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What is Field Assistant?

Field Assistant is a standalone tool you can install on your computer or laptop to access a single Open controller, several Open controllers, or a network of Open controllers and routers. You do not need to be connected to the Internet. You can communicate with the Open devices using local access or over an IP network.

**NOTE** A Field Assistant system allows a maximum of 750 Open controllers. Field Assistant does not work with CCN.

Field Assistant basics

In Field Assistant, you can use a Local Access connection. Or, you can use an IP connection to access an entire network of routers and controllers.

After you have connected to a router or controller, you can:

- Upload parameters and source files (control programs, drivers, graphics, .touch files, and BACview® files) from the controller to Field Assistant
- Commission and start up equipment
- Adjust setpoints and other control parameters
- View current trends stored in the controller
- Set and change schedules in the controller
- Run preconfigured reports that display locked values, points list, network I/O, alarm sources, equipment and controller status, and test and balance configuration
- Use the Snap and ViewBuilder applications to edit or create new control programs and views
- Download programs, schedules, parameters, and BBMD tables to controllers
- Export updated source files

To use Field Assistant, you must understand these terms:

<table>
<thead>
<tr>
<th>Source Files</th>
<th>Includes any or all of the following files:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control programs (.equipment)</td>
</tr>
<tr>
<td></td>
<td>Graphics (.view)</td>
</tr>
<tr>
<td></td>
<td>BACview® files (.bacview)</td>
</tr>
<tr>
<td></td>
<td>Screen files (.touch)</td>
</tr>
<tr>
<td></td>
<td>Drivers (.driver)</td>
</tr>
</tbody>
</table>

| Parameters | Editable properties within a control program or driver |
What is Field Assistant?

<table>
<thead>
<tr>
<th><strong>Import</strong></th>
<th>Brings files into Field Assistant. Import source files (sourcefiles.zip) from the Field Assistant Launcher.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NOTE</strong></td>
<td>Your manufacturer or representative must supply the source files.</td>
</tr>
<tr>
<td><strong>Export</strong></td>
<td>Takes source files from your Field Assistant system to use in another system. Export source files (sourcefiles.zip) from the Field Assistant Launcher.</td>
</tr>
<tr>
<td><strong>Download</strong></td>
<td>Sends source files, schedules, or parameters from Field Assistant to the controller.</td>
</tr>
<tr>
<td><strong>Upload</strong></td>
<td>Retrieves source files or parameters from the controller and stores them in Field Assistant.</td>
</tr>
</tbody>
</table>

**Field Assistant tools**

Develop and configure graphics and a system database for your Field Assistant system using the following Field Assistant tools.

1. Install the tools from your Tech Tools DVD to your computer. If the installation is not automatically started, double-click the Windows folder > Disk 1 > InstData > Setup > setup.exe.
2. Complete the Installation Wizard.

<table>
<thead>
<tr>
<th>Use...</th>
<th>To...</th>
</tr>
</thead>
<tbody>
<tr>
<td>EquipmentBuilder</td>
<td>Build or edit control programs (.equipment files) and graphics for programmable controllers</td>
</tr>
<tr>
<td>Virtual BACview®</td>
<td>View and change property values and the controller’s real time clock</td>
</tr>
<tr>
<td>BBMD Configuration Tool</td>
<td>Configure BACnet/IP Broadcast Management Devices (BBMDs)</td>
</tr>
<tr>
<td><strong>NOTE</strong></td>
<td>If your system has multiple routers that reside on different IP subnets, you must set up one router on each IP subnet as a BACnet/IP Broadcast Management Device (BBMD).</td>
</tr>
<tr>
<td>MSTP Capture Utility</td>
<td>Capture BACnet traffic on a variety of media types. It is intended for use in situations where Carrier Control Systems Support needs a network capture to troubleshoot communications.</td>
</tr>
<tr>
<td>Test &amp; Balance</td>
<td>• Calibrate airflow in a VAV or VVT Zone controller</td>
</tr>
<tr>
<td></td>
<td>• Calibrate the static pressure in a VVT Bypass controller</td>
</tr>
<tr>
<td></td>
<td>• Commission air terminals</td>
</tr>
<tr>
<td></td>
<td>• Override reheat and terminal fans</td>
</tr>
<tr>
<td><strong>NOTE</strong></td>
<td>Use Test &amp; Balance to manipulate the controllers associated with an air source, but not the air source itself, or heating and cooling equipment such as chillers and boilers.</td>
</tr>
<tr>
<td>Snap</td>
<td>Build custom control programs using individual blocks of programming code called microblocks</td>
</tr>
<tr>
<td>AppLoader</td>
<td>Use to download .clipping files to restore factory defaults and check Module Status (Modstat) via the RNET port</td>
</tr>
</tbody>
</table>
# What's new in the Field Assistant application v6.5

## Feature

<table>
<thead>
<tr>
<th>Improvement</th>
</tr>
</thead>
</table>

### New in v6.5:

**Web browser support**

The Field Assistant application:

- No longer supports IE8, IE9, or IE10.
- Now supports the Microsoft® Edge web browser.

**Supported database type**

Field Assistant uses an Apache Derby database and no longer supports an Access® database type. If you have an Access database from a previous Field Assistant version that you want to use in v6.5, you will have to convert the database to Derby first.

You must use the upgrade tool on the Tech Tools v6.5 Installation DVD to convert Access databases from previous Field Assistant version. See Converting Access databases to Derby (page 6).

**Optimize download**

The default for Optimize download for Open PIC controllers is now off (unchecked), which results in Full Source download, unless you check it to enable optimizing.

**New features for handling parameter mismatches**

Any parameter mismatch now appears on the Properties page with a purple box around it and hover text to help determine what action needs to take place. If a change was made in the controller, the Properties page now shows the controller value.

The Field Assistant application determines where a change occurred, what action needs to take place, and provides a new Resolve button that you can click to have any mismatches automatically handled. Clicking the Details button shows an additional Resolve column that indicates whether a mismatch will be resolved through upload or download. This same Resolve column has also been added to the Parameter Mismatch report.

On the Devices > Manage tab for the router, the driver now appears so that you can choose to solve parameter mismatches in the driver, the control program(s), or both.

**Security enhancements**

- Apache Tomcat web server has been upgraded to v7.0.61.
- The Field Assistant application has been upgraded to Java 8 update 51.

**Display gap in trend graph line**

To show a gap in a trend graph line if trend data is missing, you can check Display gap in graph line for missing data on an individual trend graph page.

**BACnet Firewall**

The v6-02 drivers for Carrier controllers with Ethernet capability have a new BACnet firewall feature that allows you to restrict communication with the controller to all private IP addresses and/or to a whitelist of IP addresses that you define. To set this up, right-click the controller in the navigation tree, select Driver Properties and then BACnet Firewall. Follow the instructions in the interface.

**BACnet Objects tab on Properties page**

The BACnet Points tab has been renamed BACnet Objects and now includes information specific to Display microblocks if they are included in the control program.
## Feature Improvement

<table>
<thead>
<tr>
<th>Feature</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrier® ChillerVu™</td>
<td>You can find and upload the Carrier® ChillerVu™ (OPN-PSM-MPCXPE) as an Open device if it is on a BACnet over MS/TP or BACnet over ARC156 network.</td>
</tr>
</tbody>
</table>
**Computer, operating system, and database requirements for Field Assistant**

The computer should have at least:
- Dual core processor
- 2 GB RAM
- 30 Gigabyte Hard drive
- Communications link of 10 Mbps or higher

The Field Assistant application will work with slower computers and slower links, but the results may not be satisfactory.

You must use a computer with a Windows® operating system and either Internet Explorer® v11 or Microsoft® Edge browser. A Field Assistant v6.5 or later system is supported on any of the following operating systems (32-bit and 64-bit):
- Windows® 10 Professional
- Windows® 8.1 Professional and Enterprise
- Windows® 7 Professional and Ultimate
- Windows® Vista Business or Ultimate SP2

Field Assistant v6.5 only uses an Apache Derby database. If you have an Access database from a previous Field Assistant version that you want to use in v6.5, see Converting Access databases to Derby (page 6).

The memory requirements will vary based on the:
- number of pieces of equipment and device instances
- size of the control programs

<table>
<thead>
<tr>
<th>For this size system...</th>
<th>With this number of...</th>
<th>The computer should have at least a dual core processor and...</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Instances of equipment and devices ¹</td>
<td>Physical Points and Display Objects</td>
</tr>
<tr>
<td>Small</td>
<td>0 - 250</td>
<td>0 - 1000</td>
</tr>
<tr>
<td>Medium</td>
<td>250 - 1000</td>
<td>1000 - 5000</td>
</tr>
<tr>
<td>Large</td>
<td>1000 - 10,000</td>
<td>5000 - 50,000</td>
</tr>
<tr>
<td>Huge</td>
<td>more than 10,000</td>
<td>more than 50,000</td>
</tr>
</tbody>
</table>

¹ Total number of control programs and controllers-+.
² For more information, see www.CPUbenchmark.net.
³ If using 32-bit, you cannot use more than 1.2GB for the JVM.
⁴ For a huge system with minimal user activity, the average piece of equipment or instance device requires approximately 300KB of server RAM. Contact Automated Logic® Technical Support for server sizing recommendations.
Converting Access databases to Derby

Field Assistant v6.5 creates sites using Derby databases. Older versions of Field Assistant created sites using Access, which is not compatible with Field Assistant v6.5. In order to open older Field Assistant sites created with Access, these sites must be converted to Derby by using the Field Assistant v6.0 database conversion file. This update file is located on the Tech Tools v6.5 DVD.

⚠️ **CAUTION** This update can only be applied to Field Assistant v6.0. If you are upgrading from a pre-6.0 version, you must first install Field Assistant v6.0 and upgrade all of your Field Assistant systems to v6.0. Then you must install Tech Tools v6.5 and use the following instructions to convert your databases through v6.0. You cannot open a system in v6.5 until you have converted them.

1. Open the Field Assistant v6.0 Launcher screen.
   **NOTE** Do NOT click the arrow to start a system.

2. From the Field Assistant v6.0 Launcher, click Help > Update to open the Apply Update dialog.

3. On the Apply Update dialog, in the Update File field, browse to the Tech Tools v6.5 Installation DVD, open FA60_DB_Migration_Update > WS60_Migrate_Access_To_Derby.update file and click Select.

4. Click the Apply and Restart Now or Update with Restart Later button.

5. From the Field Assistant v6.0 Launcher, click Help > Database Upgrade Utility.
   **NOTE** This option appears only after applying the update file.

6. In Target Conversion Directory, browse to the i-Vu_Tools_6.5\webroot folder and click Select.

7. In Systems To Convert, browse to your i-Vu_Tools_6.0\webroot folder and click Select. You can use the Shift or Ctrl key to multi-select databases.

   ⚠️ **CAUTION** You must get your database(s) from the webroot directory only. If, for instance, you have files on a USB drive, you must first place them on your computer in the i-Vu_Tools_v6.0\webroot folder. No other path is accepted.

8. Click the Start Conversion button.

   **NOTES**
   - The top progress bar Overall conversion progress displays the progress of all of the databases you selected. The total conversion is finished when the bar reaches the end.
   - The two lower bars show the conversion progress of each database.

9. When complete, click Exit.

10. Close the Field Assistant Launcher v6.0.

11. You can now start your systems in the Field Assistant Launcher v6.5. See Getting Started (page 7).
Getting started

1 If you will be using a database from a pre-v6.5 version of Field Assistant, you must first convert the Access database to a Derby database. See Converting Access databases to Derby (page 6) for details.

2 Set up your computer and browser (page 7).

3 Do one of the following:
   - Connect to a controller's Local Access port (Open only) (page 8)
   - Connect to a controller over an IP network (Open or XT) (page 9)

4 Start Field Assistant. (page 10) If using local access, Field Assistant automatically finds and displays the device you are connected to.

5 If you are discovering a network from a router, select the router in the navigation tree and click Devices > Manage to find associated controllers. Then select All Content and click Upload.

6 If connecting to a controller, on the Properties page, click Upload. See Upload source files from a controller (page 11).

7 Start up, commission, or change parameters, programs, or drivers as needed. See Working with equipment (page 21).

8 Export source files from the Field Assistant Launcher (page 12) to use in the i-Vu® Standard, Plus, or Pro application.

To set up a computer and web browser to view Field Assistant

• Set the monitor's screen resolution to a minimum of 1024 x 768 with 24- or 32-bit color quality
• You may want to disable the computer's navigation sounds.

NOTES

• The instructions below are for Internet Explorer 11. Other versions may vary slightly. See your web browser's Help if necessary.
• If the menu bar is not visible, right-click on the window's header, and then select Menu bar.

<table>
<thead>
<tr>
<th>Browser settings</th>
<th>Where to change setting in IE11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accept First-party and Third-party cookies.*</td>
<td>Tools &gt; Internet Options &gt; Privacy &gt; Advanced button</td>
</tr>
<tr>
<td>Automatically check for newer versions of stored</td>
<td>Tools &gt; Internet Options &gt; General &gt; Browsing history &gt;</td>
</tr>
<tr>
<td>pages*</td>
<td>Settings button</td>
</tr>
</tbody>
</table>
### Browser settings

<table>
<thead>
<tr>
<th>Browser settings</th>
<th>Where to change setting in IE11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load ActiveX Control*</td>
<td>Tools &gt; Internet Options &gt; Security &gt; Custom Level button. Under ActiveX controls and plug-ins, set the following:</td>
</tr>
<tr>
<td></td>
<td>• Download signed ActiveX controls &gt; Prompt</td>
</tr>
<tr>
<td></td>
<td>• Download unsigned ActiveX controls &gt; Disable</td>
</tr>
<tr>
<td></td>
<td>• Run ActiveX controls and plug-ins &gt; Enable</td>
</tr>
<tr>
<td></td>
<td>• Script ActiveX controls marked safe for scripting &gt; Enable</td>
</tr>
<tr>
<td>Select Play animations in web pages</td>
<td>Tools &gt; Internet Options &gt; Advanced &gt; under Multimedia</td>
</tr>
<tr>
<td>Disable all the options on the Explorer Bar</td>
<td>View &gt; Explorer Bars</td>
</tr>
<tr>
<td>Disable web browser’s pop-up blockers</td>
<td>Tools &gt; Pop-up Blocker &gt; Turn Off Pop-Up Blocker</td>
</tr>
<tr>
<td>Disable external toolbar pop-up blockers</td>
<td>Varies</td>
</tr>
<tr>
<td>Hide the browser’s toolbars</td>
<td>View &gt; Toolbars</td>
</tr>
</tbody>
</table>

### To connect to a controller’s Local Access port (Open controller only)

**PREREQUISITE** For Field Assistant to communicate with the controller, the controller must have been downloaded with at least its driver (4.x or later).

**CAUTION** If multiple controllers share power but polarity was not maintained when they were wired, the difference between the controller’s ground and the computer's AC power ground could damage the USB Link and the controller. If you are not sure of the wiring polarity, use a USB isolator between the computer and the USB Link. Purchase a USB isolator online from a third-party manufacturer. Plug the isolator into your computer’s USB port, and then plug the USB Link cable into the isolator.

**Using a USB Link**

1. If your computer does not already have the USB Link driver installed, install it before you connect the USB Link to your computer.

   **NOTE** The driver is installed with Field Assistant. But if needed, you can get the latest driver from [http://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx](http://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx).
2 Connect the computer to the local access port of the controller, ZS sensor, or an SPT sensor using the USB Link cable(s).

NOTE If using a USB isolator, plug the isolator into your computer's USB port, and then plug the USB Link cable into the isolator.

---

**To connect to a controller over an IP network (Open or XT controller)**

1 Connect a CAT5 Ethernet cable to your computer and to:
   - The controller's Ethernet port
   - or
   - A hub on the same IP network as the controller
2 Set your computer's IP parameters so that it can communicate on the controller's IP network.
3 Open Field Assistant Launcher, and start your system. See Start Field Assistant (page 10).
4 On the Devices page > Advanced tab, set the Field Assistant BACnet/IP network number to match the number of the controller's BACnet/IP network (supplied by your manufacturer or representative.).
5 On the Devices page > Manage tab, click Find Devices.
6 If you have multiple routers, select one at a time on the navigation tree. Click Find Devices to find the devices under that router.
7 On the Devices page > Manage tab, select a controller in the list. Use Ctrl+click, Shift+click, or the Select All checkbox to select multiple controllers. Click Upload All Content.
8 The message appears **This will upload all content for the controller. Are you sure you want to do this?** Click OK.
   
   NOTE If a message appears stating that a file is missing, you must stop and import the source files provided by your manufacturer or representative. Follow these steps:
   a) Close Field Assistant.
   b) Click **on the Launcher to stop your system. The Launcher will disappear and then take a few seconds to reappear.**
   c) Click **Source Files to start your system.**
To start Field Assistant

1 From your desktop, select **Start > All Programs > i-Vu_Tools_x.x > Field Assistant**.

2 Click ![Field Assistant Launcher](image) on the **Field Assistant Launcher** and type your **System Name**.

   The **System Name** cannot:
   - Begin with a number.
   - Contain special characters other than a dash or an underscore.
   - Exceed 40 characters.
   - Contain capital letters or spaces. Use an underscore or dash between words.

3 Click **Create**.

4 If your manufacturer or representative provided source files, click ![Import](image), browse to **sourcefiles.zip**, then click **Open**.

5 Select your **System Time Zone**. Your selection applies to your current system when you click ![Field Assistant Launcher](image).

6 Under **Communications**, select the method you are using to connect to a controller or system:
   - IP network - select your IP. See **To connect to a controller over an IP network** (page 9).
   - Local Access - select your USB Comm port from the drop-down list.

   **NOTE** If you are using a USB Link (#USB-L), you must connect it to your computer and the controller before launching Field Assistant in order for your Comm port to appear in the drop-down list. If you do not see your Comm port, close the **Field Assistant Launcher**, make the connection, then restart Field Assistant.

7 Click ![Start System](image) to start your system.
   - If using local access, Field Assistant will find and display the controller you are connected to and any other controllers on its local network.
   - If using an IP network, you must click **Find Devices**, then select a router in the navigation tree and click **Find Devices** again.

   **NOTE** When you click ![Stop System](image) to stop your system, the **Field Assistant Launcher** disappears for a few seconds and then reappears.

---

**NOTE** You can make changes to one controller and then copy the changes to other controllers that have the same control program. See **Copying properties from one controller to another** (page 54).
To import source files

You can import and export source files from the Field Assistant Launcher. If the controllers have full source in them, you do not need to import the source files. You will upload them from the controllers.

1. If Field Assistant is running, close the Field Assistant window and click on the Launcher to stop your system. The Launcher will disappear and then take a few seconds to reappear.

2. Click Source Files. Select the sourcefiles.zip file.

3. Click to start your system.

To upload source files from a controller

**NOTE** For best results, connect your computer to a controller on the same network segment as the controllers that you want to upload.

1. Click the link (shown below) to the controller that your computer is connected to.

2. On the Properties page, click Upload, and then click OK.

**NOTE** If a message appears stating that a file is missing, you must stop and import the source files provided by your manufacturer or representative. Follow these steps:

a) Close Field Assistant.

b) Click on the Launcher to stop your system. The Launcher will disappear and then take a few seconds to reappear.

c) Click Source Files. Select the sourcefiles.zip file.

d) Click to start your system.

e) Click Upload.

f) Return to Step 1.

3. Start up, commission, or set parameters as needed. Perform the services required. See Working with equipment (page 21).
4 If you have more controllers, move your USB Link cable to the next controller or to a controller on another network, then repeat steps 1–3.

**NOTES**
- To upload more than one controller at the same time, select the system level on the navigation tree, then go to the Devices page > Manage tab. Select the controller(s) you wish to upload in the list on the page. Ctrl+click to multi-select, or enable Select all. Select Upload All Content, then click on the Upload button.
- After uploading, we recommend that you give each controller a unique name by selecting the system level in the navigation tree to go to Devices page > Manage tab. Click in the Name field to edit.

### To export source files

1 Close the Field Assistant window.

2 In the **Field Assistant Launcher**, click **STOP** to stop your system.

3 Click **Export**.

4 Browse to a location where you want to save the source files.

**NOTE** Do not change the extension (sourcefiles.zip).

5 Click **Save Files**.
Navigating the system

**NOTE** Use only the Field Assistant interface to navigate through Field Assistant; do not use the web browser’s navigation buttons.

To navigate to an item in the system

1. Select an item on the navigation tree.
2. Use the action buttons and their drop-down menus to navigate to specific types of information about the selected tree item.
3. Use the tabs to filter the information further.
Getting to know the Field Assistant interface

To navigate using links
Click links to jump to related pages.

To show, hide, or resize the navigation tree
Click at the top of the navigation pane to hide or show the navigation tree.
Click and drag the tab on the right side of the tree to adjust its width.

Zooming in and out
- To zoom in and out on the Field Assistant interface:
  - Hold down Ctrl and press + or -. Press Ctrl+0 to return to 100%.
  - Hold down Ctrl while rolling your mouse wheel.
  - Use your web browser's zoom functions.
- If a graphic does not fit in the action pane, right-click it and select Scale to Fit to make it fit the action pane. Select Scale to Fit again to return the graphic to its original size.

Using right-click menus
You can right-click the following items to select options:

<table>
<thead>
<tr>
<th>A tree item</th>
<th>The Graphics page</th>
</tr>
</thead>
</table>
To print the action pane

Click ✎ at the top of the page to print the contents of the action pane. Set the print orientation to Landscape in the Print dialog box.

💡 TIPS

- To print a Graphics page that exceeds the size of the action pane, right-click the graphic and select Scale to Fit.
- If you do not want to print the black background, in your browser's Internet Options dialog box, disable background printing.
Colors and status in the Field Assistant Interface

The following colors indicate equipment status throughout Field Assistant interface. These colors are visible on Property pages, Graphics pages and in the setpoint graphs.

<table>
<thead>
<tr>
<th>Color</th>
<th>Color Name</th>
<th>Status Code</th>
<th>Condition Indicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purple</td>
<td>0 or 15</td>
<td>In a controller—non-operational or no communications</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>In equipment—a hardware or software error</td>
<td></td>
</tr>
<tr>
<td>Charcoal</td>
<td>14</td>
<td>In a controller—a download is required or is already in progress</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>In equipment—a controller has stopped</td>
<td></td>
</tr>
<tr>
<td>Coral</td>
<td>13</td>
<td>Control program error</td>
<td></td>
</tr>
<tr>
<td>Red</td>
<td>2 or 9</td>
<td>Heating or cooling alarm</td>
<td></td>
</tr>
<tr>
<td>Orange</td>
<td>8</td>
<td>Maximum cooling</td>
<td></td>
</tr>
<tr>
<td>Dark blue</td>
<td>3</td>
<td>Maximum heating</td>
<td></td>
</tr>
<tr>
<td>Yellow</td>
<td>7</td>
<td>Moderate cooling</td>
<td></td>
</tr>
<tr>
<td>Light blue</td>
<td>4</td>
<td>Moderate heating</td>
<td></td>
</tr>
<tr>
<td>Grey</td>
<td>1</td>
<td>Unoccupied/inactive</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>10</td>
<td>Occupied/active</td>
<td></td>
</tr>
<tr>
<td>Light green</td>
<td>6</td>
<td>Free cooling</td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td>5</td>
<td>In a controller—operational or operational read-only</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>In equipment—No heating or cooling</td>
<td></td>
</tr>
</tbody>
</table>
Setting up and configuring your system

On the Devices page > Manage tab, you can:

- Search the network to populate the system with routers and controllers (page 17)
- Upload control programs, drivers, graphics, and screen files (page 21)
- Perform downloads to individual or multi-selected controllers (page 29)

Find and upload routers and controllers

1. Select the system level in the navigation tree.
2. On the Devices page > Manage tab, click Find Devices to discover your routers.
3. Once routers are found, select one router at a time in the left-hand navigation tree and click Find Devices again.
4. Once controllers are found, you must upload content to the routers and controllers. Select one or more devices in the list on the Manage tab and click Upload All Content to upload drivers, graphics, touch files, and control programs to the Field Assistant application. Use Ctrl+click, Shift+click, or both to select multiple items.

   NOTE If Show Control Programs is checked, all control programs are listed. If you have multiple control programs in one controller, you will see every control program in the list. If it is not checked, the list only shows the individual controllers and their model. The same information is uploaded, this option just controls what you see on the Manage tab and you can toggle back and forth.
5. Click OK when you see the message This will upload all content for the controller. Are you sure you want to do this?. When complete, a check mark under Status indicates a successful upload.

NOTES
- If an error message appears, click on the message to view an explanation.
- Uploading can be time consuming, especially for multiple controllers.
- The MAC address shows to the left of the controller name in the navigation tree only. Programmable controllers show multiple equipment listings with the same MAC address, based on control programs downloaded from EquipmentBuilder or Snap.
- To view the driver names after uploading, select the Advanced tab or right-click the controller in the navigation tree and select Driver Properties or Module Status.

TIPS
- Click the symbol in the upper left corner to display the status of the latest operation.
- Status messages are color coded as follows:
  - Red - reports an error
  - Blue - requires action
  - Green - indicates an upload or download is in process
Change network and device addressing

The Field Assistant application automatically assigns a **BACnet Network IP number** and the **Device ID** for the application. Do **not** change these addresses unless absolutely necessary!

**NOTE** If you have more than 99 routers, you must set your own addresses.

**To change an address:**

1. Select the system level in the navigation tree and select the **Devices** page > **Advanced** tab.

   You can change the addressing in these fields:

   **System level:**
   - **BACnet/IP network** - default is 1600 (The maximum number allowed is 65,534)
     - **NOTE** Typically, you should not need to change this.
   - **Server Device Id** - address of the Field Assistant web server (default is 169998)
   - **Communications Time-out (in milliseconds)** - increase this value only if downloads to controllers or routers fail with communication time-out errors.
   - **Communication Retries** (default is 3)

   ![](image)

   **Router level:** (Select the router in the navigation tree and select **Devices > Advanced**.)
   - **Router to MS/TP network**
   - **Device Identifier**

2. Click **Accept**.

Set up third-party integration

You can integrate third-party devices into a Field Assistant system if the following are true:

- The third-party devices are physically connected on the Field Assistant system’s network.
- You have a Carrier controller that supports third-party integration.
- You have the correct Carrier driver for the third-party protocol.
- You have enabled a port for a third-party protocol on the Carrier controller's driver page.

To read from or write to a third-party device, you need the following information from the third-party vendor:

- Protocol
- Third-party device’s network address
- Memory location of the object in the device you want to read from or write to

If you are integrating with BACnet devices, you can use the Field Assistant **BACnet Discovery** (page 19) feature to gather this information.
Before you begin a third-party integration, study the Carrier controller’s *Installation and Start-up Guides* and the third-party protocol’s *Integration Guide*. Both are available on the Carrier website (http://www.hvacpartners.com).

The following Carrier routers let you integrate the allowed number of third-party points into your Field Assistant system:

<table>
<thead>
<tr>
<th>This router...</th>
<th>Allows this number of non-BACnet third-party points...</th>
</tr>
</thead>
<tbody>
<tr>
<td>i-Vu® Open Link</td>
<td>500</td>
</tr>
<tr>
<td>Carrier® ChillerVu™</td>
<td>1000</td>
</tr>
</tbody>
</table>

**NOTE** The point allowance of the i-Vu Open Link that provides third-party points applies to only itself. For example, if you download control programs that use 125 third-party Network I/O points, you cannot apply the unused 125 points to a different router.

### To discover third party BACnet networks, devices, and objects

The Field Assistant BACnet Discovery feature locates all accessible BACnet networks, BACnet devices, and BACnet objects (including devices in your Field Assistant system) on a BACnet network. The information gathered in this process is typically used to integrate third-party BACnet devices and their BACnet objects into the Field Assistant system.

To use **BACnet Discovery**:

1. Select the system level in the navigation tree and then the **Devices** page > **Advanced** tab.
2. Click the **BACnet Discovery Start** button to discover BACnet sites for the system. An item called **Discovered Networks** appears in the tree. After all sites are found, close the status dialog box.
3. To discover BACnet networks, select **Discovered Networks**, then click **Go**. A list of all BACnet networks appears in the navigation tree. After all networks are found, close the status dialog box.

**TIP** Run a commstat manual command to determine which device routes to each network. The **BACnet Bind Show Network** section of the Commstat window shows the IP address of the router to each network.

4. To discover BACnet devices on a network, select a network in the navigation tree, then click **Go**. After all devices are found, close the status dialog box. Click beside an item to expand the list of devices.
5. To discover BACnet objects on a device, select the device on the navigation tree, then click **Go**. After all objects are found, close the status dialog box. A list of all BACnet objects in this device appears on the navigation tree.

**TIP** Make sure you are discovering objects in the correct device. It may take some time to discover objects in devices with more than 100 objects.

6. Optional: Do the following to export the BACnet information so that it can be used in the Snap application:
   a) On the navigation tree, select a discovered network with devices or a single device.
   b) Click **Export**.
   c) Name and save the .discovery file in any folder.
NOTES

- Some third-party BACnet devices may not be discovered because they do not support the BACnet methods required for auto discovery.
- If the discovery process returns ambiguous information, such as multiple points with similar names, contact the third-party manufacturer's representative for clarification.
- Device configuration or network load can prevent the Field Assistant interface from showing all BACnet devices. If you do not see a BACnet device that you expect to see, check the system's BBMD configurations. If the configurations are correct, try the discovery process again.
You can view and adjust equipment operation from the following pages:

**Devices pages**

Select the System level on the navigation tree to view the Devices page, where you can:

- Upload source files or just parameters
- Download source files, schedules, parameters, or BBMD tables
- Check status and error messages
- View model, IP address, drivers, device ID
- Edit device names

**Graphics pages (page 51)**

You can view and adjust your essential building controls on most Graphics pages.

Graphics show the current status of mechanical equipment and may include an adjustable setpoint control or other editable properties.

To upload a graphic from ViewBuilder, double-click the controller in the navigation tree or right-click and select **Configure**.
Properties pages (page 54)
Each piece of equipment and each microblock has a Properties page. You can view and adjust more equipment properties on a Properties page than on its corresponding Graphics page. Each microblock has a Properties page, or pop-up.

Logic pages (page 59)
Logic pages show the control program for a piece of equipment. Use the sequence of control and yellow status values on the Logic pages for troubleshooting your mechanical equipment.

Properties/Microblock popups
To open a microblock pop-up where you can view and change properties:

- Click a microblock on a Logic page
- Click the bold, underlined microblock name on a Properties page
- Right-click a value and then select **Detail**
Working with control programs in the Field Assistant Interface

The source files given to you by your manufacturer or representative could contain new control programs. If it is a programmable controller, you might be able to revise it or create a new one in the Snap application.

In the navigation tree, you can double-click the controller, or right-click and select **Configure**, then select one of the following options:

- **Edit Existing** - Downloads programmable controller files to your computer to edit in Snap or EquipmentBuilder.
- **Add New** - Obtains files for the Field Assistant application to add to a controller or to replace an existing control program.
- **Update** - Changes the control program, view, driver, and screen files to use the current library version. See *Update the equipment library* (page 73) for complete instructions.
- **Delete Unused** - Deletes unused control programs.
- **Reload a revised control program** - Place the control program in the `<local drive>`\-\-\-\Vu_Tools_x.x\webroot\<system>\programs` folder. On the Field Assistant navigation tree, right-click the equipment, then select **Reload Control Program**. Reloading updates all instances of a control program throughout the system and marks the controller(s) for download. Field Assistant determines the appropriate download option (page 30) based on what changed in the control program.

You can use EquipmentBuilder or Snap to create your control programs (.equipment files).

- EquipmentBuilder can also produce a graphic (.view file), BACview® file, touchscreen file, and a sequence of operation, based on the equipment options you select.
- If using Snap, you must create your graphics separately in ViewBuilder. See Snap Help for detailed instructions on creating a custom control program.

*After creating your control program, load it into Field Assistant and download it into the controller. See Add or delete a custom control program to a controller and to Field Assistant (page 24).*

**NOTE** If you change a control program in the Snap application and it does not display correctly in the Field Assistant interface, **Ctrl+right-click** the Field Assistant action pane, and then select **Refresh**.

To edit a control program

You can edit a control program in the Snap application and add it to a controller.

**To get the control program to be edited**

1. Right-click the equipment on the Field Assistant navigation tree, then select **Configure**.
2. In the **Control Programs** section, click **Edit Existing**.
3. Click **Save as**.
4. Browse to the folder you want to put the file in.
5. Click **Save**.
6. Click **Close**.

Edit the control program in the Snap application. See Snap Help for more information.

**NOTE** Be sure to save it with a different name.
To put the edited control program back in your database

1. Right-click the equipment on the Field Assistant navigation tree, then select Configure.
2. In the Control Programs section, click Add New.
3. Browse to select the control program.
4. Click Open.
5. Click Continue.
6. Click Close.
7. Click Close again.

To download the edited control program to your controller(s)

Click Download. See Downloading to controllers (page 29).

Add or delete a custom control program

To save time when testing custom control programs, you can use Debug Mode (page 80) in the Field Assistant interface for one controller at a time.

⚠️ CAUTION Never leave your Field Assistant system without unchecking DEBUG MODE first and then downloading all content. The source files are not in the controller until you complete both steps.

To add a new control program to a programmable controller

1. Select the router in the navigation tree.
2. Select Devices > Manage tab.
3. Select the controller in the list on the page.
4. If you are adding a new control program, click the Add Control Program button. A dialog window appears.
5. Enter a name for your control program in Display Name and select your controller in the Controller drop-down list.

NOTES
- If you already have the maximum number of control programs for a controller, it will not appear in the list.
- Optional: You can change the control program's Reference Name if needed.
Do one of the following:

<table>
<thead>
<tr>
<th>If the control program is...</th>
<th>Select the control program.</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the Control Program drop-down list</td>
<td>Click Add New.</td>
</tr>
<tr>
<td>Not in the Control Program drop-down list</td>
<td>a. Click Add New.</td>
</tr>
<tr>
<td></td>
<td>b. Browse to select the control program.</td>
</tr>
<tr>
<td></td>
<td>c. Click Open.</td>
</tr>
<tr>
<td></td>
<td>d. Click Continue.</td>
</tr>
<tr>
<td></td>
<td>e. Click Close.</td>
</tr>
</tbody>
</table>

7. To upload a graphic, click Add New under Views and browse to your .view file.
8. Click Continue. When message appears File added successfully, click Close.
9. Click Close again.
10. Right-click on the programmable controller in the controller list and select Check Status from the list. The status of the controller should say File Mismatch.
11. Click the Download All Content (page 29) button.

**NOTE** If you need to edit the Object Instance, right-click the control program in the navigation tree and then select Configure. Click next to the field for additional information.

**To delete a single control program in a programmable controller**

1. Select the router in the navigation tree.
2. Right-click the the desired controller/control program in the list on the Devices page > Manage tab and click Delete Selected from the list.
3. The message appears Do you wish to remove a controller and all its descendants? Click OK.
   **IMPORTANT!** The process is not finished until you complete the following steps.
4. Highlight the programmable controller in the controller list again, and select Check Status. The status of the controller should say File Mismatch.
5. Click File Mismatch and click the Download button. This deletes the files from the controller.

**To delete all control programs in a programmable controller**

1. Select the router in the navigation tree.
2. Right-click the desired controller/control program in the list on the Devices page > Manage tab and select Delete Programs. Click OK when the following message appears This will delete all programs in this controller. Are you sure?
   **IMPORTANT!** The process is not finished until you complete the following steps.
3. Highlight the programmable controller in the controller list again, and select Check Status. The status of the controller should say File Mismatch.
4. Click File Mismatch and click the Download button. This deletes the files from the controller.
Working with drivers in the Field Assistant interface

You can make the following changes to a driver in the Field Assistant interface.

- Change or upgrade a driver. See topic below.
- Reload a driver if it becomes corrupt (for example, a driver page is missing). On the Field Assistant navigation tree, right-click the controller or driver, then select **Reload Driver**. Reloading updates all instances of the driver throughout the system and marks the controller(s) for an All Content download. Changes you made on the driver pages in Field Assistant remain in effect.

After you make these changes, you must **Download All Content** (page 29) to the affected controller(s).

To change or upgrade a driver

1. On the Field Assistant navigation tree, right-click the controller, then select **Driver Properties > Update tab**.
2. If other controllers in the system use this driver, select which controllers you want to change.

   - This controller only
   - All controllers on this network that use same driver version
   - All controllers in the system that use same driver version

3. Do one of the following:

   **If the driver is...**

   - In the **Driver Version** drop-down list
     a. Select the driver.
     b. Click **Accept**.
   - Not in the **Driver Version** drop-down list
     a. Click **Add**.
     b. Browse to select the driver.
     c. Click **Open**.
     d. Click **Continue**.
     e. Click **Close**.
     f. Click **Close** again.

4. **Download All Content** (page 29) to the controller.

**NOTE** You can click **Delete Unused** in the **Controller** section to delete all unused drivers in `\Vu_Tools_x.x\webroot\<system_name>\drivers`. 
Working with screen files in the Field Assistant interface

To use an Equipment or System Touch, or BACview®, to view or edit a controller’s property values, you must download a screen file (.touch, .bacview, .S37, or.kpd) to the controller.

To select a different screen file

1. On the Field Assistant navigation tree, right-click the controller, then select **Driver Properties > Update** tab.
2. If other controllers in the system use the current screen file, select which controllers you want to change.
   - This controller only
   - All controllers on this network that use the same screen file
   - All controllers in the system that use the same screen file
3. Do one of the following:

<table>
<thead>
<tr>
<th>If the screen file is...</th>
<th>a) Select the file.</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the <strong>Screen file</strong> drop-down list</td>
<td>b) Click <strong>Accept</strong>.</td>
</tr>
<tr>
<td>Not in the <strong>Screen file</strong> drop-down list</td>
<td>c) Click <strong>Add</strong>.</td>
</tr>
<tr>
<td></td>
<td>d) Browse to select the screen file.</td>
</tr>
<tr>
<td></td>
<td>e) Click <strong>Open</strong>.</td>
</tr>
<tr>
<td></td>
<td>f) Click <strong>Continue</strong>.</td>
</tr>
<tr>
<td></td>
<td>g) Click <strong>Close</strong>.</td>
</tr>
<tr>
<td></td>
<td>h) Click <strong>Close</strong> again.</td>
</tr>
</tbody>
</table>

4. **Download All Content** (page 29) to the controller.

**NOTE** You can click **Delete Unused** in the **Screen File** section to delete all unused screen files.

To edit a screen file

You can get a copy of a screen file from Field Assistant, edit it and then put it back into your Field Assistant...
To get the screen file

1. On the Field Assistant navigation tree, right-click the controller that uses the screen file, then select **Driver Properties > Update** tab.

2. Under **Screen File**, click **Edit**.

3. Click **Save**.

4. Browse to the folder you want to put the file in.

5. Click **Save**.

6. Click **Close**.

To put the edited file back on the server

1. On the Field Assistant navigation tree, right-click the controller that uses the screen file, then select **Driver Properties**.

2. Under **Screen File**, click **Add**.

3. Browse to select the file.

4. Click **Open**.

5. Click **Continue**.

6. Click **Close**.

7. Click **Close** again.

**BACnet device tools and services**

The tools and services described below let you control or troubleshoot BACnet devices. To access the tools and services, click on the BACnet router on the Field Assistant navigation tree, then click **Properties**.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Module Status</strong></td>
<td>Generates a Modstat report. See <em>Using a Modstat to troubleshoot your system</em> (page 82).</td>
</tr>
<tr>
<td><strong>Show Bindings</strong></td>
<td>Displays all Device IDs that the BACnet device communicates with and the network address of each device.</td>
</tr>
</tbody>
</table>

**BACnet device services**

Although the following BACnet device services can be used for Carrier controllers, you should not need to use
them for this purpose. Their primary target is a third-party device that supports these services.

<table>
<thead>
<tr>
<th>Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Sync</td>
<td>Sends the site's local time to the BACnet device.</td>
</tr>
<tr>
<td>UTC Time Sync</td>
<td>Sends the Coordinated Universal Time (UTC) to the BACnet device. The device must be able to convert the time to its local time zone.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE</strong> Some devices support only one of the above time sync services.</td>
</tr>
<tr>
<td>Backup, Restore,</td>
<td>Executes a BACnet Backup or BACnet Restore service as defined by the BACnet standards. A message appears when the backup or restore is complete.</td>
</tr>
<tr>
<td>and Abort</td>
<td>Click <strong>Abort</strong> to stop a <strong>Backup</strong> or <strong>Restore</strong>.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE</strong> These services are vendor-specific and should be used with caution. A failed restore could make a device inoperable. Before using these on a device running in a live system, test them on the device during installation.</td>
</tr>
<tr>
<td>BACnet Password</td>
<td>Applies to <strong>Backup, Restore, Warmstart</strong>, and <strong>Coldstart</strong>. Enter your BACnet password if required by the BACnet device. This password is typically defined in a third-party tool.</td>
</tr>
<tr>
<td>Warmstart or Coldstart</td>
<td>Restarts the BACnet device. For a third-party device, see the manufacturer's documentation to determine the difference between these 2 services. For Carrier controllers, these services are the same. These services will cycle the controller's outputs.</td>
</tr>
<tr>
<td>DCC</td>
<td>Use to stop or start the BACnet device's communication. Select one of the following options in the drop list, then click <strong>DCC</strong>.</td>
</tr>
<tr>
<td>Enable</td>
<td>Starts the device's communication.</td>
</tr>
<tr>
<td>Disable</td>
<td>Stops the device's communication for the amount of time that you enter in the <strong>Timeout</strong> field. See <strong>NOTE</strong> below.</td>
</tr>
<tr>
<td>Disable Initiation</td>
<td>Stops the device from initiating communication for the amount of time that you enter in the <strong>Timeout</strong> field. See <strong>NOTE</strong> below. The device will continue to respond to communications from other devices.</td>
</tr>
<tr>
<td>NOTE</td>
<td>Type −1 in the <strong>Timeout</strong> field to disable communication indefinitely. Normal communication will resume only when the device receives an <strong>Enable</strong> command.</td>
</tr>
<tr>
<td>Event Info</td>
<td>Displays detailed information about the objects that are currently in alarm.</td>
</tr>
<tr>
<td>Event Summary</td>
<td>Displays summary information about the objects that are currently in alarm.</td>
</tr>
</tbody>
</table>

**Downloading to controllers**

If you make any of the following changes, you must download the new data from the Field Assistant application to the affected controllers.
In the Field Assistant interface

- Change or reload a control program
- Change or reload a driver
- Change a schedule
- Change a screen file

The Field Assistant application automatically marks the affected controllers as requiring a download. You can download these controllers from the the Devices (page 31) page or the Properties (page 31) page for the controller, the equipment, or a microblock.

When the Field Assistant application marks a controller for download, it determines what information needs to be downloaded based on the type of information that changed. See Download Options (page 30).

By default, Full Source files are downloaded to i-Vu® Open PIC controllers because Optimize download for Open PIC controllers is unchecked on the Devices > Advanced tab (from the system level in the navigation tree). Check this option if you do not want Full Source downloaded.

⚠️ **CAUTION** If you want this option checked and purposely had it checked in your previous system, it is automatically unchecked after upgrading and you must check it again.

**NOTE** A property change in the Field Assistant interface is automatically downloaded to the controller. If the download fails, the controller is added to the Downloads page with the reason for the failure.

### Download Options

When Field Assistant marks a controller for download, it determines what information needs to be downloaded based on the type of information that changed. Below are the options that can be downloaded.

<table>
<thead>
<tr>
<th>This option...</th>
<th>Downloads...</th>
</tr>
</thead>
</table>
| All Content   | • Control programs  
• Graphics  
• Drivers  
• BACview® files  
• Touchscreen files  
• Parameters  
• Schedules  

**NOTE** An All Content download also:
• Synchronizes the controller's time to Field Assistant  
• Overwrites trends in the controller  
• Restarts the controller

<table>
<thead>
<tr>
<th>Only Schedules</th>
<th>All schedules that are not set for automatic download</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only Parameters</td>
<td>All editable properties</td>
</tr>
<tr>
<td>Only BBMDs</td>
<td>BBMD tables (.bdt file) that you have updated but have not yet written to the controller</td>
</tr>
</tbody>
</table>

**NOTE** An All Content download clears trend, history, and alarm data from the affected controllers.

### To upload or download parameters only

This option uploads all editable properties from the device, but not the source files. If you edit the properties on a controller that is not physically connected to the computer, you will have to either upload or download parameters.
To download from the Devices page

The System level Devices page shows any controllers that Field Assistant marked for download.

To download:

1. On the navigation tree, select the System or router to download controllers that you are connected to.
2. Select the controllers that you want to download.
   - **NOTE** Use Ctrl+click, Shift+click, or the Select All checkbox to select multiple controllers.
3. Click **Download**. A message appears: This will download programs and other content for the entire controller and restart it. Are you sure you want to do this?
4. Click **OK**.

**NOTES**

- Active uploads and downloads cannot be stopped.
- Icons in the Status column indicate the following:
  - **Active**—Field Assistant is uploading to the controller.
  - **Active**—Field Assistant is downloading to the controller.
  - **Pending**—You initiated the download, and the controller is waiting for its turn to download.
  - **Failed**—The download failed. See *If a controller fails to download* (page 31).
  - **On Hold**—Indicates you clicked **Hold** to stop a pending download.

Click in the upper left-hand corner to view a log of download activity in the current session. Copy to Clipboard lets you copy the text to paste it into another application.

To download from a Properties page

If a controller requires a download, a red download message and a **Download** button appear at the top of the Properties page for the controller, the equipment, or a microblock. Click the button to start the download.

Downloading from the Properties page downloads All Content to the controller.

If a controller fails to download

A controller that fails to download appears on the Downloads page or Devices page > **Manage** tab with this icon.
Working with equipment in the interface

1. Review the reason for the failure:
   ○ Hold your cursor over the failed task to see hover text giving the reason.
   ○ Click or in the upper left corner of the page to see information on all failed downloads. Copy to Clipboard lets you copy the text to paste it into another application.

2. Correct the problem that caused the failure.

3. Select the controller that you want to download.
   NOTE You must be connected to the controller to download.

Checking controller status

On the Field Assistant navigation tree, you can select a router or the System level, and then click Devices to:

- View the status of controllers (page 32)
- On the Manage tab, you can view controller information such as address and model. On the Advanced tab, you can view the driver and device ID.
- Download or upload to resolve a mismatch

Status messages

On the Devices page > Manage tab, the Status column shows a description of the devices's current state. Hold your cursor over the Status description to see hover text with a more detailed description. If multiple conditions exist, Field Assistant displays the message with the highest priority.

To see the Status messages:

- On the Field Assistant navigation tree, select the System level to view the status of routers.
- On the Field Assistant navigation tree, select a router to view the status of its controllers.

The table below shows all possible messages. The message color indicates the following:

Black—In process
Red—An error occurred
Blue—Requires action from the user
### Status column message

<table>
<thead>
<tr>
<th>Status column message</th>
<th>Hover text message</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Black messages:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Downloading</td>
<td>The controller is downloading, communications may be disabled</td>
<td></td>
</tr>
<tr>
<td>Uploading</td>
<td>The controller is uploading, communications may be disabled</td>
<td></td>
</tr>
<tr>
<td>Pending</td>
<td>This controller is waiting to be processed.</td>
<td></td>
</tr>
<tr>
<td><strong>Red messages:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communications Error</td>
<td>Cannot communicate with this controller.</td>
<td></td>
</tr>
<tr>
<td>Connection Disabled</td>
<td>The connection for this controller has been disabled</td>
<td>Occurs if someone stopped the connection.</td>
</tr>
<tr>
<td>Connection Error</td>
<td>The connection for this controller failed to start</td>
<td>Occurs if the connection is misconfigured or failed to start.</td>
</tr>
<tr>
<td>Controller Disabled</td>
<td>This controller has been disabled.</td>
<td></td>
</tr>
<tr>
<td>Controller offline</td>
<td>The controller is offline.</td>
<td></td>
</tr>
<tr>
<td>Download Failed</td>
<td>(Message depends on the cause of the failure.)</td>
<td></td>
</tr>
<tr>
<td>Download Not Permitted</td>
<td>This controller is not permitted to download.</td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>An unknown error has occurred.</td>
<td></td>
</tr>
<tr>
<td>Missing Files</td>
<td>Upload failed. Server is missing source files.</td>
<td></td>
</tr>
<tr>
<td>Not Uploadable</td>
<td>This controller is not configured for content upload.</td>
<td>Occurs if you attempt to upload a controller with a pre-4.x driver.</td>
</tr>
<tr>
<td>Out of Service</td>
<td>This controller is out of service.</td>
<td><strong>Out of Service</strong> is checked on the controller's Properties page.</td>
</tr>
<tr>
<td>Unsupported Controller</td>
<td>This controller does not support content upload.</td>
<td></td>
</tr>
<tr>
<td>Upload Not Permitted</td>
<td>This controller is not permitted to upload.</td>
<td></td>
</tr>
<tr>
<td><strong>Blue messages:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controller Replaced</td>
<td>This controller has been replaced by another controller of the same type in the field.</td>
<td></td>
</tr>
<tr>
<td>Download All Content</td>
<td>Please download all content to the controller.</td>
<td></td>
</tr>
</tbody>
</table>
### Status column message | Hover text message | Notes
--- | --- | ---
**Download Parameters** | To download parameters, highlight row and select "Only Parameters" from the Download Action menu and click "Download". |  
**Download Schedule** | To download schedules, highlight row and select "Only Schedules" from the Download Action menu and click "Download". |  
**Driver Parameter Mismatch** | Driver parameter differences detected. Upload parameters from the controller or download parameters to the controller. |  
**Network Ready to Find Devices** | To upload this network, select the router in the tree and click Find Devices button. |  
**Parameter Mismatch** | Control Program parameter differences detected. Upload parameters from the controller or download parameters to the controller. | See Handling parameter mismatches (page 34).  
**Program Mismatch** | Content differences detected. Upload all content from the controller or download all content to the controller. |  
**Unprogrammed Controller** | This is a programmable controller. To add control programs, click Add Control Program. |  
**Upload All Content** | Please upload all content from the controller. |  

**General messages:**

- This controller is ok.
- The last operation on this controller was cancelled.

