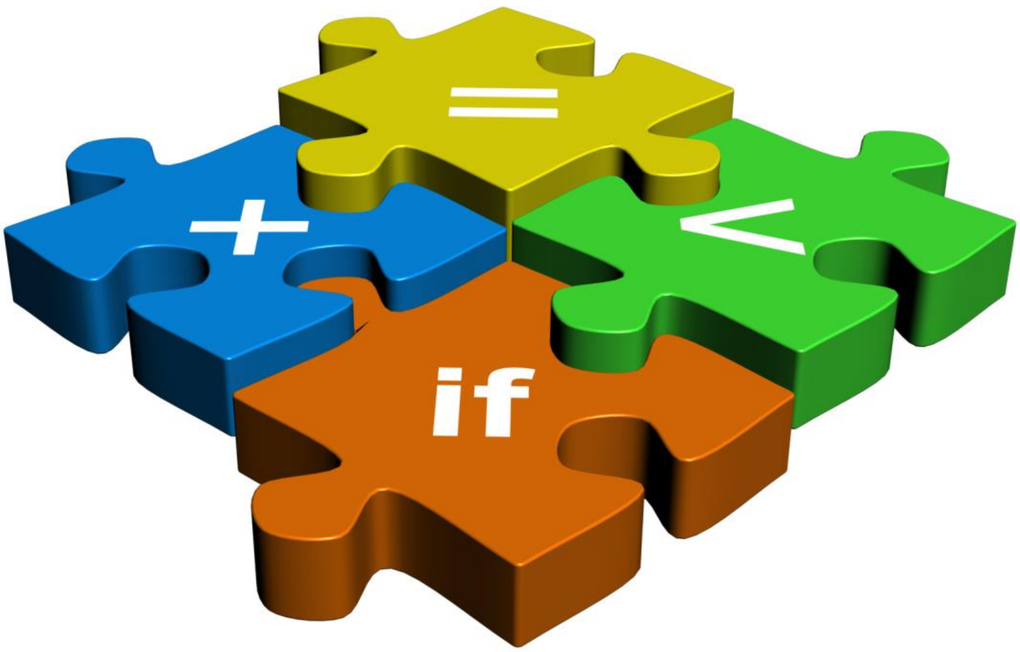
Microblock Reference

v9.0 Help



Verify that you have the most current version of this document from **www.hvacpartners.com**, the **Carrier Partner Community** website, or your local Carrier office.

Important changes are listed in **Document revision history** at the end of this document.

Contents

Microblock families

The list below includes all microblock families, however, you may not see all of them. What information you see depends on your license, the application you are using, or the control program type.

Family	Description
Carrier (page 3)	Carrier microblocks allow the i-Vu®/Field Assistant application to communicate directly with CCN devices.
I/O Pts (page 68)	Input and Output Points microblocks communicate values between a control program and a controller's physical inputs and outputs. Input values are read from sensors connected to the controller's physical inputs. Output values are sent from the controller's physical outputs to control components on the controlled equipment. The Airflow and Zone Sensor microblocks belong to this family.
Network I/O (page 172)	Network Input and Output microblocks pass information between points on the network. A network input microblock reads the value of a network-visible BACnet property on the network or of an equivalent value from another supported protocol. A network output microblock writes a value to a point on the network.
Display (page 227) & *Display2* (page 275)	Display microblocks communicate directly with BACnet objects, and can be used to integrate BACnet devices into the i-Vu®/Field Assistant system. They can be referenced on graphics, allowing any vendor's BACnet equipment to be integrated into the system's interface.
Sys In (page 292)	System Input microblocks receive heat and cool requests, as well as other system information, editable properties, or constants used as input values to a control program.
Sys Out (page 326)	System Output microblocks contain control program output values, such as heat and cool requests or other status information. You can make these values network-visible to other BACnet devices.
Log (page 343)	Log microblocks record system values, such as trends, alarms, and runtime values.
Control (page 361)	Control microblocks output signals that are used for control and scheduling purposes. Many of these microblocks generate colors, which are used to communicate control program or zone color status.
Convert (page 403)	Convert microblocks take information from other microblocks, change the data in some way, then output the changed data.
Limit (page 438)	Limit microblocks test their input values against some limit, then output either the original signal or the limit value.
Relay (page 449)	Relay microblocks act as software relays to determine how and when an input signal should be modified before it is sent from the microblock or the control program.
Logic (page 468)	Logic microblocks perform logical operations on their inputs. Often these microblocks determine the conditions that trigger equipment starts, stops, or alarms.
Math 1 (page 479)	Math 1 microblocks perform simple mathematical operations on their inputs.

Math 2 (page 496)	Math 2 microblocks perform advanced and trigonometric mathematical operations on their inputs.
Misc (page 508)	Miscellaneous microblocks include: • DO/DI Proof • Up/Down Counter • Text • Version • Sunrise/Sunset • OCL (Operator's Control Language)

Carrier microblocks

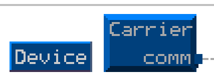
The following Carrier microblocks allow the i-Vu®/Field Assistant application to communicate directly with CCN devices.

Device	*CCN Controller* (page 4) A CCN Controller microblock does the following: • Establishes and verifies communication with a CCN device in the CCN network. • Contains the CCN device address so that all CCN points in the control program can link to it. • Determines the refresh time for these related CCN points. Write points use standard network microblocks that have individual refresh timers.
CBV	*Carrier Binary Value* (page 6) The Carrier Binary Value microblock can monitor and force (restrict) a binary value in a Carrier device.
CAV	*Carrier Analog Value* (page 8) The Carrier Analog Value microblock can monitor and force (constrain or restrict) an analog value in a Carrier device.
CBP	*Carrier Binary Point* (page 11) The Carrier Binary Point microblock reads the binary (on or off) value of a physical input on the controller and makes this value available to be read by other BACnet devices on the network. The value appears to other BACnet devices as the Present Value property of a BACnet Binary Input Object.
CAP	*Carrier Analog Point* (page 18) The Carrier Analog Point microblock reads the analog (continuous) value of a physical input on the controller. Then converts the raw data from the sensor to the appropriate range for its unit of measurement (like mA, degrees Fahrenheit, or psi).
CALARM	*BACnet CCN Alarm* (page 25) The BACnet CCN Alarm microblock monitors CCN alarms and passes them from the Carrier device to the i-Vu®/Field Assistant **Alarms** page or third-party BACnet front end.
occ	*Carrier Schedule* (page 28) The Carrier Schedule microblock writes a weekly schedule to the CCN Controller.
ovr+ occ	*Carrier Schedule with TLO and Override Status* (page 32) This microblock reads schedules from the i-Vu® or Field Assistant system and generates signals to tell the control program whether or not the zone is occupied and how long the zone will remain in its current state. The microblock writes a weekly schedule to the CCN Controller.
Spt	*Zone Setpoint for Integration* (page 37) This microblock determines a zone's heating and cooling setpoints for both occupied and unoccupied periods.

	*Carrier Setpoint* (page 40) The microblock compares the zone temperature to the zone's effective setpoint to determine the zone thermographic color that represents the control program status. Other microblocks (such as the If Color = microblock) can use this color to perform additional control. It also passes the programmable setpoints to the control program's associated CCN controller.
	*Carrier Text Display* (page 66) This microblock lets you display text for a CCN point on a **Properties** page or **Graphics** page.

CCN Controller

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Carrier microblocks* (page 3)
Icon and symbol	
What it does	A CCN Controller microblock does the following: • Establishes and verifies communication with a CCN device in the CCN network. • Contains the CCN device address so that all CCN points in the control program can link to it. • Determines the refresh time for these related CCN points. Write points use standard network microblocks that have individual refresh timers.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Refresh Time	The interval at which all CCN points in the program read their target values from the CCN device.
Bus	The number of the CCN network. (0-239)
Element	A unique number assigned to each device on a CCN network (1-239).
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Comm error limit	The number of communication failures to allow before a CCN device is considered offline and the microblock's COMM output goes OFF.
Refresh controller info	Select to initiate a read of the CCN device so that device information such as model number, serial number, etc. can be obtained.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Carrier Binary Value

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Carrier microblocks* (page 3)
Icon and symbol	
What it does	The Carrier Binary Value microblock can monitor and force (restrict) a binary value in a Carrier device. A Carrier Binary Value microblock: • Is not visible to the network • Does not contain a BACnet object • Cannot be an alarm source • Cannot be trended See the Carrier Binary Point microblock if you need these features. This microblock's poll rate is set in the related CCN Device microblock.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Com Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.

Path	Use the information below to format a valid path for the microblock you are using to read or write to the CCN point. Each item in the path is limited to 8 alpha-numeric characters. Check **Editable** if you want the path to be editable in the i-Vu®/Field Assistant interface. Path format: **CCN://LINK/<table name>/<point name><:instance#><@force level>** **LINK** represents the CCN device defined in the CCN Controller microblock. **<table name>** - Use one of the following: Definition table name:Data table name Example: `CCN://LINK/MYTABLE:MYDATA1` Definition table name:Instance number Example: `CCN://LINK/MYTABLE:1` Data table name Example: `CCN://LINK/MYDATA1` Where: • *Definition table name* is the name of the POC table that describes the data structure of the child tables. • *Data table name* is the name of the table instance that contains the variable or field being referenced. • *Instance#* is the table instance number **<point name>** Example: `CCN://LINK/.../HEATSP` **<:instance#>** (Optional) - Use the instance number of the point name if the table has more than one point with the same name. **<@force level>** (Optional) - The force level being written to (a value 1–15) Example: `CCN://LINK/HOLIDAYS:HOLIDAY1/HEATSP@4` You can edit the address/path of a CCN point in one of the following places in the i-Vu®/Field Assistant interface: • The **Details** tab of a Point Properties dialog box • The **Address** column on the **Properties** > **Network Points** page
Default Value	The value that the microblock outputs when communication with all specified targets fails or when **Communications Enabled** is not checked. The default value is used when the **Valid?** output is False (**Off**).
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Editable	Check to make this microblock's value editable in the i-Vu®/Field Assistant interface.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Carrier Analog Value

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Carrier microblocks* (page 3)
Icon and symbol	
What it does	The Carrier Analog Value microblock can monitor and force (constrain or restrict) an analog value in a Carrier device. A Carrier Analog Value microblock: • Is not visible to the network • Does not contain a BACnet object • Cannot be an alarm source • Cannot be trended See the Carrier Analog Point microblock if you need these features. This microblock's refresh rate is set in the related Carrier Device microblock.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Name	The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Comm Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.
Display resolution	The microblock's value is truncated and incrementally updated as follows: The **Display resolution** format is used to truncate the microblock’s actual value. For example, if you enter a value from: • 0.1 to 0.9, the system displays 1 digit to the right of the decimal • 0.01 to 0.99, the system displays 2 digits to the right of the decimal • 1 or greater, the system displays a whole number The **Display resolution** value determines the increment by which the displayed value is updated. For example, if you enter: • .2, the system displays 8.4, 8.6, 8.8, ... • .03, the system displays 5.09, 5.12, 5.15, ... • 10, the system displays 30, 40, 50, ...

<table>
<tr><td>Path</td><td>
Use the information below to format a valid path for the microblock you are using to read or write to the CCN point. Each item in the path is limited to 8 alpha-numeric characters. Check Editable if you want the path to be editable in the i-Vu®/Field Assistant interface.
Path format:
CCN://LINK/<table name>/<point name><:instance#><@force level>
LINK represents the CCN device defined in the CCN Controller microblock.
<table name> - Use one of the following:
Definition table name:Data table name
Example: <code>CCN://LINK/MYTABLE:MYDATA1</code>
Definition table name:Instance number
Example: <code>CCN://LINK/MYTABLE:1</code>
Data table name
Example: <code>CCN://LINK/MYDATA1</code>
Where:

Definition table name is the name of the POC table that describes the data structure of the child tables.
Data table name is the name of the table instance that contains the variable or field being referenced.
Instance# is the table instance number

<point name>
Example: <code>CCN://LINK/.../HEATSP</code>
<:instance#> (Optional) - Use the instance number of the point name if the table has more than one point with the same name.
<@force level> (Optional) - The force level being written to (a value 1–15)
Example: <code>CCN://LINK/HOLIDAYS:HOLIDAY1/HEATSP@4</code>
You can edit the address/path of a CCN point in one of the following places in the i-Vu®/Field Assistant interface:

The Details tab of a Point Properties dialog box
The Address column on the Properties > Network Points page

</td></tr>
<tr><td>Default Value</td><td>The value that the microblock outputs when communication with all specified targets fails or when Communications Enabled is not checked. The default value is used when the Valid? output is False (Off).</td></tr>
<tr><td>Editable</td><td>Check to make this microblock's value editable in the i-Vu®/Field Assistant interface.</td></tr>
<tr><td>Editing Privilege</td><td>
Preset - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is.
CAUTION If you change the Editing Privilege from Preset, the privilege you select will be used for all properties of this microblock, which is not always desirable.
</td></tr>
<tr><td>Show Property Page Text</td><td>Check to show this microblock's value on the equipment's Properties page.</td></tr>
</table>

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Carrier Binary Point

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Carrier microblocks* (page 3)
Icon and symbol	
What it does	The Carrier Binary Point microblock: • Can monitor and force (constrain or restrict) a variable in a Carrier device • Is visible to the BACnet network • Contains a BACnet binary value object • Contains a BACnet trend log object • Can be an alarm source • Can be trended • Uses the out-of-service BACnet requirements • Can be used in a graphic to force a variable This microblock's refresh rate is set in the related Carrier Device microblock. The Carrier Binary Point microblock reads the binary (on or off) value of a physical input on the controller and makes this value available to be read by other BACnet devices on the network. The value appears to other BACnet devices as the Present Value property of a BACnet Binary Input Object. You can assign a name to each input, which appears on the face of the microblock and is used as the name of the BACnet object. You can configure this microblock to make its value available on the Rnet of a UPC Open controller.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Com Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.
Writable	Check to allow BACnet commands to write to present value.
Force Level	The force level being written to (1-15).

Path	Use the information below to format a valid path for the microblock you are using to read or write to the CCN point. Each item in the path is limited to 8 alpha-numeric characters. Check **Editable** if you want the path to be editable in the i-Vu®/Field Assistant interface. Path format: **CCN://LINK/<table name>/<point name><:instance#><@force level>** **LINK** represents the CCN device defined in the CCN Controller microblock. **<table name>** - Use one of the following: Definition table name:Data table name Example: `CCN://LINK/MYTABLE:MYDATA1` Definition table name:Instance number Example: `CCN://LINK/MYTABLE:1` Data table name Example: `CCN://LINK/MYDATA1` Where: • *Definition table name* is the name of the POC table that describes the data structure of the child tables. • *Data table name* is the name of the table instance that contains the variable or field being referenced. • *Instance#* is the table instance number **<point name>** Example: `CCN://LINK/.../HEATSP` **<:instance#>** (Optional) - Use the instance number of the point name if the table has more than one point with the same name. **<@force level>** (Optional) - The force level being written to (a value 1–15) Example: `CCN://LINK/HOLIDAYS:HOLIDAY1/HEATSP@4` You can edit the address/path of a CCN point in one of the following places in the i-Vu®/Field Assistant interface: • The **Details** tab of a Point Properties dialog box • The **Address** column on the **Properties** > **Network Points** page
Default Value	The value that the microblock outputs when communication with all specified targets fails or when **Communications Enabled** is not checked. The default value is used when the **Valid?** output is False (**Off**).
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Editable	Check to make this microblock's value editable in the i-Vu®/Field Assistant interface.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object ID	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

History

Change of State Time	The date and time the most recent change of state occurred.
Change of State Count	The number of times the point has changed states. Click **Reset** to set **Change of State Count** to 0.
Time of State Count Reset	The date and time the change of state count was set to zero.
Elapsed Active Time	The amount of time the point has been in the "on" state. Click **Reset** to set **Elapsed Active Time** to 0.
Time of Active Time Reset	The date and time the elapsed active time was set to zero.

Trends

Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes. **NOTE** Set this field in Snap to one minute or greater. After the control program is running in a live system, if needed you can adjust this setting in the live system based on the characteristics of the CCN bus and its polling interval. See "To collect trend data for a point" in i-Vu help, or see the *CCN Integration Guide*.

Sample on COV (change of Value)	Records the microblock's present value only when the value changes.
Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. Click **Reset** on the **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.
In the i-Vu® or Field Assistant system only:	
Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only?	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Delete	Deletes all trend samples stored in the database for the microblock.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

Alarm

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.
Alarm Enabled?	Check to send a message when this microblock indicates an alarm condition.
Alarm State	Select the checkbox to have an alarm condition exist when the microblock's present value is on (true). Clear the checkbox to have an alarm condition exist when the microblock's present value is off (false).
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Return Enabled	Check to send a message when an alarm condition has returned to normal.
Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

BACnet Configuration

Dial on alarm	Select to have this alarm immediately delivered through a modem connection.
Notification Class	Defines how alarm notifications shall be prioritized in their handling according to TO-OFFNORMAL, TO-FAULT, and TO-NORMAL alarms; whether these categories of alarms require acknowledgement (nearly always by a human operator); and what destination devices or processes should receive notifications.

Rnet

NOTE These Rnet features work only in a UPC Open controller with a v6.04 or later driver and only in a v6.5 system with the latest cumulative patch or later system.

Enable Rnet	Check to allow this microblock to communicate its value to a sensor.
Rnet Tag	All values displayed on a ZS sensor must have an Rnet tag that defines what type of information this microblock's value represents. It also determines how the sensor will display the value. For example, if you select **Fan Status**, the sensor automatically displays on the Home screen when the microblock is active. **NOTE** If the Rnet tag droplist does not have the tag you want, you can create a custom tag in the Snap application.
Editable	Select to make this microblock's value editable on the ZS sensor. **CAUTION** Do not check this field if the microblock is being used for a status value.
ZS Sensor Display Configuration	
Show on:	Check the sensor screen(s) that you want this microblock's value displayed on. **Home Screen (1)**: When more than one value is assigned to the Home screen, the values cycle from one to the next. Typically, the first item displays for 10 seconds and any other items display for 3 seconds each. **Information Screen (2)**: This screen is accessed by pressing the sensor's button. If you select this screen and select **Maintenance** or **Alarm** below, when the microblock is active, its value displays first on the Information screen. When inactive it does not display at all. **Diagnostics Screen (3)**: This screen is accessed by holding the sensor's button for at least 3 seconds. If you select this screen and select **Maintenance** or **Alarm** below, when the microblock is active, its value displays first on the Diagnostics screen. When inactive it does not display at all. **NOTE** Select **Reorder** > **Sensor Display Order** to define the order in which multiple microblock values will appear on each sensor screen.
Show when active as:	
Maintenance	Check to have the ZS Pro sensor display on the Home screen when this microblock is active.
Alarm	Check to have the ZS Pro sensor display on the Home screen when this microblock is active.
Show text:	
Display Inactive Text	Type the text that the ZS sensor is to display when the microblock's output is off or false. **NOTE** The letters K, M, Q, V, W, X do not display on the screen.
Display Active Text	Type the text that the ZS sensor is to display when the microblock's output is on or true. **NOTE** The letters K, M, Q, V, W, X do not display on the screen.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Carrier Analog Point

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Carrier microblocks* (page 3)
Icon and symbol	
What it does	The Carrier Analog Point microblock: • Can monitor and force (constrain or restrict) a variable in a Carrier device • Is visible to the BACnet network • Contains a BACnet analog value object • Contains a BACnet trend log object • Can be an alarm source • Can be trended • Uses the out-of-service BACnet requirements • Can be used in a graphic to force a variable This microblock's poll rate is set in the related Carrier Device microblock. The Carrier Analog Point microblock reads the analog (continuous) value of a physical input on the controller. Then converts the raw data from the sensor to the appropriate range for its unit of measurement (like mA, degrees Fahrenheit, or psi). You can configure this microblock to make its value available on the Rnet of a UPC Open controller.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Name	The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Com Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.
Writable	Check to allow BACnet commands to write to present value.
Force Level	The force level being written to (1-15).
Display resolution	The microblock's value is truncated and incrementally updated as follows: The **Display resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the system displays 1 digit to the right of the decimal • 0.01 to 0.99, the system displays 2 digits to the right of the decimal • 1 or greater, the system displays a whole number The **Display resolution** value determines the increment by which the displayed value is updated. For example, if you enter: • .2, the system displays 8.4, 8.6, 8.8, ... • .03, the system displays 5.09, 5.12, 5.15, ... • 10, the system displays 30, 40, 50, ...

Path	Use the information below to format a valid path for the microblock you are using to read or write to the CCN point. Each item in the path is limited to 8 alpha-numeric characters. Check **Editable** if you want the path to be editable in the i-Vu®/Field Assistant interface. Path format: **CCN://LINK/<table name>/<point name><:instance#><@force level>** **LINK** represents the CCN device defined in the CCN Controller microblock. **<table name>** - Use one of the following: Definition table name:Data table name Example: `CCN://LINK/MYTABLE:MYDATA1` Definition table name:Instance number Example: `CCN://LINK/MYTABLE:1` Data table name Example: `CCN://LINK/MYDATA1` Where: • *Definition table name* is the name of the POC table that describes the data structure of the child tables. • *Data table name* is the name of the table instance that contains the variable or field being referenced. • *Instance#* is the table instance number **<point name>** Example: `CCN://LINK/.../HEATSP` **<:instance#>** (Optional) - Use the instance number of the point name if the table has more than one point with the same name. **<@force level>** (Optional) - The force level being written to (a value 1–15) Example: `CCN://LINK/HOLIDAYS:HOLIDAY1/HEATSP@4` You can edit the address/path of a CCN point in one of the following places in the i-Vu®/Field Assistant interface: • The **Details** tab of a Point Properties dialog box • The **Address** column on the **Properties** > **Network Points** page
Default Value	The value that the microblock outputs when communication with all specified targets fails or when **Communications Enabled** is not checked. The default value is used when the **Valid?** output is False (**Off**).
Editable	Check to make this microblock's value editable in the i-Vu®/Field Assistant interface.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

BACnet Configuration

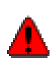
Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object ID	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.
COV Increment	An Analog Network Input (ANI) that references this microblock in its **Address** field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the **COV Increment**. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's **Refresh Time** field.

Trends

Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes. **NOTE** Set this field in Snap to one minute or greater. After the control program is running in a live system, if needed you can adjust this setting in the live system based on the characteristics of the CCN bus and its polling interval. See "To collect trend data for a point" in i-Vu help, or see the *CCN Integration Guide*.
Sample on COV (change of value)	Records the microblock's present value only when the value changes by at least the **COV Increment**.
Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. **NOTE** Click **Reset** on the **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.

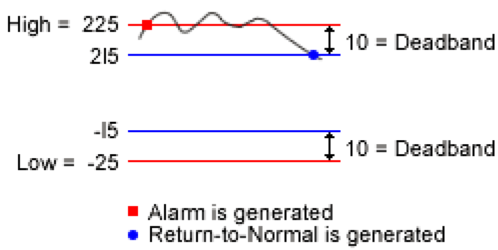
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.
In the i-Vu® or Field Assistant system only:	
Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Delete	Deletes all trend samples stored in the database for the microblock.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

Alarm

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.

Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.
Low Limit Enable	Check to send an alarm when the microblock's present value remains below the **Low Limit** value for the defined **Delay Seconds**.
Low Limit	The value the microblock's present value must drop below to send an alarm.
High Limit Enable	Check to send an alarm when the microblock's present value remains above the **High Limit** for the defined **Delay Seconds**.
High Limit	The value the microblock's present value must rise above to send an alarm.
Dead Band	The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated.

EXAMPLE



Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Return Enabled	Check to send a message when an alarm condition has returned to normal.
Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

Rnet

NOTE These Rnet features work only in a UPC Open controller with a v6.04 or later driver and only in a v6.5 system with the latest cumulative patch or later system.

Enable Rnet	Check to allow this microblock to communicate its value(s) to and from a sensor.
Rnet Tag	All values from a ZS or wireless sensor must have an Rnet tag that defines what type of information this microblock's value represents. For a ZS sensor, it also determines how the sensor will display the value. For example, if you select **Static Pressure Setpoint (411)**, the sensor displays the setpoint, a target icon to indicate it is a setpoint, and the number 411 in the lower left corner to identify the value is a static pressure setpoint. **NOTE** If the Rnet tag droplist does not have the tag you want, you can create a custom tag in the Snap application.
Display Resolution	Defines the resolution of the value to be displayed on the ZS sensor. For example, 1 displays only integers (example: 74) and 0.5 displays values to the nearest 0.5 (example: 74.5).
Editable	Select to make this microblock's value editable on the ZS sensor. ⚠ **CAUTION** Do not check this field if the microblock is being used for a status value.
Edit Increment	Select how much you want each press of the sensor's ▲ or ▼ button to change the microblock's value.
Minimum	Enter the lowest amount that this value can be changed to on the ZS sensor or in the i-Vu®/Field Assistant interface.
Maximum	Enter the highest amount that this value can be changed to on the ZS sensor or in the i-Vu®/Field Assistant interface.
ZS Sensor Display Configuration	
Show on:	Check the sensor screen(s) that you want this microblock's value displayed on. **Home Screen (1)**: When more than one value is assigned to the Home screen, the values cycle from one to the next. Typically, the first item displays for 10 seconds and any other items display for 3 seconds each. **Information Screen (2)**: This screen is accessed by pressing the sensor's *i* button. **Diagnostics Screen (3)**: This screen is accessed by holding the sensor's *i* button for at least 3 seconds. **NOTE** Select **Reorder** > **Sensor Display Order** in Snap to define the order in which multiple microblock values will appear on each sensor screen.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

BACnet CCN Alarm

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Carrier microblocks* (page 3)
Icon and symbol	
What it does	The BACnet CCN Alarm microblock monitors CCN alarms and passes them from the Carrier device to the i-Vu®/Field Assistant **Alarms** page or third-party BACnet front end. The **Alarm ID** string is used to match an incoming CCN alarm to this microblock. In most cases, this is the CCN variable name. This microblock monitors all CCN alarms, and sends an alarm event to the i-Vu®/Field Assistant application when a CCN alarm is received that matches the **Alarm ID**. Also, you can define a BACnet CCN Alarm microblock with **Accept all Alarms** checked to act as a catchall for alarms that do not match other Alarm microblock match strings. When the i-Vu®/Field Assistant application receives an alarm, it searches all BACnet CCN Alarm microblocks for matching Alarm ID's. If no match is found the alarm is processed by the BACnet CCN Alarm microblock that has **Accept all Alarms** checked. Two alarms will be generated: one from the BACnet CCN Alarm microblock that includes the original CCN alarm text, and another from the related "Point" microblock because the Present_Value (updated via the received alarm message) may trigger an alarm intrinsic to the AV or BV object in the "Point" microblock. If this behavior is undesirable, the Event_Enable flags in the corresponding "Point" microblock should be set to FALSE to inhibit the intrinsic alarm from the "Point" microblock. This microblock will have a digital output wire that transitions to "on" when the alarm is active. If **Accept all Alarms** is checked – then the output will toggle on then go back off. **RTN** messages are posted as a separate event. If that is desired another microblock with the "specific" text should be added. Then, the output will stay active until an **RTN** of that type of alarm is received. The parameters for this microblock will be similar to the alarm parameters in any Carrier® microblock that can be an alarm source, and the user will be able to enable and disable this alarm. When disabled, the microblock will still reflect the alarm status of the CCN device that sourced the alarm, but an event will not be sent to the i-Vu®/Field Assistant application.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	**NOTE** To use this field, the device's driver must be equal to or greater then 3.04.xxx. You cannot edit this field during run time. Use the text portion of the CCN alarm message generated by the Carrier® PIC device. Enter the following text `match="T051%x"` `T051%x` respresents the CCN alarm code generated by the CCN equipment. See Carrier's *Controls and Troubleshooting Guide* for specific alarm codes.
Network Visible	Check to make the microblock's output visible to third-party equipment.
Controller	Do not change this path from the default **CCN://LINK**. If altered, the alarms will not be forwarded.
Alarm ID	A variable name/point name of the Carrier CCN point you wish to monitor for an alarm.
Active/Inactive Text	The i-Vu®/Field Assistant interface displays the **Active Text** when an alarm occurs, and the **Inactive Text** when the alarm status is normal.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object ID	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Alarm

Accept All Alarms	Acts as a catchall for alarms that do not match pre-defined **Alarm ID** strings. When an alarm arrives, it will first search all BACnet CCN Alarm microblocks for matching **Alarm ID**'s, if no match is found, the alarm will be processed by the BACnet CCN Alarm microblock with **Accept all Alarms**.
Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.

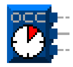
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.
Alarm Enabled?	Check to send a message when this microblock indicates an alarm condition.
Alarm State	Select the checkbox to have an alarm condition exist when the microblock's present value is on (true). Clear the checkbox to have an alarm condition exist when the microblock's present value is off (false).
Return Enable	Check to send a message when an alarm condition has returned to normal.
Fault Enable	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Carrier Schedule

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Carrier microblocks* (page 3)
Icon and symbol	 
What it does	The Carrier Schedule microblock writes a weekly schedule to the CCN Controller. The Carrier Schedule microblock provides the CCN controller with an occupancy schedule. The CCN occupancy schedule is generated from a BACnet schedule originating in the i-Vu®/Field Assistant application or a BACnet BMS. The CCN controller must use the same occupancy SCHEDULE NUMBER as this microblock's **Write to global schedule number_____** property (default=1). This ensures the schedule from this microblock is written to the correct schedule in the CCN controller. The **Schedule Number** range is 1-99. The Carrier Schedule microblock can write to the local schedule (schedule # 1 – 64) of a CCN controller or to a controller configured to receive a CCN Global schedule (schedule # 65 – 99). It will not write a schedule to a CCN controller that is broadcasting a global schedule. The microblock has three outputs: • The first (top) outputs On or Off to indicate the occupancy state of the microblock. • The second outputs how much time remains in the current state. • The third outputs On or Off to indicate if an override is in effect. This output could be used to feed a trend microblock.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Schedule Category	The category of the schedule that will run the controlled equipment. Select **Occupancy** unless you have defined a custom schedule category in the Snap and i-Vu®/Field Assistant applications.
Schedule number	• 1 – 64 are local schedules that reside within the equipment. • 65 – 99 are network or global schedules, which are sent over a CCN network and received by controllers that contain network schedules.
Group schedule overrides?	Allows an override from a single controller to override all controllers within it's **Group number**.

Configuration

Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Minimum off time	The minimum period (seconds) that the microblock's present value will be off, regardless of the input signal to the microblock.
Minimum on time	The minimum period (seconds) that the microblock's present value will be on, regardless of the input signal to the microblock.
Timed override minutes	Minutes the microblock adds to the zone's occupied time for each press of the zone's local override button or switch.

Second press cancels override	Select to have a second press of a zone sensor's override button cancel the override. If not selected, a second press will increase the override by the amount of time defined in the **Timed override minutes** field.
CCN Schedule Number	The CCN device must be configured for a schedule number between 1 and 99 inclusive.
Show scheduling limits:	The default limits for the Occupancy schedule category. **NOTES** • A schedule download will fail if you exceed these limits when creating schedules. • Changing these properties erases the schedule information in the controller, requiring you to download schedules again. • If you use Global Modify to change these limits, the affected devices will not be automatically marked for schedule download.
Weekly Schedules - Max Transitions Per Day	The number of transitions a weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.
Max Exception Schedules	The number of non-weekly schedules allowed in a controller. The default is 30. The system reserves 7 of these schedules - one for each day of the week.
Max Transitions Per Day	The number of transitions a non-weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm Enable	Check to send a message when this microblock indicates an alarm condition.
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

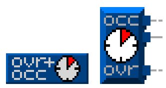
Simulation

Define the value(s) the microblock will use when you simulate the control program.

Carrier Schedule with TLO and Override Status

NOTE This microblock works only in a control program for a UPC Open controller with a v6.04 or later driver and only in a v6.5 system with the latest cumulative patch or later system.

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Carrier microblocks* (page 3)
Icon and symbol	
What it does	This microblock reads schedules from the i-Vu® or Field Assistant system and generates signals to tell the control program whether or not the zone is occupied and how long the zone will remain in its current state. The microblock writes a weekly schedule to the CCN Controller. The Carrier Schedule microblock provides the CCN controller with an occupancy schedule. The CCN occupancy schedule is generated from a BACnet schedule originating in the i-Vu®/Field Assistant application or a BACnet BMS. The CCN controller must use the same occupancy SCHEDULE NUMBER as this microblock's **Write to global schedule number_____** property (default=1). This ensures the schedule from this microblock is written to the correct schedule in the CCN controller. The **Schedule Number** range is 1-99. The Carrier Schedule microblock can write to the local schedule (schedule #1 – 64) of a CCN controller or to a controller configured to receive a CCN Global schedule (schedule #65 – 99). It will not write a schedule to a CCN controller that is broadcasting a global schedule. The microblock has three outputs: • The first (top) one outputs On or Off to indicate the occupancy state of the microblock. • The second one outputs how much time remains in the current state. • The third one outputs On or Off to indicate if an override is in effect. This output could be used to feed a trend microblock. The **ovr** output will be active only when the equipment is in a true override condition and works for overriding in an On state or an Off state, as with the Force Unoccupied feature. If an occupied schedule is running when a user starts a timed local override, the **ovr** output will not turn on until the schedule expires. You cannot set schedules using the microblock's dialog box. The **Properties** page > **Summary** tab shows the current occupancy status of the zone, the time when the occupancy is scheduled to change, and the override status. The **Properties** page > **Details** tab shows the override time remaining, which may be different than the time remaining amount.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Schedule Category	The category of the schedule that will run the controlled equipment. Select **Occupancy** unless you have defined a custom schedule category in the Snap and i-Vu®/Field Assistant applications.
Unscheduled Value	The value the microblock assumes when no schedule has been downloaded to the program if: • The system has no schedules that affect the equipment. • A stand alone controller is powered up but no schedule data has been entered.

Configuration

Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Minimum off time	The minimum period (seconds) that the microblock's present value will be off, regardless of the input signal to the microblock.
Minimum on time	The minimum period (seconds) that the microblock's present value will be on, regardless of the input signal to the microblock.
CCN Schedule Number	The CCN device must be configured for a schedule number between 1 and 99 inclusive.

Show scheduling limits:	The default limits for the Occupancy schedule category. **NOTES** • A schedule download will fail if you exceed these limits when creating schedules. • Changing these properties erases the schedule information in the controller, requiring you to download schedules again. • If you use Global Modify to change these limits, the affected devices will not be automatically marked for schedule download.
Weekly Schedules - Max Transitions Per Day	The number of transitions a weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.
Max Exception Schedules	The number of non-weekly schedules allowed in a controller. The default is 30. The system reserves 7 of these schedules - one for each day of the week.
Max Transitions Per Day	The number of transitions a non-weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm Enable	Check to send a message when this microblock indicates an alarm condition.
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Rnet

Enable Rnet	Check to allow this microblock to communicate its value(s) to and from a sensor.
Allow 'Continuous' Override	Check to allow a user to force a zone into an occupied state for an indefinite amount of time. The override remains in effect until the schedule transitions to occupied or until a user manually clears it by pressing the sensor's On/Off button twice.
Allow Force Unoccupied	Check to allow a user to save energy by forcing the zone into an unoccupied state. To force unoccupied, a user holds a ZS sensor's On/Off button for at least 3 seconds. This forced state remains in effect until the schedule transitions to unoccupied or until a user presses the sensor's On/Off button.
Allow TLO Set During Occupied	Check to allow a user to activate a timed local override while the zone is scheduled occupied. This allows a user to extend the zone's occupied time without the HVAC equipment having to go unoccupied first.

Timed Local Override

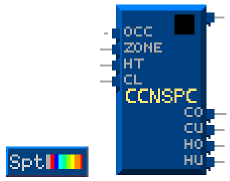
Increment	Minutes the microblock adds to the zone's occupied time for each press of the zone's local override button or switch.
Maximum Duration	Maximum value (up to 960 minutes) the microblock outputs regardless of additional pulses from the controller's input.
Show scheduling limits:	The default limits for the Occupancy schedule category. **NOTES** • A schedule download will fail if you exceed these limits when creating schedules. • Changing these properties erases the schedule information in the controller, requiring you to download schedules again. • If you use Global Modify to change these limits, the affected devices will not be automatically marked for schedule download.
Weekly Schedules - Max Transitions Per Day	The number of transitions a weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.
Max Exception Schedules	The number of non-weekly schedules allowed in a controller. The default is 30. The system reserves 7 of these schedules - one for each day of the week.
Max Transitions Per Day	The number of transitions a non-weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Zone Setpoint for Integration

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Carrier microblocks* (page 3)
Icon and symbol	
What it does	This microblock determines a zone's heating and cooling setpoints for both occupied and unoccupied periods. You can determine a zone's setpoints for both occupied and unoccupied periods; however, because of factors such as local overrides, demand level, or optimal start routines, the zone's effective setpoints may be calculated differently by the microblock. **NOTE** The Zone Setpoint for Integration microblock is only supported in the UPC Open.

Inputs and outputs

Input

OCC	Binary input - indicates whether or not the zone is currently occupied
ZONE	Analog input - current zone temperature
HT	Analog input - Effective heating setpoint from the linkage provider
CL	Analog input - Effective cooling setpoint from the linkage provider

Output

CO	Analog output - preset cooling occupied setpoint
CU	Analog output - preset cooling unoccupied setpoint
HO	Analog output - preset heating occupied setpoint
HU	Analog output - preset heating unoccupied setpoint

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Setpoints

Color Change Hysteresis

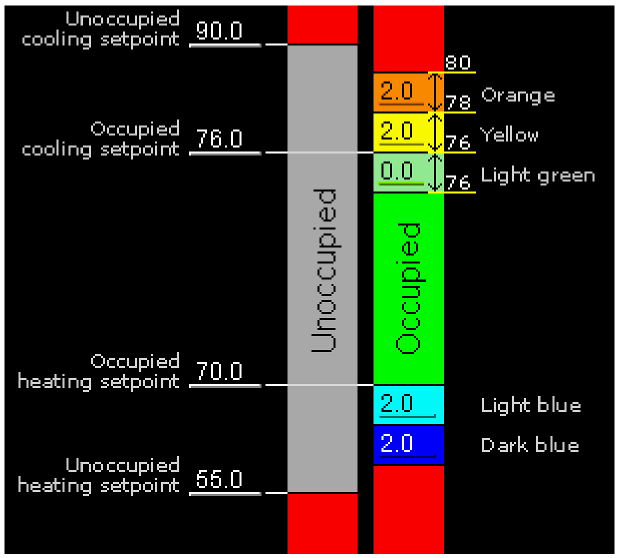
The Color Change Hysteresis is represented by the **Hyst** setting on the **Properties** page. When returning to normal, it is the number of degrees required to exceed the setpoint before the microblock's color changes. An appropriate hysteresis prevents equipment from "chattering" when the temperature is very close to and oscillating around the setpoint.

The desired occupied and unoccupied zone setpoints (degrees) and the value of each occupied color band (degrees).

A color band's value determines the threshold at which the microblock changes the zone thermographic color as the zone temperature departs from setpoint.

You can use the free cooling light green color band to enable economizer operation. If you are not using this feature, type `0` for this band's value.

EXAMPLE



Editing Privilege

Preset - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is.

CAUTION If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Show Property Page Text

Check to show this microblock's value on the equipment's **Properties** page.

Carrier Setpoint

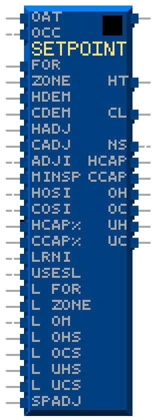
NOTE This microblock works only in a control program for a UPC Open controller with a v6.04 or later driver and only in a v6.5 system with the latest cumulative patch or later system.

⚠ The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family

Control microblocks (page 361)

Icon and symbol



NOTE The microblock's appearance depends on which options you select in the Snap application. The microblock above is the result if you select all options.

What it does

The microblock compares the zone temperature to the zone's effective setpoint to determine the zone thermographic color that represents the control program status. Other microblocks (such as the If Color = microblock) can use this color to perform additional control. It also passes the programmable setpoints to the control program's associated CCN controller.

The zone's effective setpoints may differ from its programmed occupied setpoints because of the optimal start algorithm, electric demand reduction levels, or user setpoint adjustment from the zone sensor.

OPTIONS

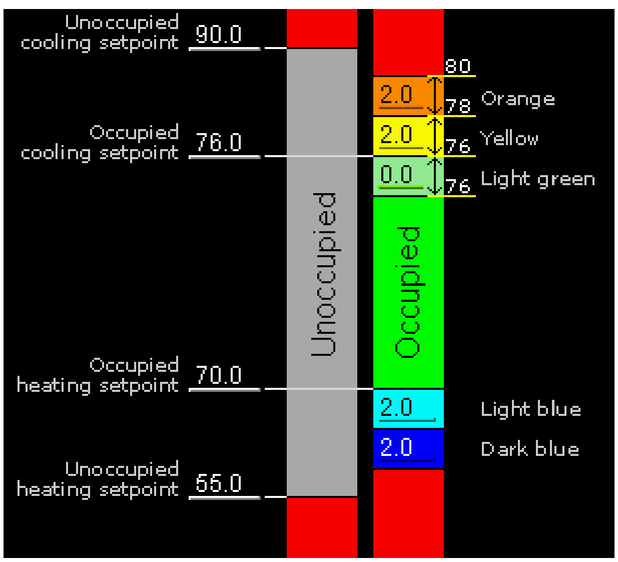
In the Snap application, you can enable the following optional functionality and inputs on the microblock's **Optional** tab.

- Demand Limiting: Provides **HDEM** and **CDEM** inputs that allow programmatic relaxation of setpoints to reduce electric demand.
- Setpoint Adjust: Provides **HADJ** or **CADJ** inputs by which the setpoint can be programmatically adjusted.
- Inhibit Setpoint Adjust: Provides **ADJI** input that allows your program to prevent the user from adjusting the setpoint at the sensor.
- Optimal Start: The microblock will use an optimal start algorithm to adjust the zone setpoint before the zone is occupied, ensuring that the zone temperature is within the occupied setpoints by the time the zone is occupied. Also provides **HOSI** and **COSI** inputs by which Optimal Start can be programmatically inhibited.

- Learning Adaptive: Adjusts (learns) zone heating and cooling capacities based on optimal start system performance. Also provides **LRNI** input by which learning can be programmatically inhibited.
- Night Setback: Provides **NS** output that is true (on) when the zone is not occupied, optimal start is not in progress, and the zone temperature exceeds the unoccupied heating or cooling setpoint.
- Minimum Setpoint Separation: Provides **MINSP** input that allows a minimum separation between the effective heating and cooling setpoints to be programmatically defined.
- Capacity Limit: Provides **HCAP%** and **CCAP%** inputs that allow programmatic limitation of the zone's learned heating or cooling capacity that the microblock uses in the Optimal Start routine.
- Zone Linkage: Provides **OH**, **OC**, **UH**, and **UC** outputs that are often needed to link zone applications with air or water sources. In contrast to the effective setpoint outputs, these outputs supply the programmed setpoints and are not affected by optimal start, demand limiting, or other temporary adjustments.
- Air Source Linkage: Provides **USESL**, **L FOR**, **L ZONE**, **L OM**, **L OHS**, **L OCS**, **L UHS**, **L UCS** inputs that are used to bypass the normal inputs to the Setpoint Microblock and substitute values from linkage.
- Setpoint Adjust Limit: Provides **SPADJ** input that sets the maximum amount (degrees) by which the user can adjust the zone's setpoints from a zone sensor. Enabling this option disables the **Setpoint Adjust Limit** field on the **Rnet** tab.

You can program a zone's occupied and unoccupied heating and cooling setpoints.

A typical zone thermographic color scale may look like this:



How it works

Heating and Cooling setpoints

The microblock outputs the effective zone heating (**HT**) and cooling (**CL**) setpoints. Unless adjusted by a user in the zone, by the optimal start algorithm, or by electric demand reduction levels, the effective setpoints equal the programmed occupied or unoccupied setpoints. All such adjustments to the programmed setpoints are cumulative. When the **OCC** input is true (on), the microblock adjusts the occupied cooling and heating setpoint values to generate the effective setpoints. When the **OCC** input is not true (off), the microblock adjusts the unoccupied heating and cooling setpoint values.

Maintaining Minimum Setpoint Separation (Deadband)

The microblock enforces a minimum separation (deadband) of twice the color change hysteresis value between the effective heating and cooling setpoints. For example, if a user or third-party BACnet system raises the heating setpoint to a value that is equal to or higher than the cooling setpoint, the cooling setpoint will be “pushed” to a higher value to prevent the heating and cooling ranges from overlapping. If locked property values or out of service values for any of the four setpoint objects (**Occupied Heating**, **Occupied Cooling**, **Unoccupied Heating** or **Unoccupied Cooling**) are set to a combination that causes the effective setpoints to overlap, the heat and cool setpoints are added, averaged, and the deadband is applied to either side of the averaged value to create effective setpoints that allow the control program to continue functioning properly.

If the option **Minimum Setpoint Separation** is selected, the deadband can be increased programmatically. If the value on the **MINSP** input is less than the microblock’s minimum deadband, the microblock will ignore the input value and use a deadband value of twice the color change hysteresis value.

Zone thermographic color

The microblock compares the zone temperature from the **ZONE** input to the zone's effective setpoints and resulting color scale to determine the zone color output value.

EXAMPLES

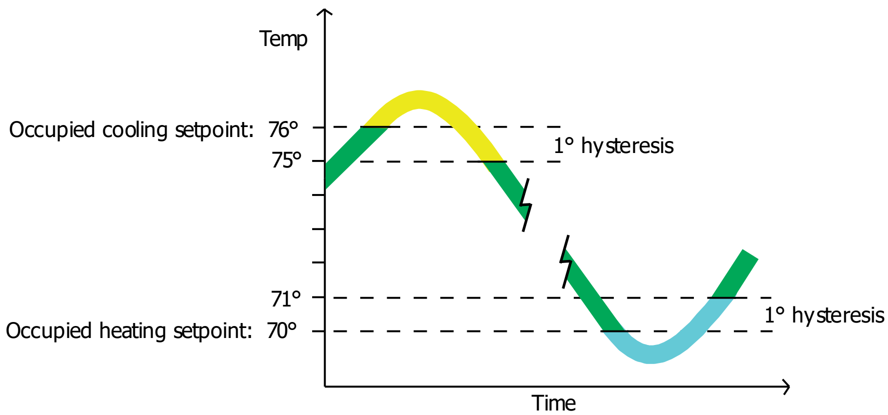
- Unoccupied
  - If the unoccupied zone temperature (65°) is between the unoccupied heating (55°) and cooling (90°) setpoints and the zone is not in optimal start, the microblock sets the color output value to unoccupied gray.
  - If the unoccupied zone temperature (54°) drops below the unoccupied heating setpoint (55°), the microblock sets the color and output value to light blue.
    NOTE The color thresholds between unoccupied gray and red can be seen in the i-Vu®/Field Assistant interface.
- Occupied
  If the occupied zone temperature (79°) exceeds the occupied cooling setpoint (76°) by more than the yellow color band value (2°) but less than the yellow and orange color band values (2° + 2° = 4°), the microblock sets the color output value to orange.
- Optimal start
  If the zone temperature (60°) drops below the effective heating setpoint (62°), the microblock sets the color output value to light blue.
  If the zone temperature (85°) exceeds the effective cooling setpoint (84°), the microblock sets the color output value to yellow.
- Demand level 1
  If the occupied zone temperature (68°) drops below the occupied heating setpoint minus the **Demand1** offset (70° – 1° = 69°) by less than the light blue band value (2°), the microblock sets the color output value to light blue.

Color Change Hysteresis

The **Color Change Hysteresis** provides a difference between the temperature at which the zone color changes as the zone temperature departs from the acceptable range between the heating and cooling setpoints and the temperature at which the zone color changes back as the zone temperature returns to the acceptable range.

EXAMPLE The following graph shows the zone color that results as the zone temperature departs from and returns to the acceptable range in a zone with the following settings:

- **Color Change Hysteresis** = 1° (applies as the temperature returns to the acceptable range)
- Occupied cooling setpoint = 76°
- Occupied heating setpoint = 70°



Demand Limiting (Optional)

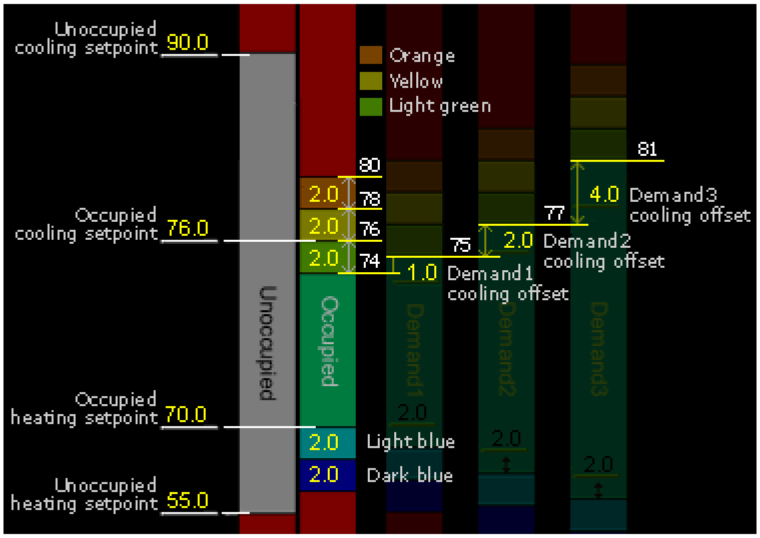
Electric rates can vary with electricity usage. In some locations, utilities offer incentives to customers to reduce electrical usage when the system-wide load threatens to exceed the grid capacity and cause brownouts. Some gas utilities offer incentives to customers to keep their natural gas usage below a certain level. To keep utility usage below peak demand levels, you can define 3 demand levels to reduce the cooling or heating load. You typically define these levels in your gas or electric meters' control programs. You can use these demand levels to relax zone occupied heating and cooling setpoints as needed throughout your system. Relaxing setpoints reduces equipment operation and reduces utility demand while minimizing the effects on occupant comfort.

To use this demand reduction strategy in a zone, set up *Analog Network Input* (page 174) microblocks to read the demand levels (1, 2, or 3) from the meter's control program and connect the Analog Network Input microblocks to this microblock's **HDEM** and **CDEM** inputs. In an all-electric system, the demand level from the electric meter would typically be connected to both inputs. Other systems may require the heating and cooling demands to be controlled separately. When the utility meter's control program indicates a demand level of 1, this microblock relaxes occupied heating or cooling setpoints and all related color band thresholds by the **Demand1** offsets you define. Similarly, a demand level of 2 relaxes setpoints by the **Demand2** offset and a demand level of 3 relaxes setpoints by the **Demand3** offset.

By defining demand level offsets for each zone, the system can reduce utility demand with significant changes to the setpoints in non-critical zones and little or no change to the setpoints in critical zones.

EXAMPLE

Below is a typical demand offset strategy and resulting effective setpoints and color thresholds. The cooling demand offsets and setpoints are highlighted in this example. Heating offsets would similarly affect the heating effective setpoints.



Setpoint Adjust (Optional)

If you select this option, the microblock exposes inputs to adjust the heating setpoint (**HADJ**) and the cooling setpoint (**CADJ**). These inputs can be used to programmatically adjust setpoints based on a condition in the zone. For example, if a conference room is scheduled to be occupied, but the zone's occupancy sensor indicates that a room is no longer occupied, the heating or cooling setpoints could be set back by a few degrees to save energy but allow rapid return to occupied setpoints. These inputs also provide a method for a non-ZS room sensor with a local setpoint adjustment to affect the zone setpoints. If the sensor only has a single setpoint adjust output it is commonly connected to both inputs so the adjustment raises or lowers both setpoints by an equal amount.

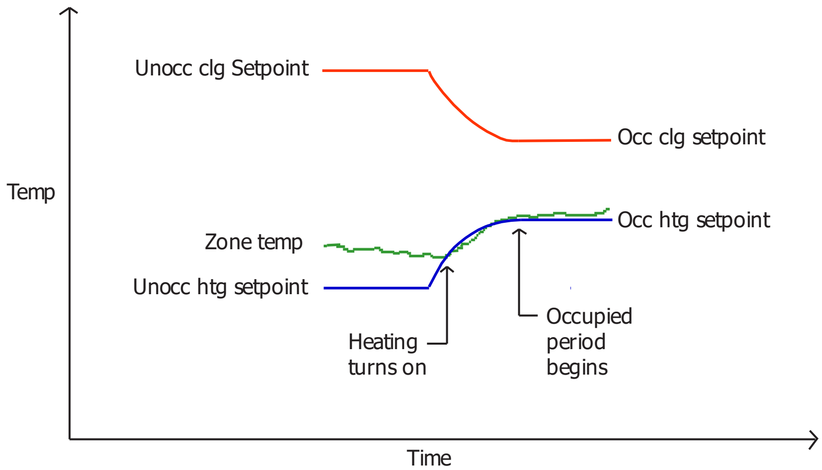
Adjusting either setpoint affects all related color bands by an equal amount. For example, if you raise the cooling setpoint by 2˚, you raise the temperature at which the color changes from green to yellow by 2˚. The temperatures at which the color changes from yellow to orange and from orange to red are also raised by 2˚.

NOTES

- You can limit the allowed amount of local setpoint adjustment for a ZS sensor using the **Setpoint Adjust Limit** on the Rnet tab. For an SPT sensor, you can limit the allowed amount of local setpoint adjustment in the zone sensor's microblock.
- If using a ZS sensor, the optional **HADJ** and **CADJ** inputs are not required for the sensor to adjust the effective setpoint.
- The Setpoint Adjust Inhibit option Provides **ADJI** input by which user setpoint adjustment from a ZS sensor can be programmatically prevented. However, the microblock will still allow programmatic adjustment of setpoint based on the **HADJ** and **CADJ** inputs.

Optimal Start (Optional)

When the zone is unoccupied, the microblock uses the outside air temperature from the **OAT** input and the design temperatures and capacities set in the microblock to estimate the time needed to warm or cool the zone from the unoccupied setpoints to the occupied setpoints. When the estimated time is less than the remaining unoccupied time indicated by the **FOR** input, the microblock outputs the programmed unoccupied setpoint values. When the estimated time to reach the occupied setpoints equals the remaining unoccupied time, the microblock transitions the effective setpoints to the occupied setpoints using a first-order curve that approximates system performance at full capacity.



Heating capacity calculation during optimal start

$t = \frac{FOR}{60}$ = Time Remaining Until Occupancy (hr)

OAT = Outside Air Temperature (°F)

H_{design} = Heating Design Temperature (°F)

HCAP = Heating Capacity (°F/hr)

H_{unocc} = Unoccupied Heating Setpoint (°F)

H_{occ} = Occupied Heating Setpoint (°F)

HSP = Heating Setpoint (°F)

$$H_1 = \frac{(H_{design} - OAT)}{(H_{design} - 65°F)} \times HCAP$$

$$H_2 = H_{unocc} + \frac{(12 - MIN(t,12))}{12} \times (H_{occ} - H_{unocc})$$

$$H_3 = MAX(MIN(H_2, (H_{occ} - (t \times H_1))), H_{unocc})$$

$$HSP = H_3 + (H_3 - H_{unocc}) \times \left(1 - \frac{(H_3 - H_{unocc})}{(H_{occ} - H_{unocc})}\right)$$

NOTE If the **Capacity Limit** optional input HCAP% is used, the H_1 calculation is:

$$H_1 = \frac{(H_{design} - OAT)}{(H_{design} - 65°F)} \times HCAP \times HCAP\%$$

Cooling capacity calculation during optimal start

$t = \frac{FOR}{60}$ = Time Remaining Until Occupancy (hr)

OAT = Outside Air Temperature (°F)

C_{design} = Cooling Design Temperature (°F)

CCAP = Cooling Capacity (°F/hr)

C_{unocc} = Unoccupied Cooling Setpoint (°F)

C_{occ} = Occupied Cooling Setpoint (°F)

CSP = Cooling Setpoint (°F)

$$C_1 = \frac{(C_{design} - OAT)}{(C_{design} - 65°F)} \times CCAP$$

$$C_2 = C_{unocc} + \frac{(12 - MIN(t,12))}{12} \times (C_{occ} - C_{unocc})$$

$$C_3 = MIN(MAX(C_2, (C_{occ} + (t \times C_1))), C_{unocc})$$

$$CSP = C_3 + (C_3 - C_{unocc}) \times (1 - \frac{(C_3 - C_{unocc})}{(C_{occ} - C_{unocc})})$$

NOTE If the **Capacity Limit** optional input CCAP% is used, the C_1 calculation is:

$$C_1 = \frac{(C_{design} - OAT)}{(C_{design} - 65°F)} \times CCAP \times CCAP\%$$

NOTE You can use the optimal start inhibit inputs (**HOSI** and **COSI**) to inhibit optimal start. For example, you may want to prevent any possible heating optimal start during the summer months or prevent optimal start from beginning more than 4 hours before occupancy.

Learning Adaptive with Optimal Start (Optional)

To minimize the energy required during optimal start, the learning adaptive optimal start algorithm evaluates the zone thermographic color at occupancy and adjusts the learned heating or cooling capacity for the next unoccupied period. If the zone temperature does not reach the setpoint by occupancy (the zone's thermographic color is not green at occupancy) the algorithm reduces the learned capacity by the adjustment value you defined for the zone's thermographic color at occupancy. During the next unoccupied period, optimal start begins sooner because the capacity is lower. If the zone temperature reaches the effective setpoint at any time during optimal start, the algorithm increases the learned heating or cooling capacity by the applicable green adjustment value regardless of the zone's color at occupancy. During the next unoccupied period, optimal start begins later because the capacity is higher.

EXAMPLE A zone's heating capacity is 5° per hour. Its light blue learning adaptive adjustment value is 0.06. If at occupancy, the zone's thermographic color is light blue, the microblock uses a learned heating capacity of 4.94° (5° – .06°) per hour in its optimal start calculations for the next unoccupied period.

A microblock with Learning Adaptive and Optimal Start enabled calculates optimal start times more accurately and controls equipment more efficiently than microblocks with only Optimal Start enabled because it uses learned capacities in its calculations. Learned capacities are displayed on the **Properties** page and are available to other parts of the control program from the **HCAP** and **CCAP** outputs.

NOTES

- The algorithm will not adjust learned heating and cooling capacities lower than 0.0625° per hour.
- If a user downloads new heating and cooling capacity values to the controller, the learned heating and cooling capacities change to the new values. If other properties from the control program are downloaded to the controller but the capacities do not change, the learned capacities are not affected.
- If a user downloads All Content to the controller, the learned heating and cooling capacities are reset to the microblock's programmed heating and cooling capacities.

To prevent learned capacities from being distorted during override periods, use the learning inhibit (**LRNI**) input to prevent learned capacities from being adjusted during override periods. When the **LRNI** input is true (on), optimal start operates normally but learned capacities are not adjusted for the next unoccupied period.

Make sure that all other control sequences in the control program, including PID loops, are tuned and functioning properly to prevent improper setpoint adjustment.

Capacity Limit (Optional)

If outside factors will prevent the heating or cooling system from running at 100% of its normal capacity, you can direct the Optimal Start routine to use only a percentage of the zone's learned heating or cooling capacity based on external logic using the **HCAP%** and **CCAP%** inputs. This percentage adjustment applies even if learning is inhibited by the **LRNI** input.

Zone Linkage (Optional)

The Zone linkage option allows for zone applications to link with air or water sources. In contrast to the effective setpoint outputs, this supplies the programmed setpoints and is not affected by optimal start, demand limiting, or other temporary adjustments.

The Zone Linkage option creates additional output wires:

OH: Occupied Heating Setpoint
OC: Occupied Cooling Setpoint
UH: Unoccupied Heating Setpoint
UC: Unoccupied Cooling Setpoint

These outputs are often needed to link zone applications with air or water sources. In contrast to the effective setpoint outputs, these outputs supply the programmed setpoints and are not affected by optimal start, demand limiting, or other temporary adjustments.

Air Source Linkage (Optional)

The Air Source Linkage option creates 8 additional input wires:

Use SL: Activates or deactivates Air Source Linkage
L FOR: The FOR time received from linkage
L ZONE: The Zone temperature received from linkage
L OM: The Occupancy Mode (Occupied or Unoccupied) received from linkage
L OHS: The Occupied Heating Setpoint received from linkage
L OCS: The Occupied Cooling Setpoint received from linkage
L UHS: The Unoccupied Heating Setpoint received from linkage
L UCS: The Unoccupied Cooling Setpoint received from linkage

This option is used to bypass the normal inputs to the Setpoint Microblock and substitute values from linkage. A typical application is a rooftop unit that may be used as a single zone unit or as an air source to supply conditioned air to multiple linked zones.

If no other zones are linked to the unit, or if a communication failure disables the linkage, the microblock functions as a normal Setpoint microblock, accepting the occupied state, zone temp, and all other local inputs and ignoring the linkage inputs. In essence, the controller operates in a stand-alone mode, using its local schedule and sensor inputs instead of the linkage inputs.

Setpoint Adjust Limit (Optional)

This optional input can be used if the setpoint adjust limit needs to be editable from an external source like an Equipment Touch or a third-party front-end, or if it needs to change because of a programmatic condition. The **Setpoint Adjust Limit** field on the **Rnet** tab is not used when this optional input is activated.

Limitations

A control program can use only one Zone Setpoint microblock. Do not use a *Set Color* (page 390) microblock or any *Set Color If True* (page 390) microblocks in a control program with a Zone Setpoint microblock.

Inputs and outputs

Inputs

OAT Outside Air Temperature	Optional–Present if **Optimal Start** is enabled. Current outside air temperature (degrees).
OCC Occupied Schedule	True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. Connect to a *time clock microblock* (page 361) or to other logic that indicates the zone's occupancy status.
FOR Remaining Time	Minutes remaining until the zone's occupancy status changes. Connect to a *time clock microblock* (page 361) or to other logic that indicates this time.
ZONE Zone Temperature	Current zone temperature (degrees). Connect to an *ASVI* (page 213) for a ZS sensor, an *RS* (page 121) microblock for an SPT sensor, for to another input microblock that indicates this value.

HDEM Heating Demand Level	Optional–Present if **Demand Limiting** is enabled. Current heating demand level (1–3). Connect to the Analog Network Input microblock that reads the heating demand level. This typically comes from an electric meter's control program if electric heat is used or a gas meter control program if gas heat is used.
CDEM Cooling Demand Level	Optional–Present if **Demand Limiting** is enabled. Current cooling demand level (1–3). Connect to the Analog Network Input microblock that reads the cooling demand level. This typically comes from an electric meter's control program if cooling is provided from local DX coils or an electrically driven central cooling plant.
HADJ Heating Setpoint Adjust	Optional–Present if **Setpoint Adjust** is enabled. Signal from zone sensor to adjust heating setpoint (degrees). Connect to the zone sensor microblock's **SP ADJ** output.
CADJ Cooling Setpoint Adjust	Optional–Present if **Setpoint Adjust** is enabled. Signal from zone sensor to adjust cooling setpoint (degrees). Connect to the zone sensor microblock's **SP ADJ** output.
ADJI	Optional–Present if **Inhibit Setpoint Adjust** is enabled. True (on) when the microblock should not accept setpoint adjust signals from a ZS sensor. This input does not inhibit setpoint adjust from the optional **HADJ** and **CADJ** inputs.
MINSP Minimum Setpoint Separation	Optional–Present if **Minimum Setpoint Separation** is enabled. Minimum separation (degrees) the microblock will enforce between the effective heating and cooling setpoints. If this value is less than twice the color change hysteresis value, the microblock will enforce a minimum separation of twice the color change hysteresis value. See **Maintaining Deadband** in “How it Works” in this microblock’s help.
HOSI Heating Optimal Start Inhibit	Optional–Present if **Optimal Start** is enabled. True (on) when the microblock should not adjust heating setpoints for optimal start.
COSI Cooling Optimal Start Inhibit	Optional–Present if **Optimal Start** is enabled. True (on) when the microblock should not adjust cooling setpoints for optimal start.
HCAP% Heating Capacity Adjusted By	Optional–Present if **Capacity Limit** is enabled. Percentage of the learned heating capacity to use during optimal start under the conditions defined by external logic.
CCAP% Cooling Capacity Adjusted By	Optional–Present if **Capacity Limit** is enabled. Percentage of the learned cooling capacity to use during optimal start under the conditions defined by external logic.
LRNI Learning Adaptive Inhibit	Optional–Present if **Learning Adaptive** is enabled. True (on) when the microblock should not adjust learned heating or cooling capacity based on conditions when the zone transitions to the occupied state.
USESL	Optional–Present if **Air Source Linkage** is enabled. True (on) when the microblock should use the setpoints and other data provided from Air Source Linkage

L FOR	Optional–Present if **Air Source Linkage** is enabled. Minutes remaining until the zone's occupancy status changes, as provided by Linkage. This input should be connected to an Air Source Linkage output and is used in place of the local timeclock value when the **Use SL** input is true.
L ZONE Linkage zone temperature (degrees)	Optional–Present if **Air Source Linkage** is enabled. This input should be connected to an Air Source Linkage output and is used in place of the local ZONE value when the **Use SL** input is true.
L OM Linkage Occupancy Mode	Optional–Present if **Air Source Linkage** is enabled. True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. This input should be connected to an Air Source Linkage output and is used in place of the local OCC value when the **Use SL** input is true.
L OHS Linkage Occupied Heating Setpoint (degrees)	Optional–Present if **Air Source Linkage** is enabled. This input should be connected to an Air Source Linkage output and is used in place of the internal setpoint value when the **Use SL** input is true.
L OCS Linkage Occupied Cooling Setpoint (degrees)	Optional–Present if **Air Source Linkage** is enabled. This input should be connected to an Air Source Linkage output and is used in place of the internal setpoint value when the **Use SL** input is true.
L UHS Linkage Unoccupied Heating Setpoint (degrees)	Optional–Present if **Air Source Linkage** is enabled. This input should be connected to an Air Source Linkage output and is used in place of the internal setpoint value when the **Use SL** input is true.
L UCS Linkage Unoccupied Cooling Setpoint (degrees)	Optional–Present if **Air Source Linkage** is enabled. This input should be connected to an Air Source Linkage output and is used in place of the internal setpoint value when the **Use SL** input is true.
SPADJ	Optional - Present if **Setpoint Adjust Limit (+/-)** is enabled. The maximum amount (degrees) by which the user can adjust the zone's setpoints from a zone sensor. The **Setpoint Adjust Limit** field on the **Rnet** tab is not used when this optional input is activated.

Outputs

<table>
<tr><td>Zone Color</td><td>Zone thermographic color based on ZONE input compared to effective setpoints.
<table>
<tr><th>Color</th><th></th><th>Status code</th><th>Condition indicated</th></tr>
<tr><td></td><td>Red</td><td>9</td><td>Cooling alarm</td></tr>
<tr><td></td><td>Orange</td><td>8</td><td>Maximum cooling</td></tr>
<tr><td></td><td>Yellow</td><td>7</td><td>Moderate cooling</td></tr>
<tr><td></td><td>Light green</td><td>6</td><td>Free cooling</td></tr>
<tr><td></td><td>Green</td><td>5</td><td>No heating or cooling</td></tr>
<tr><td></td><td>Light blue</td><td>4</td><td>Moderate heating</td></tr>
<tr><td></td><td>Dark blue</td><td>3</td><td>Maximum heating</td></tr>
<tr><td></td><td>Red</td><td>2</td><td>Heating alarm</td></tr>
<tr><td></td><td>Gray</td><td>1</td><td>Unoccupied</td></tr>
</table>
The microblock outputs the zone color's status code (1–9) on its zone color wire.</td></tr>
<tr><td>HT
Heating Setpoint</td><td>The zone's effective heating setpoint (degrees) based upon occupancy, optimal start, demand limiting, and all other adjustments.</td></tr>
<tr><td>CL
Cooling Setpoint</td><td>The zone's effective cooling setpoint (degrees) based upon occupancy, optimal start, demand limiting, and all other adjustments.</td></tr>
<tr><td>NS
Night Setback</td><td>Optional–Present if Night Setback is enabled.
True (on) when the zone is not occupied, optimal start is not in progress, and the zone temperature exceeds the unoccupied heating or cooling setpoint.</td></tr>
<tr><td>HCAP
Learned Heating Capacity</td><td>Optional–Present if Learning Adaptive is enabled.
The learned heating capacity (degrees/hour) calculated by the learning adaptive optimal start algorithm. See Learning adaptive optimal start in "How it works" in this microblock's help.</td></tr>
<tr><td>CCAP
Learned Cooling Capacity</td><td>Optional–Present if Learning Adaptive is enabled.
The learned cooling capacity (degrees/hour) calculated by the learning adaptive optimal start algorithm. See Learning adaptive optimal start in "How it works" in this microblock's help.</td></tr>
<tr><td>OH
Occupied Heating Setpoint</td><td>Optional–Present if Zone Linkage is enabled.
The programmed setpoint, not the effective setpoint. This output is not affected by local setpoint adjustment, optimal start, or demand limiting.</td></tr>
<tr><td>OC
Occupied Cooling Setpoint</td><td>Optional–Present if Zone Linkage is enabled.
The programmed setpoint, not the effective setpoint. This output is not affected by local setpoint adjustment, optimal start, or demand limiting.</td></tr>
</table>

UH Unoccupied Heating Setpoint	Optional–Present if **Zone Linkage** is enabled. The programmed setpoint, not the effective setpoint. This output is not affected by local setpoint adjustment, optimal start, or demand limiting.
UC Unoccupied Cooling Setpoint	Optional–Present if **Zone Linkage** is enabled. The programmed setpoint, not the effective setpoint. This output is not affected by local setpoint adjustment, optimal start, or demand limiting.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Units	The unit of measure, ˚F or ˚C, the setpoints are using.

Setpoints

Unoccupied, Occupied, and Demand Level Setpoints

The desired occupied and unoccupied zone setpoints (degrees), the value of each occupied color band (degrees), and the offsets for electric demand levels 1, 2, and 3 (degrees).

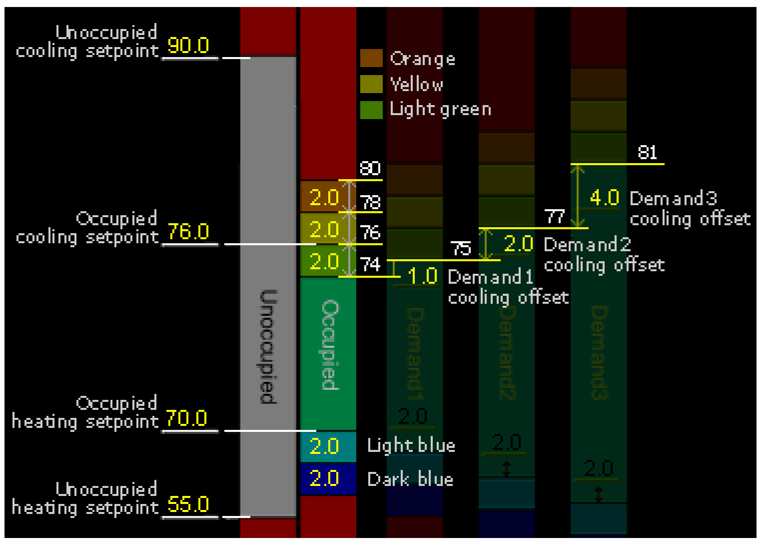
A color band's value determines the threshold at which the microblock changes the zone thermographic color as the zone temperature departs from setpoint.

You can use the free cooling light green color band to enable economizer operation. If you are not using this feature, type `0` for this band's value.

Demand level offsets determine how much to relax the zone's occupied setpoints and color band thresholds under each electric demand level. When the electric meter's control program indicates a demand level of 1, this microblock relaxes occupied heating and cooling setpoints and all related color band thresholds by the **Demand1** offsets you define. Similarly, a demand level of 2 relaxes setpoints by the **Demand2** offset and a demand level of 3 relaxes setpoints by the **Demand3** offset.

EXAMPLE

A zone thermographic color scale with typical demand offsets and resulting effective setpoints and color thresholds



Optional–Demand Levels are used only if **Demand Limiting** is enabled.

Color Change Hysteresis

The desired difference (degrees) between the temperature at which the zone color changes as the zone temperature departs from the acceptable range between the heating and cooling setpoints and the temperature at which the zone color changes back as the zone temperature returns to the acceptable range. If you are not using zone thermographic color for equipment control, type `0`. See **Color Change Hysteresis** in "How it works" in this microblock's help.

Design Properties

Heating Capacity	Optional–Used only if **Optimal Start** is enabled. The rate (degrees/hour) at which the zone temperature changes if the outside air temperature is 65°F and the heating system runs at full capacity. Adjust after startup based on system optimal start performance.
Cooling Capacity	Optional–Used only if **Optimal Start** is enabled. The rate (degrees/hour) at which the zone temperature changes if the outside air temperature is 65°F and the cooling system runs at full capacity. Adjust after startup based on system optimal start performance.
Heating Design Temperature	Optional–Used only if **Optimal Start** is enabled. The geographically-based outside air temperature (degrees) at which the heating system must run constantly in order to maintain comfort. Available in ASHRAE publications and most design references.
Cooling Design Temperature	Optional–Used only if **Optimal Start** is enabled. The geographically-based outside air temperature (degrees) at which the cooling system must run constantly in order to maintain comfort. Available in ASHRAE publications and most design references.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Learning

Color adjustment values	Optional–Used only if **Learning Adaptive** is enabled. The amount by which the microblock adjusts the zone's learned heating or cooling capacity when the zone is this thermographic color at occupancy. See **Learning adaptive optimal start** in "How it works" in this microblock's help.

BACnet

This microblock contains the following BACnet analog value objects.

This object....	Represents...	And is...
Occupied Cooling	The programmed Occupied Cooling Setpoint **NOTE** This object becomes read-only when Air Source Linkage is active.	Writable
Occupied Heating	The programmed Occupied Heating Setpoint **NOTE** This object becomes read-only when Air Source Linkage is active.	Writable
Unoccupied Cooling	The programmed Unoccupied Cooling Setpoint **NOTE** This object becomes read-only when Air Source Linkage is active.	Writable
Unoccupied Heating	The programmed Unoccupied Heating Setpoint **NOTE** This object becomes read-only when Air Source Linkage is active.	Writable
Cooling Adjustment	The value of the **CADJ** input wire	Read-only
Effective Cooling	The value of the **CL** output wire. It is the effective cooling setpoint based upon occupancy, optimal start, demand limiting, and all other adjustments.	Read-only
Heating Adjustment	The value of the **HADJ** input wire	Read-only
Effective Heating	The value of the **HT** output wire. It is the effective heating setpoint based upon occupancy, optimal start, demand limiting, and all other adjustments	Read-only
Zone Temperature Trend Log	A trend log of the zone temperature input. **NOTE** This value comes from the **L ZONE** input when Air Source Linkage is active.	Read-only
Occupied Status Trend Log	A trend log of the occupancy status. **NOTE** This value comes from the **L OM** input when Air Source Linkage is active.	Read-only

Define the following properties for the above BACnet objects.

Object Name	A unique alphanumeric string that defines the BACnet object.
Description	(optional) A BACnet-visible microblock description.
Minimum	If this setpoint can be changed from a zone sensor, this is the lowest temperature to which a user can adjust the zone's setpoint from a sensor. If a third-party vendor writes a value lower than this value to the microblock's Present_Value, the controller returns a Property, Value_Out_Of_Range error.
Maximum	If this setpoint can be changed from a zone sensor, this is the highest temperature to which a user can adjust the zone's setpoint from a sensor. If a third-party vendor writes a value higher than this value to the microblock's Present_Value, the controller returns a Property, Value_Out_Of_Range error.

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value.
COV Increment	An Analog Network Input (ANI) that references this microblock in its **Address** field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the **COV Increment**. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's **Refresh Time** field.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

CCN

Define the path for each of the following:

- Occupied Cooling
- Occupied Heating
- Unoccupied Cooling
- Unoccupied Heating

<table>
<tr>
<td>Path</td>
<td>
Use the information below to format a valid path for the microblock you are using to read or write to the CCN point. Each item in the path is limited to 8 alpha-numeric characters. Check Editable if you want the path to be editable in the i-Vu®/Field Assistant interface.

Path format:
CCN://LINK/<table name>/<point name><:instance#><@force level>

LINK represents the CCN device defined in the CCN Controller microblock.

<table name> - Use one of the following:

Definition table name:Data table name
Example: <code>CCN://LINK/MYTABLE:MYDATA1</code>

Definition table name:Instance number
Example: <code>CCN://LINK/MYTABLE:1</code>

Data table name
Example: <code>CCN://LINK/MYDATA1</code>

Where:

Definition table name is the name of the POC table that describes the data structure of the child tables.
Data table name is the name of the table instance that contains the variable or field being referenced.
Instance# is the table instance number

<point name>
Example: <code>CCN://LINK/.../HEATSP</code>

<:instance#> (Optional) - Use the instance number of the point name if the table has more than one point with the same name.

