to 9999 inclusive are used to control access to the menu. A matching number must be entered by the User. Values of 10,000 or greater will hide the menu. Entered P.I.N.s remain valid for only a short time after their use.

The **(RD) Stage Reversing Delay** property is the interval period of delay when switching form heating to cooling. The default value of **RD** is 15 minutes.

The **(RM) Reading Mode** property specifies the technique used to determine Zone Temperature when multiple *SBC*-STATs are used. The default is Average mode (**RM**=0). Highest (**RM**=1) and Lowest (**RM**=2) modes set the Zone Temperature appropriately. The Hi/Lo VST mode (**RM**=3) selects either the highest or lowest temperature depending on the supply mode. The highest temperature is used in cooling modes. The lowest temperature is used in heating modes.

A specific *SBC*-STAT may be selected by device position 0-3 (**RM**=4-7). Note that while the *SBC*-STATs appear in device positions consistently, the order may change when *SBC*-STATs are added, removed, or replaced. To specify a unique *SBC*-STAT by its GID, select the Primary GID mode (**RM**=8).

When a single *SBC*-STAT is present, its temperature is used even if RM has a different setting. If a specified *SBC*-STAT is absent, the Average mode (**RM**=0) is used.

Property **SD** is Calculated Setpoint Display. It specifies the method of setpoint display shown on an SBC-STAT3 LCD when a user changes the zone setpoint. A value of 0 will display the current offset (e.g. +/-2.5). A value of 1 will display the Zone Midpoint (Property **ZS**). A value of 2 will display the Heating Setpoint (Property **CH**). A value of 3 will display the Cooling Setpoint (Property **CC**).

The **(SE) Override Enabled/Disabled** property enables or disables the user's ability to enter extended occupancy override.

The **(SU) Alarm Setup/Setback Value** property specifies the amount added to **high_limit** or subtracted from **low_limit** during unoccupied periods. This property shifts the points at which alarms and alarm returns are generated.

Properties **(T0) Thermostat Reading** through **(T3) Thermostat Reading** display the raw (without offset) reading for Device 0 through Device 3 respectively.

The **(TM) Offset Increment** property specifies the magnitude of incremental changes to the User Setpoint Offset (**TS**). The User Adjust Position (**TP**) is multiplied by **TM** to determine the User Setpoint Offset (**TS**) value. If the User Adjust Increment is 0, you will not be able to alter the setpoint.

The **(TP) User Adjust Position** property can be raised or lowered in integral steps. This property tracks the current step. It can be set to any signed integer but will be constrained to +/–2 when adjusted by an analog thermostat or to +/–5 when set through a digital thermostat. The point is used in combination with the User Adjust Increment (**TM**) to calculate the User Setpoint Offset.

The **(TR) User Adjust Remaining** property displays the time remaining before the Setpoint Offset (**TS**) setting is reset.

During scheduled unoccupied periods, control loop setpoints and analog input alarm limits may be set up or set back to create a wider control range or deadband in the interest of conserving energy. The occupancy override feature of the *NB*-V3T allows the control loop setpoints and analog input alarm limits to use their normal, non-setup, non-setback, occupied mode values through the *SBC*-STAT override feature. For more information, see the SBC-*STAT User Manual*.

During a scheduled unoccupied mode, you can manually override the scheduled state to occupied mode through the *SBC*-STAT; the setpoints are no longer set up or set back. The Override feature puts the selected schedules into a temporary occupied mode.

The **(TS) Setpoint Offset** property defines an offset for application to setpoints. This point shows the current value calculated when you multiply the User Adjust Position (**TM**) by the User Adjust Increment (**TP**). This setting is temporary and is valid only for the User Adjust Duration (**TT**) minutes unless **TT** = 0.

NOTE
You cannot set property **TS** with the *SBC*-STAT1.

The **(TT) User Adjust Duration** property defines, in minutes, the duration for which the User Setpoint Offset (**TS**) setting applies. After that time, the User Adjust Position and User Adjust Offset are reset to 0 degrees. If the **TT** is 0, then setpoint changes remain in effect until modified.

The **(ZS) Heating/Cooling Setpoint** property displays the midpoint between the current cooling and heating setpoints. This property reflects changes in both setpoints. A change in **ZS** results in the appropriate shift of both the cooling and heating setpoint maintaining the effective deadband.

Zone Temperature Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
status_flags	four flags that indicate the general "health" of the object.
event_state	provides a way to determine if this object has an active event state associated with it.
out_of_service	indicates whether or not the process this object represents is not in service.
units	indicates the measurement units of this object.
high_limit	specifies a limit that the **present_value** must exceed before an event is generated.
low_limit	specifies a limit below which the **present_value** must fall before an event is generated.
deadband	specifies a range between the **high_limit** and **low_limit** properties within which the **present_value** must remain for a TO-NORMAL event to be generated
AE	**Alarm Enable** specifies the type of alarm checking to be done on the **present_value**. 0=disabled 4=low limit alarm 5=high limit alarm 6=low and high limit
AS	**Alarm Status** shows the current alarm condition. A value of 0 indicates a normal condition; a nonzero number indicates alarm generation. 0=No alarm (Default) 5=Low limit alarm 6=high limit alarm
BM	**SSB Bus Mode** determines how the controller will behave when multiple controllers are wired onto a SSB. 0=Master (default) 1=Slave
BT	**Application** 0 = None 1 = cooling only 2 = heating only 3 = supply dependant

Property	Description
CC	**Current Cooling Setpoint** current cooling temperature control setpoint including setback and user adjustments
CH	**Current Heating Setpoint** current heating temperature control setpoint including setbacks and user adjustments.
DF	**Thermostat Display Format** defines the format used to display the current temperature on the digital thermostat. 0=##d 1=##.#d 2=##dF 3=##.#dF 4=None
DL	**Total Zone Demand Load** indicates the heating/cooling demand in terms of temperature separation from setpoints. A cooling demand will be indicated by a negative value and a heating demand by a positive value. If the zone is satisfied, then **DL** will be 0.
DM	**Demand Mode Cool/Heat/Vent** indicates the demand for the zone. A satisfied zone will indicate “vent” (**DM**=0). If the *NB*-V3T is in cooling mode and the zone temperature exceeds the cooling setpoint, “cool” is indicated (**DM**=1). If the controller is in heating mode and the zone temperature falls below the heating setpoint, “heat” is indicated (**DM**=2). 0=Vent 1=Cool 2=Heat
DS	**Thermostat Display Mode** specifies whether English or Metric units are to be used for digital thermostat display on the *NB*-STAT3. 0=°F (default) 1=°C
DV	**Thermostat Display Value** determines whether each digital thermostat will display the identical temperature value which will be the average of all readings or if each thermostat will display its own temperature (including offset). 0=Display Average 1=Individual Temperature
ED	**Extended Occupancy Time** specifies the amount of time in minutes to extend occupancy. **ED** has a default value of 60.
ER	**Extended Occupancy Remaining** shows the amount of time remaining in extended occupancy.
G0	**Global ID for Device** the Global Identification for the first Sensor Bus device.

Property	Description
G1	**Global ID for Device** the Global Identification for the second Sensor Bus device.
G2	**Global ID for Device** the Global Identification for the third Sensor Bus device.
G3	**Global ID for Device** the Global Identification for the fourth Sensor Bus device.
OF	**Temperature Adjustment** defines an optional correction that may be required as an adjustment for the thermostat location and the possible measurement errors.
PB	**Balance P.I.N.** this Personal Identification Number controls access to the Balance Menu. A value of 0 makes the menu always accessible. 0000-9999
PG	**Primary STAT Bus GID** specifies the GID of the Primary thermostat in Primary GID mode (**RM**=8). If this thermostat is not available, then the Average temperature mode (**RM**=0) is used.
PI	**Installer P.I.N.** this Personal Identification Number controls access to all menus. A value of 0 makes the menu always accessible. 0000-9999
PO	**Present Occupancy Status** specifies the current occupancy state based on any host or occupancy overrides.
PS	**Service P.I.N.** this Personal Identification Number controls access to the Service Menu. A value of 0 makes the menu always accessible. 0000-9999
PU	**User P.I.N.** this Personal Identification Number controls access to the User Menu. A value of 0 makes the menu always accessible. 0000-9999
RD	**Stage Reversing Delay** specifies the time, in minutes, that must elapse before a zone can call for heat after a period of cooling or for cooling after a period of heating.

Property	Description
RM	**Reading Mode** specifies the value to be displayed on STAT3 modules. 0=Average 1=Highest 2=Lowest 3=Hi/Lo VST 4=Device 0 5=Device 1 6=Device 2 7=Device3 8=Primary GID
SD	**Calculated Setpoint Display**—specifies what method is used to display setpoint adjustments on an SBC-STAT3 LCD screen. 0 = Disable (+/-2.5) 1 = Zone Midpoint (Zone Temperature: **(ZS) Zone Midpoint**) 2 = Heating Setpoint (Zone Temperature: **(CH) Heating Setpoint**) 3 - Cooling Setpoint (Zone Temperature: **(CC) Cooling Setpoint**)
SE	**Override Disabled/ Enabled** enables or disables the user's ability to enter extended occupancy override. 0 = disabled 1 = enabled
SU	**Alarm Setup/Setback Value** specifies the amount added to **high_limit** or subtracted from **low_limit** during unoccupied periods. This property effectively shifts the points at which alarms and alarm returns are generated.
T0	**Thermostat Reading** raw reading for Device 0.
T1	**Thermostat Reading** raw reading for Device 1.
T2	**Thermostat Reading** raw reading for Device 2.
T3	**Thermostat Reading** raw reading for Device 3.
TM	**Offset Increment** specifies the magnitude of incremental changes to the User Setpoint Offset (**TS**). The User Adjust Position (**TP**) is multiplied by **TM** to determine the User Setpoint Offset (**TS**) value. If the User Adjust Increment is 0, you will not be able to alter the setpoint.
TP	**User Adjust Position** the User Setpoint Offset (**TS**) can be raised or lowered in integral steps. This property tracks the current step. It can be set to any signed integer but will be constrained to +/–2 when adjusted by an analog thermostat or to +/–5 when set through a digital thermostat. The point is used in combination with the User Adjust Increment (**TM**) to calculate the User Setpoint Offset.

Property	Description
TR	**User Adjust Remaining** displays the time remaining before the Setpoint Offset (**TS**) setting is reset.
TS	**Setpoint Offset** defines an offset for application to PID setpoints. This point shows the current value calculated when you multiply the User Adjust Position (**TM**) by the User Adjust Increment (**TP**). This setting is temporary and is valid only for **TT** minutes unless **TT=**0.
TT	**User Adjust Duration** the User Setpoint Offset (**TS**) is a temporary setting. The **TT** property defines in minutes the duration for which the setting applies. After that time, the User Adjust Position and User Adjust Offset are reset to 0 degrees. If the User Adjust Duration is 0, then setpoint changes remain in effect until modified. The default value for **TT** is 120.
ZS	**Heating/Cooling Setpoint** displays the midpoint between the current cooling and heating setpoints. This property reflects changes in both setpoints. A change in **ZS** results in the appropriate shift of both the cooling and heating setpoint maintaining the effective deadband.

3.3 UI01-UI05

Each Universal Input can be used as the referenced input for PID analog control, duct temperature input, as a proof of flow input, as an analog control PID input, or as a digital occupancy detection input of the *NB*-V3T. Configured as a digital input, the Universal Input can be used as a proof of flow input safeguarding electric reheats when air flow is not present. When used as the occupancy detection sensor input, the Universal Input is dedicated to the *NB*-V3T occupancy detection feature—allowing for automatic unoccupied override. This sends the *NB*-V3T into an occupied mode of operation when occupancy is detected in the control area. Each use precludes the use of the input for other functions. The Universal Inputs objects contain the following properties: **object_identifier**, **object_name**, **object_type**, **present_value**, **status_flags**, **event_state**, **reliability**, **out_of_service**, **units**, **min_pres_value**, **max_pres_value**, **high_limit**, **low_limit**, **deadband**, **AE**, **AS**, **DT**, **IF**, **IP**, **OF**, **ST**, and **SU**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to. In this case, **object_type** is Analog Input.

Property **present_value** indicates the current value of the input being measured. It is represented in engineering units.

Property **status_flags** uses four flags to indicate the state of the analog input. The four flags are:

. In_Alarm
. Fault
. Overridden
. Out_Of_Service.

Property **event_state** determines whether or not the object has an active event state associated with it.

Property **reliability** gives the reliability of the present value or operation. The different results are:
. No_Fault_Detected
. No_Sensor
. Over_Range
. Under_Range
. Open_Loop
. Shorted_Loop
. Unreliable_Other.

Property **out_of_service** can be set to True or False. When this property is True, the **present_value** will not track changes to the physical input. Also, when this property is true, the **present_value** can be changed to create specific conditions for testing purposes.

Property **units** indicates the measurement units used by the object.

Property **min_pres_value** is the lowest number that can be reliably obtained for the **present_value** of the object.

Property **max_pres_value** is the highest number that can be reliably obtained for the **present_value** of the object.

Property **high_limit** is a limit by which the **present_value** must exceed before an event is generated.

Property **low_limit** is a limit by which the **present_value** must fall below before an event is generated.

Property **deadband** is the amount by which the **present_value** must be below the **high_limit** or above the **low_limit** for a return-to-normal event to be generated.

The **(AE) Alarm Enable** property specifies the type of alarm checking to be done on the **present_value**. A value of 0 indicates that alarming is disabled; a nonzero value selects one of several alarm functions. Table 3-10 lists the options for **AE**.

Table 3-10 Alarm Enable Options

Value of **AE**	Alarm Type Enabled
AE = 0	disabled
AE = 1	contact, 0→1
AE = 2	contact, 1→0
AE = 3	change of state, 1↔0
AE = 4	low limit alarm
AE = 5	high limit alarm
AE = 6	low and high limit

The **(AS) Alarm Status** property shows the current alarm condition. A value of 0 indicates a normal condition. A nonzero number indicates alarm generation. Table 3-11 explains each status.

Table 3-11 Values for Alarm Status Property

Value of **AS**	Alarm Condition
AS = 0	normal (no alarm)
AS = 1	contact (0→1)
AS = 2	contact (1→0)
AS = 3	change of state

Table 3-11 Values for Alarm Status Property

Value of **AS**	Alarm Condition
AS = 5	low limit alarm
AS=6	high limit alarm

The **(DT) Datatype** property specifies the data type for the input. The data type determines how certain properties are displayed. This property affects the display of **present_value**, **min_pres_value**, **max_pres_value**, **SU**, **LL**, **HL**, and **HS**. Data type codes determine the number of decimal places in the value and whether or not the value is signed (positive or negative) or unsigned. This property defaults to 253 (signed 9.1 digit).

The **(IF) Input Filtering** property has two uses depending on whether the input is configured as an analog input or a digital input. For digital inputs, **IF** works as a debounce filter, specifying the amount of time, in tenths of seconds, for which the input must remain stable in order for the value to be considered reliable. For analog inputs, **IF** is a weighted gain. This property is used in the following equation to calculate the average value:

$$\text{Average Value} = \frac{(\text{Old Value} \times \textbf{IF}) + \text{New Value}}{\textbf{IF} + 1}$$

The default value for **IF** is 0.0.

The **(IP) Input Polarity** property specifies the input polarity when configured as digital. A value of 0 in **IP** indicates that a low voltage displays as **present_value**=0, a high voltage displays as **present_value**=1, and a closed contact displays as **present_value**=0. A value of 1 in **IP** indicates that a low voltage displays as **present_value**=1, a high voltage displays as **present_value**=0, and a closed contact displays as **present_value**=1.

The **(OF) UI Offset** property specifies a fixed amount that is added to the value read from the input. The **present_value** represents the sum of the read value and **OF.**

The **(ST) Sensor Type** property is used to select one of the following input types: digital, linear (scaled **min_pres_value** to **max_pres_value**), 4–20mA linear (scaled **min_pres_value** to **max_pres_value**) or thermistor (precon type III). The associated settings appear in Table 3-12.

Table 3-12 Sensor Types

Value of **ST**	Sensor Type
ST = 0	digital
ST = 2	full scale, linear input scaled from **min_pres_value** to **max_pres_value**

Table 3-12 Sensor Types

Value of **ST**	Sensor Type
ST = 3	4–20mA input scaled from **min_pres_value** to **max_pres_value**
ST = 7	–22.0 to 122.0°F (–30.0 to 50.0°C) thermistor (default)

When **ST**=0, the universal input will be configured to operate as a digital input and will allow **CV** to display a 1 or a 0—the meaning of which is dependent on **IP** (input polarity). If **IP** = 0, a low voltage input (<2.5VDC) to the universal input will result in **CV** = 0; a high voltage (>2.5VDC) applied to the universal input will result in **CV** = 1. If **IP** = 1, a low voltage applied to the universal input will read as **CV** = 1; a high voltage will result in **CV** = 0. Setting **ST** to 2 and having the *NB*-V3T set up to use the appropriate hardware input provides the ability to use a 0–10VDC device as the input. The minimum and maximum values of the range are set in properties **min_pres_value** and **max_pres_value**. For example if the input value is to be displayed as a percentage, then set **ST**=2, **min_pres_value**=0 and **max_pres_value**=100 (0–100%). The *NB*-V3T will determine the voltage input converted internally to raw counts, will scaled the raw counts (0–32767) across the range 0–100 and will display the value of the input as a range of 0–100. For linear voltage devices, be sure that the appropriate jumper and resistor on the PC board are properly set.

The *NB*-V3T also provides linear input scaling for 4–20mA current transmitters (**ST** = 3). For sensors that provide a 4–20mA signal, set **ST** = 3. Properties **min_pres_value** and **max_pres_value** are used in the same way as they are for **ST**=2.

The **(SU) Setup/Setback Limit** property specifies the amount added to **high_limit** or subtracted from **low_limit** during unoccupied periods. The property is added to **high_limit** defining the unoccupied high-limit alarm threshold; **SU** is subtracted from **low_limit** defining the unoccupied low-limit alarm threshold.

UI01-UI05 Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
status_flags	four flags that indicate the general "health" of the object.
event_state	provides a way to determine if this object has an active event state associated with it.
reliability	indicates whether the **present_value** is "reliable" as far as the device or operator can determine.
out_of_service	
units	indicates the measurement units of this object.
min_pres_value	indicates the lowest number that can be reliably used for the **present_value** property of this object.
max_pres_value	indicates the highest number that can be reliably used for the **present_value** property of this object.
high_limit	specifies a limit that the **present_value** must exceed before an event is generated.
low_limit	specifies a limit below which the **present_value** must fall before an event is generated.
deadband	specifies a range between the **high_limit** and **low_limit** properties within which the **present_value** must remain for a TO-NORMAL event to be generated
AE	**Alarm Enable** specifies the type of alarm checking to be done on the present_value. 0=disabled (default) 1=contact (0→1) 2=contact (1→0) 3=change of state 4=low limit alarm 5=high limit alarm 6=low and high limit

Property	Description
AS	**Alarm Status** shows the current alarm condition. A value of 0 indicates a normal condition; a nonzero number indicates alarm generation. 0=no alarm 1=contact (0→1) 2=contact (1→0) 3=change of state 5=low limit alarm 6=high limit alarm
DT	**Data Type** specifies the data type for the input. The data type determines how certain universal input properties are displayed. Default value is 253.
IF	**Input Filter Delay** specifies the amount of time, in tenths of seconds, during which an input configured as digital must remain stable in order for the value to be considered reliable. 0.0-25.5 (analog) 0-255 (digital) 0.0 Default
IP	**Input Polarity** specifies the input polarity when configured as digital. A value of 0 in **IP** indicates that a low voltage displays as **present_value**=0, a high voltage displays as **present_value=**1, and a closed contact=0. A value of 1 in **IP** indicates that a low voltage displays as **present_value=**1, a high voltage displays as **present_value=**0, and a closed contact=1. Default value is 0.
OF	**UI Offset** defines an optional correction that may be required as an adjustment for the thermostat location and the possible measurement errors.
ST	**Sensor Type** specifies the type of input connected. 0=digital 2=linear 3=4–20mA 7=thermistor
SU	**Setup/Setback Limit** specifies the amount added to **high_limit** or subtracted from **low_limit** during scheduled unoccupied periods.

3.4 PRESSURE CONTROL

The NB-V3T can be configured to control based on static duct pressure. Using the properties in the Pressure Control object calibration, measurement, control parameters, and alarming options may all be configured. The Pressure Control object contains the following properties: **object_identifier**, **object_name**, **object_type**, **present_value**, **status_flags**, **event_state**, **out_of_service**, **units**, **high_limit**, **low_limit**, **deadband**, **AE**, **AS**, **CA**, **CB**, **CD**, **CK**, **DD**, **DM**, **DP**, **DS**, **FC**, **FH**, **KC**, **RZ** and **SU**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to. In this case, **object_type** is Analog Input.

Property **present_value** indicates the current value of the input being measured. It is represented in engineering units.

Property **status_flags** uses four flags to indicate the state of the analog input. The four flags are:

. In_Alarm
. Fault
. Overridden
. Out_Of_Service.

Property **event_state** determines whether or not the object has an active event state associated with it.

Property **out_of_service** can be set to True or False. When this property is True, the **present_value** will not track changes to the physical input. Also, when this property is true, the **present_value** can be changed to create specific conditions for testing purposes.

Property **units** indicates the measurement units used by the object.

Property **high_limit** is a limit by which the **present_value** must exceed before an event is generated.

Property **low_limit** is a limit by which the **present_value** must fall below before an event is generated.

Property **deadband** is the amount by which the **present_value** must be below the **high_limit** or above the **low_limit** for a return-to-normal event to be generated.

The **(AE) Alarm Enable** property specifies the type of alarm checking to be done on the **present_value**. A value of 0 indicates that alarming is disabled; a nonzero value selects one of several alarm functions. Table 3-13 lists the options for **AE**.

Table 3-13 Alarm Enable Options

Value of **AE**	Alarm Type Enabled
AE = 0	disabled

Table 3-13 Alarm Enable Options

Value of **AE**	Alarm Type Enabled
AE = 4	low limit alarm
AE = 5	high limit alarm
AE = 6	low and high limit

The **(AS) Alarm Status** property shows the current alarm condition. A value of 0 indicates a normal condition. A nonzero number indicates alarm generation. Table 3-14 explains each status.

Table 3-14 Values for Alarm Status Property

Value of **AS**	Alarm Condition
AS = 0	normal (no alarm)
AS = 5	low limit alarm
AS = 6	high limit alarm

The **(CA) Average Flow** property displays the measured average pressure measured in inches of water column (in. w.c.).

The **(CB) Calibrate Flow** property is used to manually calibrate the static pressure sensor connected to the *NB*-V3T. Setting **CB** to "1=Calibrate" causes the *NB*-V3T to calibrate the current pressure reading taking the current reading as zero. Once the controller has finished calibrating the pressure sensor, **CB** will return to a value of 0.

The **(CD) Target Flow** property shows the desired static pressure measured in inches of water column (in. w.c.).

The **(CK) Duct Scaling Factor (k)** property specifies the scaling factor for the particular terminal box being used. This value may be calculated using **KC** to perform a single point calibration. The default value for **CK** is 250.

The **(DD) Damper Direction** property is used to set the direction the damper will move. Setting **DD** to "0=Normal" will cause the damper to move while a **DD** value of "1=Reverse" will cause the direction of motion to be reversed.

The **(DM) Damper Mode** property specifies whether the damper's position will be controlled by the *NB*-V3T or whether it will be kept fully open. To keep the damper open, you must set **DM** to "1=Full Open". Otherwise, you should leave **DM** set to "0=Automatic".

The **(DP) Damper Position** property displays the current position of the damper as read from the feedback potentiometer built into the actuator.

The **(DS) Damper Status** property displays the current status of the actuator as determined by the MMT system.

Table 3-15 Damper Status Values

Value of **DS**	Damper Status
DS = 0	ready
DS = 1	disconnected/open
DS = 2	jammed/shorted

The **(FC) Fan Status/Control** property shows the current status of the fan output.

The **(FH) Flow Hysteresis** property specifies the amount of flow pressure variation that will be tolerated by the *NB*-V3T before a valid change in the pressure reading is indicated. **FH** creates a deadband around the current reading that must be exceeded before the **present_value** is updated. **FH** is used to prevent the bouncing that may occur at the lower and higher ends of the operating pressure range that can lead to the Pressure Control output toggling.

The **(KC) Measured CFM for CK Adjust** property is used to perform a 1-point calibration. By entering a non-zero value corresponding to the externally measured static pressure in **KC**, the proper value for **CK** will be calculated by the *NB*-V3T.

The **(RZ) Rejuvenate Count** property displays a count of the number of MMT pulses. When the MMT detects the possibility of an actuator problem, the controller will send pulses to the actuator in an attempt to correct the problem. **RZ** displays the number of pulses that have been sent to the actuator. **RZ** can also be used as an indication of the relative status of the actuator wit a low count indicating proper functioning and a high pulse count indicating that there may be a problem.

The **(SU) Setup/Setback Limit** property specifies the amount added to **high_limit** or subtracted from **low_limit** during unoccupied periods. This property shifts the points at which alarms and alarm returns are generated.

Pressure Control Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
status_flags	four flags that indicate the general "health" of the object.
event_state	provides a way to determine if this object has an active event state associated with it.
out_of_service	indicates whether or not the process this object represents is not in service.
units	indicates the measurement units of this object.
high_limit	specifies a limit that the **present_value** must exceed before an event is generated.
low_limit	specifies a limit below which the **present_value** must fall before an event is generated.
deadband	specifies a range between the **high_limit** and **low_limit** properties within which the **present_value** must remain for a TO-NORMAL event to be generated
AE	**Alarm Enable** specifies the type of alarm checking to be done on the present_value. 0=disabled (default) 4=low limit alarm 5=high limit alarm 6=low and high limit
AS	**Alarm Status** displays the current alarm condition. A value of 0 indicates a normal condition; a nonzero number indicates alarm generation. 0=no alarm 5=low limit alarm 6=high limit alarm
CA	**Average Flow** displays the measured average pressure in inches w.c**.**
CB	**Calibrate Flow** allows a host or operator to manually calibrate the pressure sensor
CD	**Target Flow** displays the desired pressure setpoint

Property	Description
CK	**Duct Scaling Factor (k)** displays the scaling factor as required to calibrate the static pressure reading.
DD	**Damper Direction** used to set the direction of the damper motor. 0=Normal 1=Reverse
DM	**Damper Mode** used to command the damper to fully open or to operate at minimum or maximum cooling, heating, and warm-up setpoints. 0=Automatic 1=Full Open
DP	**Damper Position** shows the current position of the damper.
DS	**Damper Status** **0=Ready** **1=Disconnected/Open** **2=Jammed/Shorted**
FC	**Fan Status/Control** shows the current status of the fan output. 0=Off 1=On
FH	**Flow Hysteresis** specifies the maximum amount of variation in the flow sensor reading to be tolerated by the *NB*-V3Tb before it shows a valid change of flow
KC	**Measured CFM for CK Adjust** when you enter the pressure value measured externally, this will automatically adjust the scaling factor (**CK**) based on the present pressure reading to properly scale the duct
RZ	**Rejuvenate Count** when MMT detects the possibility of an actuator short, electrical pulses are used in an attempt to rejuvenate the motor
SU	**Setup/Setback Limit** specifies the amount to be added to the **high_limit** or subtracted from the **low_limit** during scheduled unoccupied periods.

3.5 SUPPLY TEMPERATURE

The Supply Temperature object is used to configure and calibrate the supply temperature input and contains the following properties: **object_identifier**, **object_name**, **object_type**, **present_value**, **status_flags**, **event_state**, **reliability**, **out_of_service**, **units**, **DD**, **IC**, **OF**, and **SM**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to. In this case, object_type is Analog Input.

Property **present_value** indicates the current value of the input being measured. It is represented in engineering units.

Property **status_flags** uses four flags to indicate the state of the analog input. The four flags are:

. In_Alarm
. Fault
. Overridden
. Out_Of_Service.

Property **event_state** determines whether or not the object has an active event state associated with it.

Property **reliability** gives the reliability of the present value or operation. The different results are:
. No_Fault_Detected
. No_Sensor
. Over_Range
. Under_Range
. Open_Loop
. Shorted_Loop
. Unreliable_Other.

Property **out_of_service** is Out of Service. When this property is True, the present_value will not track changes to the physical input. Also, when this property is true, the present_value can be changed to create specific conditions for testing purposes.

Property **units** are the measurement units of the object.

The **(DD) Auto Duct Delta Temperature** property defines the temperature difference by which the supply air must either exceed the **HC** heating setpoint to switch to 'heating mode', or fall below the **CC** cooling setpoint to engage 'cooling' mode.

The **(IC) Input Select** property is used to specify which input will be used to read the supply air temperature. The options for **IC** are given in Table 3-16.

*Table 3-16 **IC** Input Channel Select*

Value of **IC**	Input Selected
IC = 1	UI1
IC = 2	UI2
IC = 3	UI3
IC = 4	UI4
IC = 5	UI5

The **(OF) Supply/Duct Temp Offset** property defines an offset used to adjust the **present_value**.

The **(SM) Cooling/Heating Supply Mode** property indicates the current supply mode. **SM** can be either Cooling (**SM**=0) or Heating (**SM**=1).

Supply Temperature Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
status_flags	four flags that indicate the general "health" of the object.
event_state	provides a way to determine if this object has an active event state associated with it.
reliability	indicates whether the **present_value** is "reliable" as far as the device or operator can determine.
out_of_service	indicates whether or not the process this object represents is not in service.
units	indicates the measurement units of this object.
DD	**Auto Duct Delta Temperature** defines the temperature difference by which the supply air must either exceed the current heating setpoint to switch to 'heating mode', or fall below the current cooling setpoint to engage 'cooling' mode.
IC	**Input Channel Select** specifies the input to be used to read the supply temperature 1=UI01 2=UI02 3=UI03 4=UI04 5=UI05
OF	**Supply/Duct Temperature Adjustment** defines an offset used to adjust **present_value**.
SM	**Cooling/Heating Supply Mode** indicates the current supply mode. This would be either Cooling or Heating as specified by the System Box Type (**BT**). If **BT** is set to supply dependant, the point will indicate the current mode as determined by the source/duct temperature. 0=Cooling 1=Heating

3.6 OUTSIDE AIR TEMPERATURE

The Outside Air Temperature object is used to select and configure the outside air temperature input and contains the following properties: **object_identifier**, **object_name**, **object_type**, **present_value**, **status_flags**, **event_state**, **reliability**, **out_of_service**, **units**, **IC**, and **OF**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to. In this case, object_type is Analog Input.

Property **present_value** indicates the current value of the input being measured. It is represented in engineering units.

Property **status_flags** uses four flags to indicate the state of the analog input. The four flags are:

. In_Alarm
. Fault
. Overridden
. Out_Of_Service.

Property **event_state** determines whether or not the object has an active event state associated with it.