### Handling parameter mismatches

A parameter mismatch occurs when a value in a controller does not match the value in the system database. This can be a driver or control program value.

### To find mismatches in your system

You can find mismatches in the following places:

- The Devices page > Manage tab > Status column will show Parameter Mismatch.
- The Properties page for a controller, driver, control program, or point will show one of the following red messages at the top of the page stating:
  - Control Program parameter differences detected.
  - Driver parameter differences detected.
  - Parameter download required.
The value that has a discrepancy will appear with a purple box around it. Hover your cursor over the field to see:

![Parameter needs downloading](image1)

or

![Setpoint Adjustment](image2)

**NOTE** The Downloads page > Tasks column will show Resolve Parameters for any mismatches that your system discovered in the 3 places listed above.

**To resolve a mismatch**

1. Go to one of the following:
   - **Devices page** - Click the Parameter Mismatch link
   - **Properties page** that shows one of the red messages above

2. Click one of the following:
   - **Resolve** to let the Field Assistant application download changes made in the Field Assistant interface or upload changes made in the controller. Click the Details button to see what the discrepancy is and whether Resolve will download or upload parameters. See NOTE below.
   - **Upload** to upload the parameters from the controller to the Field Assistant application
   - **Download** to download the parameters from the Field Assistant application to the controller

**NOTE** On the Devices page with Show Control Programs unchecked, if a controller has simultaneous mismatches in the driver and control program, clicking Details will show that a control program mismatch exists but it will only show details for the driver mismatch. You must go to the control program in the tree to see details of that mismatch. However, clicking Resolve will resolve both mismatches.

---

**Managing setpoints**

The Setpoint graphic shown on a standard equipment graphic indicates the base setpoint values (Occupied High/Low, Unoccupied High/Low). The Field Assistant application reads these values back periodically, typically...
within 10 seconds. The timing can vary based on network traffic, the number of controllers in the database, and several other variables. Setpoints that are changed in the field via another user interface are displayed in the Field Assistant interface as soon as they are detected.

You can, at any time, change the setpoints from Field Assistant graphics by using the slider or by entering numeric values directly. Updated setpoints are transmitted to the controller when you Accept the changes. Setpoints can also be changed on the Properties page > Control Program tab > Space Temperature and Setpoints. or Configuration > Setpoints.

The various color bars indicate adherence to or deviation from the setpoint. You can change the current default settings for setpoint deviation. Select a color band on the setpoint graph to see the current setpoints in the Heating and Cooling fields. The values in this graphic are Fahrenheit. See setpoint descriptions below.

**NOTE** This graphic is an example only. Your setpoints may differ.

<table>
<thead>
<tr>
<th>Color</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Temperature is within the Occupied Low and High Setpoint</td>
</tr>
<tr>
<td>Grey</td>
<td>Temperature is within the Unoccupied Low and High Setpoint</td>
</tr>
<tr>
<td>Light Blue</td>
<td>Temperature is less than 2°F below the Occupied Low Setpoint</td>
</tr>
<tr>
<td>Dark Blue</td>
<td>Temperature is more than 2°F below the effective Low Setpoint but less than 4°F below the effective Low Setpoint</td>
</tr>
<tr>
<td>Yellow</td>
<td>Temperature is less than 2°F above the effective High Setpoint</td>
</tr>
<tr>
<td>Orange</td>
<td>Temperature is more than 2°F above the effective High Setpoint but less than 4°F above the effective High Setpoint</td>
</tr>
<tr>
<td>Red</td>
<td>Temperature is more than 4°F above or below the effective setpoints</td>
</tr>
</tbody>
</table>

To change a setpoint, type the number here, or slide the bar.
Adjust setpoints

- **Programmed setpoints** are set and changed by operators.
- **Effective setpoints** reflect the impact of other system conditions on the programmed setpoints, such as setpoint adjustments, and hysteresis. Effective setpoints control the equipment.

To change programmed setpoints:
1. Navigate to a setpoint control in one of the following places:
   - Properties page > Control Program tab > Configuration > Setpoints
   - The setpoint microblock pop-up on a Logic page
   - A Graphics page (Click a setpoint trend graph control to access the editable setpoint bar.)
Working with equipment in the interface

2 Make changes on a programmed setpoint bar by either:
   ○ Clicking and dragging the segment or the gap between segments
   ○ Typing new values in the Heating and Cooling fields
3 Click Accept.

Demand Control

Demand Control is a cost-saving strategy that saves energy while maintaining comfort in the following ways:

- Controlling energy use to avoid peak demand, ratchet, or time of use utility charges
- Maintaining ventilation at relaxed setpoints rather than shutting down equipment (as with load shedding or duty cycling)

Before you can use Demand Control effectively, you must:

- Obtain details regarding past energy usage and peak demand, ratchet, and time of use charges from your energy provider.
- Understand the demand profiles of the zones you are controlling.

Demand Control can be customized at the zone level. For example, you may relax the setpoints in some zones, like break rooms and closets, by a few degrees, but you may not want to relax setpoints in computer rooms at all.

To define Demand Control properties

1 On the navigation tree, select the electric meter.
2 Select Properties > Control Program and expand the Demand Level Parameters section.
3 Type the Start and End time to define the time period that you want demand control to be in effect for this zone.
4 Type kilowatts per hour (kW/hr) in the Level columns to define the amount of power that the demand must exceed before the Field Assistant system calls for a higher demand level.

**NOTE** Levels are defined in the electric meter control program in the Snap application. You can test the Demand Levels by locking the meter to a value.
In the example below, during Period 4, defined as 12:00 (noon) to 16:00 (4:00 p.m.), if the demand exceeds 800 kW/hr, the Field Assistant system will use Demand Level 1 setpoints. If the demand exceeds 1000 kW/hr, the Field Assistant system will use Demand Level 2 level setpoints and so on.

**Configuring Optimal Start**

Enable and configure Optimal Start on the Properties page > Control Program tab > Configuration > Setpoints. Your control program could be configured for Optimal Start or for both Optimal Start and Optimal Start Type.

**NOTES**
- The Optimal Start options depend on the revision date of the control program in your controller.
- Optimal Start is automatically disabled when Properties > Control Program > Maintenance > Occupancy > BAS On/Off is set to either Unoccupied or Occupied.

**Optimal Start**

Optimal Start adjusts the effective setpoints to achieve the occupied setpoints by the time scheduled occupancy begins. The Optimal Start recovery period may begin as early as 4 hours prior to occupancy. The algorithm works by moving the unoccupied setpoints toward the occupied setpoints. The rate at which the setpoints move is based on the outside air temperature, design temperatures, and capacities.

The following conditions must be true for optimal start to operate:
- On the Properties page > Control Program tab > Configuration > Setpoints > Optimal Start, the Default Value must be set greater than 0 and less than or equal to 4 (0.00 disables Optimal Start).
- The system is unoccupied

**NOTE** If the Open controller does not have a valid outside air temperature, then a constant of 65° F is used. This value is not adjustable.
The actual equation that the controller uses to calculate **Optimal Start** is nonlinear. An approximation of the result is shown below.

![Graph showing cooling setpoint and zone temperature over a 24-hour period.](image)

To change **Optimal Start** settings:

1. In the navigation tree, select the equipment that you want to change.
2. Select **Properties** page > **Control Program** tab > **Configuration** > **Setpoints**.

**Optimal Start Type**

If you have **Optimal Start Type**, you must choose from the following:

- None
- Temperature Compensated Optimal Start
- Learned Adaptive Optimal Start

To select the method used to change from unoccupied to occupied setpoints:

1. In the navigation tree, select the equipment that you want to change.
2. Click **Properties** page > **Control Program** tab > **Configuration** > **Setpoints**.
3. Select option from the **Optimal Start Type** drop-down list.
4. See below to make further adjustments.

**None** – The unit will not start to control to the occupied setpoints until the unit goes into an occupied mode. Setpoints do not ramp, but change immediately from unoccupied to occupied values. When you select **None**, you must set all Learning Adaptive Optimal Start transition factors, identified by their thermographic color, to 0. These are located directly above the **Effective Set Points** graph.

**Temperature Compensated** – The unit changes to occupied setpoints at some time prior to the occupied time, not to exceed the hours you set for **Optimal Start**. The start time is determined by the current error between space temperature and the appropriate heating or cooling setpoint. At that time, the setpoints do not ramp, but change immediately from unoccupied to occupied values. When selecting **Temperature Compensated**, you must set all Learning Adaptive Optimal Start transition factors, identified by their thermographic color to 0. These are located directly above the **Effective Set Points** graph.
When selecting **Temp Compensated**, you can adjust the following:

- **Heat Start K factor (min/deg)** – If **Optimal Start Type** is **Temp Compensated**, this is the time in minutes per degree that the equipment starts before the occupied period when the space temperature is below the occupied heating setpoint (including any setpoint offset).

- **Cool Start K factor (min/deg)** – If **Optimal Start Type** is **Temp Compensated**, this is the time in minutes per degree that the equipment starts before the occupied period when the space temperature is above the occupied cooling setpoint (including any setpoint offset).

**NOTE** The default value for the above is 15.00 and the range is 0 to 99.

**Learning Adaptive Optimal Start** – This function gradually adjusts the unoccupied setpoints over a specified period of time to achieve the occupied setpoint by the time scheduled occupancy begins. This learning adaptive algorithm uses the learned heating capacity and learned cooling capacity values to calculate the effective setpoints prior to the occupied start time. The algorithm calculates a learned cooling and heating capacity during the previous unoccupied time. Set the **Learning Adaptive Optimal Start** recovery period from 1 to 4 hours in **Optimal Start**. When the **Learning Adaptive Optimal Start** routine runs, adjustments are based on the color that is achieved when occupancy begins. Adjustment amounts are defined in the thermographic color fields located directly above the **Effective Setpoints** graph under **Setpoints**.

**EXAMPLE** The heating capacity for a zone is 5° per hour (default). When the zone becomes occupied, the zone temperature is 1° below the occupied setpoint, indicating a need for additional heat. Because the zone temperature was low by 1°, the learned heating capacity is decreased by the value entered in the **LtBlue** thermographic color field (0.0600 default). As a result, the learned heating capacity is adjusted to 4.94° for the next optimal start period. Since the algorithm has calculated that the equipment has less capacity to bring the temperature to setpoint within the configured recovery period, the setpoint adjustment begins sooner in the next unoccupied period.

To change the adjustment values in the **Learning Adaptive Optimal Start** routine:

1. In the navigation tree, select the equipment that you want to change.
2. Click **Properties** page > **Control Program** tab > **Configuration** > **Setpoints**.
3. Adjust the color fields between the Zone Setpoints graph and the the **Effective Setpoints** graph.

When you determine that no further start time optimization is required, you can disable **Heating** and **Cooling Capacity** adjustments by setting the color field values to 0.0.
You can reset the learned heating and cooling capacities by entering a value into either the **Heating Capacity** or **Cooling Capacity**, located beneath the **Zone Setpoints** graph.

**CAUTION** When using **Learning Adaptive Optimal Start**, be sure that all equipment is properly maintained so that your system does not “learn” to compensate for dirty filters or loose fan belts.
Commissioning equipment

Follow the process below to commission system equipment.

Step 1: Check out point setup

1. On the Field Assistant navigation tree, select the piece of equipment you want to check out.
2. Click Properties.
4. After completing the equipment checkout, click the Checkout tab.
5. Select Checked Out. This field is for your reference only.
6. Optional: Type notes. Notes remain in this field until an operator deletes them.
7. Optional: Click the Reports drop-down arrow, then select and run each of the following reports to verify your work:
   - Equipment > Point List
   - Alarms > Alarm Sources
   - Equipment > Network IO

TIP You can export the calibrated data so that you can import it into another control program. See Optional: Import/export calibration data (page 49).

Property descriptions

I/O Points

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Click the name to display the microblock pop-up.</td>
</tr>
<tr>
<td></td>
<td>NOTE A red name indicates a fault condition where the point may be misconfigured.</td>
</tr>
<tr>
<td></td>
<td>EXAMPLE No input/output number or a nonexistent input/output number.</td>
</tr>
<tr>
<td>Type</td>
<td>Type of Input or Output point.</td>
</tr>
<tr>
<td>Value</td>
<td>The point's present value.</td>
</tr>
<tr>
<td>Offset</td>
<td>Allows for fine calibration of the present value of an analog point.</td>
</tr>
<tr>
<td>Polarity</td>
<td>Determines the point’s binary normal polarity in the control program.</td>
</tr>
<tr>
<td></td>
<td>NOTE Polarity is not the hardware normally open/normally closed position.</td>
</tr>
<tr>
<td>Locked</td>
<td>Select the checkbox to lock the present value at the value you specify.</td>
</tr>
<tr>
<td>Exp:Num</td>
<td>Expander numbers and input or output numbers associated with where the physical point wires, such as a sensor wire, are physically connected to a controller.</td>
</tr>
<tr>
<td>I/O Type</td>
<td>Selects the bank of physical inputs or outputs on the controller.</td>
</tr>
</tbody>
</table>
Working with equipment in the interface

**Sensor**
Selects how the physical input is mapped to the engineering units.

**Min/Max** is used with the sensor type of linear to scale the input to engineering units.

**NOTE** This field is ignored for sensor types other than linear.

**EXAMPLE:**
- Linear sensor type
- Min
  - 10
- Max
  - 50
- When input reads
  - 100% the value is 50
  - 50% the value is 20
  - 0% the value is -10

**Actuator**
Selects how the present value in engineering units is mapped to the physical output.

**Min/Max** is used with the actuator type of linear to scale the output from engineering units.

**NOTE** This field is ignored for actuator types other than linear.

**EXAMPLE:**
- Linear sensor type
- Min
  - 10
- Max
  - 50
- When input reads
  - 50
  - 20
  - -10
  - 100% the output is 50
  - 50% the output is 0

**Resolution**
Amount by which the present value will change.

**EXAMPLE** If a physical input changes by 1, but the resolution is set at 2, then the present value remains the same. If the input changes by 2, the present value will then change by 2.

**Checked Out**
These fields are for your reference only.

**Checkout Notes**

**Alarm Sources**

**Name**
Click the name to display the microblock pop-up.

**Type**
Type of point that is an alarm source.

**Alarm**
Shows Alarm in red if a current alarm exists.

**Network Visible**
Select to allow the microblock to be seen by the Field Assistant application and third-party BACnet controllers on the network.

**Potential alarm source**
Select to enable the microblock to generate alarms.

**Alarm Enabled**
- **Alarm**—Select to generate an alarm when conditions exceed the limits set in the **Condition** column.
- **Return**—Select to generate a return-to-normal message when the alarm condition returns to a normal state.
- **Fault**—Select to have an alarm generated if the alarm source is not configured correctly. For example, a misconfigured channel number produces a no sensor fault.

**Requires ack**
- **Alarm**—Select to require that the alarm be acknowledged.
- **Return**—Select to require that the return-to-normal message be acknowledged.

**Critical**
Select if the alarm is critical.

**Category**
You can change the alarm category assigned to the microblock.
Condition

An alarm will be generated if conditions exceed the low or high limits set.

**Deadband:**
The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated.

**EXAMPLE**

\[
\begin{align*}
\text{High} &= 225 \\
\text{Low} &= -25 \\
10 &= \text{Deadband}
\end{align*}
\]

- Alarm is generated
- Return-to-Normal is generated

**Delay**
Delay time in seconds for notification after an alarm is generated.

---

**Trend Sources**

<table>
<thead>
<tr>
<th>Name</th>
<th>Click the name to display the microblock pop-up.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOTE</td>
<td>A red name indicates a fault condition where the point may be misconfigured.</td>
</tr>
<tr>
<td>EXAMPLE</td>
<td>No input/output number or a nonexistent input/output number.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>The type of point being trended.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Sample Interval</th>
<th>The interval or COV (Change of Value) increment that triggers the trend sample.</th>
</tr>
</thead>
</table>

**COV Increment**
The increment, or interval, that triggers the trend sample on Change of Value

---

**Network Points**

<table>
<thead>
<tr>
<th>Name</th>
<th>Click the name to display the microblock pop-up.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOTE</td>
<td>A red name indicates a condition where the point may be misconfigured.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Type of network point.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Value</th>
<th>The point’s present value.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXAMPLE</td>
<td>For a Maximum point type, Value is the maximum value of all the target BACnet object properties the point is communicating with.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Locked</th>
<th>Select the checkbox to lock the present value at the value you specify.</th>
</tr>
</thead>
</table>

| Default Value | The value that the control program will use as the point’s value when communication with the target defined in the Address column is lost or communication is disabled. |

<table>
<thead>
<tr>
<th>Com Enabled</th>
<th>Select to enable this point’s network communications. Disable this property for troubleshooting.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOTE</td>
<td>Select All in the column header to quickly enable all points in the control program.</td>
</tr>
</tbody>
</table>
## COV Enable
Select to make:
- A digital network output point write a value to the target defined in the **Address** column only when the value changes.
- An analog network output point write a value only when the value changes by the specified increment.

## Refresh Time (mm:ss)
The time interval at which the network point writes or retrieves the value to or from the target. For network output points, this time is used when COV is not enabled or when COV is enabled but fails.

**NOTE** If COV fails and the Refresh Time is zero, the value is sent once per second.

## Address
The address of the target BACnet object property or third-party value that the point communicates with.

**NOTE** Click **Search/Replace** at the top of the **Address** column to have the Field Assistant application replace all instances of specific text in the addresses with different text. This is especially useful when copying a control program to use for multiple third-party devices.

## Error
The error code and error if the point cannot communicate with the target.

## Present Value
Current value of the target defined in the **Address** column.

## Checked Out
These fields are for your reference only.

## Checkout Notes
Notes typed in this field appear in the **Equipment Points List Report**.

## BACnet Objects
Click the name to display the microblock pop-up.

**NOTE** A red name indicates a condition where the point may be misconfigured.

### Name
A unique identifier that allows the point to be referenced for used for graphics, source tree rules, or network links.

### Reference name
The BACnet object type.

### Type
The object's current value.

### Present Value
Check to lock the third-party object to a specific value.

### Locked
A device alias. See "To reuse a control program" in **Device Alias** (page 220).

### Device
An alpha-numeric string that is unique within the third-party device.

### Object Name
A combination of the object type and a unique instance number. The object ID must be unique within the device.

### Object ID
The address of the third-party object that the microblock references.

### Address
Allows other BACnet equipment to read or change the microblock's present value. Must be enabled for this microblock to generate alarms.
Rnet Points

This tab shows varying information for the different point types. Below are all possible properties that may appear on this tab and a list of the applicable points. The following list is arranged alphabetically.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Applicable Points</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combination Algorithm</td>
<td>(Analog Sensed Values)</td>
<td>The method used to combine the ZS sensors' values to determine the microblock's output value.</td>
</tr>
<tr>
<td>Default Value</td>
<td>(Analog Parameters, Binary Parameters, Multi-State Parameters)</td>
<td>The value the control program uses until a user changes the value in the system interface.</td>
</tr>
<tr>
<td>Display Resolution</td>
<td>(Analog Sensed Values, Analog Statuses, Analog Parameters)</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>Edit Increment</td>
<td>(Analog Parameters)</td>
<td>The amount that you want each press of the sensor's ▲ or ▼ button to change the microblock's value.</td>
</tr>
<tr>
<td>Editable</td>
<td>(Analog Parameters, Binary Parameters)</td>
<td>When enabled, the microblock's value is editable on the ZS sensor.</td>
</tr>
<tr>
<td>Lock Present Value to</td>
<td>(Binary Parameters)</td>
<td>Check to output the locked value from the microblock instead of the microblock's calculated value.</td>
</tr>
<tr>
<td>Maximum</td>
<td>(Analog Parameters)</td>
<td>The highest amount that this value can be changed to on the ZS sensor or in the Field Assistant interface.</td>
</tr>
<tr>
<td>Menu Configuration</td>
<td>(All points)</td>
<td>Shows which sensor screens display the value.</td>
</tr>
<tr>
<td>Minimum</td>
<td>(Analog Parameters)</td>
<td>The lowest amount that this value can be changed to on the ZS sensor or in the Field Assistant interface.</td>
</tr>
<tr>
<td>Minimum off time</td>
<td>(Binary Parameters)</td>
<td>The minimum period (seconds) that the microblock sends an off signal to the controller, regardless of the input signal to the microblock.</td>
</tr>
<tr>
<td>Minimum on time</td>
<td>(Binary Parameters)</td>
<td>The minimum period (seconds) that the microblock sends an on signal to the controller, regardless of the input signal to the microblock.</td>
</tr>
<tr>
<td>Object Id</td>
<td>(All points)</td>
<td>A combination of the object type and a unique instance number.</td>
</tr>
<tr>
<td>Object Name</td>
<td>(All points)</td>
<td>A unique alphanumeric string that defines the BACnet object. Although the <strong>Object Name</strong> field can be edited, it is not recommended.</td>
</tr>
<tr>
<td>Reference name</td>
<td>(All points)</td>
<td>A unique identifier that allows the point to be referenced for used for graphics, source tree rules, or network links.</td>
</tr>
<tr>
<td>Rnet Tag</td>
<td>(All points)</td>
<td>Defines what type of information this value represents and determines how the sensor will display the value. For example, for the Rnet Tag <strong>Fan Status</strong>, the sensor automatically displays 🎈 on the Home screen when the microblock is active.</td>
</tr>
</tbody>
</table>
Working with equipment in the interface

<table>
<thead>
<tr>
<th><strong>Show on sensors</strong></th>
<th>(Analog Sensed Values)</th>
<th>Defines whether the ZS sensors are to display their individual sensed values, or the value determined by the Combination Algorithm.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>(All points)</td>
<td>Type of Input or Output point.</td>
</tr>
<tr>
<td><strong>Value</strong></td>
<td>(All points)</td>
<td>The point's present value.</td>
</tr>
</tbody>
</table>

**Protocol Mapping**

If a control program was built with Protocol Mapping information in Snap, this tab will appear showing third-party protocol configuration information.

**Step 2: Check controller to sensor wiring**

**PREREQUISITE** On the Logic page, disable the run condition(s) in the control program to prevent control program execution from affecting output values while you check out the equipment.

**Binary inputs (BI)**

1. Short the binary inputs wires at the end device, for example, at a pump proof or fan proof.
2. On the Properties page I/O Points tab, verify the binary input point is closed.
3. Open the binary input at the end device.
4. Verify the binary input point is open on the Properties page.
5. Repeat for all binary inputs.

**NOTE** If the readings on the Properties page are reversed from actual conditions, the polarity (normally closed/normally open contact position) is set incorrectly.

**Analog inputs (AI)**

1. Verify the sensor type and the min/max values are configured correctly.
2. On the Properties page I/O Points tab, read the analog input value.
3. Short the point. The sensor should go to full range when shorted.
4. Calibrate analog input value by adjusting the calibration offset if needed.

**Binary outputs (BO)**

1. If the controller's binary output is wired through an equipment starter, set the starter HOA switch to Automatic.
2. On the controller, set the binary output’s HOA switch to On.
3. Verify that the controlled equipment has turned on.
4. On the controller, set the binary output’s HOA switch to Automatic.
5. On the Properties page I/O Points tab, lock the binary output point to On.
6. Verify the device has turned on.
Unlock the binary output point.

On the controller, set the binary output’s HOA switch to Automatic.

**NOTE** If the locked conditions on the Properties page are reversed from actual conditions, the polarity (normally closed/normally open contact position) is set incorrectly.

**Analog outputs (AO)**

1. Verify the output/actuator type and the min/max values are configured correctly.
2. Lock the analog output point to the device minimum output, such as 2 volts or 0%.
3. Verify movement of the end device to the desired position.
4. Lock the voltage output to the device maximum, such as 10 volts or 100%.
5. Verify movement of the end device to the desired position.
6. Unlock.

**Step 3: Check equipment operation**

Refer to the sequences of operation in the system specifications to verify that the equipment operates in each operational mode (for example, occupied and unoccupied) as specified.

💡 **TIP** If needed, you can import calibration data that you exported from another control program. See Optional: Import/export calibration data (page 49).

**Optional: Import/export calibration data**

You can export I/O point calibration data from a control program and import it into the same control program or another control program with the same I/O point configuration.

**To export calibration data**

1. On the Field Assistant navigation tree, select the control program whose data you want to export.
2. Scroll to the bottom of the **Properties** page I/O Points tab, and then click Export. The file `<control program name>_<ref name>.xml` is saved in your browser’s Downloads folder.

**To import calibration data**

**NOTE** We recommend that you export existing data as a backup before you import new data.

1. On the Field Assistant navigation tree, select the control program that you want to import the data into.
2. Scroll to the bottom of the **Properties** page I/O Points tab, and then click Import.
3. Browse to the file you want to import.
4 Click **Continue**. A side-by-side comparison of existing data and the new import data will appear. Red text indicates one of the following errors:

- **Duplicate data**—Existing data has duplicate I/O numbers so that import cannot determine its match.
- **I/O type mismatch**—I/O Type in existing data does not match I/O Type in import data.
- **Missing import data**—Existing data has a point that import data does not have.
- **Missing system data**—Import data has a point that existing data does not have.

5 Click **OK** to complete the import. Existing data that does not show an error will be overwritten by the imported data.

### Adjust airflow configuration for VAV or VVT controllers

To enter airflow parameters for a VAV Zone, VVT Zone or VVT Bypass controller, right-click on the controller in the navigation tree and select **Airflow Config** in the menu.

For more information, see the following microblock details.

- **VAV Zone - Airflow Control** (page 94)
- **VVT Zone - PD Airflow Control** (page 105)
- **VVT Bypass - BACnet Bypass Control** (page 112)
Graphics pages

Field Assistant can upload and display multiple graphics (.views) that were downloaded to a controller. But Field Assistant can download only a single .view to the controller. If you edit one of the .views and download to the controller, you will only download the edited .view. Information for the other .views will be removed from the controller. You can reattach and redownload those .views from your system.

You can view and adjust your system from Graphics pages.

Some typical controls that may appear on a graphics page are:

- Button or switch to turn equipment on or off
- Input field to set a property value
- Drop-down list to select a state
- Interactive room sensor to override an unoccupied schedule
- Setpoint graph to adjust setpoints
- Trend graph to view trend information
- Link to jump to another Field Assistant page

NOTES

- Right-click a value, then select Details to view and change properties in the microblock pop-up.
- Right-click a value, then select Global Modify to view and change the property in other control programs.

- A yellow dashed line indicated a value that is forced or locked.
- If a graphic does not fit in the action pane, right-click it and select Scale to Fit to make it fit the action pane. Select Scale to Fit again to return the graphic to its original size.

To attach a graphic in the Field Assistant interface

1. On the navigation tree, right-click the item that you want to attach a graphic to, then select Configure.
2. Equipment graphic only: If the system has other control programs of this type, select which control programs you want to change.

   - Change this control program only.
   - Change for all control programs of this type on this network only.
   - Change for all control programs of this type.

NOTES

- If the control program is in an IP router, the second option will change the graphic for all control programs of this type only on the IP network.
- If the control program is on the network below an IP router, the second option will not change the graphic for the router's control programs of this type.
Do one of the following:

If the graphic is...

- **In the Views Available list**
  - a. Select the graphic, then click **Attach**.
  - b. Click **Accept**.
- **Not in the Views Available list**
  - a. Click **Add New**.
  - b. Browse to select the view file.
  - c. Click **Open**.
  - d. Click **Continue**.
  - e. Click **Close**.
  - f. Click **Close** again.

**NOTES**

- Select a graphic in the **Attached** list to edit the following information for the graphic:
  - **Display Name** – The name that appears in the **Graphics** button drop-down list
  - **Category** – The name of the category that multiple graphics may be sorted into in the **Graphics** button drop-down list
    **NOTE** Changes to **Display Name** or **Category** apply only in the Field Assistant interface and are not retained if you export source files.
  - **Reference Name** – The name that is used to create links to the graphic in ViewBuilder
  - **Default View** – Sets the selected graphic as the default view if the tree item has multiple graphics. The default graphic is bolded in the **Attached** list.
    **Included in download** – Equipment graphics only. Select to have the .view file included in an **All Content** download so that it can be uploaded by Field Assistant. The graphic will have a black icon beside it in the **Attached** list. Requires 4.x or later drivers.
  - You can click **Delete Unused** at the bottom of the **Views** section to delete all unattached graphic files from your system.

**To edit a graphic from the Field Assistant application in ViewBuilder**

1. In the Field Assistant interface, double-click the controller in the navigation tree or right-click and select **Configure**.
2. Select appropriate options.
3. Click **Edit Existing** button under **Views**.
4. Click **Save** and place the file in an appropriate folder.
5. Open ViewBuilder.
6. Select **File > Open**. Browse to your saved graphic and click to open.
7. Edit and save with a new name - the original system name is locked and cannot be used for an edited graphic.
   **NOTE** Names are case sensitive and should not have spaces and/or special characters.
## To control equipment using an interactive zone sensor

An equipment graphic may include an interactive zone sensor that provides you with the following control.

<table>
<thead>
<tr>
<th>If the sensor is a...</th>
<th>You can...</th>
</tr>
</thead>
</table>
| ZS                    | • Click ▲ to raise the setpoint or ▼ to lower the setpoint.  
                         • Click 🔄 to override the schedule and put the zone in an occupied state. To cancel an override, continue clicking 🔄 until the display shows 0.  
                         • See that the zone is in an occupied state when the green LED is lit. |
| SPT Standard, Plus, or Pro | • Click the WARMER or COOLER button to adjust the setpoint.  
                                    • Click the MANUAL button to override the schedule and put the zone in an occupied state.  
                                    • Click the INFO button to cycle through the following information:  
                                      • Outside air temperature, if enabled in the control program  
                                      • Override time remaining  
                                      • Heating setpoint  
                                      • Cooling setpoint  
                                      • See the Occupied/Unoccupied state in the display. |
| SPT Pro-Plus | • Click the WARMER or COOLER button to adjust the setpoint.  
                                    • Click the MANUAL button to override the schedule and put the zone in an occupied state.  
                                    • Click the INFO button to cycle through information such as:  
                                      • Outside air temperature  
                                      • Override time remaining  
                                      • Heating setpoint  
                                      • Cooling setpoint  
                                      • Click the FAN button to adjust the fan speed.  
                                      • Click the MODE button to perform customer-specific functions.  
                                      • See the Occupied/Unoccupied state in the display. |
Copying properties from one controller to another

You can copy a control program’s properties to other controllers that use the same control program. You do not have to be physically connected to the controller that you are copying from. But, to download copied properties to a controller, you must be connected to it or to the network that the controller resides on.

1. On the navigation tree, right-click the controller that has the properties you want to copy, then select Copy Control Program Properties and click OK.

2. In the Global Copy dialog box, check Embedded Trend Graph Settings and All editable properties.

3. Click Search.

4. Do one of the following:
   - Check Skip bad values to copy all values except a bad value (the hardware differs, a property to be copied is undefined, etc.).
   - Uncheck Skip bad values to prevent any values from being copied if a bad value is found.

5. Click Apply Changes, then close the dialog box.

NOTE If a message appears Copy process complete, but some values were not copied, click OK. Field Assistant displays a list of parameters that were not copied.

Properties pages

Properties pages are automatically generated from control programs. Properties pages show the status of a piece of equipment and the points/properties currently stored in it. See Checkout input and output, alarms, trends, and network points (page 43) for details.

Use Properties pages to:
- View the status of a piece of equipment. See Colors and status in the Field Assistant interface (page 16).
- View or change the equipment point/properties currently stored in the controller.
- Commission equipment (page 43)
- Set up Linkage.

Refer to your individual controller’s Installation and Start-up Guide for detailed explanations of the points/properties.
To view or edit properties on a Properties page

1. Select a controller on the navigation tree, click Properties, and then select the appropriate tab.

   **NOTE** You must resolve any condition described in red text at the top of the page before a Properties page can obtain current information from its controller.

2. Click ➤ to show property details.

3. Do one of the following to change a property:
   - Select or clear a checkbox
   - Select an item on a drop-down list
   - Change text in a text field

4. Click Accept.

   **NOTES**
   - Click the bold, underlined point name to open the editable microblock pop-up
   - Right-click a value, then select Details to view and change properties in the microblock pop-up.
   - Right-click a value, then select Global Modify to view and change the property in other control programs.
   - Use Search/Replace on the Network Points tab to replace a term in the point address with another address.
   - For the legend of status colors, see Colors and status in the Field Assistant interface (page 16).
   - A yellow dashed box around a value indicates the value is locked or forced.
Changing properties/points in multiple controllers at the same time

Two Field Assistant features, Global Modify and Global Copy, allow you to view and change points or properties in multiple controllers at the same time.

**TIP** Click to copy a reference path to the clipboard that you can use in ViewBuilder.

### To use Global Modify

Use the Global Modify feature to:

- View a microblock’s full path, control program name.
- View or change a single property in several control programs at one time.
- View errors on Graphics and Properties pages.

1. Browse to any page that displays the property you want to view or change.
2. Do one of the following to access Global Modify.
   - Right-click the property, then select Global Modify.
   - Alt+click the property.
3. Make changes to the Control Program field, if needed.

**NOTES**

- Use wildcards in the Control Program field to broaden the search.
  For example:
  - `vav*` matches `vav`, `vav1`, `vav12345`
  - `vav*z` matches `vav`, `vav1`, `vav12345z`
  - `vav+1*2` matches `vav12`, `vavabcxyz2`
  - `vav??` matches `vav1`, `vav12`, `vavzz`, but does not match `vav`, `vav1`, `vav123`
  - * matches any control program
- Click Show Advanced to view the location and value associated with this property.
4 Select the tree item that you want to search under for every occurrence of that microblock in other control programs.

5 Click **Find All**.

6 Select the properties in the list that you want to change.

7 Do one of the following:
   a) Type a **New Value** a to the right of each selected item.
   b) Select **Enable All**, type a new value in b, then click **Set All To**.
c) Select **Enable All**, type a new value in **c**, then click **Change All By**.

To modify several properties in multiple control programs at the same time, use **Global Copy**.

**To use Global Copy**

Use **Global Copy** to copy any or all of the following from one control program to other equipment using the same control program:

- Embedded trend graph settings
- Custom trend graphs
- Custom reports
- Other editable properties to other pieces of equipment using the same control program.

1. On the navigation tree, right-click the piece of equipment that has the properties you want to copy, then select **Copy Control Program Properties**.
2. Click **OK** when you see **This will copy this control programs properties to other control programs of the same type. Continue?**. This opens the next screen and does not lock in any changes.
3. In the **Global Copy** dialog box, select the items that you want to copy.
4. Select the area on the tree containing similar control programs that you may want to copy these properties to, then click **Search**.
   All instances at that level and below are listed in the expanded lower window.
5. Check or uncheck items as needed.
6. Do one of the following:
   - Check **Skip bad values** to copy all values except a bad value (it cannot be copied because you do not have the necessary privilege, the property to be copied is undefined, etc.).
   - Uncheck this field to prevent any values from being copied if a bad value is found.
7. Click **Apply Changes**, then close the **Global Copy** dialog box.
Logic pages

The Logic page shows a custom control program for a programmable controller. The live data (yellow text) is updated every few seconds and when you click the Logic button. The control program uses exact property values for its calculations, but values are rounded to 2 decimal places when displayed on the Logic page.

💡 TIP Click anywhere on the Logic page, then use your keyboard's Page Up, Page Down, and arrow keys to scroll through the page.

NOTE If you find an unexpected value on a Properties page or a Logic page, you can use the Logic page to troubleshoot.

To view a Logic page

1. Select a custom control program on the navigation tree.
2. Click Logic.
3. Click a microblock to view its details.

To locate a microblock, section, or label

1. Right-click the Logic page, then select Jump To.
2. Do one of the following:
   - On the Microblock or Section tab, select an item to have it located and highlighted.
   - On the Label tab, select a label to display a reduced logic page outlined in yellow that shows all instances of the label. A red box indicates an output label; a yellow box indicates an input label. Click a red or yellow box to jump to that label in the full-size logic page.

NOTE You can also click a label on the full-size logic page to display the reduced logic page.

To change properties, alarms, or trends

1. Click a microblock on the equipment’s Logic page.
2. In the microblock pop-up, click the Properties, Alarms, or Trends button.
3. Change properties, alarms, or trends for that microblock in the same way that you would make changes on a regular Properties (page 54), Alarms (page 69), or Trends (page 65) page.
4. Click Accept.

NOTE Right-click a value, then select Global Modify to view and change the property in other control programs.
### Using a Logic page to troubleshoot

The Field Assistant application monitors your system and provides feedback. If you get unexpected feedback, you can use a Logic page as a troubleshooting tool. On the Logic page, work your way backward (right to left) through the sequence in the control program to discover what caused the problem. See Microblock Reference (page 1) to understand what each microblock in the sequence is doing.

<table>
<thead>
<tr>
<th>Unexpected feedback</th>
<th>Possible cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space temperature reads excessively high or low</td>
<td>• The sensor has a short (or open) circuit. Verify wires are properly connected at the sensor and controller.</td>
</tr>
<tr>
<td></td>
<td>• A sensor is missing or configured incorrectly. Open the sensor or input microblock from the Logic page to verify its configuration.</td>
</tr>
<tr>
<td>Equipment displays an unexpected color - effective setpoints are different than the programmed setpoints</td>
<td><strong>NOTE</strong> Equipment operates using effective setpoints. Open the Setpoint microblock from the Logic page and check the following:</td>
</tr>
<tr>
<td></td>
<td>• Hysteresis</td>
</tr>
<tr>
<td></td>
<td>• Demand Level</td>
</tr>
<tr>
<td></td>
<td>• Optimal Start</td>
</tr>
<tr>
<td></td>
<td>• Timed Local Override (TLO)</td>
</tr>
<tr>
<td></td>
<td>• Setpoint Adjust</td>
</tr>
<tr>
<td>Gaps in trend data on trend graph</td>
<td>Usually gaps result if network communication was disrupted or a point was temporarily disabled.</td>
</tr>
<tr>
<td></td>
<td>If the gap is not the result of interrupted communication, send reports more frequently. From the Logic page, open the trend microblock that displayed the gap in data, then decrease the notification threshold so that it is approximately 40% of the buffer size (allocated memory size) for that microblock.</td>
</tr>
<tr>
<td>The Field Assistant application is not receiving alarms from a BACnet alarm microblock</td>
<td>Locate the microblock on the Logic page. If the color square on the microblock is black, the alarm is disabled. To enable it:</td>
</tr>
<tr>
<td></td>
<td>1 Click the microblock.</td>
</tr>
<tr>
<td></td>
<td>2 In the microblock pop-up, click the Alarms button.</td>
</tr>
<tr>
<td></td>
<td>3 On the Enable/Disable tab, select Potential alarm source.</td>
</tr>
<tr>
<td>The equipment is on when I expect it to be off, or off when I expect it to be on</td>
<td>Use the Logic page to determine whether the program is sending an unexpected signal and why, or if the problem is with the physical equipment. For example, the On-Off-Auto (OOA) switch on the controller for that equipment may be locked in the On (Hand) position.</td>
</tr>
<tr>
<td>Sensor value on the Properties page does not match the reading from handheld sensor</td>
<td>Calibrate the sensor.</td>
</tr>
<tr>
<td></td>
<td>On the Logic page, check to see if the output point is locked on.</td>
</tr>
</tbody>
</table>
To lock a BACnet point of value

You can lock certain editable parameters to a specified setting from the Properties page or microblock popup.

1. Select the Lock checkbox.
2. Type the value you want to send to the controller.
3. Click Accept.

**NOTE** Locked values are indicated by a dashed yellow line on graphics.

On Properties page > Control Program tab, click to locate the point you wish to lock.

On the microblock popup:

1. Click on the underlined Name or Reference Name of the point on any of the Properties tabs to open the microblock popup.
2. Click Properties page > Details tab to lock a value.
Creating and modifying a Field Assistant schedule

Using schedules, your equipment can maintain one set of setpoints during occupied periods to provide comfort, and it can maintain a different set of setpoints during unoccupied periods to reduce energy consumption. Schedules are the most effective cost-saving strategy.

**NOTE** Do not include preheating or precooling time in your schedules. *Optimal Start* (page 39), another cost-saving strategy, automatically calculates and controls precise preheating and precooling routines.

⚠️ **CAUTION** Schedules are managed in the i-Vu® application and will override any that you set in Field Assistant. You must use the i-Vu® application to set up Holiday schedules. You can use Field Assistant to set up temporary schedules.

### To view schedules

1. Select a controller on the navigation tree.
2. Click **Schedules** page > **View** tab.
3. Optional: Click an **Effective** bar to view all the schedules that contribute to the resulting schedule.

   **NOTE** When multiple schedules affect a controller, Field Assistant sorts the schedules by priority—the higher the priority, the closer the schedule is to the **Effective** bar. You set a schedule's priority when you add a schedule.

### To apply a schedule to a controller

Schedules in Field Assistant are typically based on zone occupancy.

1. On the navigation tree, select the controller you want to schedule.
2. Click the **Schedules** page > **Configure** tab.
3. Click **Add**.
4. Select a **Priority**. A schedule's priority determines whether affected zones will use occupied or unoccupied setpoints.

<table>
<thead>
<tr>
<th>Select...</th>
<th>For...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly</td>
<td>A typical occupied period</td>
</tr>
<tr>
<td>Exception</td>
<td>An unoccupied period that overrides a Weekly schedule</td>
</tr>
</tbody>
</table>

   **NOTE** This functions the same as a Holiday schedule.

5. Select a **Type**. See table below.
6. Enter desired values in the fields below **Description** (50 characters maximum).
7 On the graph, change a time segment’s **Start** and **End** times by doing one of the following:
   - Click the segment, then type the times in the **Start** and **End** fields.
   - Click and drag either end of the segment or the entire segment.
8 Optional: Click **Add Time Period** to add one or more segments to the schedule. Or, select a segment and click **Delete Time Period** to delete that segment.
9 Click **Accept**.

<table>
<thead>
<tr>
<th>Type</th>
<th>Schedule runs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly</td>
<td>Every week on the specified days</td>
</tr>
<tr>
<td>Date</td>
<td>On a single, specified date</td>
</tr>
<tr>
<td>Date Range</td>
<td>Between two specified dates</td>
</tr>
<tr>
<td>Date List</td>
<td>On multiple, specified dates</td>
</tr>
<tr>
<td>Wildcard</td>
<td>According to a repeating pattern (For example, the second Tuesday of every month)</td>
</tr>
<tr>
<td>Continuous</td>
<td>Continuously between specified times on two separate dates</td>
</tr>
<tr>
<td>Dated Weekly</td>
<td>Weekly between a start date and an end date (For example, the summer break in the school year)</td>
</tr>
</tbody>
</table>

**To edit or delete a schedule**
1 Select the controller whose schedule was defined.
2 Click **Schedules** page > **Configure** tab.
3 Select the schedule you want to edit or delete.
4 Edit the fields you want to change or click **Delete**.
5 Click **Accept**.
Trends

Field Assistant can read and store equipment status values over a limited time and then displays this information in a trend graph to help you monitor the equipment’s operation.

You can collect trend data for any point value in the Field Assistant system. The controller reads point values at intervals that you define and then stores that data in the controller. A controller has limited memory for storing trend data.

After you set up the desired points for trend data collection (page 65), you can:

- View built-in trend graphs that show a single point (page 65)
- Create custom trend graphs with multiple points (page 66)
To collect trend data for a point

Before you can look at a trend graph for a point, you must enable trending for that point and then tell Field Assistant how you want the equipment to collect the point’s data.

1 On the navigation tree, select the controller that has the point you want to trend.
2 Click the Trends button drop-down arrow, select Disabled Points, then select the point.
3 Click the Enable/Disable tab, then check Enable Trend Log.
4 Enter information in the appropriate fields. See table below.
5 Click OK.

TIP You can set up all trends for a piece of equipment at once on the Trend Sources tab of the equipment’s Properties page.

<table>
<thead>
<tr>
<th>Field</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample every <em>:</em>:_ (hh:mm)</td>
<td>This method records (samples) the point’s value at the time interval you define in this field.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE</strong> Be sure to set trend intervals to one minute or greater.</td>
</tr>
<tr>
<td>Sample on COV (change of value)</td>
<td>This method records the point’s value only when the value changes by at least the amount you enter in the COV Increment field.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE</strong> Use this method for a binary point or for an analog point that has infrequent changes in value.</td>
</tr>
<tr>
<td>BACnet Configuration</td>
<td>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.</td>
</tr>
</tbody>
</table>

Viewing a built-in, single-point trend graph

1 On the navigation tree, select the equipment whose trend you want to view.
2 Click the Trends button drop-down arrow, select Enabled Points, and then select the graph you want to view.
3 Select the View tab. See Using trend graphs (page 68).

**NOTE** On the Configure tab, you can:
- Enable/disable the grid.
- Set the time range for the X axis. For example, enter 7 days to see the data for the last week.
- Turn off autoscaling so that you can define a range for the Y-axis
- Type a Y-axis label that will appear on the right side of the graph.
Creating a custom trend graph

When creating a custom trend graph, you can select up to 16 points. If you select more than 4 points or points with different units, the Field Assistant application splits the data into subgraphs. Each subgraph can show a maximum of 4 points with similar units.

NOTE You must enable trending for points that you want to include in the custom trend graph. See To collect trend data for a point (page 65).

To create a custom trend graph

1 On the navigation tree, select the area or equipment where you want to see the graph.
2 Click the Trends button drop-down arrow, then select New Trend Graph.
   NOTE If the Trends button does not have a drop-down arrow, the New Trend Graph page is already displayed.
3 In the tree on the New Trend Graph page, use Ctrl+click or Shift+click to select the points (16 maximum) that you want to see on a graph.
   NOTE The tree shows only points that have trending enabled. See To collect trend data for a point (page 65).
4 Click Save.
5 Type a Name for the graph that will appear at the top of the graph and in the Trends button drop-down list.
6 Click OK.
7 Select:
   ○ The View tab to see the custom trend graph. See Using trend graphs (page 68).
   ○ The Configure tab to edit the trend graph. See To edit a custom trend graph (page 67).
To edit a custom trend graph

1. On the navigation tree, select the area or equipment where you created the graph.

2. Select the Trends > Configure tab. On this page, you can:
   - Change the name of the custom trend graph
   - Enable/disable the grid
   - Set the time range for the X axis
   - Edit a subgraph's Y-axis label that will appear on the right side of the graph
   - Turn off autoscaling so that you can define a range for the Y-axis
   - Add/delete subgraphs (see instructions below)
   - Add/delete points (see instructions below)
   - Change a point's name on the graph
   - Change a binary point's active/inactive text on the graph
   - Click Delete Trend Graph to delete the entire custom trend graph

To add a subgraph to a custom trend graph

1. Click Add below the Subgraphs list.
2. Type a Y-axis label.
3. Click Add below the Points list.
4. Select a point in the Data source tree.
   - NOTE The tree shows only points that have trending enabled. See To collect trend data for a point (page 65).
5. Repeat steps 3 and 4 to add up to 4 points to the subgraph.
6. Click Accept.
   - NOTE To delete a subgraph, select it in the Subgraphs list, click Delete below the list, and then click Accept.