<@force level> (Optional) - The force level being written to (a value 1–15)
Example: <code>CCN://LINK/HOLIDAYS:HOLIDAY1/HEATSP@4</code>

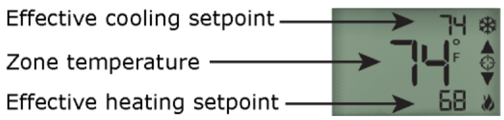
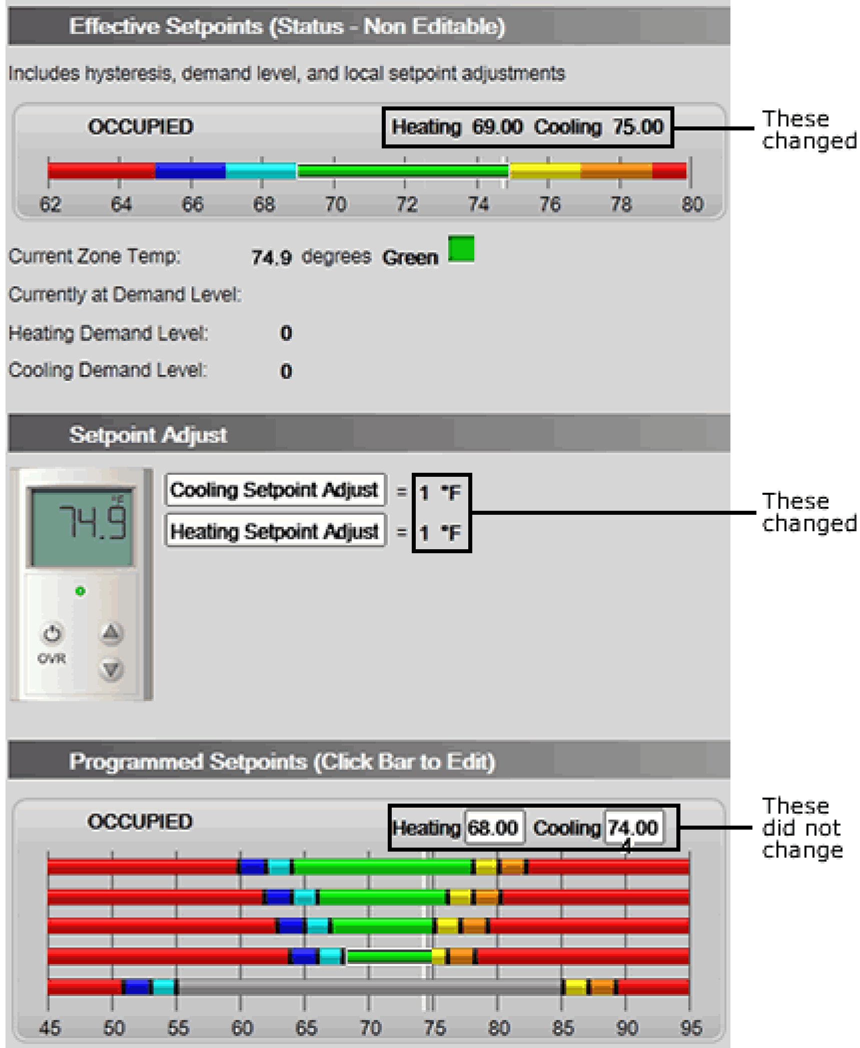
You can edit the address/path of a CCN point in one of the following places in the i-Vu®/Field Assistant interface:

The Details tab of a Point Properties dialog box
The Address column on the Properties > Network Points page

</td>
</tr>
</table>

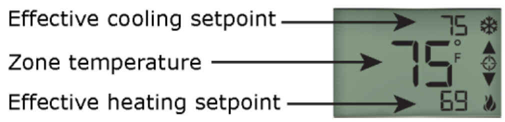
Rnet

Enable Rnet	Check to allow this microblock to communicate its value(s) to and from a sensor.
Setpoint Adjust Limit (+/-)	The maximum amount (degrees) by which the user can adjust the zone's setpoints from a zone sensor.
Clear adjustment on transition to unoccupied	ZS Pro and Pro-F sensors - Check to have the Setpoint microblock reset the sensor's setpoint adjustment value to 0 each time the microblock's OCC input changes to false (off) and leave it at 0 when the OCC input changes again to true (on) or when the zone enters a timed local override condition. If this field is not checked, the Setpoint microblock will not reset the sensor's adjusted value. ZS Plus sensor - This field does not apply. The Setpoint microblock cannot reset the sensor's adjusted value. **NOTE** The Setpoint microblock does not use adjusted values during unoccupied periods.
Edit Increment	The amount (degrees) that the zone temperature setpoint will be adjusted by each press of a ZS Pro sensor's ▲ or ▼ button. For a ZS Plus sensor, slider adjustments will be read to the nearest increment.

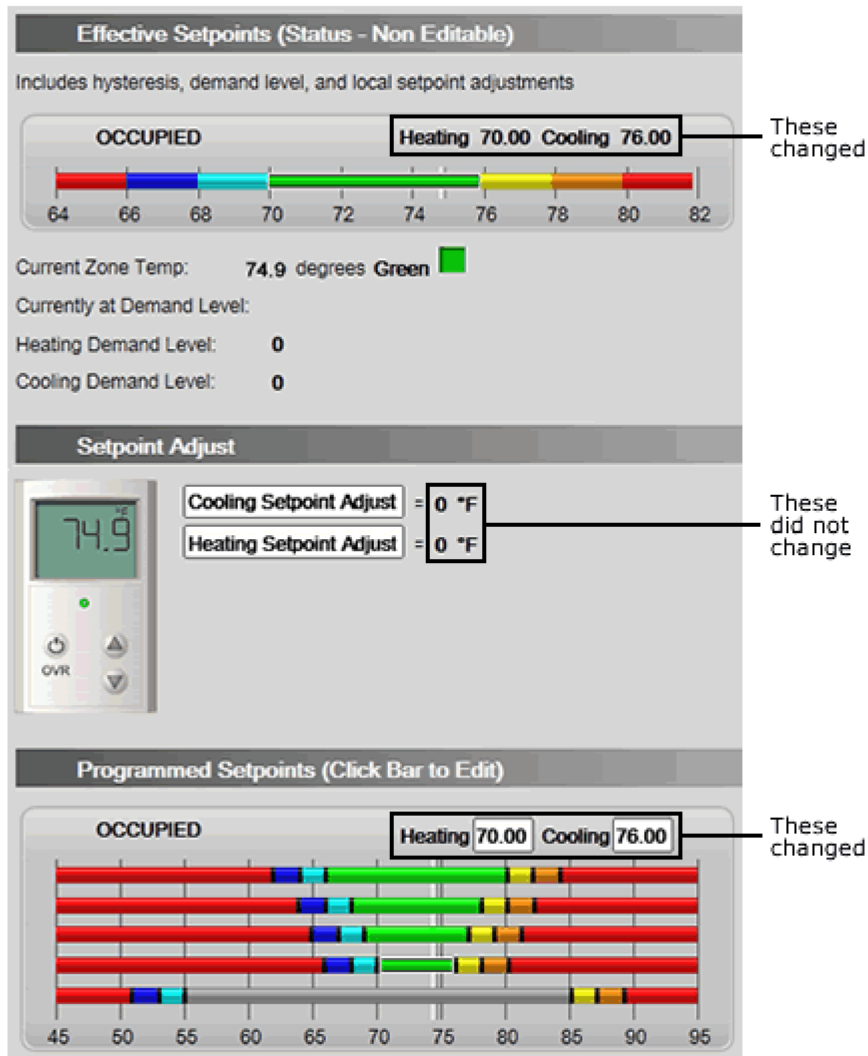
Sensor Setpoint Adjust Option	Select how you want to see and adjust setpoints on a ZS sensor.
Disabled	Prevents editing the setpoints at the sensor.
1. Adjust setpoint offset. Center display=Zone Temp. Show effective setpoints.	Example of sensor display:  Results in the i-Vu®/Field Assistant interface of adjusting setpoint offset up 1 degree: 

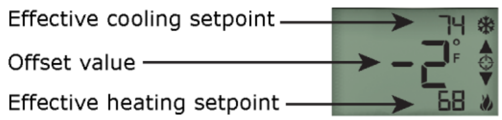
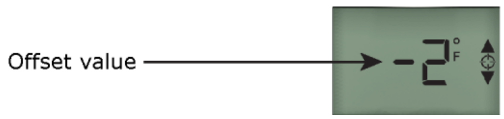
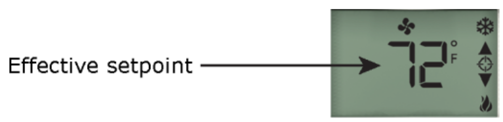
2. Adjust base setpoint. Center display=Zone Temp. Show effective setpoints.

Example of sensor display:



Results in the i-Vu®/Field Assistant interface of adjusting base setpoint up 1 degree:



3. Adjust setpoint offset. Center display= Offset value. Show effective setpoints.	Example of sensor display:  Results in the i-Vu®/Field Assistant interface of adjusting base setpoint up 1 degree: Same as **1.** above.
4. Adjust setpoint offset. Center display= Offset value. Hide effective setpoints.	Example of sensor display:  Results in the i-Vu®/Field Assistant interface of adjusting base setpoint up 1 degree: Same as **1.** above.
5. Hospitality mode	Displays only the active effective setpoint or the average of the heating and cooling setpoints if the mode is auto. The effective setpoint is adjustable. 

ZS Sensor Display Configuration	
Editable	Check under **Occupied** or **Unoccupied** to make each setpoint editable on a ZS Sensor.
Show on:	Check the sensor screen(s) that you want **Occupied**, **Unoccupied** and **Effective Setpoints** displayed on. **Home Screen (1)**: Effective Setpoints are displayed on the Home screen in the following locations:  On the Information or Diagnostics screen, effective setpoints cycle through in the primary value field and show **EFF** in the Rnet tag field. **Information Screen (2)**: This screen is accessed by pressing the sensor's *i* button. **Diagnostics Screen (3)**: This screen is accessed by holding the sensor's *i* button for at least 3 seconds.

Allow Setpoint Adjust (in a running system)	Check to allow setpoint adjustments on the sensor. **NOTE** The setpoint adjust value and effective setpoints will be determined by the following. If an Rnet has: • Multiple Pro sensors, the values will be based on the sensor that was adjusted last. • Multiple Plus sensors, the values will be the average of the sensors. • A Pro and a Plus sensor, only the Pro's value will be used. The Plus will be ignored.

Trends

This microblock contains the following BACnet trend objects.

Effective Cooling Analog Trend	A trend log of the effective cooling setpoint.
Effective Heating Analog Trend	A trend log of the effective heating setpoint.
Zone Temperature Analog Trend	A trend log of the zone temperature input. **NOTE** This value comes from the L ZONE input when Air Source Linkage is active.
Occupied Status Binary Trend	A trend log of the occupancy status. **NOTE** This value comes from the L OM input when Air Source Linkage is active.

Define the following properties for the above trend objects.

Enable	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of value)	Records the microblock’s present value only when the value changes by at least the **COV Increment**.
Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. Click **Reset** in the i-Vu®/Field Assistant interface to delete all samples currently stored in the controller.

Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.

Optional

Select the optional functionality that you want this microblock to have.

Demand Limiting	Provides **HDEM** and **CDEM** inputs that allow programmatic relaxation of setpoints to reduce electric demand. See "Demand Limiting" in How it works.
Setpoint Adjust Inputs	Provides **HADJ** or **CADJ** inputs by which the setpoint can be programmatically adjusted. See "Setpoint Adjust" in How it works.
Inhibit Setpoint Adjust from ZS	Provides **ADJI** input that allows your program to prevent the user from adjusting the setpoint at the sensor. See "Setpoint Adjust" in How it works.
Optimal Start	The microblock will use an optimal start algorithm to adjust the zone setpoint before the zone is occupied, ensuring that the zone temperature is within the occupied setpoints by the time the zone is occupied. Also provides **HOSI** and **COSI** inputs by which Optimal Start can be programmatically inhibited. See "Optimal Start" in How it works.
Learning Adaptive	Adjusts (learns) zone heating and cooling capacities based on optimal start system performance. Also provides **LRNI** input by which learning can be programmatically inhibited. See "Learning Adaptive with Optimal Start" in How it works.
Night Setback	Provides **NS** output that is true (on) when the zone is not occupied, optimal start is not in progress, and the zone temperature exceeds the unoccupied heating or cooling setpoint. See "Optimal Start" in How it works.
Minimum Setpoint Separation	Provides **MINSP** input that allows a minimum separation between the effective heating and cooling setpoints to be programmatically defined. See "Maintaining Minimum Setpoint Separation (Deadband)" in How it works.
Capacity Limit	Provides **HCAP%** and **CCAP%** inputs that allow programmatic limitation of the zone's learned heating or cooling capacity that the microblock uses in the Optimal Start routine. See "Capacity Limit" in How it works.

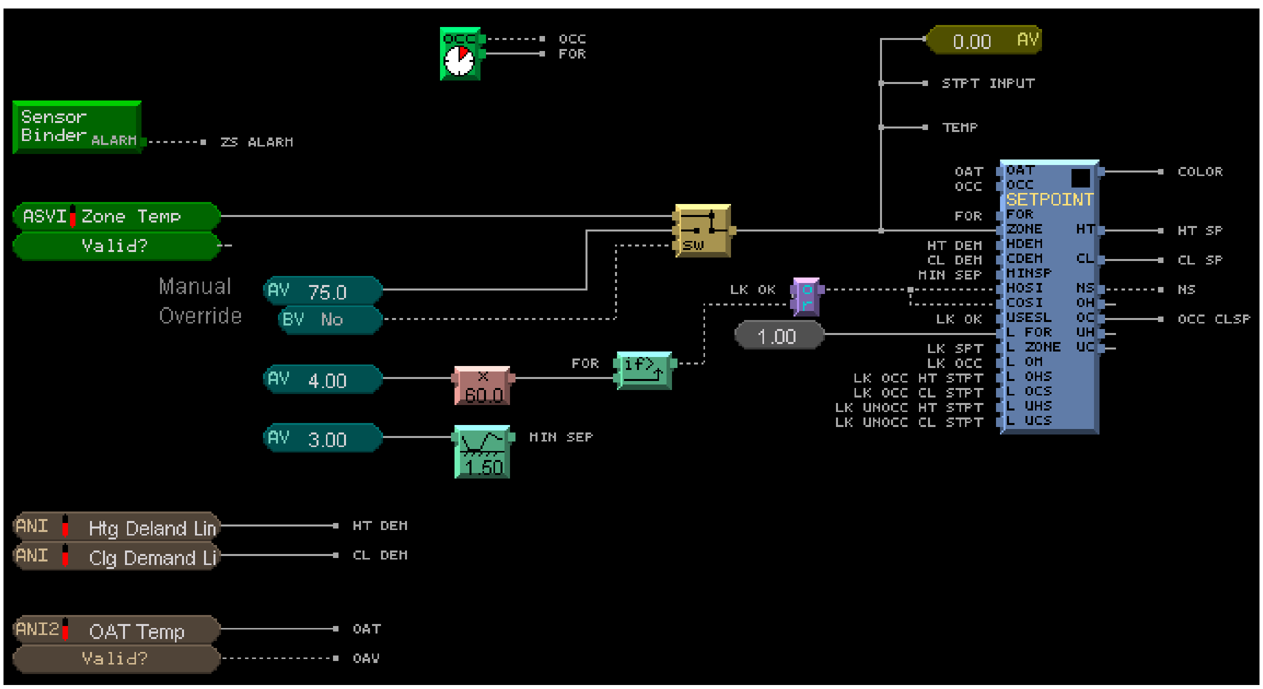
Zone Linkage	Provides **OH**, **OC**, **UH**, and **UC** outputs that are often needed to link zone applications with air or water sources. In contrast to the effective setpoint outputs, these outputs supply the programmed setpoints and are not affected by optimal start, demand limiting, or other temporary adjustments.
Air Source Linkage	Provides **USESL**, **L FOR**, **L ZONE**, **L OM**, **L OHS**, **L OCS**, **L UHS**, **L UCS** inputs that are used to bypass the normal inputs to the Setpoint Microblock and substitute values from linkage.
Setpoint Adjust Limit (+/-)	Provides **SPADJ** input that sets the maximum amount (degrees) by which the user can adjust the zone's setpoints from a zone sensor. Enabling this option disables the **Setpoint Adjust Limit** field on the **Rnet** tab.

Programming example

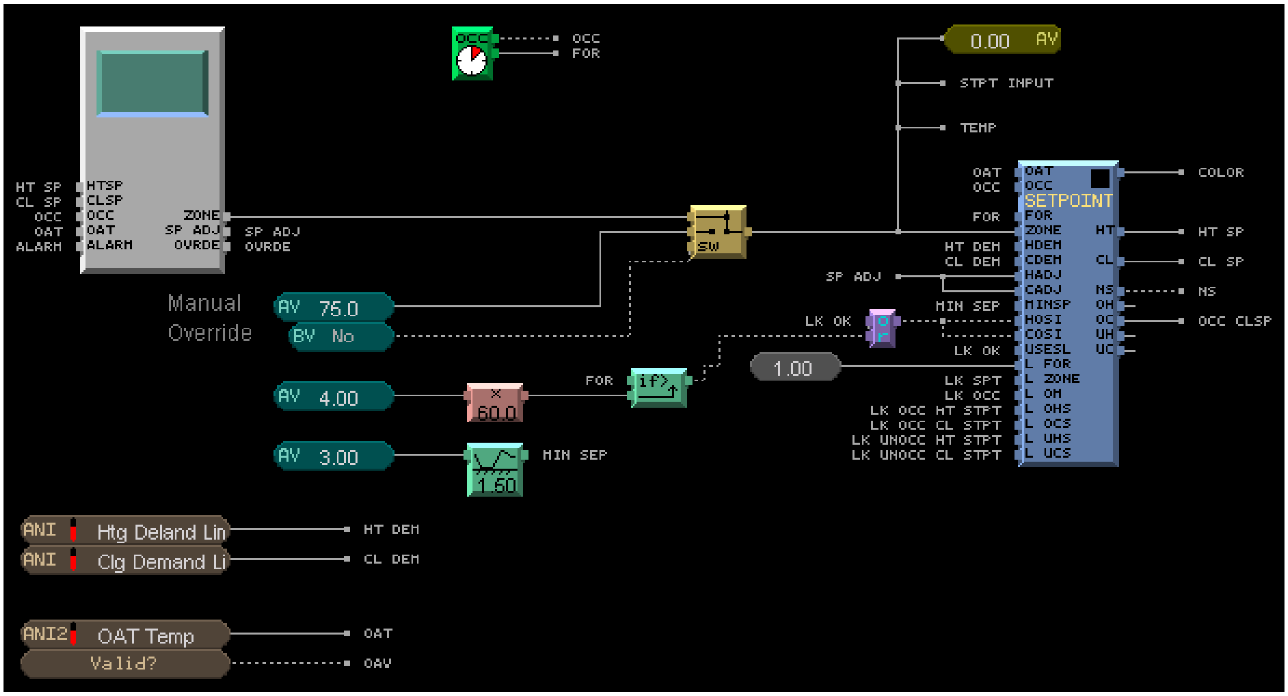
In each of the examples below, the zone control strategy does the following:

- Allows local zone setpoint adjustment using a zone sensor
- Inhibits optimal start from beginning more than 4 hours before occupancy
- Uses the full (100%) learned heating and cooling capacities during every optimal start period
- Inhibits learned heating and cooling capacity adjustments during unoccupied override periods

Example with a ZS Sensor:



Example with an SPT Sensor:



Tips and tricks

Optimal start

Write the control logic for the unoccupied mode to activate heating if the zone color is light blue or cooling if the zone color is yellow. This will bring the zone temperature back into the desired range during optimal start.

Color change hysteresis

If you are using zone thermographic color for floorplan display, but not for control, set the Color Change Hysteresis to `0`. Using zone color and hysteresis for control can confuse end users because it can prevent the zone color from changing at the programmed setpoints. To maintain a minimum separation between the effective heating and cooling setpoints with a hysteresis of 0, enable the **Minimum Setpoint Separation** option and provide your desired deadband. If you are controlling equipment based on zone thermographic color, set the hysteresis large enough to prevent the equipment from changing back and forth between two different states if the temperature oscillates near the setpoint.

Free cooling – economizer enable

If you are using zone thermographic color for control in small single-zone systems or unit ventilators, you can use the light green free cooling color band to enable economizer operation before you enable mechanical cooling. Otherwise, set the free cooling color band value to `0`.

Carrier Text Display

The information below provides a <u>FULL</u> description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Carrier microblocks* (page 3)
Icon and symbol	
What it does	This microblock lets you display text for a CCN point on a **Properties** page or **Graphics** page. **NOTE** To display on a **Graphics** page, add a **Single-line Text** control to the graphic in ViewBuilder. In the Control Properties window, type **ccn_disp_text** in the **Property** field.

Properties

Display Name	The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Path	Use the information below to format a valid path for the microblock you are using to read or write to the CCN point. Each item in the path is limited to 8 alpha-numeric characters. Check **Editable** if you want the path to be editable in the i-Vu®/Field Assistant interface. Path format: **CCN://LINK/<table name>/<point name><:instance#><@force level>** **LINK** represents the CCN device defined in the CCN Controller microblock. **<table name>** - Use one of the following: Definition table name:Data table name Example: `CCN://LINK/MYTABLE:MYDATA1` Definition table name:Instance number Example: `CCN://LINK/MYTABLE:1` Data table name Example: `CCN://LINK/MYDATA1` Where: • *Definition table name* is the name of the POC table that describes the data structure of the child tables. • *Data table name* is the name of the table instance that contains the variable or field being referenced. • *Instance#* is the table instance number **<point name>** Example: `CCN://LINK/.../HEATSP` **<:instance#>** (Optional) - Use the instance number of the point name if the table has more than one point with the same name. **<@force level>** (Optional) - The force level being written to (a value 1-15) Example: `CCN://LINK/HOLIDAYS:HOLIDAY1/HEATSP@4` You can edit the address/path of a CCN point in one of the following places in the i-Vu®/Field Assistant interface: • The **Details** tab of a Point Properties dialog box • The **Address** column on the **Properties** > **Network Points** page
Communications Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Input and Output Points microblocks

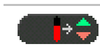
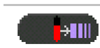
Input and Output Points microblocks communicate values between a control program and a controller's physical inputs and outputs. Input values are read from sensors connected to the controller's physical inputs. Output values are sent from the controller's physical outputs to control components on the controlled equipment.

The Airflow and Zone Sensor microblocks belong to this family.

Inputs

	*BACnet Analog Input* (page 70) Reads the analog (continuous) value of a physical input on the controller. Converts the raw data from the sensor to the appropriate range for its unit of measurement (such as mA, degrees Fahrenheit, or psi).
	*BACnet Binary Input* (page 77) Reads the binary (on or off) value of a physical input on the controller.
	*Timed Local Override* (page 83) Reads a local override input signal from a user-adjustable switch or button in the zone. Converts the signal, then outputs a remaining time value.
	*Pulse to Analog Input* (page 89) Counts pulses from a binary (on or off) input over a specified period of time. Every minute, calculates and outputs the average number of pulses received over the specified time.

Outputs

	*BACnet Analog Output* (page 95) Sends an analog (continuous) value from the control program to a physical analog output on the controller.
	*BACnet Binary Output* (page 102) Sends a binary (on or off) value from the control program to a physical digital (on or off) output on the controller.
	*Floating Motor* (page 106) Works with a bi-directional motor actuator triggered by two digital signals, such as clockwise and counterclockwise or damper open and damper closed. Converts a percent open value from the control program to on and off signals to two physical digital outputs on the controller.
	*Pulse-Width Output* (page 114) Converts a percent value from the control program to a digital on or off signal that varies in duration based on minimum and maximum values you define.

Zone (Airflow and Sensors)

U Flow	*U Line Airflow Control* (page 121) This microblock cannot be used for Carrier controllers.
LSTAT	*LogiStat Zone Sensor* (page 121) This microblock cannot be used for Carrier controllers.
RS	*RS Zone Sensor* (page 121) Sends information to and receives values from a variety of sensor configurations. Works with a schedule and setpoint microblock to maintain zone temperature at setpoint.
RS-F	*RS Zone Sensor with Fan Control* (page 131) Sends information to and receives values from a variety of sensor configurations. Works with a schedule and setpoint microblock to maintain zone temperature at setpoint. Enables the sensor's fan control and mode functionality.
AirFlw	*Airflow Control* (page 142) Maintains VAV zone airflow at setpoint. Its inputs, outputs, and properties interface with a controller's built-in airflow control algorithm. The algorithm ensures that zone airflow stays above the specified minimum for zone indoor air quality standards. Enables VAV testing and balancing through your system interface or through the stand-alone Airflow Test and Balance Utility.
AirPD	*BACnet Pressure Dependent Control* (page 154) Calculates and maintains the desired damper position in a pressure dependent zone. Controls AUX reheat operation and fan operation in a fan powered box. Its inputs, outputs, and properties interface with the control algorithms built into other controllers. The algorithm ensures that zone airflow stays above the specified minimum for zone indoor air quality standards. Enables testing and balancing through the i-Vu®/Field Assistant interface or through a stand-alone utility. Controls the damper and other key zone operations, such as the fan (**FAN**) and auxiliary heat (**AUX HEAT**), during commissioning.
Bypass	*BACnet Bypass Control* (page 163) Controls the bypass damper based on the commanded position input wire. Converts the pressure sensor count to pressure and output this value to the **DUCT SP** wire. Allows for the configuration of the duct static pressure setpoint and the maximum static pressure setpoint during LAT override. Enables testing and balancing through the i-Vu®/Field Assistant interface. Calibrates the airflow sensor readings at design setpoint and zero calibration of sensor when AHU fan is off. Calibrates full open and closed damper positions.

BACnet Analog Input

The information below provides a <u>FULL</u> description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*I/O Point microblocks* (page 68)
Icon and symbol	
What it does	Reads the analog (continuous) value of a physical input on the controller. Converts the raw data from the sensor to the appropriate range for its unit of measurement (such as mA, degrees Fahrenheit, or psi).

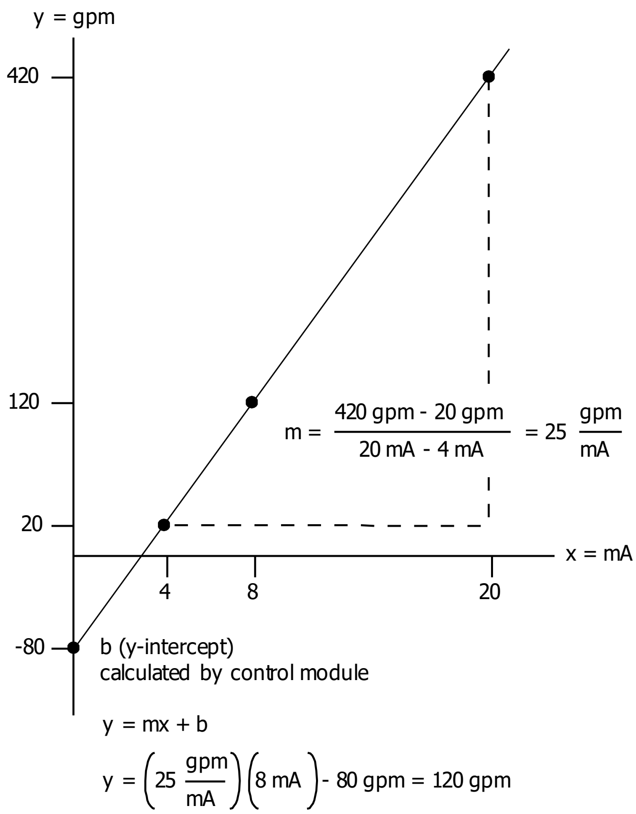
How it works

The **Input Type**, **Sensor Type**, **Scaling Range** (linear sensor types only) and **Input Resolution** together determine how the microblock converts raw sensor data into the microblock's output value.

For non-linear sensor types, you can set up a custom translation table that has sensor input values (kOhms or volts) and their equivalent output values. You set up these tables in your i-Vu® or Field Assistant system on a driver's **Custom Translation Tables Properties** page.

Linear sensor types use the slope-intercept formula for a line (y=mx+b).

EXAMPLE For a 0-20 mA input type using a **Linear w/offset** scaling method (4-20 mA) and a scaling range of 20 to 420 gpm, a sensor reading of 8 mA produces a microblock output value of 120 gpm.



The **Input Resolution** determines the final microblock output. The driver rounds the microblock's present value according to the resolution and prevents it from fluctuating too rapidly.

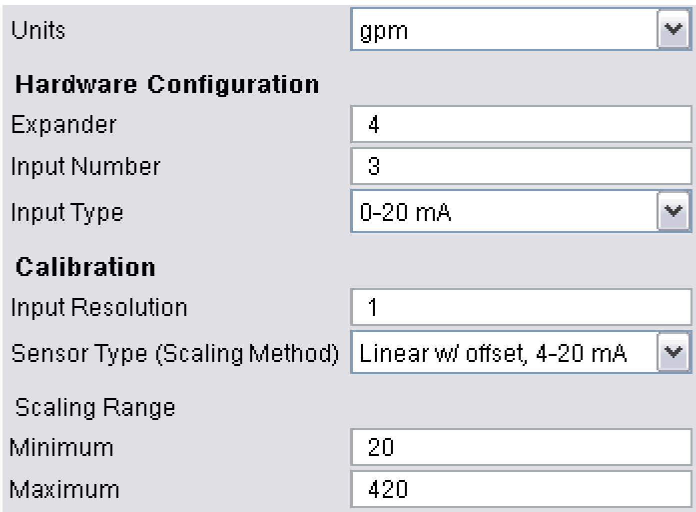
EXAMPLE If the calculated present value is 13.789 and you set the **Resolution** to 0.1, the control program uses 13.8 for any calculations downstream from the microblock. The output remains at 13.8 until the calculated present value rises to 13.9 or falls to 13.7.

Limitations

Inputs are limited to a controller's supported input types. See the controller's documentation for more information.

Configuration example

For a 4–20 mA flow meter designed for operation between 20 and 420 gpm that is wired to input 3 on a controller's expander 4:



NOTE An input resolution of 1 causes the microblock to output gpm in whole numbers.

See the controller's documentation for more information on assigning inputs and outputs to points.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**.

Hardware Configuration

Expander	The address of the expander (1 to 6) that has the physical input this microblock reads. Type `0` for a physical input on a controller without an expander.
Input Number	The number of the physical input the microblock reads.
Input Type	The type of equipment wired to the input number that the microblock reads. **Universal Input** - Provides backwards compatibility with drivers earlier than v2.02.022. With later versions, this selection displays a **?** value in the i-Vu® or Field Assistant system.

Calibration

Input Resolution	The increment by which the microblock updates the value on its output wire in the i-Vu® or Field Assistant system. The **Resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the wire displays 1 digit to the right of the decimal • 0.01 to 0.99, the wire displays 2 digits to the right of the decimal • 1 or greater, the wire displays a whole number The **Resolution** value determines the increment by which the present value is updated. For example, if you enter: • .2, the wire displays 8.4, 8.6, 8.8, ... • .03, the wire displays 5.09, 5.12, 5.15, ... • 10, the wire displays 30, 40, 50, ...
Sensor Type (Scaling Method)	The scaling method the controller uses to convert the raw sensor data to the appropriate range for the input's engineering units.
Scaling Range Minimum	Applies to linear **Sensor Types** only. The value associated with the minimum sensor signal to the controller's physical input. **EXAMPLE** For a 4-20 mA sensor that reads from 20 to 420 gpm, type `20` so that when the input reads 4 mA, the microblock outputs a value of 20.
Scaling Range Maximum	Applies to linear **Sensor Types** only. The value associated with the maximum sensor signal to the controller's physical input. **EXAMPLE** For a 4-20 mA sensor that reads from 20 to 420 gpm, type `420` so that when the input reads 20 mA, the microblock outputs a value of 420.

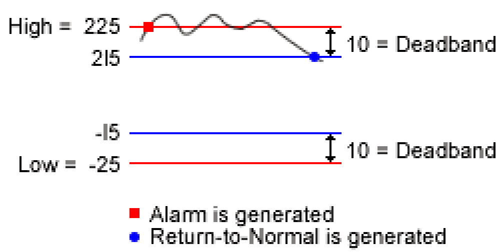
BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.
COV Increment	An Analog Network Input (ANI) that references this microblock in its **Address** field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the **COV Increment**. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's **Refresh Time** field.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Low Limit Enable	Check to send an alarm when the microblock's present value remains below the **Low Limit** value for the defined **Delay Seconds**.
Low Limit	The value the microblock's present value must drop below to send an alarm.
High Limit Enable	Check to send an alarm when the microblock's present value remains above the **High Limit** for the defined **Delay Seconds**.
High Limit	The value the microblock's present value must rise above to send an alarm.
Dead Band	The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated. **EXAMPLE** 
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Trends

Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of value)	Records the microblock's present value only when the value changes by at least the **COV Increment**.
Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. **NOTE** Click **Reset** on the **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.

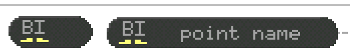
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.
In the i-Vu® or Field Assistant system only:	
Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Delete	Deletes all trend samples stored in the database for the microblock.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

BACnet Binary Input

⚠ The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*I/O Point microblocks* (page 68)
Icon and symbol	
What it does	Reads the binary (on or off) value of a physical input on the controller.

How it works

The **Input Type**, **Active Text**, **Inactive Text**, and **Polarity** together determine how the microblock converts raw sensor data into the microblock's output value.

The **Input Type** tells the microblock whether to expect a sensor that closes and opens an unpowered set of contacts to produce an on or off signal (dry contact) or a sensor that provides an on or off electrical signal up to 10 Vdc (binary input).

Then, based on the signal and **Polarity**, the microblock converts the sensor's signal to a true or false value and displays the **Active Text** or **Inactive Text**.

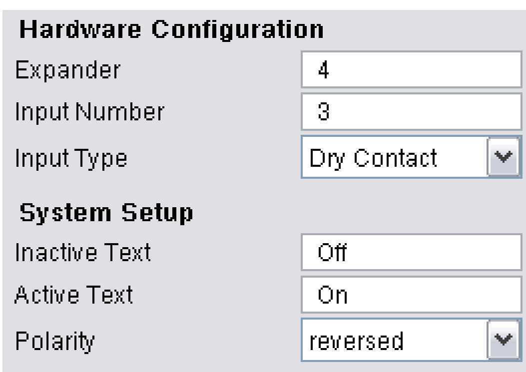
Polarity	Signal	Output
Normal	on	(true) Active Text
	off	(false) Inactive Text

Limitations

Inputs are limited to a controller's supported input types. See the controller's documentation for more information.

Configuration example

For a normally closed status relay indicating whether a fan is on or off wired to input 3 on a controller's expander 4:



Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.

Hardware Configuration

Expander	The address of the expander (1 to 6) that has the physical input this microblock reads. Type `0` for a physical input on a controller without an expander.
Input Number	The number of the physical input the microblock reads.
Input Type	The type of equipment wired to the input number that the microblock reads. Use the following guidelines for choosing the Input Type: • **Binary Input** - Configures the microblock to read a set of contacts which close/open for an on/off signal. **NOTE** We recommend using **Binary Input**. • **Dry Contact** - Same as Binary Input. • **H-O-A Status Feedback** - Reads status of HOA switches. Do not use: • **Universal Input** - Not supported. • **Pneumatic Input** - Not supported. • **Special** - Reserved for Carrier Engineering Dept. • **Counter Input** - Not supported. Use the **Pulse to Analog Input** microblock instead.

System Setup

Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Polarity	**Normal** - The microblock's output is on when the signal to the microblock is on, and is off when the signal to the microblock is off. **reversed** - The microblock's output value is off when the signal to the microblock is on, and is on when the signal to the microblock is off.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object ID	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm Enabled?	Check to send a message when this microblock indicates an alarm condition.
Alarm State	**Active** - An alarm condition exists when the microblock's present value is on (true). **Inactive** - An alarm condition exists when the microblock's present value is off (false).
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Trends

Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of Value)	Records the microblock’s present value only when the value changes.
Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. Click **Reset** on the **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.

Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.
In the i-Vu® or Field Assistant system only:	
Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only?	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Delete	Deletes all trend samples stored in the database for the microblock.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Timed Local Override

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*I/O Point microblocks* (page 68)
Icon and symbol	
What it does	Reads a local override input signal from a user-adjustable switch or button in the zone. Converts the signal, then outputs a remaining time value. This value can be used by a *time clock microblock* (page 361) to indicate a change in occupancy status.

How it works

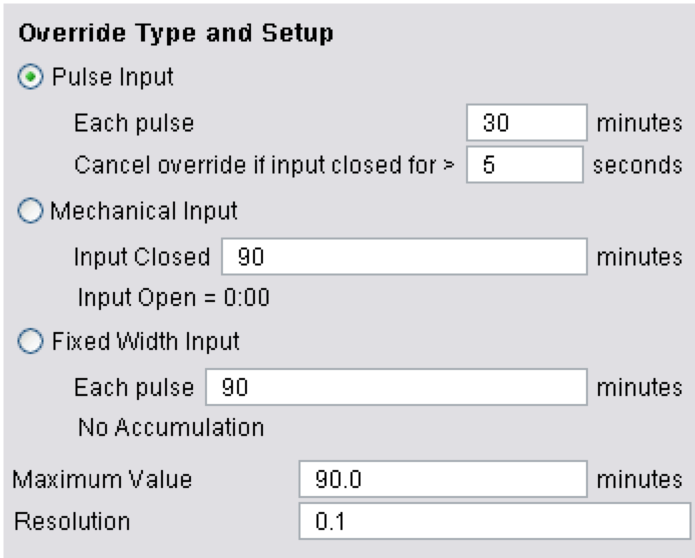
Each time the user presses the button or switch that is assigned to this input, the input senses a binary signal. The microblock converts this binary input signal, or pulse, into a time output (minutes) using one of 3 methods you choose and set up.

Method	Description
Pulse Input	Pulses counted x **Each pulse** = **Present Value** **Present Value** accumulates up to **Maximum Value**. You can define a reset signal for the user in the **Cancel override if input closed for > ___ seconds** field.
Fixed Width Input	Pulse sensed x **Each pulse** = **Present Value** No accumulation with multiple pulses. No reset signal.
Mechanical Input	Override enabled by a constant-signal device such as a wind-up timer. Signal sensed x **Input closed** = **Present Value**

Limitations

Maximum Value cannot exceed 546 minutes.

Configuration example



Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**.

Hardware Configuration

Expander	The address of the expander (1 to 6) that has the physical input this microblock reads. Type `0` for a physical input on a controller without an expander.
Input Number	The number of the physical input the microblock reads.
Input Type	The type of equipment wired to the input number that the microblock reads. **Universal Input** - Provides backwards compatibility with drivers earlier than v2.02.022. With later versions, this selection displays a **?** value in the i-Vu® or Field Assistant system.

Override Type and Setup

Pulse Input, **Mechanical Input**, or **Fixed Width Input**	Select the method the microblock uses to convert the controller's binary input signal into a time value (minutes). See "How it works" in this microblock's help.
Each pulse	Minutes the microblock adds to the zone's occupied time for each press of the zone's local override button or switch.
Cancel override if input closed for > ___ seconds	Seconds the user must press the local override button to cancel timed local override and return the zone to the unoccupied mode.
Input Closed	Minutes the microblock adds to the zone's occupied time for each press of the zone's local override button or switch.
Maximum Value	Maximum value (up to 546 minutes) the microblock outputs regardless of additional pulses from the controller's input.
Resolution	The increment by which the microblock updates the value on its output wire in the i-Vu® or Field Assistant system. The **Resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the wire displays 1 digit to the right of the decimal • 0.01 to 0.99, the wire displays 2 digits to the right of the decimal • 1 or greater, the wire displays a whole number The **Resolution** value determines the increment by which the present value is updated. For example, if you enter: • .2, the wire displays 8.4, 8.6, 8.8, ... • .03, the wire displays 5.09, 5.12, 5.15, ... • 10, the wire displays 30, 40, 50, ...

BACnet Configuration

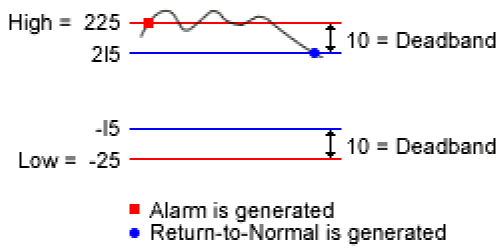
Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.
COV Increment	An Analog Network Input (ANI) that references this microblock in its **Address** field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the **COV Increment**. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's **Refresh Time** field.
Out Of Service Minimum Pres Value Minimum Value	If a third-party vendor sets the microblock's BACnet **Out_Of_Service** property to **True** and then he writes a value lower than this value to the microblock's **Present_Value**, the controller returns a **Property, Value_Out_Of_Range** error.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Low Limit Enable	Check to send an alarm when the microblock's present value remains below the **Low Limit** value for the defined **Delay Seconds**.
Low Limit	The value the microblock's present value must drop below to send an alarm.
High Limit Enable	Check to send an alarm when the microblock's present value remains above the **High Limit** for the defined **Delay Seconds**.
High Limit	The value the microblock's present value must rise above to send an alarm.

Dead Band	The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated. **EXAMPLE** 
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Trends

Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of value)	Records the microblock’s present value only when the value changes by at least the **COV Increment**.

Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. **NOTE** Click **Reset** on the **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.
In the i-Vu® or Field Assistant system only:	
Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Delete	Deletes all trend samples stored in the database for the microblock.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Pulse to Analog Input

The information below provides a <u>FULL</u> description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*I/O Point microblocks* (page 68)
Icon and symbol	
What it does	Counts pulses from a binary (on or off) input over a specified period of time. Every minute, calculates and outputs the average number of pulses received over the specified time.

How it works

Many meters measure flow rates and output pulses, where each pulse represents a quantity of the flowing medium. For example, a pulse might equal a quantity of water (gallons/pulse), gas (cubic feet/pulse), or electricity (kWh/pulse). Your meter determines your **Gain**, or the quantity that each pulse represents. For example, a flow meter that measures 15 gallons/pulse has a **Gain** of 15. This microblock calculates and outputs the flow rate from the pulses using the following formula:

$$\text{Flow rate (output)} = \frac{\text{(Pulses counted during } \textbf{Pulse Window}\text{)}}{\textbf{Pulse Window}} \times \textbf{Gain}$$

EXAMPLE

During a **Pulse Window** of 30 minutes the microblock counts 90 pulses. Each pulse represents 15 gallons (**Gain** = 15).   The microblock calculates and outputs a flow rate of 45 gallons/minute.

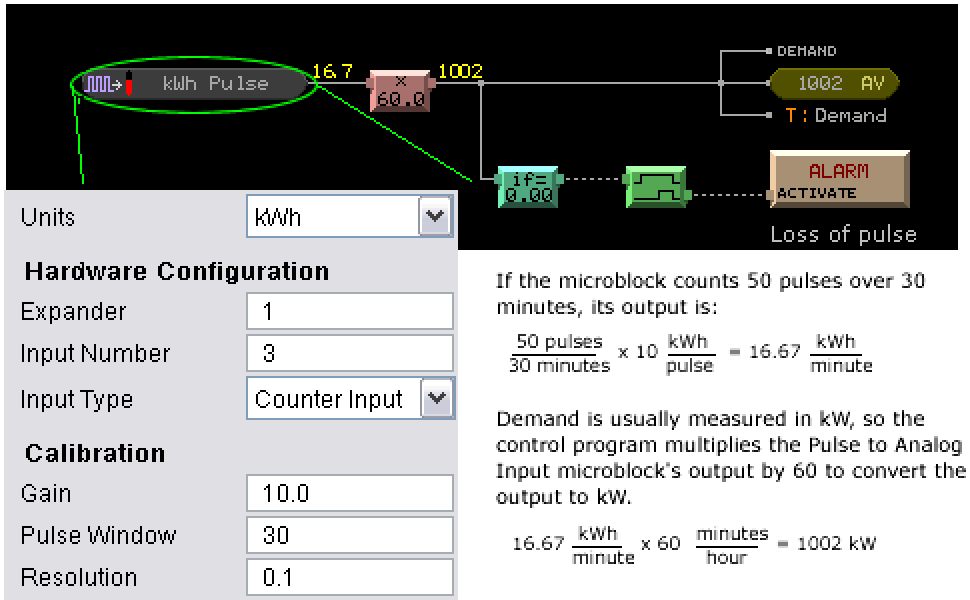
$$\text{Flow rate (output)} = \frac{\text{90 pulses}}{\text{30 minutes}} \times 15\ \frac{\text{gallons}}{\text{pulse}} = 45\ \frac{\text{gallons}}{\text{minute}}$$

Limitations

Some controllers do not support pulse counting or do not support pulse counting on all inputs. Most controllers that support pulse counting cannot count more than 4 pulses per second. See the controller's documentation for more information.

Configuration and programming example

For an electric meter connected to input 3 on a controller's expander 1 that reads 10 kWh/pulse:



Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**.

Hardware Configuration

Expander	The address of the expander (1 to 6) that has the physical input this microblock reads. Type `0` for a physical input on a controller without an expander.
Input Number	The number of the physical input the microblock reads.
Input Type	Select **Counter Input**.

Calibration

Gain	The quantity that each meter pulse represents. **EXAMPLE** For a flow meter that measures 15 gallons/pulse, type `15`.
Pulse Window	The period (minutes) over which the microblock averages the flow rate. The microblock uses a sliding window.
Resolution	The increment by which the microblock updates the value on its output wire in the i-Vu® or Field Assistant system. The **Resolution** format is used to truncate the microblock’s actual value. For example, if you enter a value from: • 0.1 to 0.9, the wire displays 1 digit to the right of the decimal • 0.01 to 0.99, the wire displays 2 digits to the right of the decimal • 1 or greater, the wire displays a whole number The **Resolution** value determines the increment by which the present value is updated. For example, if you enter: • .2, the wire displays 8.4, 8.6, 8.8, ... • .03, the wire displays 5.09, 5.12, 5.15, ... • 10, the wire displays 30, 40, 50, ...

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

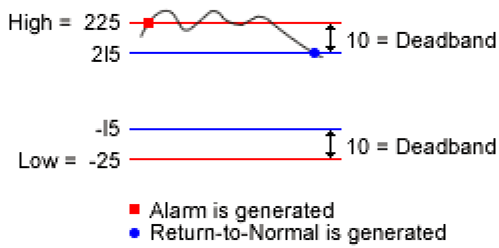
COV Increment	An Analog Network Input (ANI) that references this microblock in its **Address** field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the **COV Increment**. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's **Refresh Time** field.
Out Of Service Minimum Pres Value Minimum Value	If a third-party vendor sets the microblock's BACnet **Out_Of_Service** property to **True** and then he writes a value lower than this value to the microblock's **Present_Value**, the controller returns a **Property, Value_Out_Of_Range** error.
Out Of Service Max Pres Value Maximum Value	If a third-party vendor sets the microblock's BACnet **Out_Of_Service** property to **True**, and then he writes a value higher than this value to the microblock's **Present_Value**, the controller returns a **Property, Value_Out_Of_Range** error.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Low Limit Enable	Check to send an alarm when the microblock's present value remains below the **Low Limit** value for the defined **Delay Seconds**.
Low Limit	The value the microblock's present value must drop below to send an alarm.
High Limit Enable	Check to send an alarm when the microblock's present value remains above the **High Limit** for the defined **Delay Seconds**.
High Limit	The value the microblock's present value must rise above to send an alarm.

Dead Band	The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated. **EXAMPLE** 
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Trends

Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of value)	Records the microblock’s present value only when the value changes by at least the **COV Increment**.

Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. **NOTE** Click **Reset** on the **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.
In the i-Vu® or Field Assistant system only:	
Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Delete	Deletes all trend samples stored in the database for the microblock.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

BACnet Analog Output

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*I/O Point microblocks* (page 68)
Icon and symbol	
What it does	Sends an analog (continuous) value from the control program to a physical analog output on the controller.

How it works

The **Output Type**, **Actuator Type**, **Minimum Value**, **Maximum Value**, and **Resolution** together determine how the microblock converts its input value into the controller's output signal to the controlled equipment.

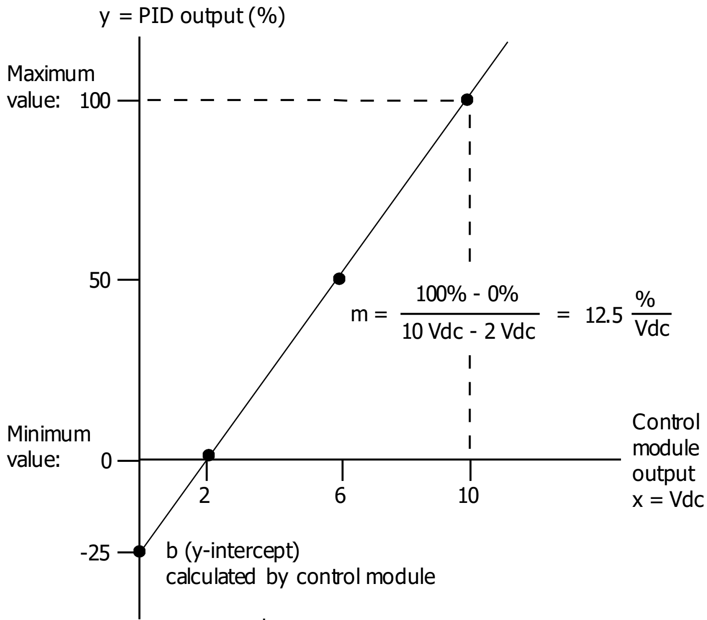
The **Output Type** tells the microblock what type of physical output it is connected to on the controller. The **Actuator Type** tells the controller how to convert the signal from the controlled equipment into engineering units. The **Minimum Value** and **Maximum Value** define the scale the microblock uses to convert the input signal from linear **Actuator Types** into the controller's output signal.

The microblock truncates the input value using the **Resolution** before performing any scaling calculations.

EXAMPLE If the wire input value is 50.073 and you set the **Resolution** to 0.1, the microblock uses 50.0 for any scaling calculations.

Linear sensor types use the slope-intercept formula for a line (y=mx+b).

EXAMPLE For a microblock that uses a 0–100% open signal from a PID microblock to control a 2–10 Vdc actuator, set the **Minimum Value** to 0 and the **Maximum Value** to 100. Then a 50% signal from the PID to the microblock produces a 6 Vdc output signal.



$$y = mx + b$$

$$x = \frac{1}{m}(y - b)$$

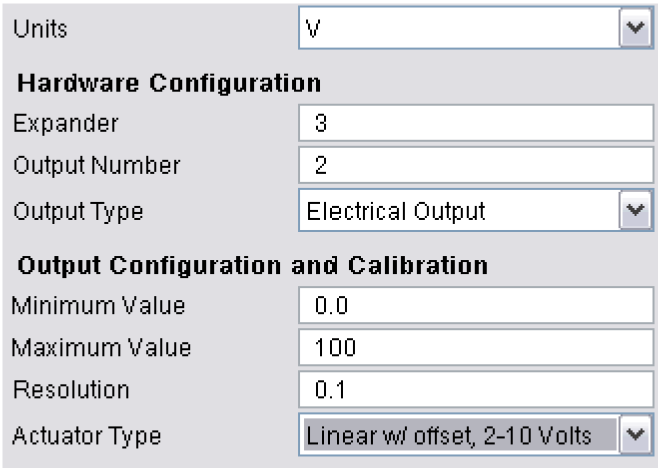
$$x = \frac{1}{12.5\,\frac{\%}{\text{Vdc}}}(50\% + 25\%) = 6\text{ Vdc}$$

Limitations

Outputs are limited to a controller's supported output types. See the controller's documentation for more information.

Configuration example

For a 0–100% signal to a 2–10 Vdc damper actuator connected to analog output 2 on a controller's expander 3:



Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**.

Hardware Configuration

Expander	The address of the expander (1 to 6) that has the physical output this microblock sends a signal to. Type `0` for a physical output on a controller without an expander.
Output Number	The number of the physical output that the microblock sends a signal to.
Output Type	The physical output type of the output number that the microblock sends a signal to.

Output Configuration and Calibration

Minimum Value	The microblock value associated with the minimum signal the controlled equipment expects. **EXAMPLE** For a 2-10 Vdc actuator controlled by a 0-100% PID signal, type `0` so that when the PID signal to the microblock is 0, the controller sends a 2 Vdc signal to the actuator.
Maximum Value	The microblock value associated with the maximum signal the controlled equipment expects. **EXAMPLE** For a 2-10 Vdc actuator controlled by a 0-100% PID signal, type `100` so that when the PID signal to the microblock is 100, the controller sends a 10 Vdc signal to the actuator.
Resolution	The increment by which the microblock updates it's input value for use in calculations. The **Resolution** format is used to truncate the microblock’s actual value. For example, if you enter a value from: • 0.1 to 0.9, the system uses and displays 1 digit to the right of the decimal • 0.01 to 0.99, the system uses and displays 2 digits to the right of the decimal • 1 or greater, the system uses and displays a whole number The **Resolution** value determines the increment by which the present value is updated. For example, if you enter: • .2, the system uses and displays 8.4, 8.6, 8.8, ... • .03, the system uses and displays 5.09, 5.12, 5.15, ... • 10, the system uses and displays 30, 40, 50, ...
Actuator Type	The signal the controlled equipment connected to the output number expects. See the controller's documentation for more information on assigning inputs and outputs to points.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.
COV Increment	An Analog Network Input (ANI) that references this microblock in its **Address** field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the **COV Increment**. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's **Refresh Time** field.

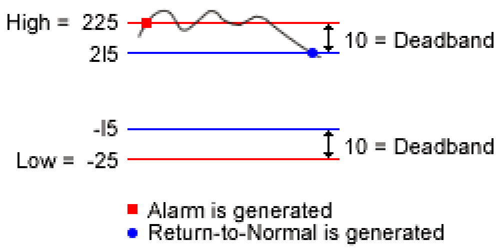
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Low Limit Enable	Check to send an alarm when the microblock's present value remains below the **Low Limit** value for the defined **Delay Seconds**.
Low Limit	The value the microblock's present value must drop below to send an alarm.
High Limit Enable	Check to send an alarm when the microblock's present value remains above the **High Limit** for the defined **Delay Seconds**.
High Limit	The value the microblock's present value must rise above to send an alarm.

Dead Band	The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated. **EXAMPLE** 
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Trends

Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of value)	Records the microblock’s present value only when the value changes by at least the **COV Increment**.

Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. **NOTE** Click **Reset** on the **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.
In the i-Vu® or Field Assistant system only:	
Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Delete	Deletes all trend samples stored in the database for the microblock.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

BACnet Binary Output

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*I/O Point microblocks* (page 68)
Icon and symbol	
What it does	Sends a binary (on or off) value from the control program to a physical digital (on or off) output on the controller.

How it works

The **Output Type**, **Minimum off time**, **Minimum on time**, and **Polarity** together determine how the microblock converts its input value into the controller's output signal to the controlled equipment.

The **Output Type** tells the microblock what type of physical output it is connected to on the controller. Based on the microblock's value and its **Polarity**, the controller converts the microblock's input value into an on or off signal to the controlled equipment. Graphics or properties pages connected to the microblock display the microblock's **Active Text** or **Inactive Text**.

Polarity	Value	Output
Normal	true	(on) Active Text
	false	(off) Inactive Text
Reversed	true	(off) Inactive Text
	false	(on) Active Text

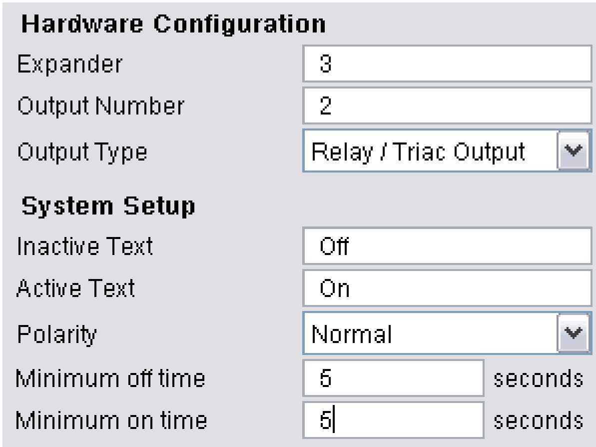
The **Minimum off time** and **Minimum on time** protect the controlled equipment by determining the minimum amount of time the microblock sends each signal to the controller, regardless of the microblock's input value.

Limitations

Binary outputs are limited to a controller's supported power, current, or pressure rating. Some controllers allow you to configure binary outputs as normally open or normally closed. Non-configurable binary outputs are normally open. See the controller's documentation for more information.

Configuration example

For an output sending a signal to a relay wired to binary output 2 on a controller's expander 3:



Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Hardware Configuration

Expander	The address of the expander (1 to 6) that has the physical output this microblock sends a signal to. Type `0` for a physical output on a controller without an expander.
Output Number	The number of the physical output that the microblock sends a signal to.
Output Type	The physical output type of the output number that the microblock sends a signal to.

Setup

Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Polarity	**Normal** - The microblock's output is on when the signal to the microblock is on, and is off when the signal to the microblock is off. **reversed** - The microblock's output value is off when the signal to the microblock is on, and is on when the signal to the microblock is off.
Minimum off time	The minimum period (seconds) that the microblock sends an off signal to the controller, regardless of the input signal to the microblock.
Minimum on time	The minimum period (seconds) that the microblock sends an on signal to the controller, regardless of the input signal to the microblock.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Trends

Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of Value)	Records the microblock’s present value only when the value changes.
Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. Click **Reset** on the **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.

In the i-Vu® or Field Assistant system only:

Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only?	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.

Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Delete	Deletes all trend samples stored in the database for the microblock.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

Floating Motor

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*I/O Point microblocks* (page 68)
Icon and symbol	
What it does	Works with a bi-directional motor actuator triggered by two digital signals, such as clockwise and counterclockwise or damper open and damper closed. Converts a percent open value from the control program to on and off signals to two physical digital outputs on the controller.

How it works

The microblock's output controls two digital signals that together provide 3 commands to a floating motor actuator:

- Don't move (both digital outputs are off)
- Open (one digital output is on)
- Close (the other digital output is on)

The direction the actuator turns to open or close the damper or valve depends on the actuator wiring.

Floating motor actuators are specified by the time required for the actuator to move from full closed to full open. Type this time (minutes:seconds) in the **Full travel time is** field.

During each calculation, the microblock uses the following formula to determine how long it should send a signal and to which output. The motor moves for the duration of the controller's digital signal.

|(Current % value - Previous % value)| x **Full travel time is** = Signal length

- If Current % value > Previous % value, send signal to **Open** output.
- If Current % value < Previous % value, send signal to **Close** output.

EXAMPLE
Full travel time = 100 seconds
Current % value = 60%
Previous % value = 80%
Output = |(60% – 80%)| x 100 seconds = 20 seconds
Since 60 < 80, the control program sends a 20-second signal to the controller's **Close** digital output.

The microblock tracks the actuator's current position based on the history of its movement since its last calibration.

If the microblock's calculated signal time to any output is less than the **Min Pulse Width**, the controller does not activate the motor.

When the microblock's value is either 0% or 100%, the microblock sends an additional signal for the **Full travel time is** duration to ensure that the damper or valve is fully open or fully closed.

Limitations

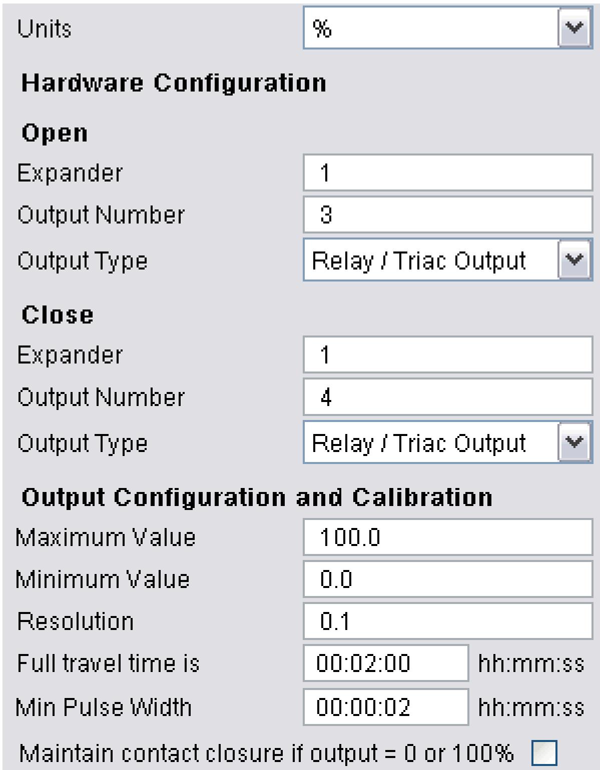
This microblock will not send a signal shorter than 1 second. To control the actuator's position to within 1% accuracy, you must use an actuator with a travel time of at least 100 seconds. For example, if your actuator has a 20-second travel time, it can only be adjusted in increments of 5% (1 second/20 seconds = .05 or 5%).

If the **Full travel time** is inaccurate, the actuator's calculated position will also be inaccurate. Over time, multiple adjustments can cause the error to increase and to affect the equipment's ability to efficiently achieve the desired setpoint.

Configuration example

For a 0–100% open signal to a 120-second floating motor actuator with the following configuration:

- **Open** output wired to input 3 on the controller's expander 1
- **Close** output wired to input 4 on the controller's expander 1



In this example, the controller turns off the signal to the appropriate output after the actuator reaches its fully open or fully closed position because **Maintain contact closure if current position = 0% or 100%** is not checked.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**.

Hardware Configuration - Open

Expander	The address of the expander (1 to 6) that has the physical output this microblock sends a signal to. Type `0` for a physical output on a controller without an expander.
Output Number	The number of the physical output that the microblock sends a signal to.
Output Type	The physical output type of the output number that the microblock sends a signal to.

Hardware Configuration - Close

Expander	The address of the expander (1 to 6) that has the physical output this microblock sends a signal to. Type `0` for a physical output on a controller without an expander.
Output Number	The number of the physical output that the microblock sends a signal to.
Output Type	The physical output type of the output number that the microblock sends a signal to.

Output Configuration and Calibration

Maximum Value	The microblock value associated with a full open signal. **EXAMPLE** For an actuator controlled by a 0 to 100% PID signal, type `100` so that when the PID signal to the microblock is 100, the controller sends a full open signal to the actuator.
Minimum Value	The microblock value associated with a full closed signal. **EXAMPLE** For an actuator controlled by a 0 to 100% PID signal, type `0` so that when the PID signal to the microblock is 0, the controller sends a full closed signal to the actuator.
Resolution	The increment by which the microblock updates it's input value for use in calculations. The **Resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the system uses and displays 1 digit to the right of the decimal • 0.01 to 0.99, the system uses and displays 2 digits to the right of the decimal • 1 or greater, the system uses and displays a whole number The **Resolution** value determines the increment by which the present value is updated. For example, if you enter: • .2, the system uses and displays 8.4, 8.6, 8.8, ... • .03, the system uses and displays 5.09, 5.12, 5.15, ... • 10, the system uses and displays 30, 40, 50, ...
Full travel time is	The period (hours:minutes:seconds) the actuator takes to travel from its fully open to its fully closed position. Maximum travel time is 54 minutes.
Min Pulse Width	The minimum period (hours:minutes:seconds) the motor should be activated each time it moves. Adjust after startup based on system performance.
Maintain contact closure if current position = 0% or 100%	Check to keep the signal to the motor on after the actuator reaches its fully open or fully closed position.

BACnet Configuration

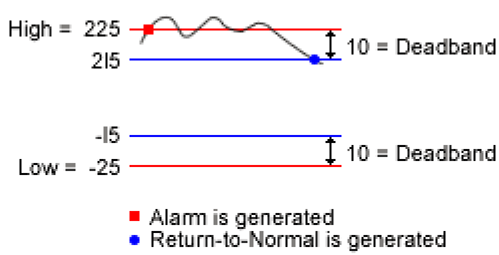
Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.
COV Increment	An Analog Network Input (ANI) that references this microblock in its **Address** field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the **COV Increment**. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's **Refresh Time** field.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Low Limit Enable	Check to send an alarm when the microblock's present value remains below the **Low Limit** value for the defined **Delay Seconds**.
Low Limit	The value the microblock's present value must drop below to send an alarm.
High Limit Enable	Check to send an alarm when the microblock's present value remains above the **High Limit** for the defined **Delay Seconds**.
High Limit	The value the microblock's present value must rise above to send an alarm.
Dead Band	The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated. **EXAMPLE**



Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Trends

Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of value)	Records the microblock’s present value only when the value changes by at least the **COV Increment**.
Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. **NOTE** Click **Reset** on the **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.

Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.
In the i-Vu® or Field Assistant system only:	
Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Delete	Deletes all trend samples stored in the database for the microblock.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

Tips and tricks

For accurate control, make sure that the **Full travel time is** value is as accurate as possible.

The microblock tracks the actuator's current position based on the history of its movement since its last calibration. To prevent compounding error over time, recalibrate the Floating Motor microblock by periodically (nightly) setting the value to 0% or 100%. When the microblock's value is either 0% or 100%, the microblock recalibrates by sending an additional signal for the **Full travel time is** duration to ensure that the damper or valve is fully open or fully closed.

Pulse-Width Output

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

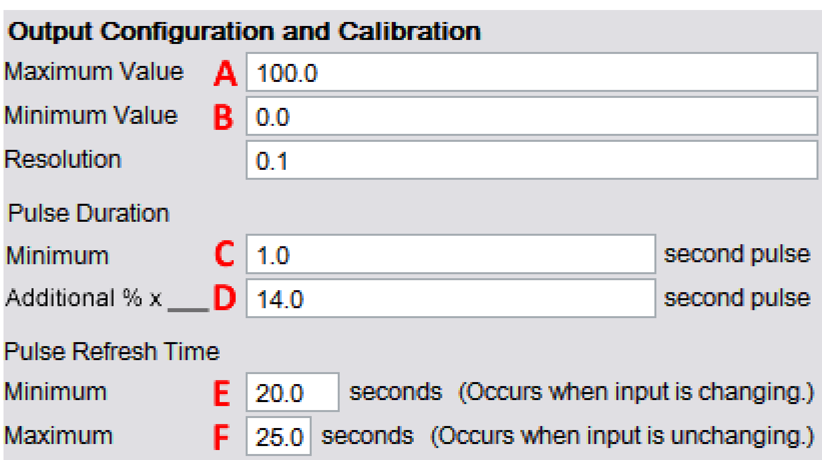
Microblock family	*I/O Point microblocks* (page 68)
Icon and symbol	
What it does	Converts a percent value from the control program to a digital on or off signal that varies in duration based on minimum and maximum values you define. Can control an actuator that requires a pulse-width signal, a hot wax valve, or a pulse-width transducer.

How it works

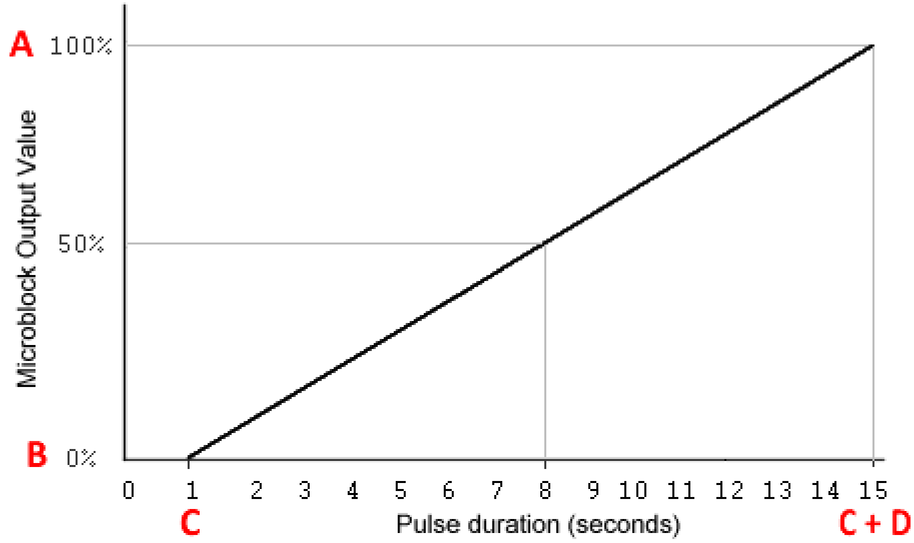
The **Minimum Value**, **Maximum Value**, **Resolution**, **Pulse Duration**, and **Pulse Refresh Time** values together determine how the microblock converts its input value into the controller's output signal to the controlled equipment.

Obtain the maximum pulse duration (full open to full closed stroke time) and minimum pulse duration (pulse duration that indicates full open or full closed) from the controlled equipment's manufacturer's specifications.

EXAMPLE For a valve actuator with a 15-second stroke time (full open to full closed), a minimum pulse duration of 1 second, a minimum pulse refresh time of 20 seconds, and that is controlled by a 0% to 100% PID signal:

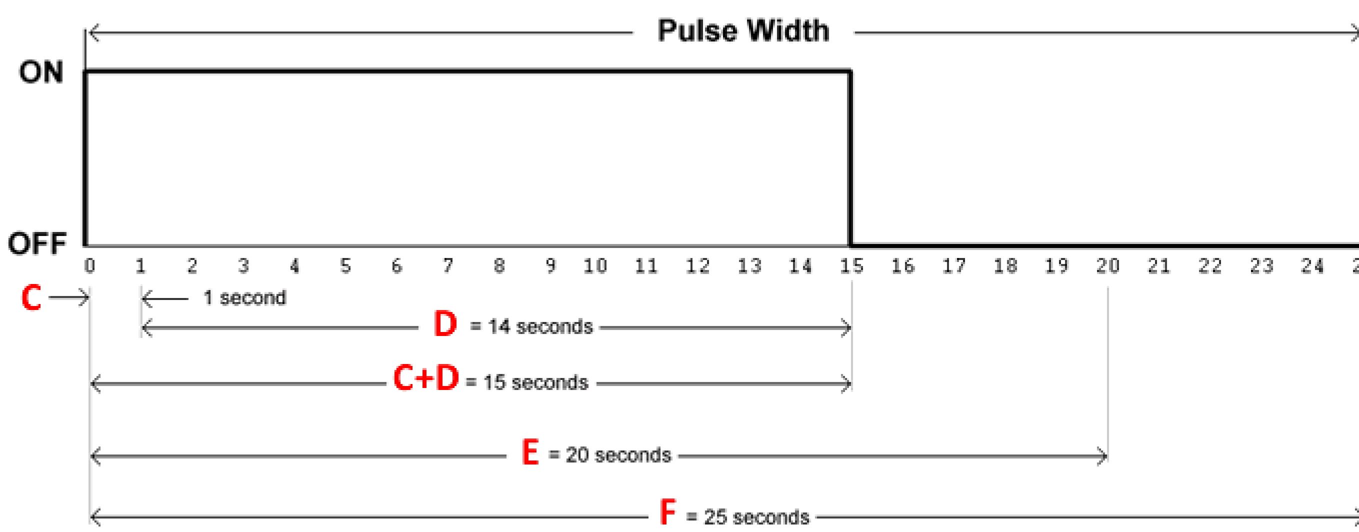


Pulse Duration varies linearly between 1 second and 1+14=15 seconds as the microblock input value varies from 0% (**Minimum Value**) to 100% (**Maximum Value**).



If the microblock input value does not change the microblock resends the pulse duration calculated based on the current input value after the **Maximum Pulse Refresh Time**.

An unchanging 50% PID output results in an 8-second pulse every 25 seconds. An unchanging 0% PID output results in a 1-second pulse every 25 seconds. As the PID output changes, the pulse duration will change no more frequently than every 20 seconds.



If the microblock input value changes by more than the **Resolution**, the microblock completes the current pulse, then recalculates and changes the pulse duration after the **Minimum Pulse Refresh Time**.

If the microblock input value changes after the **Minimum Pulse Refresh Time** but before the **Maximum Pulse Refresh Time**, the microblock immediately sends a new pulse and resets the refresh times.

The **Minimum Pulse Refresh Time** must be at least as long as the maximum pulse duration **(Minimum** + **Additional % x __**) or the complete pulse will not be sent.

The **Maximum Pulse Refresh Time** must be longer than the **Minimum Pulse Refresh Time**.

Limitations

The microblock cannot output a minimum **Pulse Duration** smaller than 0.1 seconds.

The **Minimum Pulse Refresh Time** must be at least as long as the maximum pulse duration (**Minimum** + **Additional % x __**) or the complete pulse will not be sent.

The **Maximum Pulse Refresh Time** must be longer than the **Minimum Pulse Refresh Time**.

Do not use pulse width modulated outputs with PWM-Stage Sequencer transducers. Control of the stages is limited by the timing within the pulse width modulated output, and use of this microblock could harm the controlled equipment.

Hot wax valve actuators can be difficult to control. Paraffin (wax) expands when heated by the pulse-width signal. The wax continues to expand for a time after the signal has stopped. After the signal stops, the wax will eventually contract. If the pulse-width signal begins again, the wax may continue to contract for a time after the signal starts.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**.

Hardware Configuration

Expander	The address of the expander (1 to 6) that has the physical output this microblock sends a signal to. Type `0` for a physical output on a controller without an expander.
Output Number	The number of the physical output that the microblock sends a signal to.
Output Type	The physical output type of the output number that the microblock sends a signal to.

Output Configuration and Calibration

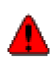
Maximum Value	The microblock value associated with the maximum pulse duration (**Minimum** + **Additional % x __**). **EXAMPLE** For an actuator controlled by a 0-100% PID signal, type `100` so that when the PID signal to the microblock is 100, the controller sends the maximum pulse duration to the actuator.
Minimum Value	The microblock value associated with the 0% Pulse duration. **EXAMPLE** For an actuator controlled by a 0-100% PID signal, type `0` so that when the PID signal to the microblock is 0, the controller sends the minimum pulse duration to the actuator.
Resolution	The increment by which the microblock updates it's input value for use in calculations. The **Resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the system uses and displays 1 digit to the right of the decimal • 0.01 to 0.99, the system uses and displays 2 digits to the right of the decimal • 1 or greater, the system uses and displays a whole number The **Resolution** value determines the increment by which the present value is updated. For example, if you enter: • .2, the system uses and displays 8.4, 8.6, 8.8, ... • .03, the system uses and displays 5.09, 5.12, 5.15, ... • 10, the system uses and displays 30, 40, 50, ...
Pulse Duration Minimum	(0.1 seconds or greater) The pulse duration the microblock outputs for a microblock input value equal to the Minimum Value.
Pulse Duration Additional % x ___	As the microblock's input varies from the Minimum Value to the Maximum Value, this value determines how much additional time will be added to the microblock's Minimum Pulse duration.

Pulse Refresh Time Minimum	How long the microblock must wait before sending a new pulse duration output for a changing input signal. Must be at least as long as the maximum pulse duration (**Minimum** + **Additional % x __**).
Pulse Refresh Time Maximum	How long the microblock waits before resending an existing pulse duration output for an unchanging input signal. Must be longer than the Minimum Pulse Refresh Time.

BACnet Configuration

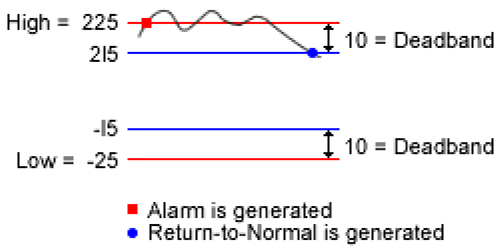
Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.
COV Increment	An Analog Network Input (ANI) that references this microblock in its **Address** field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the **COV Increment**. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's **Refresh Time** field.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Low Limit Enable	Check to send an alarm when the microblock's present value remains below the **Low Limit** value for the defined **Delay Seconds**.
Low Limit	The value the microblock's present value must drop below to send an alarm.
High Limit Enable	Check to send an alarm when the microblock's present value remains above the **High Limit** for the defined **Delay Seconds**.
High Limit	The value the microblock's present value must rise above to send an alarm.

Dead Band	The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated. **EXAMPLE** 
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Trends

Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of value)	Records the microblock’s present value only when the value changes by at least the **COV Increment**.

Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. **NOTE** Click **Reset** on the **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.

