

# *groov* Build and View USER'S GUIDE

Form 2027-160729—July 2016

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**Automation made simple.**

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*groov* Build and View User's Guide  
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# 1: Welcome

## What is *groov*?

*groov* is Opto 22's web-based operator interface system that is *simple*, *mobile*, and *connects easily* to almost any automation system or device.

**Simple:** *groov* requires only a web browser to build mobile interfaces. It puts ready-made gadgets at your fingertips and requires no programming. Using tags from the built-in Data Simulator, you can test project ideas without connecting to a live machine or system. *groov* makes it simple to build, deploy, and view effective, scalable operator interfaces.

**Mobile:** Get the free *groov* View app for Android or iOS to view your *groov* interface on your iPhone, iPad, or Android phone or tablet. If you want to use a different brand device, from a smartphone to a web-enabled big-screen TV, just view your *groov* interface using a web browser. *groov* can augment existing human-machine interfaces (HMIs) and SCADA systems by making specific data available to authorized users at any time and in any location. Using event notification, selected personnel can be alerted anywhere by email or text message about system events based on one or more conditions.

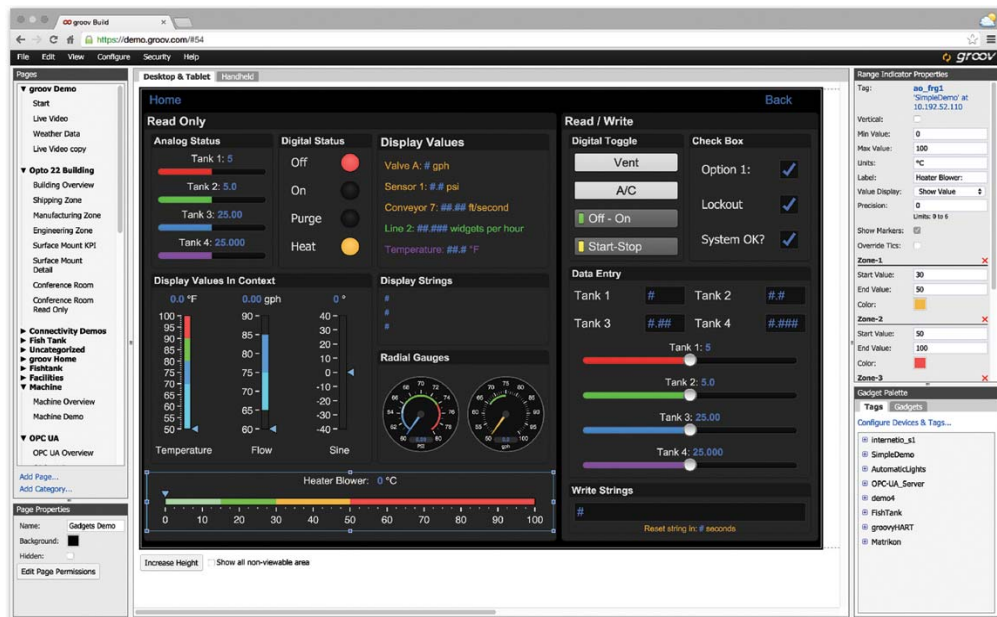


**Connects easily:** You can connect *groov* to Modbus/TCP devices and Opto 22 SNAP PAC controllers directly, or to devices from other manufacturers through an OPC UA (Unified Architecture) server. *groov* brings key data from process control, OEM machines, manufacturing and building systems, and the Internet of Things (IoT) into the hands of those who need it.

When connected to an OPC UA server, you can monitor and control PLCs and PACs such as Allen-Bradley ControlLogix and CompactLogix, Siemens SIMATIC S7, Schneider Electric Modicon, GE PACSystems, and many more. In addition you can use *groov* with databases, SNMP devices, weather stations, OPC DA servers, or any device or system supported by your OPC UA server. The KEPServerEX communication platform from Kepware Technologies is recommended by Opto 22 and tested to work with *groov*. (For more information about OPC UA, go to [opcfoundation.org/UA](http://opcfoundation.org/UA).)