To add a point to a subgraph

1. Select the subgraph in the Subgraphs list.
2. Click Add below the Points list.
3. Select a point from the Data source tree.
   - NOTE The tree shows only points that have trending enabled. See To collect trend data for a point (page 65).
4. Click Accept.
   - NOTE To delete a point, select the appropriate subgraph, select the point, click Delete below the Points list, and then click Accept.
Using trend graphs

NOTES

• A gray triangle at the top of a graph indicates a note from the system. Hover your cursor on the triangle to see which of the following occurred:
  ○ Equipment received a time synchronization from its network router or from the Field Assistant application.
  ○ Trend Historian has been enabled or disabled.
  ○ Trend Log has been enabled or disabled.
  ○ The trend object ID of a third-party trend source has been changed. For information only, you do not need to do anything.

• Click at the top of the Field Assistant page to print the graph. You may need to set your printer's orientation to Landscape.

• Toolbar options are also accessible by right-clicking a trend graph.

• You can check Display gap in graph line for missing data on an individual trend graph page.
To view trend data in a spreadsheet program

You can save trend data as csv data that you can open in a spreadsheet program such as Microsoft® Excel®.

1. On the Trends > View tab, select > Save as CSV data.
2. Save the data (.zip file) wherever you want. The .zip file contains the following:
   - A .csv file for each trend source (point). The filenames match the point names.
   - A Combined folder containing a file with the combined data for all of the graph's trend sources.
3. Open the .csv file in a spreadsheet program.

NOTES
- You will need to convert the data in the spreadsheet's Time column to a readable date/time format.
- If you use Microsoft® Excel® on a Mac and the converted date shows the wrong year, do the following:
  1. In Excel, go to File > Options > Advanced.
  2. Scroll down to the section When calculating this workbook, and then uncheck Use 1904 date system.

To set up, edit, or disable a single alarm source

1. On the navigation tree, select the alarm source.
2. Select the Properties page and click on the specific point to open the microblock popup.
3. Click the Alarms tab in the popup.
4. Make changes to the fields as needed. See table below. The fields can vary for different types of alarm sources.
5. Click Accept or Apply.

💡 TIP To set up all the alarms for a piece of equipment at once, click Properties, then select Alarm Sources.

<table>
<thead>
<tr>
<th>Field</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential alarm source</td>
<td>Select the checkbox to enable the alarm source to generate alarms. Clear the checkbox to disable the alarm source.</td>
</tr>
<tr>
<td>Alarm</td>
<td>Select to have the alarm source generate an alarm when the specified conditions occur.</td>
</tr>
<tr>
<td></td>
<td>• For a binary input, enter the conditions for generating an alarm.</td>
</tr>
<tr>
<td></td>
<td>• For an analog input, type the low and high limits that, when exceeded, will generate an alarm.</td>
</tr>
<tr>
<td>Deadband</td>
<td>The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated.</td>
</tr>
<tr>
<td>NOTE</td>
<td>If the Status checkbox is selected, the alarm condition currently exists.</td>
</tr>
<tr>
<td>Return to Normal</td>
<td>Select to have the alarm source generate a return-to-normal when the alarm condition returns to a normal state.</td>
</tr>
</tbody>
</table>
### Field Notes

<table>
<thead>
<tr>
<th>Field</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Fault                         | Select to have an alarm generated if the alarm source is not configured correctly.  
**NOTE** If the Status checkbox is selected, the alarm source is currently misconfigured. |
| Alarm requires acknowledgement | Select to have Field Assistant require that an operator acknowledge the alarm. |
| Return requires acknowledgement| Select to have Field Assistant require that an operator acknowledge the return-to-normal. |
| Classified as Critical         | This property determines the color of the system-wide alarm button when the alarm comes in.  
![Critical](image) = Critical  
![Non-critical](image) = Non-critical |
| Event State                   | The current state of the alarm source can be:  
- Normal—value is normal  
- Off normal—the value is not normal (binary only)  
- Fault—the alarm source microblock may be misconfigured  
- High Limit—the value exceeds the normal range (analog only)  
- Low Limit—the value is below the normal range (analog only) |
| BACnet Configuration:         | N/A                                                                  |
| Dial on alarm                 |                                                                      |
| Notification Class            | Do not change this field.                                           |

### Reports

Use Field Assistant reports to monitor and troubleshoot your system. See the table below for a list of all reports.

The Reports button drop-list varies depending on your navigation tree location and your connection.

This pre-configured report... allows you to...  
**Alarms**  
Alarm Sources Create a summary of potential alarm sources (page 69).
### Using schedules, trends, and reports

**This pre-configured report...** allows you to...

#### Commissioning

| Test & Balance | View the damper calibration parameters. |

#### Equipment

| Locked Values | Find all locked points and locked values. |

| Network IO | Verify the programming and status of all network points—especially useful for commissioning controllers used for third-party integration. |

| Point List | View the details of all points. Verify that all points have been checked out during commissioning. Also, create custom lists for other contractors. For example, create a list of BACnet IDs or Web services links. |

#### Network

| Controller Status | Discover network communication problems (shown as purple squares on the report) that need troubleshooting. The report also shows boot and driver version, download information, and if controller has 4.x or later driver, the report shows the serial number and Local Access port status. |

| Equipment Status | Display the thermographic color, status, and prime variable of each control program. |

### To run a report

1. Select an item on the navigation tree.

   **NOTE** A report shows data for the selected tree item and all its children.

2. Click the **Reports** button drop-down arrow, then select a report.

3. On the **Options** tab, define the layout and content of the report.

   **NOTES**
   - Changing the size and orientation of the printed page also changes the report layout on the **View** tab.
   - To create a CSV (Comma Separated Values) file after you run the report, select **Support CSV text format**. See To create a **PDF, Excel spreadsheet, or CSV file** (page 72).
   - The current operator's report options are saved so that when that operator logs in again, the same options are used.

4. Click **Run**.

5. Click **PDF** if you want to print the report.
Using schedules, trends, and reports

To create a PDF, XLS, or CSV file

PREREQUISITE FOR CSV You must enable Support CSV text format on the Reports > Options tab before you run the report.

1 Run a report.
2 Click PDF, XLS, or CSV.
3 For XLS or CSV, click Open to view the file or Save to save it.
System Management

Although the Field Assistant application is a reliable front-end, you must perform periodic backups of the Field Assistant database to ensure a quick recovery in case of failure. To make sure that your controllers have the latest version of software you must install periodic library upgrades. The sections below describe how to backup and restore the Field Assistant database and how to install the library updates.

To update Field Assistant

1. Go to the Field Assistant Launcher screen.
2. Click Help and select Update.
4. Check under Notes for any pertinent information regarding the patch.
5. Click Apply and Restart Now, if necessary.

To update the equipment library

The Field Assistant application is equipped with a complete library. There are occasionally library (.sal file) updates, which contain the following files:

- graphic (.view)
- control program (.equipment)
- driver (.driver)
- BACview (.bacview)
- Touchscreen (.touch)

Notes:

- Get the latest updates from your Carrier representative.
- The library update only changes default graphics. If you have edited your graphic in ViewBuilder, it is not updated.
- Keep copies of the latest libraries in a safe place. In the event of a system restore, any updated .sal files must be reapplied.
- The last digits in the sal library name are the release date of the library.

Step 1: Upload new library to Field Assistant

1. Obtain the updated library (.sal file) from Carrier Control Systems Support.
2. Save the file to your computer in the \Vu_Tools_x.x > sals folder.
3. Start your system in Field Assistant.
Follow these steps to implement the new equipment library:

**Step 2: Update the files for the routers**

1. Select the router that you wish to update in the navigation tree.
2. Right-click and select **Driver Properties**.
3. Select **Properties** page > **Update** tab.
4. If the database contains 2 or more routers, you must check **Change for all control programs of this type** in the **Controller** section.
5. Click **Update**. A message appears **Changes the driver and screen file to use the current library version. Continue?**
   - **NOTE** If more than one router exists, the additional routers are listed below the **Update** button.
6. Click **OK**.
7. Click **Accept**.

**Step 3: Update the files for the controllers**

1. Double-click the controller in the navigation tree or right-click and select **Configure**.
2. If you have multiple controllers of the same type, enable **Change for all control programs of this type?**.
3. Click **Update** under **Controller**. A message appears **Changes the control program, view, driver and screen file to use the current library version. Continue?**
4. Click **OK**. When the message **Updated to the library version xx.** appears, click **Close**.
5. Repeat steps 1 - 4 for any additional types of controllers.
6. Click **Close** again.

**Step 4: Apply the update to the controllers**

1. Select the router in the navigation tree and then select the **Devices** > **Manage** tab.
2. Select controllers for download.
   - **NOTE** Use **Ctrl+click. Shift+click.** or the **Select All** checkbox to select multiple controllers.
3. Select **All Content** and click **Download**.
Advanced topics

Troubleshooting and communications

Troubleshooting a Local Access connection

Inability to communicate over a Local Access connection may cause the following symptoms:

- Question marks on Field Assistant Properties pages and Graphics pages
- Cannot obtain a Modstat from the connected controller
- Controller Status report displays purple for a connected BACnet/IP controller
- Cannot download to connected controller
- A message says Local Access is disabled or unable to connect
- No controllers found in Field Assistant

<table>
<thead>
<tr>
<th>Possible cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>BACnet/IP network number in Field Assistant does not match the number found in the controller</td>
<td>Change the Field Assistant BACnet/IP network number to match the controller's IP network number.</td>
</tr>
<tr>
<td></td>
<td>1 Select the System or router on the navigation tree to go to the Devices page &gt; Advanced tab.</td>
</tr>
<tr>
<td></td>
<td>2 Type new network number in BACnet/IP network.</td>
</tr>
<tr>
<td></td>
<td>3 Click Accept.</td>
</tr>
<tr>
<td>Selected COM port is in use</td>
<td>Shut down other applications such as PuTTY that may be running and holding the port open.</td>
</tr>
<tr>
<td>Local Access is disabled</td>
<td>Your manufacturer or representative must enable Local Access in the i-Vu® interface.</td>
</tr>
</tbody>
</table>

Troubleshooting BACnet bindings

Every controller has a Device Binding Table that contains all Device IDs that the controller communicates with and the network address of each device. This typically includes the Device ID of the BACnet Alarm Recipient.

If the Field Assistant application is not receiving alarms/trends or if the a point's value is incorrect, you can view this table to see where the controller is looking for its data.

1 On the Field Assistant navigation tree, select the router that has incorrect or missing data.
2 On the Properties page, click Show Bindings.
To change controller time settings using Field Assistant

To assign a controller as the Time Broadcaster

On a small, stand-alone network of controllers, the time in the controllers is synchronized with the controller that you select as the Time Broadcaster.

1. On the navigation tree, select the System.
2. On the Devices page > Manage tab, click the Time Settings link.
3. Select the router or controller from the Time Broadcaster drop-down list.
4. A message appears for you to adjust the time intervals between broadcasts.
5. Click Accept.

To adjust the Daylight Saving Time schedule

1. On the navigation tree, select the System.
2. On the Devices page > Manage tab, click the Daylight Saving link.
3. On the Daylight Saving tab, make changes as needed.
   NOTE: Click Update to automatically set the table's Begin and End dates for the next 10 years based on the system's timezone. This marks all controllers for a Parameters download.
4. Click Accept.
5. Click OK.

If the updated dates are incorrect

If you clicked Update but the dates are incorrect, your system's Java timezone data may be out-of-date. Do the following:
2. Download the JDK DST Timezone Update Tool (tzupdate.zip).
3. In Field Assistant, go to the Devices page > Manage tab, click the Time Settings link.
4. On the Daylight Saving tab, click Import.
5. Browse to the tzupdate.zip file, select it, then click Open.
6. Click Continue.
7. Restart your system from the Field Assistant Launcher.
8. On the Daylight Saving tab, click Update.

Manual commands

To run a manual command in Field Assistant:

1. Press Ctrl+m to open the dialog box.
2. Type the manual command in the dialog box, then click OK.
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bacnet showindex</td>
<td>Displays all files (file name, size, date) downloaded to the selected controller.</td>
</tr>
<tr>
<td><strong>bbmd commands:</strong></td>
<td></td>
</tr>
<tr>
<td>bbmd read &lt;IP address&gt;</td>
<td>Reads the BBMD table of the controller at the given IP address. For example, to display the BBMD table in the BACnet device router at IP address 154.16.12.101, type:</td>
</tr>
</tbody>
</table>
| bbmd update <network number> | Selects BBMDs on the specified network and marks them for download. If no network is entered at the end of the command, all networks in the system are scanned.  
For example, if the network number is 888, type:                                                 |
| bbmd view <network number> | Views the list of BBMDs that have been selected for the network number at the end of the command. Assumes the update has been run.  
For example:                                                                                     |
| bbmd write <table file> <IP address> | Writes the BBMD table into the controller at the given IP address. See To set up BBMDs through the Field Assistant interface.  
For example, to write the BBMD table in dallasbbmd.bdt into the BACnet device router at IP address 154.16.12.101, type: |
<p>| bbmd clear &lt;IP address&gt; | Clears the BBMD for the specified controller. For example:                                                                                    |
| bbmd dump &lt;network&gt; &lt;file&gt; | Writes to a file the BBMD from the specified controller. For example:                                                                          |
| checkurls               | 1. Finds all network point exp: expressions for the selected item on the navigation tree.                                               |
|                         | 2. Converts the exp: expressions to bacnet:// equivalent expressions that the controllers use.                                              |
|                         | 3. Compares the equivalent bacnet:// expressions to the bacnet:// expressions currently downloaded in the controllers.                     |
|                         | 4. Displays any mismatches.                                                                                                                   |
| checkurls -p            | Does the same as checkurls, then adds any mismatches to the download queue as parameter downloads.                                            |
| checkurls -v            | Does the same as checkurls, but displays the exp: and bacnet:// expressions for all network points that were checked.                            |
| commstat                | Gives a complete set of diagnostic information for all defined connections as well as information regarding all modems in the system.        |
| copy                    | Displays a global copy utility that allows you to selectively copy trend graphs, custom reports and all editable properties from the selected equipment to other equipment in the system with the same control program. See To use Global Copy (page 58). |</p>
<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>download commands:</strong></td>
<td>Each of these commands performs an immediate download to a controller for the selected control program, device, or driver.</td>
</tr>
<tr>
<td>download m</td>
<td>Downloads all content, including parameters, schedules, and BBMDs (if applicable).</td>
</tr>
<tr>
<td>download p</td>
<td>Downloads parameters only.</td>
</tr>
<tr>
<td>download s</td>
<td>Downloads schedules only.</td>
</tr>
<tr>
<td><strong>go commands:</strong></td>
<td></td>
</tr>
<tr>
<td>go &lt;refname or path&gt;</td>
<td>Goes to the point in the system that is referenced.</td>
</tr>
<tr>
<td>For example:</td>
<td></td>
</tr>
<tr>
<td>go #oa_conditions</td>
<td></td>
</tr>
<tr>
<td>or go vav_1/m28</td>
<td></td>
</tr>
<tr>
<td>go ~network</td>
<td>Takes you to the network the selected object’s controller is associated to.</td>
</tr>
<tr>
<td>go -logicpopup &lt;refname&gt;</td>
<td>Goes to the microblock pop-up for the microblock that is referenced. You must run this command from the microblock’s equipment on the navigation tree.</td>
</tr>
<tr>
<td>For example:</td>
<td></td>
</tr>
<tr>
<td>go -logicpopup rs</td>
<td></td>
</tr>
<tr>
<td>go &lt;device ID&gt;/&lt;object ID&gt;</td>
<td>Goes to a device and object on the navigation tree.</td>
</tr>
<tr>
<td>For example:</td>
<td></td>
</tr>
<tr>
<td>go 300550/AI:3</td>
<td></td>
</tr>
<tr>
<td>go &lt;object ID&gt;</td>
<td>Goes to an object for the current device on the navigation tree.</td>
</tr>
<tr>
<td>For example, if a module alarm reports a control program Locked I/O Alarm and references an error in program 11, click the link to go to the device, then go to the object by typing:</td>
<td></td>
</tr>
<tr>
<td>go PRG:11</td>
<td></td>
</tr>
<tr>
<td>localhost</td>
<td>Shows the IP address of the Field Assistant web server</td>
</tr>
<tr>
<td><strong>markdown download commands:</strong></td>
<td>These commands place the controller for the selected tree item on the list to download at a later time. The download list can be viewed at the System level on the Downloads page.</td>
</tr>
<tr>
<td>markdown</td>
<td>Marks for an All Content download, that includes parameters, schedules, and BBMDs (if applicable).</td>
</tr>
<tr>
<td>markdown p</td>
<td>Marks for a Parameters download.</td>
</tr>
<tr>
<td>markdown s</td>
<td>Marks for a Schedules download.</td>
</tr>
<tr>
<td>memory</td>
<td>Shows the amount of server memory allocated for the Field Assistant application and the amount being used.</td>
</tr>
<tr>
<td>memory -free</td>
<td>Releases unused server memory, then shows the Field Assistant memory usage before and after the release.</td>
</tr>
<tr>
<td><strong>modstat commands:</strong></td>
<td>These commands display a Modstat (page 82) report.</td>
</tr>
<tr>
<td>NOTE</td>
<td>It is not necessary to download a controller before running a Modstat on it. Binding takes place when you run the modstat.</td>
</tr>
<tr>
<td>Command</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>modstat</td>
<td>Displays status of the controller at the current location, including:</td>
</tr>
<tr>
<td></td>
<td>• Hardware components of the device</td>
</tr>
<tr>
<td></td>
<td>• Software components of the device</td>
</tr>
<tr>
<td></td>
<td>• Error conditions that may exist in the device</td>
</tr>
<tr>
<td></td>
<td>• Date and time the device is using</td>
</tr>
<tr>
<td>modstat 8:&lt;device instance number&gt;</td>
<td>Displays status for a specific controller in the IP network using the controller’s ID. Your location in the system does not have to be the controller you are querying.</td>
</tr>
<tr>
<td></td>
<td>For example:</td>
</tr>
<tr>
<td></td>
<td>modstat 8:489202</td>
</tr>
<tr>
<td>modstat mac:&lt;network number&gt;,&lt;media type&gt;:&lt;mac address&gt;</td>
<td>Displays a Modstat for a specific controller in the system using the controller’s MAC address. Network number is the number of the network this controller is on; media type is the type of network the controller is on; MAC address can be either the controller address or the IP address and depends on the controller’s media type. Media types allowed are:</td>
</tr>
<tr>
<td></td>
<td>• b acnet/ip or b</td>
</tr>
<tr>
<td></td>
<td>• ms/tp or m</td>
</tr>
<tr>
<td></td>
<td>• ethernet or e</td>
</tr>
<tr>
<td></td>
<td>For example:</td>
</tr>
<tr>
<td></td>
<td>modstat mac:48161,arcnet:2 or modstat mac:888,bacnet/ip: 172.16.101.119</td>
</tr>
<tr>
<td>paramupload</td>
<td>Uploads parameters (editable properties) to the Field Assistant application from the equipment or driver at the current location and below. If you want to upload editable properties for all equipment under a particular router, navigate to the router or the network on the navigation tree.</td>
</tr>
<tr>
<td>ping</td>
<td>Ping to verify communication between IP devices. You cannot ping devices on non-IP networks. To run this command type: ping &lt;hostname&gt; where &lt;hostname&gt; is the IP address or device name.</td>
</tr>
<tr>
<td></td>
<td>For example:</td>
</tr>
<tr>
<td></td>
<td>ping 192.168.168.1 (will ping the IP address 4 times)</td>
</tr>
<tr>
<td>rebuild</td>
<td>Rebuilds a Properties page. Use if you make changes to control program property text in the Snap application.</td>
</tr>
<tr>
<td>reload</td>
<td>Reloads a control program. Use if you make changes to control program in the Snap application. Reloading updates all instances of the control program throughout the system and marks the controller(s) for download. The Field Assistant application determines the type of download based on what changed in the control program.</td>
</tr>
<tr>
<td>restartmodule</td>
<td>Restarts the current controller.</td>
</tr>
<tr>
<td>revert</td>
<td>Resets the selected driver or control program to its default values.</td>
</tr>
<tr>
<td>setdefault</td>
<td>Sets the current page as the default view for the selected action button and the selected tree location.</td>
</tr>
</tbody>
</table>
### Command Description

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>shutdown</td>
<td>Shuts down the Field Assistant Server application. This stops communication between the server and the client, but does not close any open Field Assistant pages.</td>
</tr>
<tr>
<td>storetrends</td>
<td>Uploads trend data from the controller(s) to the database for all equipment at and below the selected item on the navigation tree. This command stores trend data for points that have Trend Historian enabled.</td>
</tr>
</tbody>
</table>
| timesync | Synchronizes the time on all controllers at the current location and below to the time on the server. Run this command only from a location on the navigation tree.  
  **NOTE**: For CNN networks, executing a timesync on a controller sends the timesync to its Gateway, and all the controllers under that Gateway. |

### updatedriver commands:

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>updatedriver</td>
<td>Updates the selected controller to the latest version of its driver.</td>
</tr>
</tbody>
</table>
| whereami | Displays the full path for the current location and gives the display and reference names of the action button, category, instance and tab. If the selected tree location differs from the location shown in the action pane (for example, a point trend page), whereami returns information on both locations.  
  Use this command when you create links in ViewBuilder. |
| zap      | Restarts the current controller.                                                                                                                                                                      |

### Using DEBUG MODE

Debug Mode saves considerable time when troubleshooting custom control programs for programmable controllers. Typical operating mode in the Field Assistant application always downloads full source, which is time-consuming. While operating in Debug Mode, full source is kept in the database and is not downloaded to the controller.

⚠️ **CAUTION** Never leave your Field Assistant system without unchecking DEBUG MODE first and then downloading all content. The source files are not in the controller until you complete both steps.

**To use DEBUG MODE**

1. Select the custom control program in the navigation tree and either double-click it or right-click and select **Configure**.
2. Check **DEBUG MODE**.
3. Download the new or edited control program. See **Add or delete a custom control program** (page 24) and **Change a control program or graphic**.
4. Before logging out or switching to a different controller, select the control program in the navigation tree and either double-click it or right-click and select **Configure**.
5. Uncheck **DEBUG MODE**.
6. Download All Content from the **Downloads** page, **Devices** page > **Manage** tab, or any page that has a **Download** button.
Permissions Keys

When control programs, views, touchscreen, and BACview® files are created by an original equipment manufacturer (OEM), they cannot be used in a Field Assistant system without the creator’s permission. However, the creator can produce a key for a system with a different license that will grant permission to the key’s recipient.

If you receive a key, put it in a convenient location on your computer. You may want to keep it in the `i-Vu_Tools_x.x/resources/keys` folder.

1. In the Field Assistant Launcher, click Help and select Permission Keys from the drop-down menu.

2. To activate a key, click Add, browse to your key file and click Open.

3. To delete a key from your system, select the key in the table, then click Delete.

NOTE Red text in the table indicates the key has a problem such as it does not apply or has expired. See the Notes column for an explanation.
Using a Modstat to troubleshoot your system

A Modstat (Module Status) provides information about a controller and verifies proper network communication with the controller.

To obtain a Modstat

You can get a controller's ModStat in the following places:

- Open controller—in the Field Assistant application
- XT controller—in the Field Assistant application or the controller's Local Access web pages

In the Field Assistant application

Use one of the following methods:

- Right-click a controller on the navigation tree, then select Module Status.
- Select a controller on the navigation tree. On the Properties page, click Module Status.

In the controller's Local Access web pages (XT controller only)

1. Use an Ethernet cable to connect your computer to the controller's Local Access port.
2. Open a web browser on the computer. The Local Access web pages should automatically display showing the Modstat.

   NOTE To use Local Access, your web browser's Home page cannot be set to Google™.

Modstat field descriptions

NOTE Modstats vary for different types of controllers. The list below describes all information that could appear on any Modstat. If a description differs between different generations of controllers, the generation is noted.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date/Time</td>
<td>Date and time the Modstat was run</td>
</tr>
<tr>
<td>CM</td>
<td>The controller's rotary switch address (MAC address)</td>
</tr>
<tr>
<td>Device Instance</td>
<td>A unique ID assigned to the controller</td>
</tr>
<tr>
<td>Driver built</td>
<td>When the driver was built</td>
</tr>
<tr>
<td>Downloaded by</td>
<td>When and where the last download was performed</td>
</tr>
<tr>
<td>Application Software Version</td>
<td>The name of the first control program that is downloaded</td>
</tr>
<tr>
<td>Flash Archive Status</td>
<td>Shows the validity, date, and time of the most recent archive of parameters and status to the controller's permanent flash memory. The archive takes place once a day.</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td># PRGs initialized</td>
<td>The number of control programs that were downloaded vs. the number that are running. If these numbers are not the same, the controller has a problem such as lack of memory.</td>
</tr>
<tr>
<td># PRGs running</td>
<td></td>
</tr>
<tr>
<td>Firmware sections in flash memory</td>
<td>The name, version, and date of the driver</td>
</tr>
<tr>
<td>Reset Counters:</td>
<td>Open controller: The number of times each of the following events have occurred since the last time the controller was formatted. XT controller: The number of times each of the following events have occurred since the last time the controller was commanded to clear the reset counters. See NOTE below this table.</td>
</tr>
<tr>
<td>Power failures</td>
<td>Interruption of incoming power</td>
</tr>
<tr>
<td>Brownouts</td>
<td>Low-level incoming power</td>
</tr>
<tr>
<td>Commanded boots</td>
<td>Includes commands issued from the Field Assistant interface such as the zap manual command, plus commands issued during a memory download.</td>
</tr>
<tr>
<td>System errors</td>
<td>Error in the controller's firmware or hardware</td>
</tr>
<tr>
<td>Watchdog timeouts</td>
<td>Watchdog is firmware that monitors the firmware for normal operation. If watchdog detects a problem, it restarts the firmware.</td>
</tr>
<tr>
<td>S/W Watchdog timeouts</td>
<td>Watchdog is firmware that monitors the application firmware for normal operation. If the watchdog firmware detects a problem, it restarts the application firmware.</td>
</tr>
<tr>
<td>H/W Watchdog timeouts</td>
<td>H/W Watchdog will restart the controller if it detects a severe problem with the controller's operating system</td>
</tr>
<tr>
<td>System status</td>
<td>Gives the current status of the controller's operation.</td>
</tr>
<tr>
<td>Network status</td>
<td>Gives the current status of the controller's networks.</td>
</tr>
<tr>
<td>System error message history</td>
<td>Open controller: High-severity errors since the last memory download or format. Shows the first 5 and last 5 messages. XT controller: High-severity errors since the last memory download. Shows the most recent 5 messages and oldest 5 messages. See NOTE below this table.</td>
</tr>
<tr>
<td>Warning message history</td>
<td>Open controller: Low-severity errors and warning messages since the last memory download or format. Shows the first 5 and last 5 messages. XT controller: Low-severity errors and warning messages since the last memory download. Shows the most recent 5 messages and oldest 5 messages. See NOTE below this table.</td>
</tr>
<tr>
<td>Information message history</td>
<td>Open controller: Information-only messages since the last memory download or format. Shows the first 5 and last 5 messages. XT controller: Information-only messages since the last memory download. Shows the most recent 5 messages and oldest 5 messages. See NOTE below this table.</td>
</tr>
<tr>
<td>Manifest revision</td>
<td>Firmware revision</td>
</tr>
<tr>
<td>Field</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Installed bundles</td>
<td>Components of the firmware</td>
</tr>
<tr>
<td>ARC156 reconfigurations during the last hour</td>
<td>An ARCNET network normally reconfigures itself when a controller is added to or taken off the network. The <em>Total</em> field indicates the number of reconfigurations in the last hour. <em>Initiated by this node</em> indicates the number of reconfigurations caused by this controller, the controller with the next lower rotary switch address, or any controller located between these two controllers. An excessive number in these fields indicates a problem with the network.</td>
</tr>
<tr>
<td>BACnet comm errors in the last 7 days</td>
<td>BACnet communication errors usually indicating dropped packets caused by high traffic on network.</td>
</tr>
<tr>
<td>Core (or Main) and Base board hardware</td>
<td>Gives the following information about the controller's boards:</td>
</tr>
<tr>
<td></td>
<td>• Type and board numbers that are used internally by Carrier.</td>
</tr>
<tr>
<td></td>
<td>• The manufacture date and serial number.</td>
</tr>
<tr>
<td></td>
<td>• Open controller only: The core board's RAM and Flash memory. RAM is used for driver and control program executables. Flash memory is used for firmware and file storage. See Flash storage size below.</td>
</tr>
<tr>
<td>Largest free heap space</td>
<td>Size of the largest piece of unused dynamic memory</td>
</tr>
<tr>
<td>Database size</td>
<td>Open controller: Size of the controller's memory designated for running programs. Database memory is used for control program parameters, status and history; trends, schedules, and alarms; and driver parameters, status and history. XT controller: Size of the controller's memory.</td>
</tr>
<tr>
<td>Flash storage size</td>
<td>The size of the flash memory that is not used by the firmware. This memory is used for file storage and archiving.</td>
</tr>
<tr>
<td>Archive storage size</td>
<td>The amount of flash memory remaining for archival after files are downloaded.</td>
</tr>
<tr>
<td>File storage size</td>
<td>The size of all files (control programs, graphics, driver, etc.) downloaded to the controller. How much information is in these files depends on whether the controller's Download All Content option is selected in Field Assistant.</td>
</tr>
<tr>
<td>Raw physical switches</td>
<td>The readings used to test the DIP or rotary switches</td>
</tr>
<tr>
<td>Network Information</td>
<td>Open controller: The various network addresses for a controller installed on an Ethernet. The <strong>Current</strong> and <strong>Assigned</strong> addresses will be the same unless:</td>
</tr>
<tr>
<td></td>
<td>• The Assigned addresses were changed in PuTTY.</td>
</tr>
<tr>
<td></td>
<td>• The controller's <strong>DHCP/Assigned</strong> DIP switch was moved to the <strong>DHCP</strong> position after the Assigned addresses were defined.</td>
</tr>
<tr>
<td></td>
<td>• The Enable IP configuration changeover on the BACnet Router Properties page is being implemented.</td>
</tr>
<tr>
<td></td>
<td>XT controller: The various network addresses for the controller. The <strong>Current</strong> and <strong>Assigned</strong> addresses will be the same unless the Enable IP configuration changeover on the BACnet Router Properties page is being implemented.</td>
</tr>
<tr>
<td>Route Information</td>
<td>BACNet networks that a router is currently routing traffic to. The list changes as BACNet routers are added or removed from the system.</td>
</tr>
<tr>
<td>Ethernet statistics</td>
<td>Diagnostic counters directly related to the ethernet communications hardware.</td>
</tr>
</tbody>
</table>
NOTE: XT controller only—If you want to clear the Reset counters and the three message history fields, click the Clear Counts/Logs button on the controller's Properties page in the Field Assistant application or in the XT controller's Local Access pages.
## 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.

<table>
<thead>
<tr>
<th>Family</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrier (page 2)</td>
<td>Carrier microblocks allow the Field Assistant application to communicate directly with CCN devices.</td>
</tr>
<tr>
<td>I/O Pts (page 30)</td>
<td>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.</td>
</tr>
<tr>
<td>Network I/O (page 120)</td>
<td>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.</td>
</tr>
<tr>
<td>Display (page 167) &amp; Display2 (page 207)</td>
<td>Display microblocks communicate directly with BACnet® objects, and can be used to integrate BACnet devices into a Field Assistant system. They can be referenced on graphics, allowing any vendor's BACnet equipment to be integrated into the system's interface.</td>
</tr>
<tr>
<td>Sys In (page 222)</td>
<td>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.</td>
</tr>
<tr>
<td>Sys Out (page 251)</td>
<td>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.</td>
</tr>
<tr>
<td>Log (page 267)</td>
<td>Log microblocks record system values, such as trends, alarms, and runtime values.</td>
</tr>
<tr>
<td>Control (page 283)</td>
<td>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.</td>
</tr>
<tr>
<td>Convert (page 321)</td>
<td>Convert microblocks take information from other microblocks, change the data in some way, then output the changed data.</td>
</tr>
<tr>
<td>Limit (page 352)</td>
<td>Limit microblocks test their input values against some limit, then output either the original signal or the limit value.</td>
</tr>
<tr>
<td>Relay (page 361)</td>
<td>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.</td>
</tr>
<tr>
<td>Logic (page 378)</td>
<td>Logic microblocks perform logical operations on their inputs. Often these microblocks determine the conditions that trigger equipment starts, stops, or alarms.</td>
</tr>
<tr>
<td>Math 1 (page 386)</td>
<td>Math 1 microblocks perform simple mathematical operations on their inputs.</td>
</tr>
<tr>
<td>Math 2 (page 399)</td>
<td>Math 2 microblocks perform advanced and trigonometric mathematical operations on their inputs.</td>
</tr>
</tbody>
</table>
Carrier microblocks

The following Carrier microblocks allow the Field Assistant application to communicate directly with CCN devices.

- **Carrier Controller (page 3)**
  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.

- **Carrier Binary Value (page 4)**
  The Carrier Binary Value microblock can monitor and force (restrict) a binary value in a Carrier device.

- **Carrier Analog Value (page 7)**
  The Carrier Analog Value microblock can monitor and force (constrain or restrict) an analog value in a Carrier device.

- **Carrier Binary Point (page 9)**
  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.

- **Carrier Analog Point (page 15)**
  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).

- **BACnet CCN Alarm (page 20)**
  The BACnet CCN Alarm microblock monitors CCN alarms and passes them from the Carrier device to the Field Assistant Alarms page or third-party BACnet front end.

- **Carrier Schedule (page 22)**
  The Carrier Schedule microblock writes a weekly schedule to the CCN Controller.

Miscellaneous microblocks include:
- DO/DI Proof
- Up/Down Counter
- Text
- Version
- Sunrise/Sunset
- OCL (Operator's Control Language)
**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Carrier microblocks (page 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="Carrier.png" alt="Device" /></td>
</tr>
</tbody>
</table>

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

| Name | The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the * character. |
### 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 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.**

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Carrier microblocks (page 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>CBV CBV point name</td>
</tr>
</tbody>
</table>
| 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 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 |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Com Enabled</td>
<td>Check to enable network communications for this microblock. Uncheck when troubleshooting.</td>
</tr>
<tr>
<td>Name</td>
<td>The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the &quot; character.</td>
</tr>
</tbody>
</table>
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 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 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 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 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Carrier microblocks (page 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="CRV CRV point name" /></td>
</tr>
<tr>
<td>What It does</td>
<td>The Carrier Analog Value microblock can monitor and force (constrain or restrict) an analog value in a Carrier device.</td>
</tr>
<tr>
<td></td>
<td>A Carrier Analog Value microblock:</td>
</tr>
<tr>
<td></td>
<td>• Is not visible to the network</td>
</tr>
<tr>
<td></td>
<td>• Does not contain a BACnet object</td>
</tr>
<tr>
<td></td>
<td>• Cannot be an alarm source</td>
</tr>
<tr>
<td></td>
<td>• Cannot be trended</td>
</tr>
<tr>
<td></td>
<td>See the Carrier Analog Point microblock if you need these features.</td>
</tr>
<tr>
<td></td>
<td>This microblock's refresh rate is set in the related Carrier Device microblock.</td>
</tr>
</tbody>
</table>

Properties

TIPS

- **Alt+click** any value in the 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RefName</td>
<td>Limitations:</td>
</tr>
<tr>
<td></td>
<td>• lower case only</td>
</tr>
<tr>
<td></td>
<td>• limited to 40 characters</td>
</tr>
<tr>
<td></td>
<td>• cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td>• must be unique within a control program</td>
</tr>
<tr>
<td>Comm Enabled</td>
<td>Check to enable network communications for this microblock. Uncheck when troubleshooting.</td>
</tr>
</tbody>
</table>
**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, ...

**Name**

The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the " character.

**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 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 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 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 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 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Carrier microblocks (page 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Icon and symbol</strong></td>
<td>CBP CBP point name</td>
</tr>
</tbody>
</table>

**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.
Properties

**TIPS**

- **Alt+click** any value in the 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 |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Com Enabled</td>
<td>Check to enable network communications for this microblock. Uncheck when troubleshooting.</td>
</tr>
<tr>
<td>Writable</td>
<td>Check to allow BACnet commands to write to present value.</td>
</tr>
<tr>
<td>Force Level</td>
<td>The force level being written to (1-15).</td>
</tr>
<tr>
<td>Name</td>
<td>The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the &quot; character.</td>
</tr>
<tr>
<td>Description</td>
<td>(optional) A BACnet-visible microblock description.</td>
</tr>
</tbody>
</table>
**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 Field Assistant interface.