In the i-Vu® or Field Assistant system only:	
Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Delete	Deletes all trend samples stored in the database for the microblock.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

U-Line Airflow Control

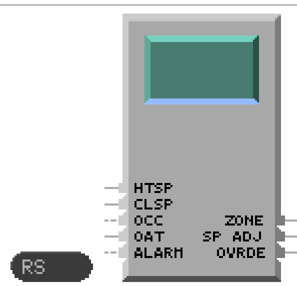
This microblock cannot be used for Carrier controllers.

LogiStat Zone Sensor

This microblock cannot be used for Carrier controllers.

RS Zone Sensor

⚠ The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*I/O Point microblocks* (page 68)
Icon and symbol	
What it does	Sends information to and receives values from a variety of sensor configurations. Works with a schedule and setpoint microblock to maintain zone temperature at setpoint. Can be connected to a controller's Rnet port. See the *Carrier Sensor Installation Guide* for supported Rnet configurations.

How it works

Some features of this microblock do not apply to all supported sensors. However, the type of sensor connected to the controller can be changed without changing the control program.

When connected to each sensor, the microblock's output and input values behave as follows:

Output/Input value	SPT Standard	Rnet that includes an SPT Plus	Rnet that includes an SPT Pro
ZONE	Current zone temperature (degrees). Units (Fahrenheit or Celsius) are determined at design time by the control program's **Metric** option. Calculated (**Average**, **Maximum**, or **Minimum**) from all communicating sensors* based on **Zone Temp Method** field selection.		The SPT Pro displays the **ZONE** output value.
SP ADJ	0	Setpoint adjustment (degrees) from sensor.	
OVRDE	0	Value (minutes) of timed local override from sensor.	
OAT (optional)	not used	not used	As the user presses the **INFO** button, the sensor cycles its display through the **OAT** input value (if used), the **HTSP** input value, and the **CLSP** input value, then returns to the **ZONE** output value.
HTSP	not used	not used	
CLSP	not used	not used	
OCC	not used	True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. Connect to a *time clock microblock* (page 361) or to other logic that indicates the zone's occupancy status.	The SPT Pro displays **Occupied** when the **OCC** input is true (on) or the TLO is enabled.
ALARM (optional)	not used	not used	If true (on), the SPT Pro displays an alarm bell icon.

* This microblock's i-Vu®/Field Assistant **Properties** page shows which sensors are communicating.

Setpoint adjust

The user can adjust zone setpoints from the zone sensor by no more than the **Max adjust = ±** number of degrees in either direction from the setpoint.

EXAMPLE If the cooling setpoint = 74°F, the heating setpoint = 70°F, and **Max adjust = ±** 2.0, the user can raise the setpoints to a maximum of 76°F and 72°F or lower them to a minimum of 72°F and 68°F.

If you check **Reset setpoint adjust to zero when unoccupied**, the microblock resets the **SP ADJ** output to 0 when the **OCC** input changes to false (off), and it remains at 0 when the **OCC** input changes again to true (on) or when the zone enters a timed local override condition.

Timed local override

Each time the user presses the zone sensor's local override or **MANUAL ON** button, the sensor sends a pulse signal to the controller. The microblock converts this binary signal into a time output (minutes) using the following formula:

Time output (minutes) = # of pulses x **Each pulse** (minutes)

The time output accumulates up to the microblock's **Maximum Accumulation** value, which cannot exceed 546 minutes (09:06:00 hh:mm:ss) regardless of additional pulses from the controller's input.

Inputs and outputs

Inputs

HTSP Heating Setpoint	Heating setpoint (degrees). Connect to a setpoint microblock's **HT** output or to other logic that indicates the zone's heating setpoint.
CLSP Cooling Setpoint	Cooling setpoint (degrees). Connect to a setpoint microblock's **CL** output or to other logic that indicates the zone's cooling setpoint.
OCC Occupied	True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. Connect to a *time clock microblock* (page 361) or to other logic that indicates the zone's occupancy status.

Optional Inputs

Select the appropriate checkbox on the Snap **Optional Inputs** tab to enable these microblock inputs.

OAT Outside Air Temp	Check for an analog **OAT** wire input. A sensor with a display shows this value when a user cycles through the **INFO** button options.
ALARM	Select for a binary (digital) **ALARM** input. When the input is true (on) an SPT Pro displays an alarm bell icon.

Outputs

ZONE Zone Temp	Current zone temperature (degrees).
SP ADJ Setpoint Adjust	Setpoint adjustment (degrees) indicated by zone sensor. Connect to a setpoint microblock's **HADJ** and **CADJ** inputs.
OVRDE Override Time	Reads a pulse signal from a local override input, then converts the signal to a remaining time value (minutes). This value can be used by a *time clock microblock with TLO* (page 361) to indicate a change in occupancy status.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Zone Temp to	Check to output the locked value from the microblock instead of the microblock's calculated value.
Zone Temp Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**.
Min Present Value **Max Present Value**	The temperature range of the sensor. These fields are for information only.
Resolution	The increment by which the microblock updates the value on its output wire in the i-Vu® or Field Assistant system. The **Resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the wire displays 1 digit to the right of the decimal • 0.01 to 0.99, the wire displays 2 digits to the right of the decimal • 1 or greater, the wire displays a whole number The **Resolution** value determines the increment by which the present value is updated. For example, if you enter: • .2, the wire displays 8.4, 8.6, 8.8, ... • .03, the wire displays 5.09, 5.12, 5.15, ... • 10, the wire displays 30, 40, 50, ...

Setpoint Adjustment

Max adjust = ±	The maximum amount (degrees) by which the user can adjust the zone's setpoints from a zone sensor.
Reset setpoint adjust to zero when unoccupied	Check to set any setpoint adjustment to 0 each time the **OCC** input changes to false (off). **SP ADJ** remains at 0 when the **OCC** input changes to true (on) or when the zone enters a timed local override condition. Uncheck to use adjusted setpoints during unoccupied periods.

Timed Local Override

These properties apply to the timed local override BACnet Analog Value object embedded in the RS Zone Sensor microblock. You can think of this object as a microblock within a microblock.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Description	(optional) A BACnet-visible microblock description.
Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**.
Increment	Minutes the microblock adds to the zone's occupied time for each press of the zone's local override button or switch.
Maximum Duration	Maximum value (up to 546 minutes) the microblock outputs regardless of additional pulses from the controller's input.
Allow Continuous	SPT and SPT Plus only. If enabled, a user can press the sensor's local override button until the **Maximum Accumulation** value is reached, then press one more time to have a continuous override until the next occupied period or until the user cancels the override.
Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object ID	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Sensor Array

Sensor calculation method	For Rnets with more than one sensor. Based on your selection, the microblock's **ZONE** output shows the **Average**, **Maximum**, or **Minimum** of up to 5 Rnet zone sensors.

BACnet Configuration

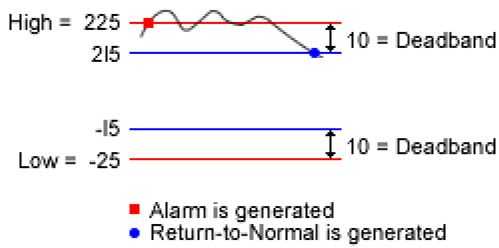
Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object ID	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.
COV Increment	An Analog Network Input (ANI) that references this microblock in its **Address** field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the **COV Increment**. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's **Refresh Time** field.
Show Property Page Text	Check to show this microblock's value on the equipment's Properties page.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Low Limit Enable	Check to send an alarm when the microblock's present value remains below the **Low Limit** value for the defined **Delay Seconds**.
Low Limit	The value the microblock's present value must drop below to send an alarm.
High Limit Enable	Check to send an alarm when the microblock's present value remains above the **High Limit** for the defined **Delay Seconds**.
High Limit	The value the microblock's present value must rise above to send an alarm.

Dead Band	The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated. **EXAMPLE** 
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Trends

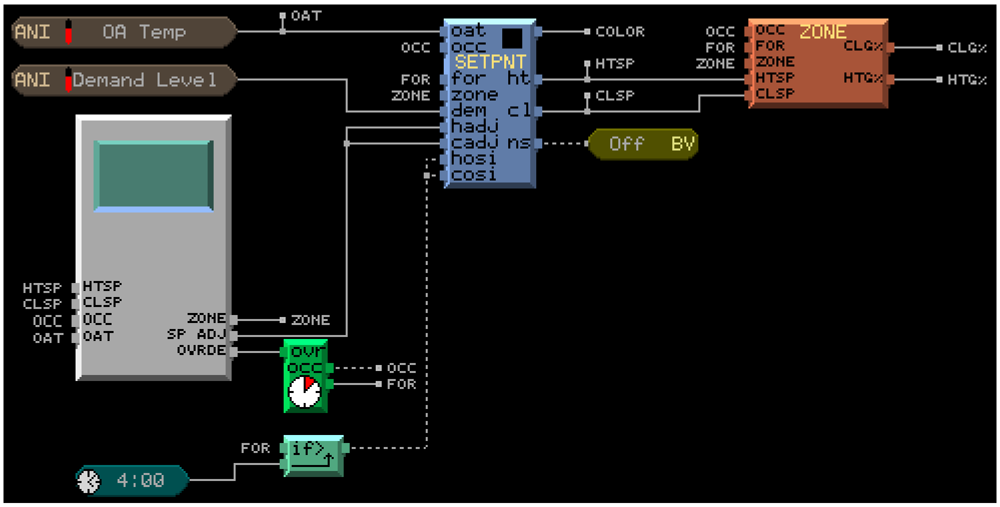
Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of value)	Records the microblock’s present value only when the value changes by at least the **COV Increment**.

Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. **NOTE** Click **Reset** on the **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.
In the i-Vu® or Field Assistant system only:	
Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Delete	Deletes all trend samples stored in the database for the microblock.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

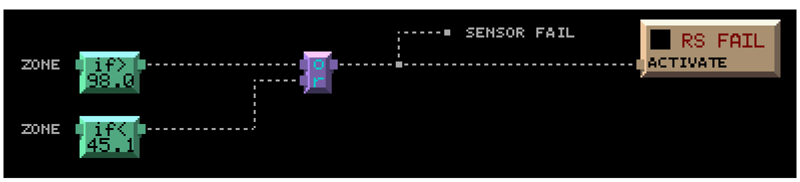
Simulation

Define the value(s) the microblock will use when you simulate the control program.

Programming example



Critical applications

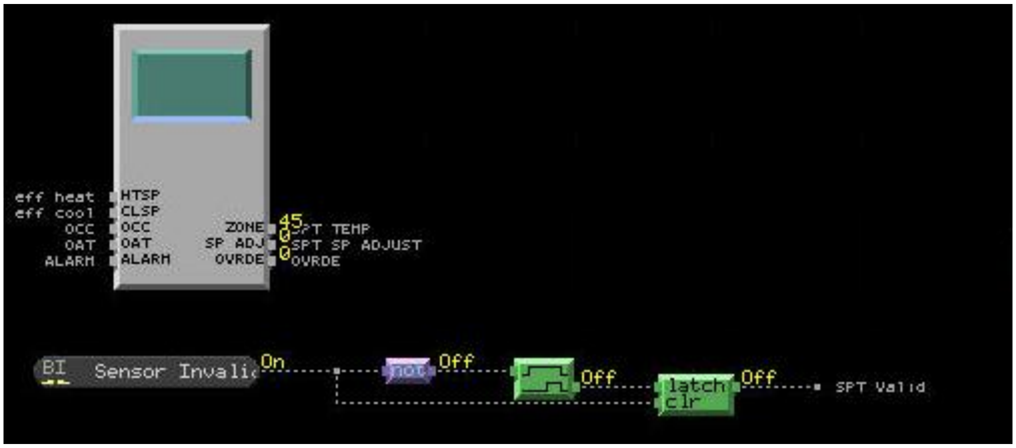


If the SPT sensor is used in a critical application, this logic will detect if the sensor is disconnected (<45.1°F) or is shorted (>98°F). The **Sensor Fail** label can be used to cause the control program to go into an appropriate failure mode if the sensor fails.

Detecting SPT sensor communication failure

Applies to the following controllers:
VVT Zone, VVT Bypass, RTU-Open, WSHP, UC, and UC XP

To verify that the SPT Zone Sensor microblock is receiving a valid value from at least one sensor on a controller's Rnet, you can add a Binary Input to the controller's control program with the following logic. The input turns on if the sensor(s) stop communicating.

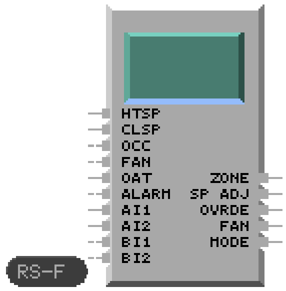


Set these Binary Input properties to the following values:

Expander:	100
Input Number:	100
Input Type:	Special

RS Zone Sensor with Fan Control

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*I/O Point microblocks* (page 68)
Icon and symbol	
What it does	Sends information to and receives values from a variety of sensor configurations. Works with a schedule and setpoint microblock to maintain zone temperature at setpoint. Enables the sensor's fan control and mode functionality. Can be connected to a controller's Rnet port. See the *Carrier Sensor Installation Guide* for supported Rnet configurations.

How it works

Some features of this microblock do not apply to all supported zone sensors. However, the type of zone sensor connected to the controller can be changed without changing the control program, so you should develop your control program to take advantage of all available features. The controller automatically detects the type of zone sensor and sets point addresses for a basic LogiStat Basic's or LogiStat Plus' **OVRDE**, **ZONE**, and **SP ADJ** inputs when you turn on the controller.

When connected to each sensor, the microblock's output and input values behave as follows:

Output/ Input value	SPT Standard	Rnet that includes an SPT Plus	Rnet that includes an SPT Pro	Rnet that includes an SPT Pro Plus
ZONE	Current zone temperature (degrees). Units (Fahrenheit or Celsius) are determined at design time by the control program's **Metric** option. Calculated (**Average**, **Maximum**, or **Minimum**) from all communicating sensors* based on **Zone Temp Method** field selection.			
			NOTE The SPT Pro and SPT Pro Plus display the temperature of their sensor, not the calculated min, max, or average temperature.	
SP ADJ	0	Setpoint adjustment (degrees) from sensor.		
OVRDE	0	Value (minutes) of timed local override from sensor.		

<table>
<tr><th>Output/
Input value</th><th>SPT Standard</th><th>Rnet that includes an SPT Plus</th><th>Rnet that includes an SPT Pro</th><th>Rnet that includes an SPT Pro Plus</th></tr>
<tr><td>FAN</td><td>not used</td><td>not used</td><td>not used</td><td>If the input is true (on), the SPT Pro Plus displays a fan icon. As the user presses the FAN button on the sensor, the output value cycles through the Order of Speeds (limited by Number of speeds) set on the microblock's Fan Speed Adjust tab.</td></tr>
<tr><td>MODE</td><td>not used</td><td>not used</td><td>not used</td><td>As the user presses the MODE button on the SPT Pro Plus, the output value and sensor display cycle through the Modes Available settings from the microblock's Mode/Sensor Display tab.</td></tr>
<tr><td>OAT
(optional)</td><td>not used</td><td>not used</td><td rowspan="3" colspan="2">As the user presses the SPT Pro's or SPT Pro Plus' INFO button, the sensor cycles its display through all available and enabled input values (other than OCC, FAN, and ALARM), then returns to the ZONE output value.

NOTE If you select the Disable info button on the Mode/Sensor Display tab, the SPT Pro Plus' display cycles through the OVRDE input value, the HTSP input value, and the CLSP input value, then returns to the ZONE output value as the user presses the sensor's INFO button.</td></tr>
<tr><td>HTSP</td><td>not used</td><td>not used</td></tr>
<tr><td>CLSP</td><td>not used</td><td>not used</td></tr>
<tr><td>AI1, AI2,
BI1, BI2
(optional)</td><td>not used</td><td>not used</td><td>not used</td><td>If input and INFO button are enabled, values are included in SPT Pro Plus' INFO button display cycle.</td></tr>
<tr><td rowspan="2">OCC</td><td rowspan="2">not used</td><td colspan="3">True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. Connect to a time clock microblock (page 361) or to other logic that indicates the zone's occupancy status.</td></tr>
<tr><td></td><td colspan="2">The SPT Pro or SPT Pro Plus displays Occupied when the OCC input is true (on).</td></tr>
<tr><td>ALARM
(optional)</td><td>not used</td><td>not used</td><td colspan="2">If true (on), the SPT Pro or SPT Pro Plus displays an alarm bell icon.</td></tr>
</table>

* This microblock's **Properties** page shows which sensors are communicating.

Setpoint adjust

The user can adjust zone setpoints from the zone sensor by no more than the **Max adjust = ±** number of degrees in either direction from the setpoint.

EXAMPLE If the cooling setpoint = 74°F, the heating setpoint = 70°F, and **Max adjust = ±** 2.0, the user can raise the setpoints to a maximum of 76°F and 72°F or lower them to a minimum of 72°F and 68°F.

If you check **Reset setpoint adjust to zero when unoccupied**, the microblock resets the **SP ADJ** output to 0 when the **OCC** input changes to false (off), and it remains at 0 when the **OCC** input changes again to true (on) or when the zone enters a timed local override condition.

Timed local override

Each time the user presses the zone sensor's local override or **MANUAL ON** button, the sensor sends a pulse signal to the controller. The microblock converts this binary signal into a time output (minutes) using the following formula:

Time output (minutes) = # of pulses x **Each pulse** (minutes)

The time output accumulates up to the microblock's **Maximum Accumulation** value, which cannot exceed 546 minutes (09:06:00 hh:mm:ss) regardless of additional pulses from the controller's input.

Inputs and outputs

Inputs

HTSP Heating Setpoint	Heating setpoint (degrees). Connect to a setpoint microblock's **HT** output or to other logic that indicates the zone's heating setpoint.
CLSP Cooling Setpoint	Cooling setpoint (degrees). Connect to a setpoint microblock's **CL** output or to other logic that indicates the zone's cooling setpoint.
OCC Occupied	True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. Connect to a *time clock microblock* (page 361) or to other logic that indicates the zone's occupancy status.
FAN	If the input is true (on), the SPT Pro Plus displays a fan icon.

Optional Inputs

Check the appropriate checkbox on the Snap **Optional Inputs** tab to enable these microblock inputs.

OAT Outside Air Temp	Check for an analog **OAT** wire input. A sensor with a display shows this value when a user cycles through the **INFO** button options.
ALARM	Check for a binary (digital) **ALARM** input. When the input is true (on) an SPT Pro or SPT Pro Plus sensor displays an alarm bell icon.
AI1, **AI2** Aux Analog Input 1 Aux Analog Input 2	Select for an analog value to be displayed (with a small 1 or 2 indicating the input) with the selected units as the user cycles through the sensor's **INFO** button display. If the value exceeds 199 or -199, the sensor displays **OF**, indicating a display overflow condition. **NOTE** The **Disable info button** checkbox on the **Mode/Sensor Display** tab must be unchecked for the user to see these values.
BI1, **BI2** Aux Binary Input 1 Aux Binary Input 2	Select for a binary (digital) value to be displayed (with a small 1 or 2 indicating the input) as the user cycles through the sensor's **INFO** button display. The sensor displays **ON** when the value is true (on) or **OF** when the value is false (off). **NOTE** The **Disable info button** checkbox on the **Mode/Sensor Display** tab must be unchecked for the user to see these values.

Outputs

ZONE Zone Temp	Current zone temperature (degrees).
SP ADJ Setpoint Adjust	Setpoint adjustment (degrees) indicated by zone sensor. Connect to a setpoint microblock's **HADJ** and **CADJ** inputs.
OVRDE Override Time	Reads a pulse signal from a local override input, then converts the signal to a remaining time value (minutes). This value can be used by a *time clock microblock with TLO* (page 361) to indicate a change in occupancy status.
FAN	As the user presses the **FAN** button on the sensor, the output value cycles through the **Order of Speeds** (limited by **Number of speeds**) set on the microblock's **Fan Speed Adjust** tab. Connect to any override or safety logic, then to a fan status or enable point.

Num of Speeds	Order of Speeds	Result: **Large text on RSPro-F** Fan output wire value
4	0,1,2,3,4,0,1,2,3,4	**AU LO M M HI AU LO M M HI** 0 1 2 3 4 0 1 2 3 4
4	0,1,2,3,4,3,2,1,0,1	**AU LO M M HI M M LO AU** 0 1 2 3 4 3 2 1 0
3	0,1,2,3,4,0,1,2,3,4	**AU LO M HI AU LO M HI** 0 1 2 3 0 1 2 3
3	0,1,2,3,4,3,2,1,0,1	**AU LO M HI M LO AU** 0 1 2 3 2 1 0
2	0,1,2,3,4,0,1,2,3,4	**AU LO HI AU LO HI** 0 1 2 0 1 2
2	0,1,2,3,4,3,2,1,0,1	**AU LO HI LO AU** 0 1 2 1 0
1	0,1,2,3,4,0,1,2,3,4	**AU M AU M** 0 1 0 1
1	0,1,2,3,4,3,2,1,0,1	**AU M AU M** 0 1 0 1
0	0,1,2,3,4,0,1,2,3,4	**AU** 0
0	0,1,2,3,4,3,2,1,0,1	**AU** 0

MODE	As the user presses the **MODE** button on the SPT Pro Plus, the output value and sensor display cycle through the **Modes Available** settings from the microblock's **Mode/Sensor Display** tab. You can use this analog value to enable different control sequences based on the user's **MODE** selection.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Zone Temp to	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Zone Temp Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**.
Min Present Value **Max Present Value**	The temperature range of the sensor. These fields are for information only.
Resolution	The increment by which the microblock updates the value on its output wire in the i-Vu® or Field Assistant system. The **Resolution** format is used to truncate the microblock’s actual value. For example, if you enter a value from: • 0.1 to 0.9, the wire displays 1 digit to the right of the decimal • 0.01 to 0.99, the wire displays 2 digits to the right of the decimal • 1 or greater, the wire displays a whole number The **Resolution** value determines the increment by which the present value is updated. For example, if you enter: • .2, the wire displays 8.4, 8.6, 8.8, ... • .03, the wire displays 5.09, 5.12, 5.15, ... • 10, the wire displays 30, 40, 50, ...

Setpoint Adjustment

Max adjust = ±	The maximum amount (degrees) by which the user can adjust the zone's setpoints from a zone sensor.
Reset setpoint adjust to zero when unoccupied	Check to set any setpoint adjustment to 0 each time the **OCC** input changes to false (off). **SP ADJ** remains at 0 when the **OCC** input changes to true (on) or when the zone enters a timed local override condition. Uncheck to use adjusted setpoints during unoccupied periods.

Timed Local Override

These properties apply to the timed local override BACnet Analog Value object embedded in the RS Zone Sensor with Fan Control microblock. You can think of this object as a microblock within a microblock.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Description	(optional) A BACnet-visible microblock description.
Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**.
Increment	Minutes the microblock adds to the zone's occupied time for each press of the zone's local override button or switch.
Maximum Duration	Maximum value (up to 546 minutes) the microblock outputs regardless of additional pulses from the controller's input.
Allow Continuous	SPT Pro and SPT Pro Plus only. If enabled, a user can press the sensor's local override button until the **Maximum Accumulation** value is reached, then press one more time to have a continuous override until the next occupied period or until the user cancels the override.
TLO Operating Sequence	Determines the order of timed local override modes the user can cycle through using the sensor's Manual On or override button. **Pulse Acc** - Each time the user presses the sensor's **Manual On** or override button, add the value in the **Each Pulse =** field to the override time up to the **Max accum.** value. The next time the user presses the button, go to the next specified mode of operation. **Continuous On** - When the user presses the sensor's **Manual On** or override button, set the zone to run continuously (24 hours per day) in the occupied mode. **Cancel** - Returns the zone to automatic control.
Maintain continuous through power fail	If the zone is in a continuously occupied mode, checking this option returns the zone to continuous operation when power is restored. If this option is not checked, the zone returns to automatic control when power is restored.
Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object ID	**Auto-assign** SiteBuilder assigns a BACnet Object ID when you attach the control program to a controller. **Use specific value** (0 to 3999999) Assign a number that is unique within the controller.

Sensor Array

Sensor calculation method	For Rnets with more than one sensor. Based on your selection, the microblock's **ZONE** output shows the **Average**, **Maximum**, or **Minimum** of up to 5 Rnet zone sensors.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.
COV Increment	An Analog Network Input (ANI) that references this microblock in its **Address** field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the **COV Increment**. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's **Refresh Time** field.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Fan Speed Adjust

Number of speeds	Determines the number of speeds that a user can cycle through using the sensor's **FAN** button. The microblock outputs the speed value on its **FAN** output wire. See "Inputs and outputs" in this microblock's help. Type 0 to disable the FAN button.
Order of speeds	Determines the order of the speeds (limited by **Number of speeds**) that a user will cycle through using the sensor's **FAN** button. The microblock outputs the speed value on its **FAN** output wire. See "Inputs and outputs" in this microblock's help.
Only Allow Auto on Unoccupied	Check this option to set the **FAN** output to 0 (Auto) when the **OCC** input is false (off). The **FAN** output remains at zero until adjusted from the sensor during an occupied period.

Mode/Sensor Display

Modes Available	The number of modes in addition to automatic control that you want the sensor to cycle through and output on the **MODE** output wire as the user presses its **MODE** button. Type `0` to disable mode selection.
Maintain Mode Through Power Failure	Check this option to return the **MODE** output value to the user's last **MODE** selection at the sensor after a power failure. Uncheck to return **MODE** output value to 0 (automatic control) after a power failure.
Reset Mode to ___ During Unoccupied	Check this option to use the entered value as the **MODE** output value when the **OCC** input changes to false (off). Uncheck to set the **MODE** output value to the user's last **MODE** selection at the sensor regardless of the **OCC** input value.

Modes 1–4

Heat/Cool	**Heating** - The sensor displays **Heating** when the user selects this mode. **Cooling** - The sensor displays **Cooling** when the user selects this mode. **None** - The sensor does not display **Heating** or **Cooling** when the user selects this mode.
Occupied/ Unoccupied	**Occupied** - The sensor displays **Occupied** when the user selects this mode. **Unoccupied** - The sensor displays **Unoccupied** when the user selects this mode. **None** - The sensor does not display **Occupied** or **Unoccupied** when the user selects this mode.
Large Text	Select the large text characters you want the sensor to display when the user selects this mode.

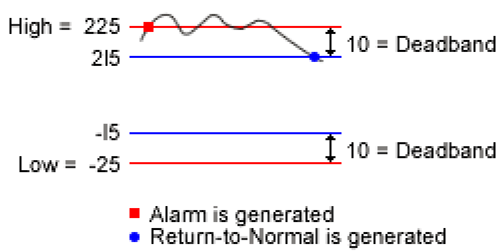
Sensor Display

Disable info button	Select to limit the sensor's **INFO** button display cycle to the **OVRDE** input value, the **HTSP** input value, and the **CLSP** input value before returning the display to the **ZONE** output value. Clear to allow the user to press the sensor's **INFO** button to cycle through all available and enabled input values other than **OCC**, **FAN**, and **ALARM** before returning the display to the **ZONE** output value.
Disable idle display	Select to display a blank screen when the user is not pressing the sensor's **MANUAL ON** button to set override time or the **WARMER** or **COOLER** buttons to change setpoints. Clear to display the **ZONE** output value and any configured input values when the user is not interacting with the sensor.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Low Limit Enable	Check to send an alarm when the microblock's present value remains below the **Low Limit** value for the defined **Delay Seconds**.
Low Limit	The value the microblock's present value must drop below to send an alarm.
High Limit Enable	Check to send an alarm when the microblock's present value remains above the **High Limit** for the defined **Delay Seconds**.
High Limit	The value the microblock's present value must rise above to send an alarm.
Dead Band	The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated. **EXAMPLE** 
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Trends

Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of value)	Records the microblock’s present value only when the value changes by at least the **COV Increment**.
Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. **NOTE** Click **Reset** on the **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.

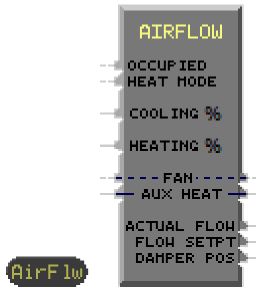
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.
In the i-Vu® or Field Assistant system only:	
Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Delete	Deletes all trend samples stored in the database for the microblock.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Airflow Control

⚠ The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*I/O Point microblocks* (page 68)
Icon and symbol	
What it does	Maintains VAV zone airflow at setpoint. Its inputs, outputs, and properties interface with a controller's built-in airflow control algorithm. The algorithm ensures that zone airflow stays above the specified minimum for zone indoor air quality standards. This microblock is used in factory applications for zone control. Enables VAV testing and balancing through your system interface or through the stand-alone Airflow Test and Balance Utility. This microblock allows the Airflow Test and Balance Utility to control the VAV damper and other key zone operations, such as the fan (**FAN**) and auxiliary heat (**AUX HEAT**), during commissioning and flow sensor calibration. For more information on testing and balancing, see your system's Help or the Airflow Test and Balance Utility help.

How it works

A patented algorithm provides fast response while minimizing overshoot and damper movements, leading to longer actuator life. The algorithm measures the damper curve slope (change in airflow / damper movement) with each damper movement and uses that information to predict the movement required for the next flow adjustment or setpoint change.

The algorithm dynamically calculates the deadband around the flow control setpoint based on the current slope. If the damper requires less than a 1-second movement to bring the measured flow to its setpoint, the damper does not move. This dynamic deadband provides accuracy at low flow settings while maintaining stability throughout the damper range.

The algorithm provides additional stability by averaging flow sensor readings over a 10-second period and reacting to average, rather than instantaneous readings, and by requiring at least a 5% change in flow setpoint to initiate a damper movement.

If measured flow falls below the **Occupied Min Airflow** while the zone is occupied, the algorithm sends a 1-second open signal to the dampers to ensure that zone airflow stays above the specified minimum for zone indoor air quality standards.

The algorithm calculates the flow setpoint based on the microblock's current operational mode.

Cooling Mode

If HEAT MODE is...	and the zone is...	the flow setpoint is...
Off	occupied	**Occupied Min Airflow +** **Cooling %** x (**Cooling Max Airflow** - **Occupied Min Airflow**)
	not occupied	**Unoccupied Min Airflow +** **Cooling %** x (**Cooling Max Airflow** - **Unoccupied Min Airflow**)

NOTE If the **Cooling %** input is 100%, the flow setpoint is the **Cooling Max Airflow**. The damper will be at the position required to maintain the flow at this setpoint, which may not be 100% open.

Heating Mode

For a VAV air handling unit that provides heat, check **Use supply air for heating when Heat Mode is ON** and connect a reverse-acting controller to the **Heating %** input.

If HEAT MODE is...	and the zone is...	the flow setpoint is...
On	occupied	**Occupied Min Airflow +** **Heating %** x (**Heating Max Airflow** - **Occupied Min Airflow**)
	not occupied	**Unoccupied Min Airflow +** **Heating %** x (**Heating Max Airflow** - **Unoccupied Min Airflow**)

For VAV boxes with reheat coils that require a certain amount of airflow from the air handling unit to operate safely and effectively, use the **Aux Heat Min Airflow** to specify the minimum airflow across the coils.

If AUX HEAT is...	and the zone is...	the flow setpoint is...
On	occupied	The largest of **Heating Max Airflow** x **Heating %** (if HEAT MODE is on) or **Auxiliary Heat Min Airflow** or **Occupied Min Airflow**
	not occupied	The largest of **Heating Max Airflow** x **Heating %** (if HEAT MODE is on) or **Auxiliary Heat Min Airflow** or **Unoccupied Min Airflow**

Limitations

This microblock is designed for comfort VAV flow control applications. Used in other applications, some properties may not apply and features intended to extend actuator life, such as the 5% threshold on setpoint adjustments, may not be compatible. You calibrate the combined flow sensor and VAV box pitot tube array by entering measured flow values in a table.

This microblock provides exceptional control of VAV boxes, but it cannot compensate for mechanical problems such as duct restrictions, damper actuator slippage, an oversized VAV box, or a damper motor that is too fast to provide accurate control.

Although this microblock applies to various controllers, some sensor and damper configurations apply only to controllers with an integrated flow sensor and damper actuator.

Inputs and outputs

Inputs

Occupied	True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. Connect to a *time clock microblock* (page 361) or to other logic that indicates the zone's occupancy status.
Heat Mode	True (on) when the AHU is in a heating mode. Not true (off) if the AHU provides cooling only or is in a cooling mode.
Cooling %	Cooling called for (%). Connect to a direct-acting controller such as the *Zone Controller* (page 404) microblock's **CLG%** output.
Heating %	Heating called for (%). Connect to a reverse-acting controller such as the *Zone Controller* (page 404) microblock's **HTG%** output.
Fan	Fan start/stop signal. Usually passed directly to the **Fan** output, unless controlled by the Airflow Test and Balance Utility for testing, balancing, and flow sensor calibration.
Aux Heat Auxiliary Heat	Signal to control the VAV box's auxiliary heat. Usually passed directly to the **Aux Heat** output, unless controlled by the Airflow Test and Balance Utility for testing, balancing, and flow sensor calibration.

Outputs

Fan	Fan start/stop signal. Usually passed directly from the **Fan** input, unless controlled by the Airflow Test and Balance Utility for testing, balancing, and flow sensor calibration.
Aux Heat Auxiliary Heat	Signal to control the VAV box's auxiliary heat. Usually passed directly from the **Aux Heat** input, unless controlled by the Airflow Test and Balance Utility for testing, balancing, and flow sensor calibration.
Actual Flow Flow	Measured airflow (units defined by **Flow Measurement Units**).
Flow Setpt Flow Setpoint	Airflow setpoint (units defined by **Flow Measurement Units**) calculated by the airflow control algorithm.
Damper Pos Damper Position	(0–100%). For **External** damper types, connect to the analog output or floating motor output that controls the damper actuator.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock... **...fan** **...auxiliary heat** **...Flow Setpoint** **...Damper Position**	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Flow Measurement Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**. For display and documentation purposes only. Set to the airflow unit of measurement used during system calibration.

Hardware Configuration

Primary Use	For a typical single-duct VAV system, select **Cooling**. For a dual-duct system, use 1 Airflow Control microblock for each duct. Select **Cooling** in the microblock that controls the primary cooling duct. Select **Heating** in the microblock that controls the heating or ventilating duct.
Sensor	Select the airflow sensor type used by your equipment.
Damper	Select the damper type used by your equipment.
Damper Motor Travel Time	The time (seconds) the damper motor takes to travel from its fully open to its fully closed position.
Direction: CW =	**Close** - Turn the damper motor clockwise to close the damper. **Open** - Turn the damper motor clockwise to open the damper. **NOTE** Applies to integrated actuators only.

Design Properties

Cooling Max Airflow	The maximum zone airflow specified for the cooling mode (**HEAT MODE** input is off).
Heating Max Airflow	The maximum zone airflow specified for a heating or warm-up mode (**HEAT MODE** input is on). Typically used if the air handling unit supplies warm air to heat the zone.
Occupied Min Airflow	The minimum airflow specified for ventilation when the zone is occupied. Applies in heating and cooling modes. Usually based on health and safety criteria such as ASHRAE Standard 62-1.
Unoccupied Min Airflow	The minimum airflow specified for ventilation when the zone is unoccupied (usually 0).
Auxiliary Heat Min Airflow	The minimum airflow specified to ensure adequate airflow over a VAV box's auxiliary heating coil. Applies when the **AUX HEAT** input is greater than zero. Type `0` if the VAV box does not have an auxiliary heating coil or if the box contains a fan that ensures sufficient flow across the coil.
Use supply air for heating when Heat Mode is ON	Check to control the VAV damper with the **Heating %** input when the air handling unit supplies warm air to the VAV box. Uncheck to provide the appropriate occupied or unoccupied minimum zone airflow during the warm-up period.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet configuration

Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Flow input properties

These properties apply to the flow input BACnet object embedded in the Airflow Control microblock. You can think of this object as a microblock within a microblock.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Description	(optional) A BACnet-visible microblock description.
Input Resolution	The increment by which the microblock updates the value on its output wire in the i-Vu® or Field Assistant system. The **Resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the wire displays 1 digit to the right of the decimal • 0.01 to 0.99, the wire displays 2 digits to the right of the decimal • 1 or greater, the wire displays a whole number The **Resolution** value determines the increment by which the present value is updated. For example, if you enter: • .2, the wire displays 8.4, 8.6, 8.8, ... • .03, the wire displays 5.09, 5.12, 5.15, ... • 10, the wire displays 30, 40, 50, ...
Lock	Check to output the locked value from the microblock instead of the microblock's calculated value.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.
COV Increment	An Analog Network Input (ANI) that references this microblock in its **Address** field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the **COV Increment**. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's **Refresh Time** field.

Trend

Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of value)	Records the microblock's present value only when the value changes by at least the **COV Increment**.

Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. **NOTE** Click **Reset** on the **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.

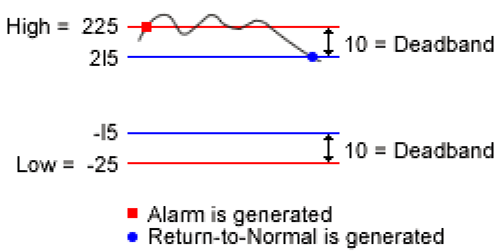
In the i-Vu® or Field Assistant system only:

Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Delete	Deletes all trend samples stored in the database for the microblock.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Low Limit Enable	Check to send an alarm when the microblock's present value remains below the **Low Limit** value for the defined **Delay Seconds**.
Low Limit	The value the microblock's present value must drop below to send an alarm.
High Limit Enable	Check to send an alarm when the microblock's present value remains above the **High Limit** for the defined **Delay Seconds**.
High Limit	The value the microblock's present value must rise above to send an alarm.
Dead Band	The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated. **EXAMPLE** 
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

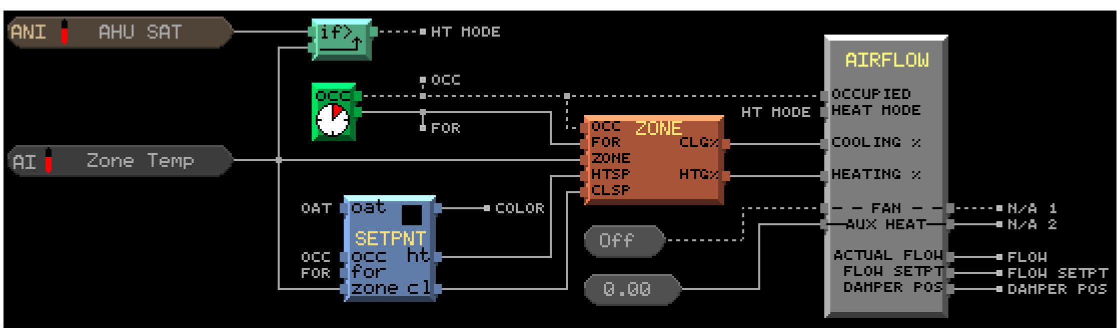
Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Programming example

This simple VAV application with no fan and no auxiliary heat compares the zone temperature to the supply air temperature from the air handling unit (AHU) to determine whether the AHU is in a heating mode. This airflow microblock is configured for a controller with an integrated actuator, so the microblock controls the actuator directly and no additional output points are needed for control.



Tips and tricks

Cooling-only VAV boxes

Uncheck **Use supply air for heating when Heat Mode is ON**. The microblock will maintain the applicable minimum flow.

Dual-duct VAV boxes

Use 2 Airflow Control microblocks. In the microblock that controls the cooling damper, lock the **HEAT MODE** off and set **Primary Use** to **Cooling**. In the microblock that controls the heating damper, lock the **HEAT MODE** on and set **Primary Use** to **Heating**. Examples of dual duct applications can be found in **EquipmentBuilder**.

Industrial process ventilation or off-hours skeleton crews

You can use the **Unoccupied Min Airflow** to provide a different minimum flow during unoccupied periods for industrial process ventilation, for skeleton staffs, or for other reasons.

Deadhead protection

To prevent deadheading the fan (running the fan with the outlet blocked), some VAV systems require a minimum number of open dampers before the fan starts. Typically, when a building is unoccupied and the AHU fan is off, VAV dampers are closed. To provide deadhead protection, set **Unoccupied Min Airflow** to a non-zero value in the VAV boxes you want to leave open. When the system is unoccupied and the fan is turned off, these VAV boxes will open their dampers fully in an attempt to maintain the **Unoccupied Min Airflow** setpoint.

Smoke control - unbounded inputs

Cooling % and **Heating %** are not limited to 0–100%. A PID microblock or Zone Controller microblock output stays within the 0–100% range, but for special circumstances like smoke control you can switch these inputs to other signals. For example, to force the dampers fully open, switch **HEAT MODE** to an off signal and switch **Cooling %** to a value such as 500%. This forces the damper to open fully trying to reach an unrealistically high flow setpoint.

Pressure-dependent control

To control a pressure-dependent VAV box (a box with no flow pickup or flow measurement, where the damper moves from 0% to 100% open proportionally with the zone temperature), check **Lock Damper Position to** on the microblock's **Properties** page and use a *BACnet Analog Network Output* (page 198) microblock to write the desired damper position to the Airflow Control microblock's **Damper Lock** property. See *BACnet object property addresses* (page 152) below. You can connect a *Zone Controller* (page 404) microblock's **CLG%** output to the Network Output microblock's input, and use a *Constant Low Limit* (page 443) microblock to impose a minimum damper position.

BACnet properties

The Airflow microblock is a proprietary BACnet object. If you make this object **Network Visible**, you can address a *BACnet Analog Network Input* (page 174) or *BACnet Analog Network Output* (page 198) microblock to access many of its configuration and control properties in other control programs. See *BACnet object property addresses* (page 152) below.

BACnet object property addresses

The Airflow Control microblock is a proprietary BACnet object (object type 768). The format for a BACnet address is **bacnet://device/object/property@priority**.

See *To format a BACnet address* (page 558) for BACnet address syntax options and information.

EXAMPLE To set up a microblock to read the **Cooling Output** (%) from the first Airflow Control microblock in the same controller, use the following address:

```
bacnet://this/768:1/4114
```

In the above address, 768:1 indicates the first instance of an Airflow Control microblock in the controller. If writing to a dual-duct application with two Airflow Control microblocks, the address in the second microblock would have 768:2.

NOTE These properties are only available with a v2-03-009 or newer driver.

BACnet property identifier #	BACnet property identifier	Description	Read/ Write
4096	Max Occ Cooling Flow	Real - units determined by flow AI.	r/w
4097	Max Occ Heating Flow	Real - units determined by flow AI.	r/w
4098	Min Occupied Flow	Real - units determined by flow AI.	r/w
4099	Min Unoccupied Flow	Real - units determined by flow AI.	r/w
4100	Min Aux Heat Flow	Real - units determined by flow AI. Minimum airflow to maintain while aux heat is active.	r/w
4101	Flow at 1 inch WC	Real - units determined by flow AI. VAV manufacturer-provided data used for baseline control.	r/w
4102	Flow Calibration	Real - units determined by flow AI. Array of 4 measured flow calibration properties.	r/w
4103	Sensor Calibration	Real - units determined by flow AI. Array of 4 raw sensor calibration properties.	r/w
4104	Aux Heat Lock	Real - lock value (%) for AUX HEAT output wire.	r/w
4105	Damper Lock	Real - lock value (% open) for VAV damper.	r/w
4106	Flow Setpoint Lock	Real - lock value, units determined by flow AI.	r/w
4107	Auto-Zero	Boolean - indicates completion of auto-zero.	r/w
4108	Test and Balance Mode	Enumeration of states of damper control while test and balance is performed.	r/w
4109	Parent Program Device ID	Device ID of device containing air source object.	r
4110	Parent Program ID	Program AI of program containing air source object.	r
4111	Air Source Object ID	Air source BACnet object ID.	r/w
4112	Occupied Mode	Boolean - true if occupied.	r

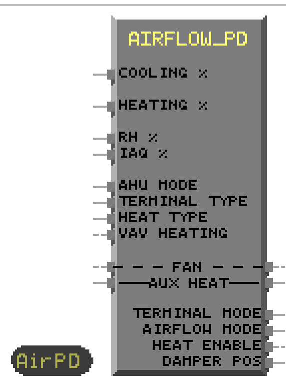
BACnet property identifier #	BACnet property identifier	Description	Read/ Write
4113	Heat Mode	Boolean - true if AHU in heating mode.	r
4114	Cooling Output	Real - percentage cooling demand.	r
4115	Heating Output	Real - percentage heating demand.	r
4116	Auxiliary Heat Output	Real - percentage of aux heat demand.	r
4117	Damper Output	Real - damper position (% open).	r
4118	Actual Flow	Real - units determined by flow AI.	r
4119	Flow Setpoint	Real - units determined by flow AI.	r
4120	Air Flow Object ID	BACnet Object ID of embedded flow AI object.	r
4121	Obsolete. Use 4141.		
4122	Loop config	Cooling or Heating (Primary Use).	r/w
4123	Sensor Config	Sensor configuration—Internal, ZASF, or External.	r
4124	Damper Config	Damper configuration—Internal, ZASF, or External.	r
4125	Raw sensor reading	Real - raw sensor value, % of scale of 0-1.0" WC.	r
4126	Raw sensor setpoint	Real - raw sensor Setpt, % of scale of 0-1.0"WC.	r
4127	Moves Today	Number of damper moves, current day.	r
4128	Moves Yesterday	Number of damper moves yesterday.	r
4129	Fan Lock	Fan lock value—on or off.	r/w
4130	Fan Output	Status of fan pass-through wire.	r
4131	Status Flags	BACnet status flags.	r
4132	Test and Balance Tech Name	Name of test and balance technician.	r/w
4133	Test and Balance Org Name	Name of test and balance company.	r/w
4134	Last Test and Balance Date	Date of last test and balance activity through stand-alone Airflow Test and Balance Utility.	r/w
4135	Display Name	Copy of Display Name provided by microblock.	r/w
4136	Owning Program ID	Object ID for program containing this instance.	r
4137	Override Flags	Unsigned - Status flags of property overrides in effect.	r
4138	Max Occ Cooling Flow Override	Real - volatile override for Max Occ Cooling Flow (4096).	r/w
4139	Min Occ Flow Override	Real - volatile override for Min Occ Flow (4098).	r/w
4140	Pars Stamp	BACnet DateTime - volatile, used to detect writes by external test and balance software.	r/w

BACnet property identifier #	BACnet property identifier	Description	Read/ Write
4141	Lock Flags	Binary lock bits whether to apply locks. Include one of the following index numbers in the address field: 4141(4) Holds the damper in its current position. 4141(5) Locks the fan to the Fan Lock State property value. 4141(6) Locks the damper to the Damper Position Lock Value property. 4141(7) Locks the aux heat to the Aux Heat Percentage Lock Value property. 4141(8) Locks the flow setpoint to the Flow Setpoint Lock Value property. **NOTE** 4141(0) creates a "Write access denied" error message. For example, `bacnet://this/768:1/4141(4)`	r/w

Pressure Dependent Airflow Control

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

This microblock is compatible only with Carrier controllers.

Microblock family	*I/O Point microblocks* (page 68)
Icon and symbol	

What it does	Calculates and maintains the desired damper position in a pressure dependent zone. Controls AUX reheat operation and fan operation in a fan powered box. Its inputs, outputs, and properties interface with the control algorithms built into other controllers. The algorithm ensures that zone airflow stays above the specified minimum for zone indoor air quality standards. Enables testing and balancing through the i-Vu®/Field Assistant interface or through a stand-alone utility. Controls the damper and other key zone operations, such as the fan (**FAN**) and auxiliary heat (**AUX HEAT**), during commissioning.

How it works

The algorithm calculates the desired damper position (setpoint) based on the microblock's current operational mode (**TERMINAL MODE**), zone temperature requirements, air source mode (**AHU MODE**) and **TERMINAL TYPE**. When in heating or cooling mode, the calculated damper position is a function of the **COOLING %** or **HEATING %** input to the microblock. Using the configured values for minimum and maximum damper positions as 0% and 100% respectively, the actual calculated damper setpoint is scaled to the range determined by the configured min and max damper positions based on the following formula.

Damper Setpoint = ((% Damper Request) * (Max. Damper Position – Min. Damper Position)) + Min. Damper Position.

For instance, for a configured min damper = 0% and a max damper = 100%, in a cooling mode, a COOLING % input value of 50% (damper request) would result in a calculated damper setpoint of 50%. For a configured min damper = 10% and max damper = 80%, a COOLING % input of 50% (damper request) would result in a calculated damper position of 45%.

NOTE When the **VAV HEATING** input = Yes, the damper setpoint calculation uses the Heating % value as the % Damper Request. When the **VAV HEATING** input = No, the damper setpoint calculation uses the AUXHEAT % value as the % Damper Request.

Once the desired damper position is calculated, the microblock's **DAMPER POS** output is used to position the damper accordingly. The damper sends position feedback information to the microblock to provide accurate movement of the damper to its calculated setpoint.

The following table shows the damper setpoint and heat enable/disable state for all associated **AHU MODES**, **TERMINAL MODES**, and zone temperature requirements for each terminal type:

Air Source (AHU) Mode	Temperature Control Requirement	Terminal Type	Aux Heat	Terminal Mode	Damper Control (Damper Setpoint used)	Heat Control	Fan Control
Off	None	All	N/A	Off	Hold Damper Position (N/A)	Disable	Disable
	Cooling	All	N/A	Off	Hold Damper Position (N/A)	Disable	Disable
	Heating	Single Duct	N/A	Off	Hold Damper Position (N/A)	Disable	Disable
		Series or Parallel Fan	No	Off	Hold Damper Position (N/A)	Disable	Disable
		Series Fan	Yes	Heat	Hold Damper Position (N/A)	Enable	Enable
		Parallel Fan	Yes	Heat	Close Damper (Heat)	Enable	Enable
Cooling, FreeCool	None	Single Duct	N/A	Cool	Cool minimum	Disable	Disable
		Series Fan	N/A	Cool	Cool minimum	Disable	Enable
		Parallel Fan	N/A	Cool	Cool minimum	Disable	Disable

	Cooling	Single Duct	N/A	Cool	Modulate Damper Position between Min and Max (Cool)	Disable	Disable
		Series Fan	N/A	Cool	Modulate Damper Position between Min and Max (Cool)	Disable	Enable
		Parallel Fan	N/A	Cool	Modulate Damper Position between Min and Max (Cool)	Disable	Disable
	Heating	Single Duct, Parallel Fan	No	Heat	Minimum Damper Position (Cool)	Disable	Disable
		Series Fan	No	Heat	Minimum Damper Position (Cool)	Disable	Enable
		Single Duct	Yes	ReHeat	Reheat Damper Position	Enable	Disable
		Series or Parallel Fan	Yes	Heat	Minimum Damper Position (Cool)	Enable	Enable
Vent	None	Single Duct or Parallel Fan	N/A	Vent	Vent Position	Disable	Disable
		Series Fan	N/A	Vent	Vent Position	Disable	Enable
Heat, Warmup	None	Single Duct, Parallel Fan	N/A	Heat	Minimum Damper Position (Heat)	Disable	Disable
		Series Fan	N/A	Heat	Minimum Damper Position (Heat)	Disable	Enable
	Cooling	Single Duct, Parallel Fan	N/A	Heat	Minimum Damper Position (Heat)	Disable	Disable
		Series Fan	N/A	Heat	Minimum Damper Position (Heat)	Disable	Enable
	Heating	Single Duct	No	Heat	Modulate Damper Position between Min and Max (Heat)	Disable	Disable
		Single Duct	Yes	Heat	Modulate Damper Position between Min and Max (Heat)	Enable	Disable
		Series or Parallel Fan	No	Heat	Modulate Damper Position between Min and Max (Heat)	Disable	Enable
		Series or Parallel Fan	Yes	Heat	Modulate Damper Position between Min and Max (Heat)	Enable	Enable
Pressure	None	Single Duct, Parallel Fan	N/A	Pressurize	Maximum Damper Position (Cool)	Disable	Disable
		Series Fan	N/A	Pressurize	Maximum Damper Position (Cool)	Disable	Enable
	Cooling	Single Duct, Parallel Fan	N/A	Pressurize	Maximum Damper Position (Cool)	Disable	Disable
		Series Fan	N/A	Pressurize	Maximum Damper Position (Cool)	Disable	Enable
	Heating	Single Duct, Parallel Fan	No	Pressurize	Maximum Damper Position (Cool)	Disable	Disable

		Series Fan	No	Pressurize	Maximum Damper Position (Cool)	Disable	Enable
		Single Duct, Parallel Fan	Yes	Pressurize	Maximum Damper Position (Cool)	Enable	Disable
		Series Fan	Yes	Pressurize	Maximum Damper Position (Cool)	Enable	Enable
Evac	All	All	N/A	Evac	Close Damper	Disable	Disable

Inputs and outputs

Inputs

Cooling %	Cooling called for (%). Connect to a direct-acting controller such as the Zone Controller microblock's **CLG%** output.
Heating %	Heating called for (%). Connect to a reverse-acting controller such as the Zone Controller microblock's **HTG%** output.
RH %	Cooling for Dehumidification called for (%). The microblock compares this value to the **COOLING %** and **IAQ %** inputs and selects the greatest value.
IAQ %	Airflow for IAQ called for (%). The microblock compares this value to the **COOLING %** and **RH %** inputs and selects the greatest value.
AHU Mode	Analog value that represents the current mode of the air source.
Terminal Type	Analog value that represents the type of terminal control used by the microblock: single duct, series fan, or parallel fan terminal.
Heat Type	Analog value that represents the type of **Aux Heat** used by the microblock: two position, modulating, staged electric, ducted or non-ducted.
VAV Heating	Binary value. When VAV HEATING = YES, the heating damper position is a function of the **HEATING %** input. When VAV HEATING = NO, the heating damper position is a function of the **AUXHEAT (%)** input.
Fan	Fan start/stop signal. Usually passed directly to the **Fan** output, unless controlled by the Airflow Test and Balance Utility for testing and balancing.
Aux Heat Auxiliary Heat	Required Auxiliary Heat %. Usually passed directly to the **Aux Heat** output, unless controlled by the Airflow Test and Balance Utility for testing and balancing.

Outputs

Fan	Fan start/stop signal. Usually passed directly from the **Fan** input, unless controlled by the Airflow Test and Balance Utility for testing and balancing.
Aux Heat Auxiliary Heat	Signal to turn on the box's auxiliary heat. Usually passed directly from the **Aux Heat** input, unless controlled by the Airflow Test and Balance Utility for testing, and balancing.
Terminal Mode	Analog value that represents the current mode of the air terminal: **1** Off **2** Heat **3** Warmup **4** Vent **5** N/A **6** Cool **7** Dehumidification **8** Reheat **9** Pressure **10** Evac **11** N/A **12** Zone IAQ **13** Zone Test and Balance
Airflow Mode	Analog value that represents the current control state of the damper: **Max cooling**, **Min heating**, etc. This is maintenance data that can be used by the Test and Balance software.
Heat Enable	Binary value that represents the current commanded state of the **Aux Heat** control.
Damper Pos Damper Position	(0–100%). Analog value that represents the current commanded position (setpoint) of the damper. For External damper types, connect to the analog output or floating motor output that controls the damper actuator.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Flow Measurement Units	The unit of measurement of the microblock's flow value. This will be displayed on the Test and Balance utility and i-Vu®/Field Assistant and Field Assistant Test and Balance section on the microblock pop-up **Details** tab.

Hardware Configuration

Damper Motor Travel Time	The time (seconds) the damper motor takes to travel from its fully open to its fully closed position.
Direction: CW =	**Close** - Turn the damper motor clockwise to close the damper. **Open** - Turn the damper motor clockwise to open the damper. **NOTE** Applies to integrated actuators only.

Damper Positions

Cooling Min	The minimum specified damper position for the cooling mode (**HEAT MODE** input is off).
Cooling Max	The maximum specified damper position for the cooling mode (**HEAT MODE** input is off).

Reheat Min	The minimum damper position specified to ensure adequate airflow over a box's auxiliary heating coil. Applies when the **AUX HEAT** input is greater than zero. Type 0 if the box does not have an auxiliary heating coil or if the box contains a fan that ensures sufficient flow across the coil.
Heating Min	The minimum specified damper position for the heating or warm-up mode (**HEAT MODE** input is on).
Heating Max	The maximum damper position specified for a heating or warm-up mode (**HEAT MODE** input is on). Typically used if the air handling unit supplies warm air to heat the zone.
Vent Position	The specified damper position when the air terminal is in Vent mode.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet Configuration

Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

BACnet

Reference Name	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Tips and tricks

BACnet properties

The Pressure Dependent Airflow microblock is a proprietary BACnet object. If you make this object Network Visible, you can address a BACnet Analog Network Input or BACnet Analog Network Output microblock to access many of its configuration and control properties in other control programs. See BACnet object property addresses below.

BACnet object property addresses

The Pressure Dependent Airflow Control microblock is a proprietary BACnet object (object type 769). The format for a BACnet address is **bacnet://device/object/property@priority**.

EXAMPLE To set up a microblock to read the **Cooling Output** (%) from the first Airflow Control microblock in the same controller, use the following address.

```
bacnet://this/769:1/4512
```

In the above address, 769:1 indicates the first instance of a Pressure Dependent Airflow Control microblock in the controller.

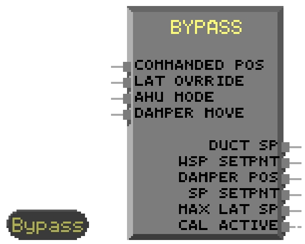
BACnet property identifier #	BACnet property identifier	Description	Read/ Write
4501	PD_MIN_COOL_POSITION	Configured Min Cool Damper Position %.	R/W
4502	PD_MAX_COOL_POSITION	Configured Max cool Damper Position %.	R/W
4503	PD_MIN_REHEAT_POSITION	Configured Min Reheat Damper Position %.	R/W
4504	PD_MIN_HEAT_POSITION	Configured Min Heat Damper Position %.	R/W
4505	PD_MAX_HEAT_POSITION	Configured Max Heat Damper Position %.	R/W
4506	PD_VENT_POSITION	Configured Vent Damper Position %.	R/W
4507	PD_REHEAT_LOCK	Reheat Lock value %.	R/W
4508	PD_DAMPE_LOCK	Damper Lock value %	R/W
4509	PD_AUTO_ZERO	Indicates completion of Auto Zero for Damper calibration.	R/W
4510	PD_TAB_MODE	Current mode of the Test and Balance program.	R/W
4156	APPLICATION INSTANCE	The Linkage application instance used in this microblock.	R/W
4511	PD_USE-SUPPLY_AIR	Use VAV Heating	R
4512	PD_COOLING	Cooling % required.	R
4513	PD_HEATING	Heating % required.	R
4514	PD_REHEAT	Reheat % required.	R
4515	PD_DAMPER	Damper % required.	R
4516	PD_RH	RH % required.	R
4517	PD_IAQ	IAQ % required.	R
4518	PD_AHU_MODE	Current AHU Mode.	R
4519	PD_TERMINAL_TYPE	Terminal Type.	R
4520	PD_HEAT_TYPE	Heat Type.	R
4521	PD_TERMINAL_MODE	Current Terminal Mode.	R
4522	PD_AIR_FLOW_MODE	Current PD Airflow Mode.	R
4523	PD_HEAT_ENABLE	Heat Enable commanded state - on, off.	R

4525	PD_LOCK_FLAGS	Binary lock bits whether to apply locks. Include one of the following index numbers in the address field: • 4530(4) Holds the damper in its current position. • 4530(5) Locks the fan to the Fan Lock State property value. • 4530(6) Locks the damper to the Damper Position Lock Value property. • 4530(7) Locks the aux heat to the Aux Heat Percentage Lock Value property. • 4530(8) Locks the flow setpoint to the flow Setpoint Lock Value property. **NOTE** 4530(0) creates a "Write access denied" error message. For example, bacnet://this/769:1/4530(4)	R/W
4527	PD_DAMP_CONFIG	Damper config - internal, external, stroke time, direction.	R
4528	PD_MOVES_TODAY	Number of damper movements today.	R
4529	PD_MOVES_YESTERDAY	Number of damper movements yesterday.	R
4530	PD_FAN_LOCK	Fan lock value - on or off.	R/W
4531	PD_FAN_OUTPT	Fan output status.	R
4532	PD_PROP_STAT_FLAG	BACnet status flags.	R
4533	PD_TAB_TECH_NAME	Test and Balance technician name.	R/W
4534	PD_TAB_ORG_NAME	Test and Balance Company name.	R/W
4535	PD_LAST_TAB_DATE	Last Test and Balance Date.	R/W
4536	PD_DISPLAY_NAME	Microblock Display Name.	R/W
4537	PD_OWN_PRG_OBJ_ID	Object ID for program containing this instance.	R
4538	PD_OVR_FLAGS	Unsigned - Status flags of property overrides in effect.	R
4539	PD_MIN_COOL_POSITION_OVR	Real - Volatile override for Min Cool Position.	R/W
4540	PD_MAX_COOL_POSITION_OVR	Real - Volatile override for Max Cool Position.	R/W
4541	PD_MIN_REHEAT_POSITION_OVR	Real - Volatile override for Min Reheat Position.	R/W
4542	PD_MIN_HEAT_POSITION_OVR	Real - Volatile override for Min Heat Position.	R/W
4543	PD_MAX_HEAT_POSITION_OVR	Real - Volatile override for Max Heat Position.	R/W
4544	PD_VENT_POSITION_OVR	Real - Volatile override for Vent Position.	R/W
4545	PD_TAB__PARS_SEAL	BACnet DateTime - volatile - used to detect writes by external test and balance software.	R/W
4546	PD_LOCK_FLAGS_BOOL	Boolean array of lock flags for damper, fan and aux heat.	R
4547	PD_PROP_STAT_FLAGS_BOOL	Boolean array of BACnet status flags.	R
4548	PD_BPD_VERSION	Microblock version number.	R

BACnet Bypass Control

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

This microblock is compatible only with Carrier controllers.

Microblock family	*I/O Point microblocks* (page 68)
Icon and symbol	
What it does	Controls the bypass damper based on the commanded position input wire. Converts the pressure sensor count to pressure and output this value to the **DUCT SP** wire. Allows for the configuration of the duct static pressure setpoint and the maximum static pressure setpoint during LAT override. Enables testing and balancing through the i-Vu®/Field Assistant interface. Calibrates the airflow sensor readings at design setpoint and zero calibration of sensor when AHU fan is off. Calibrates full open and closed damper positions. Applies to the following controllers: VVT Bypass

How it works

The microblock adds the airflow sensor output with any required zero offset and slope adjustment and converts it to a useable static pressure reading. This value is place on the **DUCT SP** output wire to be used by the control program for static pressure control.

The bypass damper is controlled by the **COMMANDED POS** input and the internal damper position feedback signal, no error control is used at this level. The output is calculated using integral control and is active until the damper position equals the **COMMANDED POS**.

The Bypass microblock provides the control program with the working static pressure setpoint, this is normally the configured base static pressure setpoint. When **LAT override** is in effect, the microblock calculates the working static pressure setpoint based on a linear value between the configured base setpoint and the configured maximum LAT setpoint. This allows for increased static pressure when the **LAT** (Leaving Air Temperature) of the AHU exceeds a configurable limit.

Test and Balance

The microblock allows for direct calibration of the sensor at the configured duct static setpoint. When the **Static Pressure Setpoint** button is selected, the microblock checks for LAT override, if active, no sensor calibration will be performed. With no LAT override (LAT OVRRIDE=0%), the CAL ACTIVE output goes true (yes) and the control program controls to the configured duct static pressure setpoint.

THE **DAMPER MOVE** input wire will equal 0 when the setpoint is reached and the damper has stopped moving. The bypass controller is now at the configured setpoint and actual pressure readings obtained from the air balancer may be entered. The current sensor reading is calibrated to this new value and the offset value is retained for future pressure sensor count conversions.

When the **Auto Zero** button is selected, the microblock ensures the air source fan is off, reads the current raw count and determines a zero offset to be used in future sensor count conversions. If AHU MODE equals any number other than “1”, no zero calibration takes place.

The **Damper Full Open** and **Damper Full Close** buttons force the damper to the fully opened or closed position. The damper position feedback values for these positions are stored and used by the damper control routine.

Normal control is suspended until the **Automatic Control** button is activated, or until one hour of inactivity has passed, at which time the Test and Balance mode will automatically be terminated.

Inputs and outputs

Inputs

COMMANDED POS	The current desired position (%) of the bypass damper.
LAT OVRRIDE	The current calculated value (%) between the configured (base) static pressure setpoint and the maximum configured **LAT override** setpoint required to satisfy LAT limits.
AHU MODE	A Multi-state variable that indicates the current mode of the associated Air Handling Unit. The AHU Modes are as follows: **1** Off **2** Warmup **3** Heat **4** Cool **5** Freecool **6** Pressure **7** Evac **8** Vent
DAMPER MOVE	A binary value that indicates whether the damper has achieved the commanded position (0), or if it is still moving (1).

Outputs

DUCT SP	The current duct static pressure (in H2O).
WSP SETPNT	Working Static Pressure setpoint (in H2O). This is the static pressure setpoint that the bypass is controlling to, and includes any **LAT override** that might be in effect.
DAMPER POS	Current position of the bypass damper (% open to bypass).
SP SETPNT	The configured (base) duct static pressure setpoint.
MAX LAT SP	The configured maximum **LAT duct static pressure setpoint**. This is the maximum duct static pressure that will be used during LAT override.
CAL ACTIVE	A binary value that indicates if the airflow sensor static pressure reading is being calibrated (yes/no) in the Test & Balance screen. **NOTE** **LAT OVERRIDE** must be 0% before the **Cal Active** output goes to “yes”.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Units	The BACnet engineering unit of measurement of the microblock's present value.

Hardware Configuration

Direction: CW =	**Close** - Turn the damper motor clockwise to close the damper. **Open** - Turn the damper motor clockwise to open the damper. **NOTE** Applies to integrated actuators only.

Design Properties

Static Pressure Setpoint	The desired duct static pressure (base) setpoint.
LAT Pressure Setpoint	The maximum duct static pressure setpoint that will be used during LAT override.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet configuration

Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Static Pressure Input Properties

Display Name	The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the " character.
Description	(optional) A BACnet-visible microblock description.
Resolution	The increment by which the microblock updates the value on its output wire.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object ID	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.
COV Increment	An Analog Network Input (ANI) that references this microblock in its **Address** field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the **COV Increment**. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's **Refresh Time** field.

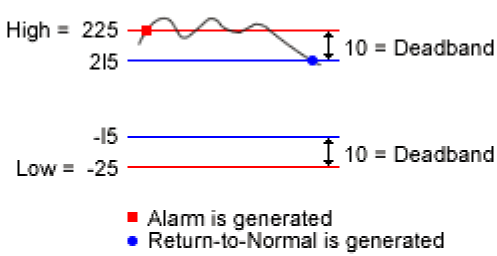
Trends

Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of value)	Records the microblock's present value only when the value changes by at least the **COV Increment**.
Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. Click **Reset** in the i-Vu®/Field Assistant interface to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trnds for ___days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarms

Low Limit Enable	Check to send an alarm when the microblock's present value remains below the **Low Limit** value for the defined **Delay Seconds**.
Low Limit	The value the microblock's present value must drop below to send an alarm.
High Limit Enable	Check to send an alarm when the microblock's present value remains below the **Low Limit** value for the defined **Delay Seconds**.
High Limit	The value the microblock's present value must rise above to send an alarm.
Dead Band	The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated. **EXAMPLE** 
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm Text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledgment	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enable	Check to send a message when an alarm condition has returned to normal.
Return Text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Tips and tricks

BACnet properties

The Bypass microblock is a proprietary BACnet object. If you make this object **Network Visible**, you can address a BACnet Analog Network Input or BACnet Analog Network Output microblock to access many of its configuration and control properties in other control programs. See BACnet object property addresses below.

BACnet object property addresses

The Bypass microblock is a proprietary BACnet object (object type 770). The format for a BACnet address is **bacnet://device/object/property@priority**.

EXAMPLE To set up a microblock to read the **Current Value of the Duct Static Pressure** from the first Bypass microblock in the same controller, use the following address.

```
bacnet://this/770:1/4710
```

In the above address, 770:1 indicates the first instance of a Bypass microblock in the controller.

BACnet property identifier #	BACnet property identifier	Description	Read/ Write
75	PROPID_OBJECT_IDENTIFIER	BACnet ID of the BP Object	R
77	PROPID_OBJECT_NAME	BACnet name of the BP Object	R
79	PROPID_OBJECT_TYPE	BACnet Type	R
28	PROPID_DESCRIPTION	BACnet Description of the BP Object	R/W
31	PROPID_DEVICE_TYPE	BACnet Device Type	R/W
168	PROPID_PROFILE_NAME	BACnet profile name of the object	R/W
4132	PROPID_TAB_TECH_NAME	Name of Test and Balance Tech.	R/W
4133	PROPID_TAB_ORG_NAME	Name of Test and Blance Company	R/W
4135	PROPID_DISPLAY_NAME	Name of Test and Blance Company	R/W
4140	PROPID_TAB_PARS_SEAL	BACnet Date/Time - Used to detect writes by external Test and Balance software	R/W
4121	PROPID_LOCK_FLAGS	Binary lock bits whether to apply locks	R
4105	PROPID_DAMPER_LOCK	Real - lock value for Damper % open	R/W
4107	PROPID_AUTO_ZERO	Boolean - indicates completion of auto-zero	R
4108	PROPID_TAB_MODE	Enumeration of states of damper control whle Test and Balance is performed.	R/W
4134	PROPID_LAST_TAB_DATE	Date of last Test and Balance	R/W
4111	PROPID_AIR_SOURCE_OBJ_ID	Airsource BACnet Object ID	R
4109	PROPID_PAR_PRG_DEV_ID	Device ID of program containing the BP Object	R
4110	PROPID_PAR_PRG_OBJ_ID	Program AI of program containing the BP Object	R
4123	PROPID_SENS_CONFIG	Sensor configuration	R
4124	PROPID_DAMP_CONFIG	Damper configuration	R
111	PROPID_STATUS_FLAGS	BACnet status flags	R
103	PROPID_RELIABILITY	BACnet reliability status of Object	R
4136	PROPID_OWN_PRG_OBJ_ID	Object ID for program containing this instance	R
4125	PROPID_FLOW_RAWPCT	Raw counts of flow sensor	R
4127	PROPID_MOVES_TODAY	Number of damper movements today	R
4128	PROPID_MOVES_YESTERDAY	Number of damper movements yesterday	R
4131	PROPID_PROP_STAT_FLAGS	PROPID_PROP_STAT_FLAGS	R
117	PROPID_UNITS	Units used by the object	R
4141	PROPID_LOCK_FLAGS_BOOL	Boolean array of lock flags	R
4142	PROPID_PROP_STAT_FLAGS_BOOL	Boolean array of BACnet status flags	R
4156	APPLICATION INSTANCE	The linkage application instance used by the microblock	R/W
4703	PROPID_BYP_VERSION	Version number of the BP microblock	R
4704	PROPID_BYP_DSP_LOCK	Real - lock value for Duct Static Press	R
4705	PROPID_BYP_COMMANDED_POSITION	Value of current damper commanded position	R
4706	PROPID_BYP_AHU_MODE	Value of current AHU Mode	R
4707	PROPID_BYP_LAT_OVERRIDE	Value of current LAT override	R
4708	PROPID_BYP_DAMPER_MOTION	Value of current Damper Move input	R
4709	PROPID_BYP_DAMPER	Value of current Damper Position	R
4710	PROPID_BYP_DUCT_STATIC	Value of current Duct Static Pressure	R
4711	PROPID_BYP_WKG_DSP	PROPID_BYP_WKG_DSP	R
4712	PROPID_BYP_CAL_ACTIVE	Value of current Cal Active output	R
4713	PROPID_BYP_DSP_WIRE	DSP wire current value	R
4714	PROPID_BYP_LAT_WIRE	LAT wire current value	R
4715	PROPID_BYP_DUCT_SP_SETPOINT	Real - Static Pressure Setpoint	R

BACnet property identifier #	BACnet property identifier	Description	Read/ Write
4716	PROPID_BYP_LAT_SETPOINT	PROPID_BYP_LAT_SETPOINT	R
4717	PROPID_BYP_CALIBRATION_SETPT	Real - Calibration Setpoint	R
4718	PROPID_BYP_DSP_SETPT_OVR	Real - DSP Setpoint override	R/W
4719	PROPID_BYP_LAT_SETPT_OVR	Real - LAT Setpoint override	R/W
4720	PROPID_BYP_CAL_SETPT_OVR	Real - Calibration Setpoint override	R/W

Network I/O microblocks

Network Input and Output microblocks pass information between points on the network. A network input microblock reads the value of a network-visible BACnet property on the network or of an equivalent value from another supported protocol. A network output microblock writes a value to a point on the network.

Read

ANI	*Analog Network Input* (page 174) Reads an analog value from a specific address on the network.
ANI2	*Analog Network Input 2* (page 181) Reads an analog value from a specific address on the network. Monitors and outputs the validity of network communication between the microblock and its target.
BNI	*Binary Network Input* (page 187) Reads a binary (digital) value from a specific address on the network.
BNI2	*Binary Network Input 2* (page 192) Reads a binary (digital) value from a specific address on the network. Monitors and outputs the validity of network communication between the microblock and its target.

Write

ANO	*Analog Network Output* (page 198) Writes an analog value to a specific address on the network.
ANO2	*Analog Network Output 2* (page 201) Writes an analog value to a specific address on the network. Stops writing to the target address when the **Enable** input is false (off).
BNO	*Binary Network Output* (page 204) Writes a binary (digital) value to a specific address on the network.
BNO2	*Binary Network Output 2* (page 206) Writes a binary (digital) value to a specific address on the network. Stops writing to the target address when the **Enable** input is false (off).

Linkage

COLL

BACnet Collector (page 208)

Provides a means for the control program to exchange sets of data across the BACnet network. Creates associations with one or more Provider microblocks and maintains:

- An **Input** data array received from Provider microblocks
- A set of **Feedback** data transmitted to each Provider microblock

PROV

BACnet Provider (page 210)

Provides a means for the control program to exchange sets of data across the BACnet network. Creates an association with one Collector microblock and maintains:

- An **Output** data array transmitted to the Collector microblock
- A set of **Feedback** data received from the Collector microblock

Rnet

ASVI

BACnet Analog Sensed Value Input (page 213)

Reads an analog value from up to 5 ZS or wireless sensors, and makes the value available to the control program on an output wire. If the Rnet has more than one ZS or wireless sensor, the microblock's combination algorithm determines whether the output value is the average, minimum, or maximum of the readings.

BSVI

BACnet Binary Sensed Value Input (page 219)

Reads a binary value from up to 5 ZS or wireless sensors, and makes the value available to the control program on an output wire. If the Rnet has more than one ZS or wireless sensor, the microblock's combination algorithm determines whether the output value is based on a single sensors value or all sensors having the same value.

S BND

Sensor Binder (page 224)

A Sensor Binder microblock is required if your control programs is to work with ZS or wireless sensors. This microblock is where you define up to 5 uniquely-addressed ZS or wireless sensors. The addresses in the microblock must match the sensors' Rnet addresses.

Analog Network Input

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Network I/O microblocks* (page 172)
Icon and symbol	
What it does	Reads an analog value from a specific address on the network. You can address the microblock to read any network-visible I/O point value, status or parameter microblock value, BACnet object property value, or an equivalent value from a supported third-party protocol. The target value may be in the same control program, in another control program in the same controller, or in another Carrier® controller or third-party device on the network.

How it works

This microblock reads the value at the **Address** you specify. The target value can be a network-visible BACnet object property value or a third-party value (if the controller supports the third-party protocol).

For a non-BACnet target, the microblock reads the target value at the interval you specify in the **Refresh Time** field. For a BACnet target, see "Polling or BACnet COV subscription" below.

If communication with all specified targets fails, or if you uncheck **Communications Enabled**, the microblock outputs the **Default** value.

Polling or BACnet COV

If a Network Input or Total Analog microblock's **Address** field references a BACnet object property, the microblock reads the property's value using one of the following methods.

- Polling—The microblock reads the property at the **Refresh Time** interval using the BACnet ReadProperty or ReadPropertyMultiple service (see "Method 1: Polling" below).
- BACnet COV (Change of Value) subscription—The microblock subscribes with the target BACnet object. An analog target notifies the microblock if the target's value changes by more than the target's BACnet COV_Increment. A binary target notifies the microblock when it changes state (see "Method 2: BACnet COV subscriptions" below).

Method 1: Polling

Benefits	• Allows rapid detection of a dead device or of network problems • Does not require additional memory
Drawbacks	• Generates unnecessary network traffic if a value does not change frequently • Misses value changes that occur between pollings • Can overwhelm the target's controller if many microblocks request the same property value (such as outside air temperature). The BACnet object must send the value to each microblock that polls for that data.
To set up	Set the microblock's **Refresh Time** to 30 seconds or less.