Property **reliability** gives the reliability of the present value or operation. The different results are:
. No_Fault_Detected
. No_Sensor
. Over_Range
. Under_Range
. Open_Loop
. Shorted_Loop
. Unreliable_Other.

Property **out_of_service** is Out of Service. When this property is True, the present_value will not track changes to the physical input. Also, when this property is true, the present_value can be changed to create specific conditions for testing purposes.

Property **units** are the measurement units of the object.

The **(IC) Input Channel Select** property is used to specify which input will be used to read the outside air temperature. The options for **IC** are given in Table 3-17.

*Table 3-17 **IC** Input Channel Select*

Value of **IC**	Input Selected
IC = 1	UI1
IC = 2	UI2

*Table 3-17 **IC** Input Channel Select*

Value of **IC**	Input Selected
IC = 3	UI3
IC = 4	UI4
IC =5	UI5

The **(OF) Outside Temperature Adjustment** property defines an offset used to adjust the **present_value**.

Outside Air Temperature Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
status_flags	four flags that indicate the general "health" of the object.
event_state	provides a way to determine if this object has an active event state associated with it.
reliability	indicates whether the **present_value** is "reliable" as far as the device or operator can determine.
out_of_service	indicates whether or not the process this object represents is not in service.
units	indicates the measurement units of this object.
IC	**Input Channel Select** selects which input represents the supply air temperature 1=UI1 2=UI2 3=UI3 4=UI4 5=UI5
OF	**Outside Temperature Adjustment** defines an offset used to adjust the **present_value**.

3.7 AO01-AO04

Analog Outputs provide an 8-bit, 0–10VDC output signal. The Analog Outputs are controlled by manually writing a value to the output's **present_value**, by having a host controller on the EIA-485 communications network write a value to the **present_value** (still in manual mode), or by automatically controlling the output using one of the *NB*-V3T's control loops. Each Analog Output object contains the following properties: **object_identifier**, **object_name**, **object_type**, **present_value**, **status_flags**, **event_state**, **out_of_service**, **units**, **min_pres_value**, **max_pres_value**, **priority_array**, **relinquish_default**, **DT**, **HS**, and **LS**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to. In this case, object_type is Analog Output.

Property **present_value** indicates the current value of the input being measured. It is represented in engineering units.

Property **status_flags** uses four flags to indicate the state of the analog input. The four flags are:

. In_Alarm
. Fault
. Overridden
. Out_Of_Service.

Property **event_state** determines whether or not the object has an active event state associated with it.

Property **out_of_service** is Out of Service. When this property is True, the **present_value** will not track changes to the physical output. Also, when this property is true, the **present_value** can be changed to create specific conditions for testing purposes.

Property **units** indicates the measurement units of this object.

Property **min_pres_value** is the lowest number that can be reliably obtained for the Present Value of the object.

Property **max_pres_value** is the highest number that can be reliably obtained.

Property **priority_array** is a read-only array of prioritized values.

Property **relinquish_default** is a value to be used as the **present_value** when all values in the priority array are NULL.

NOTE
The **priority_array** and **relinquish_default** properties are included for interoperability, but do not have an effect the **present_value** of the output. The value of **relinquish_default** will NOT be used if all entries in the **priority_array** are NULL.

The **(DT) PUP Datatype** property specifies the data type for the analog output. The data type determines how certain analog output properties are displayed. This point affects the display of **present_value**, **min_pres_value** and **max_pres_value**. The property defaults to 252 (unsigned, 9.1 digit).

The **(HS) Maximum Scaled Voltage** property specifies the actual analog output value for a **present_value** value of **max_pres_value**.

The **(LS) Minimum Scaled Voltage** property specifies the actual analog output value for a **present_value** value of **min_pres_value**.

AO01-AO04 Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
status_flags	four flags that indicate the general "health" of the object.
event_state	provides a way to determine if this object has an active event state associated with it.
out_of_service	indicates whether or not the process this object represents is not in service.
units	indicates the measurement units of this object.
min_pres_value	indicates the lowest number that can be reliably used for the **present_value** property of this object.
max_pres_value	indicates the highest number that can be reliably used for the **present_value** property of this object.
priority_array	contains prioritized commands that are in effect for this object.
relinquish_ default	the default value to be used for the **present_value** property when all command priority values in the **priority_array** property have a NULL value.
DT	**PUP Data Type** specifies the PUP data type for the analog output. The data type determines how certain analog output properties are displayed. This point affects the display of **present_value**, **min_pres_val** and **max_pres_val**. The property defaults to 252 (unsigned, 9.1 digit).
HS	**Maximum Scaled Voltage** specifies the actual analog output value for a **present_value** value of **max_pres_val**.
LS	**Minimum Scaled Voltage** specifies the actual analog output value for a **present_value** value of **min_pres_val**.

3.8 HEAT AND COOL SETPOINTS

There are seven Analog Values objects in the NB-V3T used to specify the control setpoints and the setup/setback values for the various schedule states. The objects are: Cool Setpoint, Cool Unoccupied Setup/Setback, Cool Night Setup/Setback, Heat Setpoint, Heat Unoccupied Setup/Setback, Heat Night Setup/Setback, and Warmup Setpoint. Each object contains the following properties: **object_identifier**, **object_name**, **object_type**, **present_value**, **status_flags**, **event_state**, **out_of_service**, and **units**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to. In this case, **object_type** is Analog Value.

Property **present_value** indicates the current value of the input being measured. It is represented in engineering units.

Property **status_flags** uses four flags to indicate the state of the analog input. The four flags are:

. In_Alarm
. Fault
. Overridden
. Out_Of_Service.

Property **event_state** determines whether or not the object has an active event state associated with it.

Property **units** indicates the measurement units of this object.

Heat and Cool Setpoint Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
status_flags	four flags that indicate the general "health" of the object.
event_state	provides a way to determine if this object has an active event state associated with it.
out_of_service	indicates whether or not the process this object represents is not in service.
units	indicates the measurement units of this object.

3.9 BO01-BO05

The Binary Output objects are used to configure the behavior of the digital outputs on the NB-V3T. Each output has an intended function and proprietary properties which allowing it to perform that function. All of the Binary outputs have the following standard BACnet properties: **object_identifier**, **object_name**, **object_type**, **present_value**, **status_flags**, **event_state**, **out_of_service**, and **polarity**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to. In this case, object_type is Binary Output.

Property **present_value** indicates the current value of the input being measured. It is represented in engineering units.

Property **status_flags** uses four flags to indicate the state of the analog input. The four flags are:

. In_Alarm
. Fault
. Overridden
. Out_Of_Service.

Property **event_state** determines whether or not the object has an active event state associated with it.

Property **out_of_service** is Out of Service. When this property is True, the present_value will not track changes to the physical output. Also, when this property is true, the present_value can be changed to create specific conditions for testing purposes.

NOTE

When **out_of_service** is set to "0=False", proprietary property **OI** will be set to "2=Automatic". When **out_of_service** is set to "1=True", proprietary property **OI** will be set to "3=Manual".

Property **polarity** is used to define whether the output is normal acting or reverse acting. As a normal acting output, the output is off when output control is not calling for the output to be on. As a reverse acting output, the output is off when the control loop is calling for the output to be on.

NOTE

The NB-V3T does not support the use of priorities for writing.

Property **priority_array** is a read-only array of prioritized values.

Property **relinquish_default** is a value to be used as the **present_value** when all values in the priority array are NULL.

> **NOTE**
>
> The **priority_array** and **relinquish_default** properties are included for interoperability, but do not have an effect the **present_value** of the output. The value of **relinquish_default** will NOT be used if all entries in the **priority_array** are NULL.

3.9.1 BINARY OUTPUT 1 (BO01)

Binary Output 1 is intended as a Fan Control output. The BO01 object contains the following proprietary properties in addition to the standard properties listed above: **FD**, **FN**, **FO**, **FR**, **FS**, **FU**, **FX**, **OI**, **RH**, and **RL**.

The **(FD) Shutoff Delay** property shows the amount of time, in seconds, the fan output will stay energized once the zone temperature reaches the deadband.

The **(FN) Night Setback Fan Mode** property defines the mode of the fan during the night setback schedule state. When **FN**=1, the fan runs for the entire period. When **FN**=0, the fan shuts off when the zone temperature is within the deadband.

The **(FO) Occupied Fan Mode** property defines the mode of the fan during the occupied schedule state. When **FO**=On (1), the fan runs for the entire period. When **FO**=Auto (0), the fan shuts off when the zone temperature is within the deadband.

The **(FR) Minimum Run Time** property shows the minimum amount of time, in minutes, the fan output will stay energized. This prevents short cycling of the fan output.

The **(FS) Minimum Off Time** property shows the minimum amount of time, in minutes, the fan output will stay de-energized. This prevents short cycling of the fan output.

The **(FU) Unoccupied Fan Mode** property defines the mode of the fan during the unoccupied schedule state. When **FU**=1, the fan runs for the entire period. When **FU**=0, the fan shuts off when the zone temperature is within the deadband.

The **(FX) Staging Delay** property indicates the maximum amount of time, in minutes, that the fan will operate before energizing the first stage of heating or cooling.

The **(RH) Run Hours** property reflects the amount of time that the output is energized. **RH** stored in EEPROM automatically at midnight and when the Device:**(BU) Backup Control** is enabled. Property **RH** is restored with the latest backed up information upon restoration of power after shut down or power loss. This property defaults to 0.

NOTE
You should perform a property back up (Device property **BU** = 1) after clearing the Fan Digital Output property **RH**. Otherwise the most recent "stored" value will be restored in **RH** after a power loss.

The **(RL) Run Limit** property specifies a run time limit in hours for the output. Once the run hours for the output exceed the runtime limit (**RH** > **RL**), the *NB*-V3T will generate a runtime limit alarm. To clear the run limit alarm or to receive another run limit alarm, set **RH** to 0.

BO01 Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
status_flags	four flags that indicate the general "health" of the object.
event_state	provides a way to determine if this object has an active event state associated with it.
out_of_service	indicates whether or not the process this object represents is not in service.
polarity	indicates the relationship between the physical state of the output and the logical state represented by the **present_value**e property. If the **polarity** property is NORMAL, then the ACTIVE state of the **present_value** property is also the ACTIVE or ON state of the physical output as long as **out_of_service** is FALSE. If the Polarity property is REVERSE, then the ACTIVE state of the **present_value** property is the INACTIVE or OFF state of the physical output as long as **out_of_service** is FALSE.
priority_array	contains prioritized commands that are in effect for this object.
relinquish_ default	the default value to be used for the **present_value** property when all command priority values in the **priority_array** property have a NULL value.
FD	**Shutoff Delay (seconds)** the amount of time, in seconds, the fan output will stay energized once the zone temperature reaches the deadband.
FN	**Night Setback Fan Mode** defines the mode of the fan during the night setback schedule state. 1 = fan runs for the entire period 0 = fan shuts off when zone temp is within the deadband.
FO	**Occupied Fan Mode** defines the mode of the fan during the occupied schedule state. 1 = fan runs for the entire period 0 = fan shuts off when zone temp is within the deadband.
FR	**Minimum Run Time** the minimum amount of time, in minutes, the fan output will stay energized.
FS	**Minimum Off Time** the minimum amount of time, in minutes, the fan output will stay de-energized.
FU	**Unoccupied Fan Mode** defines the mode of the fan during the unoccupied schedule state. 1 = fan runs for the entire period 0 = fan shuts off when zone temp is within the deadband.
FX	**Staging Delay** indicates the amount of time, in minutes, that the fan will operate before energizing the first stage of heating or cooling.
RH	**Run Hours** the total number of hours that the output has been energized.
RL	**Run Limit** specifies a run time limit in hours for the output. Once the run hours for the output exceed the runtime limit (**RH** > **RL**), the *NB*-V3T will generate a runtime limit alarm. To clear the run limit alarm or to receive another run limit alarm, set **RH** to 0.

3.9.2 BINARY OUTPUT 2 (BO02)

Binary Output 2 is meant to control one stage of cooling. The BO02 object contains the following proprietary properties in addition to the standard properties listed above: **CL**, **DB**, **MR**, **MS**, **MX**, **OI**, **RH**, **RL**, **TL**, and **TO**.

The **(CL) Cooling OAT Lockout** property defines the reliable Outside Air Temperature (**present_value**) below which cooling stages will not be engaged. Stages will not be de-energized should the OAT fall below this temperature during an active cycle. If **CL** is set to 999, the *NB*-V3T will disregard OAT.

The **(DB) Deadband** property defines the amount by which the temperature must drop below the setpoint before the stage will be de-energized.

The **(MR) Minimum Run Time** property shows the minimum amount of time, in minutes, the stage will stay energized.

The **(MS) Minimum Off Time** property shows the minimum amount of time, in minutes, the stage will stay de-energized.

The **(MX) Staging Delay** property indicates the maximum amount of time, in minutes, that the stage will operate before energizing the next stage of cooling.

The **(RH) Run Hours** property reflects the amount of time that the output is energized. **RH** stored in EEPROM automatically at midnight and when the Device:**(BU) Backup Control** is enabled. Property **RH** is restored with the latest backed up information upon restoration of power after shut down or power loss. This property defaults to 0.

NOTE
You should perform a property back up (System property **BU** = 1) after clearing the Fan Digital Output property **RH**. Otherwise the most recent “stored” value will be restored in **RH** after a power loss.

The **(RL) Run Limit** property specifies a run time limit in hours for the output. Once the run hours for the output exceed the runtime limit (**RH** > **RL**), the *NB*-V3T will generate a runtime limit alarm. To clear the run limit alarm or to receive another run limit alarm, set **RH** to 0.

The **(TL) Low Temp Lockout** property defines the minimum source/duct temperature below which cooling will be disengaged. If **TL** is set to 999, the *NB*-V3T will disregard duct temperature.

The **(TO) Stage Temp Offset** property indicates the temperature offset from setpoint required before engaging the stage. Note that the stage may also engage if the Staging Time of the prior stage expires.

BO02 Properties

Prop.	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
status_flags	four flags that indicate the general "health" of the object.
event_state	provides a way to determine if this object has an active event state associated with it.
out_of_service	indicates whether or not the process this object represents is not in service.
polarity	indicates the relationship between the physical state of the output and the logical state represented by the **present_value**e property. If the **polarity** property is NORMAL, then the ACTIVE state of the **present_value** property is also the ACTIVE or ON state of the physical output as long as **out_of_service** is FALSE. If the Polarity property is REVERSE, then the ACTIVE state of the **present_value** property is the INACTIVE or OFF state of the physical output as long as **out_of_service** is FALSE.
priority_array	contains prioritized commands that are in effect for this object.
relinquish_ default	the default value to be used for the **present_value** property when all command priority values in the **priority_array** property have a NULL value.
CL	**Cooling OAT Lockout** Cooling stages will not be engaged if a reliable (**reliability**=0) Outside Air Temperature (**present_value**) is available that is below the temperature specified by this property. Stages will not be de-energized should the OAT fall below this temperature during an active cycle.
DB	**Deadband** defines the amount by which the temperature must drop below the setpoint before the stage will be de-energized.
MR	**Minimum Run Time** shows the minimum amount of time, in minutes, the stage will stay energized.
MS	**Minimum Off Time** shows the minimum amount of time, in minutes, the stage will stay de-energized.
MX	**Staging Delay (minutes)** indicates the amount of time, in minutes, that the stage will operate before energizing the next stage of cooling.
RH	**Run Hours** the total number of hours that the output has been energized.
RL	**Run Limit** specifies a run time limit in hours for the output. Once the run hours for the output exceed the runtime limit (**RH** > **RL**), the *NB*-V3T will generate a runtime limit alarm. To clear the run limit alarm or to receive another run limit alarm, set **RH** to 0.
TL	**Low Temperature Lockout** defines the minimum source/duct temperature below which cooling will be disengaged.
TO	**Stage Temperature Offset** indicates the temperature offset from setpoint required before engaging the stage. Note that the stage may also engage if the Staging Time of the prior stage expires.

3.9.3 DIGITAL OUTPUT 3 (BO03)

Binary Output 3 is meant to control one stage of cooling.The BO03 object contains the following proprietary properties in addition to the standard properties listed above: **DB**, **MR**, **MS**, **OI**, **RH**, **RL**, and **TO**.

The **(DB) Deadband** property defines the amount by which the temperature must drop below the setpoint before the stage will be de-energized.

The **(MR) Minimum Run Time** property shows the minimum amount of time, in minutes, the stage will stay energized.

The **(MS) Minimum Off Time** property shows the minimum amount of time, in minutes, the stage will stay de-energized.

The **(RH) Run Hours** property reflects the amount of time that the output is energized. **RH** stored in EEPROM automatically at midnight and when the Device:**(BU) Backup Control** is enabled. Property **RH** is restored with the latest backed up information upon restoration of power after shut down or power loss. This property defaults to 0.

NOTE
You should perform a property back up (Device property **BU** = 1) after clearing the Fan Digital Output property **RH**. Otherwise the most recent “stored” value will be restored in **RH** after a power loss.

The **(RL) Run Limit** property specifies a run time limit in hours for the output. Once the run hours for the output exceed the runtime limit (**RH** > **RL**), the *NB*-V3T will generate a runtime limit alarm. To clear the run limit alarm or to receive another run limit alarm, set **RH** to 0.

The **(TO) Stage Temp Offset** property indicates the temperature offset from setpoint required before engaging the stage. Note that the stage may also engage if the Staging Time of the prior stage expires.

BO03 Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
status_flags	four flags that indicate the general "health" of the object.
event_state	provides a way to determine if this object has an active event state associated with it.
out_of_service	indicates whether or not the process this object represents is not in service.
polarity	indicates the relationship between the physical state of the output and the logical state represented by the **present_value**e property. If the **polarity** property is NORMAL, then the ACTIVE state of the **present_value** property is also the ACTIVE or ON state of the physical output as long as **out_of_service** is FALSE. If the Polarity property is REVERSE, then the ACTIVE state of the **present_value** property is the INACTIVE or OFF state of the physical output as long as **out_of_service** is FALSE.
priority_array	contains prioritized commands that are in effect for this object.
relinquish_ default	the default value to be used for the **present_value** property when all command priority values in the **priority_array** property have a NULL value.
DB	**Deadband** defines the amount by which the temperature must drop below the setpoint before the stage will be de-energized.
MR	**Minimum Run Time** shows the minimum amount of time, in minutes, the stage will stay energized.
MS	**Minimum Off Time** shows the minimum amount of time, in minutes, the stage will stay de-energized.
RH	**Run Hours** the total number of hours that the output has been energized.
RL	**Run Limit** specifies a run time limit in hours for the output. Once the run hours for the output exceed the runtime limit (**RH** > **RL**), the *NB*-V3T will generate a runtime limit alarm. To clear the run limit alarm or to receive another run limit alarm, set **RH** to 0.

Property	Description
TO	**Stage Temperature Offset** indicates the temperature offset from setpoint required before engaging the stage. Note that the stage may also engage if the Staging Time of the prior stage expires.

3.9.4 DIGITAL OUTPUT 4 (BO04)

Binary Output 4 is meant to control one stage of heating. The BO04 object contains the following proprietary properties in addition to the standard properties listed above: **DB**, **HL**, **MR**, **MS**, **MX**, **OI**, **RH**, **RL**, **TH**, and **TO**.

The **(DB) Deadband** property defines the amount by which the temperature must exceed the setpoint before the stage will be de-energized.

The **(HL) Heat OAT Lockout** property defines the reliable Outside Air Temperature (**present_value**) above which heating stages will not be engaged. Stages will not be de-energized should the OAT rise above this temperature during an active cycle. If **HL** is set to 999.0, the *NB*-V3T will disregard OAT.

The **(MR) Min Run Time** property shows the minimum amount of time, in minutes, the stage will stay energized.

The **(MS) Min Off Time** property shows the minimum amount of time, in minutes, the stage will stay de-energized.

The **(MX) Stage Delay** property indicates the maximum amount of time, in minutes, that the stage will operate before energizing the next stage of heating.

The **(RH) Run Hours** property reflects the amount of time that the output is energized. **RH** stored in EEPROM automatically at midnight and when the Device:**(BU) Backup Control** is enabled. Property **RH** is restored with the latest backed up information upon restoration of power after shut down or power loss. This property defaults to 0.

NOTE

You should perform a property back up (Device property **BU**=1) after clearing the Fan Digital Output property **RH**. Otherwise the most recent "stored" value will be restored in **RH** after a power loss.

The **(RL) Run Limit** property specifies a run time limit in hours for the output. Once the run hours for the output exceed the runtime limit (**RH** > **RL**), the *NB*-V3T will generate a runtime limit alarm. To clear the run limit alarm or to receive another run limit alarm, set **RH** to 0.

The **(TH) High Temp Lockout** property defines the reliable source/duct temperature below which heating stages will be engaged. If **TH** is set to 999, the *NB*-V3T will disregard duct temperature.

The **(TO) Stage Temp Offset** property indicates the temperature offset from setpoint required before engaging the stage. Note that the stage may also engage if the Staging Time of the prior stage expires.

BO04 Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
status_flags	four flags that indicate the general "health" of the object.
event_state	provides a way to determine if this object has an active event state associated with it.
out_of_service	indicates whether or not the process this object represents is not in service.
polarity	indicates the relationship between the physical state of the output and the logical state represented by the **present_value**e property. If the **polarity** property is NORMAL, then the ACTIVE state of the **present_value** property is also the ACTIVE or ON state of the physical output as long as **out_of_service** is FALSE. If the Polarity property is REVERSE, then the ACTIVE state of the **present_value** property is the INACTIVE or OFF state of the physical output as long as **out_of_service** is FALSE.
priority_array	contains prioritized commands that are in effect for this object.
relinquish_ default	the default value to be used for the **present_value** property when all command priority values in the **priority_array** property have a NULL value.
DB	**Deadband** defines the amount by which the temperature must drop below the setpoint before the stage will be de-energized.
HL	**Heating OAT Lockout** Heating stages will not be engaged if a Reliable (**reliability**=0) Outside Air Temperature (**present_value**) is available that is above the temperature specified by this property. Stages will not be de-energized should the OAT rise above this temperature during an active cycle.
MR	**Minimum Run Time** shows the minimum amount of time, in minutes, the stage will stay energized.
MS	**Minimum Off Time** shows the minimum amount of time, in minutes, the stage will stay de-energized.

Property	Description
MX	**Hand-off Auto Override** overrides the digital output 0=Off (default) 1=On 2=Auto allows for automatic control 3=Manual (**present_value** can be directly written to)
RH	**Run Hours** specifies a run time limit in hours for the output. Once the run hours for the output exceed the runtime limit (**RH** > **RL**), the *NB*-V3T will generate a runtime limit alarm. To clear the run limit alarm or to receive another run limit alarm, set **RH** to 0.
RL	**Run Limit** shows the maximum amount of time, in minutes, the output will stay energized.
TH	**High Temp Lockout** specifies the temperature below which heating stages will be engaged if there is a reliable source/ duct temperature.
TO	**Stage Temperature Offset** indicates the temperature offset from setpoint required before engaging the stage. Note that the stage may also engage if the Staging Time of the prior stage expires.

3.9.5 DIGITAL OUTPUT 5 (BO05)

Binary Output 5 is meant to control one stage of heating. The BO05 object contains the following proprietary properties in addition to the standard properties listed above: **DB**, **MR**, **MS**, **MX**, **OI**, **RH**, **RL**, **TH**, **TL**, and **TO**.

The **(DB) Deadband** property defines the amount by which the temperature must exceed the setpoint before the stage will be de-energized.

The **(MR) Minimum Run Time** property shows the minimum amount of time, in minutes, the stage will stay energized.

The **(MS) Minimum Off Time** property shows the minimum amount of time, in minutes, the stage will stay de-energized.

The **(RH) Run Hours** property reflects the amount of time that the output is energized. **RH** stored in EEPROM automatically at midnight and when the Device:**(BU) Backup Control** is enabled. Property **RH** is restored with the latest backed up information upon restoration of power after shut down or power loss. This property defaults to 0.

NOTE
You should perform a property back up (Device property **BU**=1) after clearing the Fan Digital Output property **RH**. Otherwise the most recent "stored" value will be restored in **RH** after a power loss.

The **(RL) Run Limit** property specifies a run time limit in hours for the output. Once the run hours for the output exceed the runtime limit (**RH** > **RL**), the *NB*-V3T will generate a runtime limit alarm. To clear the run limit alarm or to receive another run limit alarm, set **RH** to 0.

The **(TO) Stage Temp Offset** property indicates the temperature offset from setpoint required before engaging the stage. Note that the stage may also engage if the Staging Time of the prior stage expires.

BO05 Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
status_flags	four flags that indicate the general "health" of the object.
event_state	provides a way to determine if this object has an active event state associated with it.
out_of_service	indicates whether or not the process this object represents is not in service.
polarity	indicates the relationship between the physical state of the output and the logical state represented by the **present_value**e property. If the **polarity** property is NORMAL, then the ACTIVE state of the **present_value** property is also the ACTIVE or ON state of the physical output as long as **out_of_service** is FALSE. If the Polarity property is REVERSE, then the ACTIVE state of the **present_value** property is the INACTIVE or OFF state of the physical output as long as **out_of_service** is FALSE.
priority_array	contains prioritized commands that are in effect for this object.
relinquish_ default	the default value to be used for the **present_value** property when all command priority values in the **priority_array** property have a NULL value.
DB	**Deadband** defines the amount by which the temperature must drop below the setpoint before the stage will be de-energized.
MR	**Minimum Run Time** shows the minimum amount of time, in minutes, the stage will stay energized.
MS	**Minimum Off Time** shows the minimum amount of time, in minutes, the stage will stay de-energized.
RH	**Run Limit** specifies a run time limit in hours for the output. Once the run hours for the output exceed the runtime limit (**RH** > **RL**), the *NB*-V3T will generate a runtime limit alarm. To clear the run limit alarm or to receive another run limit alarm, set **RH** to 0.
RL	**Minimum Run Time** shows the minimum amount of time, in minutes, the stage will stay energized.

Property	Description
TO	**Stage Temperature Offset** indicates the temperature offset from setpoint required before engaging the stage. Note that the stage may also engage if the Staging Time of the prior stage expires.

3.10 SCHEDULE

The Schedule object is used to configure the NB-V3T's active schedule state. The properties in this object can be used to build the complete schedule for the controller. The Schedule Object contains the following properties: **object_identifier**, **object_name**, **object_type**, **present_value**, **effective_period**, **weekly_schedule**, **exception_schedule**, **list_of_object_property_references**, **priority_for_writing**, **HE**, **HO**, **IS**, and **ZE**.

The *NB*-V3T operates in one of four active schedule states:

. warm-up mode
. occupied mode
. unoccupied mode
. night setback mode

There are two types of schedules: Weekly and Exception. A Weekly schedule consists of a sequence of actions for each day of the week. You must set up a schedule for each day- Monday=1 through Sunday=7. Exception schedules override weekly schedules.

An Exception Schedule is a set of actions for a specific day that takes precedence over a weekly schedule. Exception schedule is the schedule used on any date in the Calendar Object.

The following describes the four schedule states:

Warm-up is the period of time before occupancy. Warm-up provides special control action to bring the zone temperature to its desired setpoint for the occupied mode, based on the warmup setpoint. The properties used to define the warm-up temperature appear in the analog inputs and damper control. In time based warm-up, the warm-up period ends when occupied mode begins.

Occupied mode is the period of time when the zone is occupied by people and the *NB*-V3T must maintain appropriate comfort levels in the zone. The heating and cooling setpoints define a desired zone temperature range. Occupied mode ends when unoccupied mode time begins.

Unoccupied mode is the period of time when people are not expected to be in the zone and temperature control is not as strict. During unoccupied mode, the *NB*-V3T maintains cooling comfort levels at setup values and heating comfort levels at setback values. These setup and setback values are used to broaden the control range between the heating and cooling setpoints in order to provide less stringent control. The properties used to define the offsets are located in the **Heat**/**Cool Unoccupied Setup/Setback** objects. Unoccupied mode usually ends when night setback begins.

Night setback is the period of time during unoccupied mode when the entire building is usually unoccupied and the air handler may be shut down. The controller provides the option to setup and setback the control temperature (as does the standard unoccupied mode) and to determine when these offsets are reached. As with unoccupied mode, the properties used to define the night setback offsets are located in the **Heat**/**Cool Night Setup/Setback** object.

Property **object_identifier** is a numeric code which is used to identify the object. It must be unique within the BACnet Device that maintains it.

Property **object_name** is a name for the object which is unique within the BACnet Device which maintains it.

Property **object_type** indicates which object type class value. This object is of type Schedule.

Property **present_value** is the current value of the schedule.

Property **priority_for_writing** defines the priority at which the referenced properties are commanded. This read only property's value=7.

Property **effective_period** is the date(s) when a schedule is active.

Property **weekly_schedule** contains elements 1-7 which correspond to the days of the week with Monday=1 and Sunday=7. Each element tells the sequence of schedule actions for that day.

Property **exception_schedule** is the Exception Schedule. The elements of an exception schedule override the elements of a weekly schedule. The Exception Schedule is used when the **local_date**=any date in the Calendar Object, i.e., Calendar is the holiday list, the Exception Schedule is used on holidays.

Property **list_of_object_property_reference** is Object ID/Property ID of the proprietary Schedule Object, **present_value**.

Property **priority_for_writing** defines the priority at which the referenced properties are commanded. This read only property's value=7

The **(HE) Host Overrides** property specifies whether to used a schedule sent by a host. If **HE**=1, then **HO** is used as the host override state.

The **(HO) Host Schedule** property specifies the desired schedule override state when schedule property **HE**=1. If **HE**=0, then **HO** is not used. The values for **HO** are given in Table 3-18.

*Table 3-18 **HO** Host Override Values*

Value of **HO**	Override
HO = 0	unoccupied
HO = 1	warmup
HO = 2	occupied
HO = 3	night setback

The **(IS) Inactive Schedule State** property determines which schedule state the *NB*-V3T should follow when no weekly schedule is active. Valid schedule choices are unoccupied (**IS**=0), warm-up (**IS**=1), occupied (**IS**=2), and night setback (**IS**=3).

The **(ZE) Receive Schedule** property specifies whether the *NB*-V3T should receive its schedule from a remote host.