Path format:

```plaintext
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 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 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 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**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Network Visible</strong></td>
<td>Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.</td>
</tr>
</tbody>
</table>
| **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**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Change of State Time</strong></td>
<td>The date and time the most recent change of state occurred.</td>
</tr>
<tr>
<td><strong>Change of State Count</strong></td>
<td>The number of times the point has changed states. Click <strong>Reset</strong> to set <strong>Change of State Count</strong> to 0.</td>
</tr>
<tr>
<td><strong>Time of State Count Reset</strong></td>
<td>The date and time the change of state count was set to zero.</td>
</tr>
<tr>
<td><strong>Elapsed Active Time</strong></td>
<td>The amount of time the point has been in the &quot;on&quot; state. Click <strong>Reset</strong> to set <strong>Elapsed Active Time</strong> to 0.</td>
</tr>
<tr>
<td><strong>Time of Active Time Reset</strong></td>
<td>The date and time the elapsed active time was set to zero.</td>
</tr>
</tbody>
</table>

**Trends**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enable Trend Log</strong></td>
<td>Check to have the controller collect trend data for the microblock's present value.</td>
</tr>
</tbody>
</table>
| **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 a 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 a 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

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 a 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 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 Field Assistant locations because the path is relative to the item that contains the path.

### Return text
The message displayed on the 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 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.

---

**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.

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>CRP, CRP point name</td>
</tr>
</tbody>
</table>

**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).

**Properties**

**TIPS**

- Alt+click any value in the 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.

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<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
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</thead>
<tbody>
<tr>
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<td>lower case only</td>
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<td></td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Com Enabled</th>
<th>Check to enable network communications for this microblock. Uncheck when troubleshooting.</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Writable</th>
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</table>

<table>
<thead>
<tr>
<th>Force Level</th>
<th>The force level being written to (1-15).</th>
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</table>
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
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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, ...

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.

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 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 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 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 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:

\[(100 \times 10 \text{ bytes}) + 48 = 1048 \text{ bytes of memory}\]

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 a 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 a system.

<table>
<thead>
<tr>
<th>Keep historical trends for ___ days</th>
<th>This is based on the date that the sample was read. Set this field to 0 to use the system default value.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write to historian: Every ___ trend samples</td>
<td>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.</td>
</tr>
<tr>
<td>Use default (45% of Max samples)</td>
<td></td>
</tr>
</tbody>
</table>

**In a system only:**

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

### Alarm

<table>
<thead>
<tr>
<th>Potential alarm source</th>
<th>Check to make this microblock available in the system’s Alarm Sources list.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical</td>
<td>Determines the color of the system-wide alarm button when the alarm comes in if the alarm’s <strong>Template</strong> field is set to <strong>Universal</strong>.</td>
</tr>
<tr>
<td>Category</td>
<td>The category you want to use to filter this microblock’s alarms on the system’s Alarms page &gt; View tab.</td>
</tr>
<tr>
<td>Template</td>
<td><strong>Universal</strong> - Allows your system to use the Alarm text and Return text defined in the microblock, and the <strong>Critical</strong> checkbox to determine the color of the system-wide alarm button when the alarm comes in.</td>
</tr>
<tr>
<td><strong>Low Limit Enable</strong></td>
<td>Check to send an alarm when the microblock's present value remains below the <strong>Low Limit</strong> value for the defined <strong>Delay Seconds</strong>.</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Low Limit</strong></td>
<td>The value the microblock's present value must drop below to send an alarm.</td>
</tr>
<tr>
<td><strong>High Limit Enable</strong></td>
<td>Check to send an alarm when the microblock's present value remains above the <strong>High Limit</strong> for the defined <strong>Delay Seconds</strong>.</td>
</tr>
<tr>
<td><strong>High Limit</strong></td>
<td>The value the microblock's present value must rise above to send an alarm.</td>
</tr>
</tbody>
</table>
| **Dead Band**       | The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated. **EXAMPLE**<br>![Graph](image)
| **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 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 Field Assistant locations because the path is relative to the item that contains the path. |
| **Return text**     | The message displayed on the 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 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.
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.

**Microblock family**
Carrier microblocks (page 2)

**Icon and symbol**
![CALARM ALARM active](image)

**What it does**
The BACnet CCN Alarm microblock monitors CCN alarms and passes them from the Carrier device to the 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 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 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 Field Assistant application.

**Properties**

**TIPS**
- **Alt+click** any value in the 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**<br>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 |
| **Network Visible** | Check to make the microblock's output visible to third-party equipment. |
| **Name** | The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the * character. |
| **Description** | **NOTE** To use this field, the device's driver must be equal to or greater than 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* represents the CCN alarm code generated by the CCN equipment. See Carrier's *Controls and Troubleshooting Guide* for specific alarm codes. |
| **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 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 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 |
<table>
<thead>
<tr>
<th><strong>Category</strong></th>
<th>The category you want to use to filter this microblock's alarms on the system's Alarms page &gt; View tab.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Template</strong></td>
<td><strong>Universal</strong> - 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.</td>
</tr>
<tr>
<td><strong>Alarm Enabled?</strong></td>
<td>Check to send a message when this microblock indicates an alarm condition.</td>
</tr>
</tbody>
</table>
| **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 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 Field Assistant locations because the path is relative to the item that contains the path. |
| **Return text** | The message displayed on the 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 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.

<table>
<thead>
<tr>
<th><strong>Microblock family</strong></th>
<th>Carrier microblocks (page 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Icon and symbol</strong></td>
<td>![Microblock Icon]</td>
</tr>
</tbody>
</table>
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 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 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 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 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. |
<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group schedule overrides?</strong></td>
<td>Allows an override from a single controller to override all controllers within its Group number.</td>
</tr>
<tr>
<td><strong>Configuration</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Active Text</strong></td>
<td>The Active Text your system displays when the microblock's output is on, or true.</td>
</tr>
<tr>
<td><strong>Inactive Text</strong></td>
<td>The Inactive Text your system displays when the microblock's output is off, or false.</td>
</tr>
<tr>
<td><strong>Minimum off time</strong></td>
<td>The minimum period (seconds) that the microblock's present value will be off, regardless of the input signal to the microblock.</td>
</tr>
<tr>
<td><strong>Minimum on time</strong></td>
<td>The minimum period (seconds) that the microblock's present value will be on, regardless of the input signal to the microblock.</td>
</tr>
<tr>
<td><strong>Timed override minutes</strong></td>
<td>Minutes the microblock adds to the zone's occupied time for each press of the zone's local override button or switch.</td>
</tr>
<tr>
<td><strong>Second press cancels override</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>CCN Schedule Number</strong></td>
<td>The CCN device must be configured for a schedule number between 1 and 99 inclusive.</td>
</tr>
<tr>
<td><strong>Show scheduling limits:</strong></td>
<td>The default limits for the Occupancy schedule category.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTES</strong></td>
</tr>
<tr>
<td></td>
<td>• A schedule download will fail if you exceed these limits when creating schedules.</td>
</tr>
<tr>
<td></td>
<td>• Changing these properties erases the schedule information in the controller, requiring you to download schedules again.</td>
</tr>
<tr>
<td></td>
<td>• If you use Global Modify to change these limits, the affected devices will not be automatically marked for schedule download.</td>
</tr>
<tr>
<td><strong>Weekly Schedules - Max Transitions Per Day</strong></td>
<td>The number of transitions a weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.</td>
</tr>
<tr>
<td><strong>Max Exception Schedules</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Max Transitions Per Day</strong></td>
<td>The number of transitions a non-weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.</td>
</tr>
<tr>
<td><strong>Property Page Text</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Show Property Page Text</strong></td>
<td>Check to show this microblock's value on the equipment's Properties page.</td>
</tr>
<tr>
<td><strong>Property Page Text</strong></td>
<td>You can edit the microblock description that appears on the Properties page. See &quot;Editing Properties page text using special characters&quot; and &quot;Formatting a microblock property&quot; in Snap Help.</td>
</tr>
<tr>
<td><strong>BACnet Configuration</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Network Visible</strong></td>
<td>Check to allow other BACnet equipment to read or change the microblock's present value.</td>
</tr>
</tbody>
</table>
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 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 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 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 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.

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.

**Microblock family**

*Carrier microblocks (page 2)*

**Icon and symbol**

![Microblock Icon]

**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**

<table>
<thead>
<tr>
<th>OCC</th>
<th>Binary input - indicates whether or not the zone is currently occupied</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZONE</td>
<td>Analog input - current zone temperature</td>
</tr>
<tr>
<td>HT</td>
<td>Analog input - Effective heating setpoint from the linkage provider</td>
</tr>
<tr>
<td>CL</td>
<td>Analog input - Effective cooling setpoint from the linkage provider</td>
</tr>
</tbody>
</table>

**Output**

<table>
<thead>
<tr>
<th>CO</th>
<th>Analog output - preset cooling occupied setpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td>CU</td>
<td>Analog output - preset cooling unoccupied setpoint</td>
</tr>
<tr>
<td>HO</td>
<td>Analog output - preset heating occupied setpoint</td>
</tr>
<tr>
<td>HU</td>
<td>Analog output - preset heating unoccupied setpoint</td>
</tr>
</tbody>
</table>
**Properties**

**TIPS**

- **Alt+click** any value in the 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RefName</strong></td>
<td>Limitations:</td>
</tr>
<tr>
<td></td>
<td>• lower case only</td>
</tr>
<tr>
<td></td>
<td>• limited to 40 characters</td>
</tr>
<tr>
<td></td>
<td>• cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td>• must be unique within a control program</td>
</tr>
</tbody>
</table>

**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**

![Setpoints Diagram](image-url)
### Editing Privilege

**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the 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 Text Display

⚠️ 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Carrier microblocks (page 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="#" alt="CText" /> <img src="#" alt="CText" /></td>
</tr>
</tbody>
</table>

**What it does**

This microblock allows you to place descriptive text on the **Properties** page from a CCN point.

---

### Properties

<table>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
</table>
| 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 interface. You can use any characters (including spaces) in this field, except for the " character. |
**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 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 Field Assistant interface:

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

<table>
<thead>
<tr>
<th>Communications Enabled</th>
<th>Check to enable network communications for this microblock. Uncheck when troubleshooting.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Editing Privilege</strong></td>
<td><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</td>
</tr>
<tr>
<td><strong>CAUTION</strong></td>
<td>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><strong>Show Property Page Text</strong></td>
<td>Check to show this microblock's value on the equipment's Properties page.</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Microblock</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BACnet Analog Input</strong> (page 31)</td>
<td>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).</td>
</tr>
<tr>
<td><strong>BACnet Binary Input</strong> (page 37)</td>
<td>Reads the binary (on or off) value of a physical input on the controller.</td>
</tr>
<tr>
<td><strong>Timed Local Override</strong> (page 42)</td>
<td>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.</td>
</tr>
<tr>
<td><strong>Pulse to Analog Input</strong> (page 48)</td>
<td>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.</td>
</tr>
</tbody>
</table>

Outputs

<table>
<thead>
<tr>
<th>Microblock</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BACnet Analog Output</strong> (page 53)</td>
<td>Sends an analog (continuous) value from the control program to a physical analog output on the controller.</td>
</tr>
<tr>
<td><strong>BACnet Binary Output</strong> (page 59)</td>
<td>Sends a binary (on or off) value from the control program to a physical digital (on or off) output on the controller.</td>
</tr>
<tr>
<td><strong>Floating Motor</strong> (page 63)</td>
<td>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.</td>
</tr>
<tr>
<td><strong>Pulse-Width Output</strong> (page 69)</td>
<td>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.</td>
</tr>
</tbody>
</table>

Zone (Airflow and Sensors)

<table>
<thead>
<tr>
<th>Microblock</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U Line Airflow Control</strong> (page 76)</td>
<td>This microblock cannot be used for Carrier controllers.</td>
</tr>
<tr>
<td><strong>LogiStat Zone Sensor</strong> (page 76)</td>
<td>This microblock cannot be used for Carrier controllers.</td>
</tr>
</tbody>
</table>
RS Zone Sensor (page 76)
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 Zone Sensor with Fan Control (page 84)
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.

Airflow Control (page 94)
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.

BACnet Pressure Dependent Control (page 105)
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 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.

BACnet Bypass Control (page 112)
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 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 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>I/O Point microblocks (page 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="AI icon" /></td>
</tr>
<tr>
<td>What it does</td>
<td>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).</td>
</tr>
</tbody>
</table>
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 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.

\[
y = \frac{25 \text{ gpm}}{\text{mA}} \times 8 \text{ mA} - 80 \text{ gpm} = 120 \text{ gpm}
\]

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:

<table>
<thead>
<tr>
<th>Units</th>
<th>gpm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hardware Configuration</strong></td>
<td></td>
</tr>
<tr>
<td>Expander</td>
<td>4</td>
</tr>
<tr>
<td>Input Number</td>
<td>3</td>
</tr>
<tr>
<td>Input Type</td>
<td>0-20 mA</td>
</tr>
<tr>
<td><strong>Calibration</strong></td>
<td></td>
</tr>
<tr>
<td>Input Resolution</td>
<td>1</td>
</tr>
<tr>
<td>Sensor Type (Scaling Method)</td>
<td>Linear w/ offset, 4-20 mA</td>
</tr>
<tr>
<td>Scaling Range</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>20</td>
</tr>
<tr>
<td>Maximum</td>
<td>420</td>
</tr>
</tbody>
</table>

**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 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>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display Name</strong></td>
<td>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</td>
</tr>
<tr>
<td><strong>Reference Name</strong></td>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations:</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>(optional) A BACnet-visible microblock description.</td>
</tr>
<tr>
<td><strong>Lock Present Value</strong></td>
<td>Check to output the locked value from the microblock instead of the microblock's calculated value.</td>
</tr>
</tbody>
</table>
### Editing Privilege

**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the 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 system.

### Calibration

- **Input Resolution**
  - The increment by which the microblock updates the value on its output wire in a 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**

- **High** = 225
- **Low** = -25

10 = Deadband

- **Alarm is generated**
- **Return-to-Normal is generated**
### Microblock reference

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

### Trends

<table>
<thead>
<tr>
<th><strong>Enable Trend Log</strong></th>
<th>Check to have the controller collect trend data for the microblock's present value.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample every ___ (hh:mm:ss)</strong></td>
<td>Records the microblock's present value at this interval. <strong>EXAMPLE</strong> Type <strong>00:10:00</strong> to record the microblock's present value every 10 minutes.</td>
</tr>
<tr>
<td><strong>Sample on COV (change of value)</strong></td>
<td>Records the microblock’s present value only when the value changes by at least the COV Increment.</td>
</tr>
<tr>
<td><strong>Max samples</strong></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 \times 10 \text{ bytes}) + 48 = 1048 \text{ 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. <strong>NOTE</strong> Click Reset on the Properties page in a system to delete all samples currently stored in the controller.</td>
</tr>
</tbody>
</table>

**NOTE**
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 a 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 a 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.

Microblock family

I/O Point microblocks (page 30)

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.

<table>
<thead>
<tr>
<th>Polarity</th>
<th>Signal</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>on</td>
<td>(true) Active Text</td>
</tr>
<tr>
<td></td>
<td>off</td>
<td>(false) Inactive Text</td>
</tr>
</tbody>
</table>

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:

![Hardware Configuration

Properties

Tips

- Alt+click any value in the 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 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

### 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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expander</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Input Number</strong></td>
<td>The number of the physical input the microblock reads.</td>
</tr>
<tr>
<td><strong>Input Type</strong></td>
<td>The type of equipment wired to the input number that the microblock reads.</td>
</tr>
</tbody>
</table>

#### 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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inactive Text</strong></td>
<td>The <strong>Inactive Text</strong> your system displays when the microblock's output is off, or false.</td>
</tr>
<tr>
<td><strong>Active Text</strong></td>
<td>The <strong>Active Text</strong> your system displays when the microblock's output is on, or true.</td>
</tr>
</tbody>
</table>
| **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. |
Microblock reference

**BACnet Configuration**

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Visible</td>
<td>Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.</td>
</tr>
</tbody>
</table>
| 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**

<table>
<thead>
<tr>
<th>Potential alarm source</th>
<th>Check to make this microblock available in the system's Alarm Sources list.</th>
</tr>
</thead>
</table>
| 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**

<table>
<thead>
<tr>
<th>Alarm Enabled?</th>
<th>Check to send a message when this microblock indicates an alarm condition.</th>
</tr>
</thead>
</table>
| 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 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 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**

<table>
<thead>
<tr>
<th>Return Enabled</th>
<th>Check to send a message when an alarm condition has returned to normal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return text</td>
<td>The message displayed on the Field Assistant Alarms page &gt; View tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
<tr>
<td>Return requires acknowledge</td>
<td>Check to require that an operator acknowledge return-to-normal notifications on the system's Alarms page &gt; View tab.</td>
</tr>
</tbody>
</table>
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:

\[(100 \times 10 \text{ bytes}) + 48 = 1048 \text{ bytes of memory}\]

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 a 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 a 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**
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.

**Use default (45% of Max samples)**

In a 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.

Microblock family | I/O Point microblocks (page 30)

Icon and symbol | 🛒 🛒 point name

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 283) 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.

<table>
<thead>
<tr>
<th>Method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse Input</td>
<td>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 &gt; ___ seconds field.</td>
</tr>
</tbody>
</table>
Fixed Width Input

- Pulse sensed: 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: Input closed = Present Value

**Limitations**

- **Maximum Value** cannot exceed 546 minutes.

**Configuration example**

<table>
<thead>
<tr>
<th>Override Type and Setup</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulse Input</td>
<td></td>
</tr>
<tr>
<td>Each pulse</td>
<td>30 minutes</td>
</tr>
<tr>
<td>Cancel override if input closed</td>
<td>5 seconds</td>
</tr>
<tr>
<td>Mechanical Input</td>
<td></td>
</tr>
<tr>
<td>Input Closed</td>
<td>90 minutes</td>
</tr>
<tr>
<td>Input Open</td>
<td>0:00</td>
</tr>
<tr>
<td>Fixed Width Input</td>
<td></td>
</tr>
<tr>
<td>Each pulse</td>
<td>90 minutes</td>
</tr>
<tr>
<td>No Accumulation</td>
<td></td>
</tr>
<tr>
<td>Maximum Value</td>
<td>90.0 minutes</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1</td>
</tr>
</tbody>
</table>

**Properties**

- **TIPS**
  - Alt+click any value in the 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 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

### 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 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 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 a 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

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Network Visible</strong></td>
<td>Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.</td>
</tr>
<tr>
<td><strong>Object Instance</strong></td>
<td><strong>Auto-assign</strong> - A BACnet Object ID is assigned by the system. <strong>Use specific value</strong> - (0–3999999) Assign a number that is unique within the controller.</td>
</tr>
<tr>
<td><strong>COV Increment</strong></td>
<td>An Analog Network Input (ANI) that references this microblock in its <strong>Address</strong> 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 <strong>COV Increment</strong>. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's <strong>Refresh Time</strong> field.</td>
</tr>
<tr>
<td><strong>Out Of Service Minimum</strong></td>
<td>If a third-party vendor sets the microblock's BACnet <strong>Out_Of_Service</strong> property to True and then he writes a value lower than this value to the microblock's <strong>Present_Value</strong>, the controller returns a <strong>Property, Value_Out_Of_Range</strong> error.</td>
</tr>
<tr>
<td><strong>Show Property Page Text</strong></td>
<td>Check to show this microblock's value on the equipment's <strong>Properties</strong> page.</td>
</tr>
</tbody>
</table>

### Alarms

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Potential alarm source</strong></td>
<td>Check to make this microblock available in the system's Alarm Sources list.</td>
</tr>
<tr>
<td><strong>Critical</strong></td>
<td>Determines the color of the system-wide alarm button when the alarm comes in if the alarm's <strong>Template</strong> field is set to <strong>Universal</strong>.</td>
</tr>
<tr>
<td></td>
<td>⚠️ = Critical  🚨 = Non-critical</td>
</tr>
<tr>
<td><strong>Category</strong></td>
<td>The category you want to use to filter this microblock's alarms on the system's <strong>Alarms</strong> page &gt; <strong>View</strong> tab.</td>
</tr>
<tr>
<td><strong>Template</strong></td>
<td><strong>Universal</strong> - Allows your system to use the <strong>Alarm text</strong> and <strong>Return text</strong> defined in the microblock, and the <strong>Critical</strong> checkbox to determine the color of the system-wide alarm button when the alarm comes in.</td>
</tr>
</tbody>
</table>
## Alarm

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low Limit Enable</strong></td>
<td>Check to send an alarm when the microblock's present value remains below the <strong>Low Limit</strong> value for the defined <strong>Delay Seconds</strong>.</td>
</tr>
<tr>
<td><strong>Low Limit</strong></td>
<td>The value the microblock's present value must drop below to send an alarm.</td>
</tr>
<tr>
<td><strong>High Limit Enable</strong></td>
<td>Check to send an alarm when the microblock's present value remains above the <strong>High Limit</strong> for the defined <strong>Delay Seconds</strong>.</td>
</tr>
<tr>
<td><strong>High Limit</strong></td>
<td>The value the microblock's present value must rise above to send an alarm.</td>
</tr>
<tr>
<td><strong>Dead Band</strong></td>
<td>The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated.</td>
</tr>
</tbody>
</table>

**EXAMPLE**

![Diagram of High and Low Limits with Dead Band](image)

- **High** = 225
- **Low** = -25
- **Dead Band** = 10

- **Alarm is generated**
- **Return-to-Normal is generated**

<table>
<thead>
<tr>
<th><strong>Delay Seconds</strong></th>
<th>The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alarm text</strong></td>
<td>The message displayed on the Field Assistant Alarms page &gt; View tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
<tr>
<td><strong>Alarm requires acknowledge</strong></td>
<td>Check to require that an operator acknowledge alarm notifications on the system's Alarms page &gt; View tab.</td>
</tr>
</tbody>
</table>

## Return to Normal

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Return Enabled</strong></td>
<td>Check to send a message when an alarm condition has returned to normal.</td>
</tr>
<tr>
<td><strong>Return text</strong></td>
<td>The message displayed on the Field Assistant Alarms page &gt; View tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
<tr>
<td><strong>Return requires acknowledge</strong></td>
<td>Check to require that an operator acknowledge return-to-normal notifications on the system's Alarms page &gt; View tab.</td>
</tr>
</tbody>
</table>

## Fault

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fault Enabled</strong></td>
<td>Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.</td>
</tr>
</tbody>
</table>
### Trends

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enable Trend Log</strong></td>
<td>Check to have the controller collect trend data for the microblock's present value.</td>
</tr>
<tr>
<td><strong>Sample every ___ (hh:mm:ss)</strong></td>
<td>Records the microblock's present value at this interval.</td>
</tr>
<tr>
<td><strong>Sample on COV (change of value)</strong></td>
<td>Records the microblock's present value only when the value changes by at least the COV increment.</td>
</tr>
<tr>
<td><strong>Max samples</strong></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. <strong>NOTE</strong> Click Reset on the Properties page in a system to delete all samples currently stored in the controller.</td>
</tr>
</tbody>
</table>
| **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 a 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** | 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. |
| **Use default (45% of Max samples)**         |                                                                                                                 |
| **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 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>I/O Point microblocks (page 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="icon" /></td>
</tr>
<tr>
<td>What it does</td>
<td>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.</td>
</tr>
</tbody>
</table>

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:

\[
\text{Flow rate (output)} = \left(\frac{\text{Pulses counted during Pulse Window}}{\text{Pulse Window}}\right) \times \text{Gain}
\]

**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.

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

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:

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 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 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

<table>
<thead>
<tr>
<th>Privilege</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preset</td>
<td>Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expander</td>
<td>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.</td>
</tr>
<tr>
<td>Input Number</td>
<td>The number of the physical input the microblock reads.</td>
</tr>
<tr>
<td>Input Type</td>
<td>Select <strong>Counter Input</strong>.</td>
</tr>
</tbody>
</table>

### Calibration

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

### BACnet Configuration

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Visible</td>
<td>Check to allow other BACnet equipment to read or change the microblock’s present value. Must be checked for this microblock to generate alarms.</td>
</tr>
<tr>
<td>Object Instance</td>
<td><strong>Auto-assign</strong> - A BACnet Object ID is assigned by the system. <strong>Use specific value</strong> - (0–3999999) Assign a number that is unique within the controller.</td>
</tr>
<tr>
<td>COV Increment</td>
<td>An Analog Network Input (ANI) that references this microblock in its <strong>Address</strong> 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 <strong>COV Increment</strong>. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's <strong>Refresh Time</strong> field.</td>
</tr>
<tr>
<td>Out Of Service Minimum Pres Value</td>
<td>If a third-party vendor sets the microblock’s BACnet <strong>Out_Of_Service</strong> property to <strong>True</strong> and then he writes a value lower than this value to the microblock’s <strong>Present_Value</strong>, the controller returns a <strong>Property, Value_Out_of_Range</strong> error.</td>
</tr>
</tbody>
</table>
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.

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

High = 225
215
10 = Deadband

Low = -25
-15
10 = Deadband

Alarm is generated
Return-to-Normal is generated

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 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 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

<table>
<thead>
<tr>
<th>Return Enabled</th>
<th>Check to send a message when an alarm condition has returned to normal.</th>
</tr>
</thead>
</table>

### Return text
The message displayed on the 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 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

<table>
<thead>
<tr>
<th>Fault Enabled</th>
<th>Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.</th>
</tr>
</thead>
</table>

### Trends

<table>
<thead>
<tr>
<th>Enable Trend Log</th>
<th>Check to have the controller collect trend data for the microblock's present value.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample every ___ (hh:mm:ss)</td>
<td>Records the microblock's present value at this interval.</td>
</tr>
<tr>
<td><strong>EXAMPLE</strong> Type <strong>00:10:00</strong> to record the microblock's present value every 10 minutes.</td>
<td></td>
</tr>
<tr>
<td>Sample on COV (change of value)</td>
<td>Records the microblock's present value only when the value changes by at least the COV Increment.</td>
</tr>
<tr>
<td>Max samples</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</td>
</tr>
<tr>
<td>The allocated memory is constant regardless of how many samples are actually recorded.</td>
<td></td>
</tr>
<tr>
<td>If you do not enable trending, no memory is consumed.</td>
<td></td>
</tr>
<tr>
<td><strong>NOTE</strong> Click <strong>Reset</strong> on the <strong>Properties</strong> page in a system to delete all samples currently stored in the controller.</td>
<td></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.</td>
</tr>
<tr>
<td><strong>NOTES</strong></td>
<td></td>
</tr>
<tr>
<td>• You must check <strong>Enable Trend Log</strong> if you want to <strong>Enable Trend Historian</strong>.</td>
<td></td>
</tr>
<tr>
<td>• You can change <strong>Enable Trend Historian</strong> archival settings and other trend properties on the <strong>Properties</strong> page in a system.</td>
<td></td>
</tr>
</tbody>
</table>
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 a 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.

Microblock family
I/O Point microblocks (page 30)

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.

\[
y = mx + b
\]

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

\[
x = \frac{1}{12.5 \% \ Vdc} (50\% + 25\%) = 6 \ Vdc
\]

**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:

<table>
<thead>
<tr>
<th>Units</th>
<th>V</th>
</tr>
</thead>
</table>

Hardware Configuration

<table>
<thead>
<tr>
<th>Expander</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Number</td>
<td>2</td>
</tr>
<tr>
<td>Output Type</td>
<td>Electrical Output</td>
</tr>
</tbody>
</table>

Output Configuration and Calibration

<table>
<thead>
<tr>
<th>Minimum Value</th>
<th>0.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Value</td>
<td>100</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1</td>
</tr>
<tr>
<td>Actuator Type</td>
<td>Linear w/ offset, 2-10 Volts</td>
</tr>
</tbody>
</table>

Properties

TIPS

- **Alt+click** any value in the 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>
<thead>
<tr>
<th>Display Name</th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Name</td>
<td>RefName Use the default reference name unless you want a more descriptive name for graphics or network links.</td>
</tr>
<tr>
<td>Limitations:</td>
<td></td>
</tr>
<tr>
<td>lower case only</td>
<td></td>
</tr>
<tr>
<td>limited to 40 characters</td>
<td></td>
</tr>
<tr>
<td>cannot begin with a number</td>
<td></td>
</tr>
<tr>
<td>must be unique within a control program</td>
<td></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><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</td>
</tr>
</tbody>
</table>

⚠️ 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 dropdown. For some microblocks, you can customize the dropdown by selecting **Options > Preferences > Dropdown 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 its 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**

```
High = 225
Low = -25
```

10 = Deadband

- Alarm is generated
- Return-to-Normal is generated

**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 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 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 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 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:

\[(100 \times 10 \text{ bytes}) + 48 = 1048 \text{ bytes of memory}\]

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 a 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 a 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
Write 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 a 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.

**Microblock family**

- I/O Point microblocks (page 30)

**Icon and symbol**

![Icon](image)

**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.

<table>
<thead>
<tr>
<th>Polarity</th>
<th>Value</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>true</td>
<td>(on) Active Text</td>
</tr>
<tr>
<td></td>
<td>false</td>
<td>(off) Inactive Text</td>
</tr>
<tr>
<td>Reversed</td>
<td>true</td>
<td>(off) Inactive Text</td>
</tr>
<tr>
<td></td>
<td>false</td>
<td>(on) Active Text</td>
</tr>
</tbody>
</table>
Microblock reference

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:

<table>
<thead>
<tr>
<th>Hardware Configuration</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Expander</td>
<td>3</td>
</tr>
<tr>
<td>Output Number</td>
<td>2</td>
</tr>
<tr>
<td>Output Type</td>
<td>Relay / Triac Output</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>System Setup</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inactive Text</td>
<td>Off</td>
</tr>
<tr>
<td>Active Text</td>
<td>On</td>
</tr>
<tr>
<td>Polarity</td>
<td>Normal</td>
</tr>
<tr>
<td>Minimum off time</td>
<td>5 seconds</td>
</tr>
<tr>
<td>Minimum on time</td>
<td>5 seconds</td>
</tr>
</tbody>
</table>

**Properties**

- **Alt+click** any value in the 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>
<thead>
<tr>
<th>Display Name</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</td>
<td></td>
</tr>
</tbody>
</table>
### Microblock reference

**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.

**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 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

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enable Trend Log</strong></td>
<td>Check to have the controller collect trend data for the microblock's present value.</td>
</tr>
<tr>
<td><strong>Sample every ___</strong></td>
<td>Records the microblock's present value at this interval.</td>
</tr>
<tr>
<td><strong>(hh:mm:ss)</strong></td>
<td><strong>EXAMPLE</strong> Type <code>00:10:00</code> to record the microblock's present value every 10 minutes.</td>
</tr>
<tr>
<td><strong>Sample on COV</strong></td>
<td>Records the microblock’s present value only when the value changes.</td>
</tr>
<tr>
<td><strong>Max samples</strong></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. Click <strong>Reset</strong> on the <strong>Properties</strong> page in a system to delete all samples currently stored in the controller.</td>
</tr>
<tr>
<td><strong>Enable Trend Historian</strong></td>
<td>Check this field to archive the controller's collected trend data to the system database after every 129 data samples.</td>
</tr>
<tr>
<td><strong>NOTES</strong></td>
<td>• You must check <strong>Enable Trend Log</strong> if you want to <strong>Enable Trend Historian</strong>.</td>
</tr>
<tr>
<td></td>
<td>• You can change <strong>Enable Trend Historian</strong> archival settings and other trend properties on the <strong>Properties</strong> page in a system.</td>
</tr>
<tr>
<td><strong>Keep historical trends for ___ days</strong></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>
<tr>
<td><strong>Write to historian:</strong></td>
<td>Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select <strong>Every ___ trend samples</strong> and enter a number greater than zero and less than the number in the <strong>Max samples</strong> field, or you can select <strong>Use default</strong>. The number of trends specified must be accumulated at least once before the historical trends can be viewed.</td>
</tr>
<tr>
<td><strong>Every ___ trend samples</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Use default (45% of Max samples)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>In a system only:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Stop When Full</strong></td>
<td>Check this field to stop trend sampling when the maximum number of samples is reached.</td>
</tr>
<tr>
<td><strong>Enable trend log at specific times only?</strong></td>
<td>Collects trend data for the specific period of time you define in the <strong>time</strong> and <strong>date</strong> fields.</td>
</tr>
<tr>
<td><strong>Store Trends Now</strong></td>
<td>Writes all trend data in the controller to the system database without having to enable trend historian.</td>
</tr>
<tr>
<td><strong>Trend samples accumulated since last notification</strong></td>
<td>Shows the number of samples stored in the controller since data was last written to the database.</td>
</tr>
</tbody>
</table>
**Microblock reference**

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

---

**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>I/O Point microblocks (page 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Icon and symbol</strong></td>
<td><img src="image" alt="Floating Motor Icon" /></td>
</tr>
<tr>
<td><strong>What it does</strong></td>
<td>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.</td>
</tr>
</tbody>
</table>

---

**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** 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.

\[ |(\text{Current \% value} - \text{Previous \% value})| \times \text{Full travel time} = \text{Signal length} \]

- 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 = \(|(60\% - 80\%)| \times 100 \text{ seconds} = 20 \text{ seconds} \)

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** 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

<table>
<thead>
<tr>
<th>Units</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hardware Configuration</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Open</strong></td>
<td></td>
</tr>
<tr>
<td>Expander</td>
<td>1</td>
</tr>
<tr>
<td>Output Number</td>
<td>3</td>
</tr>
<tr>
<td>Output Type</td>
<td>Relay / Triac Output</td>
</tr>
<tr>
<td><strong>Close</strong></td>
<td></td>
</tr>
<tr>
<td>Expander</td>
<td>1</td>
</tr>
<tr>
<td>Output Number</td>
<td>4</td>
</tr>
<tr>
<td>Output Type</td>
<td>Relay / Triac Output</td>
</tr>
</tbody>
</table>

| **Output Configuration and Calibration** |         |
| Maximum Value | 100.0    |
| Minimum Value | 0.0      |
| Resolution    | 0.1      |
| Full travel time is | 00:02:00 hh:mm:ss |
| Min Pulse Width | 00.00.02 hh:mm:ss |

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 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>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display Name</strong></td>
<td>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</td>
</tr>
<tr>
<td><strong>Reference Name</strong></td>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations:</td>
</tr>
<tr>
<td></td>
<td>• lower case only</td>
</tr>
<tr>
<td></td>
<td>• limited to 40 characters</td>
</tr>
<tr>
<td></td>
<td>• cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td>• must be unique within a control program</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>(optional) A BACnet-visible microblock description.</td>
</tr>
<tr>
<td><strong>Lock Present Value</strong></td>
<td>Check to output the locked value from the microblock instead of the microblock's calculated value.</td>
</tr>
<tr>
<td><strong>Editing Privilege</strong></td>
<td><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</td>
</tr>
<tr>
<td></td>
<td><strong>CAUTION</strong> If you change the <strong>Editing Privilege</strong> from <strong>Preset</strong>, the privilege you select will be used for all properties of this microblock, which is not always desirable.</td>
</tr>
<tr>
<td><strong>Units</strong></td>
<td>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 <strong>Options &gt; Preferences &gt; Droplist Options</strong>.</td>
</tr>
</tbody>
</table>

**Hardware Configuration - Open**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expander</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Output Number</strong></td>
<td>The number of the physical output that the microblock sends a signal to.</td>
</tr>
<tr>
<td><strong>Output Type</strong></td>
<td>The physical output type of the output number that the microblock sends a signal to.</td>
</tr>
</tbody>
</table>

**Hardware Configuration - Close**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expander</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Output Number</strong></td>
<td>The number of the physical output that the microblock sends a signal to.</td>
</tr>
<tr>
<td><strong>Output Type</strong></td>
<td>The physical output type of the output number that the microblock sends a signal to.</td>
</tr>
</tbody>
</table>

**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** | 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

<table>
<thead>
<tr>
<th>Potential alarm source</th>
<th>Check to make this microblock available in the system's Alarm Sources list.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical</td>
<td>Determines the color of the system-wide alarm button when the alarm comes in if the alarm's Template field is set to Universal.</td>
</tr>
<tr>
<td>Category</td>
<td>The category you want to use to filter this microblock's alarms on the system's Alarms page &gt; View tab.</td>
</tr>
<tr>
<td>Template</td>
<td>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.</td>
</tr>
</tbody>
</table>

**Alarm**

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

**EXAMPLE**

```
High = 225
215

-15
Low = -25
10 = Deadband
```

**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 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 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:

\[(100 \times 10 \text{ bytes}) + 48 = 1048 \text{ bytes of memory}\]

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 a 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 a 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**
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 a system only:

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

**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>I/O Point microblocks (page 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Icon and symbol</strong></td>
<td><img src="image" alt="" /> point name <img src="image" alt="" /></td>
</tr>
<tr>
<td><strong>What it does</strong></td>
<td>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.</td>
</tr>
</tbody>
</table>
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:

<table>
<thead>
<tr>
<th>Output Configuration and Calibration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Value A: <strong>100.0</strong></td>
</tr>
<tr>
<td>Minimum Value B: <strong>0.0</strong></td>
</tr>
<tr>
<td>Resolution: <strong>0.1</strong></td>
</tr>
<tr>
<td>Pulse Duration</td>
</tr>
<tr>
<td>Minimum: <strong>C</strong></td>
</tr>
<tr>
<td>Additional % x <strong>D</strong>: <strong>14.0</strong></td>
</tr>
<tr>
<td>Pulse Refresh Time</td>
</tr>
<tr>
<td>Minimum: <strong>E</strong></td>
</tr>
<tr>
<td>Maximum: <strong>F</strong></td>
</tr>
</tbody>
</table>

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 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>
<thead>
<tr>
<th><strong>Display Name</strong></th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reference Name</strong></td>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links.</td>
</tr>
<tr>
<td><strong>RefName</strong></td>
<td>Limitations:</td>
</tr>
<tr>
<td></td>
<td>• lower case only</td>
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<td>• cannot begin with a number</td>
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<td></td>
<td>• must be unique within a control program</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>(optional) A BACnet-visible microblock description.</td>
</tr>
<tr>
<td><strong>Lock Present Value</strong></td>
<td>Check to output the locked value from the microblock instead of the microblock's calculated value.</td>
</tr>
<tr>
<td><strong>Editing Privilege</strong></td>
<td><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</td>
</tr>
<tr>
<td><strong>CAUTION</strong></td>
<td>If you change the <em>Editing Privilege</em> from <em>Preset</em>, the privilege you select will be used for all properties of this microblock, which is not always desirable.</td>
</tr>
<tr>
<td><strong>Units</strong></td>
<td>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 <strong>Options &gt; Preferences &gt; Droplist Options</strong>.</td>
</tr>
</tbody>
</table>

### 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 its 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**
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**

\[
\begin{align*}
\text{High} &= 225 \\
\text{Low} &= -25 \\
10 &= \text{Deadband}
\end{align*}
\]

- Alarm is generated
- Return-to-Normal is generated

**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 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 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 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 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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enable Trend Log</strong></td>
<td>Check to have the controller collect trend data for the microblock's present value.</td>
<td></td>
</tr>
<tr>
<td><strong>Sample every ____ (hh:mm:ss)</strong></td>
<td>Records the microblock's present value at this interval.</td>
<td><strong>EXAMPLE</strong> Type 00:10:00 to record the microblock's present value every 10 minutes.</td>
</tr>
<tr>
<td><strong>Sample on COV (change of value)</strong></td>
<td>Records the microblock’s present value only when the value changes by at least the COV Increment.</td>
<td></td>
</tr>
<tr>
<td><strong>Max samples</strong></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 \times 10 \text{ bytes}) + 48 = 1048 \text{ 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. <strong>NOTE</strong> Click <strong>Reset</strong> on the <strong>Properties</strong> page in a system to delete all samples currently stored in the controller.</td>
<td></td>
</tr>
<tr>
<td><strong>Enable Trend Historian</strong></td>
<td>Check this field to archive the controller's collected trend data to the system database after every 129 data samples. <strong>NOTES</strong> You must check <strong>Enable Trend Log</strong> if you want to <strong>Enable Trend Historian</strong>. You can change <strong>Enable Trend Historian</strong> archival settings and other trend properties on the <strong>Properties</strong> page in a system.</td>
<td></td>
</tr>
<tr>
<td><strong>Keep historical trends for ____ days</strong></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>
<td></td>
</tr>
<tr>
<td><strong>Write to historian:</strong></td>
<td><strong>Every ____ trend samples</strong> Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select <strong>Every ____ trend samples</strong> and enter a number greater than zero and less than the number in the <strong>Max samples</strong> field, or you can select <strong>Use default</strong>. The number of trends specified must be accumulated at least once before the historical trends can be viewed.</td>
<td></td>
</tr>
<tr>
<td><strong>Use default (45% of Max samples)</strong></td>
<td><strong>NOTES</strong> In a system only: <strong>Stop When Full</strong> Check this field to stop trend sampling when the maximum number of samples is reached. <strong>Enable trend log at specific times only</strong> Collects trend data for the specific period of time you define in the <strong>time</strong> and <strong>date</strong> fields. <strong>Store Trends Now</strong> Writes all trend data in the controller to the system database without having to enable trend historian. <strong>Trend samples accumulated since last notification</strong> Shows the number of samples stored in the controller since data was last written to the database. <strong>Last Record Written to Historian</strong> Shows the number of trend samples that were last written to the database. <strong>Delete</strong> Deletes all trend samples stored in the database for the microblock.</td>
<td></td>
</tr>
</tbody>
</table>
**Microblock reference**

| 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>I/O Point microblocks (page 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>![Icon and symbol image]</td>
</tr>
</tbody>
</table>

**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:

<table>
<thead>
<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>
</tr>
</thead>
<tbody>
<tr>
<td>ZONE</td>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SP ADJ</td>
<td>0</td>
<td>Setpoint adjustment (degrees) from sensor.</td>
<td></td>
</tr>
<tr>
<td>OVRDE</td>
<td>0</td>
<td>Value (minutes) of timed local override from sensor.</td>
<td></td>
</tr>
<tr>
<td>OAT (optional)</td>
<td>not used</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>HTSP</td>
<td>not used</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>CLSP</td>
<td>not used</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>OCC</td>
<td>not used</td>
<td>True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. Connect to a time clock microblock (page 283) 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.</td>
<td></td>
</tr>
<tr>
<td>ALARM (optional)</td>
<td>not used</td>
<td>not used</td>
<td></td>
</tr>
</tbody>
</table>

* This microblock's 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

<table>
<thead>
<tr>
<th>Input</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTSP</td>
<td>Heating setpoint (degrees). Connect to a setpoint microblock’s HT output or to other logic that indicates the zone's heating setpoint.</td>
</tr>
<tr>
<td>CLSP</td>
<td>Cooling setpoint (degrees). Connect to a setpoint microblock's CL output or to other logic that indicates the zone's cooling setpoint.</td>
</tr>
<tr>
<td>OCC</td>
<td>True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. Connect to a time clock microblock (page 283) or to other logic that indicates the zone's occupancy status.</td>
</tr>
</tbody>
</table>

### Optional Inputs

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

<table>
<thead>
<tr>
<th>Input</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OAT</td>
<td>Check for an analog OAT wire input. A sensor with a display shows this value when a user cycles through the INFO button options.</td>
</tr>
<tr>
<td>ALARM</td>
<td>Select for a binary (digital) ALARM input. When the input is true (on) an SPT Pro displays an alarm bell icon.</td>
</tr>
</tbody>
</table>

### Outputs

<table>
<thead>
<tr>
<th>Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZONE</td>
<td>Current zone temperature (degrees).</td>
</tr>
<tr>
<td>SP ADJ</td>
<td>Setpoint adjustment (degrees) indicated by zone sensor. Connect to a setpoint microblock's HADJ and CADJ inputs.</td>
</tr>
<tr>
<td>OVRDE</td>
<td>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 283) to indicate a change in occupancy status.</td>
</tr>
</tbody>
</table>

### Properties

#### TIPS

- **Alt+click** any value in the 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>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display Name</td>
<td>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</td>
</tr>
<tr>
<td>Reference Name</td>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations:</td>
</tr>
<tr>
<td></td>
<td>lower case only</td>
</tr>
<tr>
<td></td>
<td>limited to 40 characters</td>
</tr>
<tr>
<td></td>
<td>cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td>must be unique within a control program</td>
</tr>
<tr>
<td>Description</td>
<td>(optional) A BACnet-visible microblock description.</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Lock Zone Temp to</td>
<td>Check to output the locked value from the microblock instead of the microblock's calculated value.</td>
</tr>
<tr>
<td>Zone Temp Units</td>
<td>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 &gt; Preferences &gt; Droplist Options.</td>
</tr>
<tr>
<td>Min Present Value</td>
<td>The temperature range of the sensor. These fields are for information only.</td>
</tr>
<tr>
<td>Max Present Value</td>
<td>The temperature range of the sensor. These fields are for information only.</td>
</tr>
<tr>
<td>Resolution</td>
<td>The increment by which the microblock updates the value on its output wire in a 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>
<tr>
<td>Setpoint Adjustment</td>
<td>The maximum amount (degrees) by which the user can adjust the zone's setpoints from a zone sensor.</td>
</tr>
<tr>
<td>Max adjust = ±</td>
<td>The maximum amount (degrees) by which the user can adjust the zone's setpoints from a zone sensor.</td>
</tr>
<tr>
<td>Reset setpoint adjust to zero when unoccupied</td>
<td>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.</td>
</tr>
<tr>
<td>Timed Local Override</td>
<td>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.</td>
</tr>
<tr>
<td>Display Name</td>
<td>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</td>
</tr>
<tr>
<td>Description</td>
<td>(optional) A BACnet-visible microblock description.</td>
</tr>
<tr>
<td>Units</td>
<td>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 &gt; Preferences &gt; Droplist Options.</td>
</tr>
<tr>
<td>Increment</td>
<td>Minutes the microblock adds to the zone's occupied time for each press of the zone's local override button or switch.</td>
</tr>
<tr>
<td>Maximum Duration</td>
<td>Maximum value (up to 546 minutes) the microblock outputs regardless of additional pulses from the controller's input.</td>
</tr>
<tr>
<td>Allow Continuous</td>
<td>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.</td>
</tr>
</tbody>
</table>
**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.
<table>
<thead>
<tr>
<th><strong>High Limit Enable</strong></th>
<th>Check to send an alarm when the microblock's present value remains above the <strong>High Limit</strong> for the defined <strong>Delay Seconds</strong>.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Limit</strong></td>
<td>The value the microblock's present value must rise above to send an alarm.</td>
</tr>
<tr>
<td><strong>Dead Band</strong></td>
<td>The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated.</td>
</tr>
</tbody>
</table>
| **EXAMPLE**           | ![Graph showing high and low limits with a dead band](image)
|                       | High = 225 10 = Deadband 215 10 = Deadband
|                       | Low = -25 10 = Deadband
|                       | -15
|                       | -15
|                       | Alarm is generated
|                       | Return-to-Normal is generated
| **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 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 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**  | Check to send a message when an alarm condition has returned to normal.                                         |
| **Return Enabled**    | Check to send a message when an alarm condition returns to normal.                                             |
| **Return text**       | The message displayed on the 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 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**             | Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.          |
| **Fault Enabled**     | Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.          |

**Trends**

<table>
<thead>
<tr>
<th><strong>Enable Trend Log</strong></th>
<th>Check to have the controller collect trend data for the microblock's present value.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample every ____ (hh:mm:ss)</strong></td>
<td>Records the microblock's present value at this interval.</td>
</tr>
<tr>
<td><strong>EXAMPLE</strong></td>
<td>Type 00:10:00 to record the microblock's present value every 10 minutes.</td>
</tr>
</tbody>
</table>
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:

\[(100 \times 10 \text{ bytes}) + 48 = 1048 \text{ bytes of memory}\]

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 a 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 a 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 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 a 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**

![Diagram](image)

**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>I/O Point microblocks (page 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>![Microblock Diagram]</td>
</tr>
<tr>
<td>What it does</td>
<td>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.</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<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>
</thead>
<tbody>
<tr>
<td><strong>ZONE</strong></td>
<td>Current zone temperature (degrees). Units (Fahrenheit or Celsius) are determined at design time by the control program's <strong>Metric</strong> option. Calculated (Average, Maximum, or Minimum) from all communicating sensors* based on <strong>Zone Temp Method</strong> field selection. <strong>NOTE</strong> The SPT Pro and SPT Pro Plus display the temperature of their sensor, not the calculated min, max, or average temperature.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SP ADJ</strong></td>
<td>0</td>
<td>Setpoint adjustment (degrees) from sensor.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OVRDE</strong></td>
<td>0</td>
<td>Value (minutes) of timed local override from sensor.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FAN</strong></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 <strong>FAN</strong> button on the sensor, the output value cycles through the <strong>Order of Speeds</strong> (limited by <strong>Number of speeds</strong>) set on the microblock's <strong>Fan Speed Adjust</strong> tab.</td>
</tr>
<tr>
<td><strong>MODE</strong></td>
<td>not used</td>
<td>not used</td>
<td>not used</td>
<td>As the user presses the <strong>MODE</strong> button on the SPT Pro Plus, the output value and sensor display cycle through the <strong>Modes Available</strong> settings from the microblock's <strong>Mode/Sensor Display</strong> tab.</td>
</tr>
<tr>
<td><strong>OAT</strong> (optional)</td>
<td>not used</td>
<td>not used</td>
<td>As the user presses the SPT Pro's or SPT Pro Plus' <strong>INFO</strong> button, the sensor cycles its display through all available and enabled input values (other than <strong>OCC</strong>, <strong>FAN</strong>, and <strong>ALARM</strong>), then returns to the <strong>ZONE</strong> output value.</td>
<td></td>
</tr>
<tr>
<td><strong>HTSP</strong></td>
<td>not used</td>
<td>not used</td>
<td><strong>NOTE</strong> If you select the <strong>Disable info button</strong> on the <strong>Mode/Sensor Display</strong> tab, the SPT Pro Plus' display cycles through the <strong>OVRDE</strong> input value, the <strong>HTSP</strong> input value, and the <strong>CLSP</strong> input value, then returns to the <strong>ZONE</strong> output value as the user presses the sensor's <strong>INFO</strong> button.</td>
<td></td>
</tr>
<tr>
<td><strong>CLSP</strong></td>
<td>not used</td>
<td>not used</td>
<td><strong>NOTE</strong> If you select the <strong>Disable info button</strong> on the <strong>Mode/Sensor Display</strong> tab, the SPT Pro Plus' display cycles through the <strong>OVRDE</strong> input value, the <strong>HTSP</strong> input value, and the <strong>CLSP</strong> input value, then returns to the <strong>ZONE</strong> output value as the user presses the sensor's <strong>INFO</strong> button.</td>
<td></td>
</tr>
<tr>
<td><strong>AI1, AI2, BI1, BI2</strong> (optional)</td>
<td>not used</td>
<td>not used</td>
<td>not used</td>
<td>If input and <strong>INFO</strong> button are enabled, values are included in SPT Pro Plus' <strong>INFO</strong> button display cycle.</td>
</tr>
<tr>
<td><strong>OCC</strong></td>
<td>not used</td>
<td>True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. Connect to a time clock microblock (page 283) or to other logic that indicates the zone's occupancy status. The SPT Pro or SPT Pro Plus displays <strong>Occupied</strong> when the <strong>OCC</strong> input is true (on).</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ALARM</strong> (optional)</td>
<td>not used</td>
<td>not used</td>
<td>If true (on), the SPT Pro or SPT Pro Plus displays an alarm bell icon.</td>
<td></td>
</tr>
</tbody>
</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**

<table>
<thead>
<tr>
<th>Input</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTSP</td>
<td>Heating Setpoint (degrees). Connect to a setpoint microblock's HT output or to other logic that indicates the zone's heating setpoint.</td>
</tr>
<tr>
<td>CLSP</td>
<td>Cooling Setpoint (degrees). Connect to a setpoint microblock's CL output or to other logic that indicates the zone's cooling setpoint.</td>
</tr>
<tr>
<td>OCC</td>
<td>True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. Connect to a time clock microblock (page 283) or to other logic that indicates the zone's occupancy status.</td>
</tr>
<tr>
<td>FAN</td>
<td>If the input is true (on), the SPT Pro Plus displays a fan icon.</td>
</tr>
</tbody>
</table>

**Optional Inputs**

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

<table>
<thead>
<tr>
<th>Input</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OAT</td>
<td>Check for an analog OAT wire input. A sensor with a display shows this value when a user cycles through the INFO button options.</td>
</tr>
<tr>
<td>ALARM</td>
<td>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.</td>
</tr>
<tr>
<td>AI1, AI2</td>
<td>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. <strong>NOTE</strong> The Disable Info button checkbox on the Mode/Sensor Display tab must be unchecked for the user to see these values.</td>
</tr>
</tbody>
</table>
**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 283) 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.

<table>
<thead>
<tr>
<th>Num of Speeds</th>
<th>Order of Speeds</th>
<th>Result:</th>
<th>Large text on RSPro-F</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>0,1,2,3,4,0,1,2,3,4</td>
<td>AU LO M M HI AU LO M M HI</td>
<td>0 1 2 3 4 0 1 2 3 4</td>
</tr>
<tr>
<td>4</td>
<td>0,1,2,3,4,3,2,1,0,1</td>
<td>AU LO M M HI M M LO AU</td>
<td>0 1 2 3 4 3 2 1 0</td>
</tr>
<tr>
<td>3</td>
<td>0,1,2,3,4,0,1,2,3,4</td>
<td>AU LO M M HI AU LO M M HI</td>
<td>0 1 2 3 0 1 2 3</td>
</tr>
<tr>
<td>3</td>
<td>0,1,2,3,4,3,2,1,0,1</td>
<td>AU LO M M HI M M LO AU</td>
<td>0 1 2 3 2 1 0</td>
</tr>
<tr>
<td>2</td>
<td>0,1,2,3,4,0,1,2,3,4</td>
<td>AU LO HI AU LO HI</td>
<td>0 1 2 0 1 2</td>
</tr>
<tr>
<td>2</td>
<td>0,1,2,3,4,3,2,1,0,1</td>
<td>AU LO HI LO AU</td>
<td>0 1 2 1 0</td>
</tr>
<tr>
<td>1</td>
<td>0,1,2,3,4,0,1,2,3,4</td>
<td>AU M AU M</td>
<td>0 1 0 1</td>
</tr>
<tr>
<td>1</td>
<td>0,1,2,3,4,3,2,1,0,1</td>
<td>AU M AU M</td>
<td>0 1 0 1</td>
</tr>
<tr>
<td>0</td>
<td>0,1,2,3,4,0,1,2,3,4</td>
<td>AU</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0,1,2,3,4,3,2,1,0,1</td>
<td>AU</td>
<td>0</td>
</tr>
</tbody>
</table>

**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.
Alt+click any value in the 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>
<thead>
<tr>
<th>Display Name</th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Name</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 Zone Temp to</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 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>Zone Temp Units</td>
<td>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 &gt; Preferences &gt; Droplist Options.</td>
</tr>
<tr>
<td>Min Present Value Max Present Value</td>
<td>The temperature range of the sensor. These fields are for information only.</td>
</tr>
<tr>
<td>Resolution</td>
<td>The increment by which the microblock updates the value on its output wire in a 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>
<tr>
<td>Setpoint Adjustment</td>
<td>The maximum amount (degrees) by which the user can adjust the zone's setpoints from a zone sensor.</td>
</tr>
<tr>
<td>Max adjust = ±</td>
<td>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.</td>
</tr>
</tbody>
</table>

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**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.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display Name</strong></td>
<td>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>(optional) A BACnet-visible microblock description.</td>
</tr>
<tr>
<td><strong>Units</strong></td>
<td>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 <strong>Options &gt; Preferences &gt; Droplist Options</strong>.</td>
</tr>
<tr>
<td><strong>Increment</strong></td>
<td>Minutes the microblock adds to the zone's occupied time for each press of the zone's local override button or switch.</td>
</tr>
<tr>
<td><strong>Maximum Duration</strong></td>
<td>Maximum value (up to 546 minutes) the microblock outputs regardless of additional pulses from the controller's input.</td>
</tr>
<tr>
<td><strong>Allow Continuous</strong></td>
<td>SPT Pro and SPT Pro Plus only. If enabled, a user can press the sensor's local override button until the <strong>Maximum Accumulation</strong> 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.</td>
</tr>
<tr>
<td><strong>TLO Operating Sequence</strong></td>
<td>Determines the order of timed local override modes the user can cycle through using the sensor's Manual On or override button.</td>
</tr>
<tr>
<td></td>
<td><strong>Pulse Acc</strong> - Each time the user presses the sensor's <strong>Manual On</strong> or override button, add the value in the <strong>Each Pulse</strong> field to the override time up to the <strong>Max accum.</strong> value. The next time the user presses the button, go to the next specified mode of operation.</td>
</tr>
<tr>
<td></td>
<td><strong>Continuous On</strong> - When the user presses the sensor's <strong>Manual On</strong> or override button, set the zone to run continuously (24 hours per day) in the occupied mode.</td>
</tr>
<tr>
<td></td>
<td><strong>Cancel</strong> - Returns the zone to automatic control.</td>
</tr>
<tr>
<td><strong>Maintain continuous through power fail</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Network Visible</strong></td>
<td>Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.</td>
</tr>
<tr>
<td><strong>Object ID</strong></td>
<td><strong>Auto-assign</strong> SiteBuilder assigns a BACnet Object ID when you attach the control program to a controller.</td>
</tr>
<tr>
<td></td>
<td><strong>Use specific value</strong> (0 to 3999999) Assign a number that is unique within the controller.</td>
</tr>
</tbody>
</table>

**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**

- **High =** 225
- **Low =** -25
- **10 = Deadband**

- Alarm is generated
- Return-to-Normal is generated

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dead Band</strong></td>
<td>The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated.</td>
</tr>
</tbody>
</table>

### Delay Seconds

The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Delay Seconds</strong></td>
<td>The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.</td>
</tr>
</tbody>
</table>

### Alarm text

The message displayed on the 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 Field Assistant locations because the path is relative to the item that contains the path.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alarm text</strong></td>
<td>The message displayed on the Field Assistant <strong>Alarms</strong> page &gt; <strong>View</strong> tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
</tbody>
</table>

### Alarm requires acknowledge

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alarm requires acknowledge</strong></td>
<td>Check to require that an operator acknowledge alarm notifications on the system's <strong>Alarms</strong> page &gt; <strong>View</strong> tab.</td>
</tr>
</tbody>
</table>

### Return to Normal

#### Return Enabled

Check to send a message when an alarm condition has returned to normal.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Return Enabled</strong></td>
<td>Check to send a message when an alarm condition has returned to normal.</td>
</tr>
</tbody>
</table>

#### Return text

The message displayed on the 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 Field Assistant locations because the path is relative to the item that contains the path.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Return text</strong></td>
<td>The message displayed on the Field Assistant <strong>Alarms</strong> page &gt; <strong>View</strong> tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
</tbody>
</table>

#### Return requires acknowledge

Check to require that an operator acknowledge return-to-normal notifications on the system's **Alarms** page > **View** tab.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Return requires acknowledge</strong></td>
<td>Check to require that an operator acknowledge return-to-normal notifications on the system's <strong>Alarms</strong> page &gt; <strong>View</strong> tab.</td>
</tr>
</tbody>
</table>

### Fault

#### Fault Enabled

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fault Enabled</strong></td>
<td>Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.</td>
</tr>
</tbody>
</table>

### Trends

#### Enable Trend Log

Check to have the controller collect trend data for the microblock's present value.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enable Trend Log</strong></td>
<td>Check to have the controller collect trend data for the microblock's present value.</td>
</tr>
</tbody>
</table>

#### 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.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample every ___ (hh:mm:ss)</strong></td>
<td>Records the microblock's present value at this interval. <strong>EXAMPLE</strong> Type <strong>00:10:00</strong> to record the microblock's present value every 10 minutes.</td>
</tr>
</tbody>
</table>

#### Sample on COV (change of value)

Records the microblock's present value only when the value changes by at least the COV Increment.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample on COV (change of value)</strong></td>
<td>Records the microblock's present value only when the value changes by at least the COV Increment.</td>
</tr>
</tbody>
</table>
### 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:

\[(100 \times 10 \text{ bytes}) + 48 = 1048 \text{ bytes of memory}\]

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 a system to delete all samples currently stored in the controller.

<table>
<thead>
<tr>
<th>Enable Trend Historian</th>
<th>Check this field to archive the controller's collected trend data to the system database after every 129 data samples.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NOTES</strong></td>
<td>• You must check Enable Trend Log if you want to Enable Trend Historian.</td>
</tr>
<tr>
<td></td>
<td>• You can change Enable Trend Historian archival settings and other trend properties on the Properties page in a 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>
<tr>
<td>Write to historian: Every ___ trend samples Use default (45% of Max samples)</td>
<td>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.</td>
</tr>
<tr>
<td>In a system only: Stop When Full</td>
<td>Check this field to stop trend sampling when the maximum number of samples is reached.</td>
</tr>
<tr>
<td>Enable trend log at specific times only</td>
<td>Collects trend data for the specific period of time you define in the time and date fields.</td>
</tr>
<tr>
<td>Store Trends Now</td>
<td>Writes all trend data in the controller to the system database without having to enable trend historian.</td>
</tr>
<tr>
<td>Trend samples accumulated since last notification</td>
<td>Shows the number of samples stored in the controller since data was last written to the database.</td>
</tr>
<tr>
<td>Last Record Written to Historian</td>
<td>Shows the number of trend samples that were last written to the database.</td>
</tr>
<tr>
<td>Delete</td>
<td>Deletes all trend samples stored in the database for the microblock.</td>
</tr>
<tr>
<td>BACnet Configuration</td>
<td>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.</td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>I/O Point microblocks (page 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="Airflow Icon" /></td>
</tr>
<tr>
<td>What it does</td>
<td>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.</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>If HEAT MODE is...</th>
<th>and the zone is...</th>
<th>the flow setpoint is...</th>
</tr>
</thead>
</table>
### 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.

<table>
<thead>
<tr>
<th>If HEAT MODE is...</th>
<th>and the zone is...</th>
<th>the flow setpoint is...</th>
</tr>
</thead>
<tbody>
<tr>
<td>On occupied</td>
<td></td>
<td><strong>Occupied Min Airflow + Heating % x (Heating Max Airflow - Occupied Min Airflow)</strong></td>
</tr>
<tr>
<td>not occupied</td>
<td></td>
<td><strong>Unoccupied Min Airflow + Heating % x (Heating Max Airflow - Unoccupied Min Airflow)</strong></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>If AUX HEAT is...</th>
<th>and the zone is...</th>
<th>the flow setpoint is...</th>
</tr>
</thead>
<tbody>
<tr>
<td>On occupied</td>
<td></td>
<td>The largest of <strong>Heating Max Airflow x Heating %</strong> (if HEAT MODE is on) or <strong>Auxiliary Heat Min Airflow</strong> or <strong>Occupied Min Airflow</strong></td>
</tr>
<tr>
<td>not occupied</td>
<td></td>
<td>The largest of <strong>Heating Max Airflow x Heating %</strong> (if HEAT MODE is on) or <strong>Auxiliary Heat Min Airflow</strong> or <strong>Unoccupied Min Airflow</strong></td>
</tr>
</tbody>
</table>

### 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.

If the Carrier controller has an integrated flow sensor, it is a velocity sensor, not a velocity pressure sensor. This can be confusing to technicians who have only worked with velocity pressure sensors. Velocity sensors do not have a K-factor. Flow varies linearly with the sensor reading, not with the square root of the sensor reading, resulting in more precise readings than velocity pressure sensors at low flows. 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

<table>
<thead>
<tr>
<th>Input</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupied</td>
<td>True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. Connect to a time clock microblock (page 283) or other logic that indicates the zone's occupancy status.</td>
</tr>
<tr>
<td>Heat Mode</td>
<td>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.</td>
</tr>
<tr>
<td>Cooling %</td>
<td>Cooling called for (%). Connect to a direct-acting controller such as the Zone Controller (page 323) microblock's CLG% output.</td>
</tr>
<tr>
<td>Heating %</td>
<td>Heating called for (%). Connect to a reverse-acting controller such as the Zone Controller (page 323) microblock's HTG% output.</td>
</tr>
<tr>
<td>Fan</td>
<td>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.</td>
</tr>
<tr>
<td>Aux Heat</td>
<td>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.</td>
</tr>
</tbody>
</table>

#### Outputs

<table>
<thead>
<tr>
<th>Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fan</td>
<td>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.</td>
</tr>
<tr>
<td>Aux Heat</td>
<td>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.</td>
</tr>
<tr>
<td>Actual Flow</td>
<td>Measured airflow (units defined by Flow Measurement Units).</td>
</tr>
<tr>
<td>Flow Setpt</td>
<td>Airflow setpoint (units defined by Flow Measurement Units) calculated by the airflow control algorithm.</td>
</tr>
<tr>
<td>Damper Pos</td>
<td>(0–100%). For External damper types, connect to the analog output or floating motor output that controls the damper actuator.</td>
</tr>
</tbody>
</table>

### Properties

#### TIPS

- **Alt+click** any value in the 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>
<thead>
<tr>
<th><strong>Display Name</strong></th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
</table>
| **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. |
| **Lock...** | 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 Field Assistant interface to find out what the actual privilege is.  
  ![CAUTION](image) **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. |
### Microblock reference

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Occupied Min Airflow</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Unoccupied Min Airflow</strong></td>
<td>The minimum airflow specified for ventilation when the zone is unoccupied (usually 0).</td>
</tr>
<tr>
<td><strong>Auxiliary Heat Min Airflow</strong></td>
<td>The minimum airflow specified to ensure adequate airflow over a VAV box's auxiliary heating coil. Applies when the <strong>AUX HEAT</strong> 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.</td>
</tr>
<tr>
<td><strong>Use supply air for heating when Heat Mode Is ON</strong></td>
<td>Check to control the VAV damper with the <strong>Heating %</strong> 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.</td>
</tr>
</tbody>
</table>

### Property Page Text

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Show Property Page Text</strong></td>
<td>Check to show this microblock's value on the equipment's <strong>Properties</strong> page.</td>
</tr>
<tr>
<td><strong>Property Page Text</strong></td>
<td>You can edit the microblock description that appears on the <strong>Properties</strong> page. See &quot;Editing Properties page text using special characters&quot; and &quot;Formatting a microblock property&quot; in Snap Help.</td>
</tr>
</tbody>
</table>

### BACnet configuration

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object Instance</strong></td>
<td>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.</td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display Name</strong></td>
<td>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>(optional) A BACnet-visible microblock description.</td>
</tr>
</tbody>
</table>
| **Input Resolution** | The increment by which the microblock updates the value on its output wire in a 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** - 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:

\[(100 \times 10 \text{ bytes}) + 48 = 1048 \text{ bytes of memory}\]

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 a 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 a 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**
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 a 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.png) = Critical
- ![](non_critical.png) = 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**