NOTE The Carrier® microblock will not poll at a **Refresh Time** interval smaller than 1 second.

BACnet ReadProperty and ReadPropertyMultiple services

See the BACnet specification for details on the ReadProperty and ReadPropertyMultiple services.

ReadPropertyMultiple occurs if:

- two or more microblocks in a controller read more than one target in the same remote controller,
- the **Refresh Time** in two or more microblocks expires at the same time, and
- the remote controller supports the service.

Method 2: BACnet COV subscriptions

Benefits	• Can decrease network traffic by preventing unnecessary updates if the target's COV_Increment is set appropriately. See step 2 in "To set up" below.
Drawbacks	• Can generate excessive network traffic if the target's COV_Increment property is too small. See step 2 in "To set up" below. • Can delay detection of a dead device or of network problems
To set up	**1** Set the microblock's **Refresh Time** to 31 seconds or more. **2** If the microblock's **Address** field references an analog property, set the target's COV_Increment property to the smallest amount by which the value must change for the target to notify its subscribers. The optimal COV_Increment is large enough to prevent unnecessary updates but small enough to be useful to the control program(s) receiving the updates.

NOTE If COV subscription fails, the microblock reads the value at the **Refresh Time** interval using the BACnet ReadProperty or ReadPropertyMultiple service. See "Method 1: Polling" above.

COV subscription details

When an input (Network Input or Total Analog microblock) subscribes with a BACnet target (object property), the input sets a 21-minute subscription Lifetime in the target. The target responds with a COV notification that includes the target's value and time remaining from the original subscription Lifetime (TimeRemaining). The input resubscribes with the target every 10 minutes to keep the target's BACnet subscription service active. The **Next Subscription** field on the input's **Properties** page shows the time remaining until the input's next subscription.

The target also sends a COV notification that includes the target's value and subscription Lifetime TimeRemaining when the target's value changes by more than the target's COV_Increment.

If the Carrier® target has one subscriber, the target sends COV notifications directly to that subscriber. If the Carrier® target has more than one subscriber, it broadcasts its COV notifications to optimize network traffic. A third-party subscriber can participate in this broadcast scheme by subscribing for Unconfirmed COV notifications with a Process ID of 0. Otherwise, the Carrier® target maintains and responds to the third-party subscription separately with its own Lifetime timer.

The Carrier® input compares the TimeRemaining value in each COV notification broadcast the target sends to its (Next Subscription time + 11) to determine whether another input has subscribed since it did. If another input has subscribed more recently, the input adds 10 minutes to its **Next Subscription** time. This allows the COV Subscription request from the last subscribing input to keep the subscription service active for all subscribers to the same data.

EXAMPLE

Elapsed time (minutes)	**Action**	**Target** Lifetime TimeRemaining (minutes)	**Input 1** Next Subscription (minutes)	**Input 2** Next Subscription (minutes)
0	Input 1 subscribes to target	21 (Input 1)	10	
0	Target broadcasts COV notification because Input 1 subscribed	21	21 ≤ 10 + 11, so keep current value of 10	
2	Input 2 subscribes to target	21 (Input 2)	10 - 2 = 8	10
0	Target broadcasts COV notification because Input 2 subscribed	21	21 > 8 + 11, so add 10 to current value of 8 8 + 10 = 18	21 ≤ 10 + 11, so keep current value of 10
3		21 - 3 = 18	18 - 3 = 15	10 - 3 = 7
0	Target broadcasts COV notification because value changed	18	18 ≤ 15 + 11 so keep current value of 15	18 ≤ 7 + 11 so keep current value of 7
7		18 - 7 = 11	15 - 7 = 8	7 - 7 = 0 resubscribe
0	Input 2 resubscribes	21 (Input 2)	8	10
0	Target broadcasts COV notification because Input 2 subscribed	21	21 > 8 + 11, so add 10 to current value 8 + 10 = 18	21 ≤ 10 + 11, so keep current value of 10

Input 2 keeps the subscription service active at the target with a minimum of network traffic.

NOTE If an input receives COV notification with a target TimeRemaining < 11, which could happen if the last subscribing input loses communication with the target, the input resubscribes immediately.

COV notification rate

COV notifications from a BACnet object property are controlled by that property's BACnet COV_Increment. When the absolute value of the difference between the property's Present_Value and the value sent in the last COV notification is greater than the COV_Increment, the object broadcasts a COV notification. For Carrier® controllers, the rate of notifications is further limited by two internal processes.

1 The control program's execution rate determines how often the check against COV_Increment is performed.

2 The controller's pending COV Notification task has built-in delays to prevent COV notifications from consuming the controller's CPU processing time.

   The built-in delays are as follows:

   If more than 15 COV notifications are pending delivery, the controller inserts a 50 millisecond delay after each set of 15 notifications. Once the entire list of pending notifications is serviced, the controller inserts another 50 millisecond delay. This results in a maximum COV notification rate of 300 COV notifications per second per Carrier® controller.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Display resolution	The microblock's value is truncated and incrementally updated as follows: The **Display resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the system displays 1 digit to the right of the decimal • 0.01 to 0.99, the system displays 2 digits to the right of the decimal • 1 or greater, the system displays a whole number The **Display resolution** value determines the increment by which the displayed value is updated. For example, if you enter: • .2, the system displays 8.4, 8.6, 8.8, ... • .03, the system displays 5.09, 5.12, 5.15, ... • 10, the system displays 30, 40, 50, ...
Address	The address of the target BACnet object property or third-party value (if the controller supports the third-party protocol). See *To format a BACnet address* (page 558) or the applicable third-party protocol Integration Guide. This microblock reads a BACnet target's value using one of 2 methods depending on the interval you specify in the **Refresh Time** field. **NOTE** For a target in the Carrier® controller, you can specify the network microblock's **Address** in: • Your i-Vu® or Field Assistant system - Select the target in the tree on the microblock's **Properties** page **Details** tab. The system creates the address for you. • The Snap application - In the microblock's properties • The SiteBuilder application - If your product supports source trees and you are using them, SiteBuilder creates the address for you. **NOTE** You can uncheck the **Editable** field in the Snap Property Editor to prevent editing of the address in the i-Vu® or Field Assistant system. **TIPS** • If you are integrating to multiple identical third-party devices, you can copy the equipment for the first device and then let the system help you address the Network I/O microblocks in the copies. See "To create a control program for multiple identical third-party devices" in the *BACnet Integration Guide*. • A single * (asterisk) as a device name in an Analog Network Input will initiate a broadcasted request for any device on the network that has MyObject to respond. The microblock will then determine which of the responders has valid data for MyObject and subscribe to that device. **NOTE** This syntax is valid when it is combined with an Object Name only. This syntax is not supported for Property or Priority and is supported for Analog Network Input and Analog Network Input 2 microblocks only.
Default Value	The value that the microblock outputs when communication with all specified targets fails or when **Communications Enabled** is not checked. The default value is used when the **Valid?** output is False (**Off**).
Communications Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.

Refresh Time	The interval at which the microblock reads the target value. If the target is a BACnet object property: • Type a value greater than 30 seconds to attempt a BACnet COV (Change of Value) subscription with the target object. If subscription succeeds, the target sends a value to this microblock only when the target's value changes by at least the target's **COV Increment**. If subscription fails, this microblock reads the target value at the interval you specify. • Type a value of 30 seconds or less to disable BACnet COV subscription and read the target value at the interval you specify. If using v6.00a or later drivers, you can reduce network traffic by: • Changing the refresh time to something greater than 10 minutes. If the refresh time is 10 minutes or less, the microblock will resubscribe every 10 minutes. If the refresh time is greater than 10 minutes, the microblock will use that value as the resubscription interval. • Entering 01 in the seconds field of any value 1 minute or greater to have this microblock subscribe using only confirmed COV notifications (not unconfirmed). For example, 1:01, 5:01, etc.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Tips and tricks

To address microblocks using source trees

You can address a network microblock in the Snap application to target a microblock in its parent application on the source tree.

Format: exp:~equipment/~<source tree reference name>/~parent/~target/<target microblock reference name>

Example: exp:~equipment/~cool/~parent/~target/supply_air_temp

By using this format in the Snap application, the i-Vu®/Field Assistant application will read the target microblock value from the parent application. This method is much faster than going to each zone individually in the i-Vu®/Field Assistant interface to address the network microblocks. For example, this allows you to create generic zone applications that can be reused not only for all zones under a single air handler, but for all zones under any air handler.

To speed detection of dead device

If a BACnet object's device loses network communication, a network input reading the object's value does not detect the failure until:

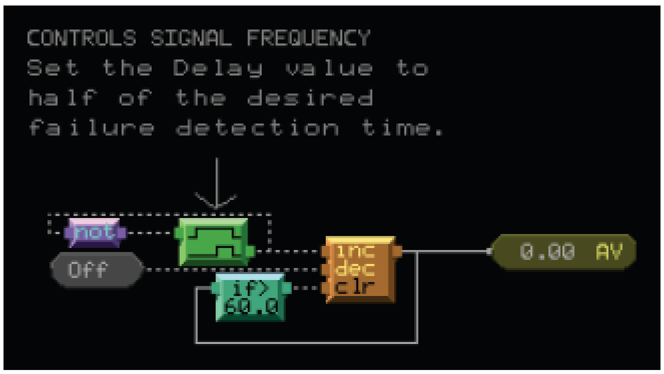
- The network input's next subscription (up to 10 minutes) if using BACnet COV subscription, or
- The **Refresh Time** expires, if polling

You can use a small **Refresh Time** to poll more often, but this can generate unnecessary network traffic under normal conditions.

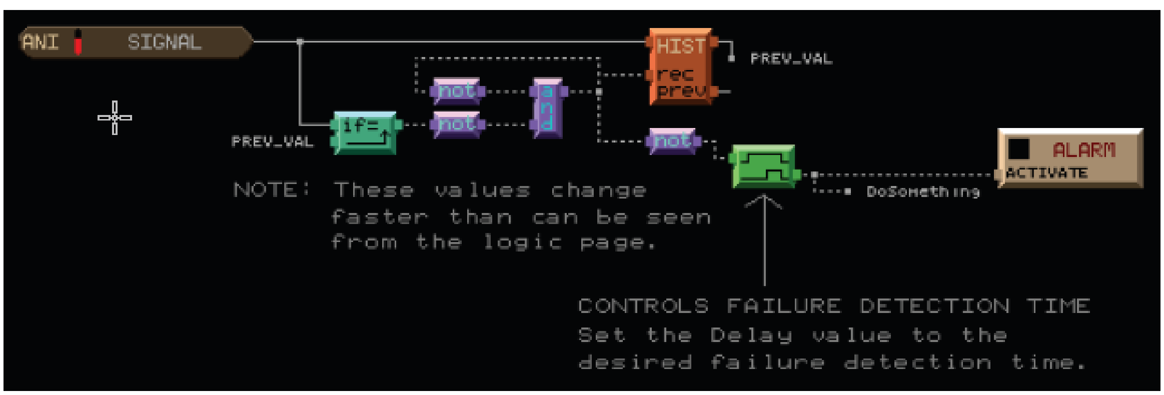
To use the benefits of BACnet COV subscription, but overcome the potential delay in detection of a dead device, send a constantly changing value from the BACnet object's control program to a network input using BACnet COV subscription. If the value stops changing, the network input's control program generates an alarm.

EXAMPLE

The logic in the BACnet object's control program that sends the value. The BACnet Analog Value microblock has a COV Increment of 0.5.



The logic in the network input's control program that receives the changing value. The SIGNAL analog network input's **Address** field contains the address of the BACnet Analog Value microblock sending the changing signal, and the network input's **Refresh Time** is 31 seconds.



Analog Network Input 2

The information below provides a <u>FULL</u> description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Network I/O microblocks* (page 172)
Icon and symbol	
What it does	Reads an analog value from a specific address on the network. Monitors and outputs the validity of network communication between the microblock and its target. You can address the microblock to read any network-visible I/O point value, status or parameter microblock value, BACnet object property value, or an equivalent value from a supported third-party protocol. The target value may be in the same control program, in another control program in the same controller, or in another Carrier® controller or third-party device on the network.

How it works

This microblock reads the value at the **Address** you specify. The target value can be a network-visible BACnet object property value or a third-party value (if the controller supports the third-party protocol).

For a non-BACnet target, the microblock reads the target value at the interval you specify in the **Refresh Time** field. For a BACnet target, see "Polling or BACnet COV subscription" below.

If communication with all specified targets fails, or if you uncheck **Communications Enabled**, the microblock outputs the **Default** value.

If communication fails with the **Address** target, the microblock reads and outputs the **Secondary Address** target value.

The **Valid?** output is False (**Off**) when communication with the **Address** fails. When the **Valid?** output is False, the microblock outputs the **Secondary Address** value if communicating, or the **Default** value if not.

The **Valid?** output is True (**On**) when the microblock is communicating with the **Address** target value or when the microblock's present value is locked in your i-Vu® or Field Assistant system.

Polling or BACnet COV subscription

If a Network Input or Total Analog microblock's **Address** field references a BACnet object property, the microblock reads the property's value using one of the following methods.

- Polling—The microblock reads the property at the **Refresh Time** interval using the BACnet ReadProperty or ReadPropertyMultiple service (see "Method 1: Polling" below).
- BACnet COV (Change of Value) subscription—The microblock subscribes with the target BACnet object. An analog target notifies the microblock if the target's value changes by more than the target's BACnet COV_Increment. A binary target notifies the microblock when it changes state (see "Method 2: BACnet COV subscriptions" below).

Method 1: Polling

Benefits	• Allows rapid detection of a dead device or of network problems • Does not require additional memory
Drawbacks	• Generates unnecessary network traffic if a value does not change frequently • Misses value changes that occur between pollings • Can overwhelm the target's controller if many microblocks request the same property value (such as outside air temperature). The BACnet object must send the value to each microblock that polls for that data.
To set up	Set the microblock's **Refresh Time** to 30 seconds or less.

NOTE The Carrier® microblock will not poll at a **Refresh Time** interval smaller than 1 second.

BACnet ReadProperty and ReadPropertyMultiple services

See the BACnet specification for details on the ReadProperty and ReadPropertyMultiple services.

ReadPropertyMultiple occurs if:

- two or more microblocks in a controller read more than one target in the same remote controller,
- the **Refresh Time** in two or more microblocks expires at the same time, and
- the remote controller supports the service.

Method 2: BACnet COV subscriptions

Benefits	• Can decrease network traffic by preventing unnecessary updates if the target's COV_Increment is set appropriately. See step 2 in "To set up" below.
Drawbacks	• Can generate excessive network traffic if the target's COV_Increment property is too small. See step 2 in "To set up" below. • Can delay detection of a dead device or of network problems
To set up	**1** Set the microblock's **Refresh Time** to 31 seconds or more. **2** If the microblock's **Address** field references an analog property, set the target's COV_Increment property to the smallest amount by which the value must change for the target to notify its subscribers. The optimal COV_Increment is large enough to prevent unnecessary updates but small enough to be useful to the control program(s) receiving the updates.

NOTE If COV subscription fails, the microblock reads the value at the **Refresh Time** interval using the BACnet ReadProperty or ReadPropertyMultiple service. See "Method 1: Polling" above.

COV subscription details

When an input (Network Input or Total Analog microblock) subscribes with a BACnet target (object property), the input sets a 21-minute subscription Lifetime in the target. The target responds with a COV notification that includes the target's value and time remaining from the original subscription Lifetime (TimeRemaining). The input resubscribes with the target every 10 minutes to keep the target's BACnet subscription service active. The **Next Subscription** field on the input's **Properties** page shows the time remaining until the input's next subscription.

The target also sends a COV notification that includes the target's value and subscription Lifetime TimeRemaining when the target's value changes by more than the target's COV_Increment.

If the Carrier® target has one subscriber, the target sends COV notifications directly to that subscriber. If the Carrier® target has more than one subscriber, it broadcasts its COV notifications to optimize network traffic. A third-party subscriber can participate in this broadcast scheme by subscribing for Unconfirmed COV notifications with a Process ID of 0. Otherwise, the Carrier® target maintains and responds to the third-party subscription separately with its own Lifetime timer.

The Carrier® input compares the TimeRemaining value in each COV notification broadcast the target sends to its (Next Subscription time + 11) to determine whether another input has subscribed since it did. If another input has subscribed more recently, the input adds 10 minutes to its **Next Subscription** time. This allows the COV Subscription request from the last subscribing input to keep the subscription service active for all subscribers to the same data.

EXAMPLE

Elapsed time (minutes)	**Action**	**Target** Lifetime TimeRemaining (minutes)	**Input 1** Next Subscription (minutes)	**Input 2** Next Subscription (minutes)
0	Input 1 subscribes to target	21 (Input 1)	10	
0	Target broadcasts COV notification because Input 1 subscribed	21	21 ≤ 10 + 11, so keep current value of 10	
2	Input 2 subscribes to target	21 (Input 2)	10 - 2 = 8	10
0	Target broadcasts COV notification because Input 2 subscribed	21	21 > 8 + 11, so add 10 to current value of 8 8 + 10 = 18	21 ≤ 10 + 11, so keep current value of 10
3		21 - 3 = 18	18 - 3 = 15	10 - 3 = 7
0	Target broadcasts COV notification because value changed	18	18 ≤ 15 + 11 so keep current value of 15	18 ≤ 7 + 11 so keep current value of 7
7		18 - 7 = 11	15 - 7 = 8	7 - 7 = 0 resubscribe
0	Input 2 resubscribes	21 (Input 2)	8	10
0	Target broadcasts COV notification because Input 2 subscribed	21	21 > 8 + 11, so add 10 to current value 8 + 10 = 18	21 ≤ 10 + 11, so keep current value of 10

Input 2 keeps the subscription service active at the target with a minimum of network traffic.

NOTE If an input receives COV notification with a target TimeRemaining < 11, which could happen if the last subscribing input loses communication with the target, the input resubscribes immediately.

COV notification rate

COV notifications from a BACnet object property are controlled by that property's BACnet COV_Increment. When the absolute value of the difference between the property's Present_Value and the value sent in the last COV notification is greater than the COV_Increment, the object broadcasts a COV notification. For Carrier® controllers, the rate of notifications is further limited by two internal processes.

1 The control program's execution rate determines how often the check against COV_Increment is performed.

2 The controller's pending COV Notification task has built-in delays to prevent COV notifications from consuming the controller's CPU processing time.

  The built-in delays are as follows:

  If more than 15 COV notifications are pending delivery, the controller inserts a 50 millisecond delay after each set of 15 notifications. Once the entire list of pending notifications is serviced, the controller inserts another 50 millisecond delay. This results in a maximum COV notification rate of 300 COV notifications per second per Carrier® controller.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Display resolution	The microblock's value is truncated and incrementally updated as follows: The **Display resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the system displays 1 digit to the right of the decimal • 0.01 to 0.99, the system displays 2 digits to the right of the decimal • 1 or greater, the system displays a whole number The **Display resolution** value determines the increment by which the displayed value is updated. For example, if you enter: • .2, the system displays 8.4, 8.6, 8.8, ... • .03, the system displays 5.09, 5.12, 5.15, ... • 10, the system displays 30, 40, 50, ...
Address	The address of the target BACnet object property or third-party value (if the controller supports the third-party protocol). See *To format a BACnet address* (page 558) or the applicable third-party protocol Integration Guide. This microblock reads a BACnet target's value using one of 2 methods depending on the interval you specify in the **Refresh Time** field. **NOTE** For a target in the Carrier® controller, you can specify the network microblock's **Address** in: • Your i-Vu® or Field Assistant system - Select the target in the tree on the microblock's **Properties** page **Details** tab. The system creates the address for you. • The Snap application - In the microblock's properties • The SiteBuilder application - If your product supports source trees and you are using them, SiteBuilder creates the address for you. **NOTE** You can uncheck the **Editable** field in the Snap Property Editor to prevent editing of the address in the i-Vu® or Field Assistant system. **TIPS** • If you are integrating to multiple identical third-party devices, you can copy the equipment for the first device and then let the system help you address the Network I/O microblocks in the copies. See "To create a control program for multiple identical third-party devices" in the *BACnet Integration Guide*. • A single * (asterisk) as a device name in an Analog Network Input will initiate a broadcasted request for any device on the network that has MyObject to respond. The microblock will then determine which of the responders has valid data for MyObject and subscribe to that device. **NOTE** This syntax is valid when it is combined with an Object Name only. This syntax is not supported for Property or Priority and is supported for Analog Network Input and Analog Network Input 2 microblocks only.
Secondary Address	The address the microblock reads if communication fails with the **Address** field target. **NOTE** You can uncheck the **Editable** field in the Snap Property Editor to prevent editing of the address in the i-Vu® or Field Assistant system.
Default Value	The value that the microblock outputs when communication with all specified targets fails or when **Communications Enabled** is not checked. The default value is used when the **Valid?** output is False (**Off**).

Communications Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.
Refresh Time	The interval at which the microblock reads the target value. If the target is a BACnet object property: • Type a value greater than 30 seconds to attempt a BACnet COV (Change of Value) subscription with the target object. If subscription succeeds, the target sends a value to this microblock only when the target's value changes by at least the target's **COV Increment**. If subscription fails, this microblock reads the target value at the interval you specify. • Type a value of 30 seconds or less to disable BACnet COV subscription and read the target value at the interval you specify. If using v6.00a or later drivers, you can reduce network traffic by: • Changing the refresh time to something greater than 10 minutes. If the refresh time is 10 minutes or less, the microblock will resubscribe every 10 minutes. If the refresh time is greater than 10 minutes, the microblock will use that value as the resubscription interval. • Entering 01 in the seconds field of any value 1 minute or greater to have this microblock subscribe using only confirmed COV notifications (not unconfirmed). For example, 1:01, 5:01, etc.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Binary Network Input

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Network I/O microblocks* (page 172)
Icon and symbol	 
What it does	Reads a binary (digital) value from a specific address on the network. You can address the microblock to read any network-visible I/O point value, status or parameter microblock value, BACnet object property value, or an equivalent value from a supported third-party protocol. The target value may be in the same control program, in another control program in the same controller, or in another Carrier® controller or third-party device on the network.

How it works

This microblock reads the value at the **Address** you specify. The target value can be a network-visible BACnet object property value or a third-party value (if the controller supports the third-party protocol).

For a non-BACnet target, the microblock reads the target value at the interval you specify in the **Refresh Time** field. For a BACnet target, see "Polling or BACnet COV subscription" below.

If communication with all specified targets fails, or if you uncheck **Communications Enabled**, the microblock outputs the **Default** value.

Polling or BACnet COV

If a Network Input or Total Analog microblock's **Address** field references a BACnet object property, the microblock reads the property's value using one of the following methods.

- Polling—The microblock reads the property at the **Refresh Time** interval using the BACnet ReadProperty or ReadPropertyMultiple service (see "Method 1: Polling" below).
- BACnet COV (Change of Value) subscription—The microblock subscribes with the target BACnet object. An analog target notifies the microblock if the target's value changes by more than the target's BACnet COV_Increment. A binary target notifies the microblock when it changes state (see "Method 2: BACnet COV subscriptions" below).

Method 1: Polling

Benefits	• Allows rapid detection of a dead device or of network problems • Does not require additional memory
Drawbacks	• Generates unnecessary network traffic if a value does not change frequently • Misses value changes that occur between pollings • Can overwhelm the target's controller if many microblocks request the same property value (such as outside air temperature). The BACnet object must send the value to each microblock that polls for that data.
To set up	Set the microblock's **Refresh Time** to 30 seconds or less.

NOTE The Carrier® microblock will not poll at a **Refresh Time** interval smaller than 1 second.

BACnet ReadProperty and ReadPropertyMultiple services

See the BACnet specification for details on the ReadProperty and ReadPropertyMultiple services.

ReadPropertyMultiple occurs if:

- two or more microblocks in a controller read more than one target in the same remote controller,
- the **Refresh Time** in two or more microblocks expires at the same time, and
- the remote controller supports the service.

Method 2: BACnet COV subscriptions

Benefits	• Can decrease network traffic by preventing unnecessary updates if the target's COV_Increment is set appropriately. See step 2 in "To set up" below.
Drawbacks	• Can generate excessive network traffic if the target's COV_Increment property is too small. See step 2 in "To set up" below. • Can delay detection of a dead device or of network problems
To set up	**1** Set the microblock's **Refresh Time** to 31 seconds or more. **2** If the microblock's **Address** field references an analog property, set the target's COV_Increment property to the smallest amount by which the value must change for the target to notify its subscribers. The optimal COV_Increment is large enough to prevent unnecessary updates but small enough to be useful to the control program(s) receiving the updates.

NOTE If COV subscription fails, the microblock reads the value at the **Refresh Time** interval using the BACnet ReadProperty or ReadPropertyMultiple service. See "Method 1: Polling" above.

COV subscription details

When an input (Network Input or Total Analog microblock) subscribes with a BACnet target (object property), the input sets a 21-minute subscription Lifetime in the target. The target responds with a COV notification that includes the target's value and time remaining from the original subscription Lifetime (TimeRemaining). The input resubscribes with the target every 10 minutes to keep the target's BACnet subscription service active. The **Next Subscription** field on the input's **Properties** page shows the time remaining until the input's next subscription.

The target also sends a COV notification that includes the target's value and subscription Lifetime TimeRemaining when the target's value changes by more than the target's COV_Increment.

If the Carrier® target has one subscriber, the target sends COV notifications directly to that subscriber. If the Carrier® target has more than one subscriber, it broadcasts its COV notifications to optimize network traffic. A third-party subscriber can participate in this broadcast scheme by subscribing for Unconfirmed COV notifications with a Process ID of 0. Otherwise, the Carrier® target maintains and responds to the third-party subscription separately with its own Lifetime timer.

The Carrier® input compares the TimeRemaining value in each COV notification broadcast the target sends to its (Next Subscription time + 11) to determine whether another input has subscribed since it did. If another input has subscribed more recently, the input adds 10 minutes to its **Next Subscription** time. This allows the COV Subscription request from the last subscribing input to keep the subscription service active for all subscribers to the same data.

EXAMPLE

Elapsed time (minutes)	**Action**	**Target** Lifetime TimeRemaining (minutes)	**Input 1** Next Subscription (minutes)	**Input 2** Next Subscription (minutes)
0	Input 1 subscribes to target	21 (Input 1)	10	
0	Target broadcasts COV notification because Input 1 subscribed	21	21 ≤ 10 + 11, so keep current value of 10	
2	Input 2 subscribes to target	21 (Input 2)	10 - 2 = 8	10
0	Target broadcasts COV notification because Input 2 subscribed	21	21 > 8 + 11, so add 10 to current value of 8 8 + 10 = 18	21 ≤ 10 + 11, so keep current value of 10
3		21 - 3 = 18	18 - 3 = 15	10 - 3 = 7
0	Target broadcasts COV notification because value changed	18	18 ≤ 15 + 11 so keep current value of 15	18 ≤ 7 + 11 so keep current value of 7
7		18 - 7 = 11	15 - 7 = 8	7 - 7 = 0 resubscribe
0	Input 2 resubscribes	21 (Input 2)	8	10
0	Target broadcasts COV notification because Input 2 subscribed	21	21 > 8 + 11, so add 10 to current value 8 + 10 = 18	21 ≤ 10 + 11, so keep current value of 10

Input 2 keeps the subscription service active at the target with a minimum of network traffic.

NOTE If an input receives COV notification with a target TimeRemaining < 11, which could happen if the last subscribing input loses communication with the target, the input resubscribes immediately.

COV notification rate

COV notifications from a BACnet object property are controlled by that property's BACnet COV_Increment. When the absolute value of the difference between the property's Present_Value and the value sent in the last COV notification is greater than the COV_Increment, the object broadcasts a COV notification. For Carrier® controllers, the rate of notifications is further limited by two internal processes.

1. The control program's execution rate determines how often the check against COV_Increment is performed.
2. The controller's pending COV Notification task has built-in delays to prevent COV notifications from consuming the controller's CPU processing time.

   The built-in delays are as follows:

   If more than 15 COV notifications are pending delivery, the controller inserts a 50 millisecond delay after each set of 15 notifications. Once the entire list of pending notifications is serviced, the controller inserts another 50 millisecond delay. This results in a maximum COV notification rate of 300 COV notifications per second per Carrier® controller.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Address	The address of the target BACnet object property or third-party value (if the controller supports the third-party protocol). See *To format a BACnet address* (page 558) or the applicable third-party protocol Integration Guide. This microblock reads a BACnet target's value using one of 2 methods depending on the interval you specify in the **Refresh Time** field. **NOTE** For a target in the Carrier® controller, you can specify the network microblock's **Address** in: • Your i-Vu® or Field Assistant system - Select the target in the tree on the microblock's **Properties** page **Details** tab. The system creates the address for you. • The Snap application - In the microblock's properties • The SiteBuilder application - If your product supports source trees and you are using them, SiteBuilder creates the address for you. **NOTE** You can uncheck the **Editable** field in the Snap Property Editor to prevent editing of the address in the i-Vu® or Field Assistant system. **TIP** If you are integrating to multiple identical third-party devices, you can copy the equipment for the first device and then let the system help you address the Network I/O microblocks in the copies. See "Create a control program" in the *BACnet Integration Guide*.
Default Value	The value that the microblock outputs when communication with all specified targets fails or when **Communications Enabled** is not checked. The default value is used when the **Valid?** output is False (**Off**).
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Communications Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.
Refresh Time	The interval at which the microblock reads the target value. If the target is a BACnet object property: • Type a value greater than 30 seconds to attempt a BACnet COV (Change of Value) subscription with the target object. If subscription succeeds, the target sends a value to this microblock only when the target's value changes state. If subscription fails, this microblock reads the target value at the interval you specify. • Type a value of 30 seconds or less to disable BACnet COV subscription and read the target value at the interval you specify. If using v6.00a or later drivers, you can reduce network traffic by: • Changing the refresh time to something greater than 10 minutes. If the refresh time is 10 minutes or less, the microblock will resubscribe every 10 minutes. If the refresh time is greater than 10 minutes, the microblock will use that value as the resubscription interval. • Entering 01 in the seconds field of any value 1 minute or greater to have this microblock subscribe using only confirmed COV notifications (not unconfirmed). For example, 1:01, 5:01, etc.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Binary Network Input 2

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Network I/O microblocks* (page 172)
Icon and symbol	
What it does	Reads a binary (digital) value from a specific address on the network. Monitors and outputs the validity of network communication between the microblock and its target. You can address the microblock to read any network-visible I/O point value, status or parameter microblock value, BACnet object property value, or an equivalent value from a supported third-party protocol. The target value may be in the same control program, in another control program in the same controller, or in another Carrier® controller or third-party device on the network.

How it works

This microblock reads the value at the **Address** you specify. The target value can be a network-visible BACnet object property value or a third-party value (if the controller supports the third-party protocol).

For a non-BACnet target, the microblock reads the target value at the interval you specify in the **Refresh Time** field. For a BACnet target, see "Polling or BACnet COV subscription" below.

If communication with all specified targets fails, or if you uncheck **Communications Enabled**, the microblock outputs the **Default** value.

If communication fails with the **Address** target, the microblock reads and outputs the **Secondary Address** target value.

The **Valid?** output is False (**Off**) when communication with the **Address** fails. When the **Valid?** output is False, the microblock outputs the **Secondary Address** value if communicating, or the **Default** value if not.

The **Valid?** output is True (**On**) when the microblock is communicating with the **Address** target value or when the microblock's present value is locked in your i-Vu® or Field Assistant system.

Polling or BACnet COV subscription

If a Network Input or Total Analog microblock's **Address** field references a BACnet object property, the microblock reads the property's value using one of the following methods.

- Polling—The microblock reads the property at the **Refresh Time** interval using the BACnet ReadProperty or ReadPropertyMultiple service (see "Method 1: Polling" below).
- BACnet COV (Change of Value) subscription—The microblock subscribes with the target BACnet object. An analog target notifies the microblock if the target's value changes by more than the target's BACnet COV_Increment. A binary target notifies the microblock when it changes state (see "Method 2: BACnet COV subscriptions" below).

Method 1: Polling

Benefits	• Allows rapid detection of a dead device or of network problems • Does not require additional memory
Drawbacks	• Generates unnecessary network traffic if a value does not change frequently • Misses value changes that occur between pollings • Can overwhelm the target's controller if many microblocks request the same property value (such as outside air temperature). The BACnet object must send the value to each microblock that polls for that data.
To set up	Set the microblock's **Refresh Time** to 30 seconds or less.

NOTE The Carrier® microblock will not poll at a **Refresh Time** interval smaller than 1 second.

BACnet ReadProperty and ReadPropertyMultiple services

See the BACnet specification for details on the ReadProperty and ReadPropertyMultiple services.

ReadPropertyMultiple occurs if:

- two or more microblocks in a controller read more than one target in the same remote controller,
- the **Refresh Time** in two or more microblocks expires at the same time, and
- the remote controller supports the service.

Method 2: BACnet COV subscriptions

Benefits	• Can decrease network traffic by preventing unnecessary updates if the target's COV_Increment is set appropriately. See step 2 in "To set up" below.
Drawbacks	• Can generate excessive network traffic if the target's COV_Increment property is too small. See step 2 in "To set up" below. • Can delay detection of a dead device or of network problems
To set up	**1** Set the microblock's **Refresh Time** to 31 seconds or more. **2** If the microblock's **Address** field references an analog property, set the target's COV_Increment property to the smallest amount by which the value must change for the target to notify its subscribers. The optimal COV_Increment is large enough to prevent unnecessary updates but small enough to be useful to the control program(s) receiving the updates.

NOTE If COV subscription fails, the microblock reads the value at the **Refresh Time** interval using the BACnet ReadProperty or ReadPropertyMultiple service. See "Method 1: Polling" above.

COV subscription details

When an input (Network Input or Total Analog microblock) subscribes with a BACnet target (object property), the input sets a 21-minute subscription Lifetime in the target. The target responds with a COV notification that includes the target's value and time remaining from the original subscription Lifetime (TimeRemaining). The input resubscribes with the target every 10 minutes to keep the target's BACnet subscription service active. The **Next Subscription** field on the input's **Properties** page shows the time remaining until the input's next subscription.

The target also sends a COV notification that includes the target's value and subscription Lifetime TimeRemaining when the target's value changes by more than the target's COV_Increment.

If the Carrier® target has one subscriber, the target sends COV notifications directly to that subscriber. If the Carrier® target has more than one subscriber, it broadcasts its COV notifications to optimize network traffic. A third-party subscriber can participate in this broadcast scheme by subscribing for Unconfirmed COV notifications with a Process ID of 0. Otherwise, the Carrier® target maintains and responds to the third-party subscription separately with its own Lifetime timer.

The Carrier® input compares the TimeRemaining value in each COV notification broadcast the target sends to its (Next Subscription time + 11) to determine whether another input has subscribed since it did. If another input has subscribed more recently, the input adds 10 minutes to its **Next Subscription** time. This allows the COV Subscription request from the last subscribing input to keep the subscription service active for all subscribers to the same data.

EXAMPLE

Elapsed time (minutes)	**Action**	**Target** Lifetime TimeRemaining (minutes)	**Input 1** Next Subscription (minutes)	**Input 2** Next Subscription (minutes)
0	Input 1 subscribes to target	21 (Input 1)	10	
0	Target broadcasts COV notification because Input 1 subscribed	21	21 ≤ 10 + 11, so keep current value of 10	
2	Input 2 subscribes to target	21 (Input 2)	10 - 2 = 8	10
0	Target broadcasts COV notification because Input 2 subscribed	21	21 > 8 + 11, so add 10 to current value of 8 8 + 10 = 18	21 ≤ 10 + 11, so keep current value of 10
3		21 - 3 = 18	18 - 3 = 15	10 - 3 = 7
0	Target broadcasts COV notification because value changed	18	18 ≤ 15 + 11 so keep current value of 15	18 ≤ 7 + 11 so keep current value of 7
7		18 - 7 = 11	15 - 7 = 8	7 - 7 = 0 resubscribe
0	Input 2 resubscribes	21 (Input 2)	8	10
0	Target broadcasts COV notification because Input 2 subscribed	21	21 > 8 + 11, so add 10 to current value 8 + 10 = 18	21 ≤ 10 + 11, so keep current value of 10

Input 2 keeps the subscription service active at the target with a minimum of network traffic.

NOTE If an input receives COV notification with a target TimeRemaining < 11, which could happen if the last subscribing input loses communication with the target, the input resubscribes immediately.

COV notification rate

COV notifications from a BACnet object property are controlled by that property's BACnet COV_Increment. When the absolute value of the difference between the property's Present_Value and the value sent in the last COV notification is greater than the COV_Increment, the object broadcasts a COV notification. For Carrier® controllers, the rate of notifications is further limited by two internal processes.

1. The control program's execution rate determines how often the check against COV_Increment is performed.
2. The controller's pending COV Notification task has built-in delays to prevent COV notifications from consuming the controller's CPU processing time.

   The built-in delays are as follows:

   If more than 15 COV notifications are pending delivery, the controller inserts a 50 millisecond delay after each set of 15 notifications. Once the entire list of pending notifications is serviced, the controller inserts another 50 millisecond delay. This results in a maximum COV notification rate of 300 COV notifications per second per Carrier® controller.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Address	The address of the target BACnet object property or third-party value (if the controller supports the third-party protocol). See *To format a BACnet address* (page 558) or the applicable third-party protocol Integration Guide. This microblock reads a BACnet target's value using one of 2 methods depending on the interval you specify in the **Refresh Time** field. **NOTE** For a target in the Carrier® controller, you can specify the network microblock's **Address** in: • Your i-Vu® or Field Assistant system - Select the target in the tree on the microblock's **Properties** page **Details** tab. The system creates the address for you. • The Snap application - In the microblock's properties • The SiteBuilder application - If your product supports source trees and you are using them, SiteBuilder creates the address for you. **NOTE** You can uncheck the **Editable** field in the Snap Property Editor to prevent editing of the address in the i-Vu® or Field Assistant system. **TIP** If you are integrating to multiple identical third-party devices, you can copy the equipment for the first device and then let the system help you address the Network I/O microblocks in the copies. See "Create a control program" in the *BACnet Integration Guide*.
Secondary Address	The address the microblock reads if communication fails with the **Address** field target. **NOTE** You can uncheck the **Editable** field in the Snap Property Editor to prevent editing of the address in the i-Vu® or Field Assistant system.
Default Value	The value that the microblock outputs when communication with all specified targets fails or when **Communications Enabled** is not checked. The default value is used when the **Valid?** output is False (**Off**).
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Communications Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.

Refresh Time	The interval at which the microblock reads the target value. If the target is a BACnet object property: • Type a value greater than 30 seconds to attempt a BACnet COV (Change of Value) subscription with the target object. If subscription succeeds, the target sends a value to this microblock only when the target's value changes state. If subscription fails, this microblock reads the target value at the interval you specify. • Type a value of 30 seconds or less to disable BACnet COV subscription and read the target value at the interval you specify. If using v6.00a or later drivers, you can reduce network traffic by: • Changing the refresh time to something greater than 10 minutes. If the refresh time is 10 minutes or less, the microblock will resubscribe every 10 minutes. If the refresh time is greater than 10 minutes, the microblock will use that value as the resubscription interval. • Entering 01 in the seconds field of any value 1 minute or greater to have this microblock subscribe using only confirmed COV notifications (not unconfirmed). For example, 1:01, 5:01, etc.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Analog Network Output

The information below provides a <u>FULL</u> description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Network I/O microblocks* (page 172)
Icon and symbol	
What it does	Writes an analog value to a specific address on the network. You can address the microblock to write to any I/O point value, status or parameter microblock value, BACnet object property value, or equivalent value from another supported protocol that is not marked "read only". The target value may be in the same control program, in another control program in the same controller, or in another Carrier® controller or third-party device on the network.

How it works

At the interval you specify in the **Refresh Time** field, this microblock writes to the value at the **Address** you specify. The target must not be "read only". The target can be a BACnet object property or a third-party value (if the controller supports the third-party protocol). See *To format a BACnet address* (page 558) or the applicable third-party protocol Integration Guide.

If you want the microblock to write to its target based on COV (Change of Value), check this microblock's **COV Enable** checkbox on the equipment's **Properties** page **Network Points** tab.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Display resolution	The microblock's value is truncated and incrementally updated as follows: The **Display resolution** format is used to truncate the microblock’s actual value. For example, if you enter a value from: • 0.1 to 0.9, the system displays 1 digit to the right of the decimal • 0.01 to 0.99, the system displays 2 digits to the right of the decimal • 1 or greater, the system displays a whole number The **Display resolution** value determines the increment by which the displayed value is updated. For example, if you enter: • .2, the system displays 8.4, 8.6, 8.8, ... • .03, the system displays 5.09, 5.12, 5.15, ... • 10, the system displays 30, 40, 50, ...

Address	The address of the target BACnet object property or third-party value (if the controller supports the third-party protocol). See *To format a BACnet address* (page 558) or the applicable third-party protocol Integration Guide. The microblock writes to its target at the **Refresh Time** interval unless you set up writing based on COV (Change of Value) in the i-Vu® or Field Assistant system. Make sure that the target is not marked "read only". **NOTE** For a target in the Carrier® controller, you can specify the network microblock's **Address** in: • Your i-Vu® or Field Assistant system - Select the target in the tree on the microblock's **Properties** page **Details** tab. The system creates the address for you. • The Snap application - In the microblock's properties • The SiteBuilder application - If your product supports source trees and you are using them, SiteBuilder creates the address for you. **NOTE** You can uncheck the **Editable** field in the Snap Property Editor to prevent editing of the address in the i-Vu® or Field Assistant system. **TIP** If you are integrating to multiple identical third-party devices, you can copy the equipment for the first device and then let the system help you address the Network I/O microblocks in the copies. See "Create a control program" in the *BACnet Integration Guide*.
COV Increment	The amount by which this microblock's input value must change before the microblock writes a new value to its target. Not used if the microblock writes at the **Refresh Time** interval. **NOTE** To write based on COV, in your i-Vu® or Field Assistant system, check this microblock's **COV Enable** checkbox on the equipment's **Properties** page **Network Points** tab.
Communications Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.
Refresh Time	The interval at which the microblock writes to its target. Not used if you check the microblock's **COV Enable** checkbox on the equipment's **Properties** page > **Network Points** tab to write based on COV (Change of Value).
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Analog Network Output 2

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Network I/O microblocks* (page 172)
Icon and symbol	
What it does	Writes an analog value to a specific address on the network. Stops writing to the target address when the **Enable** input is false (off). If writing to a BACnet object property value, when the **Enable** input transitions from true (on) to false (off), the microblock relinquishes control of the target value. You can address the microblock to write to any I/O point value, status or parameter microblock value, BACnet object property value, or equivalent value from another supported protocol that is not marked "read only". The target value may be in the same control program, in another control program in the same controller, or in another Carrier® controller or third-party device on the network.

How it works

At the interval you specify in the **Refresh Time** field, this microblock writes to the value at the **Address** you specify. The target must not be "read only". The target can be a BACnet object property or a third-party value (if the controller supports the third-party protocol). See *To format a BACnet address* (page 558) or the applicable third-party protocol Integration Guide.

If you want the microblock to write to its target based on COV (Change of Value), check this microblock's **COV Enable** checkbox on the equipment's **Properties** page **Network Points** tab. If **COV Enable** is selected, the microblock writes to its target when the **Enable** value transitions from off to on, and when the microblock's input value changes from the previous written value by at least the **COV Increment** amount.

If the target is a BACnet object property, when the Enable? input transitions from true (on) to false (off), the microblock relinquishes control of the target property.

For example, in a smoke control application, if smoke is detected, turn on the Enable? input and write a VFD fan drive to 100% at BACnet Priority 2. After the smoke alarm is cleared, turn off the Enable? input. The microblock sends a relinquish default command to clear the Priority 2 command to the VFD and allow the drive to resume normal operation.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Display resolution	The microblock's value is truncated and incrementally updated as follows: The **Display resolution** format is used to truncate the microblock’s actual value. For example, if you enter a value from: • 0.1 to 0.9, the system displays 1 digit to the right of the decimal • 0.01 to 0.99, the system displays 2 digits to the right of the decimal • 1 or greater, the system displays a whole number The **Display resolution** value determines the increment by which the displayed value is updated. For example, if you enter: • .2, the system displays 8.4, 8.6, 8.8, ... • .03, the system displays 5.09, 5.12, 5.15, ... • 10, the system displays 30, 40, 50, ...

Address	The address of the target BACnet object property or third-party value (if the controller supports the third-party protocol). See *To format a BACnet address* (page 558) or the applicable third-party protocol Integration Guide. The microblock writes to its target at the **Refresh Time** interval unless you set up writing based on COV (Change of Value) in the i-Vu® or Field Assistant system. Make sure that the target is not marked "read only". **NOTE** For a target in the Carrier® controller, you can specify the network microblock's **Address** in: • Your i-Vu® or Field Assistant system - Select the target in the tree on the microblock's **Properties** page **Details** tab. The system creates the address for you. • The Snap application - In the microblock's properties • The SiteBuilder application - If your product supports source trees and you are using them, SiteBuilder creates the address for you. **NOTE** You can uncheck the **Editable** field in the Snap Property Editor to prevent editing of the address in the i-Vu® or Field Assistant system. **TIP** If you are integrating to multiple identical third-party devices, you can copy the equipment for the first device and then let the system help you address the Network I/O microblocks in the copies. See "Create a control program" in the *BACnet Integration Guide*.
COV Increment	The amount by which this microblock's input value must change before the microblock writes a new value to its target. Not used if the microblock writes at the **Refresh Time** interval. **NOTE** To write based on COV, in your i-Vu® or Field Assistant system, check this microblock's **COV Enable** checkbox on the equipment's **Properties** page **Network Points** tab.
Communications Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.
Refresh Time	The interval at which the microblock writes to its target. Not used if you check the microblock's **COV Enable** checkbox on the equipment's **Properties** page > **Network Points** tab to write based on COV (Change of Value).
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Binary Network Output

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Network I/O microblocks* (page 172)
Icon and symbol	
What it does	Writes a binary (digital) value to a specific address on the network. You can address the microblock to write to any I/O point value, status or parameter microblock value, BACnet object property value, or equivalent value from another supported protocol that is not marked "read only". The target value may be in the same control program, in another control program in the same controller, or in another Carrier® controller or third-party device on the network.

How it works

At the interval you specify in the **Refresh Time** field, this microblock writes to the value at the **Address** you specify. The target must not be "read only". The target can be a BACnet object property or a third-party value (if the controller supports the third-party protocol). See *To format a BACnet address* (page 558) or the applicable third-party protocol Integration Guide.

If you want the microblock to write to its target based on COV (Change of Value), check this microblock's **COV Enable** checkbox on the equipment's **Properties** page **Network Points** tab.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Address	The address of the target BACnet object property or third-party value (if the controller supports the third-party protocol). See *To format a BACnet address* (page 558) or the applicable third-party protocol Integration Guide. The microblock writes to its target at the **Refresh Time** interval unless you set up writing based on COV (Change of Value) in the i-Vu® or Field Assistant system. Make sure that the target is not marked "read only". **NOTE** For a target in the Carrier® controller, you can specify the network microblock's **Address** in: • Your i-Vu® or Field Assistant system - Select the target in the tree on the microblock's **Properties** page **Details** tab. The system creates the address for you. • The Snap application - In the microblock's properties • The SiteBuilder application - If your product supports source trees and you are using them, SiteBuilder creates the address for you. **NOTE** You can uncheck the **Editable** field in the Snap Property Editor to prevent editing of the address in the i-Vu® or Field Assistant system. **TIP** If you are integrating to multiple identical third-party devices, you can copy the equipment for the first device and then let the system help you address the Network I/O microblocks in the copies. See "Create a control program" in the *BACnet Integration Guide*.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Communications Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.
Refresh Time	The interval at which the microblock writes to its target. Not used if you check the microblock's **COV Enable** checkbox on the equipment's **Properties** page > **Network Points** tab to write based on COV (Change of Value).
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Binary Network Output 2

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Network I/O microblocks* (page 172)
Icon and symbol	
What it does	Writes a binary (digital) value to a specific address on the network. Stops writing to the target address when the **Enable** input is false (off). If writing to a BACnet object property value, when the **Enable** input transitions from true (on) to false (off), the microblock relinquishes control of the target value. You can address the microblock to write to any I/O point value, status or parameter microblock value, BACnet object property value, or equivalent value from another supported protocol that is not marked "read only". The target value may be in the same control program, in another control program in the same controller, or in another Carrier® controller or third-party device on the network.

How it works

At the interval you specify in the **Refresh Time** field, this microblock writes to the value at the **Address** you specify. The target must not be "read only". The target can be a BACnet object property or a third-party value (if the controller supports the third-party protocol). See *To format a BACnet address* (page 558) or the applicable third-party protocol Integration Guide.

If you want the microblock to write to its target based on COV (Change of Value), check this microblock's **COV Enable** checkbox on the equipment's **Properties** page **Network Points** tab. If **COV Enable** is selected, the microblock writes to its target when the **Enable** value transitions from off to on, and when the microblock's input value changes state.

If the target is a BACnet object property, when the Enable? input transitions from true (on) to false (off), the microblock relinquishes control of the target property.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Address	The address of the target BACnet object property or third-party value (if the controller supports the third-party protocol). See *To format a BACnet address* (page 558) or the applicable third-party protocol Integration Guide. The microblock writes to its target at the **Refresh Time** interval unless you set up writing based on COV (Change of Value) in the i-Vu® or Field Assistant system. Make sure that the target is not marked "read only". **NOTE** For a target in the Carrier® controller, you can specify the network microblock's **Address** in: • Your i-Vu® or Field Assistant system - Select the target in the tree on the microblock's **Properties** page **Details** tab. The system creates the address for you. • The Snap application - In the microblock's properties • The SiteBuilder application - If your product supports source trees and you are using them, SiteBuilder creates the address for you. **NOTE** You can uncheck the **Editable** field in the Snap Property Editor to prevent editing of the address in the i-Vu® or Field Assistant system. **TIP** If you are integrating to multiple identical third-party devices, you can copy the equipment for the first device and then let the system help you address the Network I/O microblocks in the copies. See "Create a control program" in the *BACnet Integration Guide*.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Communications Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.
Refresh Time	The interval at which the microblock writes to its target. Not used if you check the microblock's **COV Enable** checkbox on the equipment's **Properties** page > **Network Points** tab to write based on COV (Change of Value).
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Collector

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

This microblock is compatible only with Carrier controllers.

Microblock family	*Network I/O microblock* (page 172)
Icon and symbol	
What it does	Provides a means for the control program to exchange sets of data across the BACnet network. Creates associations with one or more Provider microblocks and maintains: • An **Input** data array received from Provider microblocks • A set of **Feedback** data transmitted to each Provider microblock

How it works

The association between a Collector and Provider can be established:

- By the Collector actively communicating with each Provider and identifying itself as the recipient of that Providers output data. The Collector will actively create these associations when the **Number of Providers** property is set greater than 1.
- The Collector can be passive and wait for a Provider to send it a message to establish the association.

NOTE Both modes can be supported at the same time.

The Collector creates a table, (user defined size) to hold a set of **Input** data. Columns represent a user defined set of Input data tags and rows represent instances of the Input data set received from a number of Providers. The **Maximum Providers** property sets the number of Providers the Collector is capable of receiving and storing data from.

Feedback data will be transmitted to the associated Provider on a periodic basis or when a Change of Value (COV) occurs.

The Collector has no input or output wires. The Collector's data sets are configured and access through an OCL compatible application programming interface (API). The API consists of functions that provide the following functionality:

- Find a specific Collector
- Define the Input and **Feedback** data sets
- Read/Write the **Input** data set
- Write the **Feedback** data set

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Application Type	A numeric value representing the system application type. **1** Air Side Linkage **2** Water Side Linkage **3** Outside Air Conditions **NOTE** User can define more application types as needed.
Application Instance	A numeric value that defines the specific instance of an application. This value is usually set to 1.
Number of Providers	The number of Providers that the Collector should actively associate with.
Feedback Update Time	The amount of time the Collector will wait before sending successive updates of its **Feedback** values to its associated Providers.
Input Expiration Time	The amount of time in which the Collector must receive successive updates of **Input** values from a given Provider. If an update is not received in this time, the Collector will mark the data from the Provider as expired and exclude it from any calculations.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Tips and Tricks

BACnet properties

The BACnet Collector microblock is a proprietary BACnet object. If you make this object Network Visible, you can address a BACnet Analog Network Input or BACnet Analog Network Output microblock to access many of its configuration and control properties in other control programs. See BACnet object property addresses below.

BACnet object property addresses

BACnet object property addresses

The Collector microblock is a proprietary BACnet object (object type 771). The format for a BACnet address is bacnet://device/object/property@priority.

EXAMPLE To set up a microblock to read the Number of Providers from the Collector microblock in the same controller, use the following address.

```
bacnet://this/771:1/4602
```

In the above address, 771:1 indicates the first instance of a Collector microblock in the controller.

BACnet property identifier #	BACnet property identifier	Description	Read/ Write
4155	APPLICATION_ID	Application ID	R
4156	APPLICATION_INSTANCE	Application Instance	R/W
4157	UPDATE_TIME	Update Time	R
4158	EXPIRATION_TIME	Expiration Time	R
4601	COLL_MAX_NUMBER_OF_PROVIDER	Max Number of Providers	R
4602	COLL_NUMBER_OF_PROVIDERS	Number of Providers	R/W
4603	COLL_NUMBER_OF_PROVIDER_VALUES	Number of Provider Values	R
4604	COLL_FEEDBACK_VALUES	Number of Feedback Values	R

Provider

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

This microblock is compatible only with Carrier controllers.

Microblock family	*Network I/O microblock* (page 172)
Icon and symbol	 
What it does	Provides a means for the control program to exchange sets of data across the BACnet network. Creates an association with one Collector microblock and maintains: • An **Output** data array transmitted to the Collector microblock • A set of **Feedback** data received from the Collector microblock

How it works

The association between a Provider and Collector can be established:

- By the Provider actively communicating to its configured Collector and identifying itself as the recipient of that Collectors **Feedback** data. The Provider will actively create these associations when either of the Collector **Network Number** or **Address** properties is set to a non-zero value.
- The Provider can be passive and wait for a Collector to send it a message to establish the association.

The Provider creates an array to hold a set of **Output** data. Columns represent a user defined set of **Output** data tags. The Provider will transmit its set of **Output** data to its associated Collector. Data is transmitted on a periodic basis or when a Change of Value (COV) occurs. The Provider creates an array (user defined size) to hold a set of **Feedback** data, which is received from its associated Collector. The columns of the array represent a user defined set of **Feedback** data tags.

The Provider has no input or output wires. The Provider's data sets are configured and access through an OCL compatible application programming interface (API). The API consists of functions that provide the following functionality:

- Find a specific Provider
- Define the **Output** and **Feedback** data sets
- Write the **Output** data set
- Read the **Feedback** data set

NOTE Details about the Provider OCL API are covered in the OCL Reference Manual.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Application Type	A numeric value representing the system application type. **1** Air Side Linkage **2** Water Side Linkage **3** Outside Air Conditions **NOTE** User can define more application types as needed.
Application Instance	A numeric value that defines the specific instance of an application. This value is usually set to 1.
Network Number	The network number of the device that contains the Collector that the Provider should associate with.
Collector Address	The address of the device that contains the Collector that the Provider should associate with.
Output Update Time	The amount of time the Provider will wait before sending successive updates of its Output values to its associated Collector.
Feedback Expiration Time	The amount of time in which the Provider must receive successive updates of Feedback values from its Collector. If an update is not received in this time, the Provider will mark the data from the Collector as expired.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.

Tips and Tricks

BACnet properties

The Provider microblock is a proprietary BACnet object. If you make this object Network Visible, you can address a BACnet Analog Network Input or BACnet Analog Network Output microblock to access many of its configuration and control properties in other control programs. See BACnet object property addresses below.

BACnet object property addresses

The Provider microblock is a proprietary BACnet object (object type 772). The format for a BACnet address is bacnet://device/object/property@priority.

EXAMPLE To set up a microblock to read the Collector Address from the Provider microblock in the same controller, use the following address.

```
bacnet://this/772:1/4614
```

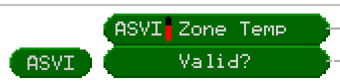
In the above address, 772:1 indicates the first instance of a Provider microblock in the controller.

BACnet property identifier #	BACnet property identifier	Description	Read/ Write
4155	APPLICATION_ID	Application ID	R
4156	APPLICATION_INSTANCE	Application Instance	R/W
4157	UPDATE_TIME	Update Time	R
4158	EXPIRATION_TIME	Expiration Time	R
4611	PROV_NUMBER_OF_OUTPUT_ELEMENTS	Number of Output Elements	R
4612	PROV_NUMBER_OF_FEEDBACK_ELEMENTS	Number of Feedback Elements	R
4613	PROV_COLLECTOR_NETWORK	Collector Network Number	R/W
4614	PROV_COLLECTOR_ADDRESS	Collector Address	R/W

BACnet Analog Sensed Value Input

NOTE A control program with this microblock works only with v5.5 or later systems and v5.5 or later drivers.

⚠ The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Network I/O microblocks* (page 172)
Icon and symbol	
What it does	Reads an analog value from up to 5 ZS or wireless sensors, and makes the value available to the control program on an output wire. If the Rnet has more than one ZS or wireless sensor, the microblock's combination algorithm determines whether the output value is the average, minimum, or maximum of the readings. If using a sensor that provides multiple values (temperature, humidity, CO_2, etc.), use one Analog Sensed Value Input microblock for each type of sensed value (temperature, humidity, CO2, or VOC). Each control program must also have a *Sensor Binder microblock* (page 224).

How it works

The **Valid?** output is False (**Off**) when all of the enabled sensors are in error. (See the ASVI microblock's Details tab in the running system. If the **Status** column shows anything other than **None**, the sensor is in error.) When the **Valid?** output is False, the microblock outputs the **Default** value.

The **Valid?** output is True (**On**) when the ASVI can get a valid value from at least one of the enabled sensors.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Rnet Tag	All values from a ZS or wireless sensor must have an Rnet tag that defines what type of information this microblock's value represents. For a ZS sensor, it also determines how the sensor will display the value. For example, if you select **Zone Humidity**, the sensor displays %💧 beside the value. **NOTE** If the Rnet tag droplist does not have the tag you want, you can create a custom tag in the Snap application.
Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Default Value	The value that the microblock outputs when communication with all enabled sensors fails or during sensor startup. The default value is used for each sensor's corrected value in the i-Vu® or Field Assistant system when the **Valid?** output is False (**Off**).
Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**.

<table>
<tr><th colspan="2">Sensor Configuration:</th></tr>
<tr><td>Index/Enable</td><td>The Index number corresponds to the ZS or wireless sensors defined in the Sensor Binder microblock (page 224). Check Enable for each sensor that you want to include in the combination algorithm used to determine the output value of the microblock.</td></tr>
<tr><td>Combination Algorithm</td><td>If using more than 1 sensor, select how the enabled sensors' values are to be combined to determine the microblock's output value. When the calculation is performed, only sensors with a valid value will be included.</td></tr>
<tr><td>COV Increment</td><td>To reduce Rnet traffic, you can force the microblock to update its output only when the sensed value changes by more than the COV Increment.</td></tr>
<tr><td>Show on Sensors</td><td>Select Local Value to have each enabled ZS sensor display its individual sensed value, or Calculated Value to have each ZS sensor display the value determined by the Combination Algorithm.</td></tr>
<tr><td>Display Resolution</td><td>Defines the resolution of the value to be displayed on the ZS sensor. For example, 1 displays only integers (example: 74) and 0.5 displays values to the nearest 0.5 (example: 74.5).</td></tr>
<tr><td>Input Smoothing</td><td>If the raw value from the sensor changes frequently, you can select one of the following options to send out an average of several readings on the output wire.
<table>
<tr><th>Select...</th><th>To send out...</th></tr>
<tr><td>None
Minimum
Medium
Maximum</td><td>The raw value
The average of the last 2 readings
The average of the last 5 readings
The average of the last 9 readings</td></tr>
</table></td></tr>
<tr><td>ZS Sensor Display Configuration:

Show on:</td><td>Check the sensor screen(s) that you want this microblock's value displayed on.

Home Screen (1): When more than one value is assigned to the Home screen, the values cycle from one to the next. Typically, the first item displays for 10 seconds and any other items display for 3 seconds each.

Information Screen (2): This screen is accessed by pressing the sensor's i button.

Diagnostics Screen (3): This screen is accessed by holding the sensor's i button for at least 3 seconds.

NOTE Select Reorder > Sensor Display Order in Snap to define the order in which multiple microblock values will appear on each sensor screen.</td></tr>
<tr><td>Input Resolution</td><td>The increment by which the microblock updates the value on its output wire in the i-Vu® or Field Assistant system.

The Resolution format is used to truncate the microblock’s actual value. For example, if you enter a value from:

0.1 to 0.9, the wire displays 1 digit to the right of the decimal
0.01 to 0.99, the wire displays 2 digits to the right of the decimal
1 or greater, the wire displays a whole number

The Resolution value determines the increment by which the present value is updated. For example, if you enter:

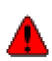
.2, the wire displays 8.4, 8.6, 8.8, ...
.03, the wire displays 5.09, 5.12, 5.15, ...
10, the wire displays 30, 40, 50, ...
</td></tr>
</table>

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
In the i-Vu® or Field Assistant system only:	

Status	**Possible statuses**	**Description**
	None	Normal operation.
	No Comm	ZS - Sensor is not communicating. Wireless - Wireless Adapter is not communicating.
	Unsupported tag	The sensor does not support the ASVI's Rnet tag.
	Unreliable	ZS - Sensor is providing unreliable values (for example, out-of-range values). Wireless - Wireless Adapter is not getting a heartbeat from the sensor.
	Unsupported read	ZS only - Sensor does not provide sensing, but can display values read from other sensors.

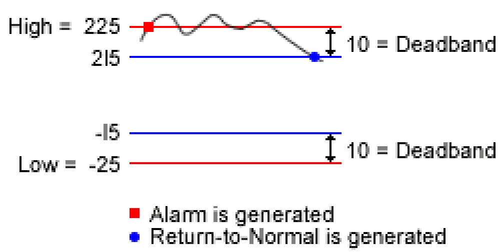
Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Low Limit Enable	Check to send an alarm when the microblock's present value remains below the **Low Limit** value for the defined **Delay Seconds**.
Low Limit	The value the microblock's present value must drop below to send an alarm.
High Limit Enable	Check to send an alarm when the microblock's present value remains above the **High Limit** for the defined **Delay Seconds**.
High Limit	The value the microblock's present value must rise above to send an alarm.
Dead Band	The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated.

EXAMPLE



Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Trends

Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of value)	Records the microblock's present value only when the value changes by at least the **COV Increment**.
Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. **NOTE** Click **Reset** on the **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.
In the i-Vu® or Field Assistant system only:	
Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.

Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Delete	Deletes all trend samples stored in the database for the microblock.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

BACnet Binary Sensed Value Input

Microblock family	*Network I/O microblocks* (page 172)
Icon and symbol	
What it does	Reads a binary value from up to 5 ZS or wireless sensors, and makes the value available to the control program on an output wire. If the Rnet has more than one ZS or wireless sensor, the microblock's combination algorithm determines whether the output value is based on a single sensors value or all sensors having the same value. Each control program must also have a *Sensor Binder microblock* (page 224).

How it works

The **Valid?** output is False (**Off)** when all of the enabled sensors are in error. (See the ASVI microblock's Details tab in the running system. If the **Status** column shows anything other than **None**, the sensor is in error.) When the **Valid?** output is False, the microblock outputs the **Default** value.

The **Valid?** output is True (**On**) when the ASVI can get a valid value from at least one of the enabled sensors.

Carrier Proprietary and Confidential

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Rnet Tag (Snap only)	All values from a ZS or wireless sensor must have an Rnet tag that defines what type of information this microblock's value represents. **NOTE** If the Rnet tag droplist does not have the tag you want, you can create a custom tag in Snap.
Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege (Snap only)	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Index/Enable	The Index number corresponds to the ZS or wireless sensors defined in the *Sensor Binder microblock* (page 224). Check **Enable** for each sensor that you want to include in the combination algorithm used to determine the output value of the microblock.
Combination Algorithm	If using more than 1 sensor, select how you want the microblock's output value to be determined. Select: **And** to output 1 if all sensors have a value of 1, otherwise output 0 **Or** to output 1 if any sensor has a value of 1, otherwise output 0
Show on Sensors	Select **Local Value** to have each enabled ZS sensor display its individual sensed value, or **Calculated Value** to have each ZS sensor display the value determined by the **Combination Algorithm**.

Show on: (Snap only)	Check the sensor screen(s) that you want this microblock's value displayed on. **Home Screen (1)**: When more than one value is assigned to the Home screen, the values cycle from one to the next. Typically, the first item displays for 10 seconds and any other items display for 3 seconds each. **Information Screen (2)**: This screen is accessed by pressing the sensor's *i* button. **Diagnostics Screen (3)**: This screen is accessed by holding the sensor's *i* button for at least 3 seconds. **NOTE** Select **Reorder** > **Sensor Display Order** in Snap to define the order in which multiple microblock values will appear on each sensor screen.
Home Screen (1)	When more than one value is assigned to the Home screen, the values cycle from one to the next. Typically, the first item displays for 10 seconds and any other items display for 3 seconds each.
Information Screen (2)	This screen is accessed by pressing the sensor's *i* button.
Diagnostics Screen (3)	This screen is accessed by holding the sensor's *i* button for at least 3 seconds.
Display Inactive Text	The text the ZS Sensor displays when the microblock's output is off, or false.
Display Active Text	The text the ZS Sensor displays when the microblock's output is on, or true.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.	
In the i-Vu® or Field Assistant system only:		
Status	**Possible statuses**	**Description**
	None	Normal operation.
	No Comm	ZS - Sensor is not communicating. Wireless - Wireless Adapter is not communicating.
	Unsupported tag	The sensor does not support the ASVI's Rnet tag.

	Unreliable	ZS - Sensor is providing unreliable values (for example, out-of-range values). Wireless - Wireless Adapter is not getting a heartbeat from the sensor.
	Unsupported read	ZS only - Sensor does not provide sensing, but can display values read from other sensors.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm Enabled?	Check to send a message when this microblock indicates an alarm condition.
Alarm State	**Active** - An alarm condition exists when the microblock's present value is on (true). **Inactive** - An alarm condition exists when the microblock's present value is off (false).
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Trends

Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of Value)	Records the microblock's present value only when the value changes.
Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. Click **Reset** on the **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.
In the i-Vu® or Field Assistant system only:	
Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.

Enable trend log at specific times only?	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Delete	Deletes all trend samples stored in the database for the microblock.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Sensor Binder

NOTE A control program with this microblock works only with v5.5 or later systems and v5.5 or later drivers.

⚠ The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Network I/O microblocks* (page 172)
Icon and symbol	
What it does	A Sensor Binder microblock is required if your control programs is to work with ZS or wireless sensors. This microblock is where you define up to 5 uniquely-addressed ZS or wireless sensors. The addresses in the microblock must match the sensors' Rnet addresses. This microblock's **ALARM** output wire turns on any time an error is reported on any of these sensors. A control program can have only one Sensor Binder microblock.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.	
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program	
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.	
Sensor Configuration	The Index number is a reference number for each sensor that you define in this microblock. ASVI and BSVI microblocks refer to the sensors by the index number defined in this microblock.	
Area	Type an intuitive name for the sensor's location. This name will appear in the ASVI, BSVI, and Setpoint microblocks in the i-Vu® or Field Assistant system.	
Network Type	Select Rnet for each sensor that you define.	
Address	ZS sensors—The physical address set on the sensor's DIP switches. Wireless sensors—The Rnet ID that you get from the SensorBuilder application.	
Lock Display	Check to lock a ZS Pro or ZS Pro-F sensor's buttons. The sensor's Home screen will display a icon. The lock can be overridden in the i-Vu®/Field Assistant interface or at the sensor by a user that knows the override procedure.	
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.	
In the i-Vu® or Field Assistant system only:		
Version	The product type, firmware version,and serial number of each sensor defined in this microblock.	
Status	**Possible statuses**	**Description**

	Sensor Offline	ZS - The controller is not communicating with the sensor. Wireless - The controller is not communicating with the Wireless Adapter or the sensor is not paired to the Wireless Adapter.
	Sensor Unconfigured	ZS - The controller is communicating with the sensor but has not yet sent the information it needs such as setpoints and Rnet tags. Wireless - The controller is communicating with the Wireless Adapter but has not yet sent the information it needs such as setpoints and Rnet tags.
	Sensor Configuring	ZS/Wireless - The controller is in the process of sending the information the sensor needs to operate.
	Sensor Configured	ZS/Wireless - The controller has sent the information the sensor needs to operate.
	Resource Allocation	ZS only - The configuration information (Rnet tags, display text, etc.) exceeded the sensor's available memory.
	Address Duplicate	ZS/Wireless - A Sensor Binder microblock in another control program has the same sensor address as this Sensor Binder microblock.
Error	ZS - Shows **No Comm** if the sensor is not communicating. Wireless - Shows **No Comm** if the Wireless Adapter is not communicating.	
Alarm	ZS - Shows **On** if any of the sensors cannot communicate. Wireless - Shows **On** if the Wireless Adapter is not communicating	

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Display microblocks

Display microblocks communicate directly with BACnet objects, and can be used to integrate BACnet devices into the i-Vu®/Field Assistant system. They can be referenced on graphics, allowing any vendor's BACnet equipment to be integrated into the system's interface.

Display microblocks differ from other microblocks:

- They are not downloaded into a controller; they are modeled in the system database.
- They cannot be used in a control program's control logic, although they can be the source of alarms.
- A single microblock can read from or write to multiple properties in a BACnet object.

AI	*BACnet Modeled Analog Input* (page 229) This microblock reads the properties from a BACnet Analog Input object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system.
BI	*BACnet Modeled Binary Input* (page 232) This microblock reads the properties from a BACnet Binary Input object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system.
MSI	*BACnet Modeled Multi-State Input* (page 235) This microblock reads the properties from a BACnet Multi-State Input object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system. Multi-State microblocks are used to indicate values that have more than two discrete states.
AO	*BACnet Modeled Analog Output* (page 238) This microblock reads the properties from a BACnet Analog Output object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system.
BO	*BACnet Modeled Binary Output* (page 241) This microblock reads the properties from a BACnet Binary Output object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system.
MSO	*BACnet Modeled Multi-State Output* (page 245) This microblock reads the properties from a BACnet Multi-State Output object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system. Multi-State microblocks are used to indicate values that have more than two discrete states.
AV	*BACnet Modeled Analog Value* (page 248) This microblock reads the properties from a BACnet Analog Parameter Value object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system.
BV	*BACnet Modeled Binary Value* (page 251) This microblock reads the properties from a BACnet Binary Value Parameter object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system.
MSV	*BACnet Modeled Multi-State Value* (page 253) This microblock reads the properties from a BACnet Binary Value Parameter object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system.

Cal	*BACnet Modeled Calendar* (page 256) This microblock defines a standardized object used to describe a list of calendar dates, which might be thought of as holidays, special events, or simply as a list of dates and makes these values available in the i-Vu® or Field Assistant system.
Trn	*BACnet Modeled Trend* (page 258) This microblock reads trend data from other objects in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system.
Sch	*BACnet Modeled Schedule* (page 261) This microblock defines a standardized object used to describe a periodic schedule that may recur during a range of dates, with optional exceptions on arbitrary dates. The Schedule object also serves as a binding between these scheduled times and the writing of specified values to specific properties of specific objects at those times.
Evt	*BACnet Modeled Event Enrollment* (page 264) This microblock defines an event and provides a connection between the occurrence of an event and the transmission of a notification message to one or more recipients.
Not	*BACnet Modeled Notification Class* (page 267) This microblock defines a standardized object that represents and contains information required for the distribution of alarm notifications within BACnet systems.
Prg	*BACnet Modeled Program* (page 269) This microblock defines a standardized object whose properties represent the externally visible characteristics of an application program and makes these characteristics available in the i-Vu® or Field Assistant system.
Dev	*BACnet Modeled Device* (page 272) This microblock defines a standardized object whose properties represent the externally visible characteristics of a BACnet device and makes these characteristics available in the i-Vu® or Field Assistant system.

To integrate using Display microblocks

If Display microblocks will provide the functionality you need, you must address the Display microblocks in your control program to retrieve data from the BACnet points of interest.

To retrieve data from BACnet objects using Display microblocks:

1 Get network, object, device, and address information from the vendor of the BACnet device. If this information is not supplied, you can discover BACnet networks, devices, and objects.

2 In the Snap application, create a control program with a Display microblock for each property you are interested in.

NOTE Each Display microblock must match the BACnet object type it references. For example, to reference a BACnet analog input, use a BACnet Modeled Analog Input microblock.

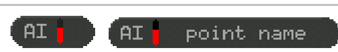
3 In each microblock, type the BACnet device's Device Instance number in the **Device Alias** field, then set the **Object Instance** to match the BACnet Object ID of the BACnet object it references.

TIPS

- In Snap, use **Edit** > **Third-Party BACnet Addresses** with discovered BACnet information to set the **Object Instance** for a display object.
- To create a re-usable program, you can use the Device alias microblock. See the *BACnet Integration Guide*.

BACnet Modeled Analog Input

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	
What it does	This microblock reads the properties from a BACnet Analog Input object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

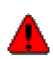
Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Supports Locked Value	Allows the BACnet object to be locked to a specific value in i-Vu® or Field Assistant and held at that value until unlocked. The locked value takes precedence over any priority array value.

BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.

The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.

Object Name	An alpha-numeric string that is unique within the BACnet device.
Present Value	The current value of the BACnet object.
Status flags	If this microblock is enabled as a potential alarm source, this will show **Status** checkboxes on the **Alarms** > **Enable/Disable** tab that indicate the current alarm status of the BACnet object.
Event state	If this microblock is enabled as a potential alarm source, this will show the current alarm state (Normal, Offnormal, Fault) of the BACnet object on the **Alarms** > **Enable/Disable** tab.
Out of Service	Lets you stop the BACnet object from reading the physical sensor's value so that you can override the logical value in the BACnet device by changing the **Present Value** in i-Vu® or Field Assistant.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

Return to Normal

Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

BACnet Modeled Binary Input

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	 
What it does	This microblock reads the properties from a BACnet Binary Input object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

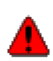
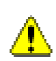
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Supports Locked Value	Allows the BACnet object to be locked to a specific value in i-Vu® or Field Assistant and held at that value until unlocked. The locked value takes precedence over any priority array value.

BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.
The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.	
Object Name	An alpha-numeric string that is unique within the BACnet device.
Present Value	The current value of the BACnet object.
Out of Service	Lets you stop the BACnet object from reading the physical sensor's value so that you can override the logical value in the BACnet device by changing the **Present Value** in i-Vu® or Field Assistant.
Polarity	If **normal** polarity, the BACnet object's value is the same as the physical sensor's value. If **reversed** polarity, the object's value is the opposite of the physical sensor's value.
Status flags	If this microblock is enabled as a potential alarm source, this will show **Status** checkboxes on the **Alarms** > **Enable/Disable** tab that indicate the current alarm status of the BACnet object.
Event state	If this microblock is enabled as a potential alarm source, this will show the current alarm state (Normal, Offnormal, Fault) of the BACnet object on the **Alarms** > **Enable/Disable** tab.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

Return to Normal

Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

BACnet Modeled Multi-State Input

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	
What it does	This microblock reads the properties from a BACnet Multi-State Input object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system. Multi-State microblocks are used to indicate values that have more than two discrete states. For example, a parameter may have states of High, Medium, and Low rather than a numeric value. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

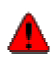
- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Supports Locked Value	Allows the BACnet object to be locked to a specific value in i-Vu® or Field Assistant and held at that value until unlocked. The locked value takes precedence over any priority array value.
BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.

The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.

Object Name	An alpha-numeric string that is unique within the BACnet device.
Present Value	The current value of the BACnet object.
Status flags	If this microblock is enabled as a potential alarm source, this will show **Status** checkboxes on the **Alarms** > **Enable/Disable** tab that indicate the current alarm status of the BACnet object.
Event state	If this microblock is enabled as a potential alarm source, this will show the current alarm state (Normal, Offnormal, Fault) of the BACnet object on the **Alarms** > **Enable/Disable** tab.
Out of Service	Lets you stop the BACnet object from reading the physical sensor's value so that you can override the logical value in the BACnet device by changing the **Present Value** in i-Vu® or Field Assistant.
Number of States	The number of states currently defined for the BACnet object.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

Return to Normal

Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

BACnet Modeled Analog Output

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	 
What it does	This microblock reads the properties from a BACnet Analog Output object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use "this" in the Display microblock's BACnet address and retrieve this microblock's values from the device to which the microblock's control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Supports Locked Value	Allows the BACnet object to be locked to a specific value in i-Vu® or Field Assistant and held at that value until unlocked. The locked value takes precedence over any priority array value.
BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.
The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.	
Object Name	An alpha-numeric string that is unique within the BACnet device.
Present Value	The current value of the BACnet object.
Out of Service	Lets you stop the BACnet object from writing to the physical sensor's value so that you can override the logical value in the BACnet device by changing the **Present Value** in i-Vu® or Field Assistant.