Schedule Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
effective_period	specifies the range of dates within which the Schedule object is active.
weekly_ schedule	a BACnetARRAY containing exactly seven elements, each containing a BACnetDailySchedule. A BACnetDailySchedule consists of a list of BACnetTimeValues that are (time, value) pairs, which describe the sequence of schedule actions on one day of the week when no Exception_Schedule is in effect. The array elements 1-7 correspond to the days Monday - Sunday, respectively.
exception_ schedule	a BACnetARRAY of BACnetSpecialEvents, each of which describes a sequence of schedule actions that takes precedence over the normal day's behavior on a specific day or days.
list_of_object_ property_ references	specifies the Device Identifiers, Object Identifiers and Property Identifiers of the properties to be written with specific values at specific times on specific days.
priority_for_ writing	defines the priority at which the referenced properties are commanded.
HE	**Host Overrides** specifies whether to use the host schedule. 0=disabled 1=enabled
HO	**Host Schedule** specifies the desired schedule override state when **HE**=1. 0 = unoccupied 1 = warm-up 2 = occupied 3 = night setback
IS	**Inactive Schedule State** determines which schedule state the *NB*-V3T should follow when there is no active schedule. 0 = unoccupied 1 = warm-up 2 = occupied 3 = night setback

Property	Description
ZE	**Receive Schedule** enables the *NB*-V3T to receive network schedule broadcasts and sets **present_value** based on the received value. 0=No 1=Yes

3.11 HOLIDAY CALENDAR

The Holiday Calendar object is used to designate exceptions form the schedule configured in the Schedule object. These holidays are days which have a different desired schedule behavior from the active schedule. The Holiday Calendar object contains the following properties: **object_identifier**, **object_name**, **object_type**, **present_value**, and **date_list**.

Property **object_identifier** is a numeric code which is used to identify the object.

Property **object_name** is a name for the object which is unique within the BACnet Device which maintains it.

Property **object_type** indicates which object type class value. This property is of type Calendar.

Property **present_value** is the current value of the Calendar. The **present_value** will be true if the **local_date** matches any date in the **datelist**.

Property **date_list** is a list of Calendar Entries, which consist of individual dates or ranges of dates

Holiday Calendar Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
datelist	a list of BACnetCalendarEntries, each of which is either an individual date (Date), range of dates (BACnetDateRange), or month/week-of-month/ day-of-week specification (BACnetWeekNDay). If the current date matches the calendar entry criteria, the present value of the Calendar object is TRUE.

3.12 ECONOMIZER

The economizer operates between a low and high temperature limit. If the Outside Air Temperature (OAT) is outside of the limits, the output is set to the minimum position limit. The Economizer adjusts its control parameters based on setup/setback values when the controller is not in an occupied schedule mode.

The analog output for the economizer control loop is AO4 on terminal block TB5. A 0-10VDC signal or 0-20mA (current sourcing) signal is used to drive a standard analog motor actuator or the user may choose to use BO03 or BO05.

The Economizer object contains the following properties: **object_identifier**, **object_name**, **object_type**, **CM**, **ED**, **EE**, **EM**, **ML**, **MP**, **MR**, **MV**, **OH**, and **OL**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to.

The **(CM) Calculated Minimum Position** property displays the actual minimum position of the economizer damper.

The **(ED) Economizer Staging Delay in Minutes** property specifies how many minutes the controller waits before using additional cooling stages after the economizer damper reaches 100%.

The **(EE) Economizer Channel Enable** property specifies the PID channel or Digital Output to be used for economizer control. When **EE** is set to zero, economizer control is disabled.

*Table 3-19 **EE** Economize Channel Enable*

Value of **EE**	Control
EE = 0	off
EE = 1	PID 1
EE = 2	PID 2
EE = 3	PID 3
EE = 4	PID 4
EE = 5	DO 3
EE = 6	DO 5

Setting **EE** to either 5 (DO 3) or 6 (DO5) enables the use of external, pre-packaged economizers.

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NOTE
Assigning a digital output to enable/disable an external economizer using DO3 or DO5 overrides the Cooling Stage 2 or Heat Stage 2 request.

The **(EM) Economizer Minimum Position. 0-100%** property specifies the PID minimum position in percent for the economizer damper.

The **(ML) Reset Limit** property specifies the value at which maximum reset is used. When the value of the reset variable is equal to **ML**, the maximum reset (**MR**) is used in determining the calculated minimum position.

The **(MP) Reset Setpoint** property specifies the value at which the reset action begins. When the value of the reset variable exceeds **MP**, reset action will be used in determining the economizer minimum position.

The **(MR) Maximum Reset** property specifies the maximum amount to reset **EM** when reset is being used.

The **(MV) Reset Variable** property allows you to specify an input sensor that is to be used to reset **EM**. A list of the input options for **MV** are given in Table 3-20.

*Table 3-20 **MV** Reset Variable Values*

Value of **MV**	Input
MV = 0	disabled (default)
MV = 1	Zone Temp
MV = 2	Supply Temp
MV = 4	UI1
MV = 5	UI2
MV = 6	UI3
MV = 7	UI4
MV = 8	UI5
MV = 11	OAT

The **(OH) OAT High Limit** property specifies an upper temperature limit for Economizer operation. If the OAT is above the high limit and the economizer is enabled, the PID is set to the Minimum Position (as specified in **EM**).

The **(OL) OAT Low Limit** property specifies an lower temperature limit for Economizer operation. If the OAT is below the low limit and the economizer is enabled, the PID is set to the Minimum Position (as specified in **EM**).

Economizer Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
CM	**Calculated Minimum Position** displays the actual minimum position of the economizer damper.
ED	**Economizer Staging Delay (minutes)** specifies how many minutes the controller waits before using additional cooling stages after the economizer damper reaches 100%.
EE	**Economizer Enable** specifies the PID channel or Digital Output to be used for economizer control. A value of zero in **EE** disables economizer control. 0=Off 1=PID 1 2=PID 2 3=PID 3 4=PID 4 5=DO 3 6=DO 5
EM	**Economizer Minimum Position (%)** specifies the PID minimum position in percent for the economizer damper.
ML	**Reset Limit** specifies the value at which maximum reset is used. When the value of the reset variable is equal to **ML**, the maximum reset (**MR**) is used in determining the calculated minimum position.
MP	**Reset Setpoint** specifies the value at which the reset action begins. When the value of the reset variable exceeds **MP**, reset action will be used in determining the economizer minimum position.
MR	**Maximum Reset** specifies the maximum amount to reset the minimum position setpoint (**EM**) by when reset is being used.
MV	**Reset Variable for Economizer Minimum Position** specifies the input to be used for calculating the reset. A value of zero disables reset. 0=Disabled 1=Zone Temperature 2=Supply Temperature 4=UI01 5=UI02 6=UI03 7=UI04 8=UI05 11=OAT
OH	**OAT High Limit** specifies the Outside Air Temperature (OAT) high limit. If the OAT is above the high limit, the PID is set to the Economizer Minimum Position (**EM**).
OL	**OAT Low Limit** specifies the Outside Air Temperature (OAT) low limit. If the OAT is below the low limit, the PID is set to the Economizer Minimum Position (**EM**).

3.13 PID CONTROL 1-4

The PID control of the *NB*-V3T is a general purpose PID loop used to control the analog output.

Proportional+Integral+Derivative (PID) represents a method of control that controls equipment according to a setpoint in proportion to the value of a measured variable. It accounts for the amount of error (difference between the measured variable and the setpoint) and the continued presence of error. You can use PID control in the analog output loop by enabling the Control Enable property (**CE**=1). Setting **CE** = 0 disables PID control. The PID Control objects contain the following properties: **object_identifier**, **object_name**, **object_type**, **AO**, **CE**, **CS**, **DB**, **I1**, **I2**, **I3**, **IC**, **IN**, **MR**, **P1**, **P2**, **P3**, **PB**, **PO**, **RC**, **RL**, **RP**, **RS**, **RT**, **RV**, **SG**, **SP**, and **SU**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to.

The **(AO) Analog Output** property shows the scaled output value used by the analog output and is a reflection of the Analog Output property **present_value**. This property is the Percent Output (**PO**) value scaled to **min_pres_val** and **max_pres_val** of the corresponding analog output **AO**.

The **(CE) Control Enable** property enables the PID loop. When **CE** = 0, **PO** is not updated but may be set manually. When **CE** = 1, **PO** is updated by the PID control loop and if the analog output is set to automatic control, the **AO** value will be set accordingly.

The **(CS) Control Setpoint** property shows the actual loop control setpoint. This read-only point reflects the unoccupied setup/setback as well as any reset and/or *SBC*-STAT setpoint adjustment. This point is expressed in the same kind of measurement units (engineering units) that the measured variable uses (e.g., degrees, cfm, inches of WC, etc.) The data type of **CS** is the same as the data type of the selected measured variable.

The **(DB) Deadband** property specifies the deadband within the proportional control band in which the output remains constant at a point midway between maximum output and minimum output. Specifying a **DB** that is greater than or equal to the resolution of the sensor specified in **IC**, you eliminate the possibility of cycling around the setpoint. The value of **DB** should never exceed the proportional band, **PB**. If **DB** is greater than **PB**, then the control loop will not have proportional control.

DB relates to the resolution of the input variable of the control loop. Recall that the range of a 15-bit, analog input is scaled into 32,767 equal divisions. The *NB*-V3T can recognize input changes that are greater than or equal to the resolution of each of the divisions. For linear analog input devices having a large operational range, the size of each division is also relatively large. For a linear analog input device having a relatively small operational range, the size of each division is relatively small.

In the case of nonlinear sensors such as thermistors, the resolution of each division becomes more irregular as the temperature range extends to the outer limits of the operational range. At these outer limits of the sensor's operation range, one small division may represent a very large or very small temperature range because of the nonlinear nature of the sensor's response curve. The incidence of this phenomenon is even more pronounced with the use of an 8-bit analog input sensor.

Whether or not the divisions of a particular sensor represent a relatively large or relatively small number, it is important to realize that if the setpoint (**SP**) chosen does not exactly fall on one of these divisions, the

NB-V3T will never attain the setpoint. The resulting control action will be an oscillation of the output around the setpoint. In order to eliminate the effects of this hunting action, a deadband can be programmed that is centered on the selected setpoint.

DB is used to specify an input variable range within the proportional band **PB**. The size of **DB** should be based on the type of sensor input selected for the input specified in **IC**. When the value of the measured variable is within ±**DB**/2 of the setpoint **SP**, the output signal remains constant at the midpoint of the minimum/maximum range.

By entering a value in **DB** that is greater than the resolution of the measured variable sensor, you create a deadband that allows the *NB*-V3T to effectively reach setpoint. **DB** defaults to 0.

NOTE

The data types returned for properties **DB** and **PB** are determined by the data type of the referenced measured variable specified by **IC**.

CAUTION

*Never change **DB** to a value greater than half of the proportional band **PB**. Doing so will eliminate the effects of PID control, resulting in on/off control.*

At this point, the *NB*-V3T will provide simple closed loop feedback proportional control. This means that the actual measured performance of the control (from the measured variable input) is fed back to the controller and is compared with the effective setpoint for the loop. Any difference between the actual value of the measured variable (let's call this XX) and effective setpoint values is called error (XX – **CS**).

An analogy is helpful in explaining the effects of error. A change in the lever position on the error side produces a proportional change in the lever on the output side. Depending on the position of the fulcrum, a change on the error side will have a greater or lesser effect on the output side. The fulcrum position changes the ratio of error to output.

One problem with proportional only control is the changes in loop performance that occur when the condition being measured by the input sensor changes (e.g., the measured temperature changes when a door is opened and the room or space is flooded with cold air). As the loop environment changes, the proportional only control loop begins to cycle around an offset from the setpoint.

Properties **(I1) Interlock 1 Enable** and **(I2) Interlock 2 Enable** specify whether interlocks 1 and 2 will affect the PID loop.

The **(I3) Fan Interlock** property specifies whether the fan interlock will affect the PID loop.

The **(IC) Input Channel** specifies the input to be used for the control loop's measured variable. When **IC** =0, the control loop is disabled. A nonzero value selects one of the inputs or zone heating or zone cooling. A list of the available measured variable inputs appears in Table 3-21.

*Table 3-21 Control Loop Measured Variables Using **IC***

Value of **IC**	Measured Variable
IC = 0	disabled (default)
IC = 1	Zone Temp
IC = 2	Supply Temp
IC = 3	Pressure
IC = 4	UI1
IC = 5	UI2
IC = 6	UI3
IC = 7	UI4
IC = 8	UI5
IC = 9	Zone Heating
IC = 10	Zone Cooling
IC = 11	OAT

The **(IN) Input Value** property is read only value that displays the **present_value** of the input selected in **IC**.

The **(MR) Maximum Reset Setpoint** property specifies the maximum amount to reset the loop setpoint (**SP**) when reset is being used.

The **(P1) Interlock 1 Position** property specifies the PID output value when Interlock 1 is active and enabled (0.0-100.0%).

The **(P2) Interlock 2 Position** property specifies the PID output value when Interlock 2 is active and enabled (0.0-100.0%).

The **(P3) Fan Status Interlock Position** property specifies the PID output value when the Fan Status interlock is active and enabled (0.0-100.0%).

The **(PB) Proportional Band** property specifies the input variable range over which the output value is proportional to the error value (i.e., changes in the measured variable result in proportional changes in the output signal). The proportional band is centered around setpoint for the loop. This point is expressed in

the same kind of measurement units (engineering units) that the measured variable uses—for example: degrees, cfm, inches of WC. The data type of **PB** is the same as the data type of the selected measured variable.

To determine **PB**, first decide how closely the *NB*-V3T must control the output to the setpoint. For instance, if the setpoint is 72°F, then an acceptable control range might be within two degrees of the setpoint. This control range can be expressed as a band centered on the setpoint: from 70° to 74°F, or 4 degrees—the *proportional band* (**PB**).

The **(PO) Percent Output** property shows the output value. The value is calculated based on the error, change in error and past error for the control loop. The point is then scaled to the selected engineering units of the analog output and is stuffed into the **AO** property as well as into **present_value** of the analog output. This point can be set manually if the control loop is disabled (**CE**=0).

For normal acting control loops, **PO** is set to maximum output when the input variable equals the setpoint plus half of the proportional band (**SP** + **PB**/2). **PO** is set to minimum output when the input variable equals the setpoint minus half of the proportional band (**SP** - **PB**/2). These associations are reversed for reverse acting control loops.

The **(RC) Reset Variable Value** property displays the value of the input selected in **RV**.

The **(RL) Reset Limit** property specifies the value at which maximum reset is used. When the value of the reset variable is equal to **RL**, the maximum reset (**MR**) is used in determining the calculated setpoint.

The **(RP**) **Reset Period** property specifies the reset period (in seconds) over which the error history is accumulated. If **RP** = 10 seconds with a constant error of 2.0, then the error history would increase by 0.2 every second. In five seconds, the error history would be 1.0. At the end of ten seconds, the error history would be 2.0. Setting **RP** to 0 disables integral action. The longer **RP** is, the less effect it has on the control response. A value of 0 disables the reset period.

At the start-up of the loop or following a change in setpoint, the error is fairly large. Proportional action causes the loop output to accelerate toward the setpoint. However by the time the loop response reaches the setpoint value, it has gained inertia from the preceding proportional action. This causes the loop to overshoot the setpoint. As the loop exceeds the setpoint moving toward its first peak, the error sum is accumulating. This slows down the acceleration, eventually causing the downturn in response.

As the error falls and then drops below the setpoint, the error sum will be reduced because now the error is in the opposite direction. The cycle continues in diminishing peaks until it finally converges at the setpoint.

The proportional control action of the loop has a major effect on integral action. Increasing **PB** results in a smaller integral effect for a given value of **RP**. In general, decreasing the proportional band **PB** will increase the amount of overshoot. On the other hand, the larger **PB** is, the slower the loop response.

Several important factors may not be obvious to inexperienced users of these DDC techniques.

First, whenever the error falls outside of the proportional band—that is, ±**PB**/2 from the setpoint, two important things happen: the controller's output is fully pegged in the appropriate direction, and the error sum stops accumulating. The control produces its maximum output because it must bring the error within the proportional band again. The error sum stops accumulating so that it does not "wind up" a massive error sum that would take many control cycles to dissipate. This feature is called antireset windup.

Antireset windup also makes the loop recover quickly when it reenters the proportional band. Another feature of antireset windup is that the error history is limited to **PB**/2 because that is all that is required to produce maximum output. Additional error accumulation would only slow down loop recovery.

To quicken loop response while eliminating overshoot, derivative action must be taken. Derivative action takes into account the rate of change in error and allows the *NB*-V3T to counter the effects of the error's rate of change on the control output. To find the change in error, subtract the current error (read every second by the PID loop) from the previous second's error. A percentage of this change (specified by **RT**) becomes the derivative contribution to the PID output.

The **(RS) Reset Setpoint** property specifies the value at which the reset action begins. When the value of the reset variable exceeds **RS**, reset action will be used in determining the calculated setpoint. Just as **SP** is the proportional control setpoint for MV, **RS** is the reset control setpoint for the value of the reset variable selected by **RV**. The data type of **RS** is the same as the data type of the reset variable specified by **RV**.

The relationship between **RL** and **RS**, as well as the sign (+ or –) of **MR**, determines how changes in the reset variable **RV** affect the setpoint of the loop **SP**.

The **(RT) Rate** property specifies a percentage of change in error that is to be used in calculating **PO**. The value is specified in percent per second. The point **RT** can have any value from 0.0 to 25.5%/second.

The **(RV) Reset Variable** property specifies the input to be used for calculating the reset used by the control loop. A value of 0 disables reset. A nonzero value selects one of the inputs. The reset variable can be any one of the values specified in Table 3-22. This point provides the ability to control a loop using one input while resetting the loop using a different input.

*Table 3-22 Available Inputs for Control Loop Reset Variable **RV***

Value of **RV**	Reset Variable
RV = 0	disabled (default)
RV = 1	Zone Temp
RV = 2	Supply Temp
RV = 3	Pressure
RV = 4	UI1
RV = 5	UI2
RV = 6	UI3
RV = 7	UI4
RV = 8	UI5
RV = 11	OAT

The **(SG) Action (Normal/Reverse)** property specifies the control action for the control loop. When **SG** = 0 (normal), a positive error causes an increase in output. When **SG** = 1 (reverse), a positive error causes a decrease in output. This point determines the response of the loop output to the kind of error. If the output action is to be increased (toward max) when the error is positive (**MV** > **SP**), set **SG** to normal (0). If the output action is to be decreased (toward min) for positive error, set **SG** to reverse (1). (Property **SG** is also used during schedule control to determine whether **SU** is added to **SP** [**SG** = 0] or subtracted from **SP** [**SG** = 1] during unoccupied periods.) For more information, refer to property **SU**.

Proportional only control produces cycling, and its performance changes when the measured environment changes. The way to eliminate cycling and to compensate for load changes is to use *integral* action.

Rather than responding exclusively to the loop error from moment to moment as is the case with proportional action, integral action is based on a summation of the error that has occurred over some period. This error sum is used to reset, or modify, the response of the control loop (output) based on a running average of the error. The amount of time over which the error averaging is accumulated is called the *reset period*.

The **(SP) Loop Setpoint** property specifies the desired loop setpoint. In PID control, the setpoint is defined in **SP**. The measured input variable is the analog sensor referenced by the universal input specified in **IC**. The setpoint is expressed in the same kind of measurement units (engineering units) that the measured variable uses (e.g., degrees, cfm, inches of WC, etc.). The data type of **SP** is the same as the data type of the selected measured variable. This value is used with the unoccupied setup/setback and the reset to calculate **CS**.

The **(SU) Setup/Setback** property specifies the amount to add (if **SG**=0) or subtract (if **SG**=1) from the setpoint during an unoccupied period. The adjusted setpoint will be displayed in **CS**. The property **CS** (the effective setpoint) incorporates any setup/setback that may exist as well as any reset or setpoint adjustment from the *SBC*-STAT. The data type of the value specified in **SU** is the same as the data type of the referenced measured variable specified by **IC**.

PID Control 1-4 Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
AO	**Analog Output** shows the scaled output value used by the analog output and is a reflection of the Analog Output property present_value. This point is the Percent Output (**PO**) value scaled to **min_pres_value** and **max_pres_value** of the corresponding analog output **AO**.
CE	**Control Enable** enables the PID loop. When **CE**=0, **PO** is not updated but may be set manually. When **CE**=1, **PO** is updated by the PID control loop and, if the analog output is set to automatic control, the **AO** value will be set accordingly. 0=No 1=Yes
CS	**Control Setpoint** specifies the setpoint for the PID loop.
DB	**Deadband** specifies the deadband within the proportional control band in which the output remains constant at a point midway between maximum output and minimum output.
I1	**Interlock 1 Enable** enables/disables PID Interlock 1. 0=Disabled 1=Enabled
I2	**Interlock 2 Enable** enables/disables PID Interlock 2. 0=Disabled 1=Enabled
I3	**No Flow Interlock Enable** enables/disables the flow interlock. 0=Disabled 1=Enable

Property	Description
IC	**Input Select** specifies the input to be used for the control loop's measured variable. A value of 0 in **IC** disables the control loop. 0= disabled 1=Zone Temp 2=Supply Temp 3=Pressure 4=UI1 5=UI2 6 =UI3 7 =UI4 8=UI5 9=Zone Heating 10=Zone Cooling 11=OAT
IN	**Input Value** read only property that displays the value of the input selected in **IC**.
MR	**Maximum Reset** specifies the maximum amount needed to reset the loop setpoint (**SP**) based on when reset is being used. **CS** takes into account the use of the maximum reset specified in **MR**.
P1	**Interlock 1 Position** specifies the PID output value when Interlock 1 is active and enabled (0.0-100.0%)
P2	**Interlock 2 Position** specifies the PID output value when Interlock 2 is active and enabled (0.0-100.0%)
P3	**No Flow Interlock Position** specifies the PID output value when the FLow Interlock is active and enabled (0.0-100.0%)
PB	**Proportional Band** specifies the input variable range over which the output value is proportional to the error value (i.e., changes in the measured variable result in proportional changes in the output signal).
PO	**Percent Output** shows the output value in hundredths of a percent (e.g., 75.00%).
RC	**Reset Value** displays the value of the input selected in Reset Variable (**RV**).
RL	**Reset Limit** specifies the value at which maximum reset is used.
RP	**Reset Period** specifies the reset period (in seconds) over which the error history is accumulated.
RS	**Reset Setpoint** the reset control setpoint for the value of the reset variable selected by **RV**.

Property	Description
RT	**Rate** specifies a percentage of change in error that is to be used in calculating **PO**. The value is specified in percent per second. **RT** can have any value from 0.0 to 25.5% per second.
RV	**Reset Variable** specifies the input to be used for calculating the reset used by the control loop. 0= disabled 1=Zone Temp 2=Supply Temp 3=Pressure 4=UI1 5=UI2 6 =UI3 7 =UI4 8=UI5 11=OAT
SG	**Action** specifies the control action for the PID loop. 0=normal (positive error causes an increase in output). 1=reverse (positive error causes a decrease in output)
SP	**Loop Setpoint** specifies the desired loop setpoint.
SU	**Setup/Setback** specifies the amount to add (if **SG**=0) or subtract (if **SG**=1) from the setpoint during scheduled unoccupied periods.

3.14 OCCUPANCY DETECTION

The Occupancy Detector properties allow you to define the circumstances under which the *NB*-V3T will automatically switch to an extended occupied mode during unoccupied periods when an occupancy detector is used with the controller. The Occupancy Detection object contains the following properties: **object_identifier**, **object_name**, **object_type**, **IC**, **MD**, **MR**, **MS**, and **MT**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to.

The **(IC) Input Select** property enables choosing the input to be used for occupancy detection. A nonzero value from the chosen input indicates occupancy. A list of the possible occupancy detector inputs is given in Table 3-23.

*Table 3-23 **IC** Input Select Values*

Value of **IC**	Measured Variable
IC = 0	None (default)
IC = 1	UI1
IC = 2	UI2
IC =3	UI3
IC =4	UI4
IC =5	UI5

The **(MD) Extended Occupancy Delay** property sets the amount of time, in seconds, during which the occupancy detector must remain on before the occupancy detector will override the zone. This prevents false triggers that might occur as others pass quickly through the zone.

The **(MR) Extended Occupancy Remaining** is a read-only property which displays the time remaining for occupancy detector override.

The **(MS) Occupancy Status** property shows the status of the occupancy detector digital input. To enable occupancy detection, **MT** must be > 0 and the input used MUST be configured as digital (**ST**=0). If either of these two conditions are not met, **MS** will display 0. When **MS** indicates occupancy in the zone is detected during unoccupied periods, the occupancy input extends occupancy time by the amount specified in **MT**.

The **(MT) Extended Occupancy Duration** property defines the length of time, in minutes, that the zone will be overridden when occupancy is detected.

Occupancy Detection Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
IC	**Input Select** specifies the input to be used for occupancy detection. 0 = None 1 = UI1 2 = UI2 3 = UI3 4 = UI4 5 = UI5
MD	**Extended Occupancy Delay** sets the amount of time, in seconds, during which the occupancy detector must remain on before the occupancy detector will override the zone. This prevents false triggers that might occur as others pass quickly through the zone.
MR	**Extended Occupancy Remaining** displays the time remaining for occupancy detector override.
MS	**Occupancy Status** the status of the occupancy detector digital input. To enable occupancy detection, **MT** must be greater than 0 and the input used MUST be configured as digital (**ST**=0). If either of these two conditions are not met, **MS** will display 0. 0=No Detection 1=Detection
MT	**Extended Occupancy Duration** defines, in minutes, the length of time that the zone will be overridden whenever occupancy is detected.

3.15 PROOF OF FLOW

THe Proof of Flow object provides confirmation of fan status using a dedicated input to monitor fan function. The Proof of Flow object contains the following properties: **object_identifier**, **object_name**, **object_type**, **IC**, **PD**, and **PF**.

Property **object_identifier** is Proof Object Identifier. This property is a unique numeric code that is used to identify the object.

Property **object_name** is Name. This property is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** is Object Type. This indicates which object type class the property belongs to.

The **(IC) Input Select** property specifies the input to be used for indicating fan status. The input options for **IC** are given in Table 3-24.

Table 3-24 Proof of Flow Input Options

Value of **IC**	Input
IC = 0	None
IC = 1	UI1
IC = 2	UI2
IC = 3	UI3
IC = 4	UI4
IC = 5	UI4

The **(PD) Proof of Flow Delay** property shows the amount of time, in seconds, imposed before enabling a positive flow indication.

The **(PF) Proof of Flow Indication** property shows the status of the fan.

Proof of Flow Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
IC	**Input Select** specifies the input to be used for flow detection. 0 =None 1 = UI1 2 = UI2 3 = UI3 4 = UI4 5 = UI5
PD	**Proof of Flow Delay (seconds)** specifies the amount of time, in seconds, that must elapse before enabling a positive flow indication.
PF	**Proof of Flow Indication** displays the status of the fan.

3.16 DAMPER 0-15

The Damper objects are used to configure the individual dampers for demand polling. Each damper object corresponds to a single damper unit and reports its schedule state and demand load. The relative sensitivities for heating and cooling for each damper unit are also configured here. The Damper objects contain the following properties: **object_identifier**, **object_name**, **object_type**, **DL**, **ER**, **ID**, **OI**, **RE**, **SC**, **SH**, and **ST**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to. In this case, **object_type** is Proprietary(135).

The **(DL) Reported Demand Load** property displays the current demand load for the damper, as reported by the damper unit.

The **(ER) Extended Occupancy Remaining** property displays the current extended occupancy time remaining as reported by the damper unit.

The **(ID) Damper x Network ID** property is the Unit ID (0 - 127) number for the damper unit.

The **(OI) Zone Bypass** property specifies whether or not to poll the damper specified in **ID**. If **OI** is set to "0=Active", then the damper unit will be polled for its demand load and that demand load will be factored in to the calculation of control parameters. Setting **OI** to "1=Bypassed" excludes the damper from the demand load calculations.

The **(RE) Unreliable?** property specifies whether communications to the damper unit are reliable. If there are any communications difficulties, **RE** will be set to True and that units demand load and override status will not be taken into account when calculating control parameters on the *NB*-V3T.

The **(SC) Cooling Sensitivity** property defines the weighting factor used when the damper is calling for cooling. The *NB*-V3T multiplies the demand load by the sensitivity (**DL** x **SC**) when calculating the average demand. The default weighting factor is 1.

The **(SH) Heating Sensitivity** property defines the weighting factor used when the damper is calling for heating. The *NB*-V3T multiplies the demand load by the sensitivity (**DL** x **SH**) when calculating the average demand. The default weighting factor is 1.

The **(ST) Send Supply Temp Flag** property specifies whether the *NB*-V3T should send the supply temperature to the damper unit. If **ST** is set to "1=Yes", then the current supply temperature (Supply Temperature:**present_value**) will be written to the **present_value** of the Supply Temperature object in the damper. In the damper unit, the supply temp must be set to out of service (Supply Temperature = out_of_service = True). Failure to set this in the Damper Unit will cause the **(RE)** Unreliable? to be set to True for that damper unit

NOTE
For a damper unit to successfully receive a Supply Temperature that is sent from the NB-V3Tb, the **out_of_service** property in the Supply Temperature object in the damper unit must be set to True.

Damper 0-15 Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
DL	**Reported Demand Load** reports the current demand load for the referenced damper controller.
ER	**Extended Occupancy Remaining** reflects the extended occupancy time remaining for each damper controller
ID	**Damper *n* Network ID** (*n*=0-15) contain the unit ID (0-127) number for the damper controller
OI	**Zone Bypass** If set to Active, the defined damper controller is used in control. If set as Bypassed, the damper controller is ignored. 0=Active 1=Bypassed
RE	**Unreliable?** 0=Reliable 1=Unreliable
SC	**Cooling Sensitivity** defines a weighting factor for each damper controller when calling for cooling.
SH	**Heating Sensitivity** defines a weighting factor for each damper controller when calling for cooling.
ST	**Send Supply Temp Flag** If set to Yes (**ST**=1) the current Supply Temperature (Supply Temperature:**present_value**) will be written to the Supply Temperature object in the damper controller. Note that the Supply Temperature must be set for Override in that controller.

3.17 OUTSIDE AIR TEMP. BROADCAST

The Outside Air Temp. Broadcast object is used to enable the broadcasting of the outside air temperature and contains the following properties: **object_identifier**, **object_name**, **object_type**, **BE**, **CV**, and **RB**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to. In this case, **object_type** is Proprietary(143).

The **(BE) OAT Broadcast Enable** property enables the *NB*-V3T to broadcast its OAT value to other controllers on the network. When set to 0, **BE** is disabled. When set to 1, OAT broadcasting is enabled.

The **(CV) Current Value of Network Broadcast Value** property shows the current value of the broadcast Outside Air Temperature (OAT) received by the *NB*-V3T or the OAT being broadcast by the controller.

The **(RB) Receive Broadcast?** property enables reception of OAT broadcasts and sets **CV** based on the received value.

NOTE

You should not have both **BE** and **RB** enabled at the same time. The *NB*-V3T may either broadcast or receive the OAT values, but not both. If both are enabled at the same time, the controller will broadcast it's OAT and ignore values broadcast to it.