```
High = 225
  ▲ 10 = Deadband
215

Low = -25
  ▼ 10 = Deadband
```

- **Alarm is generated**
- **Return-to-Normal is generated**

### 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 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 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

<table>
<thead>
<tr>
<th>Return Enabled</th>
<th>Check to send a message when an alarm condition has returned to normal.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Return text</strong></td>
<td>The message displayed on the Field Assistant Alarms page &gt; View tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
<tr>
<td><strong>Return requires acknowledge</strong></td>
<td>Check to require that an operator acknowledge return-to-normal notifications on the system's Alarms page &gt; View tab.</td>
</tr>
</tbody>
</table>

### 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 143) microblock to write the desired damper position to the Airflow Control microblock’s **Damper Lock** property. See BACnet object property addresses (page 103) below. You can connect a Zone Controller (page 323) microblock’s **CLG%** output to the Network Output microblock’s input, and use a Constant Low Limit (page 356) 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 121) or BACnet Analog Network Output (page 143) microblock to access many of its configuration and control properties in other control programs. See BACnet object property addresses (page 103) 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 452) 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.

<table>
<thead>
<tr>
<th>BACnet property Identifier #</th>
<th>BACnet property Identifier</th>
<th>Description</th>
<th>Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>4096</td>
<td>Max Occ Cooling Flow</td>
<td>Real - units determined by flow Al.</td>
<td>r/w</td>
</tr>
<tr>
<td>4097</td>
<td>Max Occ Heating Flow</td>
<td>Real - units determined by flow Al.</td>
<td>r/w</td>
</tr>
<tr>
<td>4098</td>
<td>Min Occupied Flow</td>
<td>Real - units determined by flow Al.</td>
<td>r/w</td>
</tr>
<tr>
<td>4099</td>
<td>Min Unoccupied Flow</td>
<td>Real - units determined by flow Al.</td>
<td>r/w</td>
</tr>
<tr>
<td>4100</td>
<td>Min Aux Heat Flow</td>
<td>Real - units determined by flow Al.</td>
<td>r/w</td>
</tr>
<tr>
<td></td>
<td>Minimum airflow to maintain while aux heat is active.</td>
<td>r/w</td>
<td></td>
</tr>
<tr>
<td>4101</td>
<td>Flow at 1 inch WC</td>
<td>Real - units determined by flow Al.</td>
<td>r/w</td>
</tr>
<tr>
<td></td>
<td>VAV manufacturer-provided data used for baseline control.</td>
<td>r/w</td>
<td></td>
</tr>
<tr>
<td>4102</td>
<td>Flow Calibration</td>
<td>Real - units determined by flow Al.</td>
<td>r/w</td>
</tr>
<tr>
<td></td>
<td>Array of 4 measured flow calibration properties.</td>
<td>r/w</td>
<td></td>
</tr>
<tr>
<td>4103</td>
<td>Sensor Calibration</td>
<td>Real - units determined by flow Al.</td>
<td>r/w</td>
</tr>
<tr>
<td></td>
<td>Array of 4 raw sensor calibration properties.</td>
<td>r/w</td>
<td></td>
</tr>
<tr>
<td>4104</td>
<td>Aux Heat Lock</td>
<td>Real - lock value (%) for AUX HEAT output wire.</td>
<td>r/w</td>
</tr>
<tr>
<td>BACnet property identifier #</td>
<td>BACnet property identifier</td>
<td>Description</td>
<td>Read/Write</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------------------</td>
<td>-------------</td>
<td>------------</td>
</tr>
<tr>
<td>4105</td>
<td>Damper Lock</td>
<td>Real - lock value (% open) for VAV damper.</td>
<td>r/w</td>
</tr>
<tr>
<td>4106</td>
<td>Flow Setpoint Lock</td>
<td>Real - lock value, units determined by flow AI.</td>
<td>r/w</td>
</tr>
<tr>
<td>4107</td>
<td>Auto-Zero</td>
<td>Boolean - indicates completion of auto-zero.</td>
<td>r/w</td>
</tr>
<tr>
<td>4108</td>
<td>Test and Balance Mode</td>
<td>Enumeration of states of damper control while test and balance is performed.</td>
<td>r/w</td>
</tr>
<tr>
<td>4109</td>
<td>Parent Program Device ID</td>
<td>Device ID of device containing air source object.</td>
<td>r</td>
</tr>
<tr>
<td>4110</td>
<td>Parent Program ID</td>
<td>Program AI of program containing air source object.</td>
<td>r</td>
</tr>
<tr>
<td>4111</td>
<td>Air Source Object ID</td>
<td>Air source BACnet object ID.</td>
<td>r/w</td>
</tr>
<tr>
<td>4112</td>
<td>Occupied Mode</td>
<td>Boolean - true if occupied.</td>
<td>r</td>
</tr>
<tr>
<td>4113</td>
<td>Heat Mode</td>
<td>Boolean - true if AHU in heating mode.</td>
<td>r</td>
</tr>
<tr>
<td>4114</td>
<td>Cooling Output</td>
<td>Real - percentage cooling demand.</td>
<td>r</td>
</tr>
<tr>
<td>4115</td>
<td>Heating Output</td>
<td>Real - percentage heating demand.</td>
<td>r</td>
</tr>
<tr>
<td>4116</td>
<td>Auxiliary Heat Output</td>
<td>Real - percentage of aux heat demand.</td>
<td>r</td>
</tr>
<tr>
<td>4117</td>
<td>Damper Output</td>
<td>Real - damper position (% open).</td>
<td>r</td>
</tr>
<tr>
<td>4118</td>
<td>Actual Flow</td>
<td>Real - units determined by flow AI.</td>
<td>r</td>
</tr>
<tr>
<td>4119</td>
<td>Flow Setpoint</td>
<td>Real - units determined by flow AI.</td>
<td>r</td>
</tr>
<tr>
<td>4120</td>
<td>Air Flow Object ID</td>
<td>BACnet Object ID of embedded flow AI object.</td>
<td>r</td>
</tr>
<tr>
<td>4121</td>
<td>Obsolete. Use 4141.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4122</td>
<td>Loop config</td>
<td>Cooling or Heating (Primary Use).</td>
<td>r/w</td>
</tr>
<tr>
<td>4123</td>
<td>Sensor Config</td>
<td>Sensor configuration—Internal, ZASF, or External.</td>
<td>r</td>
</tr>
<tr>
<td>4124</td>
<td>Damper Config</td>
<td>Damper configuration—Internal, ZASF, or External.</td>
<td>r</td>
</tr>
<tr>
<td>4125</td>
<td>Raw sensor reading</td>
<td>Real - raw sensor value, % of scale of 0-1.0&quot; WC.</td>
<td>r</td>
</tr>
<tr>
<td>4126</td>
<td>Raw sensor setpoint</td>
<td>Real - raw sensor Setpt, % of scale of 0-1.0&quot;WC.</td>
<td>r</td>
</tr>
<tr>
<td>4127</td>
<td>Moves Today</td>
<td>Number of damper moves, current day.</td>
<td>r</td>
</tr>
<tr>
<td>4128</td>
<td>Moves Yesterday</td>
<td>Number of damper moves yesterday.</td>
<td>r</td>
</tr>
<tr>
<td>4129</td>
<td>Fan Lock</td>
<td>Fan lock value—on or off.</td>
<td>r/w</td>
</tr>
<tr>
<td>4130</td>
<td>Fan Output</td>
<td>Status of fan pass-through wire.</td>
<td>r</td>
</tr>
<tr>
<td>4131</td>
<td>Status Flags</td>
<td>BACnet status flags.</td>
<td>r</td>
</tr>
<tr>
<td>4132</td>
<td>Test and Balance Tech Name</td>
<td>Name of test and balance technician.</td>
<td>r/w</td>
</tr>
<tr>
<td>4133</td>
<td>Test and Balance Org Name</td>
<td>Name of test and balance company.</td>
<td>r/w</td>
</tr>
<tr>
<td>4134</td>
<td>Last Test and Balance Date</td>
<td>Date of last test and balance activity through stand-alone Airflow Test and Balance Utility.</td>
<td>r/w</td>
</tr>
<tr>
<td>4135</td>
<td>Display Name</td>
<td>Copy of Display Name provided by microblock.</td>
<td>r/w</td>
</tr>
<tr>
<td>BACnet property identifier #</td>
<td>BACnet property identifier</td>
<td>Description</td>
<td>Read/Write</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------</td>
<td>-------------</td>
<td>------------</td>
</tr>
<tr>
<td>4136</td>
<td>Owning Program ID</td>
<td>Object ID for program containing this instance.</td>
<td>r</td>
</tr>
<tr>
<td>4137</td>
<td>Override Flags</td>
<td>Unsigned - Status flags of property overrides in effect.</td>
<td>r</td>
</tr>
<tr>
<td>4138</td>
<td>Max Occ Cooling Flow Override</td>
<td>Real - volatile override for Max Occ Cooling Flow (4096).</td>
<td>r/w</td>
</tr>
<tr>
<td>4139</td>
<td>Min Occ Flow Override</td>
<td>Real - volatile override for Min Occ Flow (4098).</td>
<td>r/w</td>
</tr>
<tr>
<td>4140</td>
<td>Pars Stamp</td>
<td>BACnet DateTime - volatile, used to detect writes by external test and balance software.</td>
<td>r/w</td>
</tr>
<tr>
<td>4141</td>
<td>Lock Flags</td>
<td>Binary lock bits whether to apply locks. Include one of the following index numbers in the address field:</td>
<td>r/w</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4141(4) Holds the damper in its current position.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4141(5) Locks the fan to the Fan Lock State property value.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4141(6) Locks the damper to the Damper Position Lock Value property.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4141(7) Locks the aux heat to the Aux Heat Percentage Lock Value property.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4141(8) Locks the flow setpoint to the Flow Setpoint Lock Value property.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>NOTE</strong> 4141(0) creates a “Write access denied” error message.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>For example, bacnet://this/768:1/4141(4)</td>
<td></td>
</tr>
</tbody>
</table>

**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.

**Microblock family**

*I/O Point microblocks* (page 30)

**Icon and symbol**

![AIRFLOW_PD](image)
**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 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.

\[
\text{Damper Setpoint} = ((\% \text{ Damper Request}) \times (\text{Max. Damper Position} - \text{Min. Damper Position})) + \text{Min. Damper Position}.
\]

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:

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

<table>
<thead>
<tr>
<th>Fan</th>
<th>Fan start/stop signal. Usually passed directly from the Fan input, unless controlled by the Airflow Test and Balance Utility for testing and balancing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aux Heat</td>
<td>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.</td>
</tr>
</tbody>
</table>

### Terminal Mode
Analog value that represents the current mode of the air terminal:

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Heat</td>
</tr>
<tr>
<td>3</td>
<td>Warmup</td>
</tr>
<tr>
<td>4</td>
<td>Vent</td>
</tr>
<tr>
<td>5</td>
<td>N/A</td>
</tr>
<tr>
<td>6</td>
<td>Cool</td>
</tr>
<tr>
<td>7</td>
<td>Dehumidification</td>
</tr>
<tr>
<td>8</td>
<td>Reheat</td>
</tr>
<tr>
<td>9</td>
<td>Pressure</td>
</tr>
<tr>
<td>10</td>
<td>Evac</td>
</tr>
<tr>
<td>11</td>
<td>N/A</td>
</tr>
<tr>
<td>12</td>
<td>Zone IAQ</td>
</tr>
<tr>
<td>13</td>
<td>Zone Test and Balance</td>
</tr>
</tbody>
</table>

### 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 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>
<thead>
<tr>
<th>Display Name</th>
<th>The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the &quot; character.</th>
</tr>
</thead>
</table>
| 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 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 Field Assistant and Field Assistant Test and Balance section on the microblock pop-up Details tab. |

Hardware Configuration

<table>
<thead>
<tr>
<th>Damper Motor Travel Time</th>
<th>The time (seconds) the damper motor takes to travel from its fully open to its fully closed position.</th>
</tr>
</thead>
</table>
| 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

<table>
<thead>
<tr>
<th>Cooling Min</th>
<th>The minimum specified damper position for the cooling mode (HEAT MODE input is off).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling Max</td>
<td>The maximum specified damper position for the cooling mode (HEAT MODE input is off).</td>
</tr>
<tr>
<td>Reheat Min</td>
<td>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.</td>
</tr>
</tbody>
</table>
Microblock reference

<table>
<thead>
<tr>
<th>Property</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heating Min</strong></td>
<td>The minimum specified damper position for the heating or warm-up mode (HEAT MODE input is on).</td>
</tr>
<tr>
<td><strong>Heating Max</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Vent Position</strong></td>
<td>The specified damper position when the air terminal is in Vent mode.</td>
</tr>
</tbody>
</table>

**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.

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

<table>
<thead>
<tr>
<th>Number</th>
<th>Property Name</th>
<th>Description</th>
<th>Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>4525</td>
<td>PD_LOCK_FLAGS</td>
<td>Binary lock bits whether to apply locks. Include one of the following index numbers in the address field.</td>
<td>R/W</td>
</tr>
<tr>
<td>4527</td>
<td>PD_DAMP_CONFIG</td>
<td>Damper config - internal, external, stroke time, direction.</td>
<td>R</td>
</tr>
<tr>
<td>4528</td>
<td>PD_MOVES_TODAY</td>
<td>Number of damper movements today.</td>
<td>R</td>
</tr>
<tr>
<td>4529</td>
<td>PD_MOVES_YESTERDAY</td>
<td>Number of damper movements yesterday.</td>
<td>R</td>
</tr>
<tr>
<td>4530</td>
<td>PD_FAN_LOCK</td>
<td>Fan lock value - on or off.</td>
<td>R/W</td>
</tr>
<tr>
<td>4531</td>
<td>PD_FAN_OUTPT</td>
<td>Fan output status.</td>
<td>R</td>
</tr>
<tr>
<td>4532</td>
<td>PD_PROP_STAT_FLAG</td>
<td>BACnet status flags.</td>
<td>R</td>
</tr>
<tr>
<td>4533</td>
<td>PD_TAB_TECH_NAME</td>
<td>Test and Balance technician name.</td>
<td>R/W</td>
</tr>
<tr>
<td>4534</td>
<td>PD_TAB_ORG_NAME</td>
<td>Test and Balance Company name.</td>
<td>R/W</td>
</tr>
<tr>
<td>4535</td>
<td>PD_LAST_TAB_DATE</td>
<td>Last Test and Balance Date.</td>
<td>R/W</td>
</tr>
<tr>
<td>4536</td>
<td>PD_DISPLAY_NAME</td>
<td>Microblock Display Name.</td>
<td>R/W</td>
</tr>
<tr>
<td>4537</td>
<td>PD_OWN_PRG_OBJ_ID</td>
<td>Object ID for program containing this instance.</td>
<td>R</td>
</tr>
<tr>
<td>4538</td>
<td>PD_OVR_FLAGS</td>
<td>Unsigned - Status flags of property overrides in effect.</td>
<td>R</td>
</tr>
<tr>
<td>4539</td>
<td>PD_MIN_COOL_POSITION_OVR</td>
<td>Real - Volatile override for Min Cool Position.</td>
<td>R/W</td>
</tr>
<tr>
<td>4540</td>
<td>PD_MAX_COOL_POSITION_OVR</td>
<td>Real - Volatile override for Max Cool Position.</td>
<td>R/W</td>
</tr>
<tr>
<td>4541</td>
<td>PD_MIN_REHEAT_POSITION_OVR</td>
<td>Real - Volatile override for Min Reheat Position.</td>
<td>R/W</td>
</tr>
<tr>
<td>4542</td>
<td>PD_MIN_HEAT_POSITION_OVR</td>
<td>Real - Volatile override for Min Heat Position.</td>
<td>R/W</td>
</tr>
<tr>
<td>4543</td>
<td>PD_MAX_HEAT_POSITION_OVR</td>
<td>Real - Volatile override for Max Heat Position.</td>
<td>R/W</td>
</tr>
<tr>
<td>4544</td>
<td>PD_VENT_POSITION_OVR</td>
<td>Real - Volatile override for Vent Position.</td>
<td>R/W</td>
</tr>
<tr>
<td>4545</td>
<td>PD_TAB__PARS_SEAL</td>
<td>BACnet DateTime - volatile - used to detect writes by external test and balance software.</td>
<td>R/W</td>
</tr>
<tr>
<td>4546</td>
<td>PD_LOCK_FLAGS_BOOL</td>
<td>Boolean array of lock flags for damper, fan and aux heat.</td>
<td>R</td>
</tr>
<tr>
<td>4547</td>
<td>PD_PROP_STAT_FLAGS_BOOL</td>
<td>Boolean array of BACnet status flags.</td>
<td>R</td>
</tr>
<tr>
<td>4548</td>
<td>PD_BPD_VERSION</td>
<td>Microblock version number.</td>
<td>R</td>
</tr>
</tbody>
</table>

---

**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.

**Microblock family**  
/I/O Point microblocks (page 30)
### 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 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 placed 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 OVERRIDE=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**

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

**Outputs**

<table>
<thead>
<tr>
<th>Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUCT SP</td>
<td>The current duct static pressure (in H2O).</td>
</tr>
<tr>
<td>WSP SETPNT</td>
<td>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.</td>
</tr>
<tr>
<td>DAMPER POS</td>
<td>Current position of the bypass damper (% open to bypass).</td>
</tr>
<tr>
<td>SP SETPNT</td>
<td>The configured (base) duct static pressure setpoint.</td>
</tr>
<tr>
<td>MAX LAT SP</td>
<td>The configured maximum LAT duct static pressure setpoint. This is the maximum duct static pressure that will be used during LAT override.</td>
</tr>
<tr>
<td>CAL ACTIVE</td>
<td>A binary value that indicates if the airflow sensor static pressure reading is being calibrated (yes/no) in the Test &amp; Balance screen. <strong>NOTE</strong> LAT OVERRIDE must be 0% before the Cal Active output goes to “yes”.</td>
</tr>
</tbody>
</table>

**Properties**

**TIPS**

• **Alt+click** any value in the interface to view property details, including its editing privilege and expression.
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** | Use the default reference name unless you want a more descriptive name for graphics or network links. |
| **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 Field Assistant interface to find out what the actual privilege is. |
| **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

<table>
<thead>
<tr>
<th><strong>Field</strong></th>
<th><strong>Description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display Name</strong></td>
<td>The microblock label used in the interface. You can use any characters (including spaces) in this field, except for the * character.</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>(optional) A BACnet-visible microblock description.</td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>The increment by which the microblock updates the value on its output wire.</td>
</tr>
</tbody>
</table>

## BACnet Configuration

<table>
<thead>
<tr>
<th><strong>Network Visible</strong></th>
<th>Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object ID</strong></td>
<td><strong>Auto-assign</strong> - A BACnet Object ID is assigned by the system. <strong>Use specific value</strong> - (0 - 3999999) Assign a number that is unique within the controller.</td>
</tr>
<tr>
<td><strong>COV Increment</strong></td>
<td>An Analog Network Input (ANI) that references this microblock in its <strong>Address</strong> 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 <strong>COV Increment</strong>. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's <strong>Refresh Time</strong> field.</td>
</tr>
</tbody>
</table>

## Trends

<table>
<thead>
<tr>
<th><strong>Enable Trend Log</strong></th>
<th>Check to have the controller collect trend data for the microblock's present value.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample every ____ (hh:mm:ss)</strong></td>
<td>Records the microblock's present value at this interval. <strong>EXAMPLE</strong> Type 00:10:00 to record the microblock's present value every 10 minutes.</td>
</tr>
<tr>
<td><strong>Sample on COV (change of value)</strong></td>
<td>Records the microblock's present value only when the value changes by at least the <strong>COV Increment</strong>.</td>
</tr>
<tr>
<td><strong>Max samples</strong></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. Click <strong>Reset</strong> in the Field Assistant interface to delete all samples currently stored in the controller. <strong>Enable Trend Historian</strong></td>
</tr>
</tbody>
</table>

---

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Help  
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### 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**

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**.

- ![](https://via.placeholder.com/15) = 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**