## groov Build

**groov Build** provides a library of pre-built gadgets for developing a graphical operator interface. It comes with the built-in ability to import and use tags from a variety of systems and equipment, including Modbus/TCP devices, Opto 22 SNAP PAC controllers, and (through an OPC UA server) many other manufacturers' systems, equipment, and databases. You also use *groov Build* to manage user accounts and set up email or text message event notifications.



## groov View

**groov View** runs your *groov* operator interface, which resides on a *groov* Box or *groov* Server and can be accessed on smartphones and tablets using the free *groov* View apps for iOS and Android. Or access it from a computer or other device with a web browser and a network connection to *groov*.



groov View on a tablet and a smartphone

## groov Build and groov View

The following chart compares Build and View.

	groov Build	groov View
<b>What it's for</b>	Building an operator interface: <ul style="list-style-type: none"> <li>• Connect</li> <li>• Build screens</li> <li>• Authorize users</li> <li>• Back up projects</li> </ul>	Viewing an operator interface: <ul style="list-style-type: none"> <li>• Monitor and control equipment/system</li> </ul>
<b>Who uses it</b>	Authorized <i>groov</i> Build users: <ul style="list-style-type: none"> <li>• An Admin has full control</li> <li>• An Editor can change pages but cannot authorize users</li> </ul>	Authorized <i>groov</i> users: <ul style="list-style-type: none"> <li>• An Operator can log in/out &amp; change password</li> <li>• Kiosk users cannot log out or change password</li> </ul>
<b>Password</b>	<i>groov</i> Build software password <ul style="list-style-type: none"> <li>• An Admin sets the username and password at first login to <i>groov</i>.</li> <li>• An Admin user can assign usernames and passwords to Editors and other Admins.</li> </ul>	<i>groov</i> View password <ul style="list-style-type: none"> <li>• A username and password are assigned to each user by a <i>groov</i> Build Admin.</li> </ul>

	groov Build	groov View
<b>How to get there</b>	Use a web browser. <b>groov Box</b> For the URL, enter: https://[hostname]/ Or: https://[IP address]/ <b>groov Server</b> For the URL, enter: https://localhost/ Or: https://[Server's hostname or IP address]/  From <i>groov</i> , click Settings (gear in upper right), and choose Switch to <i>groov Build</i>	Use the free <i>groov View</i> app for iOS or Android. Open the app and log in with your username and password.  Or use a web browser. For the URL, enter: https://[hostname]/
<b>How to get there in groov Find (Windows PC only)</b>	For a <i>groov Box</i> (does not apply to <i>groov Server</i> ): Click Search for devices. Find the serial number of the <i>groov Box</i> . Click <i>groov App</i> .	[Not normally used]

## Mobile Device Apps

**groov View for iOS** and **groov View for Android** are free native apps for your tablet or smartphone. You can just use your browser to run *groov*, but these apps display your interface in full-screen mode without the address bar, toolbars, and so on.

These native apps add other advantages as well. You can add another layer of security by setting up passcodes in the app. If you have more than one *groov*, you can easily access all of them from the app.



View in browser

View in app

The iOS app is also ideal for OEMs and machine builders who want to use a tablet as an operator interface to a machine. You can lock the device so it only runs *groov*.

[Get groov View for iOS.](#)

[Get groov View for Android.](#)

## groov Models

*groov* is available as either the standalone *groov* Box hardware appliance or the PC-based *groov* Server for Windows software.

**groov Box** (p/n GROOV-AR1-BASE) is an industrially hardened appliance that comes preloaded with *groov* software, including *groov* Build for building operator interfaces, *groov* View for using the interfaces you've built, and *groov* Admin for administering the Box itself. The *groov* Box communicates over a standard Ethernet network or wireless LAN (local area network), or both. For more information about the *groov* Box, see [form 2104](#), the *groov* Box User's Guide for GROOV-AR1.



**groov Server for Windows** (p/n GROOV-SVR-WIN-BASE) includes *groov* software (*groov* Build for building operator interfaces and *groov* View for using them) and is ready for installation on a Microsoft® Windows® PC. Once installed, *groov* Server runs as a service on your computer. For more information on *groov* Server, see Opto 22 [form 2078](#), the *groov* Server for Windows User's Guide.