Outside Air Temp Broadcast Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
BE	**OAT Broadcast Enable** enables the *NB*-V3T to receive network broadcasts. 0=No 1=Yes
CV	**Current Value** shows the current value of the network broadcast OAT values received or broadcast by the *NB*-V3T
RB	**Receive Broadcasts?** enables reception of OAT broadcasts and sets **CV** based on the received value. 0=No 1=Yes

3.18 BROADCAST SCHEDULE

The Broadcast Schedule properties allow the *NB*-V3T to receive network schedule information. The Broadcast Schedule object contains the following properties: **object_identifier**, **object_name**, **object_type**, **CV**, and **RB**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to.

The **(CV**) **Current Value of Network Broadcast Value** property shows the current value of the network schedule received by the *NB*-V3T. When **RB** is enabled, **CV** is forced into the Main Schedule property **CV** and is used as the functioning schedule value of the *NB*-V3T.

The **(RB) Receive Broadcasts?** property enables the *NB*-V3T to receive network broadcasts and sets **CV** value based on the received value. If **RB** = 0, then receive broadcast is disabled. If **RB** = 1, then the *NB*-V3T receives the network value and places it in **CV** and in the Schedule:**present_value** property, overriding the schedules of the *NB*-V3T.

Broadcast Schedule Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
CV	**Current Value** shows the current value of the network broadcast schedule values received by the *NB*-V3T
RB	**Receive Broadcasts?** Enables the *NB*-V3T to receive network broadcasts and sets **the** Schedule:**present_value** based on the received value. 0=No 1=Yes

SECTION 4: NB-V3Td OBJECTS & PROPERTIES

IN THIS SECTION

4.1 DEVICE

The Device object is used to control and configure a number of general controller features of the *NB*-V3T. This is the place where the controller manufacturer, controller type, serial number and unit ID number can be found. It is also where the firmware version and type along with the flash release code and the flash update count are located. The Device object contains the following properties: **object_identifier**, **object_name**, **object_type**, **system_status**, **vendor_name**, **vendor_identifier**, **model_name**, **firmware_version**, **application_software_version**, **protocol_version**, **protocol_revision**, **protocol_services_supported**, **protocol_object_types_supported**, **object_list**, **max_apdu_length_accepted**, **segmentation_supported**, **local_time**, **local_date**, **database_revision**, **apdu_segment_timeout**, **apdu_timeout**, **number_of_apdu_retries**, **time_synchronization_recipients**, **max_master**, **max_info_frames**, **device_address_binding**, **CC**, **CM**, **CP**, **CT**, **DE**, **EM**, **FT**, **IC**, **ID**, **MS**, **OC**, **OS**, **PD**, **PS**, **RC**, **RS**, **SN**, **SR**, **UP**, **VE**, **WC**, **ZN**, and **ZP**.

The **object_identifier** is a unique numeric code used to identify the object and holds the BACnet device instance, which defaults to the device's serial number.

The **object_name** is a unique name within the BACnet device that maintains it.

The **object_type** indicates the object type class. The **object_type** is Device (8).

The **system_status** indicates the current physical and logical status of the BACnet Device. The different statuses are:

. Operational
. Operational_Read_Only
. Download_Required
. Download_In_Progress
. Non_Operational.

The **vendor_name** property lists the manufacturer of the BACnet Device. All AAM devices will have a **vendor_name** of "American Auto-Matrix".

The **vendor_identifier** is a unique ID for each vendor and is assigned by ASHRAE. The **vendor_identifier** for American Auto-Matrix is 6.

The **model_name** property is the name of the controller. Each manufacturer assigns a model name of the BACnet device. The model name of the *NB*-V3Td is "NB-V3T Damper".

The **firmware_version** indicates which firmware revision code is currently installed in the BACnet device.

The **application_software_version** is the version of application software installed in the machine.

The **protocol_version** property displays the version of BACnet that is supported by the specific BACnet device.

The **protocol_revision** property displays the minor revision level of BACnet that is supported by the specific BACnet device.

The **protocol_services_supported** property indicates which standardized protocol services are supported by this device's protocol implementation. The device supports the following services:

. getAlarmSummary
. readProperty

. writeProperty
. deviceCommunicationControl
. reinitalizeDevice
. i-Am
. i-Have
. unconfirmedPrivateTransfer
. timeSynchronization
. who-Has
. who-Is.

The **protocol_object_types_supported** property indicates if the device supports standard or non-standard object types other than those in the protocol conformance class. The device supports the following object types:
. Analog Input
. Analog Output
. Analog Value
. Binary Output
. Calendar
. Device
. Schedule.

The **object_list** property is a list of **object_identifiers**. There is one **object_identifier** for each object within the device.

The **max_apdu_length_supported** property is a maximum number of octets that can be contained in a single application layer protocol data unit. The default is 50.

The **segmentation_supported** property indicates whether or not the BACnet device supports segmentation of messages.

The **local_time** property indicates the time of day. The time can be set through the Time Synchronization service. If you are using a Real-time Clock module, the *NB*-V3T will maintain the current time upon power failure.

The **local_date** property indicates the current date. The date can be set through the Time Synchronization service. If you are using a Real-time Clock module, the *NB*-V3T will maintain the current date upon power failure.

The **apdu_segment_timeout** property indicates the amount of time, in milliseconds, between retransmissions of an APDU segment. The default is 300 milliseconds.

The **apdu_timeout** property indicates the amount of time, in milliseconds, between retransmission of an APDU. The default is 300 milliseconds.

The **number_of_APDU_retries** property allows you to enter the maximum number of times an APDU should be retransmitted. The default is 1. If you do not want to perform retries, set this property to 0.

The **time_synchronization_recipients** property is a list of devices that should receive Time Sync requests. If there are no recipients in the list, a Time Sync is not sent out.

The **max_master** property is active when a device is a master node on an MS/TP network. The value of this property should be the highest possible address for master nodes and must be less than or equal to 127. The default is 127.

The **max_info_frames** property is used if the device is a node on the MS/TP network. It specifies the maximum number of information frames the node may send before it must pass the token. The default is 4.

The **device_address_binding** property is the device address. The *NB*-V3T does not store a device list. When other devices try to read this property, null is returned.

The **(CC) Count of Clock Fails** increments upon hardware failure but can also be advanced during the removal of power.

The **(CM) Controller Manufacturer Code** property is the manufacturer code for the device. For American Auto-Matrix products, the number is 255. This property is read-only. It is useful when host systems are connected to networks with unitary controllers from different manufacturers. Flash updates are rejected if **CM** is not 255.

The **(CP) Network Baud Rate** property sets the communications speed for the controller.

*Table 4-1 **CP** Values for Network Baud Rate*

Value of **CP**	baud
AS = 0	9600
AS = 6	38.4k
AS = 7	19.2k
AS = 9	57.6k

The **(CT) Controller Type** property identifies the type of device. An *NB*-V3Td is type 203. This property is read-only, and its value is established at the American Auto-Matrix factory. Flash updates for the *NB*-V3Td are rejected if **CT** is not 203.

The **(DE) Default Enable Command** property restores configuration settings to factory defaults. To set the defaults, enter a value of 197 (a value that is unlikely to occur randomly). It may take several seconds to complete the reset. Note that this will not alter the unit **ID** or selected communications baud rate.

The **(EM) English/Metric** property specifies the type of engineering units (U.S./English or Metric) to be used for temperatures. If **EM** is set to 0, degrees are specified in Fahrenheit. If **EM** is set to 1, degrees are specified in Celsius. A change in this property automatically converts setpoints to the appropriate units. The display mode for digital thermostats also changes but can be set separately. English (**EM** = 0) is the default setting.

NOTE
If the value of **EM** changes, make sure any properties set prior to the change have been recalculated and reprogrammed to reflect the **EM** type chosen. Then reset the *NB*-V3T. Failure to correct these entries will result in display and calculating errors.

The **(FT) Firmware Type** property defines the class of firmware operating system used in this controller. This property is read-only.

The **(IC) EEPROM Default Count** is a counter which increments whenever the EEPROM is restored to factory default settings (see Device:**(DE) Default Enable** for more on restoring the controller to factory defaults).

The **(ID) Unit ID** property is used to set a unique network address for each controller connected on a multidrop. Each **ID** is factory set to the last two digits of the board serial number. Valid values are 0 to 127. For example, if the serial number is 100072, the Unit ID is 72. If the serial number is 498765, the Unit ID is 65.

The **(MS) Master/Slave Mode** property determines whether the controller will behave as a Master or Slave device on the network. By default, the controller is configured as a Master device. Setting **MS** to "1=Slave" will cause the controller to act as a Slave device. Slave devices will receive time syncs and broadcasts but will never be passed the token. This means that the slave device may never send a broadcast and cannot respond to BACnet services such as WhoIs, WhoHas, etc.

NOTE
Slave devices should have their IDs set to values greater than 127 as per the BACnet standard.

NOTE
Configuring a controller as a Slave device can reduce the overall amount of network communications on your BACnet network, potentially improving communications performance.

The **(OC) Count of Illegal Opcodes** property is a counter which increments upon firmware failure but can also be advanced during the removal of power.

The **(OS) Kernel Version** property displays the version number of the kernel firmware in the controller. This property is read-only.

The **(PD) Power-On Delay** property determines how long, in seconds (0–255), an *NB*-V3T waits before energizing its outputs after a power loss or soft reset. During this time, all output control and alarm functions stop after cycling of power or *NB*-V3T reset. This property defaults to a value of 5. Any setting ≤ 2 seconds will receive a value of 2 seconds.

The **(PS) Power-Up State** property determines which schedule state the *NB*-V3T uses after a power loss and before its time is synchronized.

*Table 4-2 **PS** Values for Power-up State*

Value of **PS**	State
PS = 0	unoccupied
PS = 1	warm-up
PS = 2	occupied (default)
PS = 3	night setback

NOTE

You can also set the time through the optional Real-time Clock module. Manual time setting is also possible.

The **(RC) Count of Resets** property is a counter which increments each time power is applied to the controller. This counts power outages and noise related resets as well as resets initiated through the Reset property (**RS**).

The **(RS) Reset** property allows a host or operator to reset the controller by giving **RS** a value of 1, after which **RS** returns to 0 (the default).

The **(SN) Serial Number** property displays the serial number of the *NB*-V3T controller. This property is read-only.

The **(SR) Software Time Stamp** property uniquely defines each flash firmware image. You can access updated firmware images through *NB*-Pro. The numerically higher the firmware image, the more recent it is. We recommend that all controllers be updated periodically to use the latest available firmware. This property is read-only.

The **(UP) Flash Update Count** property is a counter which increments each time a new flash firmware image is accepted by the controller.

The **(VE) Software Version** property indicates the version number of the active firmware.

The **(WC) Count of Watchdog Cop** property is a counter which increments upon firmware failure but can also be advanced during the removal of power.

The **(ZN) Zone Number** property is a number (from 0 to 65,535) which is used to group controllers together so that they can be addressed as a logical group. For example, you can set a group of controllers to enter Warm-Up Mode all at the same time. This property defaults to 0.

The **(ZP) Count of High Current Pulses** property is a counter which advances when Motor Management Technology (MMT) takes action to maintain the operation of the actuator. When several counts are tallied over a period of a few days, the actuator is reaching its end of life. Low level count activity is normal.

Device Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
system_status	indicates the current physical and logical status of the BACnet Device.
vendor_name	identifies the manufacturer of the BACnet Device.
vendor_ identifier	a unique vendor identification code, assigned by ASHRAE, which is used to distinguish proprietary extensions to the protocol.
model_name	indicates the vendor's name used to represent the model of the device.
firmware_ revision	indicates the level of firmware installed in the device.
application_ software_ version	identifies the version of application software installed in the device.
protocol_ version	indicates the version of the BACnet protocol supported by this BACnet Device.
protocol_ revision	indicates the minor revision level of the BACnet standard.
protocol_ services_ supported	indicates which standardized protocol services are supported by this device's protocol implementation.
protocol_ object_ types_ supported	indicates which standardized object types are supported by this device's protocol implementation.
object_list	a list of each object within the device that is accessible through BACnet services.
max_apdu_ length_ accepted	specifies the maximum number of information frames the node may send before it must pass the token.
segmentation_ supported	indicates whether the device supports segmentation of messages and, if so, whether it supports segmented transmission, reception, or both.
local_time	indicates the time of day to the best of the device's knowledge.
local_date	indicates the date to the best of the device's knowledge.

Property	Description
database_ revision	
apdu_timeout	indicates the amount of time, in milliseconds, between retransmissions of an APDU requiring acknowledgment for which no acknowledgment has been received.
number_of_ apdu_retries	indicates the maximum number of times that an APDU shall be retransmitted.
time_ synchronization _recipients	a list of devices to which the device may automatically send a TimeSynchronization request.
max_master	specifies the highest possible address for master nodes and shall be less than or equal to 127.
max_info_ frames	specifies the maximum number of information frames the node may send before it must pass the token.
device_ address_ binding	a list of the device addresses that will be used when the remote device must be accessed via a BACnet service request.
CC	**Count of Clock Fails** increments upon hardware failure but can also be advanced during the removal of power.
CM	**Controller Manufacturer Code**
CP	**Network Baud Rate** 0=9600 6=38.4K 7=19.2K 9=57.6K
CT	**Controller Type** factory-set controller type identifies the type of unitary controller. **CT** for the *NB*-V3T is XX.
DE	**Default Enable Command** restores configuration settings to factory defaults. Enter 197 to set the defaults.
EM	**English/Metric** specifies which units of measurement to use in returning temperature values. 0 = English 1 = Metric Units
FT	**Firmware Type** defines the class of firmware operating system used in this controller.
IC	**EEPROM Default Count** increments whenever the EEPROM is restored to factory default settings

Property	Description
ID	**Unit ID** This value is used to set a unique network address for each controller connected on a multidrop. Each ID is factory set to the last two digits of the board serial number.
MS	**Master/Slave Mode** used to select a mode for the controller with 0=Master (default) 1=Slave
OC	**Count of Illegal Opcodes** increments upon firmware failure but can also be advanced during the removal of power.
OS	**Kernel Version**
PD	**Power-on Delay** determines how long the *NB*-V3T waits before energizing its outputs after power loss or soft reset. **PD** defaults to 5 seconds.
PS	**Power-up State** determines which schedule state to use after a power loss and before time sync. 0=unoccupied 1=warmup 2=occupied 3=night setback
RC	**Count of Resets** increments each time power is applied to the controller.
RS	**Reset** allows a host or operator to reset the controller by setting RS = 1. 0 = disabled (default), 1 = reset controller
SN	**Serial Number** displays the serial number of the *NB*-V3T controller
SR	**Software Time Stamp** uniquely defines each flash firmware image. The numerically higher the firmware image, the more recent it is.
UP	**Flash Update Count** increments each time a new flash firmware image is accepted by the controller.
VE	**Software Version** contains the version number of the active firmware.
WC	**Count of Watchdog Cop** increments upon firmware failure but can also be advanced during the removal of power.
ZN	**Zone Number** used to group controllers together so that they can be controlled simultaneously.

Property	Description
ZP	**Count of High Current Pulses** advances when MMT takes action to maintain the operation of the actuator. The activity on this count should be low. If it is high, the actuator is reaching the end of its life.

4.2 ZONE TEMPERATURE

The Zone Temperature object includes the configuration information for zone temperature measurement and control. Thermostat readings and configuration information is included as well as alarming options are found in this object. The Zone Temperature object contains the following properties: **object_identifier**, **object_name**, **object_type**, **present_value**, **status_flags**, **event_state**, **out_of_service**, **units**, **high_limit**, **low_limit**, **deadband**, **AE**, **AS**, **BM**, **BT**, **CC**, **CH**, **DF**, **DL**, **DM**, **DS**, **DV**, **ED**, **ER**, **G0**, **G1**, **G2**, **G3**, **OF**, **PB**, **PG**, **PI**, **PS**, **PU**, **RM**, **SE**, **SU**, **T0**, **T1**, **T2**, **T3**, **TM**, **TP**, **TR**, **TS**, **TT**, and **ZS**.

Property **object_identifier** is a unique numeric code that is used to identify the object. This property is read-only.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters. This property is read-only.

Property **object_type** indicates which object type class the property belongs to. In this case, Object_Type is Analog Input.

Property **present_value** indicates the current value of the input being measured. It is represented in engineering units.

Property **status_flags** uses four flags to indicate the state of the analog input. The four flags are:

. In_Alarm
. Fault
. Overridden
. Out_Of_Service.

Property **event_state** indicates whether or not the object has an active event state associated with it.

Property **out_of_service** can be set to True or False. If it is True, the **present_value** will not track changes to the physical input. Also, when this property is true, the **present_value** can be changed to create specific conditions for testing purposes.

Property **units** property indicates the measurement units of this object.

Property **high_limit** is a limit by which the **present_value** must exceed before an event is generated.

Property **low_limit** is a limit by which the **present_value** must fall below before an event is generated.

The **deadband** property is the amount by which the **present_value** must be below the **high_limit** or above the **low_limit** for a return-to-normal event to be generated.

The **(AE) Alarm Enable** property specifies the type of alarm checking to be done on the present_value. A value of 0 indicates that alarming is disabled; a nonzero number indicates one of several alarm functions. Table 4-3 defines alarm options for **AE**.

To demonstrate how limit alarming operates, let the High Alarm Limit (**high_limit**) = 80.5°F while alarming is enabled for high limit alarming (**AE** = 5). Then the zone temperature changes from 72.0°F to 83.0°F because someone opened an outside door in the summertime. A high limit alarm is generated because 83.0°F > **high_limit**. This causes the alarm status property (**AS**) to equal 6 (high limit alarm). Once the

zone temperature drops below **high_limit** and the offset defined by **deadband**, the alarm state returns to normal (**AS** = 0).

*Table 4-3 **AE** Alarm Enable Options*

Value of **AE**	Alarm Type Enabled
AE = 0	disabled
AE = 4	low limit alarm
AE = 5	high limit alarm
AE = 6	low and high limit

The **(AS) Alarm Status** property displays the current alarm condition. A value of 0 indicates a normal condition; a nonzero number indicates alarm generation. Table 4-4 explains the status for each value.

*Table 4-4 **AS** Values for Alarm Status*

Value of **AS**	Alarm Condition
AS = 0	normal (no alarm)
AS = 5	low limit alarm
AS = 6	high limit alarm

The **(BM) SSB Bus Mode** property specifies whether the *NB*-V3T will behave as a master or slave on the SSB bus. By default this should be set to “0=Master Bus Mode” unless multiple controllers are wired onto a single Sensor Bus (SSB). All additional controllers on the SSB must be configured as Slaves (**BM**=”1=Slave Bus Mode”). Masters control and communicate with digital thermostats. Slaves receive their information from the Master unit. Slaves receive the following Zone Temperature property values from the master: **present_value**, **(TS) Setpoint Offset**, **(TR) User Adjust Remaining**, and **(ER) Extended Occupancy Remaining**.

The **BT Application (Box Type)** property determines how the NB-V3T will control temperature.

*Table 4-5 **BT** Values for Application (Box Type)*

Value of **BT**	Box Type
BT = 0	CAV
BT = 1	cooling only

*Table 4-5 **BT** Values for Application (Box Type)*

Value of **BT**	Box Type
BT = 2	heating only
BT = 3	supply dependent

The supply dependant setting requires source/duct air temperature and automatically selects cooling and heating modes as required.

The **(CC) Current Cooling Setpoint** property displays the current cooling temperature control setpoint, including setbacks and user adjustments. This property mirrors the value of the Cool Setpoint:**present_value** property. This property is read-only.

The **(CH) Current Heating Setpoint** property displays the current heating temperature control setpoint, including setbacks and user adjustments. This property mirrors the value of the Heat Setpoint:**present_value** property.The point is read-only.

The **(DF) Thermostat Display Format** property defines the format used to display the current temperature on the digital thermostat. The display of the tenths digit and the Fahrenheit/Celsius character are options. Also, the display may be eliminated. Table 4-6 display the options for **DF**.

*Table 4-6 **DF** Values for Display Format*

Value of **DF**	Display Format
DF = 0	##d
DF = 1	##.#d
DF = 2	##dF
DF= 3	##.#dF
DF = 4	None

The **(DL) Total Zone Demand Load** property indicates the heating/cooling demand in terms of temperature separation from setpoints. A cooling demand will be indicated by a negative value and a heating demand by a positive value. If the zone is satisfied, then the **DL** will be 0.

The **(DM) Demand Mode Cool/Heat/Vent** property indicates the demand for the zone. A satisfied zone will indicate “vent.” If the *NB*-V3T is in cooling mode and the zone temperature exceeds the cooling

setpoint, “cool” is indicated. If the controller is in heating mode and the zone temperature falls below the heating setpoint, “heat” is indicated. Table 4-7 display the options for **DM**.

*Table 4-7 **DM** Values for Zone Demand*

Value of **DM**	Zone Demand
DM = 0	Vent
DM = 1	Cool
DM = 2	Heat

The **(DS) Thermostat Display Mode** property specifies whether the digital thermostat display on the *SBC*-STAT3 is shown using Fahrenheit or Celsius. This mode is automatically altered as appropriate when the Device:**(EM) English/Metric** property is set but may be modified later if required to display the alternate units.

The **(DV) Thermostat Display Value** property specifies what value to display when multiple Stats are connected to the controller. By default (**DV**=0) each digital thermostat will display the identical temperature value, which is the average of all readings. With **DV**=1 each thermostat will display its own temperature (including any offset).

The **(ED) Extended Occupancy Time** property specifies the amount of time (in minutes) to extend occupancy.

The **(ER) Extended Occupancy Remaining** property displays the amount of time remaining in extended occupancy. This value is set to the Extended Occupancy Duration (**ED**) when either push-button on an *SBC*-STAT2 is pressed. The *SBC*-STAT3 digital thermostat employs its User Menu for this function. The point **ER** is a read-only property that cannot be changed directly.

NOTE

Properties **ED** and **ER** will override the power-up default schedule mode.

Properties **(G0) Global ID for Device** through **(G3) are Global ID for Device** display the Global Identification for the Sensor Bus device 0 through device 3 respectively.

The **(OF) Temperature Adjustment** property defines an optional correction to the temperature reading that may be required as an adjustment for the thermostat location and any possible measurement errors.

The **(PB) Balance P.I.N.** property specifies the Personal Identification Number which controls access to the Balance Menu. A value of 0 makes the menu always accessible. Values inclusively from 0001 to 9999 are used to control access to the menu. A matching number must be entered by the Balancer. Values of 10,000 or greater will hide the menu. Entered P.I.N. numbers remain valid for only a short time after their use.

The **(PG) Primary GID** property specifies the GID of the Primary *SBC*-STAT in Primary GID mode Reading Mode (**RM**=8). If this *SBC*-STAT is not available then the Average temperature mode (**RM**=0) is used.

The **(PI) Installer P.I.N.** property is the Personal Identification Number which controls access to all menus. A value of 0 makes all of the menus always accessible. Values inclusively from 0001 to 9999 are used to control access. A matching number must be entered by the Installer. Values of 10,000 or greater will hide the Install Menu. An authenticated Installer can access all menus. Entered P.I.N.s remain valid for only four minutes after the last button press.

The **(PO) Present Occupancy Status** provides feedback on the current schedule status based on any host or occupancy overrides.

The **(PS) Service P.I.N.** property is the Personal Identification Number which controls access to the Service Menu. A value of 0 makes the menu always accessible. Values inclusively from 0001 to 9999 are used to control access to the menu. A matching number must be entered by the Servicer. Values of 10,000 or greater will hide the menu. Entered P.I.N.s remain valid for only a short time after their use.

The **(PU) User P.I.N.** property is the Personal Identification Number which controls access to the User Menu. A value of 0 makes the menu always accessible. Values from 0001 to 9999 inclusive are used to control access to the menu. A matching number must be entered by the User. Values of 10,000 or greater will hide the menu. Entered P.I.N.s remain valid for only a short time after their use.

The **(RM) Reading Mode** property specifies the technique used to determine Zone Temperature when multiple *SBC*-STATs are used. The default is Average mode (**RM**=0). Highest (**RM**=1) and Lowest (**RM**=2) modes set the Zone Temperature appropriately. The Hi/Lo VST mode (**RM**=3) selects either the highest or lowest temperature depending on the supply mode. The highest temperature is used in cooling modes. The lowest temperature in heating modes.

A specific *SBC*-STAT may be selected by device position 0-3 (**RM**=4-7). Note that while the *SBC*-STATs appear in device positions consistently, the order may change when *SBC*-STATs are added, removed, or replaced. To specify a unique *SBC*-STAT by its GID, select the Primary GID mode (**RM**=8).

When a single *SBC*-STAT is present, its temperature is used even if RM has a different setting. If a specified *SBC*-STAT is absent, the Average mode (**RM**=0) is used.

Property **SD** is Calculated Setpoint Display. It specifies the method of setpoint display shown on an SBC-STAT3 LCD when a user changes the zone setpoint. A value of 0 will display the current offset (e.g. +/-2.5). A value of 1 will display the Zone Midpoint (Property **ZS**). A value of 2 will display the Heating Setpoint (Property **CH**). A value of 3 will display the Cooling Setpoint (Property **CC**).

The **(SE) Override Enabled/Disabled** property enables or disables the user's ability to enter extended occupancy override.

The **(SU) Alarm Setup/Setback Value** property specifies the amount added to **high_limit** or subtracted from **low_limit** during unoccupied periods. This property shifts the points at which alarms and alarm returns are generated.

Properties **(T0) Thermostat Reading** through **(T3) Thermostat Reading** display the raw (without offset) reading for Device 0 through Device 3 respectively.

The **(TM) Offset Increment** property specifies the magnitude of incremental changes to the User Setpoint Offset (**TS**). The User Adjust Position (**TP**) is multiplied by **TM** to determine the User Setpoint Offset (**TS**) value. If the User Adjust Increment is 0, you will not be able to alter the setpoint.

The **(TP) User Adjust Position** property can be raised or lowered in integral steps. This property tracks the current step. It can be set to any signed integer but will be constrained to +/–2 when adjusted by an analog thermostat or to +/–5 when set through a digital thermostat. The point is used in combination with the User Adjust Increment (**TM**) to calculate the User Setpoint Offset.

The **(TR) User Adjust Remaining** property displays the time remaining before the Setpoint Offset (**TS**) setting is reset.

During scheduled unoccupied periods, control loop setpoints and analog input alarm limits may be set up or set back to create a wider control range or deadband in the interest of conserving energy. The occupancy override feature of the *NB*-V3T allows the control loop setpoints and analog input alarm limits to use their normal, non-setup, non-setback, occupied mode values through the *SBC*-STAT override feature. For more information, see the SBC-*STAT User Manual*.

During a scheduled unoccupied mode, you can manually override the scheduled state to occupied mode through the *SBC*-STAT; the setpoints are no longer set up or set back. The Override feature puts the selected schedules into a temporary occupied mode.

The **(TS) Setpoint Offset** property defines an offset for application to setpoints. This point shows the current value calculated when you multiply the User Adjust Position (**TM**) by the User Adjust Increment (**TP**). This setting is temporary and is valid only for the User Adjust Duration (**TT**) minutes unless **TT** = 0.

NOTE
You cannot set property **TS** with the *SBC*-STAT1.

The **(TT) User Adjust Duration** property defines, in minutes, the duration for which the User Setpoint Offset (**TS**) setting applies. After that time, the User Adjust Position and User Adjust Offset are reset to 0 degrees. If the **TT** is 0, then setpoint changes remain in effect until modified.

The **(ZS) Heating/Cooling Setpoint** property displays the midpoint between the current cooling and heating setpoints. This property reflects changes in both setpoints. A change in **ZS** results in the appropriate shift of both the cooling and heating setpoint maintaining the effective deadband.

Zone Temperature Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
status_flags	four flags that indicate the general "health" of the object.
event_state	provides a way to determine if this object has an active event state associated with it.
out_of_service	indicates whether or not the process this object represents is not in service.
units	indicates the measurement units of this object.
high_limit	specifies a limit that the **present_value** must exceed before an event is generated.
low_limit	specifies a limit below which the **present_value** must fall before an event is generated.
deadband	specifies a range between the **high_limit** and **low_limit** properties within which the **present_value** must remain for a TO-NORMAL event to be generated
AE	**Alarm Enable** specifies the type of alarm checking to be done on the **present_value**. 0=disabled 4=low limit alarm 5=high limit alarm 6=low and high limit
AS	**Alarm Status** shows the current alarm condition. A value of 0 indicates a normal condition; a nonzero number indicates alarm generation. 0=No alarm (Default) 5=Low limit alarm 6=high limit alarm
BM	**SSB Bus Mode** determines how the controller will behave when multiple controllers are wired onto a SSB. 0=Master (default) 1=Slave
BT	**Application** 0 = CAV 1 = cooling only 2 = heating only 3 = supply dependant

Property	Description
CC	**Current Cooling Setpoint** current cooling temperature control setpoint including setback and user adjustments
CH	**Current Heating Setpoint** current heating temperature control setpoint including setbacks and user adjustments.
DF	**Thermostat Display Format** defines the format used to display the current temperature on the digital thermostat. 0=##d 1=##.#d 2=##dF 3=##.#dF 4=None
DL	**Total Zone Demand Load** indicates the heating/cooling demand in terms of temperature separation from setpoints. A cooling demand will be indicated by a negative value and a heating demand by a positive value. If the zone is satisfied, then **DL** will be 0.
DM	**Demand Mode Cool/Heat/Vent** indicates the demand for the zone. A satisfied zone will indicate “vent” (**DM**=0). If the *NB*-V3T is in cooling mode and the zone temperature exceeds the cooling setpoint, “cool” is indicated (**DM**=1). If the controller is in heating mode and the zone temperature falls below the heating setpoint, “heat” is indicated (**DM**=2). 0=Vent 1=Cool 2=Heat
DS	**Thermostat Display Mode** specifies whether English or Metric units are to be used for digital thermostat display on the *SBC*-STAT3. 0=°F (default) 1=°C
DV	**Thermostat Display Value** determines whether each digital thermostat will display the identical temperature value which will be the average of all readings or if each thermostat will display its own temperature (including offset). 0=Display Average 1=Individual Temperature
ED	**Extended Occupancy Time** specifies the amount of time in minutes to extend occupancy. **ED** has a default value of 60.
ER	**Extended Occupancy Remaining** shows the amount of time remaining in extended occupancy.
G0	**Global ID for Device** the Global Identification for the first Sensor Bus device.