```
High = 225
  215

Low = -25
  -15
```

#### Delay Seconds

The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.
Microblock reference

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

- **Analog Network Input** (page 121)
  
  Reads an analog value from a specific address on the network.

- **Analog Network Input 2** (page 127)
  
  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.

- **Binary Network Input** (page 133)
  
  Reads a binary (digital) value from a specific address on the network.

- **Binary Network Input 2** (page 138)
  
  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

- **Analog Network Output** (page 143)
  
  Writes an analog value to a specific address on the network.

- **Analog Network Output 2** (page 145)
  
  Writes an analog value to a specific address on the network. Stops writing to the target address when the Enable input is false (off).

- **Binary Network Output** (page 148)
  
  Writes a binary (digital) value to a specific address on the network.

- **Binary Network Output 2** (page 150)
  
  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
**BACnet Collector** (page 152)

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

**BACnet Provider** (page 154)

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**

**BACnet Analog Sensed Value Input** (page 156)

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

**BACnet Binary Sensed Value Input** (page 162)

Reads a binary value from up to 5 ZS or WS sensors, and makes the value available to the control program on an output wire. If the Rnet has more than one ZS or WS 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.

**Sensor Binder** (page 166)

A Sensor Binder microblock is required if your control programs is to work with ZS or WS sensors. This microblock is where you define up to 5 uniquely-addressed ZS or WS 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.

**Microblock family**  
*Network I/O microblocks* (page 120)

**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**

<table>
<thead>
<tr>
<th>Elapsed time (minutes)</th>
<th>Action</th>
<th>Target Lifetime TimeRemaining (minutes)</th>
<th>Input 1 Next Subscription (minutes)</th>
<th>Input 2 Next Subscription (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Input 1 subscribes to target</td>
<td>21 (Input 1)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Target broadcasts COV notification because Input 1 subscribed</td>
<td>21</td>
<td>21 ≤ 10 + 11, so keep current value of 10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Input 2 subscribes to target</td>
<td>21</td>
<td>10 · 2 = 8</td>
<td>10</td>
</tr>
<tr>
<td>0</td>
<td>Target broadcasts COV notification because Input 2 subscribed</td>
<td>21</td>
<td>21 &gt; 8 + 11, so add 10 to current value of 8 8 + 10 = 18</td>
<td>21 ≤ 10 + 11, so keep current value of 10</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>21 - 3 = 18</td>
<td>18 - 3 = 15</td>
<td>10 - 3 = 7</td>
</tr>
<tr>
<td>0</td>
<td>Target broadcasts COV notification because value changed</td>
<td>18</td>
<td>18 ≤ 15 + 11, so keep current value of 15 18 ≤ 7 + 11 so keep current value of 7</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>18 - 7 = 11</td>
<td>15 - 7 = 8</td>
<td>7 - 7 = 0 resubscribe</td>
</tr>
</tbody>
</table>
**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 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>
<thead>
<tr>
<th>Elapsed time (minutes)</th>
<th>Action</th>
<th>Target Lifetime TimeRemaining (minutes)</th>
<th>Input 1 Next Subscription (minutes)</th>
<th>Input 2 Next Subscription (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Input 2 resubscribes</td>
<td>21 (Input 2)</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>0</td>
<td>Target broadcasts COV notification because Input 2 subscribed</td>
<td>21</td>
<td>21 &gt; 8 + 11, so add 10 to current value 8 + 10 = 18</td>
<td>21 ≤ 10 + 11, so keep current value of 10</td>
</tr>
</tbody>
</table>

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.
**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 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 452) 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 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 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 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 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 **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.
Icon and symbol

| ANI2 | point name | ANI2 | Valid? |

**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 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

<table>
<thead>
<tr>
<th>Elapsed time (minutes)</th>
<th>Action</th>
<th>Target Lifetime</th>
<th>Input 1 Next Subscription</th>
<th>Input 2 Next Subscription</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TimeRemaining</td>
<td>(minutes)</td>
<td>(minutes)</td>
</tr>
<tr>
<td>Elapsed time (minutes)</td>
<td>Action</td>
<td>Target Lifetime TimeRemaining (minutes)</td>
<td>Input 1 Next Subscription (minutes)</td>
<td>Input 2 Next Subscription (minutes)</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------</td>
<td>----------------------------------------</td>
<td>-------------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>0</td>
<td>Input 1 subscribes to target</td>
<td>21 (Input 1)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Target broadcasts COV notification because Input 1 subscribed</td>
<td>21</td>
<td>21 ≤ 10 + 11, so keep current value of 10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Input 2 subscribes to target</td>
<td>21 (Input 2)</td>
<td>10 - 2 = 8</td>
<td>10</td>
</tr>
<tr>
<td>0</td>
<td>Target broadcasts COV notification because Input 2 subscribed</td>
<td>21</td>
<td>21 &gt; 8 + 11, so add 10 to current value of 8 8 + 10 = 18</td>
<td>21 ≤ 10 + 11, so keep current value of 10</td>
</tr>
<tr>
<td>3</td>
<td>21 - 3 = 18</td>
<td>18 - 3 = 15</td>
<td>10 - 3 = 7</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Target broadcasts COV notification because value changed</td>
<td>18</td>
<td>18 ≤ 15 + 11 so keep current value of 15</td>
<td>18 ≤ 7 + 11 so keep current value of 7</td>
</tr>
<tr>
<td>7</td>
<td>18 - 7 = 11</td>
<td>15 - 7 = 8</td>
<td>7 - 7 = 0 resubscribe</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Input 2 resubscribes</td>
<td>21 (Input 2)</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>0</td>
<td>Target broadcasts COV notification because Input 2 subscribed</td>
<td>21</td>
<td>21 &gt; 8 + 11, so add 10 to current value 8 + 10 = 18</td>
<td>21 ≤ 10 + 11, so keep current value of 10</td>
</tr>
</tbody>
</table>

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 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>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display Name</strong></td>
<td>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</td>
</tr>
<tr>
<td><strong>Reference Name</strong></td>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links.</td>
</tr>
</tbody>
</table>
| **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 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 452) 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 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 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 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Network I/O microblocks (page 120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>GNT</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Elapsed time (minutes)</th>
<th>Action</th>
<th>Target Lifetime</th>
<th>Target TimeRemaining (minutes)</th>
<th>Input 1 Next Subscription (minutes)</th>
<th>Input 2 Next Subscription (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Input 1 subscribes to target</td>
<td>21</td>
<td>21 (Input 1)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Target broadcasts COV notification because Input 1 subscribed</td>
<td>21</td>
<td>21 ≤ 10 + 11, so keep current value of 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Input 2 subscribes to target</td>
<td>21</td>
<td>10 · 2 = 8</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Target broadcasts COV notification because Input 2 subscribed</td>
<td>21</td>
<td>21 &gt; 8 + 11, so add 10 to current value of 8</td>
<td>21 ≤ 10 + 11, so keep current value of 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 + 10 = 18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>21 · 3 = 18</td>
<td>18 · 3 = 15</td>
<td>10 · 3 = 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Target broadcasts COV notification because value changed</td>
<td>18</td>
<td>18 ≤ 15 + 11, so keep current value of 15</td>
<td>18 ≤ 7 + 11, so keep current value of 7</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>18 · 7 = 11</td>
<td>15 · 7 = 8</td>
<td>7 · 7 = 0 resubscribe</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Elapsed time (minutes) | Action | Target Lifetime | TimeRemaining (minutes) | Input 1 Next Subscription (minutes) | Input 2 Next Subscription (minutes)
--- | --- | --- | --- | --- | ---
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 | 10 | 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 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 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
<table>
<thead>
<tr>
<th><strong>Lock Present Value</strong></th>
<th>Check to output the locked value from the microblock instead of the microblock's calculated value.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Editing Privilege</strong></td>
<td><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</td>
</tr>
<tr>
<td></td>
<td>CAUTION If you change the <strong>Editing Privilege</strong> from <strong>Preset</strong>, the privilege you select will be used for all properties of this microblock, which is not always desirable.</td>
</tr>
<tr>
<td><strong>Address</strong></td>
<td>The address of the target BACnet object property or third-party value (if the controller supports the third-party protocol). See <strong>To format a BACnet address</strong> (page 452) or the applicable third-party protocol Integration Guide.</td>
</tr>
<tr>
<td></td>
<td>This microblock reads a BACnet target's value using one of 2 methods depending on the interval you specify in the <strong>Refresh Time</strong> field.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE</strong> For a target in the Carrier controller, you can specify the network microblock's <strong>Address</strong> in:</td>
</tr>
<tr>
<td></td>
<td>• Your system - Select the target in the tree on the microblock's <strong>Properties</strong> page <strong>Details</strong> tab. The system creates the address for you.</td>
</tr>
<tr>
<td></td>
<td>• The Snap application - In the microblock's properties</td>
</tr>
<tr>
<td></td>
<td>• The SiteBuilder application - If your product supports source trees and you are using them, SiteBuilder creates the address for you.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE</strong> You can uncheck the <strong>Editable</strong> field in the Snap Property Editor to prevent editing of the address in the system.</td>
</tr>
<tr>
<td></td>
<td><strong>TIP</strong> 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 &quot;Create a control program&quot; in the <strong>BACnet Integration Guide</strong>.</td>
</tr>
<tr>
<td><strong>Default Value</strong></td>
<td>The value that the microblock outputs when communication with all specified targets fails or when <strong>Communications Enabled</strong> is not checked. The default value is used when the <strong>Valid?</strong> output is False (<strong>Off</strong>).</td>
</tr>
<tr>
<td><strong>Inactive Text</strong></td>
<td>The <strong>Inactive Text</strong> your system displays when the microblock's output is off, or false.</td>
</tr>
<tr>
<td><strong>Active Text</strong></td>
<td>The <strong>Active Text</strong> your system displays when the microblock's output is on, or true.</td>
</tr>
<tr>
<td><strong>Communications Enabled</strong></td>
<td>Check to enable network communications for this microblock. Uncheck when troubleshooting.</td>
</tr>
</tbody>
</table>
Microblock reference

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

警告 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.

Microblock family

Network I/O microblocks (page 120)

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 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**

<table>
<thead>
<tr>
<th>Elapsed time (minutes)</th>
<th>Action</th>
<th>Target Lifetime TimeRemaining (minutes)</th>
<th>Input 1 Next Subscription (minutes)</th>
<th>Input 2 Next Subscription (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Input 1 subscribes to target</td>
<td>21 (Input 1)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Target broadcasts COV notification because Input 1 subscribed</td>
<td>21</td>
<td>21 ≤ 10 + 11, so keep current value of 10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Input 2 subscribes to target</td>
<td>21 (Input 2)</td>
<td>10 - 2 = 8</td>
<td>10</td>
</tr>
<tr>
<td>0</td>
<td>Target broadcasts COV notification because Input 2 subscribed</td>
<td>21</td>
<td>21 &gt; 8 + 11, so add 10 to current value of 8 8 + 10 = 18</td>
<td>21 ≤ 10 + 11, so keep current value of 10</td>
</tr>
<tr>
<td>3</td>
<td>21 - 3 = 18</td>
<td>18 - 3 = 15</td>
<td>10 - 3 = 7</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Target broadcasts COV notification because value changed</td>
<td>18</td>
<td>18 ≤ 15 + 11 so keep current value of 15</td>
<td>18 ≤ 7 + 11 so keep current value of 7</td>
</tr>
</tbody>
</table>
### Elapsed time (minutes) | Action | Target Lifetime Time Remaining (minutes) | Input 1 Next Subscription (minutes) | Input 2 Next Subscription (minutes)
---|---|---|---|---
7 | Input 2 resubscribes | 18 - 7 = 11 | 15 - 7 = 8 | 7 - 7 = 0 resubscribe
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 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 Field Assistant interface. You can use any characters except the " character.
<table>
<thead>
<tr>
<th><strong>Reference Name</strong></th>
<th><strong>Lock Present Value</strong></th>
<th><strong>Editing Privilege</strong></th>
<th><strong>Address</strong></th>
<th><strong>Secondary Address</strong></th>
<th><strong>Default Value</strong></th>
<th><strong>Inactive Text</strong></th>
<th><strong>Active Text</strong></th>
<th><strong>Communications Enabled</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RefName</strong></td>
<td></td>
<td><strong>Preset</strong></td>
<td>The address of the target BACnet object property or third-party value (if the controller supports the third-party protocol). See <em>To format a BACnet address</em> (page 452) or the applicable third-party protocol Integration Guide.</td>
<td>The address the microblock reads if communication fails with the <strong>Address</strong> field target.</td>
<td>The value that the microblock outputs when communication with all specified targets fails or when <strong>Communications Enabled</strong> is not checked. The default value is used when the <strong>Valid?</strong> output is False (Off).</td>
<td>The <strong>Inactive Text</strong> your system displays when the microblock’s output is off, or false.</td>
<td>The <strong>Active Text</strong> your system displays when the microblock’s output is on, or true.</td>
<td>Check to enable network communications for this microblock. Uncheck when troubleshooting.</td>
</tr>
<tr>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations:</td>
<td>Check to output the locked value from the microblock instead of the microblock’s calculated value.</td>
<td>Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is. <strong>CAUTION</strong> If you change the <strong>Editing Privilege</strong> from <strong>Preset</strong>, the privilege you select will be used for all properties of this microblock, which is not always desirable.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Limitations:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• lower case only</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• limited to 40 characters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• cannot begin with a number</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>• must be unique within a control program</td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>NOTE</strong> For a target in the Carrier controller, you can specify the network microblock’s <strong>Address</strong> in:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Your system - Select the target in the tree on the microblock’s <strong>Properties</strong> page <strong>Details</strong> tab. The system creates the address for you.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The Snap application - In the microblock’s properties</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The SiteBuilder application - If your product supports source trees and you are using them, SiteBuilder creates the address for you.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NOTE</strong> You can uncheck the <strong>Editable</strong> field in the Snap Property Editor to prevent editing of the address in the system.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TIP</strong> 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.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Network I/O microblocks (page 120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>![RNO](point name RNO)</td>
</tr>
<tr>
<td>What it does</td>
<td>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 &quot;read only&quot;. 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.</td>
</tr>
</tbody>
</table>
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 452) 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 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>
<thead>
<tr>
<th>Display Name</th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Name</td>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links.</td>
</tr>
<tr>
<td></td>
<td>Limitations:</td>
</tr>
<tr>
<td></td>
<td>• lower case only</td>
</tr>
<tr>
<td></td>
<td>• limited to 40 characters</td>
</tr>
<tr>
<td></td>
<td>• cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td>• must be unique within a control program</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 Field Assistant interface to find out what the actual privilege is.</td>
</tr>
</tbody>
</table>

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:                                                                 |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The Display resolution format is used to truncate the microblock's actual value. For example, if you enter a value from:</td>
</tr>
<tr>
<td></td>
<td>• 0.1 to 0.9, the system displays 1 digit to the right of the decimal</td>
</tr>
<tr>
<td></td>
<td>• 0.01 to 0.99, the system displays 2 digits to the right of the decimal</td>
</tr>
<tr>
<td></td>
<td>• 1 or greater, the system displays a whole number</td>
</tr>
<tr>
<td></td>
<td>The Display resolution value determines the increment by which the displayed value is updated. For example, if you enter:</td>
</tr>
<tr>
<td></td>
<td>• .2, the system displays 8.4, 8.6, 8.8, ...</td>
</tr>
<tr>
<td></td>
<td>• .03, the system displays 5.09, 5.12, 5.15, ...</td>
</tr>
<tr>
<td></td>
<td>• 10, the system displays 30, 40, 50, ...</td>
</tr>
</tbody>
</table>
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 452) 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 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 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 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 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.

Microblock family
Network I/O microblocks (page 120)

Icon and symbol

<table>
<thead>
<tr>
<th>point name</th>
<th>AN02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable?</td>
<td></td>
</tr>
</tbody>
</table>
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 452) 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 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 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
**Lock Present Value**
Check to output the locked value from the microblock instead of the microblock's calculated value.

**Editing Privilege**
Presets - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the 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 452) 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 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 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 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 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).
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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Network I/O microblocks (page 120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="point_name_BNO" alt="BNO" /></td>
</tr>
<tr>
<td>What it does</td>
<td>Writes a binary (digital) value to a specific address on the network.</td>
</tr>
<tr>
<td></td>
<td>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 &quot;read only&quot;.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

**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 452) 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 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 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 |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lock Present Value</strong></td>
<td>Check to output the locked value from the microblock instead of the microblock's calculated value.</td>
</tr>
</tbody>
</table>
| **Editing Privilege** | **Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the 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 452) 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 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 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 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. |
Microblock reference

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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Network I/O microblocks (page 120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="Binary Network Output 2 Icon" /></td>
</tr>
</tbody>
</table>

**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 452) 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 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 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 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 452) 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 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 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 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Network I/O microblock (page 120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>COLLECTOR</td>
</tr>
</tbody>
</table>

**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 interface to view property details, including its editing privilege and expression
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>
<thead>
<tr>
<th><strong>Name</strong></th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the * character.</th>
</tr>
</thead>
</table>
| **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.

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

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.

Microblock family Network I/O microblock (page 120)

Icon and symbol PROVIDER Application Name

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 Collector's Feedback data. The Provider will actively create these associations when either of the Collector's 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 accessed 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 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>
<thead>
<tr>
<th>Display Name</th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the * character.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Name</td>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations:</td>
</tr>
<tr>
<td>Application Type</td>
<td>A numeric value representing the system application type.</td>
</tr>
<tr>
<td>Application Instance</td>
<td>A numeric value that defines the specific instance of an application. This value is usually set to 1.</td>
</tr>
<tr>
<td>Network Number</td>
<td>The network number of the device that contains the Collector that the Provider should associate with.</td>
</tr>
<tr>
<td>Collector Address</td>
<td>The address of the device that contains the Collector that the Provider should associate with.</td>
</tr>
<tr>
<td>Output Update Time</td>
<td>The amount of time the Provider will wait before sending successive updates of its Output values to its associated Collector.</td>
</tr>
<tr>
<td>Feedback Expiration Time</td>
<td>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.</td>
</tr>
<tr>
<td>Show Property Page Text</td>
<td>Check to show this microblock's value on the equipment's <strong>Properties</strong> page.</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>BACnet property identifier #</th>
<th>BACnet property identifier</th>
<th>Description</th>
<th>Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>4155</td>
<td>APPLICATION_ID</td>
<td>Application ID</td>
<td>R</td>
</tr>
<tr>
<td>4156</td>
<td>APPLICATION_INSTANCE</td>
<td>Application Instance</td>
<td>R/W</td>
</tr>
<tr>
<td>4157</td>
<td>UPDATE_TIME</td>
<td>Update Time</td>
<td>R</td>
</tr>
<tr>
<td>4158</td>
<td>EXPIRATION_TIME</td>
<td>Expiration Time</td>
<td>R</td>
</tr>
<tr>
<td>4611</td>
<td>PROV_NUMBER_OF_OUTPUT_ELEMENTS</td>
<td>Number of Output Elements</td>
<td>R</td>
</tr>
<tr>
<td>4612</td>
<td>PROV_NUMBER_OF_FEEDBACK_ELEMENTS</td>
<td>Number of Feedback Elements</td>
<td>R</td>
</tr>
<tr>
<td>4613</td>
<td>PROV_COLLECTOR_NETWORK</td>
<td>Collector Network Number</td>
<td>R/W</td>
</tr>
<tr>
<td>4614</td>
<td>PROV_COLLECTOR_ADDRESS</td>
<td>Collector Address</td>
<td>R/W</td>
</tr>
</tbody>
</table>

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.
**What it does**

Reads an analog value from up to 5 ZS or WS sensors, and makes the value available to the control program on an output wire. If the Rnet has more than one ZS or WS 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, CO₂, 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 166).

**How it works**

The **Valid?** output is False (Off) when communication fails with all sensors that are enabled in this ASVI microblock. When the **Valid?** output is False, the microblock outputs the **Default** value.

The **Valid?** output is True (On) when any of the sensors that are enabled in this ASVI microblock are communicating.

**Properties**

- **TIPS**
  - **Alt+click** any value in the 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 WS 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 °F 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 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

**Description**

(optional) A BACnet-visible microblock description.
Microblock reference

| Editing Privilege | Preset - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the 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 a 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. |

| Sensor Configuration: |

**Index/Enable** The Index number corresponds to the ZS or WS sensors defined in the Sensor Binder microblock (page 166). 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 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. |

**COV Increment** 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. |

**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. |

**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). |

**Input Smoothing** 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>
<thead>
<tr>
<th>Select...</th>
<th>To send out...</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>The raw value</td>
</tr>
<tr>
<td>Minimum</td>
<td>The average of the last 2 readings</td>
</tr>
<tr>
<td>Medium</td>
<td>The average of the last 5 readings</td>
</tr>
<tr>
<td>Maximum</td>
<td>The average of the last 9 readings</td>
</tr>
</tbody>
</table>

**ZS Sensor Display Configuration:** 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.
### Input Resolution

The increment by which the microblock updates the value on its output wire in a 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

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Network Visible</strong></td>
<td>Check to allow other BACnet equipment to read or change the microblock's present value. Must be checked for this microblock to generate alarms.</td>
</tr>
</tbody>
</table>
| **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. |

### Alarms

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Potential alarm source</strong></td>
<td>Check to make this microblock available in the system's Alarm Sources list.</td>
</tr>
<tr>
<td><strong>Critical</strong></td>
<td>Determines the color of the system-wide alarm button when the alarm comes in if the alarm's Template field is set to Universal.</td>
</tr>
<tr>
<td></td>
<td>≠ Critical ≠ = Non-critical</td>
</tr>
<tr>
<td><strong>Category</strong></td>
<td>The category you want to use to filter this microblock's alarms on the system's Alarms page &gt; View tab.</td>
</tr>
<tr>
<td><strong>Template</strong></td>
<td><strong>Universal</strong> - 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.</td>
</tr>
</tbody>
</table>

### Alarm

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low Limit Enable</strong></td>
<td>Check to send an alarm when the microblock's present value remains below the Low Limit value for the defined Delay Seconds.</td>
</tr>
<tr>
<td><strong>Low Limit</strong></td>
<td>The value the microblock's present value must drop below to send an alarm.</td>
</tr>
<tr>
<td><strong>High Limit Enable</strong></td>
<td>Check to send an alarm when the microblock's present value remains above the High Limit for the defined Delay Seconds.</td>
</tr>
<tr>
<td><strong>High Limit</strong></td>
<td>The value the microblock's present value must rise above to send an alarm.</td>
</tr>
</tbody>
</table>
## Dead Band

The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated.

**EXAMPLE**

![Graph showing Dead Band](image)

### 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 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 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 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 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:

\[(100 \times 10 \text{ bytes}) + 48 = 1048 \text{ bytes of memory}\]

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 a 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 a 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 a 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

- **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 120)

Icon and symbol

What It does
Reads a binary value from up to 5 ZS or WS sensors, and makes the value available to the control program on an output wire. If the Rnet has more than one ZS or WS 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 166).

Properties

TIPS
- **Alt+click** any value in the 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 WS 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 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

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 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 WS sensors defined in the Sensor Binder microblock (page 166). 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:

**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.

### 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.

### 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.

### 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.

### BACnet Configuration

### 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 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 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 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 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:

\[(100 \times 10 \text{ bytes}) + 48 = 1048 \text{ bytes of memory}\]

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 a 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 a system.

<table>
<thead>
<tr>
<th>Keep historical trends for ___ days</th>
<th>This is based on the date that the sample was read. Set this field to 0 to use the system default value.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Write to historian: Every ____ trend samples</td>
<td>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.</td>
</tr>
<tr>
<td>Use default (45% of Max samples)</td>
<td></td>
</tr>
</tbody>
</table>

In a system only:

<table>
<thead>
<tr>
<th>Stop When Full</th>
<th>Check this field to stop trend sampling when the maximum number of samples is reached.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable trend log at specific times only?</td>
<td>Collects trend data for the specific period of time you define in the time and date fields.</td>
</tr>
<tr>
<td>Store Trends Now</td>
<td>Writes all trend data in the controller to the system database without having to enable trend historian.</td>
</tr>
<tr>
<td>Trend samples accumulated since last notification</td>
<td>Shows the number of samples stored in the controller since data was last written to the database.</td>
</tr>
<tr>
<td>Last Record Written to Historian</td>
<td>Shows the number of trend samples that were last written to the database.</td>
</tr>
<tr>
<td>Delete</td>
<td>Deletes all trend samples stored in the database for the microblock.</td>
</tr>
<tr>
<td>BACnet Configuration</td>
<td>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.</td>
</tr>
</tbody>
</table>
**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Network I/O microblocks (page 120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="Sensor Binder ALARM" /></td>
</tr>
<tr>
<td><strong>What it does</strong></td>
<td>A Sensor Binder microblock is required if your control program is to work with ZS or WS sensors. This microblock is where you define up to 5 uniquely-addressed ZS or WS 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.</td>
</tr>
</tbody>
</table>

**Properties**

**TIPS**

- **Alt+click** any value in the 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>
<thead>
<tr>
<th><strong>Name</strong></th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reference Name</strong></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>
</tbody>
</table>
### Editing Privilege

**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the 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 system.

### Network Type

Select Rnet for each sensor that you define.

### Address

**ZS sensors**—The physical address set on the sensor's DIP switches.  
**WS 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 lock icon. The lock can be overridden in the Field Assistant interface or at the sensor by a user that knows the override procedure.

### Show Property Page

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

### In a system only:

**Version**

The product type, firmware version, and serial number of each sensor defined in this microblock.

**Status**

Each sensor's status

**Error**

Shows if any of the sensors are in error.

**Alarm**

Shows On if any of the sensors cannot communicate.

### 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 a 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.
BACnet Modeled Analog Input (page 169)
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 system.

BACnet Modeled Binary Input (page 172)
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 system.

BACnet Modeled Multi-State Input (page 174)
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 system. Multi-State microblocks are used to indicate values that have more than two discrete states.

BACnet Modeled Analog Output (page 177)
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 system.

BACnet Modeled Binary Output (page 180)
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 system.

BACnet Modeled Multi-State Output (page 182)
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 system. Multi-State microblocks are used to indicate values that have more than two discrete states.

BACnet Modeled Analog Value (page 185)
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 system.

BACnet Modeled Binary Value (page 188)
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 system.

BACnet Modeled Multi-State Value (page 190)
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 system.

BACnet Modeled Calendar (page 192)
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 system.

BACnet Modeled Trend (page 194)
This microblock reads trend data from other objects in any BACnet device on the network and makes these values available in the system.

BACnet Modeled Schedule (page 196)
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.

BACnet Modeled Event Enrollment (page 198)
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.
**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](http://accounts.automatedlogic.com/tlib.nsf/0/16B62CA979B5D8A8525717200678C60/$FILE/BACnet%20Integration%20Guide.pdf).

---

**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Display microblocks (page 167)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Icon and symbol</strong></td>
<td><img src="image" alt="Device Alias" /> <img src="image" alt="Object Instance" /> <strong>point name</strong></td>
</tr>
</tbody>
</table>
**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 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 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>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display Name</strong></td>
<td>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</td>
</tr>
<tr>
<td><strong>Reference Name</strong></td>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations:</td>
</tr>
<tr>
<td>RefName</td>
<td>• lower case only</td>
</tr>
<tr>
<td></td>
<td>• limited to 40 characters</td>
</tr>
<tr>
<td></td>
<td>• cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td>• must be unique within a control program</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>(optional) A BACnet-visible microblock description.</td>
</tr>
<tr>
<td><strong>Editing Privilege</strong></td>
<td>Preset - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</td>
</tr>
<tr>
<td></td>
<td><strong>CAUTION</strong> 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><strong>Units</strong></td>
<td>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 &gt; Preferences &gt; Droplist Options.</td>
</tr>
<tr>
<td><strong>Object Instance</strong></td>
<td>The instance number (0 to 4,194,303) of the BACnet object you are linking to.</td>
</tr>
<tr>
<td><strong>Device Alias</strong></td>
<td>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.</td>
</tr>
</tbody>
</table>
### 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 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 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 .

Select the checkbox in the **Write to Field** column to make the property editable from the 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 .

The following properties are always present. See the ANSI / ASHRAE Standard 135 for a description of additional properties that can be enabled in Snap.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object Name</strong></td>
<td>An alpha-numeric string that is unique within the BACnet device.</td>
</tr>
<tr>
<td><strong>Present Value</strong></td>
<td>The current value of the BACnet object.</td>
</tr>
<tr>
<td><strong>Status flags</strong></td>
<td>If this microblock is enabled as a potential alarm source, this will show <strong>Status</strong> checkboxes on the Alarms &gt; Enable/Disable tab that indicate the current alarm status of the BACnet object.</td>
</tr>
<tr>
<td><strong>Event state</strong></td>
<td>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 &gt; Enable/Disable tab.</td>
</tr>
<tr>
<td><strong>Out of Service</strong></td>
<td>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 .</td>
</tr>
<tr>
<td><strong>Object ID</strong></td>
<td>A combination of the Object Type and the Object Instance number.</td>
</tr>
<tr>
<td><strong>Address</strong></td>
<td>The address of the BACnet object that this microblock references.</td>
</tr>
</tbody>
</table>

### 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 text

The message displayed on the 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 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 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 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.

**Microblock family**

Display microblocks (page 167)

**Icon and symbol**

![BI](BI.png) BI point name

**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 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 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 Field Assistant interface. You can use any characters except the " character.
## Microblock reference

| **Reference Name** | Use the default reference name unless you want a more descriptive name for graphics or network links. **Limitations:**
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RefName</strong></td>
<td>• lower case only</td>
</tr>
<tr>
<td></td>
<td>• limited to 40 characters</td>
</tr>
<tr>
<td></td>
<td>• cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td>• must be unique within a control program</td>
</tr>
</tbody>
</table>

| **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 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 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 **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. Select the checkbox in the **Write to Field** column to make the property editable from the **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. |

| **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. |
| **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**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential alarm source</td>
<td>Check to make this microblock available in the system's Alarm Sources list.</td>
</tr>
<tr>
<td>Critical</td>
<td>Determines the color of the system-wide alarm button when the alarm comes in if the alarm's Template field is set to Universal.</td>
</tr>
</tbody>
</table>
|                          | ![Critical](critical_icon) = Critical  
                          | ![Non-critical](non_critical_icon) = 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**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm text</td>
<td>The message displayed on the Field Assistant Alarms page &gt; View tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
</tbody>
</table>

**Return to Normal**

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return text</td>
<td>The message displayed on the Field Assistant Alarms page &gt; View tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
</tbody>
</table>

---

**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.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microblock family</td>
<td>Display microblocks (page 167)</td>
</tr>
</tbody>
</table>
| Icon and symbol           | ![MSI](msi_icon)  
                          | ![MSI point name](msi_point_name_icon) |

---

Field Assistant v6.5  
Help  
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**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 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 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>
<thead>
<tr>
<th>Display Name</th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Name</td>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links.</td>
</tr>
<tr>
<td>Limitations:</td>
<td></td>
</tr>
</tbody>
</table>
  - 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 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. |
Microblock reference

### 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 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 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.

Select the checkbox in the Write to Field column to make the property editable from the 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.

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.
- **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.

- ![](危) = Critical
- ![](非) = 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 text

The message displayed on the 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 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 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 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.

**Microblock family**

Display microblocks (page 167)

**Icon and symbol**

\[ \text{Icon and symbol} \]

**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 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 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 Field Assistant interface. You can use any characters except the " character.
Microblock reference

| **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.  |
| **Editing Privilege** | **Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the 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  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 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 .  |
|                     | Select the checkbox in the *Write to Field* column to make the property editable from the 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 .  |

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 .  |
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 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 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 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 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 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Display microblocks (page 167)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>![point name icon]</td>
</tr>
<tr>
<td>What it does</td>
<td>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 system. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the <strong>Object Instance</strong> setting described below. A Display microblock is most often used to display information from other vendor's equipment on <strong>Graphics</strong> and <strong>Properties</strong> 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 <strong>Present</strong> column to select which properties to get.</td>
</tr>
</tbody>
</table>

**Properties**

**TIPS**
- **Alt+click** any value in the 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>
<thead>
<tr>
<th>Display Name</th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Name</td>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations:</td>
</tr>
<tr>
<td></td>
<td>• lower case only</td>
</tr>
<tr>
<td></td>
<td>• limited to 40 characters</td>
</tr>
<tr>
<td></td>
<td>• cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td>• must be unique within a control program</td>
</tr>
<tr>
<td>Description</td>
<td>(optional) A BACnet-visible microblock description.</td>
</tr>
<tr>
<td>Editing Privilege</td>
<td><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</td>
</tr>
<tr>
<td>Inactive Text</td>
<td>The <strong>Inactive Text</strong> your system displays when the microblock's output is off, or false.</td>
</tr>
<tr>
<td><strong>Active Text</strong></td>
<td>The <strong>Active Text</strong> your system displays when the microblock's output is on, or true.</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Object Instance</strong></td>
<td>The instance number (0 to 4,194,303) of the BACnet object you are linking to.</td>
</tr>
<tr>
<td><strong>Device Alias</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Show Property Page Text</strong></td>
<td>Check to show this microblock's value on the equipment’s Properties page.</td>
</tr>
<tr>
<td><strong>Supports Locked Value</strong></td>
<td>Allows the BACnet object to be locked to a specific value and held at that value until unlocked. The locked value takes precedence over any priority array value.</td>
</tr>
<tr>
<td><strong>BACnet object properties</strong></td>
<td>Select the checkbox in the <strong>Present</strong> column to show the BACnet object property on the Properties page. Properties that do not have a checkbox in the <strong>Present</strong> column are always shown. <strong>CAUTION</strong> If you select a property that is not in the BACnet device, you will get an error in . Select the checkbox in the <strong>Write to Field</strong> column to make the property editable from the Properties page. <strong>CAUTION</strong> If you select <strong>Write to Field</strong> for a property that is read-only in the BACnet device, you will get an error in .</td>
</tr>
</tbody>
</table>

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 . |
| **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 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. |
Microblock reference

| **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 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 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 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 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.

| **Microblock family** | Display microblocks (page 167) |
| **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 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 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>
<thead>
<tr>
<th>Display Name</th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
</table>
| 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. |
| Editing Privilege | **Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the 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 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 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.

Select the checkbox in the **Write to Field** column to make the property editable from the 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.

The following properties are always present. See the ANSI / ASHRAE Standard 135 for a description of additional properties that can be enabled in Snap.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object Name</strong></td>
<td>An alpha-numeric string that is unique within the BACnet device.</td>
</tr>
<tr>
<td><strong>Present Value</strong></td>
<td>The current value of the BACnet object.</td>
</tr>
<tr>
<td><strong>Status flags</strong></td>
<td>If this microblock is enabled as a potential alarm source, this will show Status checkboxes on the Alarms &gt; Enable/Disable tab that indicate the current alarm status of the BACnet object.</td>
</tr>
<tr>
<td><strong>Event state</strong></td>
<td>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 &gt; Enable/Disable tab.</td>
</tr>
<tr>
<td><strong>Out of Service</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Number of States</strong></td>
<td>The number of states currently defined for the BACnet object.</td>
</tr>
<tr>
<td><strong>Priority Array</strong></td>
<td>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 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.</td>
</tr>
<tr>
<td><strong>Relinquish Default</strong></td>
<td>The default value used for the present value when no values have been written at any priority.</td>
</tr>
<tr>
<td><strong>Object ID</strong></td>
<td>A combination of the Object Type and the Object Instance number.</td>
</tr>
<tr>
<td><strong>Address</strong></td>
<td>The address of the BACnet object that this microblock references.</td>
</tr>
</tbody>
</table>

### 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**. |
| **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 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 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 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 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.

| **Microblock family** | **Display microblocks (page 167)** |
| **Icon and symbol** | ![RV](image) ![point name](image) ![RV](image) |
| **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 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 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>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display Name</td>
<td>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</td>
</tr>
</tbody>
</table>
| 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.                                        |
| Editing Privilege   | **Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the 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 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 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.
- Select the checkbox in the **Write to Field** column to make the property editable from the 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.
The following properties are always present. See the ANSI / ASHRAE Standard 135 for a description of additional properties that can be enabled in Snap.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object Name</td>
<td>An alpha-numeric string that is unique within the BACnet device.</td>
</tr>
<tr>
<td>Present Value</td>
<td>The current value of the BACnet object.</td>
</tr>
<tr>
<td>Out of Service</td>
<td>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 .</td>
</tr>
<tr>
<td>Status flags</td>
<td>If this microblock is enabled as a potential alarm source, this will show Status checkboxes on the Alarms &gt; Enable/Disable tab that indicate the current alarm status of the BACnet object.</td>
</tr>
<tr>
<td>Event state</td>
<td>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 &gt; Enable/Disable tab.</td>
</tr>
<tr>
<td>Object ID</td>
<td>A combination of the Object Type and the Object Instance number.</td>
</tr>
<tr>
<td>Address</td>
<td>The address of the BACnet object that this microblock references.</td>
</tr>
</tbody>
</table>

### 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 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 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 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 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Display microblocks (page 167)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>![icon] point name ![icon]</td>
</tr>
<tr>
<td><strong>What it does</strong></td>
<td>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 system. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the <strong>Object Instance</strong> setting described below. A Display microblock is most often used to display information from other vendor's equipment on <strong>Graphics</strong> and <strong>Properties</strong> 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 <strong>Present</strong> column to select which properties to get.</td>
</tr>
</tbody>
</table>

### Properties

**TIPS**
- **Alt+click** any value in the 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>
<thead>
<tr>
<th>Display Name</th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
</table>
| 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 |
<p>| Description  | (optional) A BACnet-visible microblock description. |
| Editing Privilege | <strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is. <strong>CAUTION</strong> If you change the Editing Privilege from <strong>Preset</strong>, the privilege you select will be used for all properties of this microblock, which is not always desirable. |
| Inactive Text | The <strong>Inactive Text</strong> your system displays when the microblock's output is off, or false. |</p>
<table>
<thead>
<tr>
<th><strong>Active Text</strong></th>
<th>The <strong>Active Text</strong> your system displays when the microblock's output is on, or true.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object Instance</strong></td>
<td>The instance number (0 to 4,194,303) of the BACnet object you are linking to.</td>
</tr>
<tr>
<td><strong>Device Alias</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Show Property Page Text</strong></td>
<td>Check to show this microblock's value on the equipment's <strong>Properties</strong> page.</td>
</tr>
<tr>
<td><strong>Supports Locked Value</strong></td>
<td>Allows the BACnet object to be locked to a specific value in and held at that value until unlocked. The locked value takes precedence over any priority array value.</td>
</tr>
<tr>
<td><strong>BACnet object properties</strong></td>
<td>Select the checkbox in the <strong>Present</strong> column to show the BACnet object property on the <strong>Properties</strong> page. Properties that do not have a checkbox in the <strong>Present</strong> column are always shown. <strong>CAUTION</strong> If you select a property that is not in the BACnet device, you will get an error in . Select the checkbox in the <strong>Write to Field</strong> column to make the property editable from the <strong>Properties</strong> page. <strong>CAUTION</strong> If you select <strong>Write to Field</strong> for a property that is read-only in the BACnet device, you will get an error in .</td>
</tr>
</tbody>
</table>

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 . |
| **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**. |

\[\text{⚠️} = \text{Critical} \quad \text{⚠️} = \text{Non-critical}\]

| **Category** | The category you want to use to filter this microblock’s alarms on the system’s **Alarms** page > **View** tab. |
Microblock reference

<table>
<thead>
<tr>
<th>Template</th>
<th>Universal - Allows your system to use the <strong>Alarm text</strong> and <strong>Return text</strong> defined in the microblock, and the <strong>Critical</strong> checkbox to determine the color of the system-wide alarm button when the alarm comes in.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm</td>
<td>The message displayed on the Field Assistant <strong>Alarms page &gt; View</strong> tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
<tr>
<td>Return to Normal</td>
<td>The message displayed on the Field Assistant <strong>Alarms page &gt; View</strong> tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Display microblocks (page 167)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>![RSV](point name RSV)</td>
</tr>
<tr>
<td>What it does</td>
<td>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 system. The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the <strong>Object Instance</strong> setting described below. A Display microblock is most often used to display information from other vendor's equipment on <strong>Graphics</strong> and <strong>Properties</strong> 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 <strong>Present</strong> column to select which properties to get.</td>
</tr>
</tbody>
</table>

**Properties**

**TIPS**

- **Alt+click** any value in the 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>
<thead>
<tr>
<th><strong>Display Name</strong></th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
</table>
| **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. |
| **Editing Privilege** | **Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the 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 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 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 .  
Select the checkbox in the Write to Field column to make the property editable from the 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 . |

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 . |
| **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 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 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 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 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Display microblocks (page 167)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>Cal point name</td>
</tr>
</tbody>
</table>
## 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 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 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>
<thead>
<tr>
<th>Display Name</th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Name</td>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links.</td>
</tr>
<tr>
<td>Limitations:</td>
<td>lower case only</td>
</tr>
<tr>
<td>Description</td>
<td>(optional) A BACnet-visible microblock description.</td>
</tr>
<tr>
<td>Editing Privilege</td>
<td><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Object Instance</th>
<th>The instance number (0 to 4,194,303) of the BACnet object you are linking to.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device Alias</td>
<td>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.</td>
</tr>
</tbody>
</table>

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

---
Microblock reference

**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 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 .

Select the checkbox in the Write to Field column to make the property editable from the 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 .

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.

**Microblock family**
Display microblocks (page 167)

**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 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 interface to view property details, including its editing privilege and expression
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>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display Name</strong></td>
<td>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</td>
</tr>
</tbody>
</table>
| **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. |
| **Editing Privilege** | Preset - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the 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 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 .  
  Select the checkbox in the Write to Field column to make the property editable from the 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 . |

The following properties are always present. See the ANSI / ASHRAE Standard 135 for a description of additional properties that can be enabled in Snap.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object Name</strong></td>
<td>An alpha-numeric string that is unique within the BACnet device.</td>
</tr>
<tr>
<td><strong>Log Enable</strong></td>
<td>If enabled, trend data is collected for the BACnet object.</td>
</tr>
<tr>
<td><strong>Stop When Full</strong></td>
<td>If enabled, trend data will stop being collected when the maximum number of samples is reached.</td>
</tr>
</tbody>
</table>
### 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.

### Microblock family
Display microblocks (page 167)

### Icon and symbol
![Sch](image)

### 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 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>
<thead>
<tr>
<th><strong>Display Name</strong></th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
</table>
| **Reference Name**<br>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 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 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 **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 .  
Select the checkbox in the **Write to Field** column to make the property editable from the **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 . |
The following properties are always present. See the ANSI / ASHRAE Standard 135 for a description of additional properties that can be enabled in Snap.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object Name</strong></td>
<td>An alpha-numeric string that is unique within the BACnet device.</td>
</tr>
<tr>
<td><strong>Present Value</strong></td>
<td>The current value of the BACnet object.</td>
</tr>
<tr>
<td><strong>Effective Period</strong></td>
<td>Date range that shows when the schedule object is in effect.</td>
</tr>
<tr>
<td><strong>List of Object Property references</strong></td>
<td>A list of BACnet object properties that will be affected by the schedule.</td>
</tr>
<tr>
<td><strong>Priority for writing</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Status Flags</strong></td>
<td>Status Flags indicate the current state of the BACnet object.</td>
</tr>
<tr>
<td><strong>Reliability</strong></td>
<td>Indicates if there is a configuration error.</td>
</tr>
<tr>
<td><strong>Out of Service</strong></td>
<td>The schedule object that is out of service will not use any internal calculations (weekly/exception schedule entries) to determine the <strong>Present Value</strong>.</td>
</tr>
<tr>
<td><strong>Object ID</strong></td>
<td>A combination of the Object Type and the Object Instance number.</td>
</tr>
<tr>
<td><strong>Address</strong></td>
<td>The address of the BACnet object that this microblock references.</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Display microblocks (page 167)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="Eut.png" alt="Eut" /> <img src="Eut.png" alt="Eut" /> name</td>
</tr>
<tr>
<td>What it does</td>
<td>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 <strong>Object Instance</strong> setting described below. A Display microblock is most often used to display information from other vendor's equipment on <strong>Graphics</strong> and <strong>Properties</strong> 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 <strong>Present</strong> column to select which properties to get.</td>
</tr>
</tbody>
</table>

**Properties**

💡 **TIPS**

- **Alt+click** any value in the 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>
<thead>
<tr>
<th>Display Name</th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
</table>
| 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. |
| Editing Privilege | **Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the 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 **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 .  
  Select the checkbox in the **Write to Field** column to make the property editable from the **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 . |

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 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 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 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 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.

**Microblock family**
Display microblocks (page 167)

**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 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 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 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 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.

Select the checkbox in the Write to Field column to make the property editable from the 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.

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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Display microblocks (page 167)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="#" alt="Prg" /> <img src="#" alt="Prg point name" /></td>
</tr>
<tr>
<td><strong>What it does</strong></td>
<td>This microblock defines a standardized object whose properties represent the externally visible characteristics of an application program and makes these characteristics available in the system.</td>
</tr>
</tbody>
</table>

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 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 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

**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 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 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 .

Select the checkbox in the **Write to Field** column to make the property editable from the 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 .

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.**

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Display microblocks (page 167)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="device-icon.png" alt="Dev" /> <img src="dev-point-name-icon.png" alt="Dev point name" /></td>
</tr>
<tr>
<td><strong>What it does</strong></td>
<td>This microblock defines a standardized object whose properties represent the externally visible characteristics of a BACnet device and makes these characteristics available in the system.</td>
</tr>
<tr>
<td></td>
<td>The link to the device is established in SiteBuilder. The link to a specific BACnet object in that device is the <strong>Object Instance</strong> setting described below.</td>
</tr>
<tr>
<td></td>
<td>A Display microblock is most often used to display information from other vendor's equipment on <strong>Graphics</strong> and <strong>Properties</strong> pages. The operator can then read and write to the equipment as appropriate.</td>
</tr>
<tr>
<td></td>
<td>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 <strong>Present</strong> column to select which properties to get.</td>
</tr>
</tbody>
</table>

**Properties**

- **TIPS**
  - **Alt+click** any value in the 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 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 |
| 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 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’s 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 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 .

Select the checkbox in the Write to Field column to make the property editable from the 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 .

The following properties are always present. See the ANSI / ASHRAE Standard 135 for a description of additional properties that can be enabled in Snap.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object Name</td>
<td>An alpha-numeric string that is unique within the BACnet device.</td>
</tr>
<tr>
<td>System Status</td>
<td>The current physical and logical status of the BACnet device.</td>
</tr>
<tr>
<td>Vendor Name</td>
<td>Manufacturer of the BACnet device.</td>
</tr>
<tr>
<td>Vendor Identifier</td>
<td>The BACnet device manufacturer’s unique vendor identification code (assigned by ASHRAE).</td>
</tr>
<tr>
<td>Model Name</td>
<td>Model of the BACnet device.</td>
</tr>
<tr>
<td>Firmware Revision</td>
<td>The firmware version that is in the BACnet device.</td>
</tr>
<tr>
<td>Application Software Version</td>
<td>The application software version that is in the BACnet device.</td>
</tr>
<tr>
<td>Protocol Version</td>
<td>The version of the BACnet protocol supported by the BACnet device.</td>
</tr>
<tr>
<td>Protocol Conformance Class</td>
<td>This obsolete property is no longer part of the BACnet standard, but is maintained for backward compatibility.</td>
</tr>
<tr>
<td>Protocol Services Supported</td>
<td>The standard BACnet services that the device supports.</td>
</tr>
<tr>
<td>Protocol Object Types Supported</td>
<td>The standard BACnet object types that the device supports.</td>
</tr>
<tr>
<td>Object List</td>
<td>A list of all BACnet objects that are in the BACnet device.</td>
</tr>
<tr>
<td>Max APDU Length Accepted</td>
<td>The maximum length of a message or message segment that can be accepted by the BACnet device.</td>
</tr>
<tr>
<td>Segmentation Supported</td>
<td>Indicates if the BACnet device supports segmentation of messages and if so, whether it supports segmented transmission, reception, or both.</td>
</tr>
<tr>
<td>APDU Segment Timeout</td>
<td>How many milliseconds the device will wait before resending a message segment if no response is received.</td>
</tr>
</tbody>
</table>
APDU Timeout
How many milliseconds the device will wait before resending a message if no response is received.

Number of APDU Retries
The number of times the device will resend 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 a 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.

**BACnet Modeled File (page 208)**
This microblock defines a standardized object that is used to describe properties of data files that can be accessed using BACnet File Services.

**BACnet Modeled Group (page 210)**
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.

**BACnet Modeled Loop (page 211)**
This microblock defines a standardized object whose properties represent the externally visible characteristics of any form of feedback control loop.

**BACnet Modeled Pulse Converter (page 213)**
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.

**BACnet Modeled Accumulator (page 215)**
This microblock defines a standardized object whose properties represent the externally visible characteristics of a device that indicates measurements made by counting pulses.

**BACnet Modeled Collector (page 217)**
This microblock reads properties from a BACnet proprietary collector object (BACnet object type 771).

**BACnet Modeled Table (page 219)**
This microblock reads properties from a BACnet proprietary table object (BACnet object type 773).
Device Alias (page 220)

This microblock works with the Device Alias field in every Display microblock to enable efficient reuse 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Display microblocks (page 167)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="file_point_name" alt="file point name" /></td>
</tr>
<tr>
<td>What It does</td>
<td>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 <strong>Object Instance</strong> setting described below. A Display microblock is most often used to display information from other vendor's equipment on <strong>Graphics</strong> and <strong>Properties</strong> 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 <strong>Present</strong> column to select which properties to get.</td>
</tr>
</tbody>
</table>

Properties

💡 TIPS

- **Alt+click** any value in the 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 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 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 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.

Select the checkbox in the Write to Field column to make the property editable from the 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.

The following properties are always present. See the ANSI / ASHRAE Standard 135 for a description of additional properties that can be enabled in Snap.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Object Name</td>
<td>An alpha-numeric string that is unique within the BACnet device.</td>
</tr>
<tr>
<td>File Type</td>
<td>A character string that describes the type of file.</td>
</tr>
<tr>
<td>File Size</td>
<td>The file length (octets).</td>
</tr>
<tr>
<td>Modification Date</td>
<td>The time and date the file was last modified.</td>
</tr>
<tr>
<td>Archive</td>
<td>Indicates whether or not the file has been archived.</td>
</tr>
<tr>
<td>Read Only</td>
<td>Indicates whether or not the file can be written to.</td>
</tr>
<tr>
<td>File Access Method</td>
<td>The method (Record Access or Stream Access) by which the file can be accessed.</td>
</tr>
<tr>
<td>Object ID</td>
<td>A combination of the Object Type and the Object Instance number.</td>
</tr>
<tr>
<td>Address</td>
<td>The address of the BACnet object that this microblock references.</td>
</tr>
</tbody>
</table>
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.

**Microblock family**
Display microblocks (page 167)

**Icon and symbol**
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 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 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 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's value 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 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 .

Select the checkbox in the Write to Field column to make the property editable from the 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 .

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.

Microblock family
Display microblocks (page 167)

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 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>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display Name</strong></td>
<td>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</td>
</tr>
<tr>
<td><strong>Reference Name</strong></td>
<td><strong>RefName</strong> Use the default reference name unless you want a more descriptive name for graphics or network links.</td>
</tr>
</tbody>
</table>
| **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 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 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 .

Select the checkbox in the Write to Field column to make the property editable from the 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 .

The following properties are always present. See the ANSI / ASHRAE Standard 135 for a description of additional properties that can be enabled in Snap.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object Name</strong></td>
<td>An alpha-numeric string that is unique within the BACnet device.</td>
</tr>
<tr>
<td><strong>Present Value</strong></td>
<td>The current value of the BACnet object.</td>
</tr>
<tr>
<td><strong>Status Flags</strong></td>
<td>Status Flags indicate the current state of the BACnet object.</td>
</tr>
<tr>
<td><strong>Event State</strong></td>
<td>Shows the BACnet object's current alarm status.</td>
</tr>
<tr>
<td><strong>Out of Service</strong></td>
<td>Indicates whether or not the algorithm this object represents is in service.</td>
</tr>
<tr>
<td><strong>Output Units</strong></td>
<td>The BACnet engineering unit of measurement of the microblock's present value.</td>
</tr>
<tr>
<td><strong>Manipulated Variable Reference</strong></td>
<td>The output (present value) of the control loop is written to the object and property designated by the Manipulated Variable Reference.</td>
</tr>
<tr>
<td><strong>Controlled Variable Reference</strong></td>
<td>Identifies the property used to set the loop object's Controlled Variable Value property.</td>
</tr>
<tr>
<td><strong>Controlled Variable Value</strong></td>
<td>The control loop compares the Controlled Variable Value with the Setpoint to calculate the error.</td>
</tr>
<tr>
<td><strong>Controlled Variable Units</strong></td>
<td>The engineering units of the Controlled Variable Value property.</td>
</tr>
<tr>
<td><strong>Setpoint Reference</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Setpoint</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Action</strong></td>
<td>Defines whether the loop is direct or reverse acting.</td>
</tr>
<tr>
<td><strong>Priority for Writing</strong></td>
<td>The command priority (1-16) the loop object will use when writing the object and property referenced by the Manipulated Variable Reference.</td>
</tr>
<tr>
<td><strong>Object ID</strong></td>
<td>A combination of the Object Type and the Object Instance number.</td>
</tr>
<tr>
<td><strong>Address</strong></td>
<td>The address of the BACnet object that this microblock references.</td>
</tr>
</tbody>
</table>

**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.
### Microblock family

Display microblocks (page 167)

<table>
<thead>
<tr>
<th>Icon and symbol</th>
<th>Pul</th>
<th>Pul point name</th>
</tr>
</thead>
</table>

### 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 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>
<thead>
<tr>
<th>Display Name</th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
</table>
| 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 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 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 .

Select the checkbox in the Write to Field column to make the property editable from the 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 .

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 .

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.

Microblock family

Display microblocks (page 167)
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 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 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 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 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 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 .

Select the checkbox in the Write to Field column to make the property editable from the 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 .

The following properties are always present. See the ANSI / ASHRAE Standard 135 for a description of additional properties that can be enabled in Snap.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object Name</strong></td>
<td>An alpha-numeric string that is unique within the BACnet device.</td>
</tr>
<tr>
<td><strong>Present Value</strong></td>
<td>The current value of the BACnet object.</td>
</tr>
<tr>
<td><strong>Status Flags</strong></td>
<td>Status Flags indicate the current state of the BACnet object.</td>
</tr>
<tr>
<td><strong>Event State</strong></td>
<td>The current alarm state (Normal, Offnormal, Fault) of the BACnet object.</td>
</tr>
<tr>
<td><strong>Out of Service</strong></td>
<td>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 .</td>
</tr>
<tr>
<td><strong>Scale</strong></td>
<td>The conversion factor to change the Present Value to a value in the units specified.</td>
</tr>
<tr>
<td><strong>Units</strong></td>
<td>The BACnet engineering unit of measurement of the microblock’s present value.</td>
</tr>
<tr>
<td><strong>Max Pres Value</strong></td>
<td>The maximum limit of the present value before scaling.</td>
</tr>
<tr>
<td><strong>Object ID</strong></td>
<td>A combination of the Object Type and the Object Instance number.</td>
</tr>
<tr>
<td><strong>Address</strong></td>
<td>The address of the BACnet object that this microblock references.</td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Display microblocks (page 167)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Icon and symbol</strong></td>
<td><img src="icon.png" alt="Col1" />, <img src="point_name.png" alt="Col1" /></td>
</tr>
</tbody>
</table>
**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 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>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display Name</strong></td>
<td>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</td>
</tr>
</tbody>
</table>
| **Reference Name**     | Use the default reference name unless you want a more descriptive name for graphics or network links. Use the default reference name unless you want a more descriptive name for graphics or network links. **RefName** 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 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** | Check to show this microblock's value on the equipment's **Properties** page. |
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 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.

Microblock family
Display microblocks (page 167)

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 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 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 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.

### Microblock family

**Display microblocks (page 167)**

### Icon and symbol

[Alias] [Alias] name
**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 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>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reference Name</strong></td>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links.</td>
</tr>
<tr>
<td>RefName</td>
<td>Limitations:</td>
</tr>
<tr>
<td></td>
<td>• lower case only</td>
</tr>
<tr>
<td></td>
<td>• limited to 40 characters</td>
</tr>
<tr>
<td></td>
<td>• cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td>• must be unique within a control program</td>
</tr>
<tr>
<td><strong>Device Alias</strong></td>
<td>A character string that represents the device you are integrating with. For example, the model of the</td>
</tr>
<tr>
<td></td>
<td>BACnet controller or equipment. Use this character string in the Device Alias field of any Display</td>
</tr>
<tr>
<td></td>
<td>microblocks whose value will be retrieved from the same BACnet device.</td>
</tr>
<tr>
<td><strong>Device Instance</strong></td>
<td>The device instance of the BACnet device. At runtime, the system uses this device instance in the</td>
</tr>
<tr>
<td></td>
<td>BACnet address of any Display microblocks using this microblock’s Device Alias.</td>
</tr>
</tbody>
</table>

**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 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.

### Microblocks Overview

- **Total Analog (page 223)**
  This microblock gathers heating and cooling requests. The total number of requests received is the microblock's output.

- **Average Analog (page 225)**
  This microblock calculates the average of the values read from output points. The average value is the microblock's output.

- **Minimum Analog (page 227)**
  This microblock monitors values read from output points. The lowest value read is the output of the microblock.

- **Maximum Analog (page 229)**
  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.

- **Get System Variable (page 231)**
  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.
### Get System Status (page 233)
This microblock can be used to indicate Read or Write errors in certain microblocks, and whether any microblock within the control program is Locked.

### Binary Parameter (page 235)
This microblock is used to create a yes/no, on/off, open/closed, or true/false signal to be sent to the output wire.

### Analog Parameter (page 236)
This microblock specifies a numeric value to be sent to another microblock in the control program.

### Time Parameter (page 237)
This microblock specifies an amount of time to be sent to another microblock in the control program.

### Binary Constant (page 238)
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.

### Analog Constant (page 239)
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).

### Time Constant (page 239)
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®

#### BACnet Binary Value Parameter (page 240)
This microblock creates a yes or no, or on or off signal to be sent to another microblock in the control program.

#### BACnet Analog Value Parameter (page 243)
This microblock specifies a numeric value to be sent to another microblock in the control program.

#### BACnet Multi-State Value Parameter (page 248)
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.

**Microblock family**

**Sys In microblocks (page 222)**

---

Field Assistant v6.5  
Help  
Carrier Proprietary and Confidential  
CARRIER CORPORATION ©2016  
All rights reserved
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 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 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 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Sys In microblocks (page 222)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Icon and symbol</strong></td>
<td><img src="Average" alt="Avg" />, <img src="Valid" alt="Valid?" /></td>
</tr>
</tbody>
</table>
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 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 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

**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 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Sys In microblocks (page 222)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Icon and symbol</strong></td>
<td><img src="image1" alt="Min" /> <img src="image2" alt="Valid?" /></td>
</tr>
</tbody>
</table>
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 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 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 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.

Microblock family
Sys In microblocks (page 222)

Icon and symbol

![Maximum Analog Icon](image-url)
**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**

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

**Microblock family**
**Sys In microblocks (page 222)**
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 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
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.

**Microblock family**
- Sys In microblocks (page 222)

**Icon and symbol**
- read error
- write error
- SysSta
- point locked

**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 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>
<thead>
<tr>
<th>Reference Name</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>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. <strong>Read Error</strong> 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. <strong>Write Error</strong> 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. <strong>Point Locked</strong> 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.</td>
</tr>
<tr>
<td>Property Page Text</td>
<td>Check to show this microblock's value on the equipment's Properties page. You can edit the microblock description that appears on the Properties page. See &quot;Editing Properties page text using special characters&quot; and &quot;Formatting a microblock property&quot; in Snap Help.</td>
</tr>
</tbody>
</table>
Binary 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Sys In microblocks (page 222)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>🟪Para... 🔴Off</td>
</tr>
<tr>
<td>What it does</td>
<td>This microblock is used to create a yes/no, on/off, open/closed, or true/false signal to be sent to the output wire.</td>
</tr>
</tbody>
</table>

Properties

💡 TIPS

- **Alt+click** any value in the 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Limitations:</strong></td>
<td></td>
</tr>
<tr>
<td>• lower case only</td>
<td></td>
</tr>
<tr>
<td>• limited to 40 characters</td>
<td></td>
</tr>
<tr>
<td>• cannot begin with a number</td>
<td></td>
</tr>
<tr>
<td>• must be unique within a control program</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Select <strong>Text Defined Below</strong> 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.</td>
</tr>
<tr>
<td>Editing Privilege</td>
<td><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</td>
</tr>
</tbody>
</table>

⚠️ **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.

<table>
<thead>
<tr>
<th>Default Value</th>
<th>The value the control program uses until a user changes the value in the system interface.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Momentary</td>
<td>Lets the Field Assistant user change the parameter to the new state for one execution of logic. The Field Assistant application then changes the parameter back to the original state.</td>
</tr>
<tr>
<td>Inactive Text</td>
<td>The <strong>Inactive Text</strong> your system displays when the microblock's output is off, or false.</td>
</tr>
<tr>
<td>Active Text</td>
<td>The <strong>Active Text</strong> your system displays when the microblock's output is on, or true.</td>
</tr>
</tbody>
</table>

Property Page Text
**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Sys In microblocks (page 222)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>![Parameter Icon]</td>
</tr>
<tr>
<td>What it does</td>
<td>This microblock specifies a numeric value to be sent to another microblock in the control program.</td>
</tr>
</tbody>
</table>

**Properties**

**TIPS**

- **Alt+click** any value in the 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.

- 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 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.
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.

Microblock family
Sys In microblocks (page 222)

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 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 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
Microblock reference

<table>
<thead>
<tr>
<th>Show Property Page Text</th>
<th>Check to show this microblock's value on the equipment's Properties page.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Page Text</td>
<td>You can edit the microblock description that appears on the Properties page. See &quot;Editing Properties page text using special characters&quot; and &quot;Formatting a microblock property&quot; in Snap Help.</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Sys In microblocks (page 222)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="Icon" /></td>
</tr>
<tr>
<td>What it does</td>
<td>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.</td>
</tr>
</tbody>
</table>

**Properties**

💡 **TIPS**

- **Alt+click** any value in the 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 ReName    | 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 |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>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.</td>
</tr>
<tr>
<td>Present Value</td>
<td>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 a system or in the Snap application.</td>
</tr>
<tr>
<td>Inactive Text</td>
<td>The <strong>Inactive Text</strong> your system displays when the microblock's output is off, or false.</td>
</tr>
<tr>
<td>Active Text</td>
<td>The <strong>Active Text</strong> your system displays when the microblock's output is on, or true.</td>
</tr>
</tbody>
</table>
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.

Microblock family
Sys In microblocks (page 222)

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 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 a 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.

Microblock family
Sys In microblocks (page 222)

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 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Limitations:</strong></td>
<td></td>
</tr>
<tr>
<td>• lower case only</td>
<td></td>
</tr>
<tr>
<td>• limited to 40 characters</td>
<td></td>
</tr>
<tr>
<td>• cannot begin with a number</td>
<td></td>
</tr>
<tr>
<td>• must be unique within a control program</td>
<td></td>
</tr>
</tbody>
</table>

| 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 a 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Sys In microblocks (page 222)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>[Image]</td>
</tr>
</tbody>
</table>

**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 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>
<thead>
<tr>
<th>Display Name</th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Name</td>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links.</td>
</tr>
</tbody>
</table>
| 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 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. |
| | Lets the Field Assistant user change the parameter to the new state for one execution of logic. The 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. |
**Microblock reference**

<table>
<thead>
<tr>
<th><strong>Property Page Text</strong></th>
<th>You can edit the microblock description that appears on the Properties page. See &quot;Editing Properties page text using special characters&quot; and &quot;Formatting a microblock property&quot; in Snap Help.</th>
</tr>
</thead>
</table>

**BACnet Configuration**

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

**Alarms**

<table>
<thead>
<tr>
<th><strong>Potential alarm source</strong></th>
<th>Check to make this microblock available in the system's Alarm Sources list.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Critical</strong></td>
<td>Determines the color of the system-wide alarm button when the alarm comes in if the alarm's Template field is set to Universal.</td>
</tr>
<tr>
<td><strong>Category</strong></td>
<td>The category you want to use to filter this microblock's alarms on the system's Alarms page &gt; View tab.</td>
</tr>
<tr>
<td><strong>Template</strong></td>
<td><strong>Universal</strong> - 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.</td>
</tr>
</tbody>
</table>

**Alarm**

<table>
<thead>
<tr>
<th><strong>Alarm Enabled</strong></th>
<th>Check to send a message when this microblock indicates an alarm condition.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Delay Seconds</strong></td>
<td>The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.</td>
</tr>
<tr>
<td><strong>Alarm text</strong></td>
<td>The message displayed on the Field Assistant Alarms page &gt; View tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
<tr>
<td><strong>Alarm requires acknowledge</strong></td>
<td>Check to require that an operator acknowledge alarm notifications on the system's Alarms page &gt; View tab.</td>
</tr>
</tbody>
</table>

**Return to Normal**

<table>
<thead>
<tr>
<th><strong>Return Enabled</strong></th>
<th>Check to send a message when an alarm condition has returned to normal.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Return text</strong></td>
<td>The message displayed on the Field Assistant Alarms page &gt; View tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
<tr>
<td><strong>Return requires acknowledge</strong></td>
<td>Check to require that an operator acknowledge return-to-normal notifications on the system's Alarms page &gt; View tab.</td>
</tr>
</tbody>
</table>
### Fault

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fault Enabled</strong></td>
<td>Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.</td>
</tr>
</tbody>
</table>

### Rnet

**NOTE** A control program that uses these Rnet features works only with v5.5 or later systems and v5.5 or later drivers.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enable Rnet</strong></td>
<td>Check to allow this microblock to communicate its value(s) to and from a sensor.</td>
</tr>
</tbody>
</table>
| **Rnet Tag** | All values from a ZS or WS 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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
</table>
| **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. |

| **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.*
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 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>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display Name</strong></td>
<td>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</td>
</tr>
<tr>
<td><strong>Reference Name</strong></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><strong>Description</strong></td>
<td>(optional) A BACnet-visible microblock description.</td>
</tr>
<tr>
<td><strong>Lock Present Value</strong></td>
<td>Check to output the locked value from the microblock instead of the microblock's calculated value.</td>
</tr>
<tr>
<td><strong>Editing Privilege</strong></td>
<td><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is. <strong>CAUTION</strong> 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><strong>Default Value</strong></td>
<td>The value the control program uses until a user changes the value in the system interface.</td>
</tr>
<tr>
<td><strong>Units</strong></td>
<td>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 <strong>Options &gt; Preferences &gt; Droplist Options</strong>.</td>
</tr>
</tbody>
</table>
**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.
<table>
<thead>
<tr>
<th><strong>Microblock reference</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>High Limit</strong></th>
<th>The value the microblock's present value must rise above to send an alarm.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Dead Band</strong></th>
<th>The amount inside the normal range by which an alarm condition must return before a return-to-normal notification is generated.</th>
</tr>
</thead>
</table>

**EXAMPLE**