Whether you store and serve *groov* software on a *groov* Box or on a computer using *groov* Server for Windows, an operator interface you develop with *groov* can be viewed on almost any mobile device or computer. And you can develop on one *groov* and later move your project to another: for example, develop on *groov* Server and then move the project to a *groov* Box.

## Platform Options

Three *groov* platforms are available, so you can choose the right one for your application. Platform choice depends on how many Modbus/TCP-ready devices or Opto 22 SNAP PAC controllers will be connected to *groov*, and whether an OPC UA server or OPC UA-compatible hardware device will be used.

The *groov* platforms are:

- **groov Solo**—Using either the *groov* Box (GROOV-AR1-BASE) or *groov* Server (GROOV-SVR-WIN-BASE), connect to one Modbus/TCP device or one Opto 22 SNAP PAC controller. *groov* Solo is ideal for machine builders and OEMs—who need only one controller or system connection—and offers a lower price for entry-level customers.
- **groov Plus**—Add GROOV-LIC-PLUS to your *groov* Solo Box or Server and connect to multiple Modbus/TCP devices and Opto 22 SNAP PAC controllers. *groov* Plus is best for multi-machine or system applications, or for monitoring and controlling widely dispersed assets.
- **groov Enterprise**—Add GROOV-LIC-ENT to your *groov* Solo Box or Server, or add GROOV-LIC-OPE to your *groov* Plus Box or Server, and connect to machines, PLCs, and other equipment and systems that support OPC UA, in addition to multiple Modbus/TCP devices and Opto 22 SNAP PAC controllers.

Applications change, and if you need to connect more Modbus/TCP devices or Opto 22 SNAP PAC controllers to *groov*, or add an OPC UA server or OPC UA-compatible equipment, you can quickly upgrade from one *groov* platform to the next.

## System Requirements

### For *groov* Box and *groov* Server for Windows

To build operator interfaces with *groov* you'll need:

- Any computer with a modern web browser (does not have to be a Windows PC).
- One or more of the following:
  - A Modbus device that communicates over Ethernet
  - An Opto 22 SNAP PAC controller (SNAP PAC S-series, R-series, with firmware R9.2a or newer, or SoftPAC, running a PAC Control strategy)
  - Any OPC UA-compatible automation system or equipment, plus an OPC UA server and drivers for your equipment.

***groov* and KEPServerEX:** If you are building a *groov* interface for an OPC UA compatible system and don't already have an OPC UA server installed, the KEPServerEX communication platform from Kepware Technologies is recommended by Opto 22 and tested to work with *groov*.

Kepware has developed hundreds of device drivers to communicate with automation systems, industrial databases, and other software. For more information, go to [www.kepware.com/Products/products\\_OPCServers.asp](http://www.kepware.com/Products/products_OPCServers.asp). Also see [www.kepware.com/Support\\_Center/doc\\_auto\\_tag.asp](http://www.kepware.com/Support_Center/doc_auto_tag.asp)

### For *groov* Server for Windows

To install and run *groov* Server for Windows you'll need:

- A PC on the same network as your control device, with one of the following Microsoft operating systems. If you're using an OPC UA server, this can be the same computer where the OPC UA server is installed, or a separate computer.
  - Windows® 10 Professional (32-bit or 64-bit)
  - Windows 8 Professional (32-bit or 64-bit)
  - Windows 7 Professional (32-bit or 64-bit)
  - Windows Server 2012
  - Windows Server 2008 R2

*NOTE: .NET Framework 3.5 or greater is required for all operating systems. Use the "Add roles and features" option for Windows Server 2012.*

- A minimum of 250 MB available disk space to install *groov* Server for Windows. Additional disk space is required to create projects. (Projects may be created on this PC or on another computer.)

## A Note on Browsers

Thanks to technologies such as HTML5, SVG, and CSS3, modern browsers are now fairly similar. Our browser-based *groov* View and *groov* Build work on a large number of device/operating system/browser combinations, including HDTVs, smartphones and tablets of many shapes and sizes, and computers. We've found Firefox, Chrome, Safari, and Internet Explorer 10 or newer to be generally reliable. If one browser is causing problems for you, however, try another one and let us know what issues you've seen. For Product Support, see [page 8](#).

## About This Guide

This user's guide teaches you how to build and view an operator interface with *groov*.