Property	Description
G1	**Global ID for Device** the Global Identification for the second Sensor Bus device.
G2	**Global ID for Device** the Global Identification for the third Sensor Bus device.
G3	**Global ID for Device** the Global Identification for the fourth Sensor Bus device.
OF	**Temperature Adjustment** defines an optional correction that may be required as an adjustment for the thermostat location and the possible measurement errors.
PB	**Balance P.I.N.** this Personal Identification Number controls access to the Balance Menu. A value of 0 makes the menu always accessible. 0000-9999
PG	**Primary STAT Bus GID** specifies the GID of the Primary thermostat in Primary GID mode (**RM**=8). If this thermostat is not available, then the Average temperature mode (**RM**=0) is used.
PI	**Installer P.I.N.** this Personal Identification Number controls access to all menus. A value of 0 makes the menu always accessible. 0000-9999
PO	**Present Occupancy Status** specifies the current occupancy state based on any host or occupancy overrides.
PS	**Service P.I.N.** this Personal Identification Number controls access to the Service Menu. A value of 0 makes the menu always accessible. 0000-9999
PU	**User P.I.N.** this Personal Identification Number controls access to the User Menu. A value of 0 makes the menu always accessible. 0000-9999
RM	**Reading Mode** specifies the interval period of delay when switching from heating to cooling. 0=Average 1=Highest 2=Lowest 3=Hi/Lo VST 4=Device 0 5=Device 1 6=Device 2 7=Device3 8=Primary GID

Property	Description
SD	**Calculated Setpoint Display** specifies what method is used to display setpoint adjustments on an SBC-STAT3 LCD screen. 0 = Disable (+/-2.5) 1 = Zone Midpoint (Zone Temperature: **(ZS) Zone Midpoint**) 2 = Heating Setpoint (Zone Temperature: **(CH) Heating Setpoint**) 3 - Cooling Setpoint (Zone Temperature: **(CC) Cooling Setpoint**)
SE	**Override Disabled/ Enabled** enables or disables the user's ability to enter extended occupancy override. 0 = disabled 1 = enabled
SU	**Alarm Setup/Setback Value** specifies the amount added to **high_limit** or subtracted from **low_limit** during unoccupied periods. This property effectively shifts the points at which alarms and alarm returns are generated.
T0	**Thermostat Reading** raw reading for Device 0.
T1	**Thermostat Reading** raw reading for Device 1.
T2	**Thermostat Reading** raw reading for Device 2.
T3	**Thermostat Reading** raw reading for Device 3.
TM	**Offset Increment** specifies the magnitude of incremental changes to the User Setpoint Offset (**TS**). The User Adjust Position (**TP**) is multiplied by **TM** to determine the User Setpoint Offset (**TS**) value. If the User Adjust Increment is 0, you will not be able to alter the setpoint.
TP	**User Adjust Position** the User Setpoint Offset (**TS**) can be raised or lowered in integral steps. This property tracks the current step. It can be set to any signed integer but will be constrained to +/–2 when adjusted by an analog thermostat or to +/–5 when set through a digital thermostat. The point is used in combination with the User Adjust Increment (**TM**) to calculate the User Setpoint Offset.
TR	**User Adjust Remaining** displays the time remaining before the Setpoint Offset (**TS**) setting is reset.
TS	**Setpoint Offset** defines an offset for application to PID setpoints. This point shows the current value calculated when you multiply the User Adjust Position (**TM**) by the User Adjust Increment (**TP**). This setting is temporary and is valid only for **TT** minutes unless **TT=**0.

Property	Description
TT	**User Adjust Duration** the User Setpoint Offset (**TS**) is a temporary setting. The **TT** property defines in minutes the duration for which the setting applies. After that time, the User Adjust Position and User Adjust Offset are reset to 0 degrees. If the User Adjust Duration is 0, then setpoint changes remain in effect until modified. The default value for **TT** is 120.
ZS	**Heating/Cooling Setpoint** displays the midpoint between the current cooling and heating setpoints. This property reflects changes in both setpoints. A change in **ZS** results in the appropriate shift of both the cooling and heating setpoint maintaining the effective deadband.

4.3 UI01

The Universal Input can be used as the referenced input for PID analog control, duct temperature input, as a proof of flow input, as an analog control PID input, or as a digital occupancy detection input of the *NB*-V3T. Configured as a digital input, the Universal Input can be used as a proof of flow input safeguarding electric reheats when air flow is not present. When used as the occupancy detection sensor input, the Universal Input is dedicated to the *NB*-V3T occupancy detection feature—allowing for automatic unoccupied override. This sends the *NB*-V3T into an occupied mode of operation when occupancy is detected in the control area. Each use precludes the use of the input for other functions. The Universal Inputs objects contain the following properties: **object_identifier**, **object_name**, **object_type**, **present_value**, **status_flags**, **event_state**, **reliability**, **out_of_service**, **units**, **min_pres_value**, **max_pres_value**, **high_limit**, **low_limit**, **deadband**, **AE**, **AS**, **DT**, **IF**, **IP**, **OF**, **ST**, and **SU**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to. In this case, object_type is Analog Input.

Property **present_value** indicates the current value of the input being measured. It is represented in engineering units.

Property **status_flags** uses four flags to indicate the state of the analog input. The four flags are:

. In_Alarm
. Fault
. Overridden
. Out_Of_Service.

Property **event_state** determines whether or not the object has an active event state associated with it.

Property **reliability** gives the reliability of the present value or operation. The different results are:
. No_Fault_Detected
. No_Sensor
. Over_Range
. Under_Range
. Open_Loop
. Shorted_Loop
. Unreliable_Other.

Property **out_of_service** can be set to True or False. When this property is True, the **present_value** will not track changes to the physical input. Also, when this property is true, the **present_value** can be changed to create specific conditions for testing purposes.

Property **units** indicates the measurement units used by the object.

Property **min_pres_value** is the lowest number that can be reliably obtained for the **present_value** of the object.

Property **max_pres_value** is the highest number that can be reliably obtained for the **present_value** of the object.

Property **high_limit** is a limit by which the **present_value** must exceed before an event is generated.

Property **low_limit** is a limit by which the **present_value** must fall below before an event is generated.

Property **deadband** is the amount by which the **present_value** must be below the **high_limit** or above the **low_limit** for a return-to-normal event to be generated.

The **(AE) Alarm Enable** property specifies the type of alarm checking to be done on the **present_value**. A value of 0 indicates that alarming is disabled; a nonzero value selects one of several alarm functions. Table 4-8 lists the options for **AE**.

Table 4-8 Alarm Enable Options

Value of **AE**	Alarm Type Enabled
AE = 0	disabled
AE = 1	contact, 0→1
AE = 2	contact, 1→0
AE = 3	change of state, 1↔0
AE = 4	low limit alarm
AE = 5	high limit alarm
AE = 6	low and high limit

The **(AS) Alarm Status** property shows the current alarm condition. A value of 0 indicates a normal condition. A nonzero number indicates alarm generation. Table 4-9 explains each status.

Table 4-9 Values for Alarm Status Property

Value of **AS**	Alarm Condition
AS = 0	normal (no alarm)
AS = 1	contact (0→1)
AS = 2	contact (1→0)
AS = 3	change of state

Table 4-9 Values for Alarm Status Property

Value of **AS**	Alarm Condition
AS = 5	low limit alarm
AS=6	high limit alarm

The **(DT) Datatype** property specifies the data type for the input. The data type determines how certain properties are displayed. This property affects the display of **present_value**, **min_pres_value**, **max_pres_value**, **SU**, **LL**, **HL**, and **HS**. Data type codes determine the number of decimal places in the value and whether or not the value is signed (positive or negative) or unsigned. This property defaults to 253 (signed 9.1 digit).

The **(IF) Input Filtering** property has two uses depending on whether the input is configured as an analog input or a digital input. For digital inputs, **IF** works as a debounce filter, specifying the amount of time, in tenths of seconds, for which the input must remain stable in order for the value to be considered reliable. For analog inputs, **IF** is a weighted gain. This property is used in the following equation to calculate the average value:

$$\text{Average Value} = \frac{(\text{Old Value} \times \textbf{IF}) + \text{New Value}}{\textbf{IF} + 1}$$

The default value for **IF** is 0.0.

The **(IP) Input Polarity** property specifies the input polarity when configured as digital. A value of 0 in **IP** indicates that a low voltage displays as **present_value**=0, a high voltage displays as **present_value**=1, and a closed contact displays as **present_value**=0. A value of 1 in **IP** indicates that a low voltage displays as **present_value**=1, a high voltage displays as **present_value**=0, and a closed contact displays as **present_value**=1.

The **(OF) UI Offset** property specifies a fixed amount that is added to the value read from the input. The **present_value** represents the sum of the read value and **OF.**

The **(ST) Sensor Type** property is used to select one of the following input types: digital, linear (scaled **min_pres_value** to **max_pres_value**), 4–20mA linear (scaled **min_pres_value** to **max_pres_value**) or thermistor (precon type III). The associated settings appear in Table 4-10.

Table 4-10 Sensor Types

Value of **ST**	Sensor Type
ST = 0	digital
ST = 2	full scale, linear input scaled from **min_pres_value** to **max_pres_value**

Table 4-10 Sensor Types

Value of **ST**	Sensor Type
ST = 3	4–20mA input scaled from **min_pres_value** to **max_pres_value**
ST = 7	–22.0 to 122.0°F (–30.0 to 50.0°C) thermistor (default)

When **ST**=0, the universal input will be configured to operate as a digital input and will allow **CV** to display a 1 or a 0—the meaning of which is dependent on **IP** (input polarity). If **IP** = 0, a low voltage input (<2.5VDC) to the universal input will result in **CV** = 0; a high voltage (>2.5VDC) applied to the universal input will result in **CV** = 1. If **IP** = 1, a low voltage applied to the universal input will read as **CV** = 1; a high voltage will result in **CV** = 0. Setting **ST** to 2 and having the *NB*-V3T set up to use the appropriate hardware input provides the ability to use a 0–10VDC device as the input. The minimum and maximum values of the range are set in properties **min_pres_value** and **max_pres_value**. For example if the input value is to be displayed as a percentage, then set **ST**=2, **min_pres_value**=0 and **max_pres_value**=0 (0–100%). The *NB*-V3T will determine the voltage input converted internally to raw counts, will scaled the raw counts (0–32767) across the range 0–100 and will display the value of the input as a range of 0–100. For linear voltage devices, be sure that the appropriate jumper and resistor on the PC board are properly set.

The *NB*-V3T also provides linear input scaling for 4–20mA current transmitters (**ST** = 3). For sensors that provide a 4–20mA signal, set **ST** = 3. Properties **min_pres_value** and **max_pres_value** are used in the same way as they are for **ST**=2.

The **(SU) Setup/Setback Limit** property specifies the amount added to **high_limit** or subtracted from **low_limit** during unoccupied periods. The property is added to **high_limit** defining the unoccupied high-limit alarm threshold; **SU** is subtracted from **low_limit** defining the unoccupied low-limit alarm threshold.

UI01 Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
status_flags	four flags that indicate the general "health" of the object.
event_state	provides a way to determine if this object has an active event state associated with it.
reliability	indicates whether the **present_value** is "reliable" as far as the device or operator can determine.
out_of_service	
units	indicates the measurement units of this object.
min_pres_value	indicates the lowest number that can be reliably used for the **present_value** property of this object.
max_pres_value	indicates the highest number that can be reliably used for the **present_value** property of this object.
high_limit	specifies a limit that the **present_value** must exceed before an event is generated.
low_limit	specifies a limit below which the **present_value** must fall before an event is generated.
deadband	specifies a range between the **high_limit** and **low_limit** properties within which the **present_value** must remain for a TO-NORMAL event to be generated
AE	**Alarm Enable** specifies the type of alarm checking to be done on the present_value. 0=disabled (default) 1=contact (0→1) 2=contact (1→0) 3=change of state 4=low limit alarm 5=high limit alarm 6=low and high limit

Property	Description
AS	**Alarm Status** shows the current alarm condition. A value of 0 indicates a normal condition; a nonzero number indicates alarm generation. 0=no alarm 1=contact (0→1) 2=contact (1→0) 3=change of state 5=low limit alarm 6=high limit alarm
DT	**Data Type** specifies the data type for the input. The data type determines how certain universal input properties are displayed. Default value is 253.
IF	**Input Filter Delay** specifies the amount of time, in tenths of seconds, during which an input configured as digital must remain stable in order for the value to be considered reliable. 0.0-25.5 (analog) 0-255 (digital) 0.0 Default
IP	**Input Polarity** specifies the input polarity when configured as digital. A value of 0 in **IP** indicates that a low voltage displays as **present_value**=0, a high voltage displays as **present_value=**1, and a closed contact=0. A value of 1 in **IP** indicates that a low voltage displays as **present_value=**1, a high voltage displays as **present_value=**0, and a closed contact=1. Default value is 0.
OF	**UI Offset** defines an optional correction that may be required as an adjustment for the thermostat location and the possible measurement errors.
ST	**Sensor Type** specifies the type of input connected. 0=digital 2=linear 3=4–20mA 7=thermistor
SU	**Setup/Setback Limit** specifies the amount added to **high_limit** or subtracted from **low_limit** during scheduled unoccupied periods.

4.4 SUPPLY TEMPERATURE

he Supply Temperature object is used to configure and calibrate the supply temperature input and contains the following properties: **object_identifier**, **object_name**, **object_type**, **present_value**, **status_flags**, **event_state**, **reliability**, **out_of_service**, **units**, **DD**, **OF**, and **SM**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to. In this case, object_type is Analog Input.

Property **present_value** indicates the current value of the input being measured. It is represented in engineering units.

Property **status_flags** uses four flags to indicate the state of the analog input. The four flags are:

. In_Alarm
. Fault
. Overridden
. Out_Of_Service.

Property **event_state** determines whether or not the object has an active event state associated with it.

Property **reliability** gives the reliability of the present value or operation. The different results are:
. No_Fault_Detected
. No_Sensor
. Over_Range
. Under_Range
. Open_Loop
. Shorted_Loop
. Unreliable_Other.

Property **out_of_service** is Out of Service. When this property is True, the present_value will not track changes to the physical input. Also, when this property is true, the present_value can be changed to create specific conditions for testing purposes.

Property **units** are the measurement units of the object.

The **(DD) Auto Duct Delta Temperature** property defines the temperature difference by which the supply air must either exceed the **HC** heating setpoint to switch to 'heating mode', or fall below the **CC** cooling setpoint to engage 'cooling' mode.

The **(OF) Supply/Duct Temp Offset** property defines an offset used to adjust the **present_value**.

The **(SM) Cooling/Heating Supply Mode** property indicates the current supply mode. **SM** can be either Cooling (**SM**=0) or Heating (**SM**=1).

Supply Temperature Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
status_flags	four flags that indicate the general "health" of the object.
event_state	provides a way to determine if this object has an active event state associated with it.
reliability	indicates whether the **present_value** is "reliable" as far as the device or operator can determine.
out_of_service	indicates whether or not the process this object represents is not in service.
units	indicates the measurement units of this object.
DD	**Auto Duct Delta Temperature** defines the temperature difference by which the supply air must either exceed the current heating setpoint to switch to 'heating mode', or fall below the current cooling setpoint to engage 'cooling' mode.
OF	**Supply/Duct Temperature Adjustment** defines an offset used to adjust **present_value**.
SM	**Cooling/Heating Supply Mode** indicates the current supply mode. This would be either Cooling or Heating as specified by the System Box Type (**BT**). If **BT** is set to supply dependant, the point will indicate the current mode as determined by the source/duct temperature. 0=Cooling 1=Heating

4.5 HEAT AND COOL SETPOINTS

There are seven Analog Values objects in the NB-V3T used to specify the control setpoints and the setup/ setback values for the various schedule states. The objects are: Cool Setpoint, Cool Unoccupied Setup/ Setback, Cool Night Setup/Setback, Heat Setpoint, Heat Unoccupied Setup/Setback, Heat Night Setup/ Setback, and Warmup Setpoint. Each object contains the following properties: **object_identifier**, **object_name**, **object_type**, **present_value**, **status_flags**, **event_state**, **out_of_service**, and **units**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to. In this case, **object_type** is Analog Value.

Property **present_value** indicates the current value of the input being measured. It is represented in engineering units.

Property **status_flags** uses four flags to indicate the state of the analog input. The four flags are:

. In_Alarm
. Fault
. Overridden
. Out_Of_Service.

Property **event_state** determines whether or not the object has an active event state associated with it.

Property **units** indicates the measurement units of this object.

Heat and Cool Setpoint Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
status_flags	four flags that indicate the general "health" of the object.
event_state	provides a way to determine if this object has an active event state associated with it.
out_of_service	indicates whether or not the process this object represents is not in service.
units	indicates the measurement units of this object.

4.6 SCHEDULE

The Schedule object is used to configure the NB-V3T's active schedule state. The properties in this object can be used to build the complete schedule for the controller. The Schedule Object contains the following properties: **object_identifier**, **object_name**, **object_type**, **present_value**, **effective_period**, **weekly_schedule**, **exception_schedule**, **list_of_object_property_references**, **priority_for_writing**, **HE**, **HO**, **IS**, and **ZE**.

The *NB*-V3T operates in one of four active schedule states:

. warm-up mode
. occupied mode
. unoccupied mode
. night setback mode

There are two types of schedules: Weekly and Exception. A Weekly schedule consists of a sequence of actions for each day of the week. You must set up a schedule for each day- Monday=1 through Sunday=7. Exception schedules override weekly schedules.

An Exception Schedule is a set of actions for a specific day that takes precedence over a weekly schedule. Exception schedule is the schedule used on any date in the Calendar Object.

The following describes the four schedule states:

Warm-up is the period of time before occupancy. Warm-up provides special control action to bring the zone temperature to its desired setpoint for the occupied mode, based on the warmup setpoint. The properties used to define the warm-up temperature and flow appear in the analog inputs and damper control. In time based warm-up, the warm-up period ends when occupied mode begins.

Occupied mode is the period of time when the zone is occupied by people and the *NB*-V3T must maintain appropriate comfort levels in the zone. The heating and cooling setpoints define a desired zone temperature range. Occupied mode ends when unoccupied mode time begins.

Unoccupied mode is the period of time when people are not expected to be in the zone and temperature control is not as strict. During unoccupied mode, the *NB*-V3T maintains cooling comfort levels at setup values and heating comfort levels at setback values. These setup and setback values are used to broaden the control range between the heating and cooling setpoints in order to provide less stringent control. The properties used to define the offsets are located in the **Heat**/**Cool Unoccupied Setup/Setback** objects. Unoccupied mode usually ends when night setback begins.

Night setback is the period of time during unoccupied mode when the entire building is usually unoccupied and the air handler may be shut down. The controller provides the option to setup and setback the control temperature (as does the standard unoccupied mode) and to determine when these offsets are reached. As with unoccupied mode, the properties used to define the night setback offsets are located in the **Heat**/**Cool Night Setup/Setback** object.

Property **object_identifier** is a numeric code which is used to identify the object. It must be unique within the BACnet Device that maintains it.

Property **object_name** is a name for the object which is unique within the BACnet Device which maintains it.

Property **object_type** indicates which object type class value. This object is of type Schedule.

Property **present_value** is the current value of the schedule.

Property **priority_for_writing** defines the priority at which the referenced properties are commanded. This read only property's value=7.

Property **effective_period** is the date(s) when a schedule is active.

Property **weekly_schedule** contains elements 1-7 which correspond to the days of the week with Monday=1 and Sunday=7. Each element tells the sequence of schedule actions for that day.

Property **exception_schedule** is the Exception Schedule. The elements of an exception schedule override the elements of a weekly schedule. The Exception Schedule is used when the **local_date**=any date in the Calendar Object, i.e., Calendar is the holiday list, the Exception Schedule is used on holidays.

Property **list_of_object_property_reference** is Object ID/Property ID of the proprietary Schedule Object, **present_value**.

Property **priority_for_writing** defines the priority at which the referenced properties are commanded. This read only property's value=7

The **(HE) Host Overrides** property specifies whether to used a schedule sent by a host. If **HE**=1, then **HO** is used as the host override state.

The **(HO) Host Schedule** property specifies the desired schedule override state when schedule property **HE**=1. If **HE**=0, then **HO** is not used. The values for **HO** are given in Table 4-11.

*Table 4-11 **HO** Host Override Values*

Value of **HO**	Override
HO = 0	unoccupied
HO = 1	warmup
HO = 2	occupied
HO = 3	night setback

The **(IS) Inactive Schedule State** property determines which schedule state the *NB*-V3T should follow when no weekly schedule is active. Valid schedule choices are unoccupied (**IS**=0), warm-up (**IS**=1), occupied (**IS**=2), and night setback (**IS**=3).

The **(ZE) Receive Schedule** property specifies whether the *NB*-V3T should receive its schedule from a remote host.

Schedule Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
effective_period	specifies the range of dates within which the Schedule object is active.
weekly_ schedule	a BACnetARRAY containing exactly seven elements, each containing a BACnetDailySchedule. A BACnetDailySchedule consists of a list of BACnetTimeValues that are (time, value) pairs, which describe the sequence of schedule actions on one day of the week when no Exception_Schedule is in effect. The array elements 1-7 correspond to the days Monday - Sunday, respectively.
exception_ schedule	a BACnetARRAY of BACnetSpecialEvents, each of which describes a sequence of schedule actions that takes precedence over the normal day's behavior on a specific day or days.
list_of_object_ property_ references	specifies the Device Identifiers, Object Identifiers and Property Identifiers of the properties to be written with specific values at specific times on specific days.
priority_for_ writing	defines the priority at which the referenced properties are commanded.
HE	**Host Overrides** specifies whether to use the host schedule. 0=disabled 1=enabled
HO	**Host Schedule** specifies the desired schedule override state when **HE**=1. 0 = unoccupied 1 = warm-up 2 = occupied 3 = night setback
IS	**Inactive Schedule State** determines which schedule state the *NB*-V3T should follow when there is no active schedule. 0 = unoccupied 1 = warm-up 2 = occupied 3 = night setback

Property	Description
ZE	**Receive Schedule** enables the *NB*-V3T to receive network schedule broadcasts and sets **present_value** based on the received value. 0=No 1=Yes

4.7 HOLIDAY CALENDAR

The Holiday Calendar object is used to designate exceptions form the schedule configured in the Schedule object. These holidays are days which have a different desired schedule behavior from the active schedule. The Holiday Calendar object contains the following properties: **object_identifier**, **object_name**, **object_type**, **present_value**, and **date_list**.

Property **object_identifier** is a numeric code which is used to identify the object.

Property **object_name** is a name for the object which is unique within the BACnet Device which maintains it.

Property **object_type** indicates which object type class value. This property is of type Calendar.

Property **present_value** is the current value of the Calendar. The **present_value** will be true if the **local_date** matches any date in the **datelist**.

Property **date_list** is a list of Calendar Entries, which consist of individual dates or ranges of dates

Holiday Calendar Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
present_value	indicates the current value, in engineering units, of the object.
datelist	a list of BACnetCalendarEntries, each of which is either an individual date (Date), range of dates (BACnetDateRange), or month/week-of-month/ day-of-week specification (BACnetWeekNDay). If the current date matches the calendar entry criteria, the present value of the Calendar object is TRUE.

4.8 FLOW CTRL

The Flow Ctrl object controls damper position to maintain a desired target flow value. Using the values in the Damper Ctrl object, the Flow Ctrl object calculates the damper positions which correspond to the minimum and maximum desired flow for the current schedule mode. The damper position is modulated to maintain the desired flow. The Flow Ctrl object has the following properties: **object_identifier**, **object_name**, **object_type**, **AC**, **AS**, **CD**, **DD**, **DM**, **DP**, **EF**, **EP**, **RZ**

The **(AC) Auto/Manual Mode Select** property enables the Flow Control object. When **AC** is set to "1=Auto", the Target Flow (**CD**) is determined by the control algorithms and setpoints. Setting **AC** to "0=Manual" disables Flow Control.

The **(AS) Damper Status** property displays the status of the actuator as determined by MMT. Possible values are Ready, Disconnected/ Open, and Jammed/Shorted. Diagnostic alarms and returns are issued when this status changes.

The **(CD) Target Flow** property specifies the desired flow (cfm) setpoint calculated by the cooling or heating PI loops. You can write to **CD** only when **AC** is set to Manual mode or when Zone Temperature:**BT** property is set to the CAV Box Type.

The **(DD) Damper Direction** property specifies the direction of the damper motor. When the property is set to 0, the motor turns in the normal direction. With the property set to 1, the motor turns in the opposite direction.

The **(DM) Damper Mode** property allows you to command the damper to open fully or one of the scheduled minimum or maximum flows specified in the Damper Ctrl object. When **DM** is set to "0=Automatic", the damper positions will be controlled by the *NB*-V3T's PI loops. A **DM** value of "1=Full Open" commands the damper to the fully open position by setting **DP** to 100. Setting **DM** to "2=Min Cool" or "3=Max Cool" sets **DP** to the Damper Ctrl:**(CM) Cooling Minimum Flow** or Damper Ctrl:**(CX) Cooling Maximum Flow** value, respectively. Setting **DM** to "3=Min Heat" sets **DP** to the value of Damper Ctrl:**(HM) Heating Minimum Flow** and setting **DM** to "4=Max Heat" sets **DP** to the value of Damper Ctrl:**(HX) Heating Maximum Flow**. Similarly, **DM** values of "6=Min Warmup" and "7=Max Warmup" correspond to **DP** being set to the value of Damper Ctrl:**(WM) Warmup Minimum Flow** and Damper Ctrl:**(WX**) **Warmup Maximum Flow**, respectively. The mode choices for **DM** are summarized in Table 4-12.

*Table 4-12 **DM** Damper Mode Values*

Value of **DM**	Damper Mode
DM = 0	automatic
DM = 1	full open
DM = 2	min cool
DM =3	max cool
DM = 4	min heat
DM = 5	max heat
DM = 6	min warmup

*Table 4-12 **DM** Damper Mode Values*

Value of **DM**	Damper Mode
DM = 7	max warmup

The **(DP) Damper Position** property displays the current position of the damper actuator as read from the built- in feedback potentiometer.

The **(EF) Estimated Flow at Full Open** property displays the estimated flow when the damper is fully open. **EF** is measured in cfm.

The **(EP) Estimated Target Damper Position** property displays the estimated target position with which the loop should control the damper to bring the flow closer to the setpoint. A change in **EP** causes the damper to move in the proper control direction.

The **(RZ) Actuator Pulse Count** property displays a count of the electrical pulses generated by the MMT system. **RZ** can be used to determine the general well-being of the actuator with a high pulse count indicating possibly problems with the damper actuator.

Flow Ctrl Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
AC	**Auto/manual mode select** when this property is set for Auto, the Target Flow (**CD**) is determined by the control algorithms and setpoints. 0=manual 1=auto (default)
AS	**Damper Status** reports the status of the actuator as determined by the MMT.
CD	**Target Flow** shows the desired flow (cfm) setpoint calculated by the cooling or heating PI loops.
DD	**Damper Direction** used to set the direction of the damper motor. 0=normal (default) 1=reverse
DM	**Damper Mode** used to command the damper to fully open or to operate at minimum or maximum cooling, heating, and warm-up setpoints. 0=automatic 1=full open 2=min cool 3=max cool 4=min heat 5=max heat 6=min warmup 7=max warmup
DP	**Damper Position** displays the position of the damper.
EF	**Estimated Flow at Full Open** displays the estimated flow when the damper is fully open
EP	**Estimated Target Damper Position** displays the estimated target position, measured from 0-100%, with which the loop should control the valve to bring the measured input variable closer to the setpoint.
RZ	**Actuator Pulse Count** when MMT detects the possibility of an actuator short, electrical pulses are used in an attempt to rejuvenate the motor

4.9 DAMPER CTRL

The Damper Ctrl channel is used to configure the behavior of the damper during the different schedule modes. Using the proportional band, minimum, and maximum flow values, for each schedule mode, the *NB*-V3Td calculates the target flow. The Damper Ctrl object has the following properties: **object_identifier**, **object_name**, **object_type**, **CI**, **CM**, **CP**, **CX**, **HI**, **HM**, **HP**, **HX**, **WI**, **WM**, **WP**, and **WX.**

The **(CI) Cooling Integration Constant** property specifies the amount of proportional error history (0 to 25.5%) used to calculate the desired position for the damper. This point is also used to calculate the error for the heating proportional band in Heating Only mode. The property is calculated each time the loop runs (once per second) creating an accumulated integral sum. This "integral sum", applied once per minute, is used to control overshoot while the loop is operating within the confines of the proportional band.

The P+I control loop controls the amount of integral (integral sum) that is accumulated during use of the antireset windup strategy. When the control loop reaches its maximum (maximum air flow) or its minimum (minimum air flow), the integral sum is dumped. Integral will begin to calculate again when the control is once more within the proportional band.

The **(CM) Cooling Minimum Flow** property specifies the allowable minimum (cooling) duct flow, in CFM, required while the controller is at the calculated cooling setpoint. **CM** has a range of 0 to 65,535 with a default of 100.

The **(CP) Cooling Proportional Band** property specifies, in degrees (0.0 to 100), the offset from the calculated cooling control setpoint that determines the proportional band for damper control. The damper controls air flow based on area temperature from the cooling minimum flow, **CM**, to the cooling maximum flow, **CX**, when cooling is called for by the controller. The cooling proportional band is an offset that begins at the calculated cooling control setpoint, Cool Setpoint:**present_value,** and ends at a value equal to the Cool Setpoint:**present_value** + **CP**. **CP** has a default value of 5.0.

The **(CX) Cooling Maximum Flow**. property specifies the allowable maximum (cooling) duct flow. This point has a range of 0-65,535 and a default value of 500.

The **(HI) Heating Integration Constant** property specifies the amount of proportional error history (0 to 25.5%) used to calculate the desired position for the heating duct damper. The value for this point is calculated each time that the loop runs (once per second) creating an accumulated integral sum. This integral sum, applied once per minute, is used to control overshoot while the loop is separating within the confines of the proportional band.

The P+I control loop controls the amount of integral (integral sum) that is accumulated by using an antireset windup strategy. When the control loop reaches its maximum (maximum air flow) or its minimum (minimum air flow), the integral sum is dumped. Integral will begin to be calculated again when the control is once more within the proportional band.

The **(HM) Heating Minimum Flow** property specifies the allowable minimum heating duct flow during heating. The point HM has a range of 0-65,535 and defaults to 100.

The **(HP) Heating Proportional Band** property specifies, in degrees (0.0 to 100), the offset from the calculated heating control setpoint that determines the proportional band for the heating duct damper control. The damper controls air flow based on area temperature from the cooling minimum flow, **HM**, to the cooling maximum flow, **HX**, when heating is called for by the controller. The heating proportional band is an offset that begins at the calculated heating control setpoint, Heat Setpoint:**present_value,** and ends at a value equal to the Cool Setpoint:**present_value** - **HP**. **HP** has a default value of 5.0.

The **(HX) Heating Maximum Flow** property specifies the allowable maximum heating duct flow during heating. This property defaults to 500 and can be set from 0 to 65,535.

The **(WI) Warmup Integration Constant** property specifies the amount of proportional error history (0 to 25.5%) used to calculate the desired position for the heating duct damper.

The **(WM) Warmup Minimum Flow** property specifies the allowable minimum heating duct flow during warm-up.

The **(WP) Warmup Proportional Band** property specifies the offset, in degrees (0.0 to 100), from the calculated heating control setpoint that determines the proportional band for the warm-up heating duct damper control.