Priority Array	BACnet objects can be written to by more than one source. Each source writes at a specified priority, with a higher priority overriding a lower priority. The lower the priority number (1–16), the higher the priority. On this microblock's **Properties** page in the i-Vu® or Field Assistant interface, the **Priority Array** table shows the current value for each priority. If the present value is editable, you can change it and set the priority in the **Command priority for writing** field. To clear a value in the **Priority Array** table, delete or select **Null** in the **Present Value** field. In the **Command priority for writing** field, select the priority whose value you want to clear. Then click **Accept**.
Relinquish Default	The default value used for the present value when no values have been written at any priority.
Status flags	If this microblock is enabled as a potential alarm source, this will show **Status** checkboxes on the **Alarms** > **Enable/Disable** tab that indicate the current alarm status of the BACnet object.
Event state	If this microblock is enabled as a potential alarm source, this will show the current alarm state (Normal, Offnormal, Fault) of the BACnet object on the **Alarms** > **Enable/Disable** tab.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

Return to Normal

Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

BACnet Modeled Binary Output

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	 
What it does	This microblock reads the properties from a BACnet Binary Output object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Supports Locked Value	Allows the BACnet object to be locked to a specific value in i-Vu® or Field Assistant and held at that value until unlocked. The locked value takes precedence over any priority array value.

BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.
The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.	
Object Name	An alpha-numeric string that is unique within the BACnet device.
Present Value	The current value of the BACnet object.
Out of Service	Lets you stop the BACnet object from writing to the physical sensor's value so that you can override the logical value in the BACnet device by changing the **Present Value** in i-Vu® or Field Assistant.
Polarity	If **normal** polarity, the BACnet object's value is the same as the physical sensor's value. If **reversed** polarity, the object's value is the opposite of the physical sensor's value.
Priority Array	BACnet objects can be written to by more than one source. Each source writes at a specified priority, with a higher priority overriding a lower priority. The lower the priority number (1–16), the higher the priority. On this microblock's **Properties** page in the i-Vu® or Field Assistant interface, the **Priority Array** table shows the current value for each priority. If the present value is editable, you can change it and set the priority in the **Command priority for writing** field. To clear a value in the **Priority Array** table, delete or select **Null** in the **Present Value** field. In the **Command priority for writing** field, select the priority whose value you want to clear. Then click **Accept**.
Relinquish Default	The default value used for the present value when no values have been written at any priority.
Status flags	If this microblock is enabled as a potential alarm source, this will show **Status** checkboxes on the **Alarms** > **Enable/Disable** tab that indicate the current alarm status of the BACnet object.
Event state	If this microblock is enabled as a potential alarm source, this will show the current alarm state (Normal, Offnormal, Fault) of the BACnet object on the **Alarms** > **Enable/Disable** tab.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

Return to Normal

Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

BACnet Modeled Multi-State Output

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	MSO / point name MSO
What it does	This microblock reads the properties from a BACnet Multi-State Output object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system. Multi-State microblocks are used to indicate values that have more than two discrete states. For example, a parameter may have states of High, Medium and Low rather than a numeric value. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use "this" in the Display microblock's BACnet address and retrieve this microblock's values from the device to which the microblock's control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Supports Locked Value	Allows the BACnet object to be locked to a specific value in i-Vu® or Field Assistant and held at that value until unlocked. The locked value takes precedence over any priority array value.
BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.
The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.	
Object Name	An alpha-numeric string that is unique within the BACnet device.
Present Value	The current value of the BACnet object.
Status flags	If this microblock is enabled as a potential alarm source, this will show **Status** checkboxes on the **Alarms** > **Enable/Disable** tab that indicate the current alarm status of the BACnet object.
Event state	If this microblock is enabled as a potential alarm source, this will show the current alarm state (Normal, Offnormal, Fault) of the BACnet object on the **Alarms** > **Enable/Disable** tab.
Out of Service	Lets you stop the BACnet object from writing to the physical sensor's value so that you can override the logical value in the BACnet device by changing the **Present Value** in i-Vu® or Field Assistant.
Number of States	The number of states currently defined for the BACnet object.

Priority Array	BACnet objects can be written to by more than one source. Each source writes at a specified priority, with a higher priority overriding a lower priority. The lower the priority number (1–16), the higher the priority. On this microblock's **Properties** page in the i-Vu® or Field Assistant interface, the **Priority Array** table shows the current value for each priority. If the present value is editable, you can change it and set the priority in the **Command priority for writing** field. To clear a value in the **Priority Array** table, delete or select **Null** in the **Present Value** field. In the **Command priority for writing** field, select the priority whose value you want to clear. Then click **Accept**.
Relinquish Default	The default value used for the present value when no values have been written at any priority.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

Return to Normal

Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

BACnet Modeled Analog Value

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	
What it does	This microblock reads the properties from a BACnet Analog Parameter Value object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Supports Locked Value	Allows the BACnet object to be locked to a specific value in i-Vu® or Field Assistant and held at that value until unlocked. The locked value takes precedence over any priority array value.
BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.
The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.	
Object Name	An alpha-numeric string that is unique within the BACnet device.
Present Value	The current value of the BACnet object.
Out of Service	Lets you stop the BACnet object from reading the physical sensor's value so that you can override the logical value in the BACnet device by changing the **Present Value** in i-Vu® or Field Assistant.
Status flags	If this microblock is enabled as a potential alarm source, this will show **Status** checkboxes on the **Alarms** > **Enable/Disable** tab that indicate the current alarm status of the BACnet object.
Event state	If this microblock is enabled as a potential alarm source, this will show the current alarm state (Normal, Offnormal, Fault) of the BACnet object on the **Alarms** > **Enable/Disable** tab.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

Return to Normal

Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

BACnet Modeled Binary Value

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	BV point name BV
What it does	This microblock reads the properties from a BACnet Binary Value Parameter object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use "this" in the Display microblock's BACnet address and retrieve this microblock's values from the device to which the microblock's control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Supports Locked Value	Allows the BACnet object to be locked to a specific value in i-Vu® or Field Assistant and held at that value until unlocked. The locked value takes precedence over any priority array value.
BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.
The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.	
Object Name	An alpha-numeric string that is unique within the BACnet device.
Present Value	The current value of the BACnet object.
Out of Service	Lets you stop the BACnet object from reading the physical sensor's value so that you can override the logical value in the BACnet device by changing the **Present Value** in i-Vu® or Field Assistant.
Status flags	If this microblock is enabled as a potential alarm source, this will show **Status** checkboxes on the **Alarms** > **Enable/Disable** tab that indicate the current alarm status of the BACnet object.
Event state	If this microblock is enabled as a potential alarm source, this will show the current alarm state (Normal, Offnormal, Fault) of the BACnet object on the **Alarms** > **Enable/Disable** tab.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**. = Critical = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

Return to Normal

Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

BACnet Modeled Multi-State Value

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	 

What it does	This microblock reads the properties from a BACnet Binary Value Parameter object in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

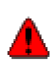
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Supports Locked Value	Allows the BACnet object to be locked to a specific value in i-Vu® or Field Assistant and held at that value until unlocked. The locked value takes precedence over any priority array value.
BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.
The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.	
Object Name	An alpha-numeric string that is unique within the BACnet device.
Present Value	The current value of the BACnet object.
Status flags	If this microblock is enabled as a potential alarm source, this will show **Status** checkboxes on the **Alarms** > **Enable/Disable** tab that indicate the current alarm status of the BACnet object.
Event state	If this microblock is enabled as a potential alarm source, this will show the current alarm state (Normal, Offnormal, Fault) of the BACnet object on the **Alarms** > **Enable/Disable** tab.
Out of Service	Lets you stop the BACnet object from reading the physical sensor's value so that you can override the logical value in the BACnet device by changing the **Present Value** in i-Vu® or Field Assistant.
Number of States	The number of states currently defined for the BACnet object.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

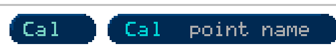
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

Return to Normal

Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

BACnet Modeled Calendar

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	
What it does	This microblock defines a standardized object used to describe a list of calendar dates, which might be thought of as holidays, special events, or simply as a list of dates and makes these values available in the i-Vu® or Field Assistant system. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.
BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.

The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.

Object Name	An alpha-numeric string that is unique within the BACnet device.
Present Value	The current value of the BACnet object.
Date List	The list of calendar periods (date, date range, or month/week-of-month/day-of-week) defined in the BACnet object.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

BACnet Modeled Trend

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	Trn Trn point name
What it does	This microblock reads trend data from other objects in any BACnet device on the network and makes these values available in the i-Vu® or Field Assistant system. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.
Trend Conformance Level	The BACnet protocol conformance level that the BACnet device trend supports.

BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.
The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.	
Object Name	An alpha-numeric string that is unique within the BACnet device.
Log Enable	If enabled, trend data is collected for the BACnet object.
Stop When Full	If enabled, trend data will stop being collected when the maximum number of samples is reached.
Buffer Size	The maximum number of samples to be collected in the BACnet device.
Log Buffer	All of the data records stored in the Trend Log object.
Record Count	Number of trend samples currently in the BACnet device.
Total Record Count	Number of trend samples logged since activation.
Object ID	A combination of the Object Type and the Object Instance number.

BACnet Modeled Schedule

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	Sch Sch point name
What it does	This microblock defines a standardized object used to describe a periodic schedule that may recur during a range of dates, with optional exceptions on arbitrary dates. The Schedule object also serves as a binding between these scheduled times and the writing of specified values to specific properties of specific objects at those times. Schedules are divided into two types of days: normal days within a week and exception days. It is assumed that the scheduler will exhibit restorative behavior in the event that the BACnet Device containing the schedule is restarted or the time is changed in the BACnet Device. The model for restoration assumes that each day's schedule is circular in nature. Thus, if the BACnet Device is restarted after midnight but prior to the first time in the list of BACnetTimeValues for that day, then the last value on the list for that day is used as the restoration value. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Schedule Category	The category of the schedule that will run the controlled equipment. Select **Occupancy** unless you have defined a custom schedule category in the Snap and i-Vu®/Field Assistant applications.
Type	The type of the schedule category you selected. Select **Binary** for an Occupancy or InterOp Occupancy schedule category. Select **Any** if the schedule object will return its own type.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.
Array Resize Write Index	The write method that the BACnet device supports for writing exception schedules.
Array Resize Write Past End	The write method that the BACnet device supports for writing exception schedules.
Supports Dated Weekly Schedules	Check for Carrier® or OEMCtrl® manufactured devices only.
Supports Exception Schedule Description	Allows Field Assistant to retrieve a holiday schedule description (if it is available) from the BACnet device.

BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.

The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.

Object Name	An alpha-numeric string that is unique within the BACnet device.
Present Value	The current value of the BACnet object.
Effective Period	Date range that shows when the schedule object is in effect.
List of Object Property references	A list of BACnet object properties that will be affected by the schedule.
Priority for writing	BACnet objects can be written to by more than one source. Each source writes at a specified priority, with a higher priority overriding a lower priority. The lower the priority number (1–16), the higher the priority.
Status Flags	Status Flags indicate the current state of the BACnet object.
Reliability	Indicates if there is a configuration error.
Out of Service	The schedule object that is out of service will not use any internal calculations (weekly/exception schedule entries) to determine the **Present Value**.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

BACnet Modeled Event Enrollment

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	Evt Evt point name
What it does	This microblock defines an event and provides a connection between the occurrence of an event and the transmission of a notification message to one or more recipients. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.
BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.

The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.

Object Name	An alpha-numeric string that is unique within the BACnet device.
Event Type	Shows the status of the Event Parameter property.
Notify Type	Shows whether the notification will be sent as an alarm or an event.
Event parameters	The condition under which an event will be generated.
Object Property Reference	Defines the object for which the event enrollment will generate events.
Event State	Shows the BACnet object's current alarm status.
Event Enable	Enables notifications of the event, return to normal, or fault.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

Return to Normal

Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.

BACnet Modeled Notification Class

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	Not Not point name
What it does	This microblock defines a standardized object that represents and contains information required for the distribution of alarm notifications within BACnet systems. Notification Classes are useful for alarm-initiating objects that have identical needs in terms of how their notifications should be handled, what the destination(s) for their notifications should be, and how they should be acknowledged. A notification class defines how alarm notifications will be prioritized in their handling according to TO-OFFNORMAL, TO-FAULT, and TO-NORMAL alarms; whether these categories of alarms require acknowledgment (nearly always by a human operator); and what destination devices or processes should receive notifications. The purpose of prioritization is to provide a means to ensure that alarms or alarm notifications with critical time considerations are not unnecessarily delayed. The possible range of priorities is 0–255. A lower number indicates a higher priority. Priorities may be assigned to TO-OFFNORMAL, TO-FAULT, and TO-NORMAL alarms individually within a notification class. It is often necessary for alarm notifications to be sent to multiple destinations or to different destinations based on the time of day or day of week. Notification Classes may specify a list of destinations, each of which is qualified by time, day of week, and type of handling. A destination specifies a set of days of the week (Monday through Sunday) during which the destination is considered viable by the Notification Class object. In addition, each destination has a FromTime and ToTime, which specify a window, on those days of the week, during which the destination is viable. If an alarm that uses a Notification Class object occurs and the day is one of the days of the week that is valid for a given destination and the time is within the window specified in the destination, then the destination will be sent a notification. Destinations may be further qualified, as applicable, by any combination of the 3 alarm transitions TO-OFFNORMAL, TO-FAULT, or TO-NORMAL. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.
BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.

The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.

Object Name	An alpha-numeric string that is unique within the BACnet device.
Notification Class	The instance number of the notification class object.
Priority	The priority (0 to 255) indicates the importance of the alarm notification (lower the number, the greater the importance).
Ack Required	Determines if an acknowledgment is required for Off-Normal, Fault, or Normal alarm notifications.
Recipients List	Shows who is to receive the alarm notifications.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

BACnet Modeled Program

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	

What it does	This microblock defines a standardized object whose properties represent the externally visible characteristics of an application program and makes these characteristics available in the i-Vu® or Field Assistant system. In this context, an application program is an abstract representation of a process within a BACnet device, which is executing a particular body of instructions that act upon a particular collection of data structures. The Program object provides a network-visible view of selected parameters of an application program in the form of properties of the Program object. Some of these properties are specified in the standard and exhibit a consistent behavior across different BACnet devices. The operating state of the process that executes the application program may be viewed and controlled through these standardized properties, which are required for all Program objects. In addition to these standardized properties, a Program object may also provide vendor-specific properties. These vendor-specific properties may serve as inputs to the program, outputs from the program, or both. However, these vendor-specific properties may not be present at all. If any vendor-specific properties are present, the standard does not define what they are or how they work, as this is specific to the particular application program and vendor. The link to this device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.
BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.
The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.	
Object Name	An alpha-numeric string that is unique within the BACnet device.
Program state	The current state (**idle**, **loading**, **running**, **waiting**, **halted**, **unloading**) of the program.
Program Change	Lets you select **ready**, **load**, **run**, **halt**, **restart**, or **unload** to change the **Program state** property.
Status flags	Status Flags indicate the current state of the BACnet object.
Out of Service	Indicates that the program object is in an IDLE state (not running) and requires manual intervention to start it again.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

BACnet Modeled Device

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	Dev Dev point name
What it does	This microblock defines a standardized object whose properties represent the externally visible characteristics of a BACnet device and makes these characteristics available in the i-Vu® or Field Assistant system. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.
BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.

The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.

Object Name	An alpha-numeric string that is unique within the BACnet device.
System Status	The current physical and logical status of the BACnet device.
Vendor Name	Manufacturer of the BACnet device.
Vendor Identifier	The BACnet device manufacturer's unique vendor identification code (assigned by ASHRAE).
Model Name	Model of the BACnet device.
Firmware Revision	The firmware version that is in the BACnet device.
Application Software Version	The application software version that is in the BACnet device.
Protocol Version	The version of the BACnet protocol supported by the BACnet device.
Protocol Conformance Class	This obsolete property is no longer part of the BACnet standard, but is maintained for backward compatibility.
Protocol Services Supported	The standard BACnet services that the device supports.
Protocol Object Types Supported	The standard BACnet object types that the device supports.

Object List	A list of all BACnet objects that are in the BACnet device.
Max APDU Length Accepted	The maximum length of a message or message segment that can be accepted by the BACnet device.
Segmentation Supported	Indicates if the BACnet device supports segmentation of messages and if so, whether it supports segmented transmission, reception, or both.
APDU Segment Timeout	How many milliseconds the device waits before resending a message segment if no response is received.
APDU Timeout	How many milliseconds the device waits before resending a message if no response is received.
Number of APDU Retries	The number of times the device resends a message.
Controller Address Binding	A list of bindings (a matching of Device ID to BACnetAddress) that the device uses to communicate with other BACnet devices. BACnetAddress is a combination of **Network Number** and **Mac Address**.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

Display2 microblocks

Display microblocks communicate directly with BACnet objects, and can be used to integrate BACnet devices into the i-Vu®/Field Assistant system. They can be referenced on graphics, allowing any vendor's BACnet equipment to be integrated into the system's interface.

Display microblocks differ from other microblocks:

- They are not downloaded into a controller; they are modeled in the system database.
- They cannot be used in a control program's control logic, although they can be the source of alarms.
- A single microblock can read from or write to multiple properties in a BACnet object.

Fil	*BACnet Modeled File* (page 276) This microblock defines a standardized object that is used to describe properties of data files that can be accessed using BACnet File Services.
Grp	*BACnet Modeled Group* (page 278) This microblock defines a standardized object whose properties represent a collection of other objects and one or more of their properties. A group object is used to simplify the exchange of information between BACnet Devices by providing a shorthand way to specify all members of the group at once.
Loop	*BACnet Modeled Loop* (page 280) This microblock defines a standardized object whose properties represent the externally visible characteristics of any form of feedback control loop.
Pul	*BACnet Modeled Pulse Converter* (page 282) This microblock defines a standardized object that represents a process in which measurements represented by pulses or counts, such as electric power, might be monitored at intervals for applications such as peak load management that require periodic measurements but not a precise accounting of every input pulse or count.
Acc	*BACnet Modeled Accumulator* (page 285) This microblock defines a standardized object whose properties represent the externally visible characteristics of a device that indicates measurements made by counting pulses.
Col	*BACnet Modeled Collector* (page 287) This microblock reads properties from a BACnet proprietary collector object (BACnet object type 771).
Table	*BACnet Modeled Table* (page 288) This microblock reads properties from a BACnet proprietary table object (BACnet object type 773).
Alias	*Device Alias* (page 290) This microblock works with the Device Alias field in every Display microblock to enable efficient re-use of a control program for multiple BACnet devices. You define a character string, or Device Alias, for a particular Device Instance in this microblock. Then you use the same character string in the Device Alias field of any Display microblocks that you want to use the same Device Instance. At runtime, the system replaces the Device Alias character string in a Display microblock with the Device Instance defined in the Device Alias microblock to create a BACnet address.

BACnet Modeled File

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	Fil Fil point name
What it does	This microblock defines a standardized object that is used to describe properties of data files that can be accessed using BACnet File Services. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.
BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.
The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.	
Object Name	An alpha-numeric string that is unique within the BACnet device.
File Type	A character string that describes the type of file.
File Size	The file length (octets).
Modification Date	The time and date the file was last modified.
Archive	Indicates whether or not the file has been archived.
Read Only	Indicates whether or not the file can be written to.
File Access Method	The method (Record Access or Stream Access) by which the file can be accessed.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

BACnet Modeled Group

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	Grp Grp point name
What it does	This microblock defines a standardized object whose properties represent a collection of other objects and one or more of their properties. A group object is used to simplify the exchange of information between BACnet Devices by providing a shorthand way to specify all members of the group at once. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use "this" in the Display microblock's BACnet address and retrieve this microblock's values from the device to which the microblock's control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.
BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.
The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.	
Object Name	An alpha-numeric string that is unique within the BACnet device.
Present Value	A list of all the properties in the group and their current values.
List of Group Members	A list of the BACnet objects and properties that are included in the group. If editable, you can add or delete objects or properties in the group.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

BACnet Modeled Loop

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	Loop Loop point name
What it does	This microblock defines a standardized object whose properties represent the externally visible characteristics of any form of feedback control loop. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.
BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.

The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.

Object Name	An alpha-numeric string that is unique within the BACnet device.
Present Value	The current value of the BACnet object.
Status Flags	Status Flags indicate the current state of the BACnet object.
Event State	Shows the BACnet object's current alarm status.
Out of Service	Indicates whether or not the algorithm this object represents is in service.
Output Units	The BACnet engineering unit of measurement of the microblock's present value.
Manipulated Variable Reference	The output (present value) of the control loop is written to the object and property designated by the **Manipulated Variable Reference**.
Controlled Variable Reference	Identifies the property used to set the loop object's **Controlled Variable Value** property.
Controlled Variable Value	The control loop compares the **Controlled Variable Value** with the **Setpoint** to calculate the error.
Controlled Variable Units	The engineering units of the **Controlled Variable Value** property.
Setpoint Reference	Reference to the object and property to be used as the loop object's setpoint. If no object is defined for **Setpoint Reference**, the value entered in the **Value** field is used.

Setpoint	The value that is used for the loop object's setpoint. This is either the real value of the object referenced in **Setpoint Reference** or, if no object is referenced, it's the value entered in the **Value** field.
Action	Defines whether the loop is direct or reverse acting.
Priority for Writing	The command priority (1-16) the loop object will use when writing the object and property referenced by the **Manipulated Variable Reference**.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

BACnet Modeled Pulse Converter

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	
What it does	This microblock defines a standardized object that represents a process in which measurements represented by pulses or counts, such as electric power, might be monitored at intervals for applications such as peak load management that require periodic measurements but not a precise accounting of every input pulse or count. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.
The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.	
Object Name	An alpha-numeric string that is unique within the BACnet device.
Present Value	The current value of the BACnet object.
Status Flags	Status Flags indicate the current state of the BACnet object.
Event State	The current alarm state (Normal, Offnormal, Fault) of the BACnet object.
Out of Service	Lets you stop the BACnet object from reading the physical sensor's value so that you can override the logical value in the BACnet device by changing the **Present Value** in i-Vu® or Field Assistant.
Units	The BACnet engineering unit of measurement of the microblock's present value.
Scale factor	The conversion factor to turn the pulse count into the units specified for the **Present Value**.
Adjust value	Lets you enter a value that adjusts the **Present Value** and the **Count** property.
Count	The current pulse count.
Update time	The date and time of the most recent pulse count.
Count change time	The date and time of the most recent change using the **Adjust value** property.
Count before change	The pulse count before any change using the **Adjust value** property.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

BACnet Modeled Accumulator

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	Acc Acc point name
What it does	This microblock defines a standardized object whose properties represent the externally visible characteristics of a device that indicates measurements made by counting pulses. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use "this" in the Display microblock's BACnet address and retrieve this microblock's values from the device to which the microblock's control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.
Supports Locked Value	Allows the BACnet object to be locked to a specific value in i-Vu® or Field Assistant and held at that value until unlocked. The locked value takes precedence over any priority array value.
BACnet object properties	Select the checkbox in the **Present** column to show the BACnet object property on the i-Vu® or Field Assistant **Properties** page. Properties that do not have a checkbox in the **Present** column are always shown. **CAUTION** If you select a property that is not in the BACnet device, you will get an error in i-Vu® or Field Assistant. Select the checkbox in the **Write to Field** column to make the property editable from the i-Vu® or Field Assistant **Properties** page. **CAUTION** If you select **Write to Field** for a property that is read-only in the BACnet device, you will get an error in i-Vu® or Field Assistant.
The following properties are always present. See the *ANSI / ASHRAE Standard 135* for a description of additional properties that can be enabled in Snap.	
Object Name	An alpha-numeric string that is unique within the BACnet device.
Present Value	The current value of the BACnet object.
Status Flags	Status Flags indicate the current state of the BACnet object.
Event State	The current alarm state (Normal, Offnormal, Fault) of the BACnet object.
Out of Service	Lets you stop the BACnet object from reading the physical sensor's value so that you can override the logical value in the BACnet device by changing the **Present Value** in i-Vu® or Field Assistant.
Scale	The conversion factor to change the **Present Value** to a value in the units specified.
Units	The BACnet engineering unit of measurement of the microblock's present value.
Max Pres Value	The maximum limit of the present value before scaling.
Object ID	A combination of the Object Type and the Object Instance number.
Address	The address of the BACnet object that this microblock references.

BACnet Modeled Collector

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	
What it does	This microblock reads properties from a BACnet proprietary collector object (BACnet object type 771). The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.
Object Name	An alpha-numeric string that is unique within the BACnet device.
Object ID	A combination of the Object Type and the Object Instance number.
Object Type	The BACnet object type.
Address	The address of the BACnet object that this microblock references.

BACnet Modeled Table

The information below provides a <u>FULL</u> description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	
What it does	This microblock reads properties from a BACnet proprietary table object (BACnet object type 773). The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the **Object Instance** setting described below. A Display microblock is most often used to display information from other vendor's equipment on **Graphics** and **Properties** pages. The operator can then read and write to the equipment as appropriate. This microblock can be used to import multiple properties from a single object, but to prevent unnecessary network traffic you should import only properties that are actually needed for the intended task. Use the checkboxes in the **Present** column to select which properties to get.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Object Instance	The instance number (0 to 4,194,303) of the BACnet object you are linking to.
Device Alias	This field represents the address of the BACnet device from which this microblock will retrieve its values. You can type the Device Instance of the BACnet device or the Device Alias character string defined in a Device Alias microblock. If you leave this field blank, the system will use “this” in the Display microblock’s BACnet address and retrieve this microblock’s values from the device to which the microblock’s control program is attached in SiteBuilder.
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.
Object Name	An alpha-numeric string that is unique within the BACnet device.
Object ID	A combination of the Object Type and the Object Instance number.
Object Type	The BACnet object type.
Address	The address of the BACnet object that this microblock references.

Device Alias

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Display microblocks* (page 227)
Icon and symbol	
What it does	This microblock works with the Device Alias field in every Display microblock to enable efficient re-use of a control program for multiple BACnet devices. You define a character string, or Device Alias, for a particular Device Instance in this microblock. Then you use the same character string in the Device Alias field of any Display microblocks that you want to use the same Device Instance. At runtime, the system replaces the Device Alias character string in a Display microblock with the Device Instance defined in the Device Alias microblock to create a BACnet address. In another instance of the same control program, you can change the Device Instance field in this microblock to re-direct all Display microblocks using this microblock's Device Alias to a new BACnet device.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Device Alias	A character string that represents the device you are integrating with. For example, the model of the BACnet controller or equipment. Use this character string in the Device Alias field of any Display microblocks whose value will be retrieved from the same BACnet device.
Device Instance	The device instance of the BACnet device. At runtime, the system uses this device instance in the BACnet address of any Display microblocks using this microblock's Device Alias.

To reuse a control program

You can reuse a control program for multiple pieces of identical third-party equipment.

To reuse a control program for identical pieces of equipment:

1. In the Snap application, open the control program you want to reuse.
2. Add a **Device Alias** microblock.
3. In the **Property Editor**, type a meaningful character string such as the model number or name of the third-party device in the **Device Alias** field.
4. Select **Control Program** > **Edit Common Properties** > **Display Points** tab.
5. Select the **All** radio button.
6. Replace the numbers in the **Device Alias** column with the model number or name of the third-party device exactly as you typed it in step 3.
7. In SiteBuilder, assign this reusable control program to each instance of the third-party device.
8. In your i-Vu® or Field Assistant system, for each instance of the third-party equipment, change the Device Alias microblock's **Device Instance** number to match each specific device.

Sys In microblocks

System Input microblocks receive heat and cool requests, as well as other system information, editable properties, or constants used as input values to a control program.

Control programs use requests to communicate their heating and cooling needs to each other.

By using requests you can construct a software "chain" mimicking the mechanical chain of equipment in the building. When properly constructed, requests allow you to schedule terminal or zone equipment only, and allow other equipment to respond to zone requests. The equipment serving zones can use requests and the **Setpoint Optimization** microblock to constantly adjust discharge **setpoints** and minimize energy consumption.

Tot	*Total Analog* (page 293) This microblock gathers heating and cooling requests. The total number of requests received is the microblock's output.
Avg	*Average Analog* (page 296) This microblock calculates the average of the values read from output points. The average value is the microblock's output.
Min	*Minimum Analog* (page 298) This microblock monitors values read from output points. The lowest value read is the output of the microblock.
Max	*Maximum Analog* (page 301) This microblock gathers "runtime" requests. The Maximum Analog Properties can receive data from up to 10 addresses. The highest value read is the output of the microblock.
SysVar	*Get System Variable* (page 303) This microblock provides information to the control program stored in each device in the network. This information, while available in each device, must be provided to the control program using this microblock.
SysSta	*Get System Status* (page 305) This microblock can be used to indicate Read or Write errors in certain microblocks, and whether any microblock within the control program is Locked.
Para	*Binary Parameter* (page 307) This microblock is used to create a yes/no, on/off, open/closed, or true/false signal to be sent to the output wire.
Para	*Analog Parameter* (page 308) This microblock specifies a numeric value to be sent to another microblock in the control program.
Para	*Time Parameter* (page 309) This microblock specifies an amount of time to be sent to another microblock in the control program.

Cnst	*Binary Constant* (page 310) This microblock specifies a yes/no, on/off, true/false, or open/closed value to be sent to another microblock in the control program. Binary Constants do not appear on the **Properties** page and should be used instead of Binary Parameter microblocks when the value of the microblock will not change.
Cnst	*Analog Constant* (page 311) This microblock specifies a numeric value to be sent to another microblock in the control program. Analog Constants do not appear on the **Properties** page and should be used instead of Analog Parameter microblocks when the value of the microblock will not change (such as a flow coefficient or pi).
Cnst	*Time Constant* (page 312) This microblock specifies a time value to be sent to another microblock in the control program. Time Constants do not appear on the **Properties** page and should be used instead of Time Parameter microblocks when the value of the microblock will not change.

BACnet

Para	*BACnet Binary Value Parameter* (page 313) This microblock creates a yes or no, or on or off signal to be sent to another microblock in the control program.
Para	*BACnet Analog Value Parameter* (page 317) This microblock specifies a numeric value to be sent to another microblock in the control program.
MSV	*BACnet Multi-State Value Parameter* (page 322) This microblock specifies a signal to be sent to the output wire. Multi-State microblocks are used to indicate values that have more than two discrete states (20 maximum).

Total Analog

⚠ The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys In microblocks* (page 292)
Icon and symbol	Total Tot Valid?
What it does	This microblock gathers heating and cooling requests. The total number of requests received is the microblock's output. The microblock can receive data from up to 10 addresses. You define the 10 addresses using the tree control on the microblock's Properties page.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Display resolution	The microblock's value is truncated and incrementally updated as follows: The **Display resolution** format is used to truncate the microblock’s actual value. For example, if you enter a value from: • 0.1 to 0.9, the system displays 1 digit to the right of the decimal • 0.01 to 0.99, the system displays 2 digits to the right of the decimal • 1 or greater, the system displays a whole number The **Display resolution** value determines the increment by which the displayed value is updated. For example, if you enter: • .2, the system displays 8.4, 8.6, 8.8, ... • .03, the system displays 5.09, 5.12, 5.15, ... • 10, the system displays 30, 40, 50, ...
Default Value	The value that the microblock outputs when communication with all specified targets fails or when **Communications Enabled** is not checked. The default value is used when the **Valid?** output is False (**Off**).
Communications Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.

Refresh Time	The interval at which the microblock reads the target value. If the target is a BACnet object property: • Type a value greater than 30 seconds to attempt a BACnet COV (Change of Value) subscription with the target object. If subscription succeeds, the target sends a value to this microblock only when the target's value changes by at least the target's **COV Increment**. If subscription fails, this microblock reads the target value at the interval you specify. • Type a value of 30 seconds or less to disable BACnet COV subscription and read the target value at the interval you specify. If using v6.00a or later drivers, you can reduce network traffic by: • Changing the refresh time to something greater than 10 minutes. If the refresh time is 10 minutes or less, the microblock will resubscribe every 10 minutes. If the refresh time is greater than 10 minutes, the microblock will use that value as the resubscription interval. • Entering 01 in the seconds field of any value 1 minute or greater to have this microblock subscribe using only confirmed COV notifications (not unconfirmed). For example, 1:01, 5:01, etc.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Average Analog

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys In microblocks* (page 292)
Icon and symbol	
What it does	This microblock calculates the average of the values read from output points. The average value is the microblock's output. For example, you could use the Average Analog Properties microblock to determine the average temperature for a floor. The microblock can receive data from up to 10 addresses. You define the 10 addresses using the tree control on the Average Analog Properties microblock's **Properties** page.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. ⚠ **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Display resolution	The microblock's value is truncated and incrementally updated as follows: The **Display resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the system displays 1 digit to the right of the decimal • 0.01 to 0.99, the system displays 2 digits to the right of the decimal • 1 or greater, the system displays a whole number The **Display resolution** value determines the increment by which the displayed value is updated. For example, if you enter: • .2, the system displays 8.4, 8.6, 8.8, ... • .03, the system displays 5.09, 5.12, 5.15, ... • 10, the system displays 30, 40, 50, ...
Default Value	The value that the microblock outputs when communication with all specified targets fails or when **Communications Enabled** is not checked. The default value is used when the **Valid?** output is False (**Off**).
Communications Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.
Refresh Time	The interval at which the microblock reads the target value. If the target is a BACnet object property: • Type a value greater than 30 seconds to attempt a BACnet COV (Change of Value) subscription with the target object. If subscription succeeds, the target sends a value to this microblock only when the target's value changes by at least the target's **COV Increment**. If subscription fails, this microblock reads the target value at the interval you specify. • Type a value of 30 seconds or less to disable BACnet COV subscription and read the target value at the interval you specify. If using v6.00a or later drivers, you can reduce network traffic by: • Changing the refresh time to something greater than 10 minutes. If the refresh time is 10 minutes or less, the microblock will resubscribe every 10 minutes. If the refresh time is greater than 10 minutes, the microblock will use that value as the resubscription interval. • Entering 01 in the seconds field of any value 1 minute or greater to have this microblock subscribe using only confirmed COV notifications (not unconfirmed). For example, 1:01, 5:01, etc.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Minimum Analog

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys In microblocks* (page 292)
Icon and symbol	
What it does	This microblock monitors values read from output points. The lowest value read is the output of the microblock. For example, you could use this microblock to determine the lowest zone temperature on a floor by gathering data from several Zone Setpoints. The microblock can receive data from up to 10 addresses. You define the 10 addresses using the tree control on the Minimum Analog Properties microblock's **Properties** page.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Display resolution	The microblock's value is truncated and incrementally updated as follows: The **Display resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the system displays 1 digit to the right of the decimal • 0.01 to 0.99, the system displays 2 digits to the right of the decimal • 1 or greater, the system displays a whole number The **Display resolution** value determines the increment by which the displayed value is updated. For example, if you enter: • .2, the system displays 8.4, 8.6, 8.8, ... • .03, the system displays 5.09, 5.12, 5.15, ... • 10, the system displays 30, 40, 50, ...
Default Value	The value that the microblock outputs when communication with all specified targets fails or when **Communications Enabled** is not checked. The default value is used when the **Valid?** output is False (**Off**).
Communications Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.

Refresh Time	The interval at which the microblock reads the target value. If the target is a BACnet object property: • Type a value greater than 30 seconds to attempt a BACnet COV (Change of Value) subscription with the target object. If subscription succeeds, the target sends a value to this microblock only when the target's value changes by at least the target's **COV Increment**. If subscription fails, this microblock reads the target value at the interval you specify. • Type a value of 30 seconds or less to disable BACnet COV subscription and read the target value at the interval you specify. If using v6.00a or later drivers, you can reduce network traffic by: • Changing the refresh time to something greater than 10 minutes. If the refresh time is 10 minutes or less, the microblock will resubscribe every 10 minutes. If the refresh time is greater than 10 minutes, the microblock will use that value as the resubscription interval. • Entering 01 in the seconds field of any value 1 minute or greater to have this microblock subscribe using only confirmed COV notifications (not unconfirmed). For example, 1:01, 5:01, etc.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Maximum Analog

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys In microblocks* (page 292)
Icon and symbol	
What it does	This microblock gathers "runtime" requests. The Maximum Analog Properties can receive data from up to 10 addresses. The highest value read is the output of the microblock. For example, if it receives requests for 2 minutes, 5 minutes and 7 minutes, the output from this microblock is 7. The microblock can receive data from up to 10 addresses. You define the 10 addresses using the tree control on the Maximum Analog Properties microblock's **Properties** page.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Display resolution	The microblock's value is truncated and incrementally updated as follows: The **Display resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the system displays 1 digit to the right of the decimal • 0.01 to 0.99, the system displays 2 digits to the right of the decimal • 1 or greater, the system displays a whole number The **Display resolution** value determines the increment by which the displayed value is updated. For example, if you enter: • .2, the system displays 8.4, 8.6, 8.8, ... • .03, the system displays 5.09, 5.12, 5.15, ... • 10, the system displays 30, 40, 50, ...
Default Value	The value that the microblock outputs when communication with all specified targets fails or when **Communications Enabled** is not checked. The default value is used when the **Valid?** output is False (**Off**).
Communications Enabled	Check to enable network communications for this microblock. Uncheck when troubleshooting.
Refresh Time	The interval at which the microblock reads the target value. If the target is a BACnet object property: • Type a value greater than 30 seconds to attempt a BACnet COV (Change of Value) subscription with the target object. If subscription succeeds, the target sends a value to this microblock only when the target's value changes by at least the target's **COV Increment**. If subscription fails, this microblock reads the target value at the interval you specify. • Type a value of 30 seconds or less to disable BACnet COV subscription and read the target value at the interval you specify. If using v6.00a or later drivers, you can reduce network traffic by: • Changing the refresh time to something greater than 10 minutes. If the refresh time is 10 minutes or less, the microblock will resubscribe every 10 minutes. If the refresh time is greater than 10 minutes, the microblock will use that value as the resubscription interval. • Entering 01 in the seconds field of any value 1 minute or greater to have this microblock subscribe using only confirmed COV notifications (not unconfirmed). For example, 1:01, 5:01, etc.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Get System Variable

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys In microblocks* (page 292)
Icon and symbol	
What it does	This microblock provides information to the control program stored in each device in the network. This information, while available in each device, must be provided to the control program using this microblock. • Current time (0-1439; in minutes since midnight) • Current day of the week (Monday=1, Sunday=7) • Current day of the month (1-31) • Minute (0-59) • Hour (0-23) • Month (1-12) • Year (1981-2040) • Seconds (0-59)

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

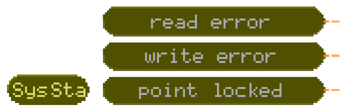
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Type	The Get System Variable microblock provides information to the control program stored in each device in the network. This information, while available in each device, must be provided to the control program using this microblock. Current time (0-1439; in minutes since midnight) • Current day of the week (Monday=1, Sunday=7) • Current day of the month (1-31) • Minute (0-59) • Hour (0-23) • Month (1-12) • Year (1981-2040) • Seconds (0-59)

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Get System Status

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys In microblocks* (page 292)
Icon and symbol	
What it does	This microblock can be used to indicate Read or Write errors in certain microblocks, and whether any microblock within the control program is Locked. **Read Error** If you choose **read error** in the Initial Type section, then the microblock has a True value only when a Network Input microblock or an Analog Properties microblock in the same control program indicates an error condition. This includes Analog Network Input, Analog Network Input 2, Binary Network Input, Binary Network Input 2, Average Analog Properties, Maximum Analog Properties, Minimum Analog Properties, and Total Analog Properties microblocks. **Write Error** If you choose **write error**, then the microblock has a value of True only when a Network Output microblock in the same control program indicates an error condition. This includes Analog Network Output, Analog Network Output 2, Binary Network Output and Binary Network Output 2 microblocks. **Point Locked** If you choose **point locked**, then the microblock has a value of True only when points in the same control program are currently locked. The microblock's value is True or False. The Get System Status function may be used to send notice of these conditions to Alarm microblocks.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

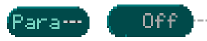
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Type	The Get System Status microblock can be used to indicate Read or Write errors in certain microblocks, and whether any microblock within the control program is Locked. **Read Error** If you choose **read error** in the Initial Type section, then the microblock has a True value only when a Network Input microblock or an Analog Properties microblock in the same control program indicates an error condition. This includes Analog Network Input, Analog Network Input 2, Binary Network Input, Binary Network Input 2, Average Analog Properties, Maximum Analog Properties, Minimum Analog Properties, and Total Analog Properties microblocks. **Write Error** If you choose **write error**, then the microblock has a value of True only when a Network Output microblock in the same control program indicates an error condition. This includes Analog Network Output, Analog Network Output 2, Binary Network Output and Binary Network Output 2 microblocks. **Point Locked** If you choose **point locked**, then the microblock has a value of True only when points in the same control program are currently locked. The microblock's value is True or False. The Get System Status function may be used to send notice of these conditions to Alarm microblocks.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Binary Parameter

The information below provides a <u>FULL</u> description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys In microblocks* (page 292)
Icon and symbol	
What it does	This microblock is used to create a yes/no, on/off, open/closed, or true/false signal to be sent to the output wire.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Type	Select **Text Defined Below** to use the values in the Active Text and Inactive Text fields. Or select the Inactive and Active text you wish to use from the Type droplist.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Default Value	The value the control program uses until a user changes the value in the system interface.
Momentary	Lets the i-Vu®/Field Assistant user change the parameter to the new state for one execution of logic. The i-Vu®/Field Assistant application then changes the parameter back to the original state.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Analog Parameter

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys In microblocks* (page 292)
Icon and symbol	
What it does	This microblock specifies a numeric value to be sent to another microblock in the control program.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Default Value	The value the control program uses until a user changes the value in the system interface.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Time Parameter

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys In microblocks* (page 292)
Icon and symbol	
What it does	This microblock specifies an amount of time to be sent to another microblock in the control program.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

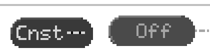
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Default Value	The value the control program uses until a user changes the value in the system interface.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Binary Constant

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys In microblocks* (page 292)
Icon and symbol	
What it does	This microblock specifies a yes/no, on/off, true/false, or open/closed value to be sent to another microblock in the control program. Binary Constants do not appear on the **Properties** page and should be used instead of Binary Parameter microblocks when the value of the microblock will not change.

Properties

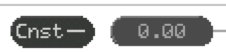
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Type	Select **Text Defined Below** to use the values in the Active Text and Inactive Text fields. Or select the Inactive and Active text you wish to use from the Type droplist.
Present Value	The value that the microblock uses on the control program output wire. For constant microblocks, this value can only be changed in the Snap application. For parameter microblocks, this value can be changed in the i-Vu® or Field Assistant system or in the Snap application.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.

Analog Constant

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys In microblocks* (page 292)
Icon and symbol	
What it does	This microblock specifies a numeric value to be sent to another microblock in the control program. Analog Constants do not appear on the **Properties** page and should be used instead of Analog Parameter microblocks when the value of the microblock will not change (such as a flow coefficient or pi).

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Present Value	The value that the microblock uses on the control program output wire. For constant microblocks, this value can only be changed in the Snap application. For parameter microblocks, this value can be changed in the i-Vu® or Field Assistant system or in the Snap application.

Time Constant

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys In microblocks* (page 292)
Icon and symbol	
What it does	This microblock specifies a time value to be sent to another microblock in the control program. Time Constants do not appear on the **Properties** page and should be used instead of Time Parameter microblocks when the value of the microblock will not change.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Present Value	The value that the microblock uses on the control program output wire. For constant microblocks, this value can only be changed in the Snap application. For parameter microblocks, this value can be changed in the i-Vu® or Field Assistant system or in the Snap application.

BACnet Binary Value Parameter

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys In microblocks* (page 292)
Icon and symbol	
What it does	This microblock creates a yes or no, or on or off signal to be sent to another microblock in the control program. Any BACnet device can read or change the value of this parameter. If no BACnet device changes the value of this parameter, the default value is used. The value appears to other BACnet devices as the Present Value property of a BACnet Binary Value Object. You can assign text to active and inactive states to make it better represent the microblock's usage. You can configure this microblock to make its value available on the Rnet.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Default Value	The value the control program uses until a user changes the value in the system interface.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Momentary	**NOTE A control program with this feature enabled works only with v5.5 or later systems and v5.5 or later drivers. This feature cannot be used in a control program for a Room Controller, S6104, UNI, or M line controller.** Lets the i-Vu®/Field Assistant user change the parameter to the new state for one execution of logic. The i-Vu®/Field Assistant application then changes the parameter back to the original state.
Minimum off time	The minimum period (seconds) that the microblock's present value will be off, regardless of the input signal to the microblock.
Minimum on time	The minimum period (seconds) that the microblock's present value will be on, regardless of the input signal to the microblock.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm Enabled	Check to send a message when this microblock indicates an alarm condition.
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Rnet

NOTE A control program that uses these Rnet features works only with v5.5 or later systems and v5.5 or later drivers.

Enable Rnet	Check to allow this microblock to communicate its value(s) to and from a sensor.
Rnet Tag	All values from a ZS or wireless sensor must have an Rnet tag that defines what type of information this microblock's value represents. For a ZS sensor, it also determines how the sensor will display the value. For example, if you select **Fan Command (101)**, the sensor displays the active or inactive text and the number 101 in the lower left corner to identify the value is a fan command. **NOTE** If the Rnet tag droplist does not have the tag you want, you can create a custom tag in the Snap application.
Editable	Select to make this microblock's value editable on the ZS sensor.
ZS Sensor Display Configuration	
Show on:	Check the sensor screen(s) that you want this microblock's value displayed on. **Home Screen (1)**: When more than one value is assigned to the Home screen, the values cycle from one to the next. Typically, the first item displays for 10 seconds and any other items display for 3 seconds each. **Information Screen (2)**: This screen is accessed by pressing the sensor's *i* button. **Diagnostics Screen (3)**: This screen is accessed by holding the sensor's *i* button for at least 3 seconds. **NOTE** Select **Reorder** > **Sensor Display Order** in Snap to define the order in which multiple microblock values will appear on each sensor screen.

Display Inactive Text	Type the text that the ZS sensor is to display when the microblock's output is off or false. **NOTE** The letters K, M, Q, V, W, X do not display on the screen.
Display Active Text	Type the text that the ZS sensor is to display when the microblock's output is on or true. **NOTE** The letters K, M, Q, V, W, X do not display on the screen.

BACnet Analog Value Parameter

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys In microblocks* (page 292)
Icon and symbol	
What it does	This microblock specifies a numeric value to be sent to another microblock in the control program. Any BACnet device on the network can read or change the value of this parameter. If no BACnet device changes the value of this parameter, the default value is used. The value appears to other BACnet devices as the Present Value property of a BACnet Analog Value Object. You can configure this microblock to make its value available on the Rnet.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Default Value	The value the control program uses until a user changes the value in the system interface.
Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

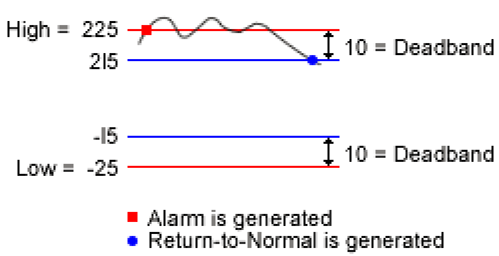
BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Critical Value	If your control program has logic that writes a critical value to this microblock periodically, select this option to have the system attempt to upload this microblock's value (Relinquish Default property) and preserve it through a download, controller restart, or power loss.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.
COV Increment	An Analog Network Input (ANI) that references this microblock in its **Address** field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the **COV Increment**. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's **Refresh Time** field.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Low Limit Enable	Check to send an alarm when the microblock's present value remains below the **Low Limit** value for the defined **Delay Seconds**.
Low Limit	The value the microblock's present value must drop below to send an alarm.
High Limit Enable	Check to send an alarm when the microblock's present value remains above the **High Limit** for the defined **Delay Seconds**.
High Limit	The value the microblock's present value must rise above to send an alarm.
Dead Band	The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated. **EXAMPLE** 
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Rnet

NOTE A control program that uses these Rnet features works only with v5.5 or later systems and v5.5 or later drivers.

Enable Rnet	Check to allow this microblock to communicate its value(s) to and from a sensor.
Rnet Tag	All values from a ZS or wireless sensor must have an Rnet tag that defines what type of information this microblock's value represents. For a ZS sensor, it also determines how the sensor will display the value. For example, if you select **Static Pressure Setpoint (411)**, the sensor displays the setpoint, a target icon to indicate it is a setpoint, and the number 411 in the lower left corner to identify the value is a static pressure setpoint. **NOTE** If the Rnet tag droplist does not have the tag you want, you can create a custom tag in the Snap application.
Display Resolution	Defines the resolution of the value to be displayed on the ZS sensor. For example, 1 displays only integers (example: 74) and 0.5 displays values to the nearest 0.5 (example: 74.5).
Editable	Select to make this microblock's value editable on the ZS sensor.
Edit Increment	Select how much you want each press of the sensor's ▲ or ▼ button to change the microblock's value.
Minimum	Enter the lowest amount that this value can be changed to on the ZS sensor or in the i-Vu®/Field Assistant interface.
Maximum	Enter the highest amount that this value can be changed to on the ZS sensor or in the i-Vu®/Field Assistant interface.

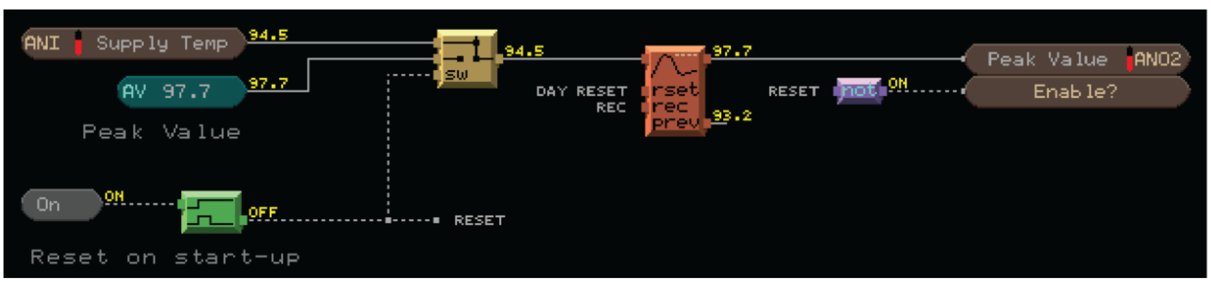
ZS Sensor Display Configuration	
Show on:	Check the sensor screen(s) that you want this microblock's value displayed on. **Home Screen (1)**: When more than one value is assigned to the Home screen, the values cycle from one to the next. Typically, the first item displays for 10 seconds and any other items display for 3 seconds each. **Information Screen (2)**: This screen is accessed by pressing the sensor's button. **Diagnostics Screen (3)**: This screen is accessed by holding the sensor's button for at least 3 seconds. **NOTE** Select **Reorder** > **Sensor Display Order** in Snap to define the order in which multiple microblock values will appear on each sensor screen.

Tips and tricks

Preserving Critical Values

If you use an Analog Network Output microblock to periodically write a critical value from within a control program to this microblock's Relinquish Default property, and you check the **Critical Value** field, the system will attempt to upload this microblock's value and preserve it through a download.

In the following example, the High Peak Recorder records the highest supply temperature each day. The Peak Value BACnet Analog Value Parameter has a reference name of peak_value, an object instance of 4013, and **Critical Value** is checked. The Peak Value ANO2 microblock's target address is bacnet://this/AV:4013/104. Thus, the ANO microblock periodically (once per minute, or based on COV) writes the day's peak supply temperature to the BAV Parameter's Relinquish Default property (104).



In the event of a download, the system uploads the Relinquish Default property from the BAV Parameter microblock, downloads to the controller, then writes the stored Relinquish Default property to the microblock with refname peak_value. So even if the program is edited and reloaded, the value in the BAV parameter is preserved, provided the BAV's refname does not change. When the controller restarts, the Reset on start-up logic feeds the peak value back into the peak recorder and disables the ANO2, preserving the peak value in the High Peak recorder through the download and preventing the ANO2 from overwriting the previous peak until the value has been restored.

BACnet Multi-State Value Parameter

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys In microblocks* (page 292)
Icon and symbol	
What it does	This microblock specifies a signal to be sent to the output wire. Multi-State microblocks are used to indicate values that have more than two discrete states (20 maximum). For example, a parameter may have states of High, Medium, and Low rather than a numeric value. Any BACnet device on the network can read or change the value of this parameter. If no BACnet device changes the value of this parameter, the default value is used. The value appears to other BACnet devices as the Present Value property of this BACnet object. You can configure this microblock to make its value available on the Rnet.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Default Value	The value the control program uses until a user changes the value in the system interface.
Momentary	NOTE A control program with this feature enabled works only with v5.5 or later systems and v5.5 or later drivers. This feature cannot be used in a control program for a Room Controller, S6104, UNI, or M line controller. Lets the i-Vu®/Field Assistant user change the parameter to the new state for one execution of logic. The i-Vu®/Field Assistant application then changes the parameter back to the original state.
State Text	You must define the text that will appear on the **Properties** page when the device is in each state. For Value 1, type the text in the field under **BACnet Text**. For each additional state, click **Add** and then type the text. To have a state put the BACnet object in an alarm or fault condition, select the appropriate option for that state under **Alarm/Fault**. You can set a maximum of 10 states to fault, and a maximum of 10 states to alarm. If you checked **Enable Rnet for ZS Sensors** on the **Rnet** tab, type the text that you want to appear on a ZS Sensor display in the field under **Rnet Text**. The **Preview** field shows you how it will look on the sensor. **NOTE** The letters K, M, Q, V, W, X do not display on the screen.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Critical Value	If your control program has logic that writes a critical value to this microblock periodically, select this option to have the system attempt to upload this microblock's value (Relinquish Default property) and preserve it through a download, controller restart, or power loss.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm Enabled	Check to send a message when this microblock indicates an alarm condition.
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Rnet

NOTE A control program that uses these Rnet features works only with v5.5 or later systems and v5.5 or later drivers.

Enable Rnet	Check to allow this microblock to communicate its value(s) to and from a sensor.
Rnet Tag	All values from a ZS or wireless sensor must have an Rnet tag that defines what type of information this microblock's value represents. For a ZS sensor, it also determines how the sensor will display the value. For example, if you select **Fan Speed Request (600)**, the sensor displays the state text and the number 600 in the lower left corner to identify the value is a fan speed request. **NOTES** • If you select **Fan Speed Request** or **Zone Mode Request**, the **Critical Value** field on the Properties tab is automatically enabled to prevent a parameter mismatch in the i-Vu®/Field Assistant application if a user changes the values on the sensor. • If the Rnet tag droplist does not have the tag you want, you can create a custom tag in the Snap application.
Editable	Check under **Occupied** or **Unoccupied** to make each setpoint editable on a ZS Sensor.
ZS Sensor Display Configuration	
Show on:	Check the sensor screen(s) that you want this microblock's values displayed on. **Home Screen (1)**: When more than one value is assigned to the Home screen, the values cycle from one to the next. Typically, the first item displays for 10 seconds and any other items display for 3 seconds each. **Information Screen (2)**: This screen is accessed by pressing the sensor's *i* button. **Diagnostics Screen (3)**: This screen is accessed by holding the sensor's *i* button for at least 3 seconds. **NOTE** Select **Reorder** > **Sensor Display Order** to define the order in which multiple microblock values will appear on each sensor screen.

Sys Out microblocks

System Output microblocks contain control program output values, such as heat and cool requests or other status information. You can make these values network-visible to other BACnet devices.

Control programs use requests to communicate their heating and cooling needs to each other.

Using requests you can construct a software "chain" mimicking the mechanical chain of equipment in the building. When properly constructed, requests allow you to schedule terminal or zone equipment only and allow other equipment to respond to zone requests. The equipment serving zones can use requests and the **Setpoint Optimization** microblock to constantly adjust discharge setpoints and minimize energy consumption.

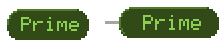
Prime	*Prime Variable* (page 327) This microblock identifies a single specific value from the control program that is representative of the entire control program, such as the current zone temperature.
···Stat	*Binary Status* (page 328) This microblock displays a yes/no, on/off, open/closed, or true/false value from the control program on the **Properties** page. You can use this microblock to display the value of another microblock that would not normally appear on the **Properties** page.
—Stat	*Analog Status* (page 329) This microblock displays the numeric value from the control program on the **Properties** page. You can use this microblock to display the value of another microblock that would not normally appear on the **Properties** page.
Stat	*Time Status* (page 330) This microblock displays a time value from the control program on the **Properties** page. You can use this microblock to display the value of another microblock that would not normally appear on the **Properties** page.

BACnet

···Stat	*BACnet Binary Value Status* (page 331) This microblock displays a yes/no or on/off value from the control program. Any BACnet device can read the value of this microblock. The value appears to other BACnet devices as the Present Value Property of a BACnet Binary Value Object.
—Stat	*BACnet Analog Value Status* (page 335) This microblock displays the numeric value from the control program. Any BACnet device can read the value of this microblock. The value appears to other BACnet devices as the Present Value property of a BACnet Analog Value Object.
— MSV	*BACnet Multi-State Value Status* (page 339) This microblock specifies a signal to be sent to another microblock in the control program. Multi-State microblocks are used to specify signals from devices that have more than two discrete states (20 maximum).

Prime Variable

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys Out microblocks* (page 326)
Icon and symbol	
What it does	This microblock identifies a single specific value from the control program that is representative of the entire control program, such as the current zone temperature. Every control program has a color and a prime variable. Their values are set in the control program logic by the Set Color and Prime Variable microblocks. If these microblocks are not present in the control program, their corresponding values will be zero. It is a good idea to provide meaningful values for these two numbers so that generic graphics or reports will have something meaningful to display for your control program.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Binary Status

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys Out microblocks* (page 326)
Icon and symbol	
What it does	This microblock displays a yes/no, on/off, open/closed, or true/false value from the control program on the **Properties** page. You can use this microblock to display the value of another microblock that would not normally appear on the **Properties** page.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

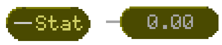
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Type	Select **Text Defined Below** to use the values in the Active Text and Inactive Text fields. Or select the Inactive and Active text you wish to use from the Type droplist.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Analog Status

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys Out microblocks* (page 326)
Icon and symbol	
What it does	This microblock displays the numeric value from the control program on the **Properties** page. You can use this microblock to display the value of another microblock that would not normally appear on the **Properties** page.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

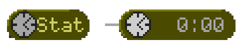
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Display resolution	The microblock's value is truncated and incrementally updated as follows: The **Display resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the system displays 1 digit to the right of the decimal • 0.01 to 0.99, the system displays 2 digits to the right of the decimal • 1 or greater, the system displays a whole number The **Display resolution** value determines the increment by which the displayed value is updated. For example, if you enter: • .2, the system displays 8.4, 8.6, 8.8, ... • .03, the system displays 5.09, 5.12, 5.15, ... • 10, the system displays 30, 40, 50, ...

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Time Status

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys Out microblocks* (page 326)
Icon and symbol	
What it does	This microblock displays a time value from the control program on the **Properties** page. You can use this microblock to display the value of another microblock that would not normally appear on the **Properties** page. The microblock's value must be defined in hours and minutes. If the microblock receives a numeric value, minutes and seconds value, or other value, it will not be converted to an hours and minutes value.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

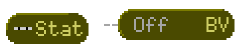
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet Binary Value Status

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys Out microblocks* (page 326)
Icon and symbol	
What it does	This microblock displays a yes/no or on/off value from the control program. Any BACnet device can read the value of this microblock. The value appears to other BACnet devices as the Present Value Property of a BACnet Binary Value Object. You can assign text to active and inactive states to make it better represent the microblock's usage. You can configure this microblock to make its value available on the Rnet.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Minimum off time	The minimum period (seconds) that the microblock's present value will be off, regardless of the input signal to the microblock.
Minimum on time	The minimum period (seconds) that the microblock's present value will be on, regardless of the input signal to the microblock.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm Enable	Check to send a message when this microblock indicates an alarm condition.
Alarm State	**Active** - An alarm condition exists when the microblock's present value is on (true). **Inactive** - An alarm condition exists when the microblock's present value is off (false).
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

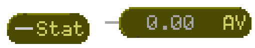
Rnet

NOTE A control program that uses these Rnet features works only with v5.5 or later systems and v5.5 or later drivers.

Enable Rnet	Check to allow this microblock to communicate its value to a sensor.
Rnet Tag	All values displayed on a ZS sensor must have an Rnet tag that defines what type of information this microblock's value represents. It also determines how the sensor will display the value. For example, if you select **Fan Status**, the sensor automatically displays on the Home screen when the microblock is active. **NOTE** If the Rnet tag droplist does not have the tag you want, you can create a custom tag in the Snap application.
ZS Sensor Display Configuration	
Show on:	Check the sensor screen(s) that you want this microblock's value displayed on. **Home Screen (1)**: When more than one value is assigned to the Home screen, the values cycle from one to the next. Typically, the first item displays for 10 seconds and any other items display for 3 seconds each. **Information Screen (2)**: This screen is accessed by pressing the sensor's button. If you select this screen and select **Maintenance** or **Alarm** below, when the microblock is active, its value displays first on the Information screen. When inactive it does not display at all. **Diagnostics Screen (3)**: This screen is accessed by holding the sensor's button for at least 3 seconds. If you select this screen and select **Maintenance** or **Alarm** below, when the microblock is active, its value displays first on the Diagnostics screen. When inactive it does not display at all. **NOTE** Select **Reorder** > **Sensor Display Order** to define the order in which multiple microblock values will appear on each sensor screen.
Show when active as:	
Maintenance	Check to have the ZS Pro sensor display on the Home screen when this microblock is active.
Alarm	Check to have the ZS Pro sensor display on the Home screen when this microblock is active.
Show text:	
Display Inactive Text	Type the text that the ZS sensor is to display when the microblock's output is off or false. **NOTE** The letters K, M, Q, V, W, X do not display on the screen.
Display Active Text	Type the text that the ZS sensor is to display when the microblock's output is on or true. **NOTE** The letters K, M, Q, V, W, X do not display on the screen.

BACnet Analog Value Status

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys Out microblocks* (page 326)
Icon and symbol	
What it does	This microblock displays the numeric value from the control program. Any BACnet device can read the value of this microblock. The value appears to other BACnet devices as the Present Value property of a BACnet Analog Value Object. You can configure this microblock to make its value available on the Rnet.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Units	The unit of measurement of the microblock's present value. Select from the BACnet engineering units in this droplist. For some microblocks, you can customize the droplist by selecting **Options** > **Preferences** > **Droplist Options**.
Display resolution	The microblock's value is truncated and incrementally updated as follows: The **Display resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the system displays 1 digit to the right of the decimal • 0.01 to 0.99, the system displays 2 digits to the right of the decimal • 1 or greater, the system displays a whole number The **Display resolution** value determines the increment by which the displayed value is updated. For example, if you enter: • .2, the system displays 8.4, 8.6, 8.8, ... • .03, the system displays 5.09, 5.12, 5.15, ... • 10, the system displays 30, 40, 50, ...

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

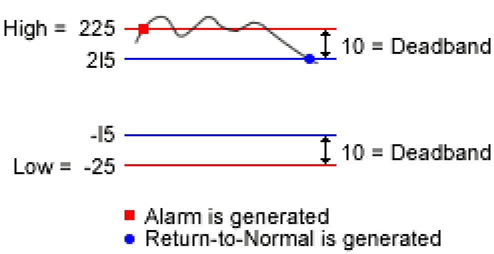
BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.
COV Increment	An Analog Network Input (ANI) that references this microblock in its **Address** field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the **COV Increment**. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's **Refresh Time** field.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Low Limit Enable	Check to send an alarm when the microblock's present value remains below the **Low Limit** value for the defined **Delay Seconds**.
Low Limit	The value the microblock's present value must drop below to send an alarm.
High Limit Enable	Check to send an alarm when the microblock's present value remains above the **High Limit** for the defined **Delay Seconds**.
High Limit	The value the microblock's present value must rise above to send an alarm.
Dead Band	The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated. **EXAMPLE** 
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Rnet

NOTE A control program that uses these Rnet features works only with v5.5 or later systems and v5.5 or later drivers.

Enable Rnet	Check to allow this microblock to communicate its value to a sensor.
Rnet Tag	All values displayed on a ZS sensor must have an Rnet tag that defines what type of information this microblock's value represents. It also determines how the sensor will display the value. For example, if you select **Outside Air Temp**, the sensor automatically displays with the value. **NOTE** If the Rnet tag droplist does not have the tag you want, you can create a custom tag in the Snap application.
Display Resolution	Defines the resolution of the value to be displayed on the ZS sensor. For example, 1 displays only integers (example: 74) and 0.5 displays values to the nearest 0.5 (example: 74.5).
ZS Sensor Display Configuration	
Show on:	Check the sensor screen(s) that you want this microblock's value displayed on. **Home Screen (1)**: When more than one value is assigned to the Home screen, the values cycle from one to the next. Typically, the first item displays for 10 seconds and any other items display for 3 seconds each. **Information Screen (2)**: This screen is accessed by pressing the sensor's button. **Diagnostics Screen (3)**: This screen is accessed by holding the sensor's button for at least 3 seconds. **NOTE** Select **Reorder** > **Sensor Display Order** in Snap to define the order in which multiple microblock values will appear on each sensor screen.

BACnet Multi-State Value Status

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Sys Out microblocks* (page 326)
Icon and symbol	
What it does	This microblock specifies a signal to be sent to another microblock in the control program. Multi-State microblocks are used to specify signals from devices that have more than two discrete states (20 maximum). For example, a device may have states of High, Medium, and Low rather than a numeric value. Any BACnet device on the network can read or change the value of this parameter. If no BACnet device changes the value of this parameter, the default value is used. The value appears to other BACnet devices as the Present Value property of the specified BACnet device. You can configure this microblock to make its value available on the Rnet.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
State Text	You must define the text that will appear on the **Properties** page when the device is in each state. For Value 1, type the text in the field under **BACnet Text**. For each additional state, click **Add** and then type the text. To have a state put the BACnet object in an alarm or fault condition, select the appropriate option for that state under **Alarm/Fault**. You can set a maximum of 10 states to fault, and a maximum of 10 states to alarm. If you checked **Enable Rnet for ZS Sensors** on the **Rnet** tab, type the text that you want to appear on a ZS Sensor display in the field under **Rnet Text**. The **Preview** field shows you how it will look on the sensor. **NOTE** The letters K, M, Q, V, W, X do not display on the screen.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm Enabled	Check to send a message when this microblock indicates an alarm condition.
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Rnet

NOTE A control program that uses these Rnet features works only with v5.5 or later systems and v5.5 or later drivers.

Enable Rnet	Check to allow this microblock to communicate its value to a sensor.
Rnet Tag	All values displayed on a ZS sensor must have an Rnet tag that defines what type of information this microblock's value represents. It also determines how the sensor will display the value. For example, if you select **Fan Speed Status**, the sensor automatically displays the appropriate icon (such as) to indicate the status and speed. **NOTE** If the Rnet tag droplist does not have the tag you want, you can create a custom tag in the Snap application.
ZS Sensor Display Configuration	
Show on:	Check the sensor screen(s) that you want this microblock's values displayed on. **Home Screen (1)**: When more than one value is assigned to the Home screen, the values cycle from one to the next. Typically, the first item displays for 10 seconds and any other items display for 3 seconds each. **Information Screen (2)**: This screen is accessed by pressing the sensor's button. **Diagnostics Screen (3)**: This screen is accessed by holding the sensor's button for at least 3 seconds. **NOTE** Select **Reorder** > **Sensor Display Order** to define the order in which multiple microblock values will appear on each sensor screen.

Log microblocks

Log microblocks record system values, such as trends, alarms, and runtime values.

Digital Trend (page 344)

This microblock records data for trend purposes from microblocks that do not support built-in trending.

Analog Trend (page 346)

This microblock records data for trend purposes from microblocks that do not support built-in trending.

Digital Trend with Sample Trigger (page 348)

This microblock records data for trend purposes. When the **rec** input goes from off to on, the **TRND** input records the current state. Data is not recorded again until the next time the **rec** input transitions from off to on.

Analog Trend with Sample Trigger (page 349)

This microblock records data for trend purposes. When the **rec** input goes from off to on, the **TRND** input records the current value. Data is not recorded again until the next time the **rec** input transitions from off to on.

Runtime Monitor (page 351)

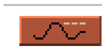
This microblock monitors the amount of time that a piece of equipment has been running and provides an output that can be used for notification when the runtime limit is exceeded.

BACnet Alarm (page 352)

This microblock transmits alarms and supplemental data from the control program to the system's alarm management system. An alarm generated by this microblock is time-stamped with the time the alarm was generated.

History Recorder (page 355)

This microblock records a current and previous value from a microblock in a control program. You determine when the value is recorded.



High Peak Recorder (page 357)

This microblock records the highest and previous highest value of a microblock in a control program. You determine when the values are recorded and when the highest value is transferred to the previous highest value.

Low Peak Recorder (page 358)

This microblock records the lowest and previous lowest value of a microblock in a control program. You determine when the values are recorded and when the lowest value is transferred to the previous lowest value.

Runtime Accumulation (page 359)

This microblock calculates the amount of time, in hours, that a piece of equipment has been running.

Digital Trend

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Log microblocks* (page 343)
Icon and symbol	
What it does	This microblock records data for trend purposes from microblocks that do not support built-in trending.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.

Sample on COV (change of value)	Records the microblock's present value only when the value changes.
Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. **NOTE** Click **Reset** on the microblock's **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.

In the i-Vu® or Field Assistant system only:

Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only?	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

Analog Trend

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Log microblocks* (page 343)
Icon and symbol	 
What it does	This microblock records data for trend purposes from microblocks that do not support built-in trending.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.

Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of value)	Records the microblock's present value only when the value changes by at least the **COV Increment**.
Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.
In the i-Vu® or Field Assistant system only:	
Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only?	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

Digital Trend with Sample Trigger

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Log microblocks* (page 343)
Icon and symbol	 
What it does	This microblock records data for trend purposes. When the **rec** input goes from off to on, the **TRND** input records the current state. Data is not recorded again until the next time the **rec** input transitions from off to on.

Properties

TIPS

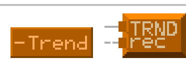
- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Enable Trend Log	Check to have the controller collect trend data for the microblock's present value.

Allocate memory for	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.

Analog Trend with Sample Trigger

⚠ The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Log microblocks* (page 343)
Icon and symbol	
What it does	This microblock records data for trend purposes. When the **rec** input goes from off to on, the **TRND** input records the current value. Data is not recorded again until the next time the **rec** input transitions from off to on.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

<table>
<tr><td>Display Name</td><td>The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.</td></tr>
<tr><td>Reference Name
RefName</td><td>Use the default reference name unless you want a more descriptive name for graphics or network links.

Limitations:
lower case only
limited to 40 characters
cannot begin with a number
must be unique within a control program</td></tr>
<tr><td>Description</td><td>(optional) A BACnet-visible microblock description.</td></tr>
<tr><td>Lock Present Value</td><td>Check to output the locked value from the microblock instead of the microblock's calculated value.</td></tr>
<tr><td>Editing Privilege</td><td>Preset - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is.

CAUTION If you change the Editing Privilege from Preset, the privilege you select will be used for all properties of this microblock, which is not always desirable.</td></tr>
<tr><td>Enable Trend Log</td><td>Check to have the controller collect trend data for the microblock's present value.</td></tr>
<tr><td>Allocate memory for</td><td>The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples:

(100 x 10 bytes) + 48 = 1048 bytes of memory

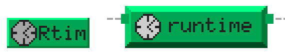
The allocated memory is constant regardless of how many samples are actually recorded.

If you do not enable trending, no memory is consumed.</td></tr>
<tr><td>Enable Trend Historian</td><td>Check this field to archive the controller's collected trend data to the system database after every 129 data samples.

NOTES
You must check Enable Trend Log if you want to Enable Trend Historian.
You can change Enable Trend Historian archival settings and other trend properties on the Properties page in the i-Vu® or Field Assistant system.</td></tr>
<tr><td>Keep historical trends for __ days</td><td>This is based on the date that the sample was read. Set this field to 0 to use the system default value.</td></tr>
</table>

Runtime Monitor

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Log microblocks* (page 343)
Icon and symbol	
What it does	This microblock monitors the amount of time that a piece of equipment has been running and provides an output that can be used for notification when the runtime limit is exceeded. The microblock tracks the amount of time that its input remains on. When the limit is reached, the microblock's output turns on. This output may be wired to a *BACnet Alarm microblock* (page 352) to generate a runtime exceeded alarm.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

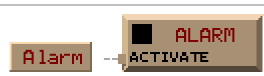
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Limit	The microblock's output will turn on when the runtime exceeds this number of hours.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet Alarm

⚠ The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Log microblocks* (page 343)
Icon and symbol	
What it does	This microblock transmits alarms and supplemental data from the control program to the system's alarm management system. An alarm generated by this microblock is time-stamped with the time the alarm was generated. For the system to receive an alarm, the **Potential alarm source** field must be checked. The color square on the left side of the microblock indicates the microblock's status: Red = In alarm Gray = Not in alarm Black = **Potential alarm source** field is unchecked

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Inactive Text	The text the system displays when the microblock's input is off (false).
Active Text	The text the system displays when the microblock's input is on (true).
Minimum off time	The minimum period (seconds) that the microblock's present value will be off, regardless of the input signal to the microblock.
Minimum on time	The minimum period (seconds) that the microblock's present value will be on, regardless of the input signal to the microblock.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm Enabled	Check to send a message when this microblock indicates an alarm condition.
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Tips and tricks

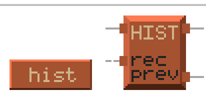
You can add a field code to the alarm text that will retrieve the value of another microblock at the time the alarm is triggered. Add the field code `$source:<path>$`, substituting <path> with the path to the value you want. The path can be an absolute path or a path relative to the BACnet Alarm microblock. See Defining i-Vu®/Field Assistant paths in i-Vu®/Field Assistant Help.

Example of alarm text:
The conference room is hot. The temperature is
$source:/trees/geographic/rd_facility/zone_1/lstat/present_value$

NOTE Field codes are processed when an alarm is processed at the server, not when the alarm is triggered in the controller. For slow changing values on a fast network, this is almost equivalent to the latched data feature in a legacy system. The value 2 to 3 seconds after the alarm occurred will be very close to the value at the time of the alarm. But for fast changing values on a slow network, the value could be misleading. If the alarm is processed up to a minute or two after the alarm occurred, the value could be very different than the value at the time of the alarm.

History Recorder

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Log microblocks* (page 343)
Icon and symbol	
What it does	This microblock records a current and previous value from a microblock in a control program. You determine when the value is recorded. The **Properties** page shows the current and previous values (Current cycle and Previous cycle), and the time and date when the recordings were made. The microblock's analog input receives the value that is to be recorded. When the **rec** input is on, the microblock transfers the current value of its input to its primary output, and the prior output value is transferred to the **prev** output. The value is recorded only once while the **rec** input is on. For example, if the microblock is used to record the zone temperature, and the **rec** input remains on while the temperature changes, only the temperature that was current at the time the **rec** input turned on will be recorded.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

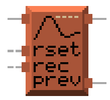
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

High Peak Recorder

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Log microblocks* (page 343)
Icon and symbol	 
What it does	This microblock records the highest and previous highest value of a microblock in a control program. You determine when the values are recorded and when the highest value is transferred to the previous highest value. For example, if you want to record the highest outside air temperature for each day, this microblock can record today's highest temperature and retain yesterday's highest temperature. The microblock's analog input receives the value that is to be recorded. When the **rec** input is on, the microblock monitors the input value and transfers the highest value received to the microblock's primary output. This output value is transferred to the **prev** output when the **rset** input is turned on.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

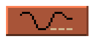
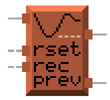
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Low Peak Recorder

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Log microblocks* (page 343)
Icon and symbol	 
What it does	This microblock records the lowest and previous lowest value of a microblock in a control program. You determine when the values are recorded and when the lowest value is transferred to the previous lowest value. For example, if you want to record the lowest outside air temperature for each day, this microblock can record today's lowest temperature and yesterday's lowest temperature. The microblock's analog input receives the value that is to be recorded. When the **rec** input is on, the microblock monitors the input value and transfers the lowest value received to the microblock's primary output. This output value is transferred to the **prev** output when the **rset** input is turned on.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

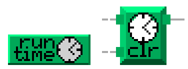
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Runtime Accumulation

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Log microblocks* (page 343)
Icon and symbol	
What it does	This microblock calculates the amount of time, in hours, that a piece of equipment has been running. This microblock records the amount of time its primary digital input is on. You can reset the microblock's value when you choose by using the microblock's **clr** input.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Simulation

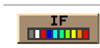
Preset Runtime Value lets you to define the number of hours that the microblock begins to count from. For example, if **Preset Runtime Value** is set to 5, the Runtime Accumulation microblock begins counting runtime hours at 5. The Reset button on the **Properties** page resets the microblock's value to the value indicated by the **Preset Runtime Value** setting.