```
High = 225
215
```

```
-15
Low = -25
```

- Alarm is generated
- Return-to-Normal is generated

<table>
<thead>
<tr>
<th><strong>Delay Seconds</strong></th>
<th>The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Alarm text</strong></th>
<th>The message displayed on the Field Assistant Alarms page &gt; View tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Alarm requires acknowledge</strong></th>
<th>Check to require that an operator acknowledge alarm notifications on the system's Alarms page &gt; View tab.</th>
</tr>
</thead>
</table>

### Return to Normal

<table>
<thead>
<tr>
<th><strong>Return Enabled</strong></th>
<th>Check to send a message when an alarm condition has returned to normal.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Return text</strong></th>
<th>The message displayed on the Field Assistant Alarms page &gt; View tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Return requires acknowledge</strong></th>
<th>Check to require that an operator acknowledge return-to-normal notifications on the system's Alarms page &gt; View tab.</th>
</tr>
</thead>
</table>

### Fault

<table>
<thead>
<tr>
<th><strong>Fault Enabled</strong></th>
<th>Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.</th>
</tr>
</thead>
</table>

### Rnet

**NOTE** A control program that uses these Rnet features works only with v5.5 or later systems and v5.5 or later drivers.

<table>
<thead>
<tr>
<th><strong>Enable Rnet</strong></th>
<th>Check to allow this microblock to communicate its value(s) to and from a sensor.</th>
</tr>
</thead>
</table>
### Rnet Tag
All values from a ZS or WS 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 Field Assistant interface.

### Maximum
Enter the highest amount that this value can be changed to on the ZS sensor or in the Field Assistant interface.

### ZS Sensor Display Configuration
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.

---

### 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 reframe peak_value. So even if the program is edited and reloaded, the value in the BAV parameter is preserved, provided the BAV’s reframe 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Sys In microblocks (page 222)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="Icon" /></td>
</tr>
<tr>
<td>What it does</td>
<td>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.</td>
</tr>
</tbody>
</table>

Properties

- **TIPS**
  - **Alt+click** any value in the 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 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 |
| **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 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. Lets the Field Assistant user change the parameter to the new state for one execution of logic. The 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. 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 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 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 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 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 WS 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 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 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.

---

**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 Variable** (page 252)
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.

**Binary Status** (page 253)
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.

**Analog Status** (page 254)
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.

**Time Status** (page 255)
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®**

**BACnet Binary Value Status** (page 256)
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.

**BACnet Analog Value Status** (page 259)
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.

**BACnet Multi-State Value Status** (page 264)
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.

**Microblock family**  
Sys Out microblocks (page 251)

**Icon and symbol**  
Prime

---

Field Assistant v6.5  
Help  
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All rights reserved  
252
### 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 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
</table>
| 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Sys Out microblocks (page 251)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>![Stat Off]</td>
</tr>
<tr>
<td>What it does</td>
<td>This microblock displays a yes/no, on/off, open/closed, or true/false value from the control program on the <strong>Properties</strong> page. You can use this microblock to display the value of another microblock that would not normally appear on the <strong>Properties</strong> page.</td>
</tr>
</tbody>
</table>

### Properties

**TIPS**

- **Alt+click** any value in the 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
</table>
| **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.

**Microblock family**

**Sys Out microblocks (page 251)**

**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 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

**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:
- 0.2, the system displays 8.4, 8.6, 8.8, ...
- 0.03, 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.

**Microblock family**

Sys Out microblocks (page 251)

**Icon and symbol**

[Stat](#) [0:00]

**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 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Sys Out microblocks (page 251)</th>
</tr>
</thead>
</table>

| Icon and symbol   | ![Stat OFF BY]                   |

| 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 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 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 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.
**Microblock reference**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical</td>
<td>Determines the color of the system-wide alarm button when the alarm comes in if the alarm's Template field is set to Universal.</td>
</tr>
<tr>
<td>Category</td>
<td>The category you want to use to filter this microblock's alarms on the system's Alarms page &gt; View tab.</td>
</tr>
<tr>
<td>Template</td>
<td>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.</td>
</tr>
</tbody>
</table>

**Alarm**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm Enable</td>
<td>Check to send a message when this microblock indicates an alarm condition.</td>
</tr>
<tr>
<td>Alarm State</td>
<td>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).</td>
</tr>
<tr>
<td>Delay Seconds</td>
<td>The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.</td>
</tr>
<tr>
<td>Alarm text</td>
<td>The message displayed on the Field Assistant Alarms page &gt; View tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
<tr>
<td>Alarm requires acknowledge</td>
<td>Check to require that an operator acknowledge alarm notifications on the system's Alarms page &gt; View tab.</td>
</tr>
</tbody>
</table>

**Return to Normal**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return Enabled</td>
<td>Check to send a message when an alarm condition has returned to normal.</td>
</tr>
<tr>
<td>Return text</td>
<td>The message displayed on the Field Assistant Alarms page &gt; View tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
<tr>
<td>Return requires acknowledge</td>
<td>Check to require that an operator acknowledge return-to-normal notifications on the system's Alarms page &gt; View tab.</td>
</tr>
</tbody>
</table>

**Fault**

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fault Enabled</td>
<td>Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.</td>
</tr>
</tbody>
</table>

**Rnet**

NOTE A control program that uses these Rnet features works only with v5.5 or later systems and v5.5 or later drivers.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable Rnet</td>
<td>Check to allow this microblock to communicate its value to a sensor.</td>
</tr>
</tbody>
</table>
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.

**Microblock family** Sys Out microblocks (page 251)

**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 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 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

### 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 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**

![Diagram showing high and low values with dead band](image)

- High = 225
- Low = -25
- 10 = Deadband

- Alarm is generated
- Return-to-Normal is generated

### 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 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 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 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 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.

The properties below define how this microblock's value will display on a ZS Pro or ZS Pro-F sensor.

### Enable Rnet for ZS Sensors

Check to allow this microblock to communicate its value to a ZS sensor.
### Rnet Tag
All values displayed on a ZS sensor must have an Rnet tag. The Rnet tag defines what type of information this microblock's value represents and 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).

### 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.

---

**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 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.

---

**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Sys Out microblocks (page 251)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="MSV" /> <img src="image" alt="MSV" /></td>
</tr>
</tbody>
</table>
| **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 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>
<thead>
<tr>
<th><strong>Display Name</strong></th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
</table>
### 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 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.

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

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alarm Enabled</strong></td>
<td>Check to send a message when this microblock indicates an alarm condition.</td>
</tr>
<tr>
<td><strong>Delay Seconds</strong></td>
<td>The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.</td>
</tr>
<tr>
<td><strong>Alarm text</strong></td>
<td>The message displayed on the Field Assistant Alarms page &gt; View tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
<tr>
<td><strong>Alarm requires acknowledge</strong></td>
<td>Check to require that an operator acknowledge alarm notifications on the system's Alarms page &gt; View tab.</td>
</tr>
</tbody>
</table>

### Return to Normal

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Return Enabled</strong></td>
<td>Check to send a message when an alarm condition has returned to normal.</td>
</tr>
<tr>
<td><strong>Return text</strong></td>
<td>The message displayed on the Field Assistant Alarms page &gt; View tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
<tr>
<td><strong>Return requires acknowledge</strong></td>
<td>Check to require that an operator acknowledge return-to-normal notifications on the system's Alarms page &gt; View tab.</td>
</tr>
</tbody>
</table>

### Fault

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fault Enabled</strong></td>
<td>Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.</td>
</tr>
</tbody>
</table>

### Rnet

**NOTE** A control program that uses these Rnet features works only with v5.5 or later systems and v5.5 or later drivers.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enable Rnet</strong></td>
<td>Check to allow this microblock to communicate its value to a sensor.</td>
</tr>
</tbody>
</table>
### 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 268)**
  This microblock records data for trend purposes from microblocks that do not support built-in trending.

- **Analog Trend (page 270)**
  This microblock records data for trend purposes from microblocks that do not support built-in trending.

- **Digital Trend with Sample Trigger (page 272)**
  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 273)**
  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 274)**
  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 276)

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 278)

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 279)

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 280)

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 281)

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.

Microblock family
Log microblocks (page 267)

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 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 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 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:

\[(100 \times 10 \text{ bytes}) + 48 = 1048 \text{ bytes of memory}\]

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 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 a 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**

Writers 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 a 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Log microblocks (page 267)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>Trend</td>
</tr>
<tr>
<td>What it does</td>
<td>This microblock records data for trend purposes from microblocks that do not support built-in trending.</td>
</tr>
</tbody>
</table>

---

### Properties

💡 **TIPS**

- **Alt+click** any value in the 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>
<thead>
<tr>
<th>Display Name</th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
</table>
| 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 |
<table>
<thead>
<tr>
<th>Description</th>
<th>(optional) A BACnet-visible microblock description.</th>
</tr>
</thead>
<tbody>
<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><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</td>
</tr>
<tr>
<td><strong>CAUTION</strong></td>
<td>If you change the <strong>Editing Privilege</strong> from <strong>Preset</strong>, 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>Sample every ___</td>
<td>Records the microblock's present value at this interval.</td>
</tr>
<tr>
<td>(hh:mm:ss)</td>
<td><strong>EXAMPLE</strong> Type <code>00:10:00</code> to record the microblock's present value every 10 minutes.</td>
</tr>
<tr>
<td>Sample on COV</td>
<td>Records the microblock's present value only when the value changes by at least the COV Increment.</td>
</tr>
<tr>
<td>(change of value)</td>
<td></td>
</tr>
</tbody>
</table>
| 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 a 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 | 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. |
| Use default (45% of Max samples) |                                                                                   |
| In a 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Log microblocks (page 267)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="Trend.png" alt="Trend" /> <img src="TRND.png" alt="TRND" /></td>
</tr>
<tr>
<td>What it does</td>
<td>This microblock records data for trend purposes. When the <code>rec</code> input goes from off to on, the <code>TRND</code> input records the current state. Data is not recorded again until the next time the <code>rec</code> input transitions from off to on.</td>
</tr>
</tbody>
</table>

### Properties

💡 **TIPS**

- **Alt+click** any value in the 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>
<thead>
<tr>
<th>Display Name</th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
<tbody>
<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:</td>
</tr>
<tr>
<td></td>
<td>• lower case only</td>
</tr>
<tr>
<td></td>
<td>• limited to 40 characters</td>
</tr>
<tr>
<td></td>
<td>• cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td>• 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><strong>Editing Privilege</strong></td>
<td><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>CAUTION</strong></td>
<td>If you change the <strong>Editing Privilege</strong> from <strong>Preset</strong>, the privilege you select will be used for all properties of this microblock, which is not always desirable.</td>
</tr>
<tr>
<td><strong>Enable Trend Log</strong></td>
<td>Check to have the controller collect trend data for the microblock's present value.</td>
</tr>
</tbody>
</table>
| **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:  
  \[(100 \times 10 \text{ bytes}) + 48 = 1048 \text{ bytes of memory}\]  
  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 a 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.

**Microblock family**

*Log microblocks (page 267)*

**Icon and symbol**

![Trend](Trend.png)

**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 interface to view property details, including its editing privilege and expression
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>
<thead>
<tr>
<th><strong>Display Name</strong></th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reference Name</strong></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><strong>Description</strong></td>
<td>(optional) A BACnet-visible microblock description.</td>
</tr>
<tr>
<td><strong>Lock Present Value</strong></td>
<td>Check to output the locked value from the microblock instead of the microblock's calculated value.</td>
</tr>
<tr>
<td><strong>Editing Privilege</strong></td>
<td><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is. <strong>CAUTION</strong> If you change the <strong>Editing Privilege</strong> from <strong>Preset</strong>, the privilege you select will be used for all properties of this microblock, which is not always desirable.</td>
</tr>
<tr>
<td><strong>Enable Trend Log</strong></td>
<td>Check to have the controller collect trend data for the microblock's present value.</td>
</tr>
</tbody>
</table>
| **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: 

\[(100 \times 10 \text{ bytes}) + 48 = 1048 \text{ bytes of memory}\]

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 a 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. |

---

**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.
**Microblock family**  
Log microblocks (page 267)

**Icon and symbol**

![Icon and symbol](image)

**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 276) to generate a runtime exceeded alarm.

**Properties**

_**TIPS**_

- **Alt+click** any value in the 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 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.

Microblock family

Log microblocks (page 267)

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 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 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

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 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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Network Visible</strong></td>
<td>Check to allow other BACnet equipment to read the microblock's present value. Must be checked for this microblock to generate alarms.</td>
</tr>
<tr>
<td><strong>Object Instance</strong></td>
<td><strong>Auto-assign</strong> - A BACnet Object ID is assigned by the system.</td>
</tr>
<tr>
<td></td>
<td><strong>Use specific value</strong> - (0–3999999) Assign a number that is unique within the controller.</td>
</tr>
</tbody>
</table>

#### Property Page Text

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Show Property Page Text</strong></td>
<td>Check to show this microblock's value on the equipment's Properties page.</td>
</tr>
<tr>
<td><strong>Property Page Text</strong></td>
<td>You can edit the microblock description that appears on the Properties page. See &quot;Editing Properties page text using special characters&quot; and &quot;Formatting a microblock property&quot; in Snap Help.</td>
</tr>
</tbody>
</table>

### 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](image)

#### 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

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alarm Enabled</strong></td>
<td>Check to send a message when this microblock indicates an alarm condition.</td>
</tr>
<tr>
<td><strong>Delay Seconds</strong></td>
<td>The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.</td>
</tr>
</tbody>
</table>
### Alarm text
The message displayed on the 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 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 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 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 Field Assistant paths in 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.

#### Microblock family
Log microblocks (page 267)

#### Icon and symbol

[Image of 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

• Alt+click any value in the 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 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

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

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.
### Microblock family

*Log microblocks (page 267)*

### Icon and symbol

![Icon and symbol](image)

### 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 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.
Microblock family: Log microblocks (page 267)

**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 `reset` input is turned on.

**Properties**

**TIPS**
- **Alt+click** any value in the 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

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

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.
## Microblock reference

**Microblock family**
*Log microblocks (page 267)*

**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 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 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 283)
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 306)
Optimizes a single setpoint to use the least amount of energy necessary to meet the needs of the controlled equipment.

**Set Color** (page 310)
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 system indicating its status.

**Set Color If True** (page 311)
This microblock broadcasts the selected color for the control program when it is activated.

**True if Color =** (page 312)
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 313)
This microblock reads schedules from the 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 318)
This microblock reads schedules from the 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 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.
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 \((65^\circ)\) is between the unoccupied heating \((55^\circ)\) and cooling \((90^\circ)\) setpoints and the zone is not in optimal start, the microblock sets the color output value to unoccupied gray.
  - If the unoccupied zone temperature \((54^\circ)\) drops below the unoccupied heating setpoint \((55^\circ)\), 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 Field Assistant interface.

- **Occupied**
  - If the occupied zone temperature \((79^\circ)\) exceeds the occupied cooling setpoint \((76^\circ)\) by more than the yellow color band value \((2^\circ)\) but less than the yellow and orange color band values \((2^\circ + 2^\circ = 4^\circ)\), the microblock sets the color output value to orange.

- **Optimal start**
  - If the zone temperature \((60^\circ)\) drops below the effective heating setpoint \((62^\circ)\), the microblock sets the color output value to light blue.
  - If the zone temperature \((85^\circ)\) exceeds the effective cooling setpoint \((84^\circ)\), the microblock sets the color output value to yellow.

- **Demand level 1**
  - If the occupied zone temperature \((68^\circ)\) drops below the occupied heating setpoint minus the Demand1.
offset \(70^\circ - 1^\circ = 69^\circ\) by less than the light blue band value \(2^\circ\), 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 121) 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 programatically 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 programmable 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

\[ t = \frac{\text{FOR}}{60} = \text{Time Remaining Until Occupancy (hr)} \]

\[ \text{OAT} = \text{Outside Air Temperature (°F)} \]

\[ H_{\text{design}} = \text{Heating Design Temperature (°F)} \]

\[ \text{HCAP} = \text{Heating Capacity (°F/hr)} \]

\[ H_{\text{unocc}} = \text{Unoccupied Heating Setpoint (°F)} \]

\[ H_{\text{occ}} = \text{Occupied Heating Setpoint (°F)} \]

\[ \text{HSP} = \text{Heating Setpoint (°F)} \]

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

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

\[ H_3 = \text{MAX}(\text{MIN}(H_2, (H_{\text{occ}} - (t \times H_2))), H_{\text{unocc}}) \]

\[ \text{HSP} = H_3 + (H_3 - H_{\text{unocc}}) \times (1 - \frac{(H_3 - H_{\text{unocc}})}{(H_{\text{occ}} - H_{\text{unocc}})}) \]

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

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

Cooling capacity calculation during optimal start
t = \frac{\text{FOR}}{60} = \text{Time Remaining Until Occupancy (hr)}

\text{OAT} = \text{Outside Air Temperature (°F)}

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

\text{CCAP} = \text{Cooling Capacity (°F/hr)}

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

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

\text{CSP} = \text{Cooling Setpoint (°F)}

\begin{align*}
C_1 &= \left(\frac{C_{\text{design}} - \text{OAT}}{C_{\text{design}} - 65°F}\right) \times \text{CCAP} \\
C_2 &= C_{\text{unocc}} + \frac{(12 - \text{MIN} (t,12))}{12} \times (C_{\text{occ}} - C_{\text{unocc}}) \\
C_3 &= \text{MIN} (\text{MAX} (C_2, (C_{\text{occ}} + (t \times C_1))), C_{\text{unocc}}) \\
\text{CSP} &= C_3 + (C_3 - C_{\text{unocc}}) \times \left(1 - \frac{(C_3 - C_{\text{unocc}})}{(C_{\text{occ}} - C_{\text{unocc}})}\right)
\end{align*}

**NOTE** If the Capacity Limit optional input \text{CCAP\%} is used, the \(C_1\) calculation is:

\begin{align*}
\text{C}_1 &= \left(\frac{C_{\text{design}} - \text{OAT}}{C_{\text{design}} - 65°F}\right) \times \text{CCAP} \times \text{CCAP\%}
\end{align*}

**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 or higher than 15.938° 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 310) microblock or any Set Color If True (page 310) microblocks in a control program with a Zone Setpoint microblock.

Inputs and outputs

Inputs

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OAT</strong> Outside Air Temperature</td>
<td>Optional—Present if Optimal Start is enabled. Current outside air temperature (degrees).</td>
</tr>
<tr>
<td><strong>OCC</strong> Occupied Schedule</td>
<td>True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. Connect to a time clock microblock (page 283) or to other logic that indicates the zone’s occupancy status.</td>
</tr>
<tr>
<td><strong>FOR</strong> Remaining Time</td>
<td>Minutes remaining until the zone’s occupancy status changes. Connect to a time clock microblock (page 283) or to other logic that indicates this time.</td>
</tr>
<tr>
<td><strong>ZONE</strong> Zone Temperature</td>
<td>Current zone temperature (degrees). Connect to an ASVI (page 156) for a ZS sensor, an RS (page 76) microblock for an SPT sensor, for to another input microblock that indicates this value.</td>
</tr>
<tr>
<td><strong>HDEM</strong> Heating Demand Level</td>
<td>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.</td>
</tr>
<tr>
<td><strong>CDEM</strong> Cooling Demand Level</td>
<td>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.</td>
</tr>
<tr>
<td><strong>HADJ</strong> Heating Setpoint Adjust</td>
<td>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.</td>
</tr>
<tr>
<td><strong>CADJ</strong> Cooling Setpoint Adjust</td>
<td>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.</td>
</tr>
<tr>
<td>Microblock</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
</tr>
<tr>
<td>ADJI</td>
<td>Optional–Present if <strong>Inhibit Setpoint Adjust</strong> 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.</td>
</tr>
<tr>
<td>MINSP</td>
<td>Optional–Present if <strong>Minimum Setpoint Separation</strong> 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 <strong>Maintaining Deadband</strong> in “How it Works” in this microblock’s help.</td>
</tr>
<tr>
<td>HOSI</td>
<td>Optional–Present if <strong>Optimal Start</strong> is enabled. True (on) when the microblock should not adjust heating setpoints for optimal start.</td>
</tr>
<tr>
<td>COSI</td>
<td>Optional–Present if <strong>Optimal Start</strong> is enabled. True (on) when the microblock should not adjust cooling setpoints for optimal start.</td>
</tr>
<tr>
<td>HCAP%</td>
<td>Optional–Present if <strong>Capacity Limit</strong> is enabled. Percentage of the learned heating capacity to use during optimal start under the conditions defined by external logic.</td>
</tr>
<tr>
<td>CCAP%</td>
<td>Optional–Present if <strong>Capacity Limit</strong> is enabled. Percentage of the learned cooling capacity to use during optimal start under the conditions defined by external logic.</td>
</tr>
<tr>
<td>LRNI</td>
<td>Optional–Present if <strong>Learning Adaptive</strong> 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.</td>
</tr>
<tr>
<td>USESL</td>
<td>Optional–Present if <strong>Air Source Linkage</strong> is enabled. True (on) when the microblock should use the setpoints and other data provided from Air Source Linkage.</td>
</tr>
<tr>
<td>L FOR</td>
<td>Optional–Present if <strong>Air Source Linkage</strong> 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 <strong>Use SL</strong> input is true.</td>
</tr>
<tr>
<td>L ZONE</td>
<td>Optional–Present if <strong>Air Source Linkage</strong> 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 <strong>Use SL</strong> input is true.</td>
</tr>
<tr>
<td>L OM</td>
<td>Optional–Present if <strong>Air Source Linkage</strong> 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 <strong>Use SL</strong> input is true.</td>
</tr>
<tr>
<td>L OHS</td>
<td>Optional–Present if <strong>Air Source Linkage</strong> 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 <strong>Use SL</strong> input is true.</td>
</tr>
</tbody>
</table>
**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>
<thead>
<tr>
<th>Zone Color</th>
<th>Zone thermographic color based on <strong>ZONE</strong> input compared to effective setpoints.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Color</strong></td>
<td><strong>Status code</strong></td>
</tr>
<tr>
<td>Red</td>
<td>9</td>
</tr>
<tr>
<td>Orange</td>
<td>8</td>
</tr>
<tr>
<td>Yellow</td>
<td>7</td>
</tr>
<tr>
<td>Light green</td>
<td>6</td>
</tr>
<tr>
<td>Green</td>
<td>5</td>
</tr>
<tr>
<td>Light blue</td>
<td>4</td>
</tr>
<tr>
<td>Dark blue</td>
<td>3</td>
</tr>
<tr>
<td>Red</td>
<td>2</td>
</tr>
<tr>
<td>Gray</td>
<td>1</td>
</tr>
</tbody>
</table>

The microblock outputs the zone color's status code (1–9) on its zone color wire.

**HT**
Heating Setpoint
The zone's effective heating setpoint (degrees) based upon occupancy, optimal start, demand limiting, and all other adjustments.

**CL**
Cooling Setpoint
The zone's effective cooling setpoint (degrees) based upon occupancy, optimal start, demand limiting, and all other adjustments.

**NS**
Night Setback
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.

**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.
Properties

**TIPS**

- **Alt+click** any value in the 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
</table>
| **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 Field Assistant interface. You can use any characters except the * character. |
| **Units** | The unit of measure, °F or °C, the setpoints are using. |

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.

OH
Occupied 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.

OC
Occupied 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.

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.
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**

Optional–Used only if Optimal Start is enabled.

**Heating Capacity**

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.

<table>
<thead>
<tr>
<th>This object...</th>
<th>Represents...</th>
<th>And Is...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupied Cooling</td>
<td>The programmed Occupied Cooling Setpoint &lt;br&gt; <strong>NOTE</strong> This object becomes read-only when Air Source Linkage is active.</td>
<td>Writable</td>
</tr>
<tr>
<td>Occupied Heating</td>
<td>The programmed Occupied Heating Setpoint &lt;br&gt; <strong>NOTE</strong> This object becomes read-only when Air Source Linkage is active.</td>
<td>Writable</td>
</tr>
<tr>
<td>Unoccupied Cooling</td>
<td>The programmed Unoccupied Cooling Setpoint &lt;br&gt; <strong>NOTE</strong> This object becomes read-only when Air Source Linkage is active.</td>
<td>Writable</td>
</tr>
</tbody>
</table>
### Microblock reference

**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.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Object Name</strong></td>
<td>A unique alphanumeric string that defines the BACnet object.</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td><em>(optional)</em> A BACnet-visible microblock description.</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Maximum</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Network Visible</strong></td>
<td>Check to allow other BACnet equipment to read or change the microblock's present value.</td>
</tr>
<tr>
<td><strong>COV Increment</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Object Instance</strong></td>
<td><strong>Auto-assign</strong> - A BACnet Object ID is assigned by the system.</td>
</tr>
<tr>
<td></td>
<td><strong>Use specific value</strong> - <em>(0–3999999)</em> Assign a number that is unique within the controller.</td>
</tr>
</tbody>
</table>
### Rnet

<table>
<thead>
<tr>
<th><strong>Enable Rnet</strong></th>
<th>Check to allow this microblock to communicate its value(s) to and from a sensor.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Setpoint Adjust Limit (⁺/-)</strong></td>
<td>The maximum amount (degrees) by which the user can adjust the zone's setpoints from a zone sensor.</td>
</tr>
</tbody>
</table>
| **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:

- Effective cooling setpoint
- Zone temperature
- Effective heating setpoint

Results in the Field Assistant interface of adjusting setpoint offset up 1 degree:

**Effective Setpoints (Status - Non Editable)**

- Includes hysteresis, demand level, and local setpoint adjustments

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Heating</th>
<th>Cooling</th>
</tr>
</thead>
<tbody>
<tr>
<td>62-64</td>
<td>69.00</td>
<td>75.00</td>
</tr>
<tr>
<td>66-70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>72-78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Current Zone Temp: 74.9 degrees GREEN

- Heating Demand Level: 0
- Cooling Demand Level: 0

**Setpoint Adjust**

- Cooling Setpoint Adjust = 1 °F
- Heating Setpoint Adjust = 1 °F

**Programmed Setpoints (Click Bar to Edit)**

- Heating: 68.00
- Cooling: 74.00

These did not change

These changed

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

Example of sensor display:
- Effective cooling setpoint
- Zone temperature
- Effective heating setpoint

Results in the 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:

Effective cooling setpoint
Offset value
Effective heating setpoint

Results in the Field Assistant interface of adjusting base setpoint up 1 degree:
Same as 1, above.


Example of sensor display:

Offset value

Results in the 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.

Trends

This microblock contains the following BACnet trend objects.
Define the following properties for the above trend objects.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enable</strong></td>
<td>Check to have the controller collect trend data for the microblock's present value.</td>
</tr>
<tr>
<td><strong>Sample every ____ (hh:mm:ss)</strong></td>
<td>Records the microblock's present value at this interval. <strong>EXAMPLE</strong> Type 00:10:00 to record the microblock's present value every 10 minutes.</td>
</tr>
<tr>
<td><strong>Sample on COV</strong></td>
<td>Records the microblock’s present value only when the value changes by at least the COV Increment.</td>
</tr>
<tr>
<td><strong>Max samples</strong></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.</td>
</tr>
<tr>
<td></td>
<td>The allocated memory is constant regardless of how many samples are actually recorded.</td>
</tr>
<tr>
<td></td>
<td>If you do not enable trending, no memory is consumed.</td>
</tr>
<tr>
<td></td>
<td>Click Reset in the Field Assistant interface to delete all samples currently stored in the controller.</td>
</tr>
<tr>
<td><strong>Enable Trend Historian</strong></td>
<td>Check this field to archive the controller's collected trend data to the system database after every 129 data samples.</td>
</tr>
<tr>
<td><strong>Notes</strong></td>
<td>You must check <strong>Enable Trend Log</strong> if you want to <strong>Enable Trend Historian</strong>.</td>
</tr>
<tr>
<td></td>
<td>You can change <strong>Enable Trend Historian</strong> archival settings and other trend properties on the Properties page in a system.</td>
</tr>
<tr>
<td><strong>Keep historical trends for ____ days</strong></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>
<tr>
<td><strong>Write to historian:</strong></td>
<td>Writes all trend data in the controller to the system database each time the controller collects the specified number of samples. You can select <strong>Every ____ trend samples</strong> and enter a number greater than zero and less than the number in the <strong>Max samples</strong> field, or you can select <strong>Use default</strong>. The number of trends specified must be accumulated at least once before the historical trends can be viewed.</td>
</tr>
</tbody>
</table>

**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 **USES.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.

Microblock family
Control microblocks (page 283)

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:

<table>
<thead>
<tr>
<th>Initial Setpoints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setpoint Optimization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every</td>
</tr>
<tr>
<td>Trim by</td>
</tr>
<tr>
<td>and respond by</td>
</tr>
<tr>
<td>but do not respond by</td>
</tr>
</tbody>
</table>

  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:

<table>
<thead>
<tr>
<th>Initial Setpoints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Setpoint Optimization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Every</td>
</tr>
<tr>
<td>Trim by</td>
</tr>
<tr>
<td>and respond by</td>
</tr>
<tr>
<td>but do not respond by</td>
</tr>
</tbody>
</table>

  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. |
**Microblock reference**

**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**

<table>
<thead>
<tr>
<th>STPT</th>
<th>Current Optimized Setpoint</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Calculated at the frequency defined in the <em>Every</em> field.</td>
</tr>
<tr>
<td></td>
<td>= previous setpoint + Trim by + lesser of (but do not respond by more than or (req x Respond by))</td>
</tr>
</tbody>
</table>

**Properties**

**TIPS**
- **Alt+click** any value in the 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>
<thead>
<tr>
<th>Reference Name</th>
<th>RefName</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links.</td>
<td></td>
</tr>
<tr>
<td>Limitations:</td>
<td></td>
</tr>
<tr>
<td>- lower case only</td>
<td></td>
</tr>
<tr>
<td>- limited to 40 characters</td>
<td></td>
</tr>
<tr>
<td>- cannot begin with a number</td>
<td></td>
</tr>
<tr>
<td>- must be unique within a control program</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Editing Privilege</th>
<th>Preset - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>WARNING</strong> 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>
</tbody>
</table>

**Initial Setpoints**

<table>
<thead>
<tr>
<th>Initial</th>
<th>The initial setpoint the microblock uses when the <em>go</em> input is enabled.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>The minimum setpoint that the microblock will output.</td>
</tr>
<tr>
<td>Maximum</td>
<td>The maximum setpoint that the microblock will output.</td>
</tr>
</tbody>
</table>

**Setpoint Optimization**

| Every | The frequency at which the microblock calculates a new setpoint. Should reflect the response speed of the control loop. |
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.

At the frequency set in the **Every** field the microblock multiplies this value by the **req** input value, then adds the lesser of

- \((\text{req} \times \text{and respond by})\) or
- **but do not respond by more than**

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.

The limit of the \((\text{req} \times \text{and respond by})\) 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.

You can edit the microblock description that appears on the equipment's **Properties** page. See "Editing Properties page text using special characters" and "Formatting a microblock property" in Snap Help.

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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Control microblocks (page 283)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="icon.png" alt="Set Color Icon" /></td>
</tr>
</tbody>
</table>

**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 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 **alarm** input receives an on signal, the control program's broadcast color is red (2), regardless of the value of the run input. When the **alarm** 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 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RefName</td>
<td>- lower case only</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- limited to 40 characters</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- cannot begin with a number</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- must be unique within a control program</td>
<td></td>
</tr>
</tbody>
</table>

## Property Page Text

<table>
<thead>
<tr>
<th>Show Property Page Text</th>
<th>Check to show this microblock's value on the equipment's Properties page.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Page Text</td>
<td>You can edit the microblock description that appears on the Properties page. See &quot;Editing Properties page text using special characters&quot; and &quot;Formatting a microblock property&quot; in Snap Help.</td>
</tr>
</tbody>
</table>

### 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Control microblocks (page 283)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>![Set Color If True Icon]</td>
</tr>
<tr>
<td>What it does</td>
<td>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.</td>
</tr>
</tbody>
</table>

Properties

**TIPS**

- **Alt+click** any value in the 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 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.

**Microblock family**  
*Control microblocks* (page 283)

**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 interface to view property details, including its editing privilege and expression.
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>
<thead>
<tr>
<th>Reference Name</th>
<th>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.</th>
</tr>
</thead>
<tbody>
<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 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>True if Color =</td>
<td>Check the color that is to be displayed with the input is on.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Property Page Text</th>
<th>Check to show this microblock's value on the equipment's Properties page.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Page Text</td>
<td>You can edit the microblock description that appears on the Properties page. See &quot;Editing Properties page text using special characters&quot; and &quot;Formatting a microblock property&quot; in Snap Help.</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Control microblocks (page 283)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>![Image] ![Image]</td>
</tr>
</tbody>
</table>
**What it does**

This microblock reads schedules from the 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 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 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>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display Name</strong></td>
<td>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</td>
</tr>
<tr>
<td><strong>Reference Name</strong></td>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations:</td>
</tr>
<tr>
<td>RefName</td>
<td>lower case only</td>
</tr>
<tr>
<td></td>
<td>limited to 40 characters</td>
</tr>
<tr>
<td></td>
<td>cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td>must be unique within a control program</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>(optional) A BACnet-visible microblock description.</td>
</tr>
<tr>
<td><strong>Lock Present Value</strong></td>
<td>Check to output the locked value from the microblock instead of the microblock's calculated value.</td>
</tr>
</tbody>
</table>
### Editing Privilege

**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the 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 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.
### Microblock reference

| **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] | Critical
| ![Non-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. |

<table>
<thead>
<tr>
<th><strong>Alarm</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alarm Enabled</strong></td>
<td>Check to send a message when this microblock indicates an alarm condition.</td>
</tr>
<tr>
<td><strong>Delay Seconds</strong></td>
<td>The time the microblock's present value must remain in an alarm condition before the microblock sends an alarm.</td>
</tr>
<tr>
<td><strong>Alarm text</strong></td>
<td>The message displayed on the Field Assistant Alarms page &gt; View tab when an alarm condition occurs. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
<tr>
<td><strong>Alarm requires acknowledge</strong></td>
<td>Check to require that an operator acknowledge alarm notifications on the system's Alarms page &gt; View tab.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Return to Normal</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Return Enabled</strong></td>
<td>Check to send a message when an alarm condition has returned to normal.</td>
</tr>
<tr>
<td><strong>Return text</strong></td>
<td>The message displayed on the Field Assistant Alarms page &gt; View tab when an alarm condition returns to normal. A relative path is useful for alarm messages that you will reuse in multiple Field Assistant locations because the path is relative to the item that contains the path.</td>
</tr>
<tr>
<td><strong>Return requires acknowledge</strong></td>
<td>Check to require that an operator acknowledge return-to-normal notifications on the system’s Alarms page &gt; View tab.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Fault</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fault Enabled</strong></td>
<td>Check to send a message when a fault condition occurs, such as a misconfigured or non-existent sensor.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Rnet</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enable Rnet</strong></td>
<td>Check to allow this microblock to communicate its value(s) to and from a sensor.</td>
</tr>
<tr>
<td><strong>Allow 'Continuous' Override</strong></td>
<td>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.</td>
</tr>
</tbody>
</table>
### 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

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increment</td>
<td>Minutes the microblock adds to the zone's occupied time for each press of the zone's local override button or switch.</td>
</tr>
<tr>
<td>Maximum Duration</td>
<td>Maximum value (up to 960 minutes) the microblock outputs regardless of additional pulses from the controller's input.</td>
</tr>
<tr>
<td>Show scheduling limits</td>
<td>The default limits for the Occupancy schedule category.</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Weekly Schedules - Max Transitions Per Day</th>
<th>The number of transitions a weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Exception Schedules</td>
<td>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.</td>
</tr>
<tr>
<td>Max Transitions Per Day</td>
<td>The number of transitions a non-weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.</td>
</tr>
</tbody>
</table>

### 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 **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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Control microblocks (page 283)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>![Microblock Icon]</td>
</tr>
</tbody>
</table>

This microblock reads schedules from the 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 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 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>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Display Name</strong></td>
<td>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</td>
</tr>
</tbody>
</table>
| **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. |
| **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 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.

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Weekly Schedules - Max Transitions Per Day</strong></td>
<td>The number of transitions a weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.</td>
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<tr>
<td><strong>Max Exception Schedules</strong></td>
<td>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.</td>
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<tr>
<td><strong>Max Transitions Per Day</strong></td>
<td>The number of transitions a non-weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.</td>
</tr>
</tbody>
</table>

**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 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 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 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 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 Controller (page 323)**
  Provides stable temperature control of a single-zone heating and cooling system using 2 modified PID control loops.

- **PID - Direct Acting (page 326)**
  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 - Reverse Acting (page 328)**

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.

**BACnet PID (page 330)**

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.

**Linear Converter (page 338)**

This microblock converts a value in a range to a proportionate value in a different range.

**Linear Converter for Variable Inputs (page 340)**

This microblock converts a value in a range to a proportionate value in a different range.

**Enthalpy Calculator (page 341)**

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.

**Dewpoint Temperature Calculator (page 342)**

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.

**Wetbulb Temperature Calculator (page 343)**

This microblock accepts a dry bulb temperature and a relative humidity value and uses this information to calculate the wet bulb temperature.

**True If = Constant (page 344)**

This microblock creates an on (or true) signal when the value of the microblock's input is equal to the trip point.

**True If > Constant (page 345)**

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 346)**

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 347)**

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 348)**

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 349)**

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 350)
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 351)
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.

Microblock family
Convert microblocks (page 321)

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**

<table>
<thead>
<tr>
<th>Input</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em><strong>OCC</strong></em></td>
<td>Occupied                                      True (on) when the zone is occupied. Not true (off) when the zone is unoccupied. Connect to a <em>time clock microblock</em> (page 283) or to other logic that indicates the zone's occupancy status.</td>
</tr>
<tr>
<td><em><strong>FOR</strong></em></td>
<td>Remaining Time                                Minutes remaining until the zone's occupancy status changes. Connect to a <em>time clock microblock</em> (page 283) or to other logic that indicates this time.</td>
</tr>
<tr>
<td><em><strong>ZONE</strong></em></td>
<td>Zone Temp                                      Current zone temperature (degrees).</td>
</tr>
<tr>
<td><em><strong>HTSP</strong></em></td>
<td>Heating Setpoint                              Heating setpoint (degrees). Connect to a setpoint microblock's <strong>HT</strong> output or to other logic that indicates the zone's heating setpoint.</td>
</tr>
<tr>
<td><em><strong>CLSP</strong></em></td>
<td>Cooling Setpoint                              Cooling setpoint (degrees). Connect to a setpoint microblock's <strong>CL</strong> output or to other logic that indicates the zone's cooling setpoint.</td>
</tr>
</tbody>
</table>

**Outputs**

<table>
<thead>
<tr>
<th>Output</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em><strong>CLG%</strong></em></td>
<td>Cooling %                                      (0–100%) Amount of cooling required. Connect to the <em>Airflow Control</em> (page 94) microblock's <strong>Cooling %</strong> input or to another <em>Output</em> (page 30) 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.</td>
</tr>
<tr>
<td><em><strong>HTG%</strong></em></td>
<td>Heating %                                      (0–100%) Amount of heating required. Connect to the <em>Airflow Control</em> (page 94) microblock's <strong>Heating %</strong> input or to another <em>Output</em> (page 30) 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.</td>
</tr>
</tbody>
</table>
Properties

**TIPS**

- **Alt+click** any value in the 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>
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<tr>
<th>Reference Name</th>
<th>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.</th>
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<tbody>
<tr>
<td><strong>Editing Privilege</strong></td>
<td><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is. <strong>CAUTION</strong> If you change the <strong>Editing Privilege</strong> from <strong>Preset</strong>, the privilege you select will be used for all properties of this microblock, which is not always desirable.</td>
</tr>
<tr>
<td><strong>Cooling Loop Gain</strong></td>
<td>(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.</td>
</tr>
<tr>
<td><strong>Heating Loop Gain</strong></td>
<td>(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.</td>
</tr>
<tr>
<td><strong>Maintain Setpoints ±</strong></td>
<td>Control range (degrees). The microblock calls for 100% heating or cooling when the zone temperature exceeds the setpoint by 75% of this limit. See &quot;How it works (page 323)&quot; in this microblock's help. If the system begins cycling, increase this value.</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Convert microblocks (page 321)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="PID DA" /></td>
</tr>
<tr>
<td>What it does</td>
<td>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.</td>
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Properties

💡 TIPS

- **Alt+click** any value in the 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 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: \( P = (\text{Input} - \text{Setpoint}) \times \text{P-gain} \). 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: \( I = \text{Previous I value} + [(\text{Input} - \text{Setpoint}) \times \text{I-gain}] \). 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.

Microblock family

Convert microblocks (page 321)

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 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.

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**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: \( P = (\text{Setpoint} - \text{Input}) \times P\text{-gain} \). 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: \( I = \text{Previous I value} + ([\text{Setpoint} - \text{Input}] \times \text{I-gain}) \). 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: \( D = ([\text{Setpoint} - \text{Input}]_{\text{current}} - ([\text{Setpoint} - \text{Input}]_{\text{previous}}) \times \text{D-gain}. \) 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 \((2 - 0) \times 3 = 6\). If at the end of the second interval the temperature is still 67, the Derivative value will decrease to 0 \((2 - 2) \times 3 = 0\). 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. |

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.

| Microblock family | Convert microblocks (page 321) |

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Field Assistant v6.5 Help
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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 react. This 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.

\[ P_{out} = P_{gain} \times (Error) \]

**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.

\[ I_{out} = I_{gain} \times (Error) + I_{out, previous interval} \]

**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.

\[ D_{out} = D_{gain} \times (Error_{current} - Error_{previous}) \]

**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.

\[ PID_{out} = P_{out} + I_{out} + D_{out} + Bias \]

**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 331)" 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 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 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
### 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 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°.

![Dead Band Diagram](image)

**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: $P = \text{Error} \times \text{P-gain}$. 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: $I = \text{Previous I value} + [\text{Error} \times \text{I-gain}]$. 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: $D = ([\text{Error}]_{\text{current}} - ([\text{Error}]_{\text{previous}}) \times \text{D-gain}$. 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 ($[2 - 0] \times 3 = 6$). If at the end of the second interval the temperature is still 67, the Derivative value will decrease to 0 ($[2 - 2] \times 3 = 0$). The microblock's output percentage uses all three components as follows: $\text{Output (\%)} = \text{Bias} + P + I + D$. 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

<table>
<thead>
<tr>
<th>Object</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loop</td>
<td><strong>Auto-assign</strong> SiteBuilder assigns a BACnet Object ID to the Loop, Setpoint, Input, and PID Out objects when you attach the control program to a controller.</td>
</tr>
<tr>
<td>Setpoint</td>
<td><strong>Use specific value</strong> 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 <strong>Loop</strong>, <strong>Setpoint</strong>, <strong>Input</strong>, and <strong>PID Out</strong> fields.</td>
</tr>
<tr>
<td>Input</td>
<td><strong>NOTE</strong> 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.</td>
</tr>
<tr>
<td>PID Out</td>
<td></td>
</tr>
</tbody>
</table>

| 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

<table>
<thead>
<tr>
<th>Units</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setpoint and Input</td>
<td>The BACnet engineering unit of measurement of the microblock's present value.</td>
</tr>
</tbody>
</table>

#### COV Increment

<table>
<thead>
<tr>
<th>COV Increment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setpoint</td>
<td>An Analog Network Input (ANI) that references this microblock in its <strong>Address</strong> 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 <strong>COV Increment</strong>. If subscription fails, the ANI reads this microblock's value at intervals specified in the ANI's <strong>Refresh Time</strong> field.</td>
</tr>
<tr>
<td>Input</td>
<td></td>
</tr>
<tr>
<td>PID Output</td>
<td></td>
</tr>
</tbody>
</table>

#### Trends

<table>
<thead>
<tr>
<th>Trend</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enable Trend Log</td>
<td>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.</td>
</tr>
<tr>
<td>Sample every ___ (hh:mm:ss)</td>
<td>Records the microblock's present value at this interval.</td>
</tr>
<tr>
<td>EXAMPLE</td>
<td>Type 00:10:00 to record the microblock's present value every 10 minutes.</td>
</tr>
</tbody>
</table>
**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:

\[(100 \times 10 \text{ bytes}) + 48 = 1048 \text{ bytes of memory}\]

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 a 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 a 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 a 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, BACview® screens, and third-party BACnet access. Gains and other values can be optionally configured as wire inputs and are read only.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property ID</th>
<th>Units</th>
<th>Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present value</td>
<td>85</td>
<td>0-100%</td>
<td>Read only</td>
</tr>
<tr>
<td>Update Interval</td>
<td>118</td>
<td>Msec</td>
<td>R/W unless input on wire</td>
</tr>
<tr>
<td>Action</td>
<td>2</td>
<td>Text Toggle</td>
<td>Read only from the Field Assistant application R/W through BACnet</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property ID</th>
<th>Units</th>
<th>Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportional Gain</td>
<td>93</td>
<td>None</td>
<td>R/W unless input on wire</td>
</tr>
<tr>
<td>Integral Gain</td>
<td>49</td>
<td>None</td>
<td>R/W unless input on wire</td>
</tr>
<tr>
<td>Derivative Gain</td>
<td>26</td>
<td>None</td>
<td>R/W unless input on wire</td>
</tr>
<tr>
<td>Bias</td>
<td>14</td>
<td>0-100%</td>
<td>R/W unless input on wire</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Property Name</th>
<th>Property ID</th>
<th>Units</th>
<th>Read/Write</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Proportional</td>
<td>4163</td>
<td>Binary</td>
<td>R/W</td>
</tr>
<tr>
<td>Deadband</td>
<td>4164</td>
<td>Same as input</td>
<td>R/W</td>
</tr>
<tr>
<td>Min Ramp Time</td>
<td>4165</td>
<td>Seconds</td>
<td>R/W</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Convert microblocks (page 321)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>📊</td>
</tr>
</tbody>
</table>
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 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:
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RefName</strong></td>
<td>• lower case only</td>
</tr>
<tr>
<td></td>
<td>• limited to 40 characters</td>
</tr>
<tr>
<td></td>
<td>• cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td>• must be unique within a control program</td>
</tr>
</tbody>
</table>

**Editing Privilege**

**Preset** - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the 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.

Microblock family
Convert microblocks (page 321)

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

\[
\text{output} = X + \text{(input} - A) \cdot \frac{Y - X}{(B - A)}
\]

where \( X \leq \text{output} \leq Y \).

Properties

TIPS
• **Alt+click** any value in the 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

### 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).

![Diagram](image1.png)

### 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.

**Microblock family**

Convert microblocks (page 321)

**Icon and symbol**

![Icon](image2.png)
**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 °C for use by the `db` input, then convert the `ent` output to metric units.

**Properties**

**TIPS**
- Alt+click any value in the 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

**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.

**Microblock family**
Convert microblocks (page 321)

**Icon and symbol**
![Dewpoint](image)

**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 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Limitations:</strong></td>
<td></td>
</tr>
<tr>
<td>lower case only</td>
<td></td>
</tr>
<tr>
<td>limited to 40 characters</td>
<td></td>
</tr>
<tr>
<td>cannot begin with a number</td>
<td></td>
</tr>
<tr>
<td>must be unique within a control program</td>
<td></td>
</tr>
</tbody>
</table>

**Wetbulb 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Convert microblocks (page 321)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="db, wetb, humidity" /></td>
</tr>
<tr>
<td>What it does</td>
<td>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.</td>
</tr>
</tbody>
</table>

**Limitations**

This microblock does not support metric temperatures. If you need a metric wetbulb 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 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
</table>
| 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Convert microblocks (page 321)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="Image" /></td>
</tr>
<tr>
<td>What it does</td>
<td>This microblock creates an on (or true) signal when the value of the microblock's input is equal to the trip point.</td>
</tr>
</tbody>
</table>

Properties

TIPS

- **Alt+click** any value in the 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 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**

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.

**Microblock family**

*Convert microblocks* (page 321)

**Icon and symbol**

![Microblock Icon]

**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 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**<br>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 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.

<table>
<thead>
<tr>
<th><strong>Microblock family</strong></th>
<th>Convert microblocks (page 321)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Icon and symbol</strong></td>
<td>![icon]</td>
</tr>
<tr>
<td><strong>What it does</strong></td>
<td>This microblock creates an on (or true) signal when the value of the microblock's input is less than the microblock's trip point.</td>
</tr>
</tbody>
</table>
- **Alt+click** any value in the 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:
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• lower case only</td>
</tr>
<tr>
<td></td>
<td>• limited to 40 characters</td>
</tr>
<tr>
<td></td>
<td>• cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td>• must be unique within a control program</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Trip Point</th>
<th>Type the constant value the microblock will use to determine if it should generate an on (or true) signal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hysteresis</td>
<td>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.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Property Page Text</th>
<th>Check to show this microblock's value on the equipment's Properties page.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Page Text</td>
<td>You can edit the microblock description that appears on the Properties page. See &quot;Editing Properties page text using special characters&quot; and &quot;Formatting a microblock property&quot; in Snap Help.</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Convert microblocks (page 321)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>![if=] ![if=3]</td>
</tr>
<tr>
<td>What it does</td>
<td>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.</td>
</tr>
</tbody>
</table>
Properties

**TIPS**
- **Alt+click** any value in the 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 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Convert microblocks (page 321)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="if&gt;" /> <img src="image" alt="if&gt;" /></td>
</tr>
<tr>
<td>What it does</td>
<td>This microblock creates an on (or true) signal when the value of the microblock's if &gt; input is greater than the microblock's other input. The microblock accepts two analog values wired from other parts of the control program.</td>
</tr>
</tbody>
</table>
Properties

**TIPS**

- **Alt+click** any value in the 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 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

<table>
<thead>
<tr>
<th>Show Property Page Text</th>
<th>Check to show this microblock's value on the equipment's <strong>Properties</strong> page.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Page Text</td>
<td>You can edit the microblock description that appears on the <strong>Properties</strong> page. See &quot;Editing Properties page text using special characters&quot; and &quot;Formatting a microblock property&quot; in Snap Help.</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Convert microblocks (page 321)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image-url" alt="Image" /></td>
</tr>
</tbody>
</table>
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 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 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

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

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.
Microblock family  
*Convert microblocks (page 321)*

Icon and symbol  
![Microblock Icon](Image)

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 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**

<table>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limitations:</td>
<td>lower case only</td>
</tr>
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<td></td>
<td>limited to 40 characters</td>
</tr>
<tr>
<td></td>
<td>cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td>must be unique within a control program</td>
</tr>
</tbody>
</table>

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.

Microblock family  
*Convert microblocks (page 321)*

Icon and symbol  
![Microblock Icon](Image)

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 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 353)*
  
  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 354)*
  
  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 355)*
  
  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 355)*
  
  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 356)*
  
  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 357)*
  
  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 358)*
  
  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 input's value.
**Variable High Limit (page 359)**

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 360)**

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.

### Microblock family
**Limit microblocks (page 352)**

### Icon and symbol
![High Signal Selector Icon](image)

### 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 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Limitations:</strong></td>
<td></td>
</tr>
<tr>
<td>• lower case only</td>
<td></td>
</tr>
<tr>
<td>• limited to 40 characters</td>
<td></td>
</tr>
<tr>
<td>• cannot begin with a number</td>
<td></td>
</tr>
<tr>
<td>• must be unique within a control program</td>
<td></td>
</tr>
<tr>
<td><strong>Editing Privilege</strong></td>
<td><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</td>
</tr>
</tbody>
</table>

**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.

**Microblock family**

*Limit microblocks (page 352)*

**Icon and symbol**

![Low Signal Selector](image)

**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 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 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.
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.

**Microblock family**  
*Limit microblocks (page 352)*

**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 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
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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.
**Microblock family**  
Limit microblocks (page 352)

**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 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.

**Microblock family**  
Limit microblocks (page 352)

**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.
• **Alt+click** any value in the 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
</table>
| **Limitations:** | • lower case only  
| | • limited to 40 characters  
| | • cannot begin with a number  
| | • must be unique within a control program |

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

| 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**. |

<table>
<thead>
<tr>
<th>Property Page Text</th>
<th>Check to show this microblock's value on the equipment's Properties page.</th>
</tr>
</thead>
</table>

| 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

**CAUTION** 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th><strong>Limit microblocks</strong> (page 352)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>![microblock_icon]</td>
</tr>
</tbody>
</table>

**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 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
</table>
| Limitations:   | • lower case only  
|                | • limited to 40 characters  
|                | • cannot begin with a number  
|                | • must be unique within a control program |

<table>
<thead>
<tr>
<th>Editing Privilege</th>
<th>Preset - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAUTION</td>
<td>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>
</tbody>
</table>

| 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**. |

### 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th><em>Limit microblocks</em> (page 352)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image-url" alt="Image" /></td>
</tr>
<tr>
<td>What it does</td>
<td>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.</td>
</tr>
</tbody>
</table>
Properties

**TIPS**

- **Alt+click** any value in the 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.

| **Microblock family** | *Limit microblocks* (page 352) |

| **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, 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 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Limit microblocks (page 352)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>![ramp icon and symbol]</td>
</tr>
</tbody>
</table>

**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 222).

---

**Properties**

💡 **TIPS**

- **Alt+click** any value in the 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>
<thead>
<tr>
<th>Reference Name</th>
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<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
</table>
| 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 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 362)

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 363)

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 (page 364)

This microblock provides a delay before passing an on signal to the next microblock.
Microblock reference

**Delay On Break** (page 365)
This microblock provides a delay before passing an off signal to the next microblock.

**Maximum On Timer** (page 366)
This microblock limits the amount of time a signal remains on.

**Minimum On/Off Timer** (page 367)
This microblock defines the minimum amount of time that a signal should remain on or off.

**Latch** (page 369)
This microblock turns the output on when clear is off and it detects an input transition from off to on.

**Toggle** (page 370)
This microblock toggles its output value when its input turns on.

**Lead/Standby** (page 371)
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 373)
This microblock switches the microblock's output between a numeric input and a constant value.

**Switch - Normally Closed to Constant** (page 374)
This microblock switches the microblock's output between a numeric input and a constant value.

**Switch** (page 375)
This microblock switches the microblock's output value between two numeric inputs.

**Digital Wire Lock** (page 375)
This microblock can lock a signal so that it remains on or off regardless of the input signal.

**Analog Wire Lock** (page 377)
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.

**Microblock family**  Relay microblocks (page 361)

**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 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
<th>Limitations:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>• lower case only</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• limited to 40 characters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• must be unique within a control program</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Editing Privilege</th>
<th>Preset - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</th>
<th><strong>CAUTION</strong> If you change the <strong>Editing Privilege</strong> from <strong>Preset</strong>, the privilege you select will be used for all properties of this microblock, which is not always desirable.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duty cycle</td>
<td>This setting determines the percentage of the cycle that the output is on.</td>
<td></td>
</tr>
<tr>
<td>Full cycle every</td>
<td>This is the length of the complete cycle.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Property Page Text</th>
<th>Check to show this microblock's value on the equipment's Properties page.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Page Text</td>
<td>You can edit the microblock description that appears on the Properties page. See &quot;Editing Properties page text using special characters&quot; and &quot;Formatting a microblock property&quot; in Snap Help.</td>
</tr>
</tbody>
</table>

Variable Duty Cycle

**CAUTION** 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Relay microblocks (page 361)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image-url" alt="Image" /></td>
</tr>
</tbody>
</table>
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 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.

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<tr>
<th>Reference Name</th>
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</thead>
<tbody>
<tr>
<td><strong>Limitations:</strong></td>
<td>• lower case only</td>
</tr>
<tr>
<td><strong>Editing Privilege</strong></td>
<td><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</td>
</tr>
<tr>
<td><strong>CAUTION</strong></td>
<td>If you change the <strong>Editing Privilege</strong> from <strong>Preset</strong>, the privilege you select will be used for all properties of this microblock, which is not always desirable.</td>
</tr>
<tr>
<td><strong>Period</strong></td>
<td>This is the length of the complete cycle.</td>
</tr>
</tbody>
</table>

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.

Microblock family

*Relay microblocks (page 361)*
This microblock provides a delay before passing an on signal to the next microblock.

When the microblock receives an on signal, its output remains off until the delay time has passed. The delay time applies only to an on signal. Once the input turns off, the output turns off immediately. If the input turns off before the delay period passes, the output does not turn on.

**Properties**

**TIPS**
- **Alt+click** any value in the 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 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.
**Microblock family**
Relay microblocks (page 361)

**Icon and symbol**

**What It does**
This microblock provides a delay before passing an off signal to the next microblock.

When the microblock receives an off signal, its output remains on until the delay time has passed. The delay time applies only to an off signal. Once the input turns on, the output turns on immediately. If the input turns on before the delay period passes, the output does not turn off.

---

**Properties**

**TIPS**
- **Alt+click** any value in the 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
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|                | • 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 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 | 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.
**Microblock family**  
*Relay microblocks (page 361)*

<table>
<thead>
<tr>
<th>Icon and symbol</th>
<th>![Image of microblock icon]</th>
</tr>
</thead>
</table>

**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 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 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 | 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.
### Microblock family

Relay microblocks (page 361)

### Icon and symbol

![ON-OFF Timer](image)

### 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 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.

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</tr>
<tr>
<td>Minimum on time</td>
<td>The minimum period (seconds) that the microblock's present value will be on, regardless of the input signal to the microblock.</td>
</tr>
<tr>
<td>Minimum off time</td>
<td>The minimum period (seconds) that the microblock's present value will be off, regardless of the input signal to the microblock.</td>
</tr>
</tbody>
</table>

### Property Page Text

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

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.

**Microblock family**
* Relay microblocks (page 361)

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

**Microblock family**
* Relay microblocks (page 361)  

**Icon and symbol**
* [Toggle symbol](image)

**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.

**Properties**

**TIPS**
- **Alt+click** any value in the 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  
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  Limitations:
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**Editing Privilege**
* Preset - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the 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**
* Check to show this microblock's value on the equipment's Properties page.
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.

**Microblock family**  
*Relay microblocks (page 361)*

**Icon and symbol**