The **(WX) Warmup Maximum Flow** property specifies the allowable maximum (heating) duct flow during warm-up which can be called for by schedule. This property defaults to 400 and has a setting range of 0 to 65,535.

Damper Ctrl Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
CI	**Cooling Integration Constant** shows the amount of proportional error history (0 to 100%) used to calculate the desired position for the cooling duct damper
CM	**Cooling Minimum Flow** shows the allowable minimum (cooling) duct flow
CP	**Cooling Proportional Band** specifies, in degrees (0.0 to 25.5), the offset from the calculated cooling control setpoint that determines the proportional band for damper control
CX	**Cooling Maximum Flow** shows the allowable maximum (cooling) duct flow
HI	**Heating Integration Constant** shows the amount of proportional error history (0 to 100%) used to calculate the desired position for the heating duct damper
HM	**Heating Minimum Flow** shows the allowable minimum heating duct flow during heating
HP	**Heating Proportional Band** specifies, in degrees (0.0 to 25.5), the offset from the calculated heating control setpoint that determines the proportional band for the heating duct damper control
HX	**Heating Maximum Flow** shows the allowable maximum heating duct flow during heating
WI	**Warmup Integration Constant** shows the amount of proportional error history (0 to 100%) used to calculate the desired position for the heating duct damper
WM	**Warmup Minimum Flow** shows the allowable minimum heating duct flow during warm-up heating
WP	**Warmup Proportional Band** specifies in degrees (0.0 to 25.5) the offset from the calculated heating control setpoint that determines the proportional band for the warm-up heating duct damper control
WX	**Warmup Maximum Flow** shows the allowable maximum heating duct flow during warm-up heating.

4.10 OCCUPANCY DETECTION

The Occupancy Detector properties allow you to define the circumstances under which the *NB*-V3T will automatically switch to an extended occupied mode during unoccupied periods when an occupancy detector is used with the controller. The Occupancy Detection object contains the following properties: **object_identifier**, **object_name**, **object_type**, **IC**, **MD**, **MR**, **MS**, and **MT**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to.

The **(IC) Input Select** property chooses the input to be used for occupancy detection. A nonzero value from the chosen input indicates occupancy. A list of the possible occupancy detector inputs is given in Table 4-13.

*Table 4-13 **IC** Input Select Values*

Value of **IC**	Measured Variable
IC = 0	None (default)
IC = 1	UI1

The **(MD) Extended Occupancy Delay** property sets the amount of time, in seconds, during which the occupancy detector must remain on before the occupancy detector will override the zone. This prevents false triggers that might occur as others pass quickly through the zone.

The **(MR) Extended Occupancy Remaining** is a read-only property which displays the time remaining for occupancy detector override.

The **(MS) Occupancy Status** property shows the status of the occupancy detector digital input. To enable occupancy detection, **MT** must be > 0 and the input used MUST be configured as digital (**ST**=0). If either of these two conditions are not met, **MS** will display 0. When **MS** indicates occupancy in the zone is detected during unoccupied periods, the occupancy input extends occupancy time by the amount specified in **MT**.

The **(MT) Extended Occupancy Duration** property defines the length of time, in minutes, that the zone will be overridden when occupancy is detected.

Occupancy Detection Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
IC	**Input Select** specifies the input to be used for occupancy detection. 0 = None 1 = UI1
MD	**Extended Occupancy Delay** sets the amount of time, in seconds, during which the occupancy detector must remain on before the occupancy detector will override the zone. This prevents false triggers that might occur as others pass quickly through the zone.
MR	**Extended Occupancy Remaining** displays the time remaining for occupancy detector override.
MS	**Occupancy Status** the status of the occupancy detector digital input. To enable occupancy detection, **MT** must be greater than 0 and the input used MUST be configured as digital (**ST**=0). If either of these two conditions are not met, **MS** will display 0. 0=No Detection 1=Detection
MT	**Extended Occupancy Duration** defines, in minutes, the length of time that the zone will be overridden whenever occupancy is detected.

4.11 BROADCAST SCHEDULE

The Broadcast Schedule properties allow the *NB*-V3T to receive network schedule information. The Broadcast Schedule object contains the following properties: **object_identifier**, **object_name**, **object_type**, **CV**, and **RB**.

Property **object_identifier** is a unique numeric code that is used to identify the object.

Property **object_name** is a unique name used to represent an object within the BACnet device. The name must be at least one character in length and it must consist of printable characters.

Property **object_type** indicates which object type class the property belongs to.

The **(CV**) **Current Value of Network Broadcast Value** property shows the current value of the network schedule received by the *NB*-V3T. When **RB** is enabled, **CV** is forced into the Main Schedule property **CV** and is used as the functioning schedule value of the *NB*-V3T.

The **(RB) Receive Broadcasts?** property enables the *NB*-V3T to receive network broadcasts and sets **CV** value based on the received value. If **RB** = 0, then receive broadcast is disabled. If **RB** = 1, then the *NB*-V3T receives the network value and places it in **CV** and in the Schedule:**present_value** property, overriding the schedules of the *NB*-V3T.

Broadcast Schedule Properties

Property	Description
object_ identifier	a numeric code that is used to identify the object.
object_name	represents a name for the object that is unique within the device.
object_type	indicates membership in a particular object type class.
CV	**Current Value** shows the current value of the network broadcast schedule values received by the *NB*-V3T
RB	**Receive Broadcasts?** Enables the *NB*-V3T to receive network broadcasts and sets **Schedule:present_value** based on the received value. 0=No 1=Yes

APPENDIX A: NB-V3Tb PROPERTIES

The following tables contain listings of the BACnet objects and property assignments for the NB-V3Tb. Each property is listed with its identifier number, data type, access code, storage, default value (if any) and a brief description of its functionality.

IN THIS SECTION

A.1 DEVICE

NOTE

The Device object is represented in *NB*-Pro as follows:
AAM V3T Bypass xxxxxxxxxx
(where xxxxxxxxxx is the Unitary Controller serial number)

Property	Identifier #	Data Type	Access	Storage & Default	Description
object_ identifier	75	BACnet ObjID	RW	EE Device (8), Instance *n* *n* = last seven digits of SN #	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- AAM NB-V3T Bypass *serial number*	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Device (8)	indicates membership in a particular object type class.
system_status	112	BACnet ObjID	RO	- 0	indicates the current physical and logical status of the BACnet Device.
vendor_name	121	CharStr	RO	- American Auto-Matrix	identifies the manufacturer of the BACnet Device.
vendor_ identifier	120	Unsigned	RO	- 6	a unique vendor identification code, assigned by ASHRAE, which is used to distinguish proprietary extensions to the protocol.
model_name	70	CharStr	RO	- NB-V3T Bypass	indicates the vendor's name used to represent the model of the device.
firmware_ revision	44	CharStr	RO	- revision number	indicates the level of firmware installed in the device.
application_ software_ version	12	CharStr	RO	- version number	identifies the version of application software installed in the device.
protocol_ version	98	Unsigned	RO	- 1	indicates the version of the BACnet protocol supported by this BACnet Device.
protocol_ revision	139	Unsigned	RO	- 2	indicates the minor revision level of the BACnet standard.
protocol_ services_ supported	97	BACnet Services Supported	RO	-	indicates which standardized protocol services are supported by this device's protocol implementation.
protocol_ object_ types_ supported	96	BACnet Object Types Supported	RO	-	indicates which standardized object types are supported by this device's protocol implementation.
object_list	76	BACnet Array	RO	-	a list of each object within the device that is accessible through BACnet services.

Property	Identifier #	Data Type	Access	Storage & Default	Description
max_apdu_ length_ accepted	62	Unsigned	RO	- 50	specifies the maximum number of information frames the node may send before it must pass the token.
segmentation_ supported	107	BACnet Segment ation	RO	- 3	indicates whether the device supports segmentation of messages and, if so, whether it supports segmented transmission, reception, or both.
local_time	57	Time	RW	RAM	indicates the time of day to the best of the device's knowledge.
local_date	56	Date	RW	RAM	indicates the date to the best of the device's knowledge.
database_ revision	155	UInt	RO	- 1	indicates the logical revision number for the device's database. the revision is incremented when an object is created, an object is deleted, an object's name is changed, or a restore is performed.
apdu_timeout	11	Unsigned	RW	EE 300	indicates the amount of time, in milliseconds, between retransmissions of an APDU requiring acknowledgment for which no acknowledgment has been received.
number_of_ apdu_retries	73	Unsigned	RW	EE 1	indicates the maximum number of times that an APDU shall be retransmitted.
time_ synchronization _recipients	116	List	RW	EE 0	a list of devices to which the device may automatically send a TimeSynchronization request.
max_master	64	Unsigned	RW	EE 127	specifies the highest possible address for master nodes and shall be less than or equal to 127.
max_info_ frames	63	Unsigned	RW	EE 4	specifies the maximum number of information frames the node may send before it must pass the token.
device_ address_ binding	30	List	RO	- NULL	a list of the device addresses that will be used when the remote device must be accessed via a BACnet service request.
BU	16758	Bool	RW	RAM 0	**Backup Control** **BU** = 1 forces backup of **AE** and digital outputs 1-5 **RH** to EEPROM.
CC	16770	UInt	RW	EE 0	**Count of Clock Fails** increments upon hardware failure but can also be advanced during the removal of power.
CM	16779	UInt	RO	- 255	**Controller Manufacturer Code** indicates the factory-set manufacturer number for the controller. (**CM** for American Auto-Matrix controllers is always 255)
CP	16781	UInt	RW	EE 0	**Network Baud Rate** 0=9600 6=38.4K 7=19.2K 9=57.6K
CT	16784	UInt	RO	- 204	**Controller Type** factory-set controller type identifies the type of unitary controller. **CT** for the *NB*-V3T is 204.
DE	16795	UInt	RW	RAM 0	**Default Enable Command** restores configuration settings to factory defaults. Enter 197 to set the defaults.

Property	Identifier #	Data Type	Access	Storage & Default	Description
EM	16813	Bool	RW	EE 0	**English/Metric** specifies which units of measurement to use in returning temperature values. 0 = English 1 = Metric Units
F1	16820	Bool	RW	EE 0	**Interlock 1 Trips Fan (Y/N)** 0=Interlock 1 will not trip the fan. 1= the fan is shut down when Interlock 1 is active.
F2	16821	Bool	RW	EE 0	**Interlock 2 Trips Fan (Y/N)** 0=Interlock 2 will not trip the fan. 1= the fan is shut down when Interlock 2 is active.
F3	16822	Bool	RW	EE 0	**No Flow Trips Fan (Y/N)** 0=Interlock 3 will not trip the fan. 1= the fan is shut down when Interlock 3 is active.
FT	16834	UInt	RO	- 4	**Firmware Type** defines the class of firmware operating system used in this controller.
I1	16868	UInt	RW	EE 0	**Interlock 1 Input Channel** specifies the input to be used for Interlock 1. Disabling this input disables the PID Interlock 1. 0=Disabled 1=UI1 2=UI2 3=UI3 4=UI4 5=UI5
I2	16869	UInt	RW	EE 0	**Interlock 2 Input Channel** specifies the input to be used for Interlock 2. Disabling this input disables the PID Interlock 2. 0=Disabled 1=UI1 2=UI2 3=UI3 4=UI4 5=UI5
I3	16870	UIntBool	RW	EE 0	**Fan Failure Interlock** used as a Proof of Flow interlock 0=Disabled 1=Fan Status
IC	16876	UInt	RO	EE 0	**EEPROM Default Count** increments whenever the EEPROM is restored to factory default settings
ID	16877	UInt	RW	EE Factory Set	**Unit ID** This value is used to set a unique network address for each controller connected on a multidrop. Each ID is factory set to the last two digits of the board serial number.
IS	16882	bitstring	RO	RAM N/A	**Interlock Status** displays the status of all of the interlocks. bit #0=Interlock 1 bit #1=Interlock 2 bit #2=Interlock 3

Property	Identifier #	Data Type	Access	Storage & Default	Description
MS	16902	UInt	RW	EE 0	**Master/Slave Mode** used to select a mode for the controller with 0=Master (default) 1=Slave
OC	16917	UInt	RW	EE 0	**Count of Illegal Opcodes** increments upon firmware failure but can also be advanced during the removal of power.
OS	16925	Real	RO	N/A	**Kernel Version** indicates the version number of the kernel.
PD	16942	UInt	RW	EE 5	**Power-on Delay** determines how long the *NB*-V3T waits before energizing its outputs after power loss or soft reset. **PD** defaults to 5 seconds.
PS	16951	UInt	RW	EE 2	**Power-up State** determines which schedule state to use after a power loss and before time sync. 0=unoccupied 1=warmup 2=occupied 3=night setback
RC	16963	UInt	RW	EE 0	**Count of Resets** increments each time power is applied to the controller.
RI	16967	Bool	RW	EE 0	**Reset Fan Failure Interlock** When Fan Failure Interlock is enabled to shut down the fan (FF00;**F3**=1), setting Reset Fan Failure Interlock (FF00;**RI**=1) allows the fan to restart.
RS	16972	Bool	RW	RAM 0	**Reset** allows a host or operator to reset the controller by setting RS = 1. 0 = disabled (default), 1 = reset controller
SN	16991	UInt	RO	EE factory set	**Serial Number** displays the serial number of the *NB*-V3T controller
SR	16994	UInt	RO	RAM Flash	**Software Time Stamp** uniquely defines each flash firmware image. The numerically higher the firmware image, the more recent it is.
UP	17030	UInt	RO	EE 0	**Flash Update Count** increments each time a new flash firmware image is accepted by the controller.
VE	17043	Real	RO	RAM Flash	**Software Version** contains the version number of the active firmware.
WC	17050	UInt	RW	EE 0	**Count of Watchdog Cop** increments upon firmware failure but can also be advanced during the removal of power.
ZN	17084	UInt	RW	EE 0	**Zone Number** used to group controllers together so that they can be controlled simultaneously.
ZP	17085	UInt	RO	RAM 0	**Count of High Current Pulses** advances when MMT takes action to maintain the operation of the actuator. The activity on this count should be low. If it is high, the actuator is reaching the end of its life.

A.2 ZONE TEMPERATURE

Property	Identifier #	Data Type	Access	Storage & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Input (0), Instance 0	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Zone Temperature	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Input (0)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM 0	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	RAM 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	RAM 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RW	EE 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	RAM 95	indicates the measurement units of this object.
high_limit	45	Real	RW	NRAM 0.0	specifies a limit that the **present_value** must exceed before an event is generated.
low_limit	59	Real	RW	NRAM 0.0	specifies a limit below which the **present_value** must fall before an event is generated.
deadband	25	Real	RW	NRAM 0.0	specifies a range between the **high_limit** and **low_limit** properties within which the **present_value** must remain for a TO-NORMAL event to be generated
AE	16743	UInt	RW	EE 0	**Alarm Enable** specifies the type of alarm checking to be done on the **present_value**. 0=disabled 4=low limit alarm 5=high limit alarm 6=low and high limit
AS	16747	UInt	RO	RAM 0	**Alarm Status** shows the current alarm condition. A value of 0 indicates a normal condition; a nonzero number indicates alarm generation. 0=No alarm (Default) 5=Low limit alarm 6=high limit alarm
BM	16754	UInt	RW	EE 0	**SSB Bus Mode** determines how the controller will behave when multiple controllers are wired onto a SSB. 0=Master (default) 1=Slave

Property	Identifier #	Data Type	Access	Storage & Default	Description
BT	16757	UInt	RW	EE 3	**Application** 0 = None 1 = cooling only 2 = heating only 3 = supply dependant
CC	16770	Real	RO	RAM 72.0	**Current Cooling Setpoint** current cooling temperature control setpoint including setback and user adjustments
CH	16775	Real	RO	RAM 68.0	**Current Heating Setpoint** current heating temperature control setpoint including setbacks and user adjustments.
DF	16796	UInt	RW	EE 0	**Thermostat Display Format** defines the format used to display the current temperature on the digital thermostat. 0=##° 1=##.#° 2=##°F 3=##.#°F 4=None
DL	16798	Real	RO	RAM 0	**Total Zone Demand Load** indicates the heating/cooling demand in terms of temperature separation from setpoints. A cooling demand will be indicated by a negative value and a heating demand by a positive value. If the zone is satisfied, then **DL** will be 0.
DM	16799	UInt	RO	RAM 0	**Demand Mode Cool/Heat/Vent** indicates the demand for the zone. A satisfied zone will indicate “vent” (**DM**=0). If the *NB*-V3T is in cooling mode and the zone temperature exceeds the cooling setpoint, “cool” is indicated (**DM**=1). If the controller is in heating mode and the zone temperature falls below the heating setpoint, “heat” is indicated (**DM**=2). 0=Vent 1=Cool 2=Heat
DS	16803	UInt	RW	EE 0	**Thermostat Display Mode** specifies whether English or Metric units are to be used for digital thermostat display on the *NB*-STAT3. 0=°F (default) 1=°C
DV	16805	UInt	RW	EE 0	**Thermostat Display Value** determines whether each digital thermostat will display the identical temperature value which will be the average of all readings or if each thermostat will display its own temperature (including offset). 0=Display Average 1=Individual Temperature
ED	16808	UInt	RW	EE 60	**Extended Occupancy Time** specifies the amount of time in minutes to extend occupancy. **ED** has a default value of 60.
ER	16816	UInt	RO	RAM 0	**Extended Occupancy Remaining** shows the amount of time remaining in extended occupancy.
G0	16837	UInt	RO	RAM 0	**Global ID for Device** the Global Identification for the first Sensor Bus device.
G1	16838	UInt	RO	RAM 0	**Global ID for Device** the Global Identification for the second Sensor Bus device.

Property	Identifier #	Data Type	Access	Storage & Default	Description
G2	16839	UInt	RO	RAM 0	**Global ID for Device** the Global Identification for the third Sensor Bus device.
G3	16840	UInt	RO	RAM 0	**Global ID for Device** the Global Identification for the fourth Sensor Bus device.
OF	16919	Real	RW	EE 0.0	**Temperature Adjustment** defines an optional correction that may be required as an adjustment for the thermostat location and the possible measurement errors.
PB	16940	UInt	RW	EE 2200	**Balance P.I.N.** this Personal Identification Number controls access to the Balance Menu. A value of 0 makes the menu always accessible. 0000-9999
PG	16945	UInt	RW	EE 0	**Primary STAT Bus GID** specifies the GID of the Primary thermostat in Primary GID mode (**RM**=8). If this thermostat is not available, then the Average temperature mode (**RM**=0) is used.
PI	16947	UInt	RW	EE 3300	**Installer P.I.N.** this Personal Identification Number controls access to all menus. A value of 0 makes the menu always accessible. 0000-9999
PO	16949	UInt	RO	RAM NA	**Present Occupany Status** specifies the current occupancy state based on any host or occupancy overrides.
PS	16951	UInt	RW	EE 1100	**Service P.I.N.** this Personal Identification Number controls access to the Service Menu. A value of 0 makes the menu always accessible. 0000-9999
PU	16952	UInt	RW	EE 0	**User P.I.N.** this Personal Identification Number controls access to the User Menu. A value of 0 makes the menu always accessible. 0000-9999
RD	17091	Real	RW	EE 15.0	**Stage Reversing Delay** specifies the time, in minutes, that must elapse before a zone can call for heat after a period of cooling or for cooling after a period of heating.
RM	16969	UInt	RW	EE 0	**Reading Mode** specifies the interval period of delay when switching from heating to cooling. 0=Average 1=Highest 2=Lowest 3=Hi/Lo VST 4=Device 0 5=Device 1 6=Device 2 7=Device3 8=Primary GID
SD	16983	UInt	RW	EE 0	**Calculated Setpoint Display** specifices the method of setpoint display on SBC-STAT3s

Property	Identifier #	Data Type	Access	Storage & Default	Description
SE	16984	UInt	RW	EE 1	**Override Disabled/ Enabled** enables or disables the user's ability to enter extended occupancy override. 0 = disabled 1 = enabled
SU	16997	Real	RW	EE 0.0	**Alarm Setup/Setback Value** specifies the amount added to **high_limit** or subtracted from **low_limit** during unoccupied periods. This property effectively shifts the points at which alarms and alarm returns are generated.
T0	17002	Real	RO	RAM -	**Thermostat Reading** raw reading for Device 0.
T1	17003	Real	RO	RAM -	**Thermostat Reading** raw reading for Device 1.
T2	17004	Real	RO	RAM -	**Thermostat Reading** raw reading for Device 2.
T3	17005	Real	RO	RAM -	**Thermostat Reading** raw reading for Device 3.
TM	17011	Real	RW	EE 0.5°F	**Offset Increment** specifies the magnitude of incremental changes to the User Setpoint Offset (**TS**). The User Adjust Position (**TP**) is multiplied by **TM** to determine the User Setpoint Offset (**TS**) value. If the User Adjust Increment is 0, you will not be able to alter the setpoint.
TP	17013	Int	RW	RAM 0	**User Adjust Position** the User Setpoint Offset (**TS**) can be raised or lowered in integral steps. This property tracks the current step. It can be set to any signed integer but will be constrained to +/–2 when adjusted by an analog thermostat or to +/–5 when set through a digital thermostat. The point is used in combination with the User Adjust Increment (**TM**) to calculate the User Setpoint Offset.
TR	17014	UInt	RW	RAM 0	**User Adjust Remaining** displays the time remaining before the Setpoint Offset (**TS**) setting is reset.
TS	17015	Real	RW	RAM 0.0	**Setpoint Offset** defines an offset for application to PID setpoints. This point shows the current value calculated when you multiply the User Adjust Position (**TM**) by the User Adjust Increment (**TP**). This setting is temporary and is valid only for **TT** minutes unless **TT=**0.
TT	17016	UInt	RW	EE 120	**User Adjust Duration** the User Setpoint Offset (**TS**) is a temporary setting. The **TT** property defines in minutes the duration for which the setting applies. After that time, the User Adjust Position and User Adjust Offset are reset to 0 degrees. If the User Adjust Duration is 0, then setpoint changes remain in effect until modified. The default value for **TT** is 120.
ZS	17087	Real	RW	RAM 70.0	**Heating/Cooling Setpoint** displays the midpoint between the current cooling and heating setpoints. This property reflects changes in both setpoints. A change in **ZS** results in the appropriate shift of both the cooling and heating setpoint maintaining the effective deadband.

A.3 UI01-UI05

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Input (0), Instance *n* *n* = 1-5	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM UI0*n* *n* = 1-5	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Input (0)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM 0	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	RAM 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	RAM 0	provides a way to determine if this object has an active event state associated with it.
reliability	103	BACnet Reliability	RO	RAM 0	indicates whether the **present_value** is "reliable" as far as the device or operator can determine.
out_of_service	81	Bool	RW	EE 0	indicates whether or not the **present_value** is prevented from being modified by software local to the BACnet device in which the object resides. When **out_of_service** is TRUE, the **present_value** property may be written to freely.
units	117	BACnet Eng. Units	RW	EE 95	indicates the measurement units of this object.
min_pres_value	69	Real	RW	EE 0.0	indicates the lowest number that can be reliably used for the **present_value** property of this object.
max_pres_value	65	Real	RW	EE 0.0	indicates the highest number that can be reliably used for the **present_value** property of this object.
high_limit	45	Real	RW	EE 0.0	specifies a limit that the **present_value** must exceed before an event is generated.
low_limit	59	Real	RW	EE 0.0	specifies a limit below which the **present_value** must fall before an event is generated.
deadband	25	Real	RW	EE 0.0	specifies a range between the **high_limit** and **low_limit** properties within which the **present_value** must remain for a TO-NORMAL event to be generated
AE	16743	UInt	RW	EE 0	**Alarm Enable** specifies the type of alarm checking to be done on the present_value. 0=disabled (default) 1=contact (0→1) 2=contact (1→0) 3=change of state 4=low limit alarm 5=high limit alarm 6=low and high limit

Property	Identifier #	Data Type	Access	Store & Default	Description
AS	16747	UInt	RO	RAM 0	**Alarm Status** shows the current alarm condition. A value of 0 indicates a normal condition; a nonzero number indicates alarm generation. 0=no alarm 1=contact (0→1) 2=contact (1→0) 3=change of state 5=low limit alarm 6=high limit alarm
DT	16804	UInt	RW	EE 253	**Data Type** specifies the data type for the input. The data type determines how certain universal input properties are displayed. Default value is 253.
IF	16878	UInt	RW	EE 0.0	**Input Filter Delay** specifies the amount of time, in tenths of seconds, during which an input configured as digital must remain stable in order for the value to be considered reliable. 0.0-25.5 (analog) 0-255 (digital) 0.0 Default
IP	16881	Bool	RW	EE 0	**Input Polarity** specifies the input polarity when configured as digital. A value of 0 in **IP** indicates that a low voltage displays as **present_value**=0, a high voltage displays as **present_value=**1, and a closed contact=0. A value of 1 in **IP** indicates that a low voltage displays as **present_value=**1, a high voltage displays as **present_value=**0, and a closed contact=1. Default value is 0.
OF	16919	Real	RW	EE 0.0	**UI Offset** defines an optional correction that may be required as an adjustment for the thermostat location and the possible measurement errors.
ST	16996	UInt	RW	EE 7	**Sensor Type** specifies the type of input connected. 0=digital 2=linear 3=4–20mA 7=thermistor
SU	16997	Real	RW	EE 0.0	**Setup/Setback Limit** specifies the amount added to **high_limit** or subtracted from **low_limit** during scheduled unoccupied periods.

A.4 PRESSURE CONTROL

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Input (0), Instance 6	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM Pressure Control	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Input (0)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM 0	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	RAM 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	RAM 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RW	NRAM 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	NRAM 95	indicates the measurement units of this object.
high_limit	45	Real	RW	NRAM 0.0	specifies a limit that the **present_value** must exceed before an event is generated.
low_limit	59	Real	RW	NRAM 0.0	specifies a limit below which the **present_value** must fall before an event is generated.
deadband	25	Real	RW	NRAM 0.0	specifies a range between the **high_limit** and **low_limit** properties within which the **present_value** must remain for a TO-NORMAL event to be generated
AE	16743	UInt	RW	EE 0	**Alarm Enable** specifies the type of alarm checking to be done on the present_value. 0=disabled (default) 4=low limit alarm 5=high limit alarm 6=low and high limit
AS	16747	UInt	RO	RAM 0	**Alarm Status** displays the current alarm condition. A value of 0 indicates a normal condition; a nonzero number indicates alarm generation. 0=no alarm 3=change of state 5=low limit alarm 6=high limit alarm
CA	16768	Float	RO	RAM 0.0	**Average Flow** displays the measured average pressure in inches w.c**.**
CB	16769	Bool	RW	RAM 0	**Calibrate Flow** allows a host or operator to manually calibrate the pressure sensor
CD	16771	Float	RW	RAM -	**Target Flow** displays the desired pressure setpoint

Property	Identifier #	Data Type	Access	Store & Default	Description
CK	16777	Uint	RW	EE 250	**Duct Scaling Factor (k)** displays the scaling factor as required to calibrate the static pressure reading.
DD	16794	Bool	RW	EE 0	**Damper Direction** used to set the direction of the damper motor. 0=Normal 1=Reverse
DM	16799	UInt	RW	EE 0	**Damper Mode** used to command the damper to fully open or to operate at minimum or maximum cooling, heating, and warm-up setpoints. 0=Automatic 1=Full Open
DP	16801	UInt	RO	RAM -	**Damper Position** shows the current status of the fan output
DS	16038	UInt	RO	RAM -	**Damper Status** **reports the status of the actuator as determined by the MMT.** **0=Ready** **1=Disconnected/Open** **2=Jammed/shorted**
FC	16824	Bool	RW	RAM -	**Fan Status/Control** shows the current status of the fan output. 0=Off 1=On
FH	16827	Float	RW	EE 0.20	**Flow Hysteresis** specifies the maximum amount of variation in the flow sensor reading to be tolerated by the *NB*-V3Tb before it shows a valid change of flow
KC	16884	UInt	RW	RAM 0.0	**Measured CFM for CK Adjust** when you enter the pressure value measured externally, this will automatically adjust the scaling factor (**CK**) based on the present pressure reading to properly scale the duct
RZ	16975	UInt	RO	RAM -	**Rejuvenate Count** when MMT detects the possibility of an actuator short, electrical pulses are used in an attempt to rejuvenate the motor
SU	16997	Float	RW	EE 0.0	**Setup/Setback Limit** specifies the amount to be added to the **high_limit** or subtracted from the **low_limit** during scheduled unoccupied periods.

A.5 SUPPLY TEMPERATURE

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Input (0), Instance 8	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM Supply Temperature	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Input (0)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM -	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	RAM 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	RAM 0	provides a way to determine if this object has an active event state associated with it.
reliability	103	BACnet Reliability	RO	RAM 0	indicates whether the **present_value** is "reliable" as far as the device or operator can determine.
out_of_service	81	Boolean	RW	EE 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	NRAM 64	indicates the measurement units of this object.
DD	16794	Real	RW	EE 2.5	**Auto Duct Delta Temperature** defines the temperature difference by which the supply air must either exceed the current heating setpoint to switch to 'heating mode', or fall below the current cooling setpoint to engage 'cooling' mode.
IC	16875	UInt	RW	EE 1	**Input Channel Select** specifies the input to be used to read the supply temperature 1=UI01 2=UI02 3=UI03 4=UI04 5=UI05
OF	16919	Real	RW	EE 0.0	**Supply/Duct Temperature Adjustment** defines an offset used to adjust **present_value**.
SM	16990	UInt	RO	RAM 0	**Cooling/Heating Supply Mode** indicates the current supply mode. This would be either Cooling or Heating as specified by the System Box Type (**BT**). If **BT** is set to supply dependant, the point will indicate the current mode as determined by the source/duct temperature. 0=Cooling 1=Heating

A.6 OUTSIDE AIR TEMPERATURE

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Input (0), Instance 9	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM Outside Air Temperature	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Input (0)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM -	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	RAM 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	RAM 0	provides a way to determine if this object has an active event state associated with it.
reliability	103	BACnet Reliability	RO	RAM 0	indicates whether the **present_value** is "reliable" as far as the device or operator can determine.
out_of_service	81	Boolean	RW	EE 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	NRAM 64	indicates the measurement units of this object.
IC	16875	UInt	RW	EE 2	**Input Channel Select** selects which input represents the supply air temperature 1=UI1 2=UI2 3=UI3 4=UI4 5=UI5
OF	16919	Real	RW	EE 0.0	**Outside Temperature Adjustment** defines an offset used to adjust the **present_value**.