Control microblocks

Control microblocks output signals that are used for control and scheduling purposes. Many of these microblocks generate colors, which are used to communicate control program or zone color status.

NOTE Make sure a control program broadcasts a single color by using one of the following:

- 1 Setpoint microblock
- 1 Set Color microblock
- 1 or more Set Color If True microblocks

	*BACnet Setpoint* (page 362) This microblock compares the zone temperature to the zone's effective setpoint to determine the zone color that represents the control program status. Other microblocks (such as the If Color = microblock) can use this color to perform additional control.
	*Setpoint Optimization* (page 386) Optimizes a single setpoint to use the least amount of energy necessary to meet the needs of the controlled equipment.
	*Set Color* (page 390) This microblock defines a color (white, gray, or red) for a control program that does not use a Zone Setpoint or Set Color If True microblock. This microblock is used so the control program displays a color in the i-Vu® or Field Assistant system indicating its status.
	*Set Color If True* (page 391) This microblock broadcasts the selected color for the control program when it is activated.
	*True if Color =* (page 392) This microblock allows you to define control sequences based on the control program's current color.
	*BACnet Time Clock with TLO and Override Status* (page 394) This microblock reads schedules from the i-Vu® or Field Assistant system and generates signals to tell the control program whether or not the zone is occupied and how long the zone will remain in its current state.
	*BACnet Multi-State Time Clock* (page 399) This microblock reads schedules from the i-Vu® or Field Assistant system and generates values to tell the control program what state the zone is in, and how long the zone will remain in its current state.

BACnet Setpoint

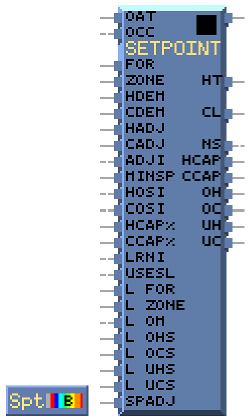
NOTE A control program with this microblock works only with v6.0 or later i-Vu®/Field Assistant systems and drivers.

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family

Control microblocks (page 361)

Icon and symbol



NOTE The microblock's appearance depends on which options you select in the Snap application. The microblock above is the result if you select all options.

What it does

The microblock compares the zone temperature to the zone's effective setpoint to determine the zone thermographic color that represents the control program status. Other microblocks (such as the If Color = microblock) can use this color to perform additional control.

The zone's effective setpoints may differ from its programmed occupied setpoints because of the optimal start algorithm, electric demand reduction levels, or user setpoint adjustment from the zone sensor.

OPTIONS

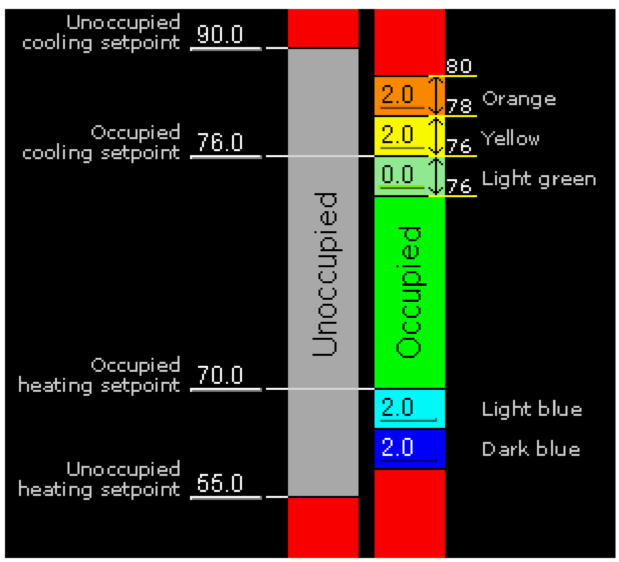
In the Snap application, you can enable the following optional functionality and inputs on the microblock's **Optional** tab.

- Demand Limiting: Provides **HDEM** and **CDEM** inputs that allow programmatic relaxation of setpoints to reduce electric demand.
- Setpoint Adjust: Provides **HADJ** or **CADJ** inputs by which the setpoint can be programmatically adjusted.
- Inhibit Setpoint Adjust: Provides **ADJI** input that allows your program to prevent the user from adjusting the setpoint at the sensor.

- Optimal Start: The microblock will use an optimal start algorithm to adjust the zone setpoint before the zone is occupied, ensuring that the zone temperature is within the occupied setpoints by the time the zone is occupied. Also provides **HOSI** and **COSI** inputs by which Optimal Start can be programmatically inhibited.
- Learning Adaptive: Adjusts (learns) zone heating and cooling capacities based on optimal start system performance. Also provides **LRNI** input by which learning can be programmatically inhibited.
- Night Setback: Provides **NS** output that is true (on) when the zone is not occupied, optimal start is not in progress, and the zone temperature exceeds the unoccupied heating or cooling setpoint.
- Minimum Setpoint Separation: Provides **MINSP** input that allows a minimum separation between the effective heating and cooling setpoints to be programmatically defined.
- Capacity Limit: Provides **HCAP%** and **CCAP%** inputs that allow programmatic limitation of the zone's learned heating or cooling capacity that the microblock uses in the Optimal Start routine.
- Zone Linkage: Provides **OH**, **OC**, **UH**, and **UC** outputs that are often needed to link zone applications with air or water sources. In contrast to the effective setpoint outputs, these outputs supply the programmed setpoints and are not affected by optimal start, demand limiting, or other temporary adjustments.
- Air Source Linkage: Provides **USESL**, **L FOR**, **L ZONE**, **L OM**, **L OHS**, **L OCS**, **L UHS**, **L UCS** inputs that are used to bypass the normal inputs to the Setpoint Microblock and substitute values from linkage.
- Setpoint Adjust Limit: Provides **SPADJ** input that sets the maximum amount (degrees) by which the user can adjust the zone's setpoints from a zone sensor. Enabling this option disables the **Setpoint Adjust Limit** field on the **Rnet** tab.

You can program a zone's occupied and unoccupied heating and cooling setpoints.

A typical zone thermographic color scale may look like this:



How it works

Heating and Cooling setpoints

The microblock outputs the effective zone heating (**HT**) and cooling (**CL**) setpoints. Unless adjusted by a user in the zone, by the optimal start algorithm, or by electric demand reduction levels, the effective setpoints equal the programmed occupied or unoccupied setpoints. All such adjustments to the programmed setpoints are cumulative. When the **OCC** input is true (on), the microblock adjusts the occupied cooling and heating setpoint values to generate the effective setpoints. When the **OCC** input is not true (off), the microblock adjusts the unoccupied heating and cooling setpoint values.

Maintaining Minimum Setpoint Separation (Deadband)

The microblock enforces a minimum separation (deadband) of twice the color change hysteresis value between the effective heating and cooling setpoints. For example, if a user or third-party BACnet system raises the heating setpoint to a value that is equal to or higher than the cooling setpoint, the cooling setpoint will be “pushed” to a higher value to prevent the heating and cooling ranges from overlapping. If locked property values or out of service values for any of the four setpoint objects (**Occupied Heating**, **Occupied Cooling**, **Unoccupied Heating** or **Unoccupied Cooling**) are set to a combination that causes the effective setpoints to overlap, the heat and cool setpoints are added, averaged, and the deadband is applied to either side of the averaged value to create effective setpoints that allow the control program to continue functioning properly.

If the option **Minimum Setpoint Separation** is selected, the deadband can be increased programmatically. If the value on the **MINSP** input is less than the microblock’s minimum deadband, the microblock will ignore the input value and use a deadband value of twice the color change hysteresis value.

Zone thermographic color

The microblock compares the zone temperature from the **ZONE** input to the zone's effective setpoints and resulting color scale to determine the zone color output value.

EXAMPLES

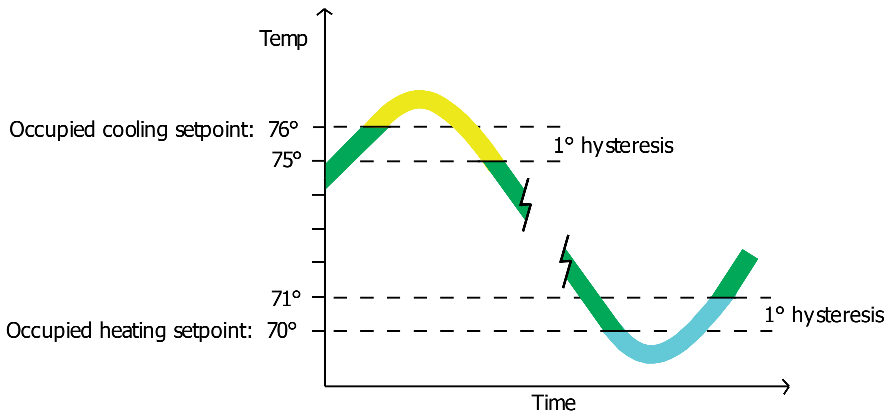
- Unoccupied
  - If the unoccupied zone temperature (65°) is between the unoccupied heating (55°) and cooling (90°) setpoints and the zone is not in optimal start, the microblock sets the color output value to unoccupied gray.
  - If the unoccupied zone temperature (54°) drops below the unoccupied heating setpoint (55°), the microblock sets the color and output value to light blue.
    NOTE The color thresholds between unoccupied gray and red can be seen in the i-Vu®/Field Assistant interface.
- Occupied
  If the occupied zone temperature (79°) exceeds the occupied cooling setpoint (76°) by more than the yellow color band value (2°) but less than the yellow and orange color band values (2° + 2° = 4°), the microblock sets the color output value to orange.
- Optimal start
  If the zone temperature (60°) drops below the effective heating setpoint (62°), the microblock sets the color output value to light blue.
  If the zone temperature (85°) exceeds the effective cooling setpoint (84°), the microblock sets the color output value to yellow.
- Demand level 1
  If the occupied zone temperature (68°) drops below the occupied heating setpoint minus the **Demand1** offset (70° – 1° = 69°) by less than the light blue band value (2°), the microblock sets the color output value to light blue.

Color Change Hysteresis

The **Color Change Hysteresis** provides a difference between the temperature at which the zone color changes as the zone temperature departs from the acceptable range between the heating and cooling setpoints and the temperature at which the zone color changes back as the zone temperature returns to the acceptable range.

EXAMPLE The following graph shows the zone color that results as the zone temperature departs from and returns to the acceptable range in a zone with the following settings:

- **Color Change Hysteresis** = 1° (applies as the temperature returns to the acceptable range)
- Occupied cooling setpoint = 76°
- Occupied heating setpoint = 70°



Demand Limiting (Optional)

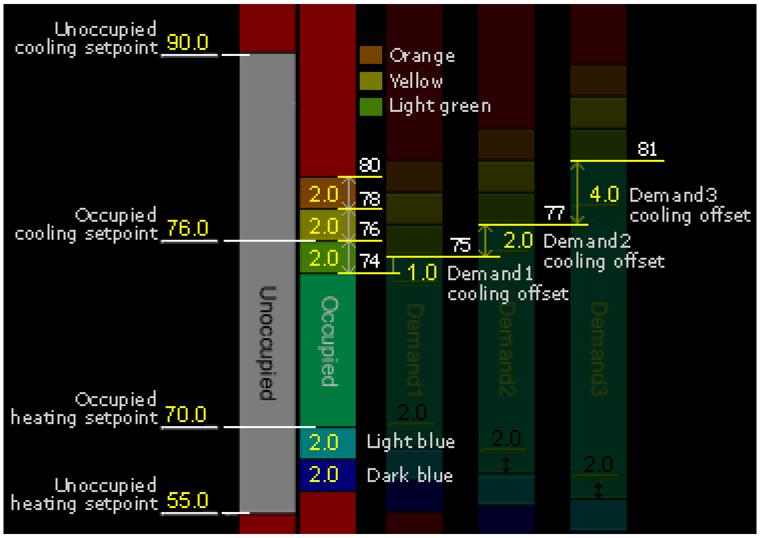
Electric rates can vary with electricity usage. In some locations, utilities offer incentives to customers to reduce electrical usage when the system-wide load threatens to exceed the grid capacity and cause brownouts. Some gas utilities offer incentives to customers to keep their natural gas usage below a certain level. To keep utility usage below peak demand levels, you can define 3 demand levels to reduce the cooling or heating load. You typically define these levels in your gas or electric meters' control programs. You can use these demand levels to relax zone occupied heating and cooling setpoints as needed throughout your system. Relaxing setpoints reduces equipment operation and reduces utility demand while minimizing the effects on occupant comfort.

To use this demand reduction strategy in a zone, set up *Analog Network Input* (page 174) microblocks to read the demand levels (1, 2, or 3) from the meter's control program and connect the Analog Network Input microblocks to this microblock's **HDEM** and **CDEM** inputs. In an all-electric system, the demand level from the electric meter would typically be connected to both inputs. Other systems may require the heating and cooling demands to be controlled separately. When the utility meter's control program indicates a demand level of 1, this microblock relaxes occupied heating or cooling setpoints and all related color band thresholds by the **Demand1** offsets you define. Similarly, a demand level of 2 relaxes setpoints by the **Demand2** offset and a demand level of 3 relaxes setpoints by the **Demand3** offset.

By defining demand level offsets for each zone, the system can reduce utility demand with significant changes to the setpoints in non-critical zones and little or no change to the setpoints in critical zones.

EXAMPLE

Below is a typical demand offset strategy and resulting effective setpoints and color thresholds. The cooling demand offsets and setpoints are highlighted in this example. Heating offsets would similarly affect the heating effective setpoints.



Setpoint Adjust (Optional)

If you select this option, the microblock exposes inputs to adjust the heating setpoint (**HADJ**) and the cooling setpoint (**CADJ**). These inputs can be used to programmatically adjust setpoints based on a condition in the zone. For example, if a conference room is scheduled to be occupied, but the zone's occupancy sensor indicates that a room is no longer occupied, the heating or cooling setpoints could be set back by a few degrees to save energy but allow rapid return to occupied setpoints. These inputs also provide a method for a non-ZS room sensor with a local setpoint adjustment to affect the zone setpoints. If the sensor only has a single setpoint adjust output it is commonly connected to both inputs so the adjustment raises or lowers both setpoints by an equal amount.

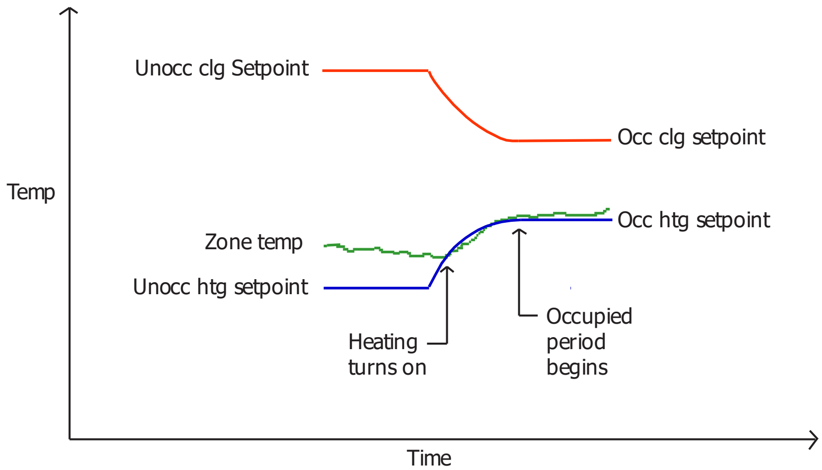
Adjusting either setpoint affects all related color bands by an equal amount. For example, if you raise the cooling setpoint by 2˚, you raise the temperature at which the color changes from green to yellow by 2˚. The temperatures at which the color changes from yellow to orange and from orange to red are also raised by 2˚.

NOTES

- You can limit the allowed amount of local setpoint adjustment for a ZS sensor using the **Setpoint Adjust Limit** on the Rnet tab. For an SPT sensor, you can limit the allowed amount of local setpoint adjustment in the zone sensor's microblock.
- If using a ZS sensor, the optional **HADJ** and **CADJ** inputs are not required for the sensor to adjust the effective setpoint.
- The Setpoint Adjust Inhibit option Provides **ADJI** input by which user setpoint adjustment from a ZS sensor can be programmatically prevented. However, the microblock will still allow programmatic adjustment of setpoint based on the **HADJ** and **CADJ** inputs.

Optimal Start (Optional)

When the zone is unoccupied, the microblock uses the outside air temperature from the **OAT** input and the design temperatures and capacities set in the microblock to estimate the time needed to warm or cool the zone from the unoccupied setpoints to the occupied setpoints. When the estimated time is less than the remaining unoccupied time indicated by the **FOR** input, the microblock outputs the programmed unoccupied setpoint values. When the estimated time to reach the occupied setpoints equals the remaining unoccupied time, the microblock transitions the effective setpoints to the occupied setpoints using a first-order curve that approximates system performance at full capacity.



Heating capacity calculation during optimal start

$t = \frac{FOR}{60}$ = Time Remaining Until Occupancy (hr)

OAT = Outside Air Temperature (°F)

H_{design} = Heating Design Temperature (°F)

$HCAP$ = Heating Capacity (°F/hr)

H_{unocc} = Unoccupied Heating Setpoint (°F)

H_{occ} = Occupied Heating Setpoint (°F)

HSP = Heating Setpoint (°F)

$$H_1 = \frac{(H_{design} - OAT)}{(H_{design} - 65°F)} \times HCAP$$

$$H_2 = H_{unocc} + \frac{(12 - MIN(t, 12))}{12} \times (H_{occ} - H_{unocc})$$

$$H_3 = MAX(MIN(H_2, (H_{occ} - (t \times H_1))), H_{unocc})$$

$$HSP = H_3 + (H_3 - H_{unocc}) \times \left(1 - \frac{(H_3 - H_{unocc})}{(H_{occ} - H_{unocc})}\right)$$

NOTE If the **Capacity Limit** optional input HCAP% is used, the H_1 calculation is:

$$H_1 = \frac{(H_{design} - OAT)}{(H_{design} - 65°F)} \times HCAP \times HCAP\%$$

Cooling capacity calculation during optimal start

$t = \frac{FOR}{60}$ = Time Remaining Until Occupancy (hr)

OAT = Outside Air Temperature (°F)

C_{design} = Cooling Design Temperature (°F)

CCAP = Cooling Capacity (°F/hr)

C_{unocc} = Unoccupied Cooling Setpoint (°F)

C_{occ} = Occupied Cooling Setpoint (°F)

CSP = Cooling Setpoint (°F)

$$C_1 = \frac{(C_{design} - OAT)}{(C_{design} - 65°F)} \times CCAP$$

$$C_2 = C_{unocc} + \frac{(12 - MIN\ (t,12))}{12} \times (C_{occ} - C_{unocc})$$

$$C_3 = MIN\ (MAX\ (C_2\ , (C_{occ} + (t \times C_1))), C_{unocc})$$

$$CSP = C_3 + (C_3 - C_{unocc}) \times (1 - \frac{(C_3 - C_{unocc})}{(C_{occ} - C_{unocc})})$$

NOTE If the **Capacity Limit** optional input CCAP% is used, the C_1 calculation is:

$$C_1 = \frac{(C_{design} - OAT)}{(C_{design} - 65°F)} \times CCAP \times CCAP\%$$

NOTE You can use the optimal start inhibit inputs (**HOSI** and **COSI**) to inhibit optimal start. For example, you may want to prevent any possible heating optimal start during the summer months or prevent optimal start from beginning more than 4 hours before occupancy.

Learning Adaptive with Optimal Start (Optional)

To minimize the energy required during optimal start, the learning adaptive optimal start algorithm evaluates the zone thermographic color at occupancy and adjusts the learned heating or cooling capacity for the next unoccupied period. If the zone temperature does not reach the setpoint by occupancy (the zone's thermographic color is not green at occupancy) the algorithm reduces the learned capacity by the adjustment value you defined for the zone's thermographic color at occupancy. During the next unoccupied period, optimal start begins sooner because the capacity is lower. If the zone temperature reaches the effective setpoint at any time during optimal start, the algorithm increases the learned heating or cooling capacity by the applicable green adjustment value regardless of the zone's color at occupancy. During the next unoccupied period, optimal start begins later because the capacity is higher.

EXAMPLE A zone's heating capacity is 5° per hour. Its light blue learning adaptive adjustment value is 0.06. If at occupancy, the zone's thermographic color is light blue, the microblock uses a learned heating capacity of 4.94° (5° – .06°) per hour in its optimal start calculations for the next unoccupied period.

A microblock with Learning Adaptive and Optimal Start enabled calculates optimal start times more accurately and controls equipment more efficiently than microblocks with only Optimal Start enabled because it uses learned capacities in its calculations. Learned capacities are displayed on the **Properties** page and are available to other parts of the control program from the **HCAP** and **CCAP** outputs.

NOTES

- The algorithm will not adjust learned heating and cooling capacities lower than 0.0625° per hour.
- If a user downloads new heating and cooling capacity values to the controller, the learned heating and cooling capacities change to the new values. If other properties from the control program are downloaded to the controller but the capacities do not change, the learned capacities are not affected.
- If a user downloads All Content to the controller, the learned heating and cooling capacities are reset to the microblock's programmed heating and cooling capacities.

To prevent learned capacities from being distorted during override periods, use the learning inhibit (**LRNI**) input to prevent learned capacities from being adjusted during override periods. When the **LRNI** input is true (on), optimal start operates normally but learned capacities are not adjusted for the next unoccupied period.

Make sure that all other control sequences in the control program, including PID loops, are tuned and functioning properly to prevent improper setpoint adjustment.

Capacity Limit (Optional)

If outside factors will prevent the heating or cooling system from running at 100% of its normal capacity, you can direct the Optimal Start routine to use only a percentage of the zone's learned heating or cooling capacity based on external logic using the **HCAP%** and **CCAP%** inputs. This percentage adjustment applies even if learning is inhibited by the **LRNI** input.

Zone Linkage (Optional)

The Zone linkage option allows for zone applications to link with air or water sources. In contrast to the effective setpoint outputs, this supplies the programmed setpoints and is not affected by optimal start, demand limiting, or other temporary adjustments.

The Zone Linkage option creates additional output wires:

OH: Occupied Heating Setpoint
OC: Occupied Cooling Setpoint
UH: Unoccupied Heating Setpoint
UC: Unoccupied Cooling Setpoint

These outputs are often needed to link zone applications with air or water sources. In contrast to the effective setpoint outputs, these outputs supply the programmed setpoints and are not affected by optimal start, demand limiting, or other temporary adjustments.

Air Source Linkage (Optional)

The Air Source Linkage option creates 8 additional input wires:

Use SL: Activates or deactivates Air Source Linkage
L FOR: The FOR time received from linkage
L ZONE: The Zone temperature received from linkage
L OM: The Occupancy Mode (Occupied or Unoccupied) received from linkage
L OHS: The Occupied Heating Setpoint received from linkage
L OCS: The Occupied Cooling Setpoint received from linkage
L UHS: The Unoccupied Heating Setpoint received from linkage
L UCS: The Unoccupied Cooling Setpoint received from linkage

This option is used to bypass the normal inputs to the Setpoint Microblock and substitute values from linkage. A typical application is a rooftop unit that may be used as a single zone unit or as an air source to supply conditioned air to multiple linked zones.

If no other zones are linked to the unit, or if a communication failure disables the linkage, the microblock functions as a normal Setpoint microblock, accepting the occupied state, zone temp, and all other local inputs and ignoring the linkage inputs. In essence, the controller operates in a stand-alone mode, using its local schedule and sensor inputs instead of the linkage inputs.

Setpoint Adjust Limit (Optional)

This optional input can be used if the setpoint adjust limit needs to be editable from an external source like an Equipment Touch or a third-party front-end, or if it needs to change because of a programmatic condition. The **Setpoint Adjust Limit** field on the **Rnet** tab is not used when this optional input is activated.

Limitations

A control program can use only one Zone Setpoint microblock. Do not use a *Set Color* (page 390) microblock or any *Set Color If True* (page 390) microblocks in a control program with a Zone Setpoint microblock.

Inputs and outputs

Inputs

OAT Outside Air Temperature	Optional–Present if **Optimal Start** is enabled. Current outside air temperature (degrees).
OCC Occupied Schedule	True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. Connect to a *time clock microblock* (page 361) or to other logic that indicates the zone's occupancy status.
FOR Remaining Time	Minutes remaining until the zone's occupancy status changes. Connect to a *time clock microblock* (page 361) or to other logic that indicates this time.
ZONE Zone Temperature	Current zone temperature (degrees). Connect to an *ASVI* (page 213) for a ZS sensor, an *RS* (page 121) microblock for an SPT sensor, for to another input microblock that indicates this value.

HDEM Heating Demand Level	Optional–Present if **Demand Limiting** is enabled. Current heating demand level (1–3). Connect to the Analog Network Input microblock that reads the heating demand level. This typically comes from an electric meter's control program if electric heat is used or a gas meter control program if gas heat is used.
CDEM Cooling Demand Level	Optional–Present if **Demand Limiting** is enabled. Current cooling demand level (1–3). Connect to the Analog Network Input microblock that reads the cooling demand level. This typically comes from an electric meter's control program if cooling is provided from local DX coils or an electrically driven central cooling plant.
HADJ Heating Setpoint Adjust	Optional–Present if **Setpoint Adjust** is enabled. Signal from zone sensor to adjust heating setpoint (degrees). Connect to the zone sensor microblock's **SP ADJ** output.
CADJ Cooling Setpoint Adjust	Optional–Present if **Setpoint Adjust** is enabled. Signal from zone sensor to adjust cooling setpoint (degrees). Connect to the zone sensor microblock's **SP ADJ** output.
ADJI	Optional–Present if **Inhibit Setpoint Adjust** is enabled. True (on) when the microblock should not accept setpoint adjust signals from a ZS sensor. This input does not inhibit setpoint adjust from the optional **HADJ** and **CADJ** inputs.
MINSP Minimum Setpoint Separation	Optional–Present if **Minimum Setpoint Separation** is enabled. Minimum separation (degrees) the microblock will enforce between the effective heating and cooling setpoints. If this value is less than twice the color change hysteresis value, the microblock will enforce a minimum separation of twice the color change hysteresis value. See **Maintaining Deadband** in “How it Works” in this microblock’s help.
HOSI Heating Optimal Start Inhibit	Optional–Present if **Optimal Start** is enabled. True (on) when the microblock should not adjust heating setpoints for optimal start.
COSI Cooling Optimal Start Inhibit	Optional–Present if **Optimal Start** is enabled. True (on) when the microblock should not adjust cooling setpoints for optimal start.
HCAP% Heating Capacity Adjusted By	Optional–Present if **Capacity Limit** is enabled. Percentage of the learned heating capacity to use during optimal start under the conditions defined by external logic.
CCAP% Cooling Capacity Adjusted By	Optional–Present if **Capacity Limit** is enabled. Percentage of the learned cooling capacity to use during optimal start under the conditions defined by external logic.
LRNI Learning Adaptive Inhibit	Optional–Present if **Learning Adaptive** is enabled. True (on) when the microblock should not adjust learned heating or cooling capacity based on conditions when the zone transitions to the occupied state.
USESL	Optional–Present if **Air Source Linkage** is enabled. True (on) when the microblock should use the setpoints and other data provided from Air Source Linkage

L FOR	Optional–Present if **Air Source Linkage** is enabled. Minutes remaining until the zone's occupancy status changes, as provided by Linkage. This input should be connected to an Air Source Linkage output and is used in place of the local timeclock value when the **Use SL** input is true.
L ZONE Linkage zone temperature (degrees)	Optional–Present if **Air Source Linkage** is enabled. This input should be connected to an Air Source Linkage output and is used in place of the local ZONE value when the **Use SL** input is true.
L OM Linkage Occupancy Mode	Optional–Present if **Air Source Linkage** is enabled. True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. This input should be connected to an Air Source Linkage output and is used in place of the local OCC value when the **Use SL** input is true.
L OHS Linkage Occupied Heating Setpoint (degrees)	Optional–Present if **Air Source Linkage** is enabled. This input should be connected to an Air Source Linkage output and is used in place of the internal setpoint value when the **Use SL** input is true.
L OCS Linkage Occupied Cooling Setpoint (degrees)	Optional–Present if **Air Source Linkage** is enabled. This input should be connected to an Air Source Linkage output and is used in place of the internal setpoint value when the **Use SL** input is true.
L UHS Linkage Unoccupied Heating Setpoint (degrees)	Optional–Present if **Air Source Linkage** is enabled. This input should be connected to an Air Source Linkage output and is used in place of the internal setpoint value when the **Use SL** input is true.
L UCS Linkage Unoccupied Cooling Setpoint (degrees)	Optional–Present if **Air Source Linkage** is enabled. This input should be connected to an Air Source Linkage output and is used in place of the internal setpoint value when the **Use SL** input is true.
SPADJ	Optional - Present if **Setpoint Adjust Limit (+/-)** is enabled. The maximum amount (degrees) by which the user can adjust the zone's setpoints from a zone sensor. The **Setpoint Adjust Limit** field on the **Rnet** tab is not used when this optional input is activated.

Outputs

<table>
<tr><td>Zone Color</td><td>Zone thermographic color based on ZONE input compared to effective setpoints.
<table>
<tr><th>Color</th><th></th><th>Status code</th><th>Condition indicated</th></tr>
<tr><td></td><td>Red</td><td>9</td><td>Cooling alarm</td></tr>
<tr><td></td><td>Orange</td><td>8</td><td>Maximum cooling</td></tr>
<tr><td></td><td>Yellow</td><td>7</td><td>Moderate cooling</td></tr>
<tr><td></td><td>Light green</td><td>6</td><td>Free cooling</td></tr>
<tr><td></td><td>Green</td><td>5</td><td>No heating or cooling</td></tr>
<tr><td></td><td>Light blue</td><td>4</td><td>Moderate heating</td></tr>
<tr><td></td><td>Dark blue</td><td>3</td><td>Maximum heating</td></tr>
<tr><td></td><td>Red</td><td>2</td><td>Heating alarm</td></tr>
<tr><td></td><td>Gray</td><td>1</td><td>Unoccupied</td></tr>
</table>
The microblock outputs the zone color's status code (1–9) on its zone color wire.</td></tr>
<tr><td>HT
Heating Setpoint</td><td>The zone's effective heating setpoint (degrees) based upon occupancy, optimal start, demand limiting, and all other adjustments.</td></tr>
<tr><td>CL
Cooling Setpoint</td><td>The zone's effective cooling setpoint (degrees) based upon occupancy, optimal start, demand limiting, and all other adjustments.</td></tr>
<tr><td>NS
Night Setback</td><td>Optional–Present if Night Setback is enabled.
True (on) when the zone is not occupied, optimal start is not in progress, and the zone temperature exceeds the unoccupied heating or cooling setpoint.</td></tr>
<tr><td>HCAP
Learned Heating Capacity</td><td>Optional–Present if Learning Adaptive is enabled.
The learned heating capacity (degrees/hour) calculated by the learning adaptive optimal start algorithm. See Learning adaptive optimal start in "How it works" in this microblock's help.</td></tr>
<tr><td>CCAP
Learned Cooling Capacity</td><td>Optional–Present if Learning Adaptive is enabled.
The learned cooling capacity (degrees/hour) calculated by the learning adaptive optimal start algorithm. See Learning adaptive optimal start in "How it works" in this microblock's help.</td></tr>
<tr><td>OH
Occupied Heating Setpoint</td><td>Optional–Present if Zone Linkage is enabled.
The programmed setpoint, not the effective setpoint. This output is not affected by local setpoint adjustment, optimal start, or demand limiting.</td></tr>
<tr><td>OC
Occupied Cooling Setpoint</td><td>Optional–Present if Zone Linkage is enabled.
The programmed setpoint, not the effective setpoint. This output is not affected by local setpoint adjustment, optimal start, or demand limiting.</td></tr>
</table>

UH Unoccupied Heating Setpoint	Optional–Present if **Zone Linkage** is enabled. The programmed setpoint, not the effective setpoint. This output is not affected by local setpoint adjustment, optimal start, or demand limiting.
UC Unoccupied Cooling Setpoint	Optional–Present if **Zone Linkage** is enabled. The programmed setpoint, not the effective setpoint. This output is not affected by local setpoint adjustment, optimal start, or demand limiting.

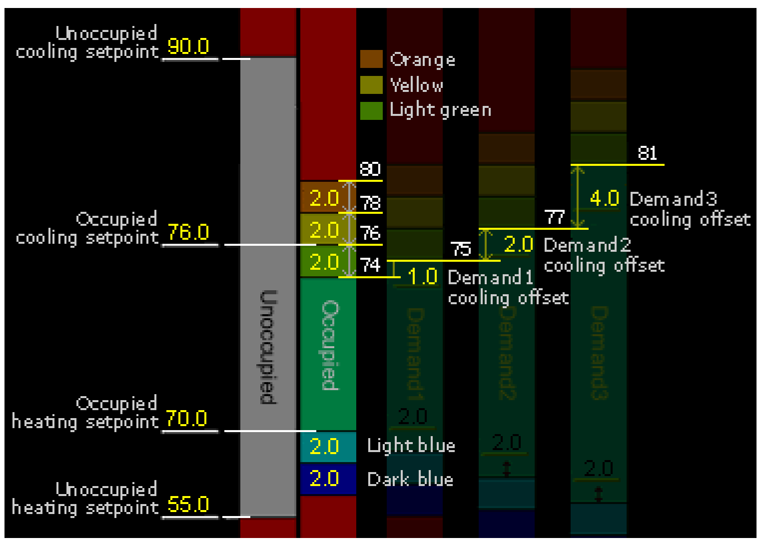
Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Units	The unit of measure, ˚F or ˚C, the setpoints are using.

Setpoints

Unoccupied, Occupied, and Demand Level Setpoints	The desired occupied and unoccupied zone setpoints (degrees), the value of each occupied color band (degrees), and the offsets for electric demand levels 1, 2, and 3 (degrees). A color band's value determines the threshold at which the microblock changes the zone thermographic color as the zone temperature departs from setpoint. You can use the free cooling light green color band to enable economizer operation. If you are not using this feature, type `0` for this band's value. Demand level offsets determine how much to relax the zone's occupied setpoints and color band thresholds under each electric demand level. When the electric meter's control program indicates a demand level of 1, this microblock relaxes occupied heating and cooling setpoints and all related color band thresholds by the **Demand1** offsets you define. Similarly, a demand level of 2 relaxes setpoints by the **Demand2** offset and a demand level of 3 relaxes setpoints by the **Demand3** offset. **EXAMPLE** A zone thermographic color scale with typical demand offsets and resulting effective setpoints and color thresholds  Optional–Demand Levels are used only if **Demand Limiting** is enabled.
Color Change Hysteresis	The desired difference (degrees) between the temperature at which the zone color changes as the zone temperature departs from the acceptable range between the heating and cooling setpoints and the temperature at which the zone color changes back as the zone temperature returns to the acceptable range. If you are not using zone thermographic color for equipment control, type `0`. See **Color Change Hysteresis** in "How it works" in this microblock's help.

Design Properties

Heating Capacity	Optional–Used only if **Optimal Start** is enabled. The rate (degrees/hour) at which the zone temperature changes if the outside air temperature is 65°F and the heating system runs at full capacity. Adjust after startup based on system optimal start performance.
Cooling Capacity	Optional–Used only if **Optimal Start** is enabled. The rate (degrees/hour) at which the zone temperature changes if the outside air temperature is 65°F and the cooling system runs at full capacity. Adjust after startup based on system optimal start performance.
Heating Design Temperature	Optional–Used only if **Optimal Start** is enabled. The geographically-based outside air temperature (degrees) at which the heating system must run constantly in order to maintain comfort. Available in ASHRAE publications and most design references.
Cooling Design Temperature	Optional–Used only if **Optimal Start** is enabled. The geographically-based outside air temperature (degrees) at which the cooling system must run constantly in order to maintain comfort. Available in ASHRAE publications and most design references.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Learning

Color adjustment values	Optional–Used only if **Learning Adaptive** is enabled. The amount by which the microblock adjusts the zone's learned heating or cooling capacity when the zone is this thermographic color at occupancy. See **Learning adaptive optimal start** in "How it works" in this microblock's help.

BACnet

This microblock contains the following BACnet analog value objects.

This object....	Represents...	And is...
Occupied Cooling	The programmed Occupied Cooling Setpoint **NOTE** This object becomes read-only when Air Source Linkage is active.	Writable
Occupied Heating	The programmed Occupied Heating Setpoint **NOTE** This object becomes read-only when Air Source Linkage is active.	Writable
Unoccupied Cooling	The programmed Unoccupied Cooling Setpoint **NOTE** This object becomes read-only when Air Source Linkage is active.	Writable
Unoccupied Heating	The programmed Unoccupied Heating Setpoint **NOTE** This object becomes read-only when Air Source Linkage is active.	Writable
Cooling Adjustment	The value of the **CADJ** input wire	Read-only
Effective Cooling	The value of the **CL** output wire. It is the effective cooling setpoint based upon occupancy, optimal start, demand limiting, and all other adjustments.	Read-only
Heating Adjustment	The value of the **HADJ** input wire	Read-only
Effective Heating	The value of the **HT** output wire. It is the effective heating setpoint based upon occupancy, optimal start, demand limiting, and all other adjustments	Read-only
Zone Temperature Trend Log	A trend log of the zone temperature input. **NOTE** This value comes from the **L ZONE** input when Air Source Linkage is active.	Read-only
Occupied Status Trend Log	A trend log of the occupancy status. **NOTE** This value comes from the **L OM** input when Air Source Linkage is active.	Read-only

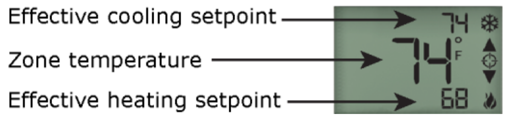
Define the following properties for the above BACnet objects.

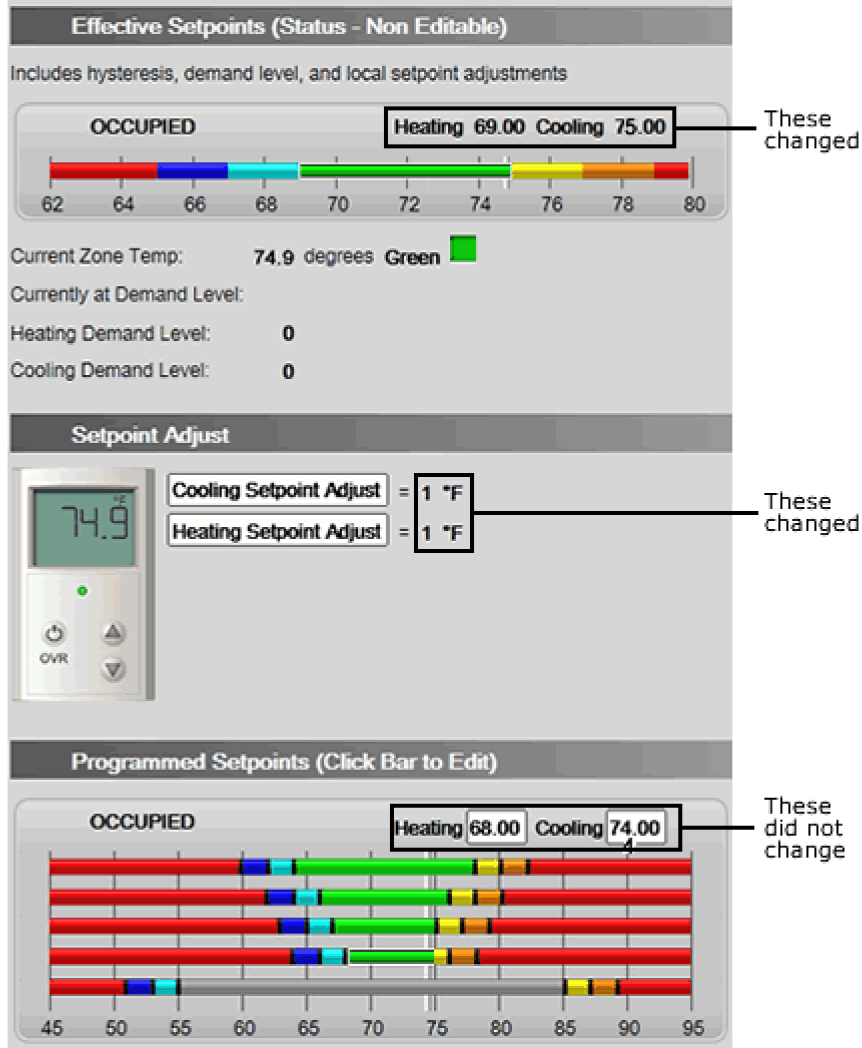
Object Name	A unique alphanumeric string that defines the BACnet object.
Description	(optional) A BACnet-visible microblock description.
Minimum	If this setpoint can be changed from a zone sensor, this is the lowest temperature to which a user can adjust the zone's setpoint from a sensor. If a third-party vendor writes a value lower than this value to the microblock's Present_Value, the controller returns a Property, Value_Out_Of_Range error.
Maximum	If this setpoint can be changed from a zone sensor, this is the highest temperature to which a user can adjust the zone's setpoint from a sensor. If a third-party vendor writes a value higher than this value to the microblock's Present_Value, the controller returns a Property, Value_Out_Of_Range error.

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value.
COV Increment	An Analog Network Input (ANI) that references this microblock in its **Address** field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the **COV Increment**. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's **Refresh Time** field.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Rnet

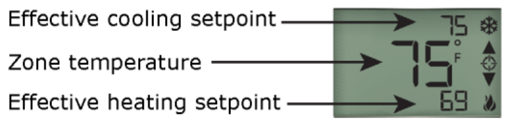
Enable Rnet	Check to allow this microblock to communicate its value(s) to and from a sensor.
Setpoint Adjust Limit (+/-)	The maximum amount (degrees) by which the user can adjust the zone's setpoints from a zone sensor.
Clear adjustment on transition to unoccupied	ZS Pro and Pro-F sensors - Check to have the Setpoint microblock reset the sensor's setpoint adjustment value to 0 each time the microblock's OCC input changes to false (off) and leave it at 0 when the OCC input changes again to true (on) or when the zone enters a timed local override condition. If this field is not checked, the Setpoint microblock will not reset the sensor's adjusted value. ZS Plus sensor - This field does not apply. The Setpoint microblock cannot reset the sensor's adjusted value. **NOTE** The Setpoint microblock does not use adjusted values during unoccupied periods.
Edit Increment	The amount (degrees) that the zone temperature setpoint will be adjusted by each press of a ZS Pro sensor's ▲ or ▼ button. For a ZS Plus sensor, slider adjustments will be read to the nearest increment.

<table>
<tr><th>Sensor Setpoint Adjust Option</th><th>Select how you want to see and adjust setpoints on a ZS sensor.</th></tr>
<tr><td>Disabled</td><td>Prevents editing the setpoints at the sensor.</td></tr>
<tr><td>1. Adjust setpoint offset. Center display=Zone Temp. Show effective setpoints.</td><td>Example of sensor display:


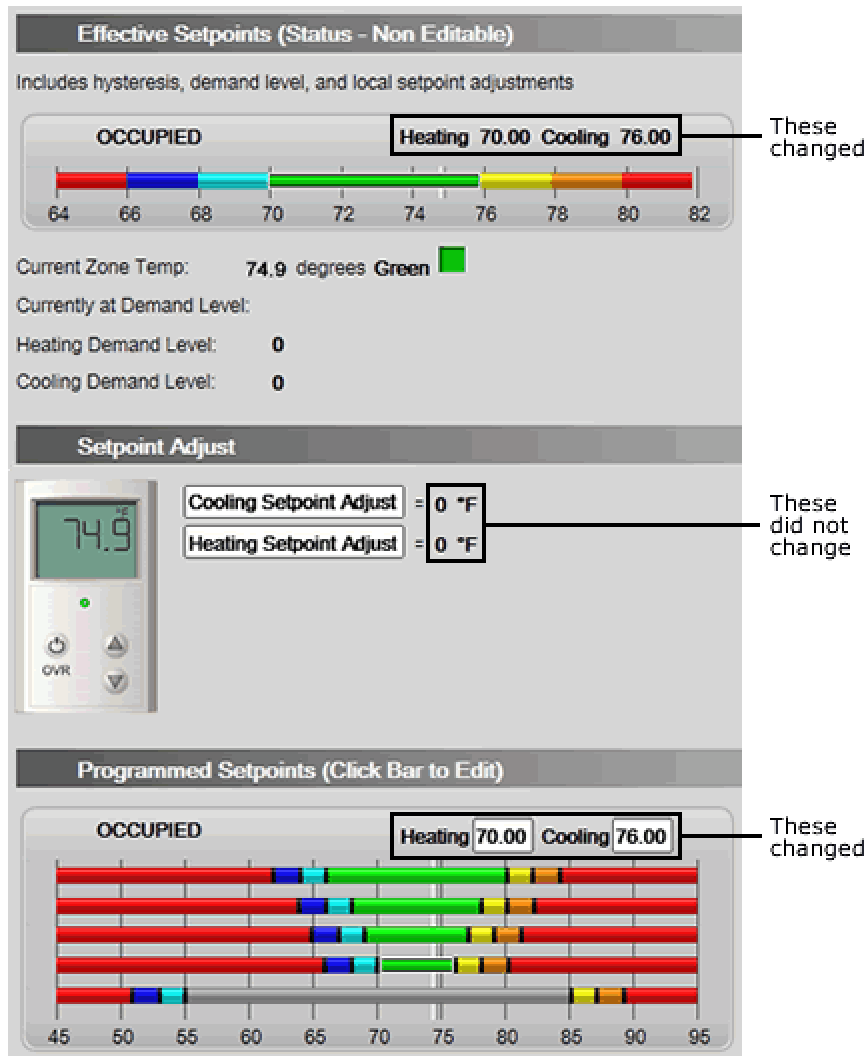
Results in the i-Vu®/Field Assistant interface of adjusting setpoint offset up 1 degree:

</td></tr>
</table>

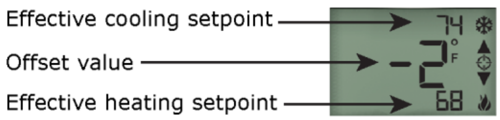
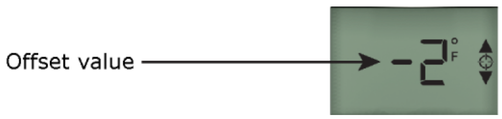
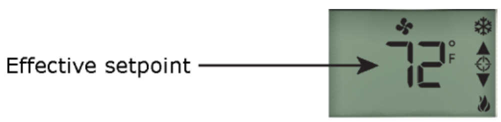
2. Adjust base setpoint. Center display=Zone Temp. Show effective setpoints.

Example of sensor display:



Results in the i-Vu®/Field Assistant interface of adjusting base setpoint up 1 degree:



3. Adjust setpoint offset. Center display= Offset value. Show effective setpoints.	Example of sensor display:  Results in the i-Vu®/Field Assistant interface of adjusting base setpoint up 1 degree: Same as **1.** above.
4. Adjust setpoint offset. Center display= Offset value. Hide effective setpoints.	Example of sensor display:  Results in the i-Vu®/Field Assistant interface of adjusting base setpoint up 1 degree: Same as **1.** above.
5. Hospitality mode	Displays only the active effective setpoint or the average of the heating and cooling setpoints if the mode is auto. The effective setpoint is adjustable. 

ZS Sensor Display Configuration	
Editable	Check under **Occupied** or **Unoccupied** to make each setpoint editable on a ZS Sensor.
Show on:	Check the sensor screen(s) that you want **Occupied**, **Unoccupied** and **Effective Setpoints** displayed on. **Home Screen (1)**: Effective Setpoints are displayed on the Home screen in the following locations:  On the Information or Diagnostics screen, effective setpoints cycle through in the primary value field and show **EFF** in the Rnet tag field. **Information Screen (2)**: This screen is accessed by pressing the sensor's *i* button. **Diagnostics Screen (3)**: This screen is accessed by holding the sensor's *i* button for at least 3 seconds.

Allow Setpoint Adjust (in a running system)	Check to allow setpoint adjustments on the sensor. **NOTE** The setpoint adjust value and effective setpoints will be determined by the following. If an Rnet has: • Multiple Pro sensors, the values will be based on the sensor that was adjusted last. • Multiple Plus sensors, the values will be the average of the sensors. • A Pro and a Plus sensor, only the Pro's value will be used. The Plus will be ignored.

Trends

This microblock contains the following BACnet trend objects.

Effective Cooling Analog Trend	A trend log of the effective cooling setpoint.
Effective Heating Analog Trend	A trend log of the effective heating setpoint.
Zone Temperature Analog Trend	A trend log of the zone temperature input. **NOTE** This value comes from the L ZONE input when Air Source Linkage is active.
Occupied Status Binary Trend	A trend log of the occupancy status. **NOTE** This value comes from the L OM input when Air Source Linkage is active.

Define the following properties for the above trend objects.

Enable	Check to have the controller collect trend data for the microblock's present value.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of value)	Records the microblock’s present value only when the value changes by at least the **COV Increment**.
Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. Click **Reset** in the i-Vu®/Field Assistant interface to delete all samples currently stored in the controller.

Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.
Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.

Optional

Select the optional functionality that you want this microblock to have.

Demand Limiting	Provides **HDEM** and **CDEM** inputs that allow programmatic relaxation of setpoints to reduce electric demand. See "Demand Limiting" in How it works.
Setpoint Adjust Inputs	Provides **HADJ** or **CADJ** inputs by which the setpoint can be programmatically adjusted. See "Setpoint Adjust" in How it works.
Inhibit Setpoint Adjust from ZS	Provides **ADJI** input that allows your program to prevent the user from adjusting the setpoint at the sensor. See "Setpoint Adjust" in How it works.
Optimal Start	The microblock will use an optimal start algorithm to adjust the zone setpoint before the zone is occupied, ensuring that the zone temperature is within the occupied setpoints by the time the zone is occupied. Also provides **HOSI** and **COSI** inputs by which Optimal Start can be programmatically inhibited. See "Optimal Start" in How it works.
Learning Adaptive	Adjusts (learns) zone heating and cooling capacities based on optimal start system performance. Also provides **LRNI** input by which learning can be programmatically inhibited. See "Learning Adaptive with Optimal Start" in How it works.
Night Setback	Provides **NS** output that is true (on) when the zone is not occupied, optimal start is not in progress, and the zone temperature exceeds the unoccupied heating or cooling setpoint. See "Optimal Start" in How it works.
Minimum Setpoint Separation	Provides **MINSP** input that allows a minimum separation between the effective heating and cooling setpoints to be programmatically defined. See "Maintaining Minimum Setpoint Separation (Deadband)" in How it works.
Capacity Limit	Provides **HCAP%** and **CCAP%** inputs that allow programmatic limitation of the zone's learned heating or cooling capacity that the microblock uses in the Optimal Start routine. See "Capacity Limit" in How it works.

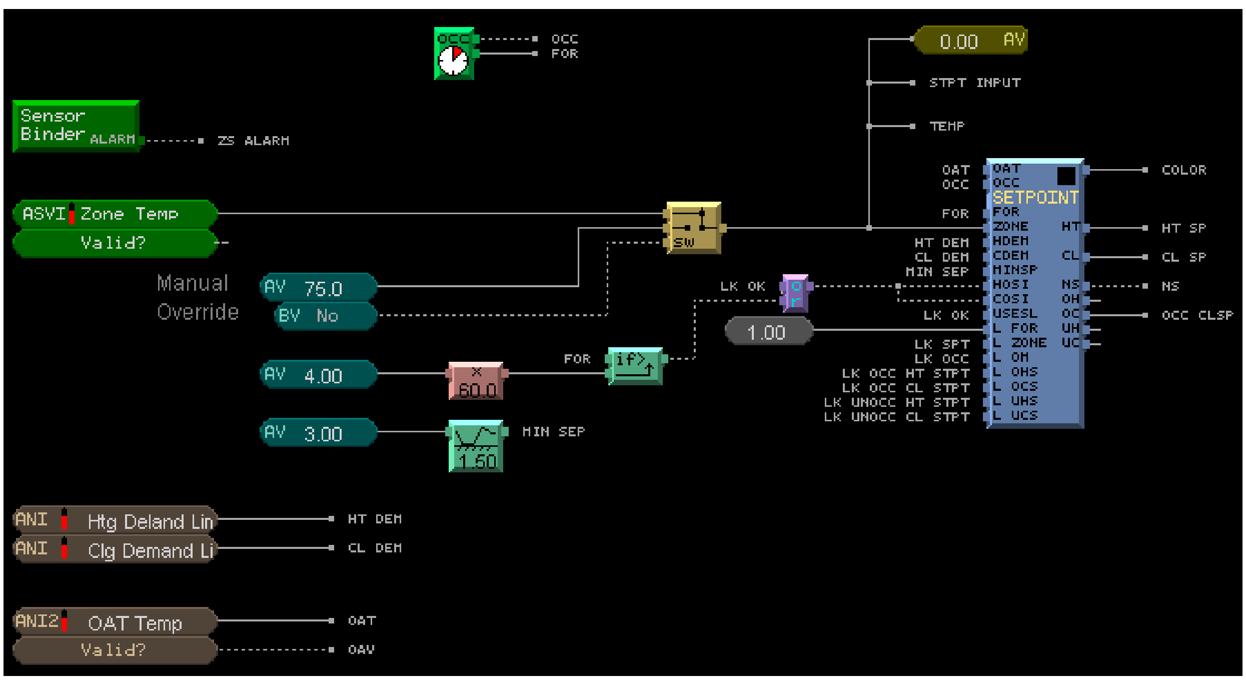
Zone Linkage	Provides **OH**, **OC**, **UH**, and **UC** outputs that are often needed to link zone applications with air or water sources. In contrast to the effective setpoint outputs, these outputs supply the programmed setpoints and are not affected by optimal start, demand limiting, or other temporary adjustments.
Air Source Linkage	Provides **USESL**, **L FOR**, **L ZONE**, **L OM**, **L OHS**, **L OCS**, **L UHS**, **L UCS** inputs that are used to bypass the normal inputs to the Setpoint Microblock and substitute values from linkage.
Setpoint Adjust Limit (+/-)	Provides **SPADJ** input that sets the maximum amount (degrees) by which the user can adjust the zone's setpoints from a zone sensor. Enabling this option disables the **Setpoint Adjust Limit** field on the **Rnet** tab.

Programming example

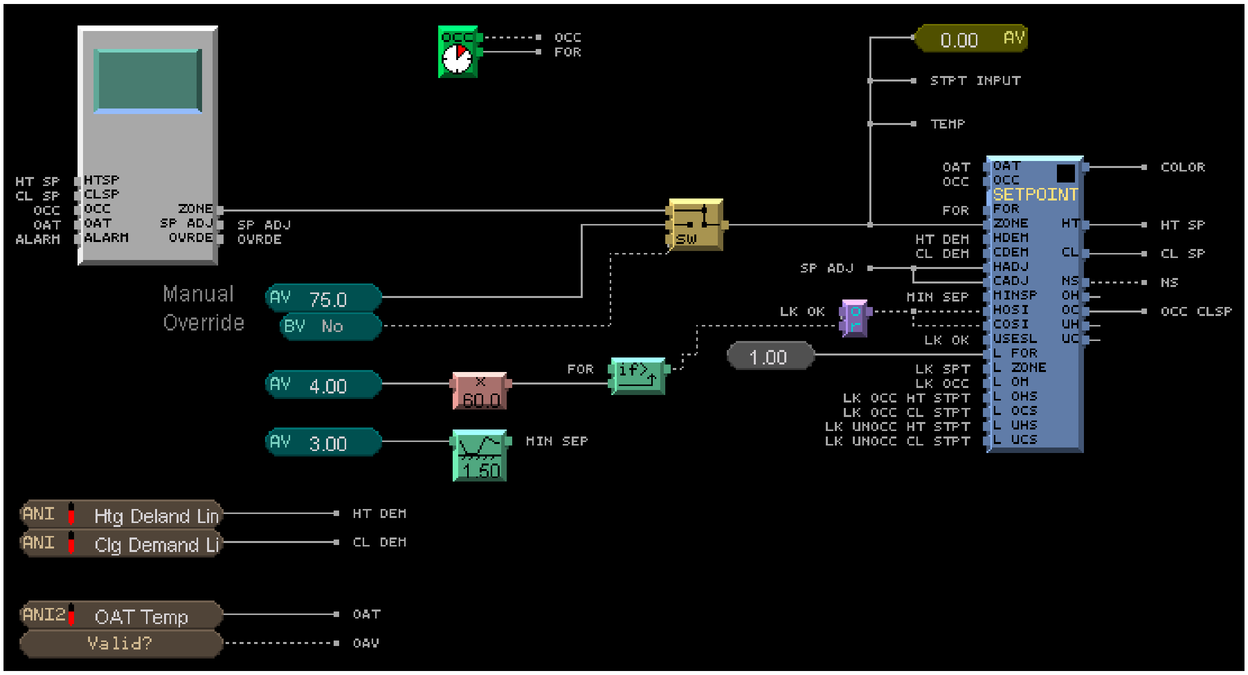
In each of the examples below, the zone control strategy does the following:

- Allows local zone setpoint adjustment using a zone sensor
- Inhibits optimal start from beginning more than 4 hours before occupancy
- Uses the full (100%) learned heating and cooling capacities during every optimal start period
- Inhibits learned heating and cooling capacity adjustments during unoccupied override periods

Example with a ZS Sensor:



Example with an SPT Sensor:



Tips and tricks

Optimal start

Write the control logic for the unoccupied mode to activate heating if the zone color is light blue or cooling if the zone color is yellow. This will bring the zone temperature back into the desired range during optimal start.

Color change hysteresis

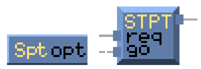
If you are using zone thermographic color for floorplan display, but not for control, set the Color Change Hysteresis to `0`. Using zone color and hysteresis for control can confuse end users because it can prevent the zone color from changing at the programmed setpoints. To maintain a minimum separation between the effective heating and cooling setpoints with a hysteresis of 0, enable the **Minimum Setpoint Separation** option and provide your desired deadband. If you are controlling equipment based on zone thermographic color, set the hysteresis large enough to prevent the equipment from changing back and forth between two different states if the temperature oscillates near the setpoint.

Free cooling – economizer enable

If you are using zone thermographic color for control in small single-zone systems or unit ventilators, you can use the light green free cooling color band to enable economizer operation before you enable mechanical cooling. Otherwise, set the free cooling color band value to `0`.

Setpoint Optimization

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Control microblocks* (page 361)
Icon and symbol	
What it does	Optimizes a single setpoint to use the least amount of energy necessary to meet the needs of the controlled equipment. You set a maximum and minimum value that the setpoint will not exceed, and you determine whether and how often the setpoint is calculated. The microblock uses requests from controlled equipment to increase or decrease the setpoint, and adjusts (trims) the setpoint with each calculation to minimize energy use. This allows you to efficiently meet the building's requirements by optimizing the setpoint according to the needs of the controlled equipment.

How it works

When the **go** input is enabled, the microblock outputs the **Initial** setpoint.

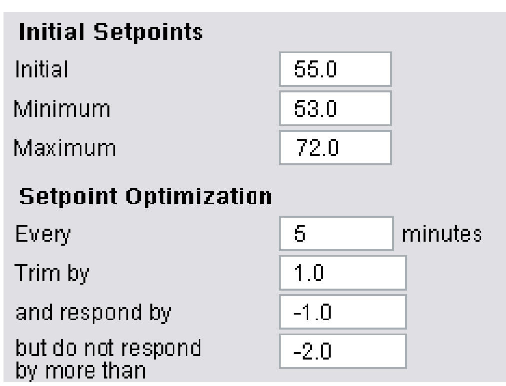
At the frequency defined by the **Every** value, the microblock calculates a new setpoint:

New setpoint = previous setpoint + **Trim by** + lesser of (**but do not respond by more than** or (**Respond by** x **req**))

The microblock uses the **Trim by** value to decrease the energy consumed by the mechanical equipment when no requests are received.

EXAMPLES

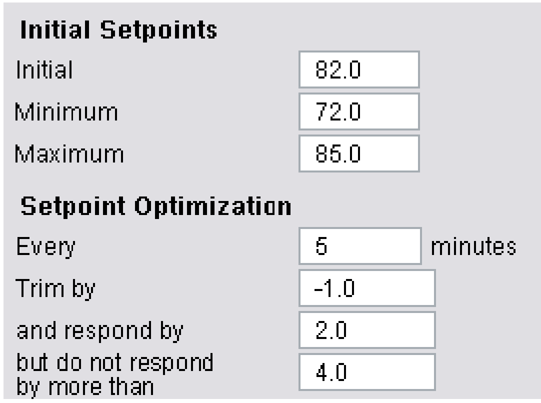
- To optimize the cooling setpoint for a VAV air handling unit receiving requests from multiple VAV boxes:



If the microblock outputs 57° and 5 minutes later the **req** input sees 4 requests, the new setpoint is 56° = (57 + 1 + (-2)).

Because (**req** x **and respond by**) = -4, the microblock calculates using the **but do not respond by more than** value.

- To optimize the heating setpoint for a VAV air handling unit receiving requests from multiple VAV boxes:



If the microblock outputs 75° and 5 minutes later the **req** input sees 2 requests, the new setpoint is 78° = 75 + (-1) + (2 x 2.0)

If the microblock outputs 72° and 5 minutes later the **req** input sees 0 requests, the new setpoint is still 72°. The microblock calculates a new setpoint of 71° = (72 + (-1) + 0). But the microblock will not output a setpoint lower than the **Minimum** value of 72°.

Inputs and outputs

Inputs

req Number of requests	Requests for setpoint adjustment from controlled equipment. Connect to a Total Analog or other microblock with a total number of requests for an increase or decrease in the current setpoint. Common uses are heating requests for an increased heating setpoint, cooling requests for a decreased cooling setpoint, or VAV box requests for an increased duct static pressure.
go	True (on) if the control program should optimize the current setpoint. **EXAMPLES** • Optimize the heating setpoint if the supply fan has flow. • Optimize the cooling setpoint if the supply fan has flow. • Optimize the duct static pressure setpoint if the fan is commanded on.

Outputs

STPT Current Optimized Setpoint	Calculated at the frequency defined in the **Every** field. = previous setpoint + **Trim by** + lesser of (**but do not respond by more than** or (**req** x **Respond by**))

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Initial Setpoints

Initial	The initial setpoint the microblock uses when the **go** input is enabled.
Minimum	The minimum setpoint that the microblock will output.
Maximum	The maximum setpoint that the microblock will output.

Setpoint Optimization

Every	The frequency at which the microblock calculates a new setpoint. Should reflect the response speed of the control loop.
Trim by	The microblock adjusts the setpoint by this value at the frequency set in the **Every** field. For a direct acting loop (such as cooling) use a positive number. For a reverse acting loop (such as heating) use a negative number.
and respond by	At the frequency set in the **Every** field the microblock multiplies this value by the **req** input value, then adds the lesser of • (**req** x **and respond by**) or • **but do not respond by more than** to the (previous setpoint + **Trim by** value). For a direct acting loop (such as cooling) use a negative number. For a reverse acting loop (such as heating) use a positive number.

but do not respond by more than	The limit of the (**req** x **and respond by**) value that the microblock adds to the (previous setpoint + **Trim by**) value at the frequency set in the **Every** field. For a direct acting loop (such as cooling) use a negative number. For a reverse acting loop (such as heating) use a positive number.

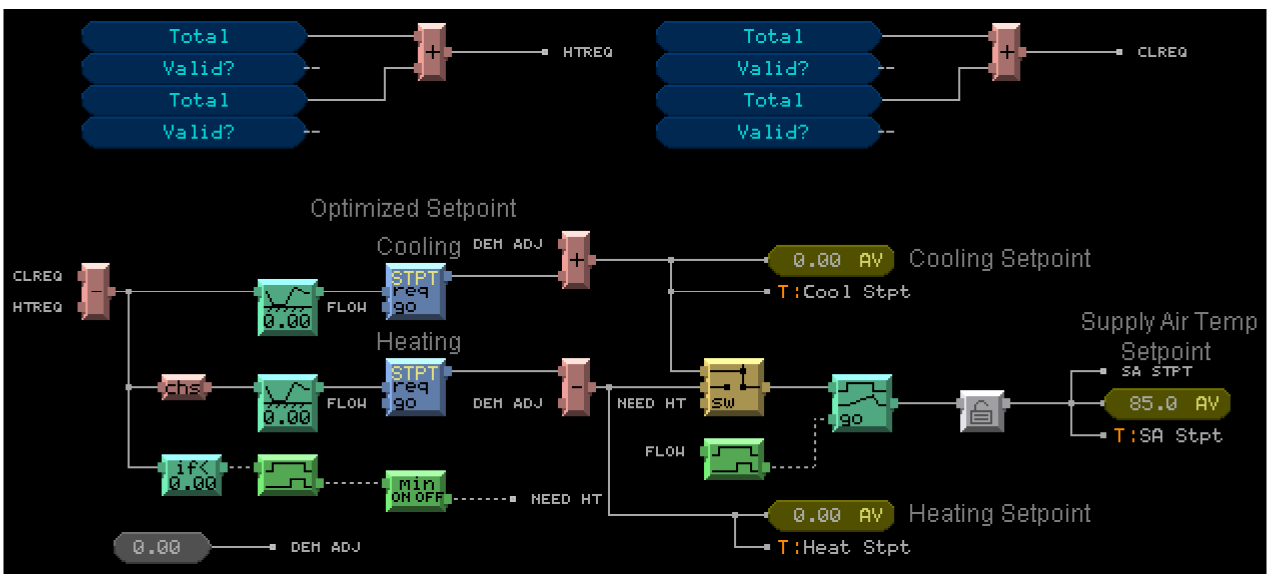
Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Programming example

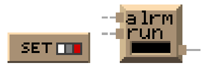
For the heating and cooling setpoint optimization microblocks' configuration, see the examples in "How it works" above. The logic below to optimize for a VAV air handling unit's supply air temperature setpoint does the following:

- Accepts heating and cooling requests from up to 20 zones
- Uses net heating and cooling requests to determine whether to use the optimized cooling setpoint or the optimized heating setpoint
- Uses a ramp to prevent large jumps in setpoint when switching between heating and cooling, typical of the swing seasons



Set Color

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Control microblocks* (page 361)
Icon and symbol	
What it does	This microblock defines a color (white, gray, or red) for a control program that does not use a Zone Setpoint or Set Color If True microblock. This microblock is used so the control program displays a color in the i-Vu® or Field Assistant system indicating its status. For example, this microblock can be used to generate a color for a piece of equipment depending on its status: white if the equipment is running, gray if the equipment is not running, and red if an alarm condition exists for the equipment. **NOTE** Do not use the Set Color microblock in combination with any Zone Setpoint or Set Color If True microblocks in the same control program. There cannot be more than one Set Color microblock in a control program. When the microblock's **alrm** input receives an on signal, the control program's broadcast color is red (2), regardless of the value of the run input. When the **alrm** input is off and the run input is on, the control program's broadcast color is white (10). If both inputs are off, the control program's broadcast color is gray (1).

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Set Color If True

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Control microblocks* (page 361)
Icon and symbol	
What it does	This microblock broadcasts the selected color for the control program when it is activated. The microblock's input accepts an on or off signal. When the input is on, the selected color is broadcast. If the input is off, the microblock does not generate any color. This allows you to use more than one Set Color If True microblock in a control program, as long as only one of these microblocks is activated at a time.

Properties

TIPS

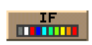
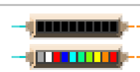
- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Color	Select the color that is to be displayed with the input is on.

True if Color =

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Control microblocks* (page 361)
Icon and symbol	 
What it does	This microblock allows you to define control sequences based on the control program's current color. This microblock accepts a color value from a Zone Setpoint or Set Color microblock. If the color matches one of the colors selected for the microblock, the microblock's output is turned on. For example, this microblock can be used to create a signal that turns a BACnet Alarm microblock on when the control program's color is either red or orange. In the Snap application, select the color or colors that will turn the microblock's output on. On the **Properties** page, indicate the desired color or colors by changing the appropriate dash to an X. The dashes represent the colors in the order indicated by the letters (rdlggyor): red (heat alarm), dark blue, light blue, green, speckled green, yellow, orange, and red (cooling alarm). The dashes represented by the letters (gw) stand for the colors gray and white.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
True if Color =	Check the color that is to be displayed with the input is on.

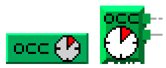
Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet Time Clock with TLO and Override Status

NOTE A control program with this microblock works only with v5.5 or later systems and v5.5 or later drivers.

⚠ The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Control microblocks* (page 361)
Icon and symbol	
What it does	This microblock reads schedules from the i-Vu® or Field Assistant system and generates signals to tell the control program whether or not the zone is occupied and how long the zone will remain in its current state. The microblock has two outputs: the **occ** output, which indicates whether the zone is currently occupied (on) or unoccupied (off); and the timer output, which indicates the number of minutes remaining until the occupancy changes. The value of these outputs depends on the schedule entered for the control program in the i-Vu® or Field Assistant system. This microblock can optionally accept an override signal that indicates the number of minutes to override occupancy from either of the following: • A sensor if **Enable Rnet** is selected. • Another microblock if **Timed Local Override** on the **Optional** tab is selected. This microblock can also indicate when the zone is in an override state using the optional **Override Status** (**ovr**) output. The **ovr** output will be active only when the equipment is in a true override condition and works for overriding in an On state or an Off state, as with the Force Unoccupied feature. If an occupied schedule is running when a user starts a timed local override, the **ovr** output will not turn on until the schedule expires. You cannot set schedules using the microblock's dialog box. The **Properties** page > **Summary** tab shows the current occupancy status of the zone, the time when the occupancy is scheduled to change, and the override status. The **Properties** page > **Details** tab shows the override time remaining, which may be different than the time remaining amount.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Schedule Category	The category of the schedule that will run the controlled equipment. Select **Occupancy** unless you have defined a custom schedule category in the Snap and i-Vu®/Field Assistant applications.
Unscheduled Value	The value the microblock assumes when no schedule has been downloaded to the program if: • The system has no schedules that affect the equipment. • A stand alone controller is powered up but no schedule data has been entered.

Configuration

Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Minimum off time	The minimum period (seconds) that the microblock's present value will be off, regardless of the input signal to the microblock.
Minimum on time	The minimum period (seconds) that the microblock's present value will be on, regardless of the input signal to the microblock.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm Enabled	Check to send a message when this microblock indicates an alarm condition.
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Rnet

Enable Rnet	Check to allow this microblock to communicate its value(s) to and from a sensor.
Allow 'Continuous' Override	Check to allow a user to force a zone into an occupied state for an indefinite amount of time. The override remains in effect until the schedule transitions to occupied or until a user manually clears it by pressing the sensor's On/Off button twice.
Allow Force Unoccupied	Check to allow a user to save energy by forcing the zone into an unoccupied state. To force unoccupied, a user holds a ZS sensor's On/Off button for at least 3 seconds. This forced state remains in effect until the schedule transitions to unoccupied or until a user presses the sensor's On/Off button.
Force Unoccupied without Delay	Check to allow a user to force a zone to unoccupied immediately instead of the normal 3-second delay. **NOTE** This feature is unavailable if **Allow TLO Set During Occupied** is checked.
Allow TLO Set During Occupied	Check to allow a user to activate a timed local override while the zone is scheduled occupied. This allows a user to extend the zone's occupied time without the HVAC equipment having to go unoccupied first. **NOTE** This feature is unavailable if **Force Unoccupied without Delay** is checked.

Timed Local Override

Increment	Minutes the microblock adds to the zone's occupied time for each press of the zone's local override button or switch.
Maximum Duration	Maximum value (up to 960 minutes) the microblock outputs regardless of additional pulses from the controller's input.

Show scheduling limits:	The default limits for the Occupancy schedule category. **NOTES** • A schedule download will fail if you exceed these limits when creating schedules. • Changing these properties erases the schedule information in the controller, requiring you to download schedules again. • If you use Global Modify to change these limits, the affected devices will not be automatically marked for schedule download.
Weekly Schedules - Max Transitions Per Day	The number of transitions a weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.
Max Exception Schedules	The number of non-weekly schedules allowed in a controller. The default is 30. The system reserves 7 of these schedules - one for each day of the week.
Max Transitions Per Day	The number of transitions a non-weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.

Optional

Timed Local Override	Use for an SPT sensor or any other microblock that reads a TLO signal. For a ZS sensor, use the TLO options on the **Rnet** tab. Typically, for a ZS sensor, you should use the TLO options on the **Rnet** tab. However, if you do use this TLO input for a ZS sensor, it is in conjunction with the sensor's built-in TLO function. This microblock uses whichever TLO value is greater, the one from the sensor or the one from the optional input. This optional TLO input does not count down automatically.
Override Status	The **ovr** output will be **On** while either of the following conditions exists: • The schedule is unoccupied and the override time remaining from the **ovr** input or ZS sensor is greater than 0. • The schedule is occupied and the microblock gets a force unoccupied signal from a ZS sensor.
Allow for External Scheduling	This checkbox produces two binary inputs on the schedule microblock to allow the zone to be optionally scheduled by an external source like a binary input or third-party front-end via a binary value parameter. The **ext** input tells the schedule microblock to use the external schedule. The **cmd** input tells the schedule microblock to be either occupied (on) or unoccupied (off). When external scheduling is used, the user still has the option of using the ZS sensor for override or for forcing it into an unoccupied state.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

BACnet Multi-State Time Clock

The information below provides a <u>FULL</u> description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Control microblocks* (page 361)
Icon and symbol	
What it does	This microblock reads schedules from the i-Vu® or Field Assistant system and generates values to tell the control program what state the zone is in, and how long the zone will remain in its current state. This microblock can be used to establish a schedule that outputs different values at different times of the day. For example, it can be used to control lighting which has multiple modes such as normal workday, janitorial cleaning, and after-hours modes. The Multi-State Time Clock should be used with the system's Multi-State (not Boolean) schedules. The value appears to other BACnet devices as the Present Value property of a BACnet schedule object. The microblock has two outputs: the mode output, which indicates what mode the zone is currently in; and the time output, which indicates the number of minutes remaining until the mode changes. The value of these outputs depends on the schedule entered for the control program in the i-Vu® or Field Assistant system. Enter or view schedules on the **Schedules** page. You cannot set schedules using the microblock's dialog box. The Properties page shows the current occupancy status of the zone and the time when the occupancy is scheduled to change.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Description	(optional) A BACnet-visible microblock description.
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Schedule Category	Select the category of the schedule that will run the controlled equipment.
Unscheduled Value	The value the microblock assumes when no schedule has been downloaded to the program if: • The system has no schedules that affect the equipment. • A stand alone controller is powered up but no schedule data has been entered.
State Text	You must define the text that will appear on the **Properties** page when the device is in each state. For Value 1, type the text in the field under **BACnet Text**. For each additional state, click **Add** and then type the text. To have a state put the BACnet object in an alarm or fault condition, select the appropriate option for that state under **Alarm/Fault**.
Show scheduling limits:	The default limits for the Occupancy schedule category. **NOTES** • A schedule download will fail if you exceed these limits when creating schedules. • Changing these properties erases the schedule information in the controller, requiring you to download schedules again. • If you use Global Modify to change these limits, the affected devices will not be automatically marked for schedule download.
Weekly Schedules - Max Transitions Per Day	The number of transitions a weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.
Max Exception Schedules	The number of non-weekly schedules allowed in a controller. The default is 30. The system reserves 7 of these schedules - one for each day of the week.
Max Transitions Per Day	The number of transitions a non-weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object Instance	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.
Template	**Universal** - Allows your system to use the **Alarm text** and **Return text** defined in the microblock, and the **Critical** checkbox to determine the color of the system-wide alarm button when the alarm comes in.

Alarm

Alarm Enabled	Check to send a message when this microblock indicates an alarm condition.
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Convert microblocks

Convert microblocks take information from other microblocks, change the data in some way, then output the changed data.