```
LEAD/STANDBY
```

**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 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.

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<td><strong>Editing Privilege</strong></td>
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<td><strong>CAUTION</strong></td>
<td>If you change the <strong>Editing Privilege</strong> from <strong>Preset</strong>, the privilege you select will be used for all properties of this microblock, which is not always desirable.</td>
</tr>
<tr>
<td><strong>Swap based on runtime?</strong></td>
<td>You may want the standby output to become the lead based on runtime, check <strong>Swap based on runtime.</strong> In <strong>Swap lead output after __ hrs.</strong> set when the lead output's runtime expires. You can determine the starting runtime value using the <strong>Preset runtime value</strong> setting on the Properties page. For example, if the <strong>Preset runtime value</strong> is 100, and the <strong>Swap lead output after __ hrs</strong> setting is 150, the lead output becomes the standby output after 50 hours have passed (150 hours - 100 hours preset = 50 hours). Once the <strong>Preset runtime value</strong> 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 <strong>Preset runtime value</strong> again.</td>
</tr>
<tr>
<td><strong>NOTE</strong></td>
<td>If you manually swap using the input, the swap timer will be reset.</td>
</tr>
<tr>
<td><strong>TIP</strong></td>
<td>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.</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Relay microblocks (page 361)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="Switch Icon" /></td>
</tr>
<tr>
<td>What it does</td>
<td>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 <code>sw</code> input is on. When the <code>sw</code> input is on, the output equals the constant value.</td>
</tr>
</tbody>
</table>

### Properties

**TIPS**

- **Alt+click** any value in the 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.

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**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.

<table>
<thead>
<tr>
<th>Constant</th>
<th>The value the microblock outputs if the <code>sw</code> input is on (true).</th>
</tr>
</thead>
</table>

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

Microblock family

Relay microblocks (page 361)

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 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 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
Microblock reference

**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.

**Microblock family**

Relay microblocks (page 361)

**Icon and symbol**

![Switch icon](image)

**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 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**

<table>
<thead>
<tr>
<th>Reference Name</th>
<th>RefName</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links.</td>
<td></td>
</tr>
<tr>
<td>Limitations:</td>
<td></td>
</tr>
<tr>
<td>- lower case only</td>
<td></td>
</tr>
<tr>
<td>- limited to 40 characters</td>
<td></td>
</tr>
<tr>
<td>- cannot begin with a number</td>
<td></td>
</tr>
<tr>
<td>- must be unique within a control program</td>
<td></td>
</tr>
</tbody>
</table>

---

**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.
### Microblock reference

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Relay microblocks (page 361)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="Icon and symbol" /></td>
</tr>
</tbody>
</table>

### 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 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 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

#### 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 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.
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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Relay microblocks (page 361)</th>
</tr>
</thead>
</table>
| Icon and symbol | ![icon](image)

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 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>
<thead>
<tr>
<th>Display Name</th>
<th>The microblock label used in the Snap application and the Field Assistant interface. You can use any characters except the &quot; character.</th>
</tr>
</thead>
</table>
| 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 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:

**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 - 2 Input** (page 379)

  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.

- **And - 3 Input** (page 380)

  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.
And - 4 Input (page 381)
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.

And - 5 Input (page 381)
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 - 2 Input (page 382)
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.

Or - 3 Input (page 383)
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.

Or - 4 Input (page 383)
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.

Or - 5 Input (page 384)
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.

Exclusive Or (XOR) (page 385)
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 (page 386)
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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Logic microblocks (page 378)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>and</td>
</tr>
<tr>
<td>What It does</td>
<td>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.</td>
</tr>
</tbody>
</table>

Properties

- Alt+click any value in the 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
</table>
| 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 **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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Logic microblocks (page 378)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="And-3 Input Icon" /></td>
</tr>
<tr>
<td>What it does</td>
<td>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.</td>
</tr>
</tbody>
</table>

**Properties**

💡 **TIPS**

- **Alt+click** any value in the 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
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</thead>
</table>
| 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Logic microblocks (page 378)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="Logo" /></td>
</tr>
<tr>
<td>What it does</td>
<td>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.</td>
</tr>
</tbody>
</table>

Properties

💡 TIPS
- Alt+click any value in the 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>
<thead>
<tr>
<th>Reference Name</th>
<th>RefName</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations:</td>
<td></td>
</tr>
<tr>
<td>• lower case only</td>
<td></td>
</tr>
<tr>
<td>• limited to 40 characters</td>
<td></td>
</tr>
<tr>
<td>• cannot begin with a number</td>
<td></td>
</tr>
<tr>
<td>• must be unique within a control program</td>
<td></td>
</tr>
</tbody>
</table>

And - 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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Logic microblocks (page 378)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="Logo" /></td>
</tr>
<tr>
<td>What it does</td>
<td>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.</td>
</tr>
</tbody>
</table>
**Properties**

**TIPS**

- **Alt+click** any value in the 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 |

**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th><strong>Logic microblocks</strong> (page 378)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="Icon" /></td>
</tr>
<tr>
<td>What it does</td>
<td>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.</td>
</tr>
</tbody>
</table>

**Properties**

**TIPS**

- **Alt+click** any value in the 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
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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.

Microblock family
Logic microblocks (page 378)

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 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
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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.
**Microblock family**  
*Logic microblocks (page 378)*

**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 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.

**Microblock family**  
*Logic microblocks (page 378)*

**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 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>
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<tr>
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</thead>
<tbody>
<tr>
<td>Limitations:</td>
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<td></td>
<td>• limited to 40 characters</td>
</tr>
<tr>
<td></td>
<td>• cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td>• must be unique within a control program</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Logic microblocks (page 378)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="XOR symbol" /></td>
</tr>
<tr>
<td>What It does</td>
<td>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.</td>
</tr>
</tbody>
</table>

**Properties**

💡 **TIPS**
• **Alt+click** any value in the 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>
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<tr>
<th>Reference Name</th>
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<tbody>
<tr>
<td>Limitations:</td>
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<td></td>
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<td></td>
<td>• cannot begin with a number</td>
</tr>
<tr>
<td></td>
<td>• must be unique within a control program</td>
</tr>
</tbody>
</table>
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.

**Microblock family**

*Logic microblocks (page 378)*

**Icon and symbol**

```
not :not:
```

**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 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.

- **Add Constant to Variable** (page 387)
  
  This microblock adds its input value to the Constant value. The microblock's output is the result of this calculation.

- **Subtract Constant from Variable** (page 388)
  
  This microblock subtracts the Constant value from its input value. The microblock's output is the result of this calculation.

- **Multiply Variable Times Constant** (page 389)
  
  This microblock multiplies its input value by the Constant value. The microblock's output is the result of this calculation.
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.

Microblock family  
Math 1 microblocks (page 386)
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 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>
<thead>
<tr>
<th>Reference Name</th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links. Limitations:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>•</strong> lower case only</td>
<td></td>
</tr>
<tr>
<td><strong>•</strong> limited to 40 characters</td>
<td></td>
</tr>
<tr>
<td><strong>•</strong> cannot begin with a number</td>
<td></td>
</tr>
<tr>
<td><strong>•</strong> must be unique within a control program</td>
<td></td>
</tr>
</tbody>
</table>

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

| Constant | Perform the microblock's mathematical function using the input and this value. |

| 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.

**Microblock family**

Math 1 microblocks (page 386)
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 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

<table>
<thead>
<tr>
<th>Reference Name</th>
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</tr>
</thead>
<tbody>
<tr>
<td>RefName</td>
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<td>- cannot begin with a number</td>
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</tbody>
</table>

Editing Privilege

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

Constant

<table>
<thead>
<tr>
<th>Constant</th>
<th>Perform the microblock's mathematical function using the input and this value.</th>
</tr>
</thead>
</table>

Property Page Text

<table>
<thead>
<tr>
<th>Show Property Page Text</th>
<th>Check to show this microblock's value on the equipment's Properties page.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Page Text</td>
<td>You can edit the microblock description that appears on the Properties page. See &quot;Editing Properties page text using special characters&quot; and &quot;Formatting a microblock property&quot; in Snap Help.</td>
</tr>
</tbody>
</table>

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.

Microblock family

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Math 1 microblocks (page 386)</th>
</tr>
</thead>
</table>
**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 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 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 **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.

**Microblock family**

*Math 1 microblocks* (page 386)
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 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.

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</tr>
<tr>
<td>Constant</td>
<td>Perform the microblock's mathematical function using the input and this value.</td>
</tr>
</tbody>
</table>

**Modulo Divide by Constant**

- **CAUTION** 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.

| Microblock family | *Math 1 microblocks* (page 386) |
## Icon and symbol

![mod - MODULO](mod - MODULO)

### 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 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**
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Limitations:
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#### Editing Privilege
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⚠️ **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.
### Microblock family

Math 1 microblocks (page 386)

### Icon and symbol

![Icon](image)

### 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 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.

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### Add 3 Variables

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<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="Icon" /></td>
</tr>
<tr>
<td>What it does</td>
<td>This microblock adds the values of its inputs. The microblock's output is the result of this calculation.</td>
</tr>
</tbody>
</table>

---

### Properties

#### TIPS

- **Alt+click** any value in the 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**.
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.

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<tbody>
<tr>
<td>Icon and symbol</td>
<td>![Add 4 Variables icon]</td>
</tr>
<tr>
<td>What it does</td>
<td>This microblock adds the values of its inputs. The microblock's output is the result of this calculation.</td>
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Properties

TIPS

- **Alt+click** any value in the interface to view property details, including its editing privilege and expression (location path) for use on graphics.
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Subtract Two Variables

The information below provides a FULL description of this microblock and all of its properties. What

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</table>
Microblock reference

information you see and what you can do with it depends on your license and the application you are in.

**Microblock family**  
*Math 1 microblocks* (page 386)

**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**

**WARNING**

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.

**Microblock family**  
*Math 1 microblocks* (page 386)

**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**

**WARNING**

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.

**Microblock family**  
*Math 1 microblocks* (page 386)

**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**

**WARNING**

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.

**Microblock family**  
*Math 1 microblocks* (page 386)

**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**

**WARNING**

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**Microblock family**  
*Math 1 microblocks* (page 386)

**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**

**WARNING**

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**Microblock family**  
*Math 1 microblocks* (page 386)

**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.
(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.

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### Divide Two Variables

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<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="Divide Two Variables Icon" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What it does</th>
<th>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.</th>
</tr>
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</table>

### Properties

💡 **TIPS**

- **Alt+click** any value in the interface to view property details, including its editing privilege and expression (location path) for use on graphics.

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</table>
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.

**Microblock family**

Math 1 microblocks (page 386)

**Icon and symbol**

![Mod 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 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

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Limitations:

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Average

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**Microblock family**

Math 1 microblocks (page 386)

**Icon and symbol**

![Avg symbol]

**What it does**

This microblock calculates the average of its two inputs.
Properties

Tips
- Alt+click any value in the interface to view property details, including its editing privilege and expression (location path) for use on graphics.
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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.

- Microblock family: Math 1 microblocks (page 386)
- Icon and symbol: ![chspchsp]
- 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 interface to view property details, including its editing privilege and expression (location path) for use on graphics.
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Absolute Value

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<th>Math 1 microblocks (page 386)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>abs, -abs</td>
</tr>
<tr>
<td>What it does</td>
<td>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.</td>
</tr>
</tbody>
</table>

Properties

💡 TIPS

- **Alt+click** any value in the interface to view property details, including its editing privilege and expression (location path) for use on graphics.
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</table>

Math 2 microblocks

Math 2 microblocks perform advanced and trigonometric mathematical operations on their inputs.

- **Sine** (page 400)
  
  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.

- **Cosine** (page 401)
  
  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.
Microblock reference

**Tangent (page 401)**

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.

**Natural Log (page 402)**

A Natural Log microblock calculates the natural logarithm of its input. The microblock's output is the result of this calculation.

**Log (page 403)**

A Log microblock calculates the base 10 logarithm of its input. The microblock's output is the result of this calculation.

**Exponent (page 403)**

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.

**Square Root (page 404)**

A Square Root microblock calculates the square root of its input value. The microblock's output is the result of this calculation.

**Integrator (page 405)**

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 Up/Down (page 407)**

A Round Up/Down microblock rounds the input value up or down and produces a whole number.

**Truncate (page 407)**

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.

**Microblock family**

Math 2 microblocks (page 399)

**Icon and symbol**

\[ \sin \text{ or } -\sin \]

**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 interface to view property details, including its editing privilege and expression (location path) for use on graphics.
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Cosine

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**Microblock family**
Math 2 microblocks (page 399)

**Icon and symbol**
[cos]

**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 interface to view property details, including its editing privilege and expression (location path) for use on graphics.
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**Reference Name**
RefName

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Limitations:
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Tangent

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**Microblock family**
Math 2 microblocks (page 399)
**Microblock reference**

<table>
<thead>
<tr>
<th>Icon and symbol</th>
<th>( \tan ) - ( \tan^{-1} )</th>
</tr>
</thead>
</table>

**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 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.

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---

**Natural Log**

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<th><em>Math 2 microblocks (page 399)</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td>( \ln ) - ( \ln^{-1} )</td>
</tr>
<tr>
<td>What it does</td>
<td>A Natural Log microblock calculates the natural logarithm of its input. The microblock's output is the result of this calculation.</td>
</tr>
</tbody>
</table>

---

**Properties**

- **TIPS**
  - **Alt+click** any value in the 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.
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.

**Microblock family**

Math 2 microblocks (page 399)

**Icon and symbol**

![Log Icon](image)

**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 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

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.

**Microblock family**

Math 2 microblocks (page 399)
**Icon and symbol**

![Symbol](image)

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

### Square Root

![Warning](image)
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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Math 2 microblocks (page 399)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td>What it does</td>
<td>A Square Root microblock calculates the square root of its input value. The microblock’s output is the result of this calculation.</td>
</tr>
</tbody>
</table>

### Properties

**TIPS**

- **Alt+click** any value in the 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

---

**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.

**Microblock family**

Math 2 microblocks (page 399)

**Icon and symbol**

[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 interface to view property details, including its editing privilege and expression
Microblock reference

(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.

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<tr>
<th>Reference Name</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Editing Privilege</td>
<td><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is. <strong>CAUTION</strong> If you change the Editing Privilege from <strong>Preset</strong>, the privilege you select will be used for all properties of this microblock, which is not always desirable.</td>
</tr>
<tr>
<td>Display resolution</td>
<td>The microblock's value is truncated and incrementally updated as follows: The <strong>Display resolution</strong> 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 <strong>Display resolution</strong> 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, ...</td>
</tr>
<tr>
<td>Rate</td>
<td>Select the accumulation rate that this microblock is to use.</td>
</tr>
<tr>
<td>Property Page Text</td>
<td>Check to show this microblock's value on the equipment's <strong>Properties</strong> page.</td>
</tr>
<tr>
<td>Property Page Text</td>
<td>You can edit the microblock description that appears on the <strong>Properties</strong> page. See &quot;Editing Properties page text using special characters&quot; and &quot;Formatting a microblock property&quot; in Snap Help.</td>
</tr>
</tbody>
</table>

**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.

### Microblock family

Math 2 microblocks (page 399)

### Icon and symbol

round

### 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 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.
**Microblock family**

*Math 2 microblocks (page 399)*

**Icon and symbol**

![trunc](image)

**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 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.

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<tr>
<th>Reference Name</th>
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<tbody>
<tr>
<td><strong>RefName</strong></td>
<td><strong>Limitations:</strong></td>
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<tr>
<td></td>
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</tr>
</tbody>
</table>

---

### Misc microblocks

- **DO/DI Proof (page 409)**
  - 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 410)**
  - 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 411)**
  - A Text microblock allows you to place and format descriptive text on the **Properties** page.

- **Version (page 414)**
  - A Version microblock allows you to attach a fixed version number to a control program.

- **Sunrise/Sunset (page 415)**
  - 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 416) (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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Misc microblocks (page 408)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="Proof_icon.png" alt="Proof Icon" /></td>
</tr>
<tr>
<td>What it does</td>
<td>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.</td>
</tr>
</tbody>
</table>

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 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>
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<tr>
<th>Reference Name</th>
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</table>

<table>
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<tr>
<th>Editing Privilege</th>
<th><strong>Preset</strong> - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the Field Assistant interface to find out what the actual privilege is.</th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>CAUTION</strong> 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>
</tbody>
</table>
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
alarm 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.

Microblock family
Misc microblocks (page 408)

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 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

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 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.

Microblock family

Misc microblocks (page 408)

Icon and symbol

Text Text

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 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.

- **Expand Begin Closed**
  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.

- **Table Begin**
  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.
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".

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.

These options are currently not used.

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

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.

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.

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Misc microblocks (page 408)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icon and symbol</td>
<td><img src="Image" alt="Ver" /> <img src="Image" alt="Ver v0.0" /></td>
</tr>
<tr>
<td>What it does</td>
<td>A Version microblock allows you to attach a fixed version number to a control program.</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

**Properties**

**TIPS**

- **Alt+click** any value in the 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.

**Microblock family**  
*Misc microblocks (page 408)*

**Icon and symbol**  
![Sunrise/Sunset symbol](image)

**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 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
Microblock reference

**Editing Privilege**

Preset - Each microblock property has an appropriate privilege or role assigned to it. You can use Global Modify in the 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.

**Microblock family**

Misc microblocks (page 408)

**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 418).
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 418)
   • Predefined symbols (page 420)
   • System variables (page 421)
   • Special characters (page 421)
   • Functions (page 422)
   • Structures (page 425)

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.
**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.

**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.

**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.
### Term

<table>
<thead>
<tr>
<th>Term</th>
<th>Notes</th>
</tr>
</thead>
</table>
| 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.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Value</th>
<th>Symbol</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRAY</td>
<td>1</td>
<td>JAN</td>
<td>1</td>
</tr>
<tr>
<td>HRED</td>
<td>2</td>
<td>FEB</td>
<td>2</td>
</tr>
<tr>
<td>KBLUE</td>
<td>3</td>
<td>MAR</td>
<td>3</td>
</tr>
<tr>
<td>LTBLUE</td>
<td>4</td>
<td>APR</td>
<td>4</td>
</tr>
<tr>
<td>GREEN</td>
<td>5</td>
<td>MAY</td>
<td>5</td>
</tr>
<tr>
<td>SPECKLE</td>
<td>6</td>
<td>JUN</td>
<td>6</td>
</tr>
<tr>
<td>YELLOW</td>
<td>7</td>
<td>JUL</td>
<td>7</td>
</tr>
<tr>
<td>ORANGE</td>
<td>8</td>
<td>AUG</td>
<td>8</td>
</tr>
<tr>
<td>CRED</td>
<td>9</td>
<td>SEP</td>
<td>9</td>
</tr>
<tr>
<td>WHITE</td>
<td>10</td>
<td>OCT</td>
<td>10</td>
</tr>
<tr>
<td>TRUE</td>
<td>1</td>
<td>NOV</td>
<td>11</td>
</tr>
<tr>
<td>FALSE</td>
<td>0</td>
<td>DEC</td>
<td>12</td>
</tr>
<tr>
<td>ON</td>
<td>1</td>
<td>MON</td>
<td>1</td>
</tr>
<tr>
<td>OFF</td>
<td>0</td>
<td>TUE</td>
<td>2</td>
</tr>
<tr>
<td>OCC</td>
<td>1</td>
<td>WED</td>
<td>3</td>
</tr>
<tr>
<td>UNOCC</td>
<td>0</td>
<td>THU</td>
<td>4</td>
</tr>
<tr>
<td>OCCUPIED</td>
<td>1</td>
<td>FRI</td>
<td>5</td>
</tr>
</tbody>
</table>
### 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.

<table>
<thead>
<tr>
<th>System variable</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLOR</td>
<td>Control program's current color (1-10)</td>
</tr>
<tr>
<td>MDAY</td>
<td>Current day of the month (1-31)</td>
</tr>
<tr>
<td>MONTH</td>
<td>Current month (1-12)</td>
</tr>
<tr>
<td>TIME</td>
<td>Current time (0-1439; in minutes since midnight)</td>
</tr>
<tr>
<td>WKDAY</td>
<td>Current day of the week (Monday=1, Sunday=7)</td>
</tr>
<tr>
<td>YDAY</td>
<td>Current day of the year (1-366)</td>
</tr>
<tr>
<td>YEAR</td>
<td>Current year (1981-2040)</td>
</tr>
</tbody>
</table>

### Special characters

You can use the following special characters in your OCL program.

<table>
<thead>
<tr>
<th>Character</th>
<th>Use to...</th>
</tr>
</thead>
<tbody>
<tr>
<td>( )</td>
<td>Use to override order of evaluation in an expression, delineate arguments in function calls, and to specify a conditional expression.</td>
</tr>
<tr>
<td>, (comma)</td>
<td>Use to separate arguments in function calls.</td>
</tr>
<tr>
<td>: (colon)</td>
<td>Use to identify labels referenced by GOSUB and GOTO keywords.</td>
</tr>
<tr>
<td>//</td>
<td>Use to place comments in the program. Any text following 2 slashes is ignored by the OCL compiler.</td>
</tr>
<tr>
<td>H</td>
<td>Use to represent one hour, or 3600 seconds.</td>
</tr>
<tr>
<td>M</td>
<td>Use to represent one minute, or 60 seconds.</td>
</tr>
<tr>
<td>S</td>
<td>Reserved but has no effect. The default time unit is seconds.</td>
</tr>
</tbody>
</table>
## 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.

<table>
<thead>
<tr>
<th>Function</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ABS</strong></td>
<td>Returns the absolute value of the number, variable, or expression in parenthesis.</td>
</tr>
<tr>
<td><strong>EXAMPLE</strong></td>
<td></td>
</tr>
<tr>
<td>( X = -10 )</td>
<td></td>
</tr>
<tr>
<td>( Y = \text{ABS}(X) )</td>
<td></td>
</tr>
<tr>
<td>( Z = \text{ABS}(5+3) )</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td><strong>AVG</strong></td>
<td>Returns the average of a set of values.</td>
</tr>
<tr>
<td><strong>EXAMPLE</strong></td>
<td></td>
</tr>
<tr>
<td>( \text{XAN} = 5 )</td>
<td></td>
</tr>
<tr>
<td>( \text{BETA} = \text{AVG}(1, 4, \text{XAN}, 9) )</td>
<td></td>
</tr>
<tr>
<td>In this example, OCL assigns ( \text{BETA} ) to 4.75.</td>
<td></td>
</tr>
<tr>
<td><strong>BETWEEN</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>EXAMPLE</strong></td>
<td></td>
</tr>
<tr>
<td>( \text{STAT1} = \text{BETWEEN}(17, 15, 20) )</td>
<td></td>
</tr>
<tr>
<td>( \text{BETA} = 2 )</td>
<td></td>
</tr>
<tr>
<td>( \text{STAT2} = \text{BETWEEN}(\text{BETA}, 3, 5) )</td>
<td></td>
</tr>
<tr>
<td>In this example, OCL assigns the value of ( \text{STAT1} ) to 1.0, since 17 falls between 15 and 20. OCL assigns the value of ( \text{STAT2} ) to 0.0, since ( \text{BETA} ) (which has a value of 2) is not between 3 and 5.</td>
<td></td>
</tr>
<tr>
<td><strong>COS</strong></td>
<td>Computes the cosine of the value (in degrees) in parentheses.</td>
</tr>
<tr>
<td><strong>EXAMPLE</strong></td>
<td></td>
</tr>
<tr>
<td>( \text{VAL} = \text{COS}(45) )</td>
<td></td>
</tr>
<tr>
<td>In this example, OCL assigns the value of ( \text{VAL} ) to 0.707.</td>
<td></td>
</tr>
<tr>
<td><strong>DEلون</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>EXAMPLE</strong></td>
<td></td>
</tr>
<tr>
<td>( \text{STAGE1} = \text{DEلون} (\text{GAS}, 1:00) )</td>
<td></td>
</tr>
<tr>
<td>This example turns on the variable ( \text{STAGE1} ) after the variable ( \text{GAS} ) has been on for 1 minute.</td>
<td></td>
</tr>
<tr>
<td><strong>EXAMPLE</strong></td>
<td></td>
</tr>
<tr>
<td>( \text{STAGE2} = \text{DE론} (\text{FLOW1} &gt; 125, 5 \text{H}) )</td>
<td></td>
</tr>
<tr>
<td>This example turns on the variable ( \text{STAGE2} ) after the value of the variable ( \text{FLOW1} ) has been greater than 125 for 5 hours.</td>
<td></td>
</tr>
<tr>
<td>Function</td>
<td>Notes</td>
</tr>
<tr>
<td>----------</td>
<td>-------</td>
</tr>
</tbody>
</table>
| 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). |
| 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. |
<table>
<thead>
<tr>
<th>Function</th>
<th>Notes</th>
</tr>
</thead>
</table>
| 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. |
<table>
<thead>
<tr>
<th>Function</th>
<th>Notes</th>
</tr>
</thead>
</table>
| **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

<table>
<thead>
<tr>
<th>Structure</th>
<th>Notes</th>
</tr>
</thead>
</table>
| 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. |
<p>| EXITPROG | Ends the OCL program. Place all subroutines after the EXITPROG statement to ensure they are not executed inadvertently. |</p>
<table>
<thead>
<tr>
<th>Structure</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GOSUB</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>EXAMPLE</strong></td>
<td>IF ( X &lt; 23.0 ) THEN GOSUB TURNON ELSE GOSUB TURNOFF EXITPROG TURNON: START (LOCK1) START (LOCK2) RETURN TURNOFF STOP (LOCK1) STOP (LOCK2) RETURN</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td><strong>GOTO</strong></td>
<td>Transfers execution of OCL to the designated label. The GOTO structure is not recommended because it creates difficulties in debugging the OCL sequence.</td>
</tr>
<tr>
<td><strong>EXAMPLE</strong></td>
<td>IF ( (PH &gt;= 6) ) THEN GOTO ACID ( Y = GB - X ) GOTO LAST ACID: ( Y = GB + X ) LAST:</td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td><strong>IF...THEN</strong></td>
<td>Tells OCL to execute a program statement if the value of the variable or expression in parenthesis is TRUE.</td>
</tr>
<tr>
<td><strong>EXAMPLE</strong></td>
<td>IF ( (BOILER9) ) THEN ( X = 45 ) In this example, if ( BOILER9 ) is on, OCL sets ( X ) to 45 .</td>
</tr>
<tr>
<td><strong>IF...THEN...ELSE</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>EXAMPLE</strong></td>
<td>IF ( (HUMIDITY &gt; 88) ) THEN DEMAND = 4 ELSE DEMAND = 2</td>
</tr>
<tr>
<td>In this example, OCL sets DEMAND equal to 4 if HUMIDITY is greater than 88; otherwise OCL sets DEMAND equal to 2.</td>
<td></td>
</tr>
</tbody>
</table>
### Structure

<table>
<thead>
<tr>
<th>Structure</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IFONCE...THEN</strong></td>
<td>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.</td>
</tr>
</tbody>
</table>
| **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**

- = (Equal To)
- > (Greater Than)
- >= (Greater Than or Equal To)
- < (Less Than)
- <= (Less Than or Equal To)
- <> (Not Equal To)
- AND
- OR
- NOT

### Examples

<table>
<thead>
<tr>
<th>This statement...</th>
<th>Will be true if...</th>
</tr>
</thead>
<tbody>
<tr>
<td>IF ((A1+A2=4) AND NOT (A1=A2)) THEN ANS = 1</td>
<td>A1=1 and A2=3 but not if A1=A2=2</td>
</tr>
</tbody>
</table>
This statement... | Will be true if...
---|---
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 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 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 429) | BACnet Setpoint (page 283)
BACnet Time Clock (page 442) | BACnet Time Clock with TLO and Override Status (page 313)
BACnet Time Clock with TLO (page 445) | BACnet Time Clock with TLO and Override Status (page 313)

BACnet Zone Setpoint

Microblock family | Control (page 283)

Icon and symbol

NOTE The microblock’s appearance depends on which options you select in Snap. The figure above includes all options.
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 312) 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 121) 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). 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**

\[
t = \frac{\text{FOR}}{60} = \text{Time Remaining Until Occupancy (hr)}
\]

\[
\text{OAT} = \text{Outside Air Temperature (°F)}
\]

\[
H_{\text{design}} = \text{Heating Design Temperature (°F)}
\]

\[
H_{\text{CAP}} = \text{Heating Capacity (°F/hr)}
\]

\[
H_{\text{unocc}} = \text{Unoccupied Heating Setpoint (°F)}
\]

\[
H_{\text{occ}} = \text{Occupied Heating Setpoint (°F)}
\]

\[
H_{\text{SP}} = \text{Heating Setpoint (°F)}
\]

\[
H_1 = \frac{(H_{\text{design}} - \text{OAT})}{(H_{\text{design}} - 65°F)} \times H_{\text{CAP}}
\]

\[
H_2 = H_{\text{unocc}} + \frac{(12 \cdot \text{MIN} (t, 12))}{12} \times (H_{\text{occ}} - H_{\text{unocc}})
\]

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

\[
H_{\text{SP}} = H_3 + (H_3 - H_{\text{unocc}}) \times (1 - \frac{(H_3 - H_{\text{unocc}})}{(H_{\text{occ}} - H_{\text{unocc}})})
\]

**Cooling capacity calculation during optimal start**

\[
t = \frac{\text{FOR}}{60} = \text{Time Remaining Until Occupancy (hr)}
\]

\[
\text{OAT} = \text{Outside Air Temperature (°F)}
\]

\[
C_{\text{design}} = \text{Cooling Design Temperature (°F)}
\]

\[
C_{\text{CAP}} = \text{Cooling Capacity (°F/hr)}
\]

\[
C_{\text{unocc}} = \text{Unoccupied Cooling Setpoint (°F)}
\]

\[
C_{\text{occ}} = \text{Occupied Cooling Setpoint (°F)}
\]

\[
C_{\text{SP}} = \text{Cooling Setpoint (°F)}
\]

\[
C_1 = \frac{(C_{\text{design}} - \text{OAT})}{(C_{\text{design}} - 65°F)} \times C_{\text{CAP}}
\]

\[
C_2 = C_{\text{unocc}} + \frac{(12 \cdot \text{MIN} (t, 12))}{12} \times (C_{\text{occ}} - C_{\text{unocc}})
\]

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

\[
C_{\text{SP}} = C_3 + (C_3 - C_{\text{unocc}}) \times (1 - \frac{(C_3 - C_{\text{unocc}})}{(C_{\text{occ}} - C_{\text{unocc}})})
\]

**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 310) microblock or any Set Color If True (page 310) 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**

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OAT</strong></td>
<td>Outside Air Temperature</td>
</tr>
<tr>
<td><strong>OCC</strong></td>
<td>Occupied Schedule</td>
</tr>
<tr>
<td><strong>FOR</strong></td>
<td>Remaining Time</td>
</tr>
</tbody>
</table>
### 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.

<table>
<thead>
<tr>
<th>Color</th>
<th>Status code</th>
<th>Condition Indicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>9</td>
<td>Cooling alarm</td>
</tr>
<tr>
<td>Orange</td>
<td>8</td>
<td>Maximum cooling</td>
</tr>
<tr>
<td>Yellow</td>
<td>7</td>
<td>Moderate cooling</td>
</tr>
<tr>
<td>Light green</td>
<td>6</td>
<td>Free cooling</td>
</tr>
<tr>
<td>Green</td>
<td>5</td>
<td>No heating or cooling</td>
</tr>
<tr>
<td>Light blue</td>
<td>4</td>
<td>Moderate heating</td>
</tr>
<tr>
<td>Dark blue</td>
<td>3</td>
<td>Maximum heating</td>
</tr>
<tr>
<td>Red</td>
<td>2</td>
<td>Heating alarm</td>
</tr>
<tr>
<td>Gray</td>
<td>1</td>
<td>Unoccupied</td>
</tr>
</tbody>
</table>

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 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 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

```
Unoccupied cooling setpoint: 50.0
Occupied cooling setpoint: 76.0
Occupied heating setpoint: 70.0
Unoccupied heating setpoint: 55.0

Demand1 cooling offset: 2.0
Demand2 cooling offset: 2.0
Demand3 cooling offset: 4.0
```

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.

<table>
<thead>
<tr>
<th>Object Name</th>
<th>A unique alphanumeric string that defines the BACnet object.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>An optional BACnet property that may be used to describe the object.</td>
</tr>
<tr>
<td>Network Visible</td>
<td>Check to allow other BACnet equipment to read or change the microblock's present value.</td>
</tr>
<tr>
<td>COV Increment</td>
<td>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.</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Object Name</th>
<th>A unique alphanumeric string that defines the BACnet object.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>An optional BACnet property that may be used to describe the object.</td>
</tr>
<tr>
<td>Network Visible (Zone Temperature and Occupied Status only)</td>
<td>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.</td>
</tr>
<tr>
<td>Enable</td>
<td>Check to have the controller collect trend data for the microblock's present value.</td>
</tr>
<tr>
<td>Interval</td>
<td>If trending is enabled, records the microblock's present value at this interval. <strong>EXAMPLE</strong> Type 00:10:00 to record the microblock's present value every 10 minutes. <strong>TIP</strong></td>
</tr>
<tr>
<td>Interval</td>
<td>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 Field Assistant.</td>
</tr>
<tr>
<td>Interval</td>
<td>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 Field Assistant. You can change the COV Increment in Field Assistant.</td>
</tr>
</tbody>
</table>
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:

\[(100 \times 10 \text{ bytes}) + 48 = 1048 \text{ bytes of memory}\]

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 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 a 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

<table>
<thead>
<tr>
<th>Demand Limiting</th>
<th>Setpoint Adjust</th>
<th>Optimal Start</th>
<th>Learning Adaptive</th>
<th>Capacity Limit</th>
<th>Minimum Setpoint Separation</th>
<th>Use Orphan Trend</th>
<th>Network Visible</th>
</tr>
</thead>
</table>

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

<table>
<thead>
<tr>
<th>Microblock family</th>
<th>Control microblock (page 283)</th>
</tr>
</thead>
</table>

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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 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
(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. 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 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 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 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 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 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 283)

**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 Field Assistant interface. You can use any characters except the " character.
## Microblock reference

<table>
<thead>
<tr>
<th><strong>Reference Name</strong></th>
<th>Use the default reference name unless you want a more descriptive name for graphics or network links.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Limitations:</strong></td>
<td>• lower case only &lt;br&gt; • limited to 40 characters &lt;br&gt; • cannot begin with a number &lt;br&gt; • must be unique within a control program</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Description</strong></th>
<th>(optional) A BACnet-visible microblock description.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lock Present Value</strong></td>
<td>Check to output the locked value from the microblock instead of the microblock's calculated value.</td>
</tr>
<tr>
<td><strong>Unscheduled Value</strong></td>
<td>The value the microblock assumes when no schedule has been downloaded to the program if: &lt;br&gt; • The system has no schedules that affect the equipment. &lt;br&gt; • A stand alone controller is powered up but no schedule data has been entered.</td>
</tr>
</tbody>
</table>

### Configuration

<table>
<thead>
<tr>
<th><strong>Active Text</strong></th>
<th>The <strong>Active Text</strong> your system displays when the microblock's output is on, or true.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inactive Text</strong></td>
<td>The <strong>Inactive Text</strong> your system displays when the microblock’s output is off, or false.</td>
</tr>
<tr>
<td><strong>Minimum off time</strong></td>
<td>The minimum period (seconds) that the microblock's present value will be off, regardless of the input signal to the microblock.</td>
</tr>
<tr>
<td><strong>Minimum on time</strong></td>
<td>The minimum period (seconds) that the microblock's present value will be on, regardless of the input signal to the microblock.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Show scheduling limits:</strong></th>
<th>The default limits for the Occupancy schedule category.</th>
</tr>
</thead>
</table>

**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.

<table>
<thead>
<tr>
<th><strong>Weekly Schedules - Max Transitions Per Day</strong></th>
<th>The number of transitions a weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Max Exception</strong></td>
<td>The number of non-weekly schedules allowed in a controller. The default is 30. Field Assistant reserves 7 of these schedules - one for each day of the week.</td>
</tr>
<tr>
<td><strong>Max Transitions Per Day</strong></td>
<td>The number of transitions a non-weekly schedule allows in a 24-hour period. The default is 6, which creates 5 schedule segments.</td>
</tr>
</tbody>
</table>

### Property Page Text

<table>
<thead>
<tr>
<th><strong>Show Property Page Text</strong></th>
<th>Check to show this microblock's value on the equipment's <strong>Properties</strong> page.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Property Page Text</strong></td>
<td>Enter a meaningful description of the microblock for use on the <strong>Properties</strong> page in the Field Assistant application.</td>
</tr>
</tbody>
</table>

### BACnet Configuration

Field Assistant v6.5  
Help  
Carrier Proprietary and Confidential  
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446
### 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 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 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 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 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.
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.

<table>
<thead>
<tr>
<th><strong>Unit</strong></th>
<th><strong>Abbreviation</strong></th>
<th><strong>BACnet number</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>amperes</td>
<td>A</td>
<td>3</td>
</tr>
<tr>
<td>bars</td>
<td>bar</td>
<td>55</td>
</tr>
<tr>
<td>bits per second</td>
<td>bps</td>
<td></td>
</tr>
<tr>
<td>btus</td>
<td>BTU</td>
<td>20</td>
</tr>
<tr>
<td>btus-per-hour</td>
<td>BTU/hr</td>
<td>50</td>
</tr>
<tr>
<td>btus-per-pound-dry-air</td>
<td>BTU/lb</td>
<td>24</td>
</tr>
<tr>
<td>centimeters-mercury</td>
<td>cm Hg</td>
<td>60</td>
</tr>
<tr>
<td>centimeters-of-water</td>
<td>cm H2O</td>
<td>57</td>
</tr>
<tr>
<td>cubic-feet</td>
<td>ft³</td>
<td>79</td>
</tr>
<tr>
<td>cubic-feet-per-minute</td>
<td>cfm</td>
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<td>m³/hr</td>
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</tr>
<tr>
<td>cubic-meters/second</td>
<td>m³/sec</td>
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</tr>
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<td>cycle/hr</td>
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</tr>
<tr>
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<td>°C/hr</td>
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</tr>
<tr>
<td>degrees-Celsius/min</td>
<td>°C/min</td>
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</tr>
<tr>
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<tr>
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<td>°F/hr</td>
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<td>ft/min</td>
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</tr>
<tr>
<td>Unit</td>
<td>Abbreviation</td>
<td>BACnet number</td>
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<tr>
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<tr>
<td>joules/kilogram- K</td>
<td>J/kg; °K</td>
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</tr>
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<tr>
<td>liters</td>
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<td>MJ/ft2</td>
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</tr>
<tr>
<td>megavolt-amperes</td>
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</tr>
<tr>
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<td>per-minute</td>
<td>per min</td>
<td>100</td>
</tr>
<tr>
<td>Unit</td>
<td>Abbreviation</td>
<td>BACnet number</td>
</tr>
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<tr>
<td>percent-rel-humidity</td>
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<td>29</td>
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<tr>
<td>pounds-force/inch2</td>
<td>psi</td>
<td>56</td>
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<tr>
<td>psi/degree-Fahrenheit</td>
<td>psi/°F</td>
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<td>ton</td>
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<td>5</td>
</tr>
<tr>
<td>Volts alternating current</td>
<td>Vac</td>
<td></td>
</tr>
<tr>
<td>Volts direct current</td>
<td>Vdc</td>
<td></td>
</tr>
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<tr>
<td>watts-per-square-foot</td>
<td>W/ft2</td>
<td>34</td>
</tr>
<tr>
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<td>W/m2</td>
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</tr>
<tr>
<td>watts/m2-K</td>
<td>W/m2-K</td>
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<td>wk</td>
<td>69</td>
</tr>
<tr>
<td>years</td>
<td>yr</td>
<td>67</td>
</tr>
</tbody>
</table>
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:

- Device instance number
  - bacnet://2010/>
- BACnet device name
  - bacnet://MyDevice/>
- Network number: MAC address
  - 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:

- Object type: Instance number
  - bacnet://.../ai:2
  - (See **NOTES** below)
- 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.

<table>
<thead>
<tr>
<th>Use...</th>
<th>Or...</th>
<th>Or...</th>
</tr>
</thead>
<tbody>
<tr>
<td>ai</td>
<td>analog-input</td>
<td>0</td>
</tr>
<tr>
<td>ao</td>
<td>analog-output</td>
<td>1</td>
</tr>
<tr>
<td>av</td>
<td>analog-value</td>
<td>2</td>
</tr>
<tr>
<td>bi</td>
<td>binary-input</td>
<td>3</td>
</tr>
<tr>
<td>bo</td>
<td>binary-output</td>
<td>4</td>
</tr>
<tr>
<td>bv</td>
<td>binary-value</td>
<td>5</td>
</tr>
<tr>
<td>dev</td>
<td>device</td>
<td>8</td>
</tr>
<tr>
<td>msi</td>
<td>multistate-input</td>
<td>13</td>
</tr>
<tr>
<td>mso</td>
<td>multistate-output</td>
<td>14</td>
</tr>
<tr>
<td>msv</td>
<td>multistate-value</td>
<td>19</td>
</tr>
</tbody>
</table>

- 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
- 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.

<table>
<thead>
<tr>
<th>Property Identifier</th>
<th>Identifier #</th>
</tr>
</thead>
<tbody>
<tr>
<td>change_of_state_count</td>
<td>15</td>
</tr>
<tr>
<td>cov_increment</td>
<td>22</td>
</tr>
<tr>
<td>derivative_constant</td>
<td>26</td>
</tr>
<tr>
<td>event_state</td>
<td>36</td>
</tr>
<tr>
<td>high_limit</td>
<td>45</td>
</tr>
<tr>
<td>integral_constant</td>
<td>49</td>
</tr>
<tr>
<td>low_limit</td>
<td>59</td>
</tr>
<tr>
<td>max_pres_value</td>
<td>65</td>
</tr>
<tr>
<td>min_pres_value</td>
<td>69</td>
</tr>
<tr>
<td>out-of-service</td>
<td>81</td>
</tr>
<tr>
<td>present_value</td>
<td>85</td>
</tr>
<tr>
<td>proportional_constant</td>
<td>93</td>
</tr>
<tr>
<td>reliability</td>
<td>103</td>
</tr>
<tr>
<td>relinquish_default</td>
<td>104</td>
</tr>
<tr>
<td>setpoint</td>
<td>108</td>
</tr>
<tr>
<td>system_status</td>
<td>112</td>
</tr>
<tr>
<td>trigger</td>
<td>205</td>
</tr>
<tr>
<td>units</td>
<td>117</td>
</tr>
<tr>
<td>vendor_identifier</td>
<td>120</td>
</tr>
</tbody>
</table>
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://2499:0x0E0C90047CA/bi:3
bacnet://2436:192.168.47.36:47806/0:2
Important changes to this document are listed below. Minor changes such as typographical or formatting errors are not listed.

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Change description</th>
<th>Code*</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/16/16</td>
<td>Manual commands</td>
<td>Corrected Ctrl+M to CTRL+Shift+M to access manual commands</td>
<td>X-TS-RD-BR-OC</td>
</tr>
</tbody>
</table>

* For internal use only