A.7 AO01-AO04

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	EEPROM Analog Output (1), Instance *n* *n* = 1-4	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM AO0*n* *n* = 1-4	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Output (1)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM -	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	RAM 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	RAM 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RW	NRAM 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RW	NRAM 95	indicates the measurement units of this object.
min_pres_value	69	Real	RW	NRAM 0.0	indicates the lowest number that can be reliably used for the **present_value** property of this object.
max_pres_value	65	Real	RW	NRAM 100.0	indicates the highest number that can be reliably used for the **present_value** property of this object.
priority_array	87	BACnet Array	RO	-	contains prioritized commands that are in effect for this object.
relinquish_ default	104	Real	RO	- 0	the default value to be used for the **present_value** property when all command priority values in the **priority_array** property have a NULL value.
DT	16804	UInt	RW	EE 252	**PUP Data Type** specifies the PUP data type for the analog output. The data type determines how certain analog output properties are displayed. This point affects the display of **present_value**, **min_pres_value** and **max_pres_value**. The property defaults to 252 (unsigned, 9.1 digit).
HS	16863	Real	RW	EE 100.0	**Maximum Scaled Voltage** specifies the actual analog output value for a **present_value** value of **max_pres_val**.
LS	16894	Real	RW	EE 0.0	**Minimum Scaled Voltage** specifies the actual analog output value for a **present_value** value of **min_pres_value**.

A.8 COOL SETPOINT

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Value (2), Instance 1	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Cool Setpoint	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Value (2)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM -	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	- 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	- 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RO	- 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	RAM 64	indicates the measurement units of this object.

A.9 COOL UNOCCUPIED SETUP/SETBACK

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Value (2), Instance2	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Cool Unoccupied Setup/Setback	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Value (2)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM -	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	- 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	- 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RO	- 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	RAM 64	indicates the measurement units of this object.

A.10 COOL NIGHT SETUP/SETBACK

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Value (2), Instance 3	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Cool Night Setup/ Setback	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Value (2)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM -	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	- 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	- 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RO	- 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	RAM 64	indicates the measurement units of this object.

A.11 HEAT SETPOINT

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Value (2), Instance 4	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Heat Setpoint	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Value (2)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM -	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	- 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	- 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RO	- 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	RAM 64	indicates the measurement units of this object.

A.12 HEAT UNOCCUPIED SETUP/SETBACK

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Value (2), Instance 5	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Heat Unoccupied Setup/Setback	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Value (2)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM -	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	- 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	- 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RO	- 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	RAM 64	indicates the measurement units of this object.

A.13 HEAT NIGHT SETUP/SETBACK

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Value (2), Instance 6	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Heat Night Setup/ Setback	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Value (2)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM -	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	- 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	- 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RO	- 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	RAM 64	indicates the measurement units of this object.

A.14 WARMUP SETPOINT

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	EEPROM Analog Value (2), Instance 7	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM Warmup Setpoint	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Value (2)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM -	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	RAM 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	RAM 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RO	NRAM 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	NRAM 95	indicates the measurement units of this object.

A.15 BO01

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Binary Output (4), Instance 1	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- BO01	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Binary Output (4)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM -	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	RAM 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	RAM 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RW	EE 0	indicates whether or not the process this object represents is not in service.
polarity	84	BACnet Polarity	RW	EE 0	indicates the relationship between the physical state of the output and the logical state represented by the **present_value**e property. If the **polarity** property is NORMAL, then the ACTIVE state of the **present_value** property is also the ACTIVE or ON state of the physical output as long as **out_of_service** is FALSE. If the Polarity property is REVERSE, then the ACTIVE state of the **present_value** property is the INACTIVE or OFF state of the physical output as long as **out_of_service** is FALSE.
priority_array	87	BACnet Array	RO	-	contains prioritized commands that are in effect for this object.
relinquish_ default	104	Real	RO	- 0	the default value to be used for the **present_value** property when all command priority values in the **priority_array** property have a NULL value.
FD	16825	UInt	RW	EE 30	**Shutoff Delay (seconds)** the amount of time, in seconds, the fan output will stay energized once the zone temperature reaches the deadband.
FN	16829	UInt	RW	EE 0	**Night Setback Fan Mode** defines the mode of the fan during the night setback schedule state. 1 = fan runs for the entire period 0 = fan shuts off when zone temp is within the deadband.
FO	16830	UInt	RW	EE 1	**Occupied Fan Mode** defines the mode of the fan during the occupied schedule state. 1 = fan runs for the entire period 0 = fan shuts off when zone temp is within the deadband.
FR	16832	Real	RW	EE 0.5	**Minimum Run Time** the minimum amount of time, in minutes, the fan output will stay energized.
FS	16833	Real	RW	EE 1.0	**Minimum Off Time** the minimum amount of time, in minutes, the fan output will stay de-energized.

Property	Identifier #	Data Type	Access	Store & Default	Description
FU	16835	UInt	RW	EE 0	**Unoccupied Fan Mode** defines the mode of the fan during the unoccupied schedule state. 1 = fan runs for the entire period 0 = fan shuts off when zone temp is within the deadband.
FX	16836	Real	RW	EE 0.1	**Staging Delay** indicates the amount of time, in minutes, that the fan will operate before energizing the first stage of heating or cooling.
RH	16966	Real	RW	RAM -	**Run Hours** the total number of hours that the output has been energized.
RL	16968	Real	RW	EE 0.0	**Run Limit** specifies a run time limit in hours for the output. Once the run hours for the output exceed the runtime limit (**RH** > **RL**), the *NB*-V3T will generate a runtime limit alarm. To clear the run limit alarm or to receive another run limit alarm, set **RH** to 0.

A.16 BO02

Prop.	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Binary Output (4), Instance 2	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM BO02	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Binary Output (4)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM -	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	RAM 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	RAM 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RW	EE 0	indicates whether or not the process this object represents is not in service.
polarity	84	BACnet Polarity	RW	EE 0	indicates the relationship between the physical state of the output and the logical state represented by the **present_value**e property. If the **polarity** property is NORMAL, then the ACTIVE state of the **present_value** property is also the ACTIVE or ON state of the physical output as long as **out_of_service** is FALSE. If the Polarity property is REVERSE, then the ACTIVE state of the **present_value** property is the INACTIVE or OFF state of the physical output as long as **out_of_service** is FALSE.
priority_array	87	BACnet Array	RO	-	contains prioritized commands that are in effect for this object.
relinquish_ default	104	Real	RO	- 0	the default value to be used for the **present_value** property when all command priority values in the **priority_array** property have a NULL value.
CL	16778	Real	RW	EE 55.0	**Cooling OAT Lockout** Cooling stages will not be engaged if a reliable (**reliability**=0) Outside Air Temperature (**present_value**) is available that is below the temperature specified by this property. Stages will not be de-energized should the OAT fall below this temperature during an active cycle.
DB	16792	Real	RW	EE 0.0	**Deadband** defines the amount by which the temperature must drop below the setpoint before the stage will be de-energized.
MR	16901	Real	RW	EE 3.0	**Minimum Run Time** shows the minimum amount of time, in minutes, the stage will stay energized.
MS	16902	Real	RW	EE 7.0	**Minimum Off Time** shows the minimum amount of time, in minutes, the stage will stay de-energized.
MX	16905	Real	RW	EE 20.0	**Staging Delay (minutes)** indicates the amount of time, in minutes, that the stage will operate before energizing the next stage of cooling.

Prop.	Identifier #	Data Type	Access	Store & Default	Description
RH	16966	Real	RW	RAM -	**Run Hours** the total number of hours that the output has been energized.
RL	16968	Real	RW	EE 0.0	**Run Limit** specifies a run time limit in hours for the output. Once the run hours for the output exceed the runtime limit (**RH** > **RL**), the *NB*-V3T will generate a runtime limit alarm. To clear the run limit alarm or to receive another run limit alarm, set **RH** to 0.
TL	17010	Real	RW	EE 45.0	**Low Temperature Lockout** defines the minimum source/duct temperature below which cooling will be disengaged.
TO	17012	Real	RW	EE 0.0	**Stage Temperature Offset** indicates the temperature offset from setpoint required before engaging the stage. Note that the stage may also engage if the Staging Time of the prior stage expires.

A.17 BO03

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Binary Output (4), Instance 3	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM BO03	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Binary Output (4)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM -	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	RAM 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	EE 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RW	EE 0	indicates whether or not the process this object represents is not in service.
polarity	84	BACnet Polarity	RW	EE 0	indicates the relationship between the physical state of the output and the logical state represented by the **present_value**e property. If the **polarity** property is NORMAL, then the ACTIVE state of the **present_value** property is also the ACTIVE or ON state of the physical output as long as **out_of_service** is FALSE. If the Polarity property is REVERSE, then the ACTIVE state of the **present_value** property is the INACTIVE or OFF state of the physical output as long as **out_of_service** is FALSE.
priority_array	87	BACnet Array	RO	-	contains prioritized commands that are in effect for this object.
relinquish_ default	104	Real	RO	- 0	the default value to be used for the **present_value** property when all command priority values in the **priority_array** property have a NULL value.
DB	16792	Real	RW	EE 0.0	**Deadband** defines the amount by which the temperature must drop below the setpoint before the stage will be de-energized.
MR	16901	Real	RW	EE 3.0	**Minimum Run Time** shows the minimum amount of time, in minutes, the stage will stay energized.
MS	16902	Real	RW	EE 7.0	**Minimum Off Time** shows the minimum amount of time, in minutes, the stage will stay de-energized.
RH	16966	Real	RW	RAM -	**Run Hours** the total number of hours that the output has been energized.
RL	16968	Real	RW	EE 0.0	**Run Limit** specifies a run time limit in hours for the output. Once the run hours for the output exceed the runtime limit (**RH** > **RL**), the *NB*-V3T will generate a runtime limit alarm. To clear the run limit alarm or to receive another run limit alarm, set **RH** to 0.

Property	Identifier #	Data Type	Access	Store & Default	Description
TO	17012	Real	RW	EE 2.0	**Stage Temperature Offset** indicates the temperature offset from setpoint required before engaging the stage. Note that the stage may also engage if the Staging Time of the prior stage expires.

A.18 BO04

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Binary Output (4), Instance 4	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM BO04	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Binary Output (4)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM -	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	RAM 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	RAM 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RW	EE 0	indicates whether or not the process this object represents is not in service.
polarity	84	BACnet Polarity	RW	EE 0	indicates the relationship between the physical state of the output and the logical state represented by the **present_value**e property. If the **polarity** property is NORMAL, then the ACTIVE state of the **present_value** property is also the ACTIVE or ON state of the physical output as long as **out_of_service** is FALSE. If the Polarity property is REVERSE, then the ACTIVE state of the **present_value** property is the INACTIVE or OFF state of the physical output as long as **out_of_service** is FALSE.
priority_array	87	BACnet Array	RO	-	contains prioritized commands that are in effect for this object.
relinquish_ default	104	Real	RO	- 0	the default value to be used for the **present_value** property when all command priority values in the **priority_array** property have a NULL value.
DB	16792	Real	RW	EE 0.0	**Deadband** defines the amount by which the temperature must drop below the setpoint before the stage will be de-energized.
HL	16858	Real	RW	EE 80.0	**Heating OAT Lockout** Heating stages will not be engaged if a Reliable (**reliability**=0) Outside Air Temperature (**present_value**) is available that is above the temperature specified by this property. Stages will not be de-energized should the OAT rise above this temperature during an active cycle.
MR	16901	Real	RW	EE 3.0	**Minimum Run Time** shows the minimum amount of time, in minutes, the stage will stay energized.
MS	16902	Real	RW	EE 7.0	**Minimum Off Time** shows the minimum amount of time, in minutes, the stage will stay de-energized.
MX	16905	Real	RW	EE 20.0	**Stage Delay** indicates the amount of time, in minutes, that the stage will operate before energizing the next stage of heating.

Property	Identifier #	Data Type	Access	Store & Default	Description
RH	16966	Real	RW	RAM -	**Run Hours** the total number of hours that the output has been energized.
RL	16968	Real	RW	EE 0.0	**Run Limit** specifies a run time limit in hours for the output. Once the run hours for the output exceed the runtime limit (**RH** > **RL**), the *NB*-V3T will generate a runtime limit alarm. To clear the run limit alarm or to receive another run limit alarm, set **RH** to 0.
TH	17009	Real	RW	EE 105.0	**High Temp Lockout** specifies the temperature below which heating stages will be engaged if there is a reliable source/duct temperature.
TO	17012	Real	RW	EE 0.0	**Stage Temperature Offset** indicates the temperature offset from setpoint required before engaging the stage. Note that the stage may also engage if the Staging Time of the prior stage expires.

A.19 BO05

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Binary Output (4), Instance 5	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM BO05	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Binary Output (4)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM -	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	RAM 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	RAM 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RW	EE 0	indicates whether or not the process this object represents is not in service.
polarity	84	BACnet Polarity	RW	EE 0	indicates the relationship between the physical state of the output and the logical state represented by the **present_value**e property. If the **polarity** property is NORMAL, then the ACTIVE state of the **present_value** property is also the ACTIVE or ON state of the physical output as long as **out_of_service** is FALSE. If the Polarity property is REVERSE, then the ACTIVE state of the **present_value** property is the INACTIVE or OFF state of the physical output as long as **out_of_service** is FALSE.
priority_array	87	BACnet Array	RO	-	contains prioritized commands that are in effect for this object.
relinquish_ default	104	Real	RO	- 0	the default value to be used for the **present_value** property when all command priority values in the **priority_array** property have a NULL value.
DB	16792	Real	RW	EE 0.0	**Deadband** defines the amount by which the temperature must drop below the setpoint before the stage will be de-energized.
MR	16901	Real	RW	EE 3.0	**Minimum Run Time** shows the minimum amount of time, in minutes, the stage will stay energized.
MS	16902	Real	RW	EE 7.0	**Minimum Off Time** shows the minimum amount of time, in minutes, the stage will stay de-energized.
RH	16966	Real	RW	RAM -	**Run Limit** specifies a run time limit in hours for the output. Once the run hours for the output exceed the runtime limit (**RH** > **RL**), the *NB*-V3T will generate a runtime limit alarm. To clear the run limit alarm or to receive another run limit alarm, set **RH** to 0.
RL	16968	Real	RW	EE 0.0	**Minimum Run Time** shows the minimum amount of time, in minutes, the stage will stay energized.

Property	Identifier #	Data Type	Access	Store & Default	Description
TO	17012	Real	RW	EE 2.0	**Stage Temperature Offset** indicates the temperature offset from setpoint required before engaging the stage. Note that the stage may also engage if the Staging Time of the prior stage expires.

A.20 SCHEDULE

<table>
<tr><th>Property</th><th>Identifier #</th><th>Data Type</th><th>Access</th><th>Store & Default</th><th>Description</th></tr>
<tr><td>object_
identifier</td><td>75</td><td>BACnet
ObjID</td><td>RO</td><td>NRAM
Schedule (17),
Instance1</td><td>a numeric code that is used to identify the object.</td></tr>
<tr><td>object_name</td><td>77</td><td>CharStr</td><td>RO</td><td>NRAM
Schedule</td><td>represents a name for the object that is unique within the device.</td></tr>
<tr><td>object_type</td><td>79</td><td>BACnet
ObjType</td><td>RO</td><td>-
Schedule (17)</td><td>indicates membership in a particular object type class.</td></tr>
<tr><td>present_value</td><td>85</td><td>Real</td><td>RO</td><td>RAM
0</td><td>indicates the current value, in engineering units, of the object.</td></tr>
<tr><td>effective_period</td><td>32</td><td>BACnet
Date</td><td>RO</td><td>Always</td><td>specifies the range of dates within which the Schedule object is active.</td></tr>
<tr><td>weekly_
schedule</td><td>123</td><td>BACnet
Array</td><td>RW</td><td>EE
<table><tr><th>Time</th><th>Mode</th></tr><tr><td>7:00</td><td>1
(Warmup)</td></tr><tr><td>8:00</td><td>2
(Occupied)</td></tr><tr><td>17:00</td><td>0
(Unoccupied)</td></tr><tr><td>20:00</td><td>3
(Night
Setback)</td></tr></table></td><td>a BACnetARRAY containing exactly seven elements, each containing a BACnetDailySchedule. A BACnetDailySchedule consists of a list of BACnetTimeValues that are (time, value) pairs, which describe the sequence of schedule actions on one day of the week when no Exception_Schedule is in effect. The array elements 1-7 correspond to the days Monday - Sunday, respectively.</td></tr>
<tr><td>exception_
schedule</td><td>38</td><td>BACnet
Array</td><td>RW</td><td>EE
<table><tr><th>Time</th><th>Mode</th></tr><tr><td>7:00</td><td>1
(Warmup)</td></tr><tr><td>8:00</td><td>2
(Occupied)</td></tr><tr><td>17:00</td><td>0
(Unoccupied)</td></tr><tr><td>20:00</td><td>3
(Night
Setback)</td></tr></table></td><td>a BACnetARRAY of BACnetSpecialEvents, each of which describes a sequence of schedule actions that takes precedence over the normal day's behavior on a specific day or days.</td></tr>
<tr><td>list_of_object_
property_
references</td><td>54</td><td>ObjID</td><td>RO</td><td>-
NULL</td><td>specifies the Device Identifiers, Object Identifiers and Property Identifiers of the properties to be written with specific values at specific times on specific days.</td></tr>
<tr><td>priority_for_
writing</td><td>88</td><td>Unsigned</td><td>RO</td><td>-
7</td><td>defines the priority at which the referenced properties are commanded.</td></tr>
<tr><td>HE</td><td>16853</td><td>Bool</td><td>RW</td><td>EE
0</td><td>Host Overrides
specifies whether to use the host schedule.

0=disabled
1=enabled</td></tr>
</table>

Property	Identifier #	Data Type	Access	Store & Default	Description
HO	16860	UInt	RW	RAM 0	**Host Schedule** specifies the desired schedule override state when **HE**=1. 0 = unoccupied 1 = warm-up 2 = occupied 3 = night setback
IS	16882	UInt	RW	EE 3	**Inactive Schedule State** determines which schedule state the *NB*-V3T should follow when there is no active schedule. 0 = unoccupied 1 = warm-up 2 = occupied 3 = night setback
ZE	17081	Bool	RW	EE 0	**Receive Schedule** enables the *NB*-V3T to receive network schedule broadcasts and sets present_value based on the received value. 0=No 1=Yes

A.21 HOLIDAY CALENDAR

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	EEPROM Calendar (6), Instance 1	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM Holiday Calendar	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Calendar (6),	indicates membership in a particular object type class.
present_value	85	Real	RO	RAM 0	indicates the current value, in engineering units, of the object.
datelist	23	BACnet Calendar Entry	RW	EE Empty	a list of BACnetCalendarEntries, each of which is either an individual date (Date), range of dates (BACnetDateRange). If the current date matches the calendar entry criteria, the present value of the Calendar object is TRUE.

A.22 ECONOMIZER

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Proprietary (133), Instance 1	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM Economizer	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Proprietary (133))	indicates membership in a particular object type class.
CM	16779	Real	RO	RAM -	**Calculated Minimum Position** displays the actual minimum position of the economizer damper.
ED	16808	Real	RW	EE 1.0	**Economizer Staging Delay (minutes)** specifies how many minutes the controller waits before using additional cooling stages after the economizer damper reaches 100%.
EE	16809	UInt	RW	EE 0	**Economizer Enable** specifies the PID channel or Digital Output to be used for economizer control. A value of zero in **EE** disables economizer control. 0=Off 1=PID 1 2=PID 2 3=PID 3 4=PID 4 5=DO 3 6=DO 5
EM	16813	Real	RW	EE 10.0	**Economizer Minimum Position (%)** specifies the PID minimum position in percent for the economizer damper.
ML	16090	Real	RW	EE 0.0	**Reset Limit** specifies the value at which maximum reset is used. When the value of the reset variable is equal to **ML**, the maximum reset (**MR**) is used in determining the calculated minimum position.
MP	16900	Real	RW	EE 0.0	**Reset Setpoint** specifies the value at which the reset action begins. When the value of the reset variable exceeds **MP**, reset action will be used in determining the economizer minimum position.
MR	16901	Real	RW	EE 0.0	**Maximum Reset** specifies the maximum amount to reset the minimum position setpoint (**EM**) by when reset is being used.
MV	16904	UInt	RW	EE 0	**Reset Variable for Economizer Minimum Position** specifies the input to be used for calculating the reset. A value of zero disables reset. 0=Disabled 1=Zone Temperature 2=Supply Temperature 4=UI01 5=UI02 6=UI03 7=UI04 8=UI05 11=OAT
OH	16920	Real	RW	EE 60.0	**OAT High Limit** specifies the Outside Air Temperature (OAT) high limit. If the OAT is above the high limit, the PID is set to the Economizer Minimum Position (**EM**).

Property	Identifier #	Data Type	Access	Store & Default	Description
OL	16922	Real	RW	EE 45.0	**OAT Low Limit** specifies the Outside Air Temperature (OAT) low limit. If the OAT is below the low limit, the PID is set to the Economizer Minimum Position (**EM**).

A.23 PID CONTROL 1-4

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Proprietary (133), Instance *n* *n* = 11 - 14	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM PID Control *n* *n* = 1-4	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Proprietary (133)	indicates membership in a particular object type class.
AO	16746	UInt	RW	RAM NA	**Analog Output** shows the scaled output value used by the analog output and is a reflection of the Analog Output property present_value. This point is the Percent Output (**PO**) value scaled to **min_pres_value** and **max_pres_value** of the corresponding analog output **AO**.
CE	16772	Bool	RW	EE 0	**Control Enable** enables the PID loop. When **CE**=0, **PO** is not updated but may be set manually. When **CE**=1, **PO** is updated by the PID control loop and, if the analog output is set to automatic control, the **AO** value will be set accordingly. 0=No 1=Yes
CS	16783	Real	RO	RAM 0.0	**Control Setpoint** specifies the setpoint for the PID loop.
DB	16792	Real	RW	EE 0.0	**Deadband** specifies the deadband within the proportional control band in which the output remains constant at a point midway between maximum output and minimum output.
I1	16868	Bool	RW	EE 0	**Interlock 1 Enable** enables/disables PID Interlock 1. 0=Disabled 1=Enabled
I2	16869	Bool	RW	EE 0	**Interlock 2 Enable** enables/disables PID Interlock 2. 0=Disabled 1=Enabled
I3	16870	Bool	RW	EE 0	**No Flow Interlock Enable** enables/disables the flow interlock. 0=Disabled 1=Enable

Property	Identifier #	Data Type	Access	Store & Default	Description
IC	16876	UInt	RW	EE 0	**Input Select** specifies the input to be used for the control loop's measured variable. A value of 0 in **IC** disables the control loop. 0= disabled 1=Zone Temp 2=Supply Temp 4=UI1 5=UI2 6 =UI3 7 =UI4 8=UI5 9=Zone Heating 10=Zone Cooling 11=OAT
IN	16880	Real	RO	RAM -	**Input Value** read only property that displays the value of the input selected in **IC**.
MR	16901	Real	RW	EE 0.0	**Maximum Reset** specifies the maximum amount needed to reset the loop setpoint (**SP**) based on when reset is being used. **CS** takes into account the use of the maximum reset specified in **MR**.
P1	16930	Real	RW	EE 0.0	**Interlock 1 Position** specifies the PID output value when Interlock 1 is active and enabled (0.0-100.0%)
P2	16931	Real	RW	EE 0.0	**Interlock 2 Position** specifies the PID output value when Interlock 2 is active and enabled (0.0-100.0%)
P3	16932	Real	RW	EE 0.0	**No Flow Interlock Position** specifies the PID output value when the FLow Interlock is active and enabled (0.0-100.0%)
PB	16940	Real	RW	EE 0.0	**Proportional Band** specifies the input variable range over which the output value is proportional to the error value (i.e., changes in the measured variable result in proportional changes in the output signal).
PO	16949	Real	RW	RAM -	**Percent Output** shows the output value in hundredths of a percent (e.g., 75.00%).
RC	16963	Real	RO	RAM -	**Reset Value** displays the value of the input selected in Reset Variable (**RV**).
RL	16968	Real	RW	EE 0.0	**Reset Limit** specifies the value at which maximum reset is used.
RP	16971	UInt	RW	EE 0	**Reset Period** specifies the reset period (in seconds) over which the error history is accumulated.
RS	16972	Real	RW	EE 0.0	**Reset Setpoint** the reset control setpoint for the value of the reset variable selected by **RV**.
RT	16973	Real	RW	EE 0.0	**Rate** specifies a percentage of change in error that is to be used in calculating **PO**. The value is specified in percent per second. **RT** can have any value from 0.0 to 25.5% per second.

Property	Identifier #	Data Type	Access	Store & Default	Description
RV	16974	UInt	RW	EE 0	**Reset Variable** specifies the input to be used for calculating the reset used by the control loop. 0= disabled 1=Zone Temp 2=Supply Temp 4=UI1 5=UI2 6 =UI3 7 =UI4 8=UI5 11=OAT
SG	16986	UInt	RW	EE 0	**Action** specifies the control action for the PID loop. 0=normal (positive error causes an increase in output). 1=reverse (positive error causes a decrease in output)
SP	16993	Real	RW	EE 0.0	**Loop Setpoint** specifies the desired loop setpoint.
SU	16997	Real	RW	EE 0.0	**Setup/Setback** specifies the amount to add (if **SG**=0) or subtract (if **SG**=1) from the setpoint during scheduled unoccupied periods.

A.24 OCCUPANCY DETECTION

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Proprietary (131), Instance1	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM Occupancy Detection	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Proprietary (131)	indicates membership in a particular object type class.
IC	16876	UInt	RW	EE 0	**Input Select** specifies the input to be used for occupancy detection. 0 = None 1 = UI1 2 = UI2 3 = UI3 4 = UI4 5 = UI5
MD	16896	UInt	RW	EE 30	**Extended Occupancy Delay** sets the amount of time, in seconds, during which the occupancy detector must remain on before the occupancy detector will override the zone. This prevents false triggers that might occur as others pass quickly through the zone.
MR	16901	UInt	RO	RAM -	**Extended Occupancy Remaining** displays the time remaining for occupancy detector override.
MS	16902	UInt	RO	RAM 0	**Occupancy Status** the status of the occupancy detector digital input. To enable occupancy detection, **MT** must be greater than 0 and the input used MUST be configured as digital (**ST**=0). If either of these two conditions are not met, **MS** will display 0. 0=No Detection 1=Detection
MT	16903	UInt	RW	EE 0	**Extended Occupancy Duration** defines, in minutes, the length of time that the zone will be overridden whenever occupancy is detected.

A.25 PROOF OF FLOW

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Proprietary (131), Instance 2	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM Proof of Flow	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Proprietary (131))	indicates membership in a particular object type class.
IC	16876	UInt	RW	EE 0	**Input Select** specifies the input to be used for flow detection. 0 =None 1 = UI1 2 = UI2 3 = UI3 4 = UI4 5 = UI5
PD	16942	UInt	RW	EE 60	**Proof of Flow Delay (seconds)** specifies the amount of time, in seconds, that must elapse before enabling a positive flow indication.
PF	16944	UInt	RO	RAM -	**Proof of Flow Indication** displays the status of the fan.

A.26 DAMPER 0-15

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Proprietary (135)), Instance *n* *n* = 0-15	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM Damper *n* n = *0-15*	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Proprietary (135)	indicates membership in a particular object type class.
DL	16798	Real	RO	RAM -	**Reported Demand Load** reports the current demand load for the referenced damper controller.
ER	16816	UInt	RO	RAM -	**Extended Occupancy Remaining** reflects the extended occupancy time remaining for each damper controller
ID	16877	UInt	RW	EE 0	**Damper *n* Network ID** (*n*=0-15) contain the unit ID (0-127) number for the damper controller
OI	16921	Bool	RW	EE 0	**Zone Bypass** If set to Active, the defined damper controller is used in control. If set as Bypassed, the damper controller is ignored. 0=Active 1=Bypassed
RE	16963	Bool	RO	RAM -	**Unreliable?** 0=Relliable 1=Unreliable
SC	16982	Real	RW	EE 1.0	**Cooling Sensitivity** defines a weighting factor for each damper controller when calling for cooling.
SH	16987	Real	RW	EE 1.0	**Heating Sensitivity** defines a weighting factor for each damper controller when calling for cooling.
ST	16996	Bool	RW	EE 0	**Send Supply Temp Flag** If set to Yes (**ST**=1) the current Supply Temperature (Supply Temperature:**present_value**) will be written to the Supply Temperature object in the damper controller. Note that the Supply Temperature must be set for Override in that controller.

A.27 OUTSIDE AIR TEMP. BROADCAST

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Proprietary (143), Instance 0	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM Outside Air Temp. Broadcast	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Proprietary (143)	indicates membership in a particular object type class.
BE	16752	Bool	RW	0	**OAT Broadcast Enable** enables the *NB*-V3T to receive network broadcasts. 0=No 1=Yes
CV	16785	Real	RO	RAM -	**Current Value** shows the current value of the network broadcast schedule values received by the *NB*-V3T
RB	16962	Bool	RW	EE 0	**Receive Broadcasts?** enables reception of OAT broadcasts and sets **CV** based on the received value. 0=No 1=Yes

A.28 BROADCAST SCHEDULE

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Proprietary (143), Instance 5	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM Broadcast Schedule	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Proprietary (143))	indicates membership in a particular object type class.
CV	16785	UInt	RO	RAM 0	**Current Value** shows the current value of the network broadcast schedule values received by the *NB*-V3T
RB	16962	Bool	RW	EE 0	**Receive Broadcasts?** Enables the *NB*-V3T to receive network broadcasts and sets **CV** value based on the received value. 0=No 1=Yes

APPENDIX B: NB-V3Td PROPERTIES

The following tables contain listings of the BACnet objects and property assignments for the NB-V3Td. Each property is listed with its identifier number, data type, access code, storage, default value (if any) and a brief description of its functionality.

IN THIS SECTION

B.1 DEVICE

NOTE

The Device object is represented in *NB*-Pro as follows:
AAM V3T Bypass xxxxxxxxxx
(where xxxxxxxxxx is the Unitary Controller serial number)

Property	Identifier #	Data Type	Access	Storage & Default	Description
object_ identifier	75	BACnet ObjID	RW	- Device (8), Instance *n* *n* = last seven digits of SN #	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- AAM NB-V3T Bypass *serial number*	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Device (8)	indicates membership in a particular object type class.
system_status	112	BACnet ObjID	RO	- 0	indicates the current physical and logical status of the BACnet Device.
vendor_name	121	CharStr	RO	- American Auto-Matrix	identifies the manufacturer of the BACnet Device.
vendor_ identifier	120	Unsigned	RO	- 6	a unique vendor identification code, assigned by ASHRAE, which is used to distinguish proprietary extensions to the protocol.
model_name	70	CharStr	RO	- NB-V3T Damper	indicates the vendor's name used to represent the model of the device.
firmware_ revision	44	CharStr	RO	- revision number	indicates the level of firmware installed in the device.
application_ software_ version	12	CharStr	RO	- version number	identifies the version of application software installed in the device.
protocol_ version	98	Unsigned	RO	- 1	indicates the version of the BACnet protocol supported by this BACnet Device.
protocol_ revision	139	Unsigned	RO	- 2	indicates the minor revision level of the BACnet standard.
protocol_ services_ supported	97	BACnet Services Supported	RO	-	indicates which standardized protocol services are supported by this device's protocol implementation.
protocol_ object_ types_ supported	96	BACnet Object Types Supported	RO	-	indicates which standardized object types are supported by this device's protocol implementation.
object_list	76	BACnet Array	RO	-	a list of each object within the device that is accessible through BACnet services.