Zone	*Zone Controller* (page 404) Provides stable temperature control of a single-zone heating and cooling system using 2 modified PID control loops.
Pid da	*PID - Direct Acting* (page 408) The PID - Direct Acting microblock calculates three values: a proportional value, integral value, and derivative value. These 3 values are added together with the bias to create an output percentage that increases as the input rises above the setpoint.
Pid ra	*PID - Reverse Acting* (page 410) The PID - Reverse Acting microblock calculates three values: a proportional value, integral value, and derivative value. These 3 values, together with the bias, create an output percentage that increases as the input falls below the setpoint.
BACPid	*BACnet PID* (page 413) The BACnet PID microblock calculates 3 values: a proportional value, integral value, and derivative value. These 3 values, together with the **Bias**, create an output percentage that increases or decreases as the input changes from the setpoint depending on the PID action selected.
RATIO C	*Linear Converter* (page 422) This microblock converts a value in a range to a proportionate value in a different range.
RATIO	*Linear Converter for Variable Inputs* (page 423) This microblock converts a value in a range to a proportionate value in a different range.
enth	*Enthalpy Calculator* (page 425) This microblock accepts a dry bulb temperature and a relative humidity input and calculates a corresponding value for enthalpy. Enthalpy is a measure of energy inherent in the air. A high enthalpy value indicates a higher air temperature.
dewpt	*Dewpoint Temperature Calculator* (page 426) This microblock accepts a dry bulb temperature and a relative humidity value and uses this information to calculate the dewpoint temperature. The dewpoint is the temperature at which water vapor begins condensing.
wetb	*Wet Bulb Temperature Calculator* (page 427) This microblock accepts a dry bulb temperature and a relative humidity value and uses this information to calculate the wet bulb temperature.
if= c	*True If = Constant* (page 428) This microblock creates an on (or true) signal when the value of the microblock's input is equal to the trip point.
if> c	*True If > Constant* (page 430) This microblock creates an on (or true) signal when the value of the microblock's input is greater than the microblock's trip point.

True If < Constant (page 431)

This microblock creates an on (or true) signal when the value of the microblock's input is less than the microblock's trip point.

True If = Variable (page 432)

This microblock accepts two analog values wired from other parts of the control program. The microblock creates an on (or true) signal when the value of both inputs is the same.

True If > Variable Input (page 433)

This microblock creates an on (or true) signal when the value of the microblock's if > input is greater than the microblock's other input. The microblock accepts two analog values wired from other parts of the control program.

True If < Variable Input (page 435)

This microblock creates an on (or true) signal when the value of the microblock's if < input is less than the microblock's other input. The microblock accepts two analog values wired from other parts of the control program.

Analog to Digital Converter (page 436)

This microblock converts a numeric input to an on/off digital signal. If the input value is zero, the microblock creates an off signal. If the input value is any number other than zero, the microblock creates an on signal.

Digital to Analog Converter (page 437)

This microblock accepts a digital on or off signal and converts it to a numeric value. If the microblock's input is on, the output value is 1.0. If the input is off, the output value is 0.0.

Zone Controller

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	
What it does	Provides stable temperature control of a single-zone heating and cooling system using 2 modified PID control loops. 2 non-linear PID loops (direct-acting for the cooling output and reverse-acting for the heating output) make fine-tuning corrections when the system is near setpoint and larger corrections when the setpoint or the load changes and the system needs to adjust quickly. The microblock also optimizes performance in the night setback and morning start-up modes.

How it works

A patented, modified PID algorithm provides responsive, stable control and reduces overshoot in zone control applications.

When the zone is unoccupied, the algorithm uses proportional-only control with a large gain and bias, providing on/off zone heating and cooling control to minimize unoccupied run time and to maximize efficiency. For example, if the temperature drops below the unoccupied heating setpoint, the algorithm calls for 100% heating. It maintains a 100% output until the zone temperature rises approximately 1 degree above setpoint, then turns off heating and remains inactive unless the temperature exceeds the unoccupied setpoint.

When the zone is occupied, the algorithm compares the zone temperature to the setpoint and uses the **Maintain Setpoint ±** limit to determine its response.

When the zone is occupied and the zone temperature deviates from the heating or cooling setpoint by 75% of the **Maintain Setpoint ±** limit, the algorithm calls for 100% heating or cooling to quickly bring the zone back to setpoint. A ± 1° limit provides excellent control in most situations. Increase this limit if the system begins to cycle.

EXAMPLES

- If a zone's cooling setpoint is 74 °F, **Maintain Setpoint ±** 1 calls for full cooling when the temperature reaches 74.75 °F.
- If a zone's heating setpoint is 70 °F, **Maintain Setpoint ±** 1 calls for full heating when the temperature reaches 69.25 °F.

When the algorithm calls for 100% heating or cooling, it uses the integral correction term's value to determine how much to add to the integral correction at each interval until the zone temperature returns to within 75% of the **Maintain Setpoint ±** limit. This strategy ensures that when the temperature returns closer to setpoint, the microblock's output is close to the value needed to keep it there.

When the zone is occupied and the zone temperature is within 75% of the **Maintain Setpoint ±** limit, the algorithm uses a low proportional gain and adds a fixed integral correction in each interval where the zone temperature departs from the setpoint or remains constant. In each interval where the zone temperature moves toward the setpoint, the algorithm subtracts the fixed integral correction. This strategy gives faster response and better stability in HVAC zone applications than traditional PID control.

Limitations

This microblock is designed for zone comfort control applications such as a VAV box, unit ventilator, or single-zone AHU. Internal gains and sampling rates optimized for zone temperature control may not be compatible with other applications.

Heating and cooling setpoints must be at least as far apart as the value of the **Maintain Setpoints ±** property, and unoccupied setpoints must be farther apart than occupied setpoints.

The control algorithm assumes a continuous zone temperature. Discontinuities in temperature do not happen in real-world systems, but they can easily occur when you simulate a control program.

Inputs and outputs

Inputs

OCC Occupied	True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. Connect to a *time clock microblock* (page 361) or to other logic that indicates the zone's occupancy status.
FOR Remaining Time	Minutes remaining until the zone's occupancy status changes. Connect to a *time clock microblock* (page 361) or to other logic that indicates this time.
ZONE Zone Temp	Current zone temperature (degrees).
HTSP Heating Setpoint	Heating setpoint (degrees). Connect to a setpoint microblock's **HT** output or to other logic that indicates the zone's heating setpoint.
CLSP Cooling Setpoint	Cooling setpoint (degrees). Connect to a setpoint microblock's **CL** output or to other logic that indicates the zone's cooling setpoint.

Outputs

CLG% Cooling %	(0–100%) Amount of cooling required. Connect to the *Airflow Control* (page 142) microblock's **Cooling %** input or to another *Output* (page 68) microblock that can send the signal to the cooling system. You can also use this output to trigger cooling requests to the air handling unit.
HTG% Heating %	(0–100%) Amount of heating required. Connect to the *Airflow Control* (page 142) microblock's **Heating %** input or to another *Output* (page 68) microblock that can send the signal to the heating system. You can also use this output to trigger heating requests to the air handling unit.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

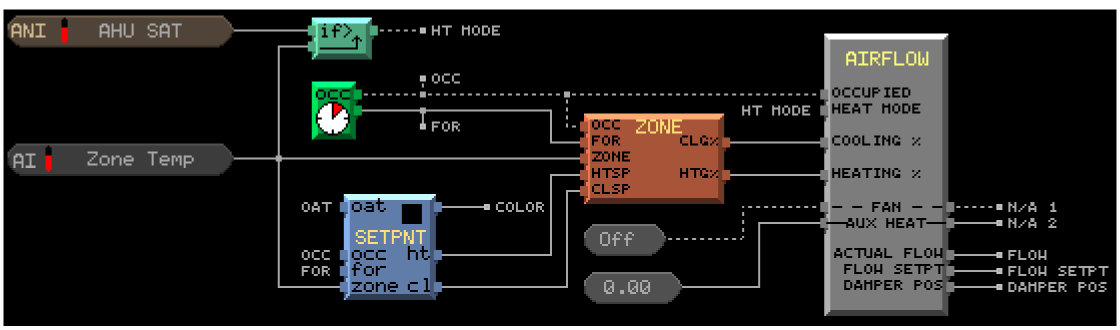
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Cooling Loop Gain	(1 - 5). Speed of the integral action relative to the proportional action when the system is in a cooling mode. If the system begins cycling, decrease this value.
Heating Loop Gain	(1 - 5). Speed of the integral action relative to the proportional action when the system is in a heating mode. If the system begins cycling, decrease this value.
Maintain Setpoints ±	Control range (degrees). The microblock calls for 100% heating or cooling when the zone temperature exceeds the setpoint by 75% of this limit. See "*How it works* (page 405)" in this microblock's help. If the system begins cycling, increase this value.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

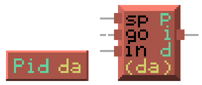
Programming example

This simple VAV application has no fan and no auxiliary heat in the zone.



PID - Direct Acting

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	
What it does	PID (Proportional, Integral, Derivative) loops use industry standard algorithms to calculate an appropriate response for controlling a physical output, based on the equipment's setpoint and the input. The PID - Direct Acting microblock calculates three values: a proportional value, integral value, and derivative value. These 3 values are added together with the bias to create an output percentage that increases as the input rises above the setpoint.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Gain

Proportional	You can define P-gain by entering a value in this field as described below or by entering a value in the **Input range** field. Entering a value in either field automatically sets the other field. The Proportional gain (P-gain) value is used to calculate the proportional component of the routine. This component increases in direct proportion to the difference between the setpoint and the input. When the input goes up, the proportional component goes up. If you define only the P-gain portion of the PID microblock, the microblock's output value could cause the input to oscillate around the setpoint or possibly to never reach the setpoint (if the P-gain is too low). The proportional value is calculated using the following formula: P = (Input - Setpoint) x P-gain. For example, if the P-gain is 20, the setpoint is 65, and the current temperature is 67, the proportional value is 40. If the P-gain is 20, the setpoint is 65, and the current temperature is 70 or higher, the proportional value is 100%. So the proportional output increases from 0 to 100% as the input changes from 0 to 5 degrees away from setpoint. The Snap application sets the **Input range** field to 100/20 = 5.
Input range	You can define P-gain by entering a value in this field as described below or by entering a value in the **Proportional** field. Entering a value in either field automatically sets the other field. In this field, specify the range for the input that will cause the P output to vary from 20% to 100%. For example, if you need to maintain temperatures ±2 from setpoint, enter 2. The Snap application sets the **Proportional** field to 100/2 = 50.
Integral	The Integral gain (I-gain) value is used to calculate the integral component of the PID routine. The integral value accounts for the amount of time that the input and the setpoint have been different. The longer the input and setpoint are different, the larger the integral value becomes. The integral value is calculated as follows: I = Previous I value + [(Input - Setpoint) x I-gain] For example, if the I-gain is 2, the setpoint is 65, and the current temperature is 67, the integral value for the first interval will be 4. If at the end of the second interval the temperature is still 67, the integral value will increase to 8.
Derivative	The Derivative gain (D-gain) value attempts to control the rate at which the input is brought to Setpoint in order to prevent the Setpoint from being exceeded. This value uses information from the current and previous intervals and is calculated using the following formula: D = [(Input - Setpoint)current - (Input - Setpoint)previous] x D-gain. For example, if the D-gain is 3, the Setpoint is 65, and the current temperature is 67, the Derivative value for the first interval is 6 ([2 - 0] x 3 = 6). If at the end of the second interval the temperature is still 67, the Derivative value will decrease to 0 ([2 - 2] x 3 = 0). The microblock's output percentage uses all three components as follows: Output (%) = Bias + P + I + D. The Bias is set on the microblock dialog or the Properties page. Using the examples listed for each component above and assuming a Bias value of 0, the Output value of the PID microblock for the first interval would be 50; for the second interval the value would be 48.

Loop

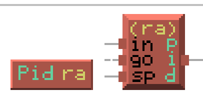
Bias	The **Bias** value is added to the **Proportional**, **Integral**, and **Derivative** values calculated by the microblock to create the final **Output** value. The **Bias** can be viewed as a starting point for the calculation. When the go input is off, the microblock's output defaults to 0.
Interval	How often (in seconds) the microblock calculates its output value. When the microblock's **Go** input is on, the output value is calculated once each interval.
Hold I Error	When checked, this setting retains the last calculated integral value when the microblock's go input is off.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

PID - Reverse Acting

⚠ The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	
What it does	PID (Proportional, Integral, Derivative) loops use industry standard algorithms to calculate an appropriate response for controlling a physical output, based on the equipment's setpoint and the input. The PID - Reverse Acting microblock calculates three values: a proportional value, integral value, and derivative value. These 3 values, together with the bias, create an output percentage that increases as the input falls below the setpoint.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Gain

Proportional	You can define P-gain by entering a value in this field as described below or by entering a value in the **Input range** field. Entering a value in either field automatically sets the other field. The Proportional gain (P-gain) value is used to calculate the proportional component of the routine. This component increases in reverse proportion to the difference between the setpoint and the input. When the input goes up, the proportional component goes down. If you define only the P-gain portion of the PID microblock, the microblock's output value could cause the input to oscillate around the setpoint or possibly to never reach the setpoint (if the P-gain is too low). The proportional value is calculated using the following formula: P = (Setpoint - Input) x P-gain. For example, if the P-gain is 20, the setpoint is 65, and the current temperature is 67, the proportional value is 40. If the P-gain is 20, the setpoint is 65, and the current temperature is 70 or higher, the proportional value is 100%. So the proportional output increases from 0 to 100% as the input changes from 0 to 5 degrees away from setpoint. The Snap application sets the **Input range** field to 100/20 = 5.
Input range	You can define P-gain by entering a value in this field as described below or by entering a value in the **Proportional** field. Entering a value in either field automatically sets the other field. In this field, specify the range for the input that will cause the P output to vary from 20% to 100%. For example, if you need to maintain temperatures ±2 from setpoint, enter 2. The Snap application sets the **Proportional** field to 100/2 = 50.

Integral	The Integral gain (I-gain) value is used to calculate the integral component of the PID routine. The integral value accounts for the amount of time that the input and the setpoint have been different. The longer the input and setpoint are different, the larger the integral value becomes. The integral value is calculated as follows: I = Previous I value + [(Setpoint - Input) x I-gain] For example, if the I-gain is 2, the setpoint is 65, and the current temperature is 67, the integral value for the first interval will be 4. If at the end of the second interval the temperature is still 67, the integral value will increase to 8.
Derivative	The Derivative gain (D-gain) value attempts to control the rate at which the input is brought to Setpoint in order to prevent the Setpoint from being exceeded. This value uses information from the current and previous intervals and is calculated using the following formula: D = [(Setpoint - Input)current - (Setpoint - Input)previous] x D-gain. For example, if the D-gain is 3, the Setpoint is 65, and the current temperature is 67, the Derivative value for the first interval is 6 ([2 - 0] x 3 = 6). If at the end of the second interval the temperature is still 67, the Derivative value will decrease to 0 ([2 - 2] x 3 = 0). The microblock's output percentage uses all three components as follows: Output (%) = Bias + P + I + D. The Bias is set on the microblock dialog or the Properties page. Using the examples listed for each component above and assuming a Bias value of 0, the Output value of the PID microblock for the first interval would be 50; for the second interval the value would be 48.

Loop

Bias	The **Bias** value is added to the **Proportional**, **Integral**, and **Derivative** values calculated by the microblock to create the final **Output** value. The **Bias** can be viewed as a starting point for the calculation. When the go input is off, the microblock's output defaults to 0.
Interval	How often (in seconds) the microblock calculates its output value. When the microblock's **Go** input is on, the output value is calculated once each interval.
Hold I Error	When checked, this setting retains the last calculated integral value when the microblock's go input is off.

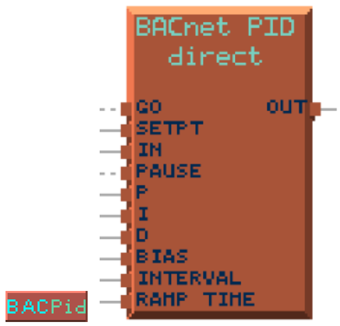
Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet PID

NOTE A control program with this microblock works only with v5.1 or later systems and v4.x or later drivers.

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	 **NOTE** The microblock's appearance depends on which options you select in the Snap application. The figure above includes all options.
What it does	PID (Proportional, Integral, Derivative) loops use industry standard algorithms to calculate an appropriate response for controlling a physical output, based on the equipment's setpoint and the input. The BACnet PID microblock calculates 3 values: a proportional value, integral value, and derivative value. These 3 values, together with the **Bias**, create an output percentage that increases or decreases as the input changes from the setpoint depending on the PID action selected.

How it works

PID (Proportional, Integral, Derivative) loops use industry standard algorithms to calculate an appropriate response for controlling a physical output, based on the equipment's setpoint and the input.

The PID microblock calculated 3 values: a proportional value, integral value, and derivative value. These 3 values are added together with the **Bias** to create an output percentage that increases or decreases as the measured value varies from the setpoint. The PID output is recalculated every **Interval**, determined by the user.

Deadband

Specify a **Deadband** to prevent the PID controller from making small adjustments to the output when input values are close to setpoint. Once the control program drives the input value to setpoint, it will pause the PID calculations and maintain the output until the difference between the setpoint and input is greater than the **Deadband**.

Calculate Continuously

Conventional PID controls update all 3 terms at the same time; at the time **Interval** specified. Selecting **Calculate Continuously** allows the **Proportional** term to be updated continuously instead of each interval. This prevents the Integral term from building up too quickly (windup) if the system reacts slowly, especially if there is a long delay between when the control output changes and when the system begins to reactThis allows the output to change enough to calculate a meaningful **Derivative** term between updates. The **Proportional** term does not depend on the interval and there is usually no reason to wait between intervals to update. The **Calculate Continuously** option often provides better control over a conventional PID loop.

Pause

Locks the output to its current value when **Pause** input is on. Allows external logic to implement a deadband or otherwise pause PID calculations based on system performance. **Pause** is only available as an optional wire input, if not selected, no **Pause** property is visible on the **Properties** page.

Proportional

The **Proportional** term generates an output signal that varies based on how far the input is from the setpoint. Error is calculated as the difference between the setpoint and the input. A larger error value produces a larger output. A **Proportional Gain** value determines how responsive the output is to the error; higher gains increase system response to the error. The **Proportional** term is calculated each interval using the following formula.

$$P_{out} = P_{gain}\ (\text{Error})$$

Integral

The **Integral** term reduces the **Error** the longer the input is different from the setpoint. The accumulated error is looked at over time and the output is adjusted to eliminate this error. The **Integral Gain** value determines how responsive the output is to the error; higher gains increase system response to the error. The **Integral** term is calculated each interval using the following formula.

$$I_{out} = I_{gain}\ (\text{Error}) + I_{out,\ \text{previous interval}}$$

Derivative

The **Derivative** term varies based on the change in the **Error**, slowing the rate of change as the input gets closer to the setpoint. This reduces overshoot. A larger change will result in a greater response. A **Derivative Gain** value determines how responsive the output is to the error; higher gains increase system response to the error. The **Derivative** term is calculated at each interval using the following formula.

$$D_{out} = D_{gain}\,(\text{Error}_{\text{current}} - \text{Error}_{\text{previous}})$$

Bias

The **Bias** value is added to the proportional, integral, and derivative values calculated by the microblock to create the final output value. Bias can be viewed as a starting point for the calculation.

$$PID_{out} = P_{out} + I_{out} + D_{out} + \text{Bias}$$

Ramp Time

The minimum allowable time (seconds) that the **Output** can change from 0 to 100%. This effectively "ramps" the **Output** to prevent the PID term from changing faster than a control actuator can modulate a valve, damper, or other controlled device. The **Min Ramp Time** setting limits the **Integral** term so it will not build up faster than the actuator can respond. If your system has a slow actuator, set this property equal to the actuator stroke time. Otherwise, set it to zero to disable this feature.

Limitations

Expected **Output** values may differ from calculated values due to the microblocks limitations.

The **Output:**

- Can never be less than 0% or more than 100%.
- Is limited by the physical devices that are being controlled. Transition times for physical devices may be slower than the calculated times. If the calculated values cause the **Output** to be less than 0% or more than 100%, the calculated **Integral** term may be restricted to keep it from building up too fast; this is commonly called "anti-windup".
- Is limited by the minimum ramp time.

Inputs and outputs

Inputs

Go	When the microblock's **Go** input is on, the output is enabled. When the **Go** input is off, the output value is 0.
Setpt	The desired zone temperature.
In	The current zone temperature.

Optional Inputs

• **Pause** • **Proportional** • **Integral** • **Derivative** • **Bias** • **Interval** • **Ramp Time**	Check the optional functionality that you want this microblock to have. See "*How it works* (page 413)" for a description of each input. • Selecting these inputs allows the value to be automatically adjusted by control program logic. • Optional inputs selected in the Snap application change the values within the microblock to read only. • Optional inputs selected are not editable on the **Properties** page. • The microblock must be network visible for BACnet to write to these properties.

Outputs

Out	The current calculated output value (%).

Properties

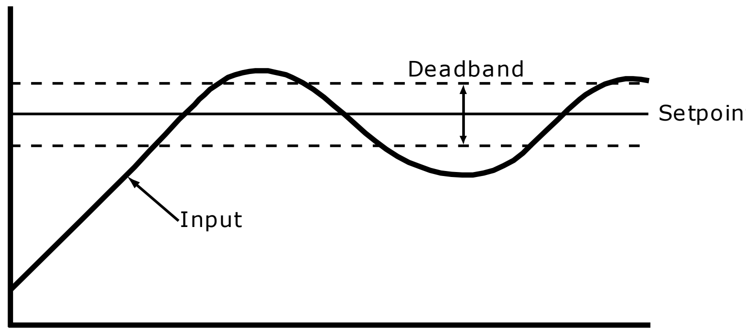
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Loop

Action	**Direct action** • Used in cooling applications. • The **Output** increases when the **Input** is greater than the **Setpoint**. • The **Output** is proportional to the **Error** value**.** • The **Error** is calculated as (Input - Setpoint). **Reverse action** • Used in heating applications. • The **Output** decreases when the **Input** is greater than the **Setpoint**. • The **Output** is inversely proportional to the **Error** value. • The **Error** is calculated as (Setpoint - Input).

Dead Band	A range in which the input may vary from the **Setpoint** before the **Output** is updated. **EXAMPLE** If **Setpoint** = 75° and **Deadband** = 2, the **Input** will vary between 73°-77°.  **NOTE** Once the **Input** falls outside the **Deadband**, it must reach or exceed the **Setpoint** value before the **Output** is paused again.
Update Interval	Determines how often the microblock calculates the **Output** value.
Bias	The **Bias** value is added to the **Proportional**, **Integral**, and **Derivative** values calculated by the microblock to create the final **Output** value. The **Bias** can be viewed as a starting point for the calculation.
Min Ramp Time to transition between 0 and 100%	The minimum allowable time (seconds) that the **Output** can change from 0 to 100% to allow for physical devices to travel from its fully open to its fully closed position. This is also the minimum allowable time for the Output to change from 100% to 0.

Gain

Proportional	You can define P-gain by entering a value in this field as described below or by entering a value in the **Input range** field. Entering a value in either field automatically sets the other field. The Proportional gain (P-gain) value is used to calculate the proportional component of the routine. This component increases in direct proportion to the difference between the setpoint and the input. When the input goes up, the proportional component goes up. If you define only the P-gain portion of the PID microblock, the microblock's output value could cause the input to oscillate around the setpoint or possibly to never reach the setpoint (if the P-gain is too low). The proportional value is calculated using the following formula: P = Error x P-gain. For example, in a Direct Acting PID loop, if the P-gain is 20, the setpoint is 65, and the current temperature is 67, the proportional value is 40. If the P-gain is 20, the setpoint is 65, and the current temperature is 70 or higher, the proportional value is 100%. So the proportional output increases from 0 to 100% as the input changes from 0 to 5 degrees away from setpoint. The Snap application sets the **Input range** field to 100/20 = 5.
Input range	You can define P-gain by entering a value in this field as described below or by entering a value in the **Proportional** field. Entering a value in either field automatically sets the other field. In this field, specify the range for the input that will cause the P output to vary from 20% to 100%. For example, if you need to maintain temperatures ±2 from setpoint, enter 2. The Snap application sets the **Proportional** field to 100/2 = 50.

Calculate continually	Updates the PID output based on instantaneous calculation of **Proportional** value regardless of **Update** interval.
Integral	The Integral gain (I-gain) value is used to calculate the integral component of the PID routine. The integral value accounts for the amount of time that the input and the setpoint have been different. The longer the input and setpoint are different, the larger the integral value becomes. The integral value is calculated as follows: I = Previous I value + [Error x I-gain] For example, if the I-gain is 2, the setpoint is 65, and the current temperature is 67, the integral value for the first interval will be 4. If at the end of the second interval the temperature is still 67, the integral value will increase to 8.
Derivative	The Derivative gain (D-gain) value attempts to control the rate at which the input is brought to Setpoint in order to prevent the Setpoint from being exceeded. This value uses information from the current and previous intervals and is calculated using the following formula: D = [(Error)current - (Error)previous] x D-gain. For example, if the D-gain is 3, the Setpoint is 65, and the current temperature is 67, the Derivative value for the first interval is 6 ([2 - 0] x 3 = 6). If at the end of the second interval the temperature is still 67, the Derivative value will decrease to 0 ([2 - 2] x 3 = 0). The microblock's output percentage uses all three components as follows: Output (%) = Bias + P + I + D. The Bias is set on the microblock dialog or the Properties page. Using the examples listed for each component above and assuming a Bias value of 0, the Output value of the PID microblock for the first interval would be 50; for the second interval the value would be 48.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

BACnet Object Details

Object Instance

• **Loop** • **Setpoint** • **Input** • **PID Out**	**Auto-assign** SiteBuilder assigns a BACnet Object ID to the Loop, Setpoint, Input, and PID Out objects when you attach the control program to a controller. **Use specific value** Manually enter BACnet ID's (0 to 3999999) to these objects if you need specific ID's. You must assign numbers that are unique within the controller. Enter the numbers in the **Loop**, **Setpoint**, **Input**, and **PID Out** fields. **NOTE** The **Loop** Object ID is the ID used for the BACnet PID microblock. The **Setpoint**, **Input**, and **PID Out** Object ID's are provided for compatibility with third party BACnet systems that use external references for these values.
Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
BACnet Writable	Check to control these parameters with BACnet commands.

Units

Setpoint and Input	The BACnet engineering unit of measurement of the microblock's present value.

COV Increment

• **Setpoint** • **Input** • **PID Output**	An Analog Network Input (ANI) that references this microblock in its **Address** field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the **COV Increment**. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's **Refresh Time** field.

Trends

Enable Trend Log	Select to have the controller collect analog trend data for the present values of the Setpoint, Input, and PID Output objects. It will also collect binary trend data for the Loop object (On = in control, Off = not in control). The loop is considered to be in control if it is actively controlling the output, meaning the GO input is on, the loop is not paused or overridden, and the input is not within the deadband.
Sample every ___ (hh:mm:ss)	Records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes.
Sample on COV (change of value)	Records the microblock’s present value only when the value changes by at least the **COV Increment**.
Max samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. **NOTE** Click **Reset** on the microblock's **Properties** page in the i-Vu® or Field Assistant system to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.

Write to historian: **Every ___ trend samples** **Use default (45% of Max samples)**	Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select **Every __ trend samples** and enter a number greater than zero and less than the number in the **Max samples** field, or you can select **Use default**. The number of trends specified must be accumulated at least once before the historical trends can be viewed.
In the i-Vu® or Field Assistant system only:	
Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only?	Collects trend data for the specific period of time you define in the **time** and **date** fields.
Store Trends Now	Writes all trend data in the controller to the system database without having to enable trend historian.
Trend samples accumulated since last notification	Shows the number of samples stored in the controller since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Delete	Deletes all trend samples stored in the database for the microblock.
BACnet Configuration	The **Object Name** is a unique alphanumeric string that defines the BACnet object. Although the **Object Name** field can be edited, it is not recommended. The **Notification Class** is set to 1 to receive alarms generated by Carrier® controllers.

BACnet object property addresses

Parameter and Status

The BACnet PID microblock is a BACnet Loop Object (object type 12). A complete description of the properties of this object is documented in the ASHRAE BACnet Handbook. The following is a subset of those properties that are most useful for graphics, touchscreens, BAC*view*® screens, and third-party BACnet access. Gains and other values can be optionally configured as wire inputs and are read only.

Property Name	Property ID	Units	Read/Write
Present_value	85	0-100%	Read only
Update Interval	118	Msec	R/W unless input on wire
Action	2	Text Toggle	Read only from the i-Vu®/Field Assistant application R/W through BACnet **CAUTION** Changing the action at runtime (from direct to reverse or from reverse to direct) could produce unwanted and possibly dangerous conditions in your system.
Proportional Gain	93	None	R/W unless input on wire
Integral Gain	49	None	R/W unless input on wire
Derivative Gain	26	None	R/W unless input on wire
Bias	14	0-100%	R/W unless input on wire

The format for a BACnet address is bacnet://device/object/property@priority.

EXAMPLE To set up a microblock to read the **Deadband** from the BACnet PID microblock in the same controller, use the following address.

bacnet://this/12:1/4164

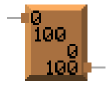
In the above address, 12:1 indicates the first instance of a BACnet PID microblock in the controller.

The following refinements to the standard PID algorithm are not part of the standard BACnet Loop Object but can be accessed as BACnet Proprietary Objects.

Property Name	Property ID	Units	Read/Write
Continuous Proportional	4163	Binary	R/W
Deadband	4164	Same as input	R/W
Min Ramp Time	4165	Seconds	R/W

Linear Converter

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	 
What it does	This microblock converts a value in a range to a proportionate value in a different range. For example, you can use this microblock to convert a PID output percent value to a 3-13 psi value to operate a hot water valve. You could also use this microblock to establish a setpoint range for equipment based on the outside air temperature range.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Input

From	Define the beginning value for the input range.
To	Define the ending value for the input range.

Output

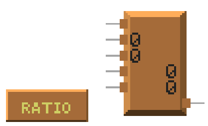
From	Define the beginning value for the output range.
To	Define the ending value for the output range.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Linear Converter for Variable Inputs

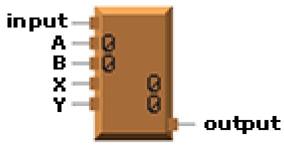
The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	
What it does	This microblock converts a value in a range to a proportionate value in a different range.

How it works

You define the starting (Input) and ending (Output) range by four inputs to the microblock.

- A and B define the input's range
- X and Y define the output's range



$$\text{output} = X + (\text{input} - A) * \frac{(Y - X)}{(B - A)}$$

where X ≤ **output** ≤ Y.

Properties

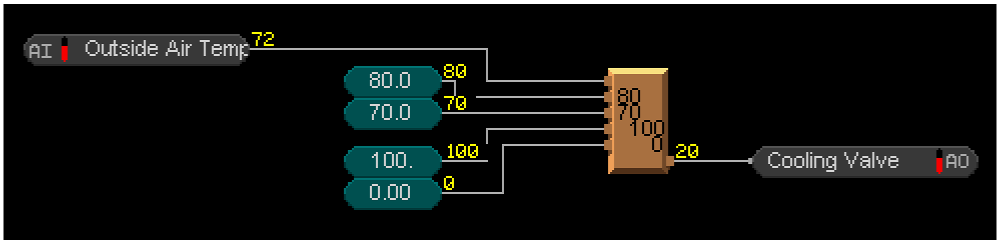
TIPS

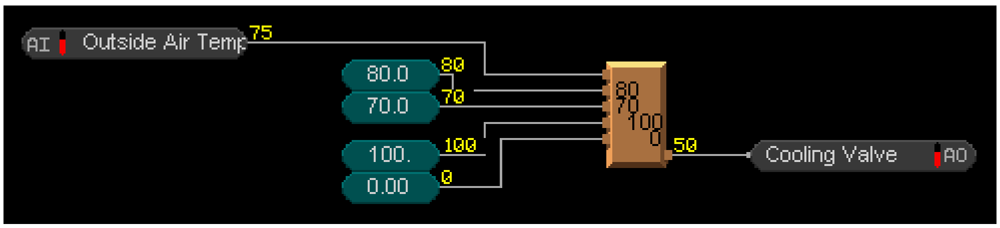
- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

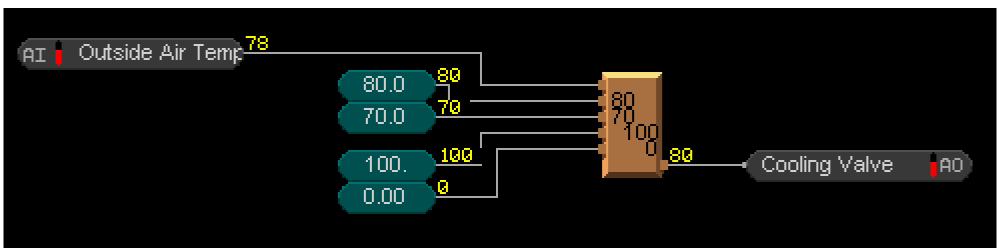
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Programming example

The images below show how the Linear Converter for Variable Inputs microblock can open a cooling valve as the day gets warmer. As the outside air temperature rises from 70 degrees to 80 degrees (user adjustable), the cooling valve opens from 0 to 100% (user adjustable).

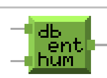






Enthalpy Calculator

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	 
What it does	This microblock accepts a dry bulb temperature and a relative humidity input and calculates a corresponding value for enthalpy. Enthalpy is a measure of energy inherent in the air. A high enthalpy value indicates a higher air temperature.

Limitations

In cases where the temperature and humidity input values are very high or very low, the enthalpy calculation can become distorted. If the **db** input is below 32°F or above 104°F, it may be necessary to substitute additional logic in place of the Enthalpy Calculator microblock. This may also be necessary if the **hum** input value falls below 0% or goes above 100%.

NOTE This microblock does not support metric temperatures. If you need a metric enthalpy, convert temperature to °F for use by the **db** input, then convert the **ent** output to metric units.

Properties

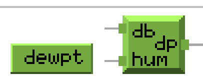
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Dewpoint Temperature Calculator

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	
What it does	This microblock accepts a dry bulb temperature and a relative humidity value and uses this information to calculate the dewpoint temperature. The dewpoint is the temperature at which water vapor begins condensing.

Limitations

In cases where the temperature and humidity input values are very high or very low, the dewpoint temperature can become distorted. Use Constant High Limit and Constant Low Limit microblocks to limit the db temperature input between 32°F and 104°F, and humidity input values between 0% and 100%.

NOTE This microblock does not support metric temperatures. If you need a metric dewpoint, convert temperature to °F for use by the **db** input, then convert the **dp** output from °F to °C.

Properties

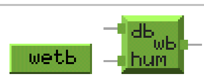
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Wet Bulb Temperature Calculator

The information below provides a <u>FULL</u> description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	
What it does	This microblock accepts a dry bulb temperature and a relative humidity value and uses this information to calculate the wet bulb temperature. The wet bulb temperature lowers when the humidity is low, indicating that more water can be absorbed by the air through evaporation.

Limitations

This microblock does not support metric temperatures. If you need a metric wet bulb temperature, convert temperature to °F for use by the **db** input, then convert the **wb** output from °F to °C.

Properties

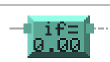
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

True If = Constant

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	 
What it does	This microblock creates an on (or true) signal when the value of the microblock's input is equal to the trip point.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Trip Point	Type the constant value the microblock will use to determine if it should generate an on (or true) signal.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

True If > Constant

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	 
What it does	This microblock creates an on (or true) signal when the value of the microblock's input is greater than the microblock's trip point.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Trip Point	Type the constant value the microblock will use to determine if it should generate an on (or true) signal.
Hysteresis	The **Hysteresis** setting indicates the amount by which the input value must fall below the trip point before the microblock's output is turned off. The hysteresis can prevent the microblock from changing its value too frequently when the input oscillates around the trip point. For example, if the trip point is 35 and the hysteresis is 2, the microblock's input must fall to 33 before the output turns off.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

True If < Constant

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	 
What it does	This microblock creates an on (or true) signal when the value of the microblock's input is less than the microblock's trip point.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

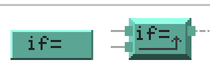
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Trip Point	Type the constant value the microblock will use to determine if it should generate an on (or true) signal.
Hysteresis	The Hysteresis setting indicates the amount by which the input value must rise above the trip point before the microblock's output is turned off. The hysteresis can prevent the microblock from changing its value too frequently when the input oscillates around the trip point. For example, if the trip point is 35 and the hysteresis is 2, the microblock's input must rise above 37 before the output turns off.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

True If = Variable

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	
What it does	This microblock accepts two analog values wired from other parts of the control program. The microblock creates an on (or true) signal when the value of both inputs is the same.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

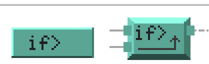
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

True If > Variable Input

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	
What it does	This microblock creates an on (or true) signal when the value of the microblock's if > input is greater than the microblock's other input. The microblock accepts two analog values wired from other parts of the control program.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

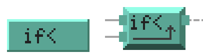
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Hysteresis	The **Hysteresis** setting indicates the amount by which the input value must fall below the trip point before the microblock's output is turned off. The hysteresis can prevent the microblock from changing its value too frequently when the input oscillates around the trip point. For example, if the trip point is 35 and the hysteresis is 2, the microblock's input must fall to 33 before the output turns off.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

True If < Variable Input

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	
What it does	This microblock creates an on (or true) signal when the value of the microblock's if < input is less than the microblock's other input. The microblock accepts two analog values wired from other parts of the control program.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

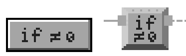
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Hysteresis	The Hysteresis setting indicates the amount by which the input value must rise above the trip point before the microblock's output is turned off. The hysteresis can prevent the microblock from changing its value too frequently when the input oscillates around the trip point. For example, if the trip point is 35 and the hysteresis is 2, the microblock's input must rise above 37 before the output turns off.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Analog to Digital Converter

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	
What it does	This microblock converts a numeric input to an on/off digital signal. If the input value is zero, the microblock creates an off signal. If the input value is any number other than zero, the microblock creates an on signal.

Properties

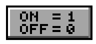
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Digital to Analog Converter

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Convert microblocks* (page 403)
Icon and symbol	 
What it does	This microblock accepts a digital on or off signal and converts it to a numeric value. If the microblock's input is on, the output value is 1.0. If the input is off, the output value is 0.0.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

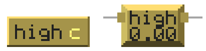
Limit microblocks

Limit microblocks test their input values against some limit, then output either the original signal or the limit value.

	*Constant High Signal Selector* (page 439) This microblock accepts a numeric value from another microblock and compares it to a constant value you define. The higher of the two values is the microblock's output value.
	*Constant Low Signal Selector* (page 440) This microblock accepts a numeric value from another microblock and compares it to a constant value you define. The lower of the two values is the microblock's output value.
	*Variable High Signal Selector* (page 441) This microblock accepts two numeric values from other microblocks in the control program and compares them to each other. The higher of the two values is the microblock's output value.
	*Variable Low Signal Selector* (page 442) This microblock accepts two numeric values from other microblocks in the control program and compares them to each other. The lower of the two values is the microblock's output value.
	*Constant Low Limit* (page 443) This microblock sets a limit that the microblock's value cannot go below. If the microblock's input is higher than the low limit you define, the microblock outputs the input value. If the input value is less than the low limit you define, the microblock outputs the low limit value.
	*Constant High Limit* (page 444) This microblock sets a limit that the microblock's value cannot go above. If the microblock's input is less than the high limit you define, the microblock outputs the input value. If the input value is higher than the high limit you define, the microblock outputs the high limit value.
	*Variable Low Limit* (page 445) This microblock limits a value based on another value in the microblock. The value of the microblock's second input is the low limit for the output. If the first input's value is greater than the second input, the microblock outputs the first input's value. If the first input is lower than the second, the microblock outputs the second inputs value.
	*Variable High Limit* (page 446) This microblock limits a value based on another value in the microblock. The value of the microblock's first input is the high limit for the output. If the second input's value is less than the first input, the microblock outputs the second input's value. If the second input is higher than the first, the microblock outputs the first input's value.
	*Ramp Up/Down Control* (page 447) This microblock limits the rate at which an analog signal may increase or decrease. When the microblock's go input is on, the microblock's ramp control is enabled. When the go input is off, the output value is equal to the input value.

Constant High Signal Selector

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Limit microblocks* (page 438)
Icon and symbol	
What it does	This microblock accepts a numeric value from another microblock and compares it to a constant value you define. The higher of the two values is the microblock's output value.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

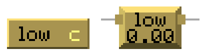
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Constant	The microblock compares the input to this value and outputs the higher of the two.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Constant Low Signal Selector

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Limit microblocks* (page 438)
Icon and symbol	
What it does	This microblock accepts a numeric value from another microblock and compares it to a constant value you define. The lower of the two values is the microblock's output value.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

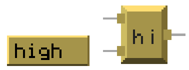
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Constant	The microblock compares the input to this value and outputs the lower of the two.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Variable High Signal Selector

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Limit microblocks* (page 438)
Icon and symbol	
What it does	This microblock accepts two numeric values from other microblocks in the control program and compares them to each other. The higher of the two values is the microblock's output value.

Properties

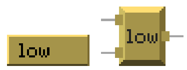
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Variable Low Signal Selector

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Limit microblocks* (page 438)
Icon and symbol	
What it does	This microblock accepts two numeric values from other microblocks in the control program and compares them to each other. The lower of the two values is the microblock's output value.

Properties

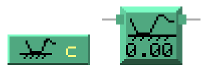
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Constant Low Limit

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Limit microblocks* (page 438)
Icon and symbol	
What it does	This microblock sets a limit that the microblock's value cannot go below. If the microblock's input is higher than the low limit you define, the microblock outputs the input value. If the input value is less than the low limit you define, the microblock outputs the low limit value.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

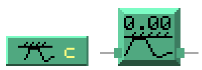
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Low Limit	If the microblock's input is: • Greater than the **Low Limit**, the microblock outputs the input value. • Less than the **Low Limit**, the microblock outputs the **Low Limit**.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Constant High Limit

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Limit microblocks* (page 438)
Icon and symbol	
What it does	This microblock sets a limit that the microblock's value cannot go above. If the microblock's input is less than the high limit you define, the microblock outputs the input value. If the input value is higher than the high limit you define, the microblock outputs the high limit value.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

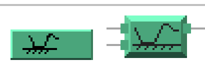
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
High Limit	If the microblock's input is: • Less than the **High Limit**, the microblock outputs the input value. • Greater than the **High Limit**, the microblock outputs the **High Limit**.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Variable Low Limit

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Limit microblocks* (page 438)
Icon and symbol	
What it does	This microblock limits a value based on another value in the microblock. The value of the microblock's second input is the low limit for the output. If the first input's value is greater than the second input, the microblock outputs the first input's value. If the first input is lower than the second, the microblock outputs the second inputs value.

Properties

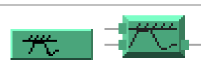
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Variable High Limit

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Limit microblocks* (page 438)
Icon and symbol	
What it does	This microblock limits a value based on another value in the microblock. The value of the microblock's first input is the high limit for the output. If the second input's value is less than the first input, the microblock outputs the second input's value. If the second input is higher than the first, the microblock outputs the first input's value.

Properties

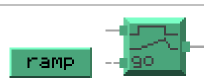
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Ramp Up/Down Control

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Limit microblocks* (page 438)
Icon and symbol	
What it does	This microblock limits the rate at which an analog signal may increase or decrease. When the microblock's go input is on, the microblock's ramp control is enabled. When the go input is off, the output value is equal to the input value. This microblock is often used as an additional safety measure to slow the reaction of a piece of equipment. This microblock can also be used in a sequence to prevent incoming requests from being canceled. For more information, refer to the appropriate request microblock description in *SysIn Microblocks* (page 292).

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Display resolution	The microblock's value is truncated and incrementally updated as follows: The **Display resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the system displays 1 digit to the right of the decimal • 0.01 to 0.99, the system displays 2 digits to the right of the decimal • 1 or greater, the system displays a whole number The **Display resolution** value determines the increment by which the displayed value is updated. For example, if you enter: • .2, the system displays 8.4, 8.6, 8.8, ... • .03, the system displays 5.09, 5.12, 5.15, ... • 10, the system displays 30, 40, 50, ...
Increase	The amount the analog signal is to increase.
Every	The amount of time between increases of the analog signal.
Decrease	The amount the analog signal is to decrease.
Every	The amount of time between decreases of the analog signal.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Relay microblocks

Relay microblocks act as software relays to determine how and when an input signal should be modified before it is sent from the microblock or the control program.

Constant Duty Cycle (page 450)

This microblock produces an output that cycles on and off according to the length of time you define for the cycle, and the percentage of that time you specify the output should be on.

Variable Duty Cycle (page 451)

This microblock produces an output that cycles on and off according to the length of time you define for the cycle and the value of the microblock's input, which indicates the percentage of the cycle time the output should be on.

Delay On Make

This microblock provides a delay before passing an on signal to the next microblock.

Delay On Break

This microblock provides a delay before passing an off signal to the next microblock.

Maximum On Timer (page 455)

This microblock limits the amount of time a signal remains on.

Minimum On/Off Timer (page 456)

This microblock defines the minimum amount of time that a signal should remain on or off.

Latch (page 457)

This microblock turns the output on when clear is off and it detects an input transition from off to on.

Toggle (page 458)

This microblock toggles its output value when its input turns on.

Lead/Standby (page 460)

This microblock is used to control two devices, where one device is a standby (backup) to the other. It is commonly used to control critical devices, such as two pumps in parallel, because it will automatically turn on the standby device if the lead device fails.

Switch - Normally Closed to Variable (page 462)

This microblock switches the microblock's output between a numeric input and a constant value.

Switch - Normally Closed to Constant (page 463)

This microblock switches the microblock's output between a numeric input and a constant value.

Switch (page 464)

This microblock switches the microblock's output value between two numeric inputs.

Digital Wire Lock (page 465)

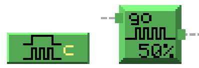
This microblock can lock a signal so that it remains on or off regardless of the input signal.

Analog Wire Lock (page 466)

This microblock can lock a specified value so that it remains the same regardless of the input signal.

Constant Duty Cycle

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Relay microblocks* (page 449)
Icon and symbol	
What it does	This microblock produces an output that cycles on and off according to the length of time you define for the cycle, and the percentage of that time you specify the output should be on. The microblock only cycles the output when the go input is on; if the go input is off, the output remains on.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

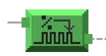
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Duty cycle	This setting determines the percentage of the cycle that the output is on.
Full cycle every	This is the length of the complete cycle.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Variable Duty Cycle

The information below provides a <u>FULL</u> description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Relay microblocks* (page 449)
Icon and symbol	 
What it does	This microblock produces an output that cycles on and off according to the length of time you define for the cycle and the value of the microblock's input, which indicates the percentage of the cycle time the output should be on. The microblock only cycles the output when the input value is greater than zero. If the input is zero, the output remains off.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

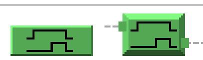
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Period	This is the length of the complete cycle.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Delay On Make

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Relay microblocks* (page 449)
Icon and symbol	
What it does	This microblock provides a delay before passing an on signal to the next microblock. Delay on Make always starts with an output value of FALSE. On Delay on Make, if the input is TRUE at startup, the delay time counts down and the output remains FALSE until the delay time elapses.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

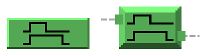
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Delay	Enter the amount of time for the delay. Maximum delay is 09:06:00.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Delay On Break

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Relay microblocks* (page 449)
Icon and symbol	
What it does	This microblock provides a delay before passing an off signal to the next microblock. Delay on Break matches the value of the input at startup. On Delay on Break: • If input is TRUE at startup, the output is TRUE.If the input is FALSE at startup, the output is FALSE. • The next transition from TRUE to FALSE, triggers the delay time to count down. The output remains TRUE until the delay time elapses.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

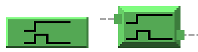
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Delay	Enter the amount of time for the delay. Maximum delay is 09:06:00.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Maximum On Timer

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Relay microblocks* (page 449)
Icon and symbol	
What it does	This microblock limits the amount of time a signal remains on. When the microblock's input turns on, the microblock turns its output on for a specified amount of time. When the time expires, the output turns off. If the input turns off before this time expires, the output turns off immediately.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Duration	This is the maximum amount of time the microblock's output stays on.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Minimum On/Off Timer

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Relay microblocks* (page 449)
Icon and symbol	 
What it does	This microblock defines the minimum amount of time that a signal should remain on or off. For example, this microblock can be used to prevent an on/off signal from rapid fluctuations that could affect equipment performance. When the microblock receives an on signal, the output turns on and remains on for the amount of time defined in the **Minimum on time** field. When this time expires, the output either remains on if the input is on, or turns off if the input is off. Likewise, when the microblock receives an off signal, the output turns off and remains off for the amount of time defined in the **Minimum off time** field. When this time expires, the microblock's output either remains off if the input is off, or turns on if the input is on.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

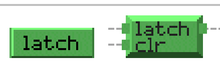
Minimum on time	The minimum period (seconds) that the microblock's present value will be on, regardless of the input signal to the microblock.
Minimum off time	The minimum period (seconds) that the microblock's present value will be off, regardless of the input signal to the microblock.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Latch

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Relay microblocks* (page 449)
Icon and symbol	
What it does	This microblock turns the output on when clear is off and it detects an input transition from off to on. If the **clr** input is on, the output will always be off. If the **clr** input is off, then a transition of the latch input from off to on will cause the output to turn on and remain on until the **clr** input is turned on.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

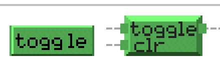
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Toggle

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Relay microblocks* (page 449)
Icon and symbol	
What it does	This microblock toggles its output value when its input turns on. For example, when the toggle input turns on, the output turns on and remains on when the input turns off again. When the input turns back on, the output toggles off. When the **clr** input turns on, the output turns off or remains off if it is off already.

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Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

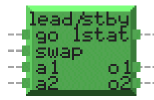
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Lead/Standby

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Relay microblocks* (page 449)
Icon and symbol	 

What it does

This microblock is used to control two devices, where one device is a standby (backup) to the other. It is commonly used to control critical devices, such as two pumps in parallel, because it will automatically turn on the standby device if the lead device fails.

Swap outputs based on runtime
On start-up, output **o1** is the lead output. It turns on and off as the **go** input turns on and off. An internal runtime counter controls how long **o1** remains as the lead output. When the counter expires, output **o2** becomes the lead and turns on and off as the **go** input turns on and off. Output **o1** then becomes the standby. This restarts the runtime counter. When the new runtime expires, **o1** again becomes the lead and **o2** becomes the standby. When **go** turns off, both outputs turn off without switching the lead and standby designation.

Swap outputs when inputs swap
The lead and standby outputs can also be switched by sending an on signal to the **swap** input. The outputs are not affected when **swap** turns off again. They remain switched until another event, such as an on signal to the **swap** input, causes them to switch again. You should only send a pulse signal to the **swap** input because leaving **swap** on prevents the microblock from responding to alarm inputs.

Swap outputs based on alarm inputs
These inputs signal a device failure and would switch operation to the standby device. For example, on a pump failure, the lead pump would turn off and the standby pump would turn on.

The 2 alarm inputs, **a1** and **a2**, correspond to the outputs **o1** and **o2**. If **o1** turns on but the device controlled by **o1** fails to start, external control logic (not internal to microblock) should send an alarm signal to **a1**, causing the microblock to turn on **o2** and turn off **o1**. Similarly, if **o2** is on and **a2** turns on, the microblock turns on **o1** and turns off **o2**.

Show lead status
The output **lstat** indicates the status of the output currently designated as the lead. During normal operations, **lstat** remains on as long as the **go** input is on, even as the lead output switches between **o1** and **o2**. If **o1** is the lead and an alarm on **a1** causes the output to switch to **o2**, **lstat** turns off because the lead output is no longer turned on.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Swap based on runtime? **Swap lead output after __ hours**	If you want the standby output to become the lead based on runtime, check **Swap based on runtime**. In **Swap lead output after __ hrs**, set when the lead output's runtime expires. You can determine the starting runtime value using the **Preset runtime value** setting on the Properties page. For example, if the **Preset runtime value** is 100, and the **Swap lead output after __ hrs** setting is 150, the lead output becomes the standby output after 50 hours have passed (150 hours - 100 hours preset = 50 hours). Once the **Preset runtime value** is used, the Latch in preset value now property on the Properties page automatically changes to N. You must change this property back to Y to use the **Preset runtime value** again. **NOTE** If you manually swap using the input, the swap timer will be reset. **TIP** If you need to have at least one of the outputs on at all times, you may want to use Delay on Break microblocks on the outputs to account for the possibility of lag time when the outputs are swapped.

Property Page Text

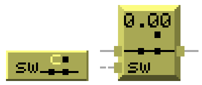
Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Simulation

Define the value(s) the microblock will use when you simulate the control program.

Switch - Normally Closed to Variable

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Relay microblocks* (page 449)
Icon and symbol	
What it does	This microblock switches the microblock's output between a numeric input and a constant value. The microblock's output equals the numeric input unless the **sw** input is on. When the **sw** input is on, the output equals the constant value.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

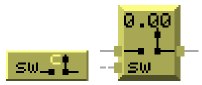
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Constant	The value the microblock outputs if the **sw** input is on (true).

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Switch - Normally Closed to Constant

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Relay microblocks* (page 449)
Icon and symbol	
What it does	This microblock switches the microblock's output between a numeric input and a constant value. The microblock's output equals the constant value unless the **sw** input is on. When the **sw** input is on, the output equals the numeric input's value.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

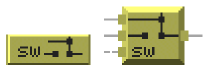
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Constant	The value the microblock outputs if the **sw** input is off (false).

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Switch

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Relay microblocks* (page 449)
Icon and symbol	
What it does	This microblock switches the microblock's output value between two numeric inputs. The microblock's output equals the first numeric input unless the **sw** input is on. When the **sw** input is on, the output equals the second numeric input.

Properties

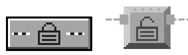
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Digital Wire Lock

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Relay microblocks* (page 449)
Icon and symbol	
What it does	This microblock can lock a signal so that it remains on or off regardless of the input signal. You can assign a **Name** to the lock that appears on the **Properties** page.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Enable	Check to output the locked value from the microblock instead of the microblock's calculated value.
Locked Value	Set the value of the microblock's output.

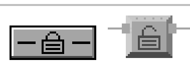
Dated	The lock is effective only for the time indicated by the **Begin** and **End** fields.
Begin	Set the beginning date and time of the lock.
End	Set the ending date and time of the lock.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Analog Wire Lock

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Relay microblocks* (page 449)
Icon and symbol	
What it does	This microblock can lock a specified value so that it remains the same regardless of the input signal. You can assign a **Name** to the lock that appears on the **Properties** page. You can use any characters (including spaces) in this field, except for the " character.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Lock Present Value	Check to output the locked value from the microblock instead of the microblock's calculated value.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Display resolution	The microblock's value is truncated and incrementally updated as follows: The **Display resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the system displays 1 digit to the right of the decimal • 0.01 to 0.99, the system displays 2 digits to the right of the decimal • 1 or greater, the system displays a whole number The **Display resolution** value determines the increment by which the displayed value is updated. For example, if you enter: • .2, the system displays 8.4, 8.6, 8.8, ... • .03, the system displays 5.09, 5.12, 5.15, ... • 10, the system displays 30, 40, 50, ...
Enable	Check to output the locked value from the microblock instead of the microblock's calculated value.
Locked Value	Set the value of the microblock's output.
Dated	The lock is effective only for the time indicated by the **Begin** and **End** fields.
Begin	Set the beginning date and time of the lock.
End	Set the ending date and time of the lock.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

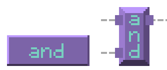
Logic microblocks

Logic microblocks perform logical operations on their inputs. Often these microblocks determine the conditions that trigger equipment starts, stops, or alarms.

and	*And - 2 Input* (page 469) This microblock accepts 2 on or off (digital) signals. If both inputs are on, the output is on. If either of the 2 inputs is off, the output is off.
and3	*And - 3 Input* (page 470) This microblock accepts 3 on or off (digital) signals. If all the inputs are on, the output is on. If any of the 3 inputs is off, the output is off.
and4	*And - 4 Input* (page 471) This microblock accepts 4 on or off (digital) signals. If all the inputs are on, the output is on. If any of the 4 inputs is off, the output is off.
and5	*And - 5 Input* (page 472) This microblock accepts 5 on or off (digital) signals. If all the inputs are on, the output is on. If any of the 5 inputs is off, the output is off.
or	*Or - 2 Input* (page 473) This microblock accepts 2 on or off (digital) signals. If either or both of the inputs are on, the microblock's output turns on. If neither of the 2 inputs are on, the microblock's output turns off.
or3	*Or - 3 Input* (page 474) This microblock accepts 3 on or off (digital) signals. If any of the 3 inputs are on, the microblock's output turns on. If none of the inputs are on, the microblock's output turns off.
or4	*Or - 4 Input* (page 475) This microblock accepts 4 on or off (digital) signals. If any of the 4 inputs are on, the microblock's output turns on. If none of the inputs are on, the microblock's output turns off.
or5	*Or - 5 Input* (page 476) This microblock accepts 5 on or off (digital) signals. If any of the 5 inputs are on, the microblock's output turns on. If none of the inputs are on, the microblock's output turns off.
xor	*Exclusive Or (XOR)* (page 477) This microblock accepts two on or off (digital) signals. If either of the two inputs are on (but not both), the microblock's output turns on. If none of the inputs are on, or if both of the inputs are on, the microblock's output turns off.
not	*Not* (page 478) This microblock produces an output opposite of its input.

And - 2 Input

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Logic microblocks* (page 468)
Icon and symbol	
What it does	This microblock accepts 2 on or off (digital) signals. If both inputs are on, the output is on. If either of the 2 inputs is off, the output is off.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

And - 3 Input

The information below provides a <u>FULL</u> description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Logic microblocks* (page 468)
Icon and symbol	
What it does	This microblock accepts 3 on or off (digital) signals. If all the inputs are on, the output is on. If any of the 3 inputs is off, the output is off.

Properties

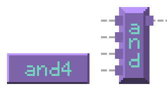
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

And - 4 Input

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Logic microblocks* (page 468)
Icon and symbol	
What it does	This microblock accepts 4 on or off (digital) signals. If all the inputs are on, the output is on. If any of the 4 inputs is off, the output is off.

Properties

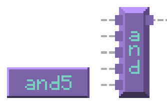
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

And - 5 Input

The information below provides a <u>FULL</u> description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Logic microblocks* (page 468)
Icon and symbol	
What it does	This microblock accepts 5 on or off (digital) signals. If all the inputs are on, the output is on. If any of the 5 inputs is off, the output is off.

Properties

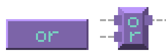
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Or - 2 Input

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Logic microblocks* (page 468)
Icon and symbol	
What it does	This microblock accepts 2 on or off (digital) signals. If either or both of the inputs are on, the microblock's output turns on. If neither of the 2 inputs are on, the microblock's output turns off.

Properties

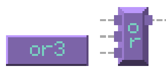
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Or - 3 Input

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Logic microblocks* (page 468)
Icon and symbol	
What it does	This microblock accepts 3 on or off (digital) signals. If any of the 3 inputs are on, the microblock's output turns on. If none of the inputs are on, the microblock's output turns off.

Properties

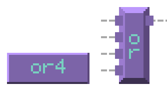
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Or - 4 Input

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Logic microblocks* (page 468)
Icon and symbol	
What it does	This microblock accepts 4 on or off (digital) signals. If any of the 4 inputs are on, the microblock's output turns on. If none of the inputs are on, the microblock's output turns off.

Properties

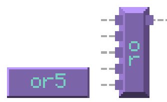
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Or - 5 Input

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Logic microblocks* (page 468)
Icon and symbol	
What it does	This microblock accepts 5 on or off (digital) signals. If any of the 5 inputs are on, the microblock's output turns on. If none of the inputs are on, the microblock's output turns off.

Properties

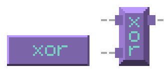
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Exclusive Or (XOR)

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Logic microblocks* (page 468)
Icon and symbol	
What it does	This microblock accepts two on or off (digital) signals. If either of the two inputs are on (but not both), the microblock's output turns on. If none of the inputs are on, or if both of the inputs are on, the microblock's output turns off.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Not

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Logic microblocks* (page 468)
Icon and symbol	
What it does	This microblock produces an output opposite of its input. For example, when the microblock's input is on, the output is off. When the input is off, the output is on.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Math 1 microblocks

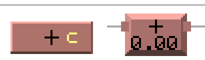
Math 1 microblocks perform simple mathematical operations on their inputs.

+ c	*Add Constant to Variable* (page 480) This microblock adds its input value to the Constant value. The microblock's output is the result of this calculation.
– c	*Subtract Constant from Variable* (page 481) This microblock subtracts the Constant value from its input value. The microblock's output is the result of this calculation.
× c	*Multiply Variable Times Constant* (page 482) This microblock multiplies its input value by the Constant value. The microblock's output is the result of this calculation.
÷ c	*Divide Variable by Constant* (page 484) This microblock divides its input value by the Constant value. The microblock's output is the result of this calculation.
mod c	*Modulo Divide by Constant* (page 485) This microblock divides its input value by the Constant value. The microblock's output is equal to the remainder of this calculation.
+	*Add 2 Variables* (page 486) This microblock adds the values of its inputs. The microblock's output is the result of this calculation.
+3	*Add 3 Variables* (page 487) This microblock adds the values of its inputs. The microblock's output is the result of this calculation.
+4	*Add 4 Variables* (page 488) This microblock adds the values of its inputs. The microblock's output is the result of this calculation.
–	*Subtract Two Variables* (page 489) This microblock subtracts the value of its second input from the value of its first input. The microblock's output is the result of this calculation.
×	*Multiply Two Variables* (page 490) This microblock multiplies the values of its two inputs together. The microblock's output is the result of this calculation.
÷	*Divide Two Variables* (page 491) This microblock divides the value of its first input by the value of its second input. The microblock's output is the result of this calculation.
mod	*Modulus* (page 492) This microblock divides the value of its first input by the value of its second input. The microblock's output equals the remainder of this calculation.

avg	*Average* (page 493) This microblock calculates the average of its two inputs.
chs	*Change Sign* (page 494) This microblock changes the sign of its input value by multiplying the value by -1.
abs	*Absolute Value* (page 495) This microblock determines the absolute value of its input by removing its sign.

Add Constant to Variable

⚠ The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 1 microblocks* (page 479)
Icon and symbol	
What it does	This microblock adds its input value to the Constant value. The microblock's output is the result of this calculation.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Constant	Perform the microblock's mathematical function using the input and this value.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Subtract Constant from Variable

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 1 microblocks* (page 479)
Icon and symbol	 
What it does	This microblock subtracts the Constant value from its input value. The microblock's output is the result of this calculation.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

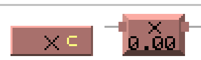
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Constant	Perform the microblock's mathematical function using the input and this value.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Multiply Variable Times Constant

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 1 microblocks* (page 479)
Icon and symbol	
What it does	This microblock multiplies its input value by the Constant value. The microblock's output is the result of this calculation.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

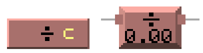
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Constant	Perform the microblock's mathematical function using the input and this value.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Divide Variable by Constant

The information below provides a <u>FULL</u> description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 1 microblocks* (page 479)
Icon and symbol	
What it does	This microblock divides its input value by the Constant value. The microblock's output is the result of this calculation.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

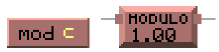
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Constant	Perform the microblock's mathematical function using the input and this value.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Modulo Divide by Constant

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 1 microblocks* (page 479)
Icon and symbol	
What it does	This microblock divides its input value by the Constant value. The microblock's output is equal to the remainder of this calculation. For example, if the microblock's input is 10 and the Constant is 3, the microblock's output is 1.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

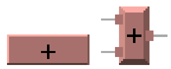
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Constant	Perform the microblock's mathematical function using the input and this value.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Add 2 Variables

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 1 microblocks* (page 479)
Icon and symbol	
What it does	This microblock adds the values of its inputs. The microblock's output is the result of this calculation.

Properties

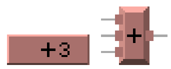
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Add 3 Variables

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 1 microblocks* (page 479)
Icon and symbol	
What it does	This microblock adds the values of its inputs. The microblock's output is the result of this calculation.

Properties

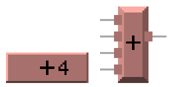
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Add 4 Variables

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 1 microblocks* (page 479)
Icon and symbol	
What it does	This microblock adds the values of its inputs. The microblock's output is the result of this calculation.

Properties

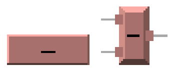
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Subtract Two Variables

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 1 microblocks* (page 479)
Icon and symbol	
What it does	This microblock subtracts the value of its second input from the value of its first input. The microblock's output is the result of this calculation.

Properties

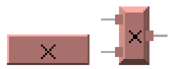
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Multiply Two Variables

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 1 microblocks* (page 479)
Icon and symbol	
What it does	This microblock multiplies the values of its two inputs together. The microblock's output is the result of this calculation.

Properties

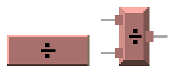
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Divide Two Variables

The information below provides a <u>FULL</u> description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 1 microblocks* (page 479)
Icon and symbol	
What it does	This microblock divides the value of its first input by the value of its second input. The microblock's output is the result of this calculation.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Modulus

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 1 microblocks* (page 479)
Icon and symbol	 
What it does	This microblock divides the value of its first input by the value of its second input. The microblock's output equals the remainder of this calculation. For example, if the microblock's first input is ten, and the second input is three, the microblock's output is the remainder of 10/3, or 1.

Properties

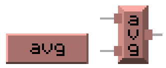
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Average

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 1 microblocks* (page 479)
Icon and symbol	
What it does	This microblock calculates the average of its two inputs.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Change Sign

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 1 microblocks* (page 479)
Icon and symbol	 
What it does	This microblock changes the sign of its input value by multiplying the value by -1. For example, if the microblock's input value is -32, the output value is 32.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Absolute Value

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 1 microblocks* (page 479)
Icon and symbol	
What it does	This microblock determines the absolute value of its input by removing its sign. For example, if the microblock's input is -10, the output is 10. If the microblock's input is 8, the output is 8.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Math 2 microblocks

Math 2 microblocks perform advanced and trigonometric mathematical operations on their inputs.

sin	*Sine* (page 497) A Sine microblock accepts a value in degrees and calculates the sine of this value. The microblock's output is the result of this calculation.
cos	*Cosine* (page 498) A Cosine microblock accepts a value in degrees and calculates the cosine of this value. The microblock's output is the result of this calculation.
tan	*Tangent* (page 499) A Tangent microblock accepts a value in degrees and calculates the tangent of this value. The microblock's output is the result of this calculation.
ln	*Natural Log* (page 500) A Natural Log microblock calculates the natural logarithm of its input. The microblock's output is the result of this calculation.
log	*Log* (page 501) A Log microblock calculates the base 10 logarithm of its input. The microblock's output is the result of this calculation.
x^y	*Exponent* (page 502) An Exponent microblock raises the value of its second input to the power of its first input. The microblock's output is the result of this calculation.
$\sqrt{\ }$	*Square Root* (page 503) A Square Root microblock calculates the square root of its input value. The microblock's output is the result of this calculation.
$\int$	*Integrator* (page 504) An Integrator microblock calculates a value over time (minutes or hours) at the rate (units/minute or units/hour) you select in the Snap application.
round	*Round Up/Down* (page 506) A Round Up/Down microblock rounds the input value up or down and produces a whole number.
trunc	*Truncate* (page 507) A Truncate microblock discards the fractional portion of its input and provides a whole number output.

Sine

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 2 microblocks* (page 496)
Icon and symbol	
What it does	A Sine microblock accepts a value in degrees and calculates the sine of this value. The microblock's output is the result of this calculation.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Cosine

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 2 microblocks* (page 496)
Icon and symbol	
What it does	A Cosine microblock accepts a value in degrees and calculates the cosine of this value. The microblock's output is the result of this calculation.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Tangent

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 2 microblocks* (page 496)
Icon and symbol	
What it does	A Tangent microblock accepts a value in degrees and calculates the tangent of this value. The microblock's output is the result of this calculation.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Natural Log

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 2 microblocks* (page 496)
Icon and symbol	
What it does	A Natural Log microblock calculates the natural logarithm of its input. The microblock's output is the result of this calculation.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Log

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 2 microblocks* (page 496)
Icon and symbol	
What it does	A Log microblock calculates the base 10 logarithm of its input. The microblock's output is the result of this calculation.

Properties

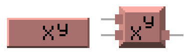
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Exponent

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 2 microblocks* (page 496)
Icon and symbol	
What it does	An Exponent microblock raises the value of its second input to the power of its first input. The microblock's output is the result of this calculation.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Square Root

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 2 microblocks* (page 496)
Icon and symbol	
What it does	A Square Root microblock calculates the square root of its input value. The microblock's output is the result of this calculation.

Properties

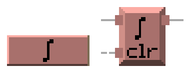
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Integrator

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 2 microblocks* (page 496)
Icon and symbol	
What it does	An Integrator microblock calculates a value over time (minutes or hours) at the rate (units/minute or units/hour) you select in the Snap application. For example, if the microblock's input value is constant at 10, and the selected rate is units per hour, the microblock's output increases at a rate of 10 per hour. If the microblock’s input value is constant at 10 and the selected rate is units per minute, the microblock’s output increases at a rate of 10 per minute. At the end of the first hour, the output value is 10; at the end of the second hour, the output is 20, and so on. When the **clr** input turns on, the microblock's output value is reset to zero.

How it works

The microblock accumulates the wire input value at every execution of the control program. If the selected rate is once per minute, on a one minute interval the microblock divides the total accumulated input by the number of executions during that minute, then increases the wire output value by the average input value for the minute. If the selected rate is once per hour, the microblock increases the output value every minute by 1/60th of the averaged input value for the minute.

Limitations

In drivers 4.x or later, the integrator microblock retains its output magnitude through a power loss, controller reset, or controller restart. You can reset the microblock’s output value to zero using a "true" value on the **clr** input, or by downloading to the controller.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Display resolution	The microblock's value is truncated and incrementally updated as follows: The **Display resolution** format is used to truncate the microblock's actual value. For example, if you enter a value from: • 0.1 to 0.9, the system displays 1 digit to the right of the decimal • 0.01 to 0.99, the system displays 2 digits to the right of the decimal • 1 or greater, the system displays a whole number The **Display resolution** value determines the increment by which the displayed value is updated. For example, if you enter: • .2, the system displays 8.4, 8.6, 8.8, ... • .03, the system displays 5.09, 5.12, 5.15, ... • 10, the system displays 30, 40, 50, ...
Rate	Select the accumulation rate that this microblock is to use.

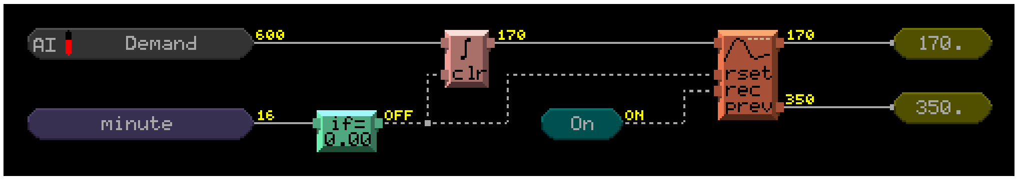
Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Tips and tricks

Metering

You can use the integrator microblock in combination with a peak recorder to accumulate and record meter demand and consumption at regular intervals. The example below records hourly accumulation.



Round Up/Down

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 2 microblocks* (page 496)
Icon and symbol	
What it does	A Round Up/Down microblock rounds the input value up or down and produces a whole number. If the fraction of the input value is less than 0.5, the microblock rounds the number down to the next whole number. If the fraction of the input is 0.5 or greater, the microblock rounds the number up to the next whole number.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Truncate

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Math 2 microblocks* (page 496)
Icon and symbol	 
What it does	A Truncate microblock discards the fractional portion of its input and provides a whole number output.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

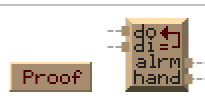
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Misc microblocks

	*DO/DI Proof* (page 508) A DO/DI Proof microblock verifies proper equipment operation by comparing the status of a digital input with the status of a corresponding digital output.
	*Up/Down Counter* (page 510) An Up/Down Counter microblock counts the number of on signals it receives and produces a number that increases or decreases according to the input receiving the signal.
	*Text* (page 511) A Text microblock allows you to place and format descriptive text on the **Properties** page.
	*Version* (page 515) A Version microblock allows you to attach a fixed version number to a control program.
	*Sunrise/Sunset* (page 516) A Sunrise/Sunset microblock calculates the time the sun will rise and set based on location and time zone information entered in the Snap application or on the **Properties** page.
	*OCL* (page 518) (Operator's Control Language) OCL allows you to create your own microblock when no other microblock suits your application. You define the microblock's inputs, outputs, and internal calculations.

DO/DI Proof

⚠ The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Misc microblocks* (page 508)
Icon and symbol	
What it does	A DO/DI Proof microblock verifies proper equipment operation by comparing the status of a digital input with the status of a corresponding digital output. For example, the microblock can compare an input indicating the fan's on or off status with the output that turns the fan on or off. If the two inputs do not receive the same signal, the DO/DI Proof microblock provides two outputs that can be used to trigger alarms.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.
Feedback Delay	You can set an allowable delay between the time a digital output turns on and the time the digital input registers the new status. When the microblock's do input turns on, if the **di** input does not turn on by the time the feedback delay time expires, the **alrm** output turns on.
Debounce Time	The **Debounce time** setting is the amount of time that the **di** input must remain on or off before it is considered valid. The **Debounce time** should not be longer than the feedback delay; otherwise, an alarm will be generated each time the equipment starts.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Up/Down Counter

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Misc microblocks* (page 508)
Icon and symbol	 
What it does	An Up/Down Counter microblock counts the number of on signals it receives and produces a number that increases or decreases according to the input receiving the signal. Each time the **inc** input turns on, the output value increases by one. Each time the **dec** input turns on, the output value decreases by one (but does not fall below zero). When the **clr** input turns on, the output value resets to zero.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Text

The information below provides a <u>FULL</u> description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Misc microblocks* (page 508)
Icon and symbol	
What it does	A Text microblock allows you to place and format descriptive text on the **Properties** page. The text is entered and edited in the Snap application and cannot be edited on the **Properties** page. You can select types of text, line separators, or controls for expanding and collapsing sections. You may also hide sections of the **Properties** page by setting conditions. This lets you format the layout of the **Properties** page. You can control the position of the text and the nesting order of the formatting on the **Properties** page by placing the Text microblocks in the correct sequence as you design the control program, or by selecting **Reorder** > **Edit Order**.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Type	Select one of the following options:
Plain	For creating plain text.
Separator	To create a horizontal line on the Properties page, often used to offset or group information, choose **Separator** as the **Text Type**. If you would like text to appear on the separator line, type the text in the **Property Page Text** field.
Bold	For creating bold text.

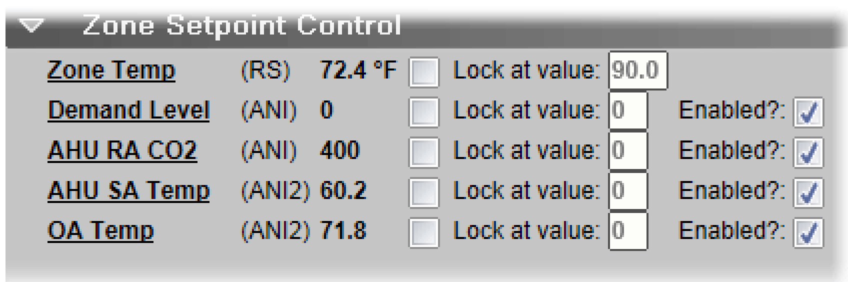
<table>
<tr>
<td>Expand Begin Closed

Expand Begin Opened

Expand End</td>
<td>To format a section using expanded formatting, first insert a Text microblock with the Text Type set as Expand Begin Closed or Expand Begin Opened, depending on how you want the area to display when first viewed. If you would like text to appear on your expandable line, type the text in the Property Page Text field.

You must also insert a Text microblock with the Text Type set as Expand End at the end of the section you wish to group together.</td>
</tr>
<tr>
<td>Table Begin

Table End</td>
<td>To align data in a table, insert a Text microblock with the Text Type set as Table Begin. To complete the table, insert a Text microblock with the Text Type set as Table End after the last item you want to include in the table.