Property	Identifier #	Data Type	Access	Storage & Default	Description
max_apdu_ length_ accepted	62	Unsigned	RO	- 50	specifies the maximum number of information frames the node may send before it must pass the token.
segmentation_ supported	107	BACnet Segment ation	RO	- 3	indicates whether the device supports segmentation of messages and, if so, whether it supports segmented transmission, reception, or both.
local_time	57	Time	RW	RAM -	indicates the time of day to the best of the device's knowledge.
local_date	56	Date	RW	RAM -	indicates the date to the best of the device's knowledge.
database_ revision	155	UInt	RO	- 1	indicates the logical revision number for the device's database. the revision is incremented when an object is created, an object is deleted, an object's name is changed, or a restore is performed.
apdu_timeout	11	Unsigned	RW	EE 300	indicates the amount of time, in milliseconds, between retransmissions of an APDU requiring acknowledgment for which no acknowledgment has been received.
number_of_ apdu_retries	73	Unsigned	RW	EE 1	indicates the maximum number of times that an APDU shall be retransmitted.
time_ synchronization _recipients	116	List	RW	EE 0	a list of devices to which the device may automatically send a TimeSynchronization request.
max_master	64	Unsigned	RW	EE 127	specifies the highest possible address for master nodes and shall be less than or equal to 127.
max_info_ frames	63	Unsigned	RW	EE 4	specifies the maximum number of information frames the node may send before it must pass the token.
device_ address_ binding	30	List	RW	- NULL	a list of the device addresses that will be used when the remote device must be accessed via a BACnet service request.
BU	16758	Bool	RW	RAM 0	**Backup Control** **BU** = 1 forces backup of **AE** and digital outputs 1-5 **RH** to EEPROM.
CC	16770	UInt	RW	EE 0	**Count of Clock Fails** increments upon hardware failure but can also be advanced during the removal of power.
CM	16779	UInt	RO	- 255	**Controller Manufacturer Code**
CP	16781	UInt	RW	EE 0	**Network Baud Rate** 0=9600 6=38.4K 7=19.2K 9=57.6K
CT	16784	UInt	RO	- 203	**Controller Type** factory-set controller type identifies the type of unitary controller. **CT** for the *NB*-V3T is 203.
DE	16795	UInt	RW	RAM 0	**Default Enable Command** restores configuration settings to factory defaults. Enter 197 to set the defaults.

Property	Identifier #	Data Type	Access	Storage & Default	Description
EM	16813	Bool	RW	EE 0	**English/Metric** specifies which units of measurement to use in returning temperature values. 0 = English 1 = Metric Units
F1	16820	Bool	RW	EE 0	**Interlock 1 Trips Fan (Y/N)** 0=Interlock 1 will not trip the fan. 1= the fan is shut down when Interlock 1 is active.
F2	16821	Bool	RW	EE 0	**Interlock 2 Trips Fan (Y/N)** 0=Interlock 2 will not trip the fan. 1= the fan is shut down when Interlock 2 is active.
F3	16822	Bool	RW	EE 0	**No Flow Trips Fan (Y/N)** 0=Interlock 3 will not trip the fan. 1= the fan is shut down when Interlock 3 is active.
FT	16834	UInt	RO	- 4	**Firmware Type** defines the class of firmware operating system used in this controller.
I1	16868	UInt	RW	EE 0	**Interlock 1 Input Channel** specifies the input to be used for Interlock 1. Disabling this input disables the PID Interlock 1. 0=Disabled 1=UI1 2=UI2 3=UI3 4=UI4 5=UI5
I2	16869	UInt	RW	EE 0	**Interlock 2 Input Channel** specifies the input to be used for Interlock 2. Disabling this input disables the PID Interlock 2. 0=Disabled 1=UI1 2=UI2 3=UI3 4=UI4 5=UI5
I3	16870	UIntBool	RW	EE 0	**Fan Failure Interlock** used as a Proof of Flow interlock 0=Disabled 1=Fan Status
IC	16876	UInt	RO	EE 0	**EEPROM Default Count** increments whenever the EEPROM is restored to factory default settings
ID	16877	UInt	RW	EE Factory Set	**Unit ID** This value is used to set a unique network address for each controller connected on a multidrop. Each ID is factory set to the last two digits of the board serial number.
IS	16882	bitstring	RO	RAM N/A	**Interlock Status** displays the status of all of the interlocks. bit #0=Interlock 1 bit #1=Interlock 2 bit #2=Interlock 3

Property	Identifier #	Data Type	Access	Storage & Default	Description
MS	16902	UInt	RW	EE 0	**Master/Slave Mode** used to select a mode for the controller with 0=Master (default) 1=Slave
OC	16917	UInt	RW	EE 0	**Count of Illegal Opcodes** increments upon firmware failure but can also be advanced during the removal of power.
OS	16925	Real	RO	N/A	Kernel Version
PD	16942	UInt	RW	EE 5	**Power-on Delay** determines how long the *NB*-V3T waits before energizing its outputs after power loss or soft reset. **PD** defaults to 5 seconds.
PS	16951	UInt	RW	EE 2	**Power-up State** determines which schedule state to use after a power loss and before time sync. 0=unoccupied 1=warmup 2=occupied 3=night setback
RC	16963	UInt	RW	EE 0	**Count of Resets** increments each time power is applied to the controller.
RI	16967	Bool	RW	EE 0	**Reset Fan Failure Interlock** When Fan Failure Interlock is enabled to shut down the fan (FF00;**F3**=1), setting Reset Fan Failure Interlock (FF00;**RI**=1) allows the fan to restart.
RS	16972	Bool	RW	RAM 0	**Reset** allows a host or operator to reset the controller by setting RS = 1. 0 = disabled (default), 1 = reset controller
SN	16991	UInt	RO	EE factory set	**Serial Number** displays the serial number of the *NB*-V3T controller
SR	16994	UInt	RO	RAM Flash	**Software Time Stamp** uniquely defines each flash firmware image. The numerically higher the firmware image, the more recent it is.
UP	17030	UInt	RO	EE 0	**Flash Update Count** increments each time a new flash firmware image is accepted by the controller.
VE	17043	Real	RO	RAM Flash	**Software Version** contains the version number of the active firmware.
WC	17050	UInt	RW	EE 0	**Count of Watchdog Cop** increments upon firmware failure but can also be advanced during the removal of power.
ZN	17084	UInt	RW	EE 0	**Zone Number** used to group controllers together so that they can be controlled simultaneously.
ZP	17085	UInt	RO	RAM 0	**Count of High Current Pulses** advances when MMT takes action to maintain the operation of the actuator. The activity on this count should be low. If it is high, the actuator is reaching the end of its life.

B.2 ZONE TEMPERATURE

Property	Identifier #	Data Type	Access	Storage & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Input (0), Instance 0	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Zone Temperature	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Input (0)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM 0	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	RAM 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	RAM 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RW	EE 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	RAM 95	indicates the measurement units of this object.
high_limit	45	Real	RW	NRAM 0.0	specifies a limit that the **present_value** must exceed before an event is generated.
low_limit	59	Real	RW	NRAM 0.0	specifies a limit below which the **present_value** must fall before an event is generated.
deadband	25	Real	RW	NRAM 0.0	specifies a range between the **high_limit** and **low_limit** properties within which the **present_value** must remain for a TO-NORMAL event to be generated
AE	16743	UInt	RW	EE 0	**Alarm Enable** specifies the type of alarm checking to be done on the **present_value**. 0=disabled 4=low limit alarm 5=high limit alarm 6=low and high limit
AS	16747	UInt	RO	RAM 0	**Alarm Status** shows the current alarm condition. A value of 0 indicates a normal condition; a nonzero number indicates alarm generation. 0=No alarm (Default) 5=Low limit alarm 6=high limit alarm
BM	16754	UInt	RW	EE 0	**SSB Bus Mode** determines how the controller will behave when multiple controllers are wired onto a SSB. 0=Master (default) 1=Slave

Property	Identifier #	Data Type	Access	Storage & Default	Description
BT	16757	UInt	RW	EE 3	**Application** 0 = CAV 1 = cooling only 2 = heating only 3 = supply dependant
CC	16770	Real	RO	RAM NA	**Current Cooling Setpoint** current cooling temperature control setpoint including setback and user adjustments
CH	16775	Real	RO	RAM	**Current Heating Setpoint** current heating temperature control setpoint including setbacks and user adjustments.
DF	16796	UInt	RW	EE 0	**Thermostat Display Format** defines the format used to display the current temperature on the digital thermostat. 0=##° 1=##.#° 2=##°F 3=##.#°F 4=None
DL	16798	Real	RO	RAM 0	**Total Zone Demand Load** indicates the heating/cooling demand in terms of temperature separation from setpoints. A cooling demand will be indicated by a negative value and a heating demand by a positive value. If the zone is satisfied, then **DL** will be 0.
DM	16799	UInt	RO	RAM 0	**Demand Mode Cool/Heat/Vent** indicates the demand for the zone. A satisfied zone will indicate “vent” (**DM**=0). If the *NB*-V3T is in cooling mode and the zone temperature exceeds the cooling setpoint, “cool” is indicated (**DM**=1). If the controller is in heating mode and the zone temperature falls below the heating setpoint, “heat” is indicated (**DM**=2). 0=Vent 1=Cool 2=Heat
DS	16803	UInt	RW	EE 0	**Thermostat Display Mode** specifies whether English or Metric units are to be used for digital thermostat display on the *SBC*-STAT3. 0=°F (default) 1=°C
DV	16805	UInt	RW	EE 0	**Thermostat Display Value** determines whether each digital thermostat will display the identical temperature value which will be the average of all readings or if each thermostat will display its own temperature (including offset). 0=Display Average 1=Individual Temperature
ED	16808	UInt	RW	EE 60	**Extended Occupancy Time** specifies the amount of time in minutes to extend occupancy. **ED** has a default value of 60.
ER	16816	UInt	RO	RAM NA	**Extended Occupancy Remaining** shows the amount of time remaining in extended occupancy.
G0	16837	UInt	RO	RAM NA	**Global ID for Device** the Global Identification for the first Sensor Bus device.
G1	16838	UInt	RO	RAM NA	**Global ID for Device** the Global Identification for the second Sensor Bus device.

Property	Identifier #	Data Type	Access	Storage & Default	Description
G2	16839	UInt	RO	RAM NA	**Global ID for Device** the Global Identification for the third Sensor Bus device.
G3	16840	UInt	RO	RAM NA	**Global ID for Device** the Global Identification for the fourth Sensor Bus device.
OF	16919	Real	RW	EE 0	**Temperature Adjustment** defines an optional correction that may be required as an adjustment for the thermostat location and the possible measurement errors.
PB	16940	UInt	RW	EE 2200	**Balance P.I.N.** this Personal Identification Number controls access to the Balance Menu. A value of 0 makes the menu always accessible. 0000-9999
PG	16945	UInt	RW	EE NA	**Primary STAT Bus GID** specifies the GID of the Primary thermostat in Primary GID mode (**RM**=8). If this thermostat is not available, then the Average temperature mode (**RM**=0) is used.
PI	16947	UInt	RW	EE 3300	**Installer P.I.N.** this Personal Identification Number controls access to all menus. A value of 0 makes the menu always accessible. 0000-9999
PO	16949	UInt	RO	RAM NA	**Present Occupancy Status** specifies the current occupancy state based on any host or occupancy overrides.
PS	16951	UInt	RW	EE 1100	**Service P.I.N.** this Personal Identification Number controls access to the Service Menu. A value of 0 makes the menu always accessible. 0000-9999
PU	16952	UInt	RW	EE 0000	**User P.I.N.** this Personal Identification Number controls access to the User Menu. A value of 0 makes the menu always accessible. 0000-9999
RD	17091	Real	RW	EE 15	**Stage Reversing Delay**
RM	16969	UInt	RW	EE 0	**Reading Mode** specifies the interval period of delay when switching from heating to cooling. 0=Average 1=Highest 2=Lowest 3=Hi/Lo VST 4=Device 0 5=Device 1 6=Device 2 7=Device3 8=Primary GID
SE	16984	UInt	RW	EE 1	**Override Disabled/ Enabled** enables or disables the user's ability to enter extended occupancy override. 0 = disabled 1 = enabled

Property	Identifier #	Data Type	Access	Storage & Default	Description
SU	16997	Real	RW	EE 0.0	**Alarm Setup/Setback Value** specifies the amount added to **high_limit** or subtracted from **low_limit** during unoccupied periods. This property effectively shifts the points at which alarms and alarm returns are generated.
T0	17002	Real	RO	RAM NA	**Thermostat Reading** raw reading for Device 0.
T1	17003	Real	RO	RAM NA	**Thermostat Reading** raw reading for Device 1.
T2	17004	Real	RO	RAM NA	**Thermostat Reading** raw reading for Device 2.
T3	17005	Real	RO	RAM NA	**Thermostat Reading** raw reading for Device 3.
TM	17011	Real	RW	EE 0.5°F	**Offset Increment** specifies the magnitude of incremental changes to the User Setpoint Offset (**TS**). The User Adjust Position (**TP**) is multiplied by **TM** to determine the User Setpoint Offset (**TS**) value. If the User Adjust Increment is 0, you will not be able to alter the setpoint.
TP	17013	Int	RW	RAM 0	**User Adjust Position** the User Setpoint Offset (**TS**) can be raised or lowered in integral steps. This property tracks the current step. It can be set to any signed integer but will be constrained to +/–2 when adjusted by an analog thermostat or to +/–5 when set through a digital thermostat. The point is used in combination with the User Adjust Increment (**TM**) to calculate the User Setpoint Offset.
TR	17014	UInt	RW	RAM 0	**User Adjust Remaining** displays the time remaining before the Setpoint Offset (**TS**) setting is reset.
TS	17015	Real	RW	RAM 0	**Setpoint Offset** defines an offset for application to PID setpoints. This point shows the current value calculated when you multiply the User Adjust Position (**TM**) by the User Adjust Increment (**TP**). This setting is temporary and is valid only for **TT** minutes unless **TT=**0.
TT	17016	UInt	RW	EE 120 minutes	**User Adjust Duration** the User Setpoint Offset (**TS**) is a temporary setting. The **TT** property defines in minutes the duration for which the setting applies. After that time, the User Adjust Position and User Adjust Offset are reset to 0 degrees. If the User Adjust Duration is 0, then setpoint changes remain in effect until modified. The default value for **TT** is 120.
ZS	17087	Real	RW	RAM 70.0	**Heating/Cooling Setpoint** displays the midpoint between the current cooling and heating setpoints. This property reflects changes in both setpoints. A change in **ZS** results in the appropriate shift of both the cooling and heating setpoint maintaining the effective deadband.

B.3 UI01

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Input (0), Instance 1	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM UI01	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Input (0)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM 0	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	RAM 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	RAM 0	provides a way to determine if this object has an active event state associated with it.
reliability	103	BACnet Reliability	RO	RAM 0	indicates whether the **present_value** is "reliable" as far as the device or operator can determine.
out_of_service	81	Bool	RW	EE 0	indicates whether or not the **present_value** is prevented from being modified by software local to the BACnet device in which the object resides. When **out_of_service** is TRUE, the **present_value** property may be written to freely.
units	117	BACnet Eng. Units	RW	EE 95	indicates the measurement units of this object.
min_pres_value	69	Real	RW	EE 0.0	indicates the lowest number that can be reliably used for the **present_value** property of this object.
max_pres_value	65	Real	RW	EE 0.0	indicates the highest number that can be reliably used for the **present_value** property of this object.
high_limit	45	Real	RW	EE 0.0	specifies a limit that the **present_value** must exceed before an event is generated.
low_limit	59	Real	RW	EE 0.0	specifies a limit below which the **present_value** must fall before an event is generated.
deadband	25	Real	RW	EE 0.0	specifies a range between the **high_limit** and **low_limit** properties within which the **present_value** must remain for a TO-NORMAL event to be generated
AE	16743	UInt	RW	EE 0	**Alarm Enable** specifies the type of alarm checking to be done on the present_value. 0=disabled (default) 1=contact (0→1) 2=contact (1→0) 3=change of state 4=low limit alarm 5=high limit alarm 6=low and high limit

Property	Identifier #	Data Type	Access	Store & Default	Description
AS	16747	UInt	RO	RAM 0	**Alarm Status** shows the current alarm condition. A value of 0 indicates a normal condition; a nonzero number indicates alarm generation. 0=no alarm 1=contact (0→1) 2=contact (1→0) 3=change of state 5=low limit alarm 6=high limit alarm
DT	16804	UInt	RW	EE 253	**Data Type** specifies the data type for the input. The data type determines how certain universal input properties are displayed. Default value is 253.
IF	16878	UInt	RW	EE 0.0	**Input Filter Delay** specifies the amount of time, in tenths of seconds, during which an input configured as digital must remain stable in order for the value to be considered reliable. 0.0-25.5 (analog) 0-255 (digital) 0.0 Default
IP	16881	Bool	RW	EE 0	**Input Polarity** specifies the input polarity when configured as digital. A value of 0 in **IP** indicates that a low voltage displays as **present_value**=0, a high voltage displays as **present_value=**1, and a closed contact=0. A value of 1 in **IP** indicates that a low voltage displays as **present_value=**1, a high voltage displays as **present_value=**0, and a closed contact=1. Default value is 0.
OF	16919	Real	RW	EE 0	**UI Offset** defines an optional correction that may be required as an adjustment for the thermostat location and the possible measurement errors.
ST	16996	UInt	RW	EE 7	**Sensor Type** specifies the type of input connected. 0=digital 2=linear 3=4–20mA 7=thermistor
SU	16997	Real	RW	EE 0.0	**Setup/Setback Limit** specifies the amount added to **high_limit** or subtracted from **low_limit** during scheduled unoccupied periods.

B.4 SUPPLY TEMPERATURE

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Input (0), Instance 8	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM Supply Temperature	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Input (0)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM 0	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	RAM 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	RAM 0	provides a way to determine if this object has an active event state associated with it.
reliability	103	BACnet Reliability	RO	RAM 0	indicates whether the **present_value** is "reliable" as far as the device or operator can determine.
out_of_service	81	Boolean	RW	EE 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RW	RAM 64	indicates the measurement units of this object.
DD	16794	Real	RW	EE 2.5°F	**Auto Duct Delta Temperature** defines the temperature difference by which the supply air must either exceed the current heating setpoint to switch to 'heating mode', or fall below the current cooling setpoint to engage 'cooling' mode.
OF	16919	Real	RW	EE 0	**Supply/Duct Temperature Adjustment** defines an offset used to adjust **present_value**.
SM	16990	UInt	RO	RAM NA	**Cooling/Heating Supply Mode** indicates the current supply mode. This would be either Cooling or Heating as specified by the System Box Type (**BT**). If **BT** is set to supply dependant, the point will indicate the current mode as determined by the source/duct temperature. 0=Cooling 1=Heating

B.5 COOL SETPOINT

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Value (2), Instance 1	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Cool Setpoint	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Value (2)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM 0	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	- 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	- 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RO	- 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	RAM 64	indicates the measurement units of this object.

B.6 COOL UNOCCUPIED SETUP/SETBACK

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Value (2), Instance 2	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Cool Unoccupied Setup/Setbackt	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Value (2)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM 0	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	- 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	- 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RO	- 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	RAM 64	indicates the measurement units of this object.

B.7 COOL NIGHT SETUP/SETBACK

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Value (2), Instance 3	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Cool Night Setup/Setbackt	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Value (2)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM 0	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	- 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	- 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RO	- 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	RAM 64	indicates the measurement units of this object.

B.8 HEAT SETPOINT

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Value (2), Instance 4	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Heat Setpoint	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Value (2)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM 0	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	- 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	- 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RO	- 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	RAM 64	indicates the measurement units of this object.

B.9 HEAT UNOCCUPIED SETUP/SETBACK

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Value (2), Instance 5	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Heat Unoccupied Setup/Setbackt	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Value (2)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM 0	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	- 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	- 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RO	- 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	RAM 64	indicates the measurement units of this object.

B.10 HEAT NIGHT SETUP/SETBACK

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Value (2), Instance 6	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Heat Night Setup/Setbackt	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Value (2)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM 0	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	- 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	- 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RO	- 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	RAM 64	indicates the measurement units of this object.

B.11 WARMUP SETPOINT

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Analog Value (2), Instance 7	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Warmup Setpoint	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Analog Value (2)	indicates membership in a particular object type class.
present_value	85	Real	RW	RAM 0	indicates the current value, in engineering units, of the object.
status_flags	111	BACnet Status Flags	RO	- 0	four flags that indicate the general "health" of the object.
event_state	36	BACnet Event State	RO	- 0	provides a way to determine if this object has an active event state associated with it.
out_of_service	81	Boolean	RO	- 0	indicates whether or not the process this object represents is not in service.
units	117	BACnet Eng. Units	RO	RAM 64	indicates the measurement units of this object.

B.12 SCHEDULE

<table>
<tr><th>Property</th><th>Identifier #</th><th>Data Type</th><th>Access</th><th>Store & Default</th><th>Description</th></tr>
<tr><td>object_
identifier</td><td>75</td><td>BACnet
ObjID</td><td>RO</td><td>NRAM
Schedule (17),
Instance1</td><td>a numeric code that is used to identify the object.</td></tr>
<tr><td>object_name</td><td>77</td><td>CharStr</td><td>RO</td><td>NRAM
Schedule</td><td>represents a name for the object that is unique within the device.</td></tr>
<tr><td>object_type</td><td>79</td><td>BACnet
ObjType</td><td>RO</td><td>-
Schedule (17)</td><td>indicates membership in a particular object type class.</td></tr>
<tr><td>present_value</td><td>85</td><td>Real</td><td>RO</td><td>RAM
0</td><td>indicates the current value, in engineering units, of the object.</td></tr>
<tr><td>effective_period</td><td>32</td><td>BACnet
Date
Range</td><td>RO</td><td></td><td>specifies the range of dates within which the Schedule object is active.</td></tr>
<tr><td>weekly_
schedule</td><td>123</td><td>BACnet
Array</td><td>RW</td><td>EE
<table><tr><th>Time</th><th>Mode</th></tr><tr><td>7:00</td><td>1
(Warmup)</td></tr><tr><td>8:00</td><td>2
(Occupied)</td></tr><tr><td>17:00</td><td>0
(Unoccupied)</td></tr><tr><td>20:00</td><td>3
(Night
Setback)</td></tr></table></td><td>a BACnetARRAY containing exactly seven elements, each containing a BACnetDailySchedule. A BACnetDailySchedule consists of a list of BACnetTimeValues that are (time, value) pairs, which describe the sequence of schedule actions on one day of the week when no Exception_Schedule is in effect. The array elements 1-7 correspond to the days Monday - Sunday, respectively.</td></tr>
<tr><td>exception_
schedule</td><td>38</td><td>BACnet
Array</td><td>RW</td><td>EE
<table><tr><th>Time</th><th>Mode</th></tr><tr><td>7:00</td><td>1
(Warmup)</td></tr><tr><td>8:00</td><td>2
(Occupied)</td></tr><tr><td>17:00</td><td>0
(Unoccupied)</td></tr><tr><td>20:00</td><td>3
(Night
Setback)</td></tr></table></td><td>a BACnetARRAY of BACnetSpecialEvents, each of which describes a sequence of schedule actions that takes precedence over the normal day's behavior on a specific day or days.</td></tr>
<tr><td>list_of_object_
property_
references</td><td>54</td><td>ObjID</td><td>RO</td><td>-
NULL</td><td>specifies the Device Identifiers, Object Identifiers and Property Identifiers of the properties to be written with specific values at specific times on specific days.</td></tr>
<tr><td>priority_for_
writing</td><td>88</td><td>Unsigned</td><td>RO</td><td>-
7</td><td>defines the priority at which the referenced properties are commanded.</td></tr>
<tr><td>HE</td><td>16853</td><td>Bool</td><td>RW</td><td>EE
0</td><td>Host Overrides
specifies whether to use the host schedule.

0=disabled
1=enabled</td></tr>
</table>

Property	Identifier #	Data Type	Access	Store & Default	Description
HO	16860	UInt	RW	RAM 0	**Host Schedule** specifies the desired schedule override state when **HE**=1. 0 = unoccupied 1 = warm-up 2 = occupied 3 = night setback
IS	16882	UInt	RW	EE 3	**Inactive Schedule State** determines which schedule state the *NB*-V3T should follow when there is no active schedule. 0 = unoccupied 1 = warm-up 2 = occupied 3 = night setback
ZE	17081	Bool	RW	EE 0	**Receive Schedule** enables the *NB*-V3T to receive network schedule broadcasts and sets present_value based on the received value. 0=No 1=Yes

B.13 HOLIDAY CALENDAR

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	EEPROM Calendar (6), Instance 1	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	NRAM Holiday Calendar	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Calendar (6),	indicates membership in a particular object type class.
present_value	85	Real	RO	RAM 0	indicates the current value, in engineering units, of the object.
datelist	23	BACnet Calendar Entry	RW	EE Empty	a list of BACnetCalendarEntries, each of which is either an individual date (Date), range of dates (BACnetDateRange). If the current date matches the calendar entry criteria, the present value of the Calendar object is TRUE.

B.14 FLOW CTRL

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Proprietary (133), Instance 0	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Flow Ctrl	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Proprietary (133)	indicates membership in a particular object type class.
AC	16741	UInt	RW	EE 1	**Auto/manual mode select** when this property is set for Auto, the Target Flow (**CD**) is determined by the control algorithms and setpoints. 0=manual 1=auto (default) 2=tracking
AS	16747	UInt	RO	RAM -	**Damper Status** reports the status of the actuator as determined by the MMT.
CD	16771	UInt	RW	RAM -	**Target Flow** shows the desired flow (cfm) setpoint calculated by the cooling or heating PI loops.
DD	16794	Bool	RW	EE 0	**Damper Direction** used to set the direction of the damper motor. 0=normal (default) 1=reverse
DM	16799	UInt	RW	EE 0	**Damper Mode** used to command the damper to fully open or to operate at minimum or maximum cooling, heating, and warm-up setpoints. 0=automatic 1=full open 2=min cool 3=max cool 4=min heat 5=max heat 6=min warmup 7=max warmup
DP	16801	UInt	RO	RAM -	**Damper Position** displays the position of the damper.
EF	16810	UInt	RW	EE 700	**Estimated Flow at Full Open** displays the estimated flow when the damper is fully open
EP	16815	UInt	RO	RAM -	**Estimated Target Damper Position** displays the estimated target position, measured from 0-100%, with which the loop should control the valve to bring the measured input variable closer to the setpoint.
RZ	16975	UInt	RO	RAM -	**Actuator Pulse Count** when MMT detects the possibility of an actuator short, electrical pulses are used in an attempt to rejuvenate the motor

B.15 DAMPER CTRL

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Proprietary (133), Instance 1	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Damper Ctrl	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Proprietary (133)	indicates membership in a particular object type class.
CI	16776	Float	RW	EE 5.0	**Cooling Integration Constant** shows the amount of proportional error history (0 to 100%) used to calculate the desired position for the cooling duct damper
CM	16779	UInt	RW	EE 100	**Cooling Minimum Flow** shows the allowable minimum (cooling) duct flow
CP	16781	Float	RW	EE 5.0	**Cooling Proportional Band** specifies, in degrees (0.0 to 25.5), the offset from the calculated cooling control setpoint that determines the proportional band for damper control
CX	16786	UInt	RW	EE 500	**Cooling Maximum Flow** shows the allowable maximum (cooling) duct flow
HI	16857	Float	RW	EE 5.0	**Heating Integration Constant** shows the amount of proportional error history (0 to 100%) used to calculate the desired position for the heating duct damper
HM	16859	UInt	RW	EE 100	**Heating Minimum Flow** shows the allowable minimum heating duct flow during heating
HP	16861	Float	RW	EE 5.0	**Heating Proportional Band** specifies, in degrees (0.0 to 25.5), the offset from the calculated heating control setpoint that determines the proportional band for the heating duct damper control
HX	16866	UInt	RW	EE 500	**Heating Maximum Flow** shows the allowable maximum heating duct flow during heating
WI	17052	Float	RW	EE 10.0	**Warmup Integration Constant** shows the amount of proportional error history (0 to 100%) used to calculate the desired position for the heating duct damper
WM	17053	UInt	RW	EE 300	**Warmup Minimum Flow** shows the allowable minimum heating duct flow during warm-up heating
WP	17055	Float	RW	EE 5.0	**Warmup Proportional Band** specifies in degrees (0.0 to 25.5) the offset from the calculated heating control setpoint that determines the proportional band for the warm-up heating duct damper control
WX	17057	UInt	RW	EE 700	**Warmup Maximum Flow** shows the allowable maximum heating duct flow during warm-up heating.

B.16 OCCUPANCY DETECTION

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Proprietary (131), Instance1	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Occupancy Detection	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Proprietary (131)	indicates membership in a particular object type class.
IC	16876	UInt	RW	EE 0	**Input Select** specifies the input to be used for occupancy detection. 0 = None 1 = UI1
MD	16896	UInt	RW	EE 30	**Extended Occupancy Delay** sets the amount of time, in seconds, during which the occupancy detector must remain on before the occupancy detector will override the zone. This prevents false triggers that might occur as others pass quickly through the zone.
MR	16901	UInt	RO	RAM NA	**Extended Occupancy Remaining** displays the time remaining for occupancy detector override.
MS	16902	UInt	RO	RAM 0	**Occupancy Status** the status of the occupancy detector digital input. To enable occupancy detection, **MT** must be greater than 0 and the input used MUST be configured as digital (**ST**=0). If either of these two conditions are not met, **MS** will display 0. 0=No Detection 1=Detection
MT	16903	UInt	RW	EE 0	**Extended Occupancy Duration** defines, in minutes, the length of time that the zone will be overridden whenever occupancy is detected.

B.17 BROADCAST SCHEDULE

Property	Identifier #	Data Type	Access	Store & Default	Description
object_ identifier	75	BACnet ObjID	RO	- Proprietary (143), Instance 5	a numeric code that is used to identify the object.
object_name	77	CharStr	RO	- Broadcast Schedule	represents a name for the object that is unique within the device.
object_type	79	BACnet ObjType	RO	- Proprietary (143))	indicates membership in a particular object type class.
CV	16785	UInt	RO	RAM 0	**Current Value** shows the current value of the network broadcast schedule values received by the *NB*-V3T
RB	16962	Bool	RW	EE 0	**Receive Broadcasts?** Enables the *NB*-V3T to receive network broadcasts and sets **Schedule:present_value** based on the received value. 0=No 1=Yes