NOTE When working with a table within an expanded section, make sure the table begins after the Expand Begin and ends before the Expand End.</td>
</tr>
</table>

Conditional Hide Begin **Conditional Hide End**	You can hide part of the **Properties** page based on a value from a specific microblock. For example, you can specify that the **Properties page text** from an **Analog Input** microblock will only appear on the **Properties** page if the value is above 85. The expression is evaluated relative to the entire control program, not at that particular microblock. Place a **Text** microblock with the **Text Type** set as **Conditional Hide Begin** before the microblock to be evaluated and another set to **Conditional Hide End** after it. Type a conditional expression in the **Properties Page Text** field of the **Text** microblock. Microblock properties may be referenced between the dollar signs ($), and the expression must be Boolean. For example, to show the microblock **Properties** page text only when the present value of the point named Zone Temp is greater than 85, the expression would be "$Zone_Temp/present_value$ >85". See *Operators* (page 513) for more information. **NOTES** • When referring to the name of a point, use the **RefName** rather than the **Display Name**. • Technical Support does not provide assistance with writing and editing Javascript. See Javascript textbooks, available in most bookstores, for help with Javascript. **TIP** If you are adding the **Conditional Hide** formatting after the control program has been designed or would prefer to group all of the **Text** microblocks within the control program, use the **Reorder** menu to correctly place the **Text** microblocks.
Important Begin **Important End**	These options are currently not used.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

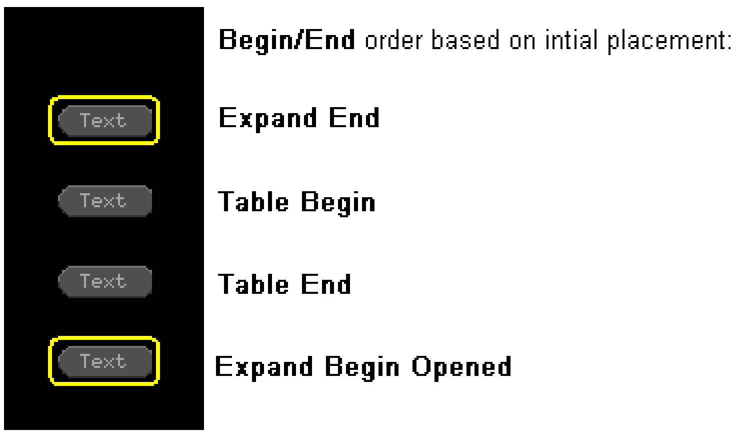
Operators

An operator defines how each piece of an expression is to be handled. For example, an operator can compare or perform an action between the value of a microblock property, a literal value, or the result of an expression. The following table lists operators that can be used in expressions.

Path Operators		
$*path*$	Get value	Gets the value of the path
??*path*??	Check for presence	Checks for the existence of the path. If it exists, the expression is true. If it does not, the expression is false.
Operators that return true/false		
<	Less than	Compares numeric data. Returns true if the value to the left of the operator is smaller than the value to the right.
>	Greater than	Compares numeric data. Returns true if the value to the left of the operator is larger than the value to the right.
<=	Less than or equal to	Compares numeric data. Returns true if the value to the left of the operator is smaller than or equal to the value to the right.
>=	Greater than or equal to	Compares numeric data. Returns true if the value to the left of the operator is larger than or equal to the value to the right.
!	Not	Evaluates the expression and returns the opposite. Example: !$zone_temp/locked$ If zone_temp/locked is true, the expression is false. If zone_temp/locked is false, the expression is true.
==	Equal to	Compares data. Returns true if the value on both sides of the operator are equal.
!=	Not equal to	Compares data. Returns true if the value to the left of the operator does not match the value to the right.
&&	And	Combines expressions. Returns true if the expressions on both sides of && result in true. For example: $zone_temp/locked$==false &&$zone_temp/present_value$>75 ?'#FF0000':'#FFF660'
||	Or	Combines expressions. Returns true if the expression on either side or both sides of the operator results in true.
Operators that return a numeric value		
+	Add	Adds numeric data, expressions, or values.
-	Subtract	Subtracts numeric data, expressions, or values.
*	Multiply	Multiplies numeric data, expressions, or values.
/	Divide	Divides numeric data, expressions, or values.
%	Modulus	Finds the remainder in the division of numeric data, expressions, or values.
Other operators		
( )	Parentheses	Use to nest expressions. Operations in parentheses are evaluated before those outside parentheses.

To correctly order Begin/End Text microblocks

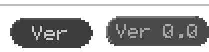
When adding Text microblocks in the Snap application that have a **Begin** or **End** text type, you must define the correct order for the microblocks so that the text appears correctly on a Properties page. Each **Begin** microblock must be followed by an **End** microblock, and you can have a set of **Begin**/**End** microblocks inside of another set of **Begin**/**End** microblocks. The initial order of the Properties page text is the order in which you add microblocks to the workspace. Moving the microblocks will not correct the Properties page order. If the microblocks are outlined in yellow, your **Begin**/**End** microblocks are out of order. In the example below, the order of the first and fourth microblocks are reversed.



To correct the order, you can either change the microblocks' **Type** selection in the Property Editor, or select **Reorder** > **Edit Order**.

Version

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Misc microblocks* (page 508)
Icon and symbol	
What it does	A Version microblock allows you to attach a fixed version number to a control program. This number appears only on the face of the microblock and on the **Properties** page of the device where the control program resides. The Version number can only be changed on the microblock dialog. The Version microblock does not interact with any other microblock in the control program and does not have any corresponding **Properties** page text.

Properties

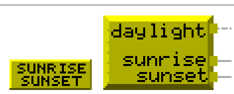
TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Version	Type a version number for the control program.

Sunrise/Sunset

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Misc microblocks* (page 508)
Icon and symbol	
What it does	A Sunrise/Sunset microblock calculates the time the sun will rise and set based on location and time zone information entered in the Snap application or on the **Properties** page. The sunrise and sunset outputs produce today's sunrise and sunset times. The output values are in minutes since midnight. The daylight output turns on when the current time falls between sunrise and sunset and turns off when the current time is before sunrise or after sunset.

Properties

TIPS

- **Alt+click** any value in the i-Vu® or Field Assistant interface to view property details, including its editing privilege and expression (location path) for use on graphics.
- You can right-click some properties in the Snap Property Editor and select **Make editable** or **Make read-only** to determine that property's functionality in your system.

Reference Name	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

Latitude/Longitude

Degrees/Minutes	Enter settings accurately to ensure that the correct sunrise and sunset times are calculated. See an atlas or your local weather station to determine this information for your area. Enter the longitude for a location in the Western Hemisphere (North or South America) as a negative number.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

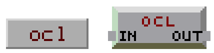
Simulation

Define the value(s) the microblock will use when you simulate the control program.

NOTE The **Latitude** and **Longitude** settings on the **General** tab have no effect on simulation.

OCL (Operator's Control Language)

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Misc microblocks* (page 508)
Icon and symbol	
What it does	OCL allows you to create your own microblock when no other microblock suits your application. You define the microblock's inputs, outputs, and internal calculations. Although the OCL has great flexibility, you should not put an entire control program into one microblock. Break it into smaller sections, using wires and other microblocks. You will be able to easily see the components of the control program, making it easier to troubleshoot.

To create an OCL microblock

1. In the Snap application, click the OCL microblock icon in the **Misc** microblock menu.
2. Click in the workspace where you want to place the microblock.

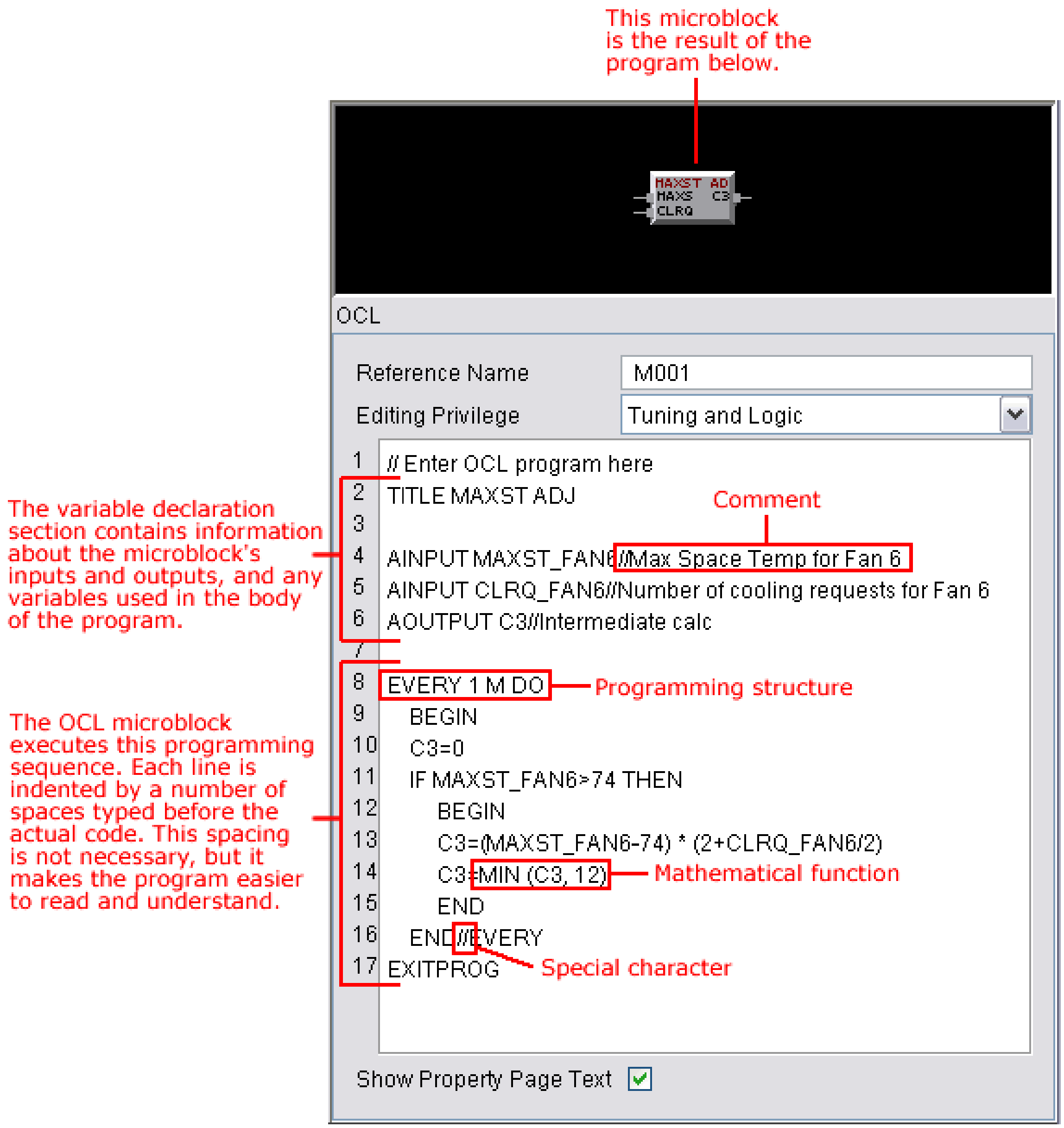
   The OCL microblock first appears as a blank gray microblock. After you define it's title, inputs, and outputs, the microblock will show these.
3. In the Property Editor, type the *variable declaration section* (page 520).
4. Press Enter to add a blank line.
5. Type the programming sequence that the OCL microblock will execute. Use the following:
   - Information from the *variable declaration section* (page 520)
   - *Predefined symbols* (page 522)
   - *System variables* (page 523)
   - *Special characters* (page 523)
   - *Functions* (page 524)
   - *Structures* (page 528)

NOTES

- The OCL program is not case-sensitive.
- A red box around the microblock indicates the program contains errors. The Property Editor turns the program's text red, displays a description of the error below the program's text, and highlights the line containing the error.
- The outputs of an OCL program are updated only at the end of the program execution, essentially at the "EXITPROG" line. Changes calculated during a program loop will not be output until the execution exits the loop and reaches the end of the program.

TIP To use your programmed OCL microblock in more than one control program, right-click the microblock, then select **Add to Favorites**.

Sample program



Variable declaration section

In this section, you define the microblock's:

- Title
- Inputs and outputs
- Variables used in the OCL program
- Text that appears on the Properties pages

In the variable declaration section of your OCL program, add the following terms that will be used by the microblock. Type each term in upper or lower case letters, and add at least one space after the term. Do not create a variable using the same name as any of the predefined symbols, functions, or commands.

Term	Notes
AINPUT	Defines the microblock's analog inputs. Each input's name must begin with a letter and be no more than 32 characters (only the first 4 appear on the microblock). Separate multiple names with a comma. **EXAMPLE** `AINPUT TMP1,CUR5,ENT3` This line creates 3 analog inputs for the microblock named TMP1, CUR5, and ENT3.
AOUTPUT	Defines the microblock's analog outputs. Each output's name must begin with a letter and be no more than 32 characters (only the first 4 appear on the microblock). Separate multiple names with a comma. **EXAMPLE** `AOUTPUT COIL,POWR,HEAT` This line creates 3 analog outputs for the microblock named COIL, POWR, and HEAT.
DINPUT	Defines the microblock's digital inputs. Each input's name must begin with a letter and be no more than 32 characters (only the first 4 appear on the microblock). Separate multiple names with a comma. **EXAMPLE** `DINPUT STA1,PMP2` This line creates 2 digital inputs for the microblock named STA1 and PMP2.
DOUTPUT	Defines the microblock's digital outputs. Each output's name must begin with a letter and be no more than 32 characters (only the first 4 appear on the microblock). Separate multiple names with a comma. **EXAMPLE** `DOUTPUT SEC7,LIG2` This line creates 2 digital outputs for the microblock named SEC7 and LIG2.

Term	Notes

PAR	Defines variables that are used in the OCL program, and if necessary, the text for these variables that appears on the Properties page. A variable can be any letter or letter combination as long as it is not already used by OCL.
	
	If the variable appears on the Properties page, type the Properties page text after the variable and in quotation marks. To display the value of the property, type the expression between $ signs.
	
	TIP To display the variable's value on the Properties page but not have the value be an editable field, set the editable property to false.
	
	EXAMPLE
	`PAR E = 2.71 "E equals $E$", X = 5.0`
	`"$X:editable="false"$"`
	
	OCL assigns the variable E to 2.71 and X to 5.0. The Properties page will display the text "E equals 2.71", with the "2.71" as an editable field. The Properties page will also show "X equals 5.0", but the value "5.0" will not be editable.

TIMER	Defines timing variables. Similar to the VAR declaration, type a variable name, text in quotation marks, and an expression between $ signs to display the variable's present value. **EXAMPLE** `TIMER T2 "Time remaining for Timer2 = $T2$ (mm:ss)"` OCL displays the given text on the Properties page along with the present value of T2.
TITLE	Defines the microblock's title that appears on the microblock's face. The title will not appear if no inputs or outputs are defined. The title can be up to 8 characters. **EXAMPLE** `TITLE ICEPLANT` OCL assigns the name "ICEPLANT" to the microblock.
VAR	Defines variables that are used in the OCL program, and if necessary, the text for these variables that appears on the Properties page. A variable can be any letter or letter combination as long as it is not already used in the variable declaration section or by OCL. If the variable appears on the Properties page, type the Properties page text after the variable and in quotation marks. To display the value of the variable, type the expression between $ signs. **EXAMPLE** `VAR Z "Z equals $Z$"` OCL displays the text "Z equals" followed by the present value of Z.

Predefined symbols

OCL predefined symbols are terms that already have an assigned value. You can use these terms in the OCL program. You cannot change a symbol's value. Do not list these terms in the variable declaration section.

Symbol	Value	Symbol	Value
GRAY	1	JAN	1
HRED	2	FEB	2
KBLUE	3	MAR	3
LTBLUE	4	APR	4
GREEN	5	MAY	5
SPECKLE	6	JUN	6
YELLOW	7	JUL	7
ORANGE	8	AUG	8
CRED	9	SEP	9
WHITE	10	OCT	10
TRUE	1	NOV	11
FALSE	0	DEC	12
ON	1	MON	1
OFF	0	TUE	2
OCC	1	WED	3
UNOCC	0	THU	4
OCCUPIED	1	FRI	5
UNOCCUPIED	0	SAT	6
YES	1	SUN	7
NO	0		

System variables

You can use the following system variables in your OCL program to read information from the control program. Each variable produces a number corresponding to the variable's current value in the control program.

System variable	Notes
COLOR	Control program's current color (1-10)
MDAY	Current day of the month (1-31)
MONTH	Current month (1-12)
TIME	Current time (0-1439; in minutes since midnight)
WKDAY	Current day of the week (Monday=1, Sunday=7)
YDAY	Current day of the year (1-366)
YEAR	Current year (1981-2040)

Special characters

You can use the following special characters in your OCL program.

Character	Use to...
( )	Use to override order of evaluation in an expression, delineate arguments in function calls, and to specify a conditional expression.
, (comma)	Use to separate arguments in function calls.
: (colon)	Use to identify labels referenced by GOSUB and GOTO keywords.
//	Use to place comments in the program. Any text following 2 slashes is ignored by the OCL compiler.
H	Use to represent one hour, or 3600 seconds.
M	Use to represent one minute, or 60 seconds.
S	Reserved but has no effect. The default time unit is seconds.

Mathematical functions

You can use the following mathematical and logical functions in your OCL program. Each of these functions acts on a value or set of values in parenthesis following the name of the function. These functions can act on numbers, variables, or expressions to calculate the results.

Function	Notes

ABS	Returns the absolute value of the number, variable, or expression in parenthesis.
	
	EXAMPLE
	`X = -10`
	`Y = ABS(X)`
	`Z = ABS(5+3)`
	
	In this example, OCL assigns Y to 10, because the absolute value of X equals 10. OCL assigns Z to 8, because the absolute value of 5+3 equals 8.

AVG	Returns the average of a set of values.
	
	EXAMPLE
	`XAN = 5`
	`BETA = AVG(1,4,XAN,9)`
	
	In this example, OCL assigns BETA to 4.75.

BETWEEN	Evaluates the 3 values in parentheses and determines whether the first value falls between the second and third values. If the first value does fall between the second and third values, the function returns a value of 1.0. If not, the between function returns a value of 0.0.
	
	EXAMPLE
	`STAT1 = BETWEEN(17,15,20)`
	`BETA = 2`
	`STAT2 = BETWEEN(BETA,3,5)`
	
	In this example, OCL assigns the value of STAT1 to 1.0, since 17 falls between 15 and 20. OCL assigns the value of STAT2 to 0.0, since BETA (which has a value of 2) is not between 3 and 5.

COS	Computes the cosine of the value (in degrees) in parentheses. **EXAMPLE** `VAL = COS(45)` In this example, OCL assigns the value of VAL to 0.707.

DELON	Calculates whether a variable or expression has been on or true for the amount of time specified. The time must be specified as a number, variable, or expression.
	
	EXAMPLE
	`STAGE1 = DELON(GAS, 1:00)`
	
	This example turns on the variable STAGE1 after the variable GAS has been on for 1 minute.
	
	EXAMPLE
	`STAGE2 = DELON(FLOW1 > 125, 5 H)`
	
	This example turns on the variable STAGE2 after the value of the variable FLOW1 has been greater than 125 for 5 hours.

Function	Notes

LMT	Limits a value based on the high and low limits specified. This function requires 3 values: the first value is the value to be limited, the second value is the low limit, and the third value is the high limit. Each of the values can be a number, a variable, or an expression. If the first value falls between the low and high limits, the value is unchanged. If the first value is lower than the low limit, the low limit becomes the function's value. If the first value is higher than the high limit, the high limit becomes the function's value.
	EXAMPLE
	`ZETA1 = 3`
	`ZETA2 = LMT(ZETA1, 5, 10)`
	In this example, ZETA2 = 5, since the value of ZETA1 (which is 3) is less than the low limit of 5.

LN	Calculates the natural logarithm of the indicated value. **EXAMPLE** `Y = LN(134)` In this example, OCL sets Y equal to 4.8978.
LOG	Calculates the base 10 logarithm of the indicated value. **EXAMPLE** `X = LOG(134)` In this example, OCL sets X equal to 2.1271

MAX	Determines the larger number from a set of 2 numbers, variables, constants, or expressions.
	EXAMPLE
	`SIGMA = 7`
	`GAMMA = MAX(SIGMA,10)`
	In this example, OCL sets GAMMA equal to 10, since 10 is larger than SIGMA (which is set to 7).

MIN	Determines the smaller number from a set of 2 numbers, variables, constants, or expressions.
	EXAMPLE
	`X = 2`
	`RHO = MIN(1+X,4)`
	In this example, OCL sets RHO equal to 3, since 1+X (when X = 2) is less than 4.

POW	Calculates the first value raised to the power of the second value. **EXAMPLE** `CHI = POW(TAU,3)` In this example, OCL sets CHI equal to TAU raised to the power of 3 (TAU cubed).

Function	Notes

RATIO	Converts a value in a range to a proportionate value in a different range. The first value in parenthesis is the value to be converted. The next 2 values indicate the current range that the first value belongs in. The last 2 numbers indicate the range the value should be converted to.
	
	EXAMPLE
	`N=40`
	`DELTA = RATIO(N, 0, 100, 3, 13)`
	
	In this example, OCL sets DELTA to 7.

RND	Rounds the specified number to the nearest whole number.
	
	EXAMPLE
	`KAPPA = RND(3.442)`
	`LAMBDA = RND(10.59)`
	
	In this example, OCL sets KAPPA equal to 3.0 and LAMBDA equal to 11.0.

SIN	Calculates the sine of the value (in degrees) in parenthesis. **EXAMPLE** `X = SIN(90)` In this example, OCL sets X equal to 1.0
SQRT	Calculates the square root of the indicated value. **EXAMPLE** `Y = SQRT(81)` In this example, OCL sets Y equal to 9.
START	Turns on the variable or variables in parenthesis. You can use as many variables as necessary, separating each variable with a comma. **EXAMPLE** `START(FAN1, PUMP4, STAGE2)` In this example, OCL turns on the variables FAN1, PUMP4, and STAGE2.
STOP	Turns off all of the variables listed in parenthesis. You can use as many variables as necessary, separating each variable with a comma. **EXAMPLE** `STOP (ALARM, LIGHT2, COMP4)` This example turns off the variables ALARM, LIGHT2, and COMP4.
TAN	Calculates the tangent of the value (in degrees) indicated in parenthesis. **EXAMPLE** `XI = TAN(71)` In this example, OCL sets the variable XI equal to 2.904.

Function	Notes

TOF	Returns the amount of time in seconds that the variable or expression in parenthesis has been off or false.
	
	WARNING Do not put this function in a conditional section of the program. It must execute to calculate properly.
	
	EXAMPLE
	
	//first do things that always need to be executed
	
	X=TOF(COMP1)
	
	//then do things appropriate to the state we're in, but EXITPROG each time to check the state
	
	IF (FOO) THEN
	
	BEGIN
	
	...do something...
	
	IF (PUMP) THEN FOO = FALSE //if pump comes on, break out of the loop
	
	EXITPROG //leave, knowing you'll be right back if FOO is still true
	
	END
	
	IF (X>300) THEN...
	
	In this example, OCL sets X equal to the amount of time in seconds that COMP1 has been off, and updates that time regardless of the FOO loop.

TON	Returns the amount of time in seconds that the variable or expression in parenthesis has been on or true.
	
	WARNING Do not put this function in a conditional section of the program. It must execute to calculate properly.
	
	EXAMPLE
	
	P1_TIME = TON(PUMP1)
	
	P2_TIME = TON(PUMP2)
	
	IF (PRIMARY) THEN X=P1_TIME ELSE X=P2_TIME
	
	IF (X>30) = THEN START(CHILLER1)
	
	In this example, OCL sets P1_TIME equal to the amount of time in seconds that PUMP1 has been running, and P2_TIME equal to the amount of time in seconds that PUMP2 has been running.

TRN	Discards the fractional portion of the value in parenthesis. **EXAMPLE** `WEIGHT= TRN((CREQ1 + CREQ2 + CREQ3)/3)` In this example, OCL evaluates the equation in parenthesis and truncates the value. If CREQ1 equals 2, CREQ2 equals 5, and CREQ3 equals 0, the value of WEIGHT is 2.

Programming structures

OCL supports several programming structures that are common to many other programming languages.

Structure	Notes

BEGIN...END	Groups a number of program statements. This structure is often used to group a sequence of statements that should be executed when a given condition is met.
	
	EXAMPLE
	`IF (OCC) THEN`
	`BEGIN`
	`START PUMP1`
	`START BOILER1`
	`RATE = 4 * LMT(FLOW,5,10)`
	`END`
	
	In this example, OCL starts PUMP1, starts BOILER1, and calculates RATE when OCC is TRUE.

DELAY	Halts execution for the specified amount of time. Define the time in hours (H), minutes (M), or seconds (the default unit). **EXAMPLE** `DELAY 10H` This example stops the execution of OCL for 10 hours.

EVERY...DO	Tells OCL to execute a program statement once every time the specified time interval passes. Define the time in hours (H), minutes (M), or seconds (the default unit). The actual amount of time can be a number or a variable.
	
	EXAMPLE
	`EVERY 10 M DO`
	`A = B + AVG(C, D + E)`
	
	This example calculates the value of the variable A every 10 minutes.

EXITLOOP	Skips the remaining portion of a WHILE...DO loop if the specified condition is met.
	
	EXAMPLE
	`WHILE (CONTENT < 90.1) DO`
	`BEGIN`
	`IF (TLO = ON) THEN EXITLOOP`
	`D = D + 2`
	`END`
	
	In this example, OCL continues to calculate the value of the variable D until either the value of CONTENT becomes greater than 90.1 or the variable TLO turns on.

EXITPROG	Ends the OCL program. Place all subroutines after the EXITPROG statement to ensure they are not executed inadvertently.

Structure	Notes

GOSUB	Calls a subroutine which is referenced by a label or name. Place all subroutines after the EXITPROG statement to ensure they are not executed inadvertently. When the subroutine finishes, the RETURN statement resumes execution of the OCL program at the point where the subroutine was invoked.
	
	EXAMPLE
	`IF X < 23.0 THEN GOSUB TURNON`
	`ELSE GOSUB TURNOFF`
	`EXITPROG`
	`TURNON:`
	`START (LOCK1)`
	`START (LOCK2)`
	`RETURN`
	`TURNOFF`
	`STOP (LOCK1)`
	`STOP (LOCK2)`
	`RETURN`
	
	In this example, OCL begins the TURNON subroutine, which turns LOCK1 and LOCK2 on, if X is less than 23. If X is greater than 23, OCL begins the TURNOFF subroutine, which turns LOCK1 and LOCK2 OFF.

GOTO	Transfers execution of OCL to the designated label. The GOTO structure is not recommended because it creates difficulties in debugging the OCL sequence.
	
	EXAMPLE
	`IF (PH >= 6) THEN GOTO ACID`
	`Y = GB - X`
	`GOTO LAST`
	`ACID:`
	`Y = GB + X`
	`LAST:`
	
	In this example, OCL jumps to the line labeled ACID if PH is greater than or equal to 6. After it reaches line ACID, it sets Y equal to GB + X and proceeds to the line LAST. If PH is less than 6, OCL sets Y equal to GB - X and jumps to the line LAST.

IF...THEN	Tells OCL to execute a program statement if the value of the variable or expression in parenthesis is TRUE. **EXAMPLE** `IF (BOILER9) THEN X = 45` In this example, if BOILER9 is on, OCL sets X to 45 .

IF...THEN...ELSE	Works similarly to IF...THEN but adds an alternative statement to be executed if the value of the variable or expression in parenthesis is FALSE.
	
	EXAMPLE
	`IF (HUMIDITY > 88) THEN`
	`DEMAND = 4`
	`ELSE`
	`DEMAND = 2`
	
	In this example, OCL sets DEMAND equal to 4 if HUMIDITY is greater than 88; otherwise OCL sets DEMAND equal to 2.

Structure	Notes

IFONCE...THEN	Works similarly to the IF...THEN structure but executes the program statement only once after the value of the variable or expression in parenthesis has been determined to be true.
	
	EXAMPLE
	`IFONCE(PRESSURE > 178)`
	`THEN START (ALARM6)`
	
	In this example, OCL starts ALARM6 if PRESSURE becomes greater than 178.

WHILE...DO	This structure tells OCL to execute a program statement provided that the value of the variable or expression in parenthesis is TRUE.
	
	EXAMPLE
	`WHILE (WASTETIME>150) DO`
	`WASTETIME = WASTETIME - 1`
	
	NOTE The WHILE...DO function is provided to support existing OCL programs, but we recommend that you do not use it in new programs. In some cases, each WHILE...DO loop can add up to a 100 msec delay. Ten WHILE...DO loops will create a 1 second delay. This delay affects all programs within the controller, not just the OCL program. Also, OCL output values will not update until the "While" condition is no longer true and the program exits the WHILE...DO loop.

Operators

Mathematical Operators

+ (Add)
- (Subtract)
* (Multiply)
/ (Divide)

NOTE Do not use ** to raise to a power. Use the POW function instead.

Logical Operators

=
>
<
>= (Greater Than or Equal To)
<= (Less Than or Equal To)
<> (Not Equal To)
AND
OR
NOT

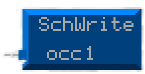
Examples

This statement...	Will be true if...
IF ((A1+A2=4) AND NOT (A1=A2)) THEN ANS = 1	A1=1 and A2=3 but not if A1=A2=2
IF ((A1+A2=4) OR NOT (A1=A2)) THEN ANS = 1	A1+ A2=4 or if A1 does not equal A2
IF (POW(A1,2)+A2=4) THEN ANS = 1	$A1^2 + A2 = 4$

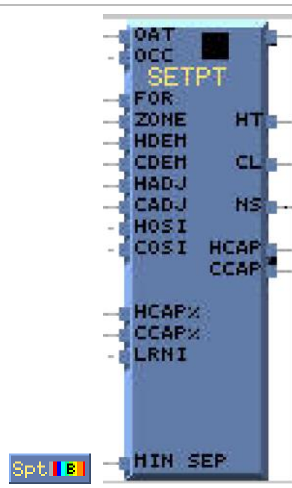
Retired microblocks

The microblocks listed in the left column below have been retired from the Snap microblock menu. However, they are still supported by the Snap application, controllers, and the i-Vu®/Field Assistant application. If you open a control program that contains one of these microblocks, you can edit properties in the microblock and copy and paste it to other applications if necessary.

For applications to be used in v6.0 or later i-Vu®/Field Assistant systems, use the microblocks in the right column below. These microblocks have configurable options that provide the functionality of the retired microblocks.

Instead of this retired microblock...		Use...
	*BACnet Zone Setpoint* (page 531)	*BACnet Setpoint* (page 362)
	*BACnet Time Clock* (page 546)	*BACnet Time Clock with TLO and Override Status* (page 394)
	*BACnet Time Clock with TLO* (page 548)	*BACnet Time Clock with TLO and Override Status* (page 394)
	*Carrier Schedule Write* (page 551)	*Carrier Schedule* (page 28) or *Carrier Schedule with TLO and Override Status* (page 32)

BACnet Zone Setpoint

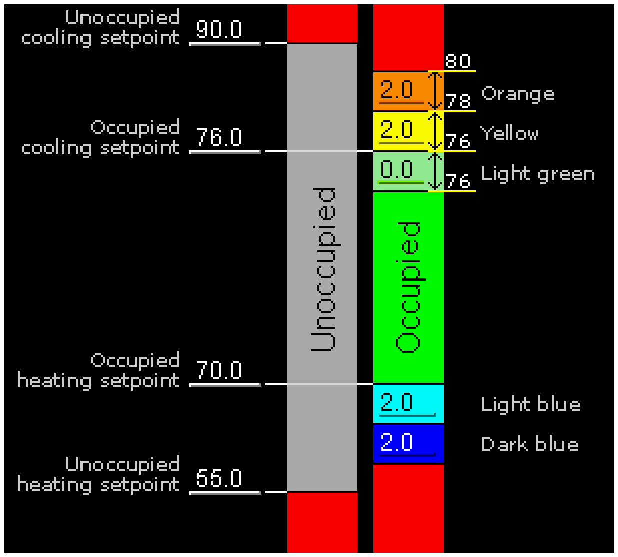
Microblock family	*Control* (page 361)
Icon and symbol	 **NOTE** The microblock's appearance depends on which options you select in Snap. The figure above includes all options.

What it does

Calculates effective heating and cooling setpoints and exposes them to BACnet. Calculates the zone thermographic color for single-zone equipment.

You can program a zone's occupied and unoccupied heating and cooling setpoints. The zone's effective setpoints may differ from its programmed occupied setpoints because of setpoint adjustment in the zone, the optimal start algorithm, or electric demand reduction levels. The microblock compares the zone temperature to the zone's effective setpoint to determine the zone thermographic color that represents the control program status. Other microblocks (such as the *If Color =* (page 392) microblock) can use this color to perform additional control.

A typical zone thermographic color scale may look like this:



OPTIONS

In Snap only, you can enable the following optional functionality on the microblock's **Optional** tab.

- Demand Limiting
- Setpoint Adjust
- Optimal Start
- Capacity Limit

How it works

Heating and Cooling setpoints

The microblock outputs the effective zone heating and cooling setpoints. Unless adjusted by a user in the zone, by the optimal start algorithm, or by electric demand reduction levels, the effective setpoints equal the programmed occupied and unoccupied setpoints. When the **OCC** input is true (on), the microblock outputs the occupied cooling and heating setpoint values. When the **OCC** input is not true (off), the microblock outputs the unoccupied heating and cooling setpoint values.

Normally the separation between the heating and cooling setpoints is controlled by the values the user chooses for these setpoints; however, the microblock will not allow the heating and cooling ranges to overlap. For example, if a user tries to raise the heating setpoint to a value that is equal to or higher than the cooling setpoint, the cooling setpoint will be “pushed” to a higher value to prevent the ranges from overlapping. The effective setpoints will also be affected by this change, as these setpoints will maintain a separation of at least twice the value of the color change hysteresis. The setpoints will maintain a similar separation if a BACview or a third party BACnet system writes directly to the heating and cooling setpoint objects.

Zone thermographic color

The microblock compares the zone temperature from the **ZONE** input to the zone's effective setpoints and resulting color scale to determine the zone color output value.

EXAMPLES

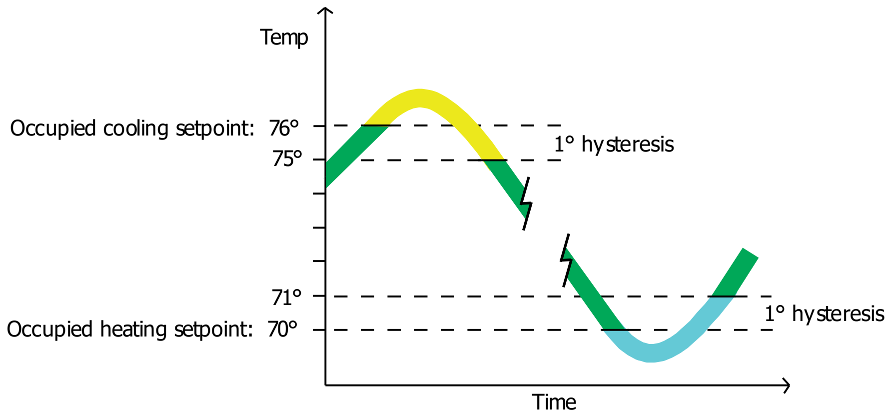
- Unoccupied
  If the unoccupied zone temperature (65°) is between the unoccupied heating (55°) and cooling (90°) setpoints and the zone is not in optimal start, the microblock sets the color output value to unoccupied gray.
- Occupied
  If the occupied zone temperature (79°) exceeds the occupied cooling setpoint (76°) by more than the yellow color band value (2°) but less than the yellow and orange color band values (2° + 2° = 4°), the microblock sets the color output value to orange.
- Optimal start
  If the zone temperature (60°) exceeds the effective heating setpoint (62°), the microblock sets the color output value to light blue.
  If the zone temperature (85°) exceeds the effective cooling setpoint (84°), the microblock sets the color output value to yellow.
- Demand level 1
  If the occupied zone temperature (68°) exceeds the occupied heating setpoint minus the **Demand1** offset (70° – 1° = 69°) by less than the light blue band value (2°), the microblock sets the color output value to light blue.

Color Change Hysteresis

The **Color Change Hysteresis** provides a difference between the temperature at which the zone color changes as the zone temperature departs from the acceptable range between the heating and cooling setpoints and the temperature at which the zone color changes back as the zone temperature returns to the acceptable range.

EXAMPLE The following graph shows the zone color that results as the zone temperature departs from and returns to the acceptable range in a zone with the following settings:

- **Color Change Hysteresis** = 1° (applies as the temperature returns to the acceptable range)
- Occupied cooling setpoint = 76°
- Occupied heating setpoint = 70°



Demand Limiting (Optional)

Electric rates can vary with electricity usage. In some locations, utilities offer incentives to customers to reduce electrical usage when the system-wide load threatens to exceed the grid capacity and cause brownouts. Some gas utilities offer incentives to customers to keep their natural gas usage below a certain level. To keep utility usage below peak demand levels, you can define 3 demand levels to reduce the cooling load and 3 demand levels to reduce the heating load. You typically define these levels in your gas or electric meters' control programs. You can use these demand levels to relax zone occupied heating and cooling setpoints as needed throughout your system. Relaxing setpoints reduces equipment operation and reduces utility demand while minimizing the effects on occupant comfort.

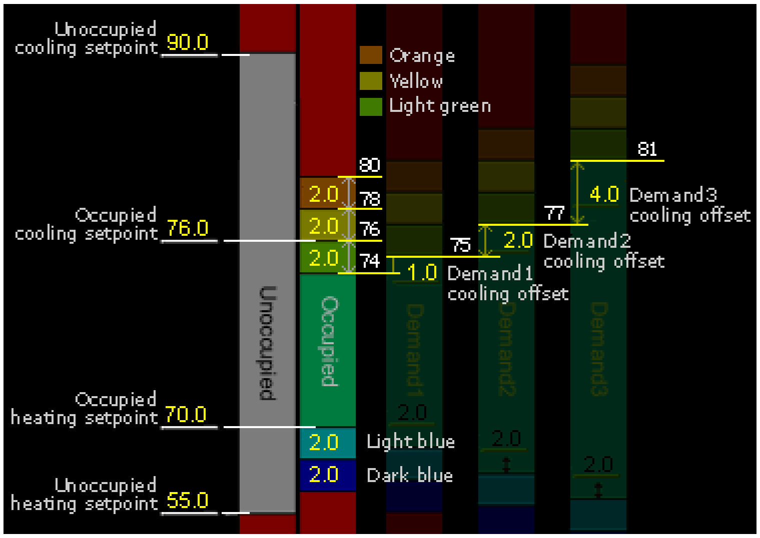
To use this demand reduction strategy in a zone, set up *Analog Network Input* (page 174) microblocks to read the demand levels (1, 2, or 3) from the meter's control program and connect the Analog Network Input microblocks to this microblock's **HDEM** and **CDEM** inputs. In an all-electric system, the demand level from the electric meter would typically be connected to both inputs. Other systems may require the heating and cooling demands to be controlled separately. When the utility meter's control program indicates a demand level of 1, this microblock relaxes occupied heating or cooling setpoints and all related color band thresholds by the **Demand1** offsets you define. Similarly, a demand level of 2 relaxes setpoints by the **Demand2** offset and a demand level of 3 relaxes setpoints by the **Demand3** offset.

By defining demand level offsets for each zone, the system can reduce utility demand with significant changes to the setpoints in non-critical zones and little or no change to the setpoints in critical zones.

EXAMPLE

Below is a typical demand offset strategy and resulting effective setpoints and color thresholds. The cooling demand offsets and setpoints are highlighted in this example. Heating offsets would similarly affect the heating effective setpoints.

Carrier Proprietary and Confidential



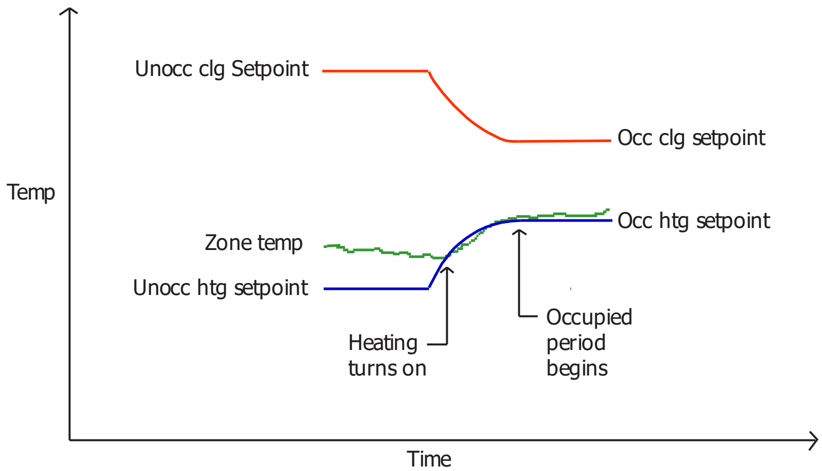
Setpoint Adjust (Optional)

If you select this option, the microblock exposes inputs to adjust the heating setpoint (**HADJ**) and the cooling setpoint (**CADJ**). The most common use for these inputs is to provide a method for a room sensor with a local setpoint adjustment to affect the zone setpoints. If the sensor only has a single setpoint adjust output it is commonly connected to both inputs so the adjustment raises or lowers both setpoints by an equal amount. Adjusting either setpoint affects all related color bands by an equal amount. For example, if you raise the cooling setpoint by 2˚, you raise the temperature at which the color changes from green to yellow by 2˚. The temperatures at which the color changes from yellow to orange and from orange to red is also raised by 2˚.

NOTE You can limit the allowed amount of local setpoint adjustment in the zone sensor's microblock.

Optimal Start (Optional)

When the zone is unoccupied, the microblock uses the outside air temperature from the **OAT** input and the design temperatures and capacities set in the microblock to estimate the time needed to warm or cool the zone from the unoccupied setpoints to the occupied setpoints. When the estimated time is less than the remaining unoccupied time indicated by the **FOR** input, the microblock outputs the programmed unoccupied setpoint values. When the estimated time to reach the occupied setpoints equals the remaining unoccupied time, the microblock transitions the effective setpoints to the occupied setpoints using a first-order curve that approximates system performance at full capacity.



Heating capacity calculation during optimal start

$t = \frac{FOR}{60}$ = Time Remaining Until Occupancy (hr)

OAT = Outside Air Temperature (°F)

H_{design} = Heating Design Temperature (°F)

HCAP = Heating Capacity (°F/hr)

H_{unocc} = Unoccupied Heating Setpoint (°F)

H_{occ} = Occupied Heating Setpoint (°F)

HSP = Heating Setpoint (°F)

$$H_1 = \frac{(H_{design} - OAT)}{(H_{design} - 65°F)} \times HCAP$$

$$H_2 = H_{unocc} + \frac{(12 - MIN(t, 12))}{12} \times (H_{occ} - H_{unocc})$$

$$H_3 = MAX(MIN(H_2, (H_{occ} - (t \times H_1))), H_{unocc})$$

$$HSP = H_3 + (H_3 - H_{unocc}) \times \left(1 - \frac{(H_3 - H_{unocc})}{(H_{occ} - H_{unocc})}\right)$$

Cooling capacity calculation during optimal start

$t = \frac{FOR}{60}$ = Time Remaining Until Occupancy (hr)

OAT = Outside Air Temperature (°F)

C_{design} = Cooling Design Temperature (°F)

CCAP = Cooling Capacity (°F/hr)

C_{unocc} = Unoccupied Cooling Setpoint (°F)

C_{occ} = Occupied Cooling Setpoint (°F)

CSP = Cooling Setpoint (°F)

$$C_1 = \frac{(C_{design} - OAT)}{(C_{design} - 65°F)} \times CCAP$$

$$C_2 = C_{unocc} + \frac{(12 - MIN\ (t,12))}{12} \times (C_{occ} - C_{unocc})$$

$$C_3 = MIN\ (MAX\ (C_2\ ,\ (C_{occ} + (t \times C_1))),\ C_{unocc})$$

$$CSP = C_3 + (C_3 - C_{unocc}) \times \left(1 - \frac{(C_3 - C_{unocc})}{(C_{occ} - C_{unocc})}\right)$$

NOTE You can use the optimal start inhibit inputs (**HOSI** and **COSI**) to inhibit optimal start. For example, you may want to prevent any possible heating optimal start during the summer months or prevent optimal start from beginning more than 4 hours before occupancy.

Capacity Limit (Optional)

If outside factors will prevent the heating or cooling system from running at 100% of its normal capacity, you can direct the Optimal Start routine to use only a percentage of the zone's learned heating or cooling capacity based on external logic using the **HCAP%** and **CCAP%** inputs. This percentage adjustment applies even if learning is inhibited by the **LRNI** input.

Use Orphan Trend Network Visible (Optional)

Selecting **Use Orphan Trend Network** controls the Network Visibility of the trend objects:

- Zone Temp Trend Log
- Occupied Status Trend Log

If not selected, these trend objects will always be Network Visible.

Limitations

A control program can use only one Zone Setpoint microblock. Do not use a *Set Color* (page 390) microblock or any

Set Color If True (page 390) microblocks in a control program with a Zone Setpoint microblock.

Maintaining Hysteresis

Because the objects of this microblock are visible to and modifiable through BACnet, setpoint behavior differs from our standard setpoint operation. The four basic setpoint objects, **Occupied Heating, Occupied Cooling, Unoccupied Heating** and **Unoccupied Cooling**, have locks that may affect the present values of the BACnet objects. Locking one setpoint of a pair may affect the other setpoint of the pair to maintain **Hysteresis**. It is also possible to lock both values of the pair such that the heat and cool setpoints of the pair cross. **Effective Setpoints** should never get closer than deadband (2 * hysteresis). If locked parameter values or out of service values are set to invalid combinations that do overlap, the heat and cool setpoints are added, averaged, and the deadband is applied to either side of the averaged value to create setpoints that allow the control program to continue functioning properly.

Inputs and outputs

Inputs

OAT Outside Air Temperature	Optional–Present if **Optimal Start** is enabled. Current outside air temperature (degrees).
OCC Occupied Schedule	True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. Connect to a *time clock microblock* (page 361) or to other logic that indicates the zone's occupancy status.
FOR Remaining Time	Minutes remaining until the zone's occupancy status changes. Connect to a *time clock microblock* (page 361) or to other logic that indicates this time.
ZONE Zone Temperature	Current zone temperature (degrees).
HDEM Heating Demand Level	Optional–Present if **Demand Limiting** is enabled. Current heating demand level (1–3). Connect to the Analog Network Input microblock that reads the heating demand level. This typically comes from an electric meter's control program if electric heat is used or a gas meter control program if gas heat is used.
CDEM Cooling Demand Level	Optional–Present if **Demand Limiting** is enabled. Current cooling demand level (1–3). Connect to the Analog Network Input microblock that reads the cooling demand level. This typically comes from an electric meter's control program if cooling is provided from local DX coils or an electrically driven central cooling plant.
HADJ Heating Setpoint Adjust	Optional–Present if **Setpoint Adjust** is enabled. Signal from zone sensor to adjust heating setpoint (degrees). Connect to the zone sensor microblock's **SP ADJ** output.
CADJ Cooling Setpoint Adjust	Optional–Present if **Setpoint Adjust** is enabled. Signal from zone sensor to adjust cooling setpoint (degrees). Connect to the zone sensor microblock's **SP ADJ** output.

HOSI Heating Optimal Start Inhibit	Optional–Present if **Optimal Start** is enabled. True (on) when the microblock should not adjust heating setpoints for optimal start.
COSI Cooling Optimal Start Inhibit	Optional–Present if **Optimal Start** is enabled. True (on) when the microblock should not adjust cooling setpoints for optimal start.
HCAP% Heating Capacity Adjusted By	Optional–Present if **Capacity Limit** is enabled. Percentage of the learned heating capacity to use during optimal start under the conditions defined by external logic.
CCAP% Cooling Capacity Adjusted By	Optional–Present if **Capacity Limit** is enabled. Percentage of the learned cooling capacity to use during optimal start under the conditions defined by external logic**.**
LRNI Learning Adaptive Inhibit	Not available.
MIN SEP Minimum Setpoint Separation	Optional This input affects the behavior of the heating and cooling setpoint such that if the user adjusts one setpoint, the other setpoint will automatically adjust (if needed) to maintain the specified minimum separation between setpoints.

Outputs

Zone Color

Zone thermographic color based on **ZONE** input compared to effective setpoints.

Color		**Status code**	**Condition indicated**
	Red	9	Cooling alarm
	Orange	8	Maximum cooling
	Yellow	7	Moderate cooling
	Light green	6	Free cooling
	Green	5	No heating or cooling
	Light blue	4	Moderate heating
	Dark blue	3	Maximum heating
	Red	2	Heating alarm
	Gray	1	Unoccupied

The microblock outputs the zone color's status code (1–9) on its zone color wire.

HT Heating Setpoint	Zone's effective heating setpoint (degrees).
CL Cooling Setpoint	Zone's effective cooling setpoint (degrees).

NS Night Setback	True (on) when the zone is not occupied, optimal start is not in progress, and the zone temperature exceeds the unoccupied heating or cooling setpoint.
HCAP Learned Heating Capacity	Optional–Present if **Learning Adaptive** is enabled. The learned heating capacity (degrees/hour) calculated by the learning adaptive optimal start algorithm. See **Learning adaptive optimal start** in "How it works" in this microblock's help.
CCAP Learned Cooling Capacity	Optional–Present if **Learning Adaptive** is enabled. The learned cooling capacity (degrees/hour) calculated by the learning adaptive optimal start algorithm. See **Learning adaptive optimal start** in "How it works" in this microblock's help.

Properties

Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Units	The unit of measure, ˚F or ˚C, the setpoints are using.

Setpoints

Unoccupied, Occupied, and Demand Level Setpoints

The desired occupied and unoccupied zone setpoints (degrees), the value of each occupied color band (degrees), and the offsets for electric demand levels 1, 2, and 3 (degrees).

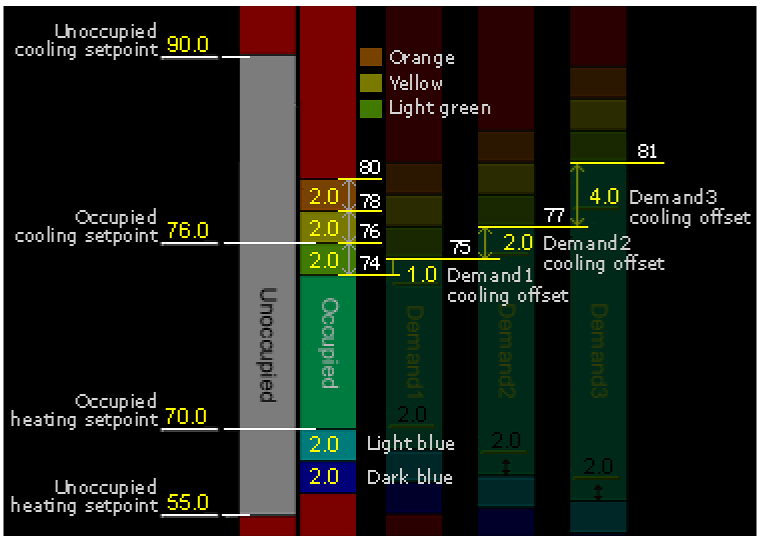
A color band's value determines the threshold at which the microblock changes the zone thermographic color as the zone temperature departs from setpoint.

You can use the free cooling light green color band to enable economizer operation. If you are not using this feature, type `0` for this band's value.

Demand level offsets determine how much to relax the zone's occupied setpoints and color band thresholds under each electric demand level. When the electric meter's control program indicates a demand level of 1, this microblock relaxes occupied heating and cooling setpoints and all related color band thresholds by the **Demand1** offsets you define. Similarly, a demand level of 2 relaxes setpoints by the **Demand2** offset and a demand level of 3 relaxes setpoints by the **Demand3** offset.

EXAMPLE

A zone thermographic color scale with typical demand offsets and resulting effective setpoints and color thresholds



Optional–Demand Levels are used only if **Demand Limiting** is enabled.

Color Change Hysteresis

The desired difference (degrees) between the temperature at which the zone color changes as the zone temperature departs from the acceptable range between the heating and cooling setpoints and the temperature at which the zone color changes back as the zone temperature returns to the acceptable range. If you are not using zone thermographic color for equipment control, type `0`. See **Color Change Hysteresis** in "How it works" in this microblock's help.

Design Properties

Heating Capacity

Optional–Used only if **Optimal Start** is enabled.

The rate (degrees/hour) at which the zone temperature changes if the outside air temperature is 65°F and the heating system runs at full capacity. Adjust after startup based on system optimal start performance.

Cooling Capacity	Optional–Used only if **Optimal Start** is enabled. The rate (degrees/hour) at which the zone temperature changes if the outside air temperature is 65°F and the cooling system runs at full capacity. Adjust after startup based on system optimal start performance.
Heating Design Temperature	Optional–Used only if **Optimal Start** is enabled. The geographically-based outside air temperature (degrees) at which the heating system must run constantly in order to maintain comfort. Available in ASHRAE publications and most design references.
Cooling Design Temperature	Optional–Used only if **Optimal Start** is enabled. The geographically-based outside air temperature (degrees) at which the cooling system must run constantly in order to maintain comfort. Available in ASHRAE publications and most design references.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

Learning Adaptive

Color adjustment values	Optional–Used only if **Learning Adaptive** is enabled. The amount by which the microblock adjusts the zone's learned heating or cooling capacity when the zone is this thermographic color at occupancy. See **Learning adaptive** in "How it works" in this microblock's help.

BACnet

This microblock contains the following BACnet analog value objects.

Occupied Cooling	The programmed Occupied Cooling Setpoint. This object is writable. **NOTE** This object becomes read-only when Air Source Linkage is active.
Occupied Heating	The programmed Occupied Heating Setpoint. This object is writable. **NOTE** This object becomes read-only when Air Source Linkage is active.
Unoccupied Cooling	The programmed Unoccupied Cooling Setpoint. This object is writable. **NOTE** This object becomes read-only when Air Source Linkage is active.
Unoccupied Heating	The programmed Unoccupied Heating Setpoint. This object is writable. **NOTE** This object becomes read-only when Air Source Linkage is active.
Cooling Adjustment	The value of the **CADJ** input wire. This object is read-only.
Effective Cooling	The effective cooling setpoint based upon occupancy, optimal start, demand limiting, and all other adjustments. This object is read-only.
Heating Adjustment	The value of the **HADJ** input wire. This object is read-only.

Effective Heating	The effective heating setpoint based upon occupancy, optimal start, demand limiting, and all other adjustments. This object is read-only.

Define the following properties for the above BACnet objects.

Object Name	A unique alphanumeric string that defines the BACnet object.
Description	An optional BACnet property that may be used to describe the object.
Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value.
COV Increment	An Analog Network Input (ANI) that references this microblock in its Address field tries to subscribe to this microblock's COV (Change of Value) service. If subscription succeeds, the ANI receives a value from this microblock only when this microblock's present value changes by at least the COV Increment. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's Refresh Time field.

Trend

This microblock contains the following BACnet trend objects.

Effective Cooling Analog Trend	A trend log of the effective cooling setpoint.
Effective Heating Analog Trend	A trend log of the effective heating setpoint.
Zone Temperature Analog Trend	A trend log of the zone temperature input. **NOTE** This value comes from the L ZONE input when Air Source Linkage is active.
Occupied Status Binary Trend	A trend log of the occupancy status. **NOTE** This value comes from the L OM input when Air Source Linkage is active.

Define the following properties for the above trend objects.

Object Name	A unique alphanumeric string that defines the BACnet object.
Description	An optional BACnet property that may be used to describe the object.
Network Visible (Zone Temperature and Occupied Status only)	Select to allow other BACnet equipment to read or change trend properties. These properties will still be exposed to BACview even if they are not Network Visible.
Enable	Check to have the controller collect trend data for the microblock's present value.

Interval	If trending is enabled, records the microblock's present value at this interval. **EXAMPLE** Type `00:10:00` to record the microblock's present value every 10 minutes. **TIP** • For a binary trend, you can set this field to 00:00:00 to record this microblock's value only when the value changes. This will select the **Sample on COV (Change of Value)** field in i-Vu®/Field Assistant. • For an analog trend, you can set this field to 00:00:00 to record this microblock's value only when the value changes by at least 1 (the default COV increment). Setting this field to 00:00:00 will select the **Sample on COV (Change of Value)** field in i-Vu®/Field Assistant. You can change the **COV Increment** in i-Vu®/Field Assistant.
Allocate memory for __ trend samples	The number of data samples the controller allocates memory for. Memory consumption is 10 bytes for each sample plus 48 bytes. For example, for 100 samples: (100 x 10 bytes) + 48 = 1048 bytes of memory The allocated memory is constant regardless of how many samples are actually recorded. If you do not enable trending, no memory is consumed. Click **Reset** in i-Vu®/Field Assistant to delete all samples currently stored in the controller.
Enable Trend Historian	Check this field to archive the controller's collected trend data to the system database after every 129 data samples. **NOTES** • You must check **Enable Trend Log** if you want to **Enable Trend Historian**. • You can change **Enable Trend Historian** archival settings and other trend properties on the **Properties** page in the i-Vu® or Field Assistant system.
Keep historical trends for __ days	This is based on the date that the sample was read. Set this field to 0 to use the system default value.

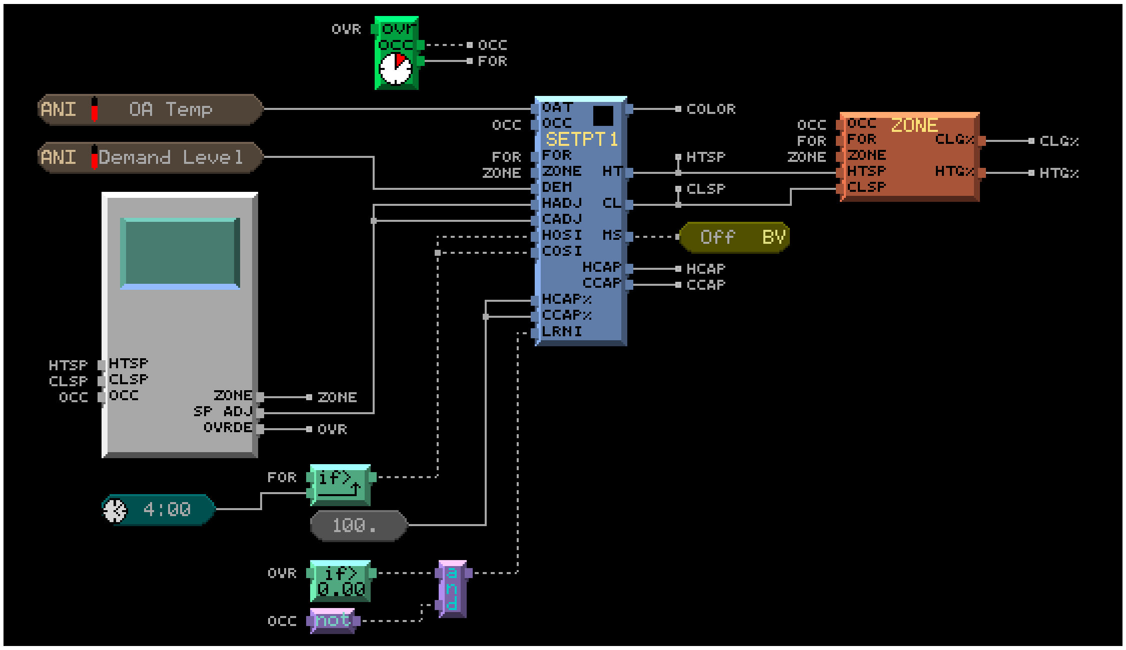
Optional

Demand Limiting **Setpoint Adjust** **Optimal Start** **Learning Adaptive** **Capacity Limit** **Minimum Setpoint Separation** **Use Orphan Trend** **Network Visible**	Select the optional functionality that you want this microblock to have. See How it works for a description of each. (Not available.)

Programming example

This zone control strategy does the following:

- Allows local zone setpoint adjustment using a zone sensor
- Inhibits optimal start from beginning more than 4 hours before occupancy
- Uses the full (100%) learned heating and cooling capacities during every optimal start period
- Inhibits learned heating and cooling capacity adjustments during unoccupied override periods



Tips and tricks

Optimal start

Write the control logic for the unoccupied mode to activate heating if the zone color is light blue or cooling if the zone color is yellow. This will bring the zone temperature back into the desired range during optimal start.

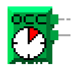
Color change hysteresis

If you are using zone thermographic color for floorplan display, but not for control, set the Color Change Hysteresis to `0`. Using zone color and hysteresis for control can confuse end users because it can prevent the zone color from changing at the programmed setpoints. If you are controlling equipment based on zone thermographic color, set the hysteresis large enough to prevent the equipment from changing back and forth between two different states if the temperature oscillates near the setpoint.

Free cooling – economizer enable

If you are using zone thermographic color for control in small single-zone systems or unit ventilators, you can use the light green free cooling color band to enable economizer operation before you enable mechanical cooling. Otherwise, set the free cooling color band value to `0`.

BACnet Time Clock

Microblock family	*Control microblock* (page 361)
Icon and symbol	 
What it does	Reads schedules from the running system and generates signals to tell the control program whether or not the zone is occupied, and how long the zone will remain in its current state of occupancy. You cannot set schedules using the microblock's dialog box. The **Properties** page shows the current occupancy status of the zone and the time when the occupancy is scheduled to change. The microblock has two outputs: the **occ** output, which indicates whether the zone is currently occupied (on) or unoccupied (off); and the timer output, which indicates the number of minutes remaining until the occupancy changes. The value of these outputs depends on the schedule entered for the control program in the running system. Create or view schedules on the **Schedules** page.

Properties

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value (i-Vu®/Field Assistant only)	Check to output the locked value from the microblock instead of the microblock's calculated value.

Unscheduled Value	The value the microblock assumes when no schedule has been downloaded to the program if: • The system has no schedules that affect the equipment. • A stand alone controller is powered up but no schedule data has been entered.

Configuration

Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Minimum off time	The minimum period (seconds) that the microblock's present value will be off, regardless of the input signal to the microblock.
Minimum on time	The minimum period (seconds) that the microblock's present value will be on, regardless of the input signal to the microblock.
Show scheduling limits:	The default limits for the Occupancy schedule category. **NOTES** • A schedule download will fail if you exceed these limits when creating schedules. • Changing these properties erases the schedule information in the controller, requiring you to download schedules again. • If you use Global Modify to change these limits, the affected devices will not be automatically marked for schedule download. **Weekly Schedules - Max Transitions Per Day**: The number of transitions a weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments. **Max Exception**: The number of non-weekly schedules allowed in a controller. The default is 30. i-Vu®/Field Assistant reserves 7 of these schedules - one for each day of the week. **Max Transitions Per Day**: The number of transitions a non-weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.

Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	Enter a meaningful description of the microblock for use on the **Properties** page in the i-Vu®/Field Assistant application.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object ID	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.

Alarm

Alarm Enable	Check to send a message when this microblock indicates an alarm condition.
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

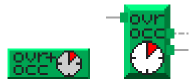
Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

BACnet Time Clock with TLO

Microblock family	*Control microblock* (page 361)

Icon and symbol	
What it does	Reads schedules from the running system and generates signals to tell the control program whether or not the zone is occupied and how long the zone will remain in its current state. This microblock can also accept an override signal (using the **ovr** input) from another microblock that indicates the number of minutes to override occupancy. You cannot set schedules using the microblock's dialog box. The **Properties** page shows the current occupancy status of the zone, and the time when the occupancy is scheduled to change.

Properties

Display Name	The microblock label used in the Snap application and the i-Vu®/Field Assistant interface. You can use any characters except the " character.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Description	(optional) A BACnet-visible microblock description.
Lock Present Value (i-Vu®/Field Assistant only)	Check to output the locked value from the microblock instead of the microblock's calculated value.
Unscheduled Value	The value the microblock assumes when no schedule has been downloaded to the program if: • The system has no schedules that affect the equipment. • A stand alone controller is powered up but no schedule data has been entered.

Configuration

Active Text	The **Active Text** your system displays when the microblock's output is on, or true.
Inactive Text	The **Inactive Text** your system displays when the microblock's output is off, or false.
Minimum off time	The minimum period (seconds) that the microblock's present value will be off, regardless of the input signal to the microblock.
Minimum on time	The minimum period (seconds) that the microblock's present value will be on, regardless of the input signal to the microblock.

Show scheduling limits:	The default limits for the Occupancy schedule category. **NOTES** • A schedule download will fail if you exceed these limits when creating schedules. • Changing these properties erases the schedule information in the controller, requiring you to download schedules again. • If you use Global Modify to change these limits, the affected devices will not be automatically marked for schedule download. **Weekly Schedules - Max Transitions Per Day**: The number of transitions a weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments. **Max Exception**: The number of non-weekly schedules allowed in a controller. The default is 30. i-Vu®/Field Assistant reserves 7 of these schedules - one for each day of the week. **Max Transitions Per Day**: The number of transitions a non-weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.

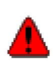
Property Page Text

Show Property Page Text	Check to show this microblock's value on the equipment's **Properties** page.
Property Page Text	Enter a meaningful description of the microblock for use on the **Properties** page in the i-Vu®/Field Assistant application.

BACnet Configuration

Network Visible	Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.
Object ID	**Auto-assign -** A BACnet Object ID is assigned by the system. **Use specific value -** (0–3999999) Assign a number that is unique within the controller.

Alarms

Potential alarm source	Check to make this microblock available in the system's Alarm Sources list.
Critical	Determines the color of the system-wide alarm button when the alarm comes in if the alarm's **Template** field is set to **Universal**.  = Critical  = Non-critical
Category	The category you want to use to filter this microblock's alarms on the system's **Alarms** page > **View** tab.

Alarm

Alarm Enable	Check to send a message when this microblock indicates an alarm condition.
Delay Seconds	The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Alarm text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Alarm requires acknowledge	Check to require that an operator acknowledge alarm notifications on the system's **Alarms** page > **View** tab.

Return to Normal

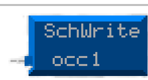
Return Enabled	Check to send a message when an alarm condition has returned to normal.
Return text	The message displayed on the i-Vu®/Field Assistant **Alarms** page > **View** tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple i-Vu®/Field Assistant locations because the path is relative to the item that contains the path.
Return requires acknowledge	Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

Fault

Fault Enabled	Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.

Carrier Schedule Write

The information below provides a FULL description of this microblock and all of its properties. What information you see and what you can do with it depends on your license and the application you are in, and in some cases, a controller's driver version.

Microblock family	*Carrier microblocks* (page 3)
Icon and symbol	

What it does	This microblock commands the occupied/unoccupied status of the CCN controller. It does this by using the GLOBAL SCHEDULE BROADCAST mechanism, but by writing this information as a unicast message to the one CCN controller being controlled by this Control Program. The CCN controller must use the same SCHEDULE NUMBER as this microblock's **Write to global schedule number _____** property (default = 65). This ensures the controller observes the global schedule status written by this microblock. To allow the CCN controller to startup during the optimal start period as determined by the Carrier Setpoint microblock, the **OCC** output of the Carrier Setpoint microblock can be tied to the input of the Carrier Schedule Write microblock. If the Control Program does not include a Carrier Setpoint Microblock, such as a program that controls lighting, the **OCC** output of the standard Schedule microblock can be tied directly to the input of the Carrier Schedule Write microblock. To prevent the CCN controller from performing its own optimal start algorithm, this microblock will set the occupancy variables in the CCN controller related to the time of the next occupied or unoccupied period to values that will effectively disable the local optimal start algorithm in the CCN controller.

Properties

Write to global schedule number	This number should match the CCN controller's schedule number (set to 65 by default). This ensures the controller observes the global schedule status written by this microblock.
Reference Name RefName	Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations: • lower case only • limited to 40 characters • cannot begin with a number • must be unique within a control program
Property Page Text	You can edit the microblock description that appears on the **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.
Editing Privilege	**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the i-Vu®/Field Assistant interface to find out what the actual privilege is. **CAUTION** If you change the **Editing Privilege** from **Preset**, the privilege you select will be used for all properties of this microblock, which is not always desirable.

BACnet Unit abbreviations and numbers

Several microblocks have a two-part **Units** field—a scrolling list and a number field. If the unit of measure that you need is not available in the scrolling list, type the BACnet number for the unit of measure you need in the number field.

Unit	Abbreviation	BACnet number
amperes	A	3
bars	bar	55
bits per second	bps	
btus	BTU	20
btus-per-hour	BTU/hr	50
btus-per-pound-dry-air	BTU/lb	24
centimeters-mercury	cm Hg	60
centimeters-of-water	cm H2O	57
cubic-feet	ft3	79
cubic-feet-per-minute	cfm	84
cubic-meters	m3	80
cubic-meters/hour	m3/hr	135
cubic-meters/second	m3/sec	85
cycles-per-hour	cycle/hr	25
cycles-per-minute	cycle/min	26
days	day	70
degree-days-Celsius	dd-°C	65
degree-days-F	dd-°F	66
degrees-angular	deg	90
degrees-Celsius	°C	62
degrees-Celsius/hour	°C/hr	91
degrees-Celsius/min	°C/min	92
degrees-Fahrenheit	°F	64
degrees-F/minute	°F/min	94
degrees-Fahrenheit/hr	°F/hr	93
degrees-Kelvin	°K	63
degrees-phase	deg	14

Unit	Abbreviation	BACnet number
feet	ft	33
feet-per-second	ft/sec	76
feet-per-minute	ft/min	77
foot-candles	ft-candle	38
gallons-imperial	gal(UK)	81
gallons US	gal	83
gallons/minute UK	gpm(UK)	86
gallons-per-minute US	gpm	89
grams-water/kg-dry-air	gH2O/kg	28
hectopascals	hPa	133
hertz	Hz	27
horsepower	HP	51
hours	hr	71
inches	in	32
inches-of-mercury	in Hg	61
inches-of-water	in H2O	58
joules	J	16
joules/degree-Kelvin	J/°K	127
joules/kilogram- K	J/kg- °K	128
joules/kilogram-dry-air	J/kg	23
kilo-bits-per-second	kbps	
kilobyte	kByte (exception: if NOT BACnet-related, kB)	
kilohms	kOhm	122
kilograms	kg	39
kilograms-per-hour	kg/hr	44
kilograms-per-minute	kg/min	43
kilograms-per-second	kg/s	42
kilohertz	kHz	129
kilojoules	kJ	17
kilojoules/kilogram	kJ/kg	125
kilometers-per-hour	k/sec	75
kilopascals	kPa	54
kilovolts	kV	6

Unit	Abbreviation	BACnet number
kilovolt-amperes	kVA	9
kilovolt-A-reactive	kVAR	12
kilowatt-hours	kW-hr	19
kilowatt-hours/ ft2	kW-hr/ft2	138
kilowatt-hours/ m2	kW-hr/m2	137
kilowatts	kW	48
liters	L	82
liters-per-hour	L/hr	136
liters-per-minute	L/min	88
liters-per-second	L/sec	87
lumens	lum	36
luxes	lux	37
megavolts	MV	7
megahertz	MHz	130
megohms	MOhm	123
Mega-bits-per-second	Mbps	
megabyte	MByte (exception: if NOT BACnet-related, MB)	
megajoules	MJ	126
megajoules/ ft2	MJ/ft2	140
megajoules/ m2	MJ/m2	139
megavolt-amperes	MVA	10
megavolt-A-reactive	MVAR	13
megawatts	MW	49
meters	m	31
meters-per-second	m/sec	74
miles-per-hour	mi/hr	78
milliamperes	mA	2
millibars	mbar	134
millimeters	mm	30
millimeters-of-mercury	mm Hg	59
milliseconds	msec	
millivolts	mV	124

Unit	Abbreviation	BACnet number
milliwatts	mW	132
minutes	min	72
months	mo	68
Ohms	Ohm	4
parts-per-billion	ppb	97
parts-per-million	ppm	96
pascals	Pa	53
per-hour	/hr	131
per-minute	per min	100
per-second	per sec	101
percent	%	98
percent/second	% per sec	99
percent-rel-humidity	%RH	29
pounds-force/inch2	psi	56
psi/degree-Fahrenheit	psi/°F	102
pounds-mass	lbm	40
pounds-mass/hour	lbm/hr	46
pounds-mass/minute	lbm/min	45
power-factor	PF	15
radians	rad	103
revolutions/minute	rpm	104
seconds	sec	73
square-feet	ft2	1
square-meters	m2	0
therms	therm	21
ton-hours	ton-hr	22
tons (weight)	ton	41
tons-refrigeration	ton	52
volt-amperes	VA	8
volt-amperes-reactive	VAR	11
volts	V	5
Volts alternating current	Vac	
Volts direct current	Vdc	

Unit	Abbreviation	BACnet number
watt-hours	W-hr	18
watts	W	47
watts-per-square-foot	W/ft2	34
watts/square-meter	W/m2	35
watts/ m2- K	W/m2- K	141
weeks	wk	69
years	yr	67

To format a BACnet address

The BACnet standard allows multiple formats for creating a valid address in each microblock that you use to read from or write to a third-party BACnet point. Some are shown below.

CAUTION When integrating third-party devices into your system, most communication problems are caused by incorrect data or typing errors in the microblock's Address field.

bacnet://device/object/property@priority

1 2 3 4

NOTE Numeric values in a BACnet address can be entered using decimal or hexadecimal notation. Type `0x` before a hexadecimal value.

1 **Device** - Use one of the following:

	EXAMPLES
Device instance number	`bacnet://2010/…`
BACnet device name	`bacnet://MyDevice/…`
Network number: MAC address (of third-party device)	`bacnet://1234:35/…` `bacnet://1234:0x23/…`
The word "this" if a network point requests a value from another control program in the same Carrier® controller. Avoids network traffic. Requires v2.05 or later controller driver.	`bacnet://this/…`
A single * (wildcard) that sends out a request on the network for all devices that contain the Object specified in the address. (See **Object** below.) The microblock subscribes to the nearest responder.	`bacnet://*/…`

NOTES

- You can use an * in the address of Network Input and Total Analog microblocks.
- An address with an * is restricted to the present_value property (the default when you do not specify a property).
- Requires a v3.04 or later driver.

2 **Object** - Use one of the following: **EXAMPLES**

Object type: Instance number (See NOTES below)	`bacnet://…/ai:2`
BACnet object name	`bacnet://…/MyObject`

NOTES

- For object type, you may type the abbreviation (not case sensitive), the full name, or the object type number. Some standard BACnet object type numbers are listed below. See the BACnet standard for a complete list. For proprietary BACnet objects, see the object's manufacturer.

Use...	Or...	Or...
ai	analog-input	0
ao	analog-output	1
av	analog-value	2
bi	binary-input	3
bo	binary-output	4
bv	binary-value	5
dev	device	8
msi	multistate-input	13
mso	multistate-output	14
msv	multistate-value	19

- Every object in a controller has a unique instance number, regardless of its control program.

3 **Property** (optional) If you want to read or write a property other than present_value, type one of the following:

	EXAMPLES
BACnet property identifier	`bacnet://…/…/cov_increment`
BACnet property identifier #	`bacnet://…/…/22`
Property identifier (with index)	`bacnet://…/…/priority-array(12)`
Property identifier # (with index)	`bacnet://…/…/87(12)`

NOTE Some standard BACnet properties are listed below. See the BACnet standard for a complete list. For proprietary BACnet objects, see the object's manufacturer.

Property identifier	Identifier #
change_of_state_count	15
cov_increment	22
derivative_constant	26
event_state	36
high_limit	45
integral_constant	49
low_limit	59
max_pres_value	65
min_pres_value	69
out-of-service	81
present_value	85
proportional_constant	93
reliability	103
relinquish_default	104
setpoint	108
system_status	112
trigger	205
units	117
vendor_identifier	120

4 **Priority** (optional) If you want to write at a priority other than 16, type @ followed by a priority number.

Number (1-16)

EXAMPLE

`bacnet://…/…/…@9`

NOTE Priority levels 1 and 2 are reserved for manual and automatic life safety commands. For more information on reserved priority levels see the BACnet standard.

Examples of BACnet addresses:

`bacnet://MyDevice/ai:2`

`bacnet://1234:0x23/analog-input:2/priority-array(12)@8`

`bacnet://2499:0x00E0C90047CA/bi:3`

`bacnet://2436:192.168.47.36:47806/0:2`

Document revision history

Important changes to this document are listed below. Minor changes such as typographical or formatting errors are not listed.

Date	Topic	Change description	Code*
		No updates yet	

* For internal use only