This guide assumes that you have already set up your *groov* Box or installed and set up *groov* Server for Windows, and that you are already familiar with your personal computer's operating system and how to use your tablet or smartphone.

**To set up a *groov* Box and get started with *groov*,** see [form 2103](#), the *groov Quick Start for GROOV-AR1*. Also see [form 2104](#), the *groov Box User's Guide for GROOV-AR1*.

**To install and get started with *groov* Server for Windows,** see [form 2078](#), the *groov Server for Windows User's Guide*.

### In this guide

**Chapter 1: Welcome** introduces this user's guide and *groov*.

**Chapter 2: Building a Project** walks you through building a sample project, and then describes how to create pages, add devices and tags, and configure gadgets.

**Chapter 3: Managing *groov*** describes how to manage user accounts, back up and restore your project, and update *groov* and your license.

**Chapter 4: Gadget Reference** provides details on how to configure gadget properties.

**Chapter 5: Using Events and Notifications** describes how to set up user accounts and event conditions in *groov* so that users can be notified about system status.

**Chapter 6: Viewing Your Operator Interface** describes how to open and use a *groov* HMI on any device with access to the Internet.

**Chapter 7: Troubleshooting and Additional Help** provides troubleshooting information and answers questions you may have about *groov*.

**Appendix A: IP Cameras** describes the IP cameras that work with the Video gadget.

**Appendix B: OPC UA Data Types Supported** lists the OPC UA data types supported in *groov* and the corresponding *groov* names.

**Appendix C: Data Simulator Tags** lists the Data Simulator tags and briefly describes what they do.

## Other *groov* Resources

Resources for *groov* are on [www.groov.com](http://www.groov.com). Additional resources for *groov* and other related products—such as PAC Project—are also available on the Opto 22 website, [www.opto22.com](http://www.opto22.com).

## Product Support

If you have any questions about *groov*, you can call, fax, or e-mail Opto 22 Product Support.

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951-695-3080  
Monday through Friday,  
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*NOTE: Email messages and phone calls to Opto 22 Product Support are grouped together and answered in the order received.*

**Fax:** 951-695-3017

**Email:** [support@opto22.com](mailto:support@opto22.com)

**Opto 22 website:** [www.opto22.com](http://www.opto22.com)

When calling for technical support, be prepared to provide the following information about your system to the Product Support engineer:

- *groov* type (*groov* Box or Server) and platform
- *groov* version. In Build, select Help > About.
- A description of your system equipment:
  - Computer type, speed, memory, and operating system
  - Brand and model numbers for the controllers or devices you are monitoring and controlling through *groov*
- A description of the network
- Specific error messages or other diagnostic indications



## 2: Building a Project

This chapter describes the basic aspects of creating an operator interface in *groov* Build, including how to create pages, add devices and tags, and configure gadgets. The operator interface you build resides on the *groov* Box or on the PC where *groov* Server is installed, and it can be accessed from a computer, smartphone, tablet, or other mobile device with a web browser.

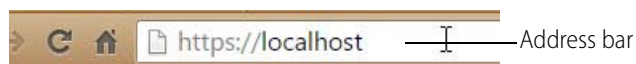
### In this chapter:

Opening Build in <i>groov</i> Server for Windows.....	9
Opening Build on a <i>groov</i> Box.....	10
Building a Sample Project.....	11
Working with Pages.....	19
Adding a Device.....	25
Adding Gadgets.....	51
Editing Gadgets.....	53
Optimizing Layouts.....	56

## Opening Build in *groov* Server for Windows

The first time you open *groov*, make sure to follow the instructions in [form 2078](#), the *groov* Server for Windows User's Guide.

1. Open Firefox, Chrome, or Internet Explorer 10 or newer and do one of the following:
  - If *groov* Server is installed on the same computer, type `https://localhost` in the address bar of your browser.



- If *groov* Server is installed on a different computer, type `https://` and the computer's hostname. For example, if the computer's hostname is `RStarr-w7`, you type `https://RStarr-w7`. You can use the IP address of the host PC instead of the hostname. However, if the PC is on a network with DNS and DHCP, the IP address is subject to change.

*NOTE: If *groov* does not open, see Chapter 7: Troubleshooting and Additional Help*

2. When *groov* opens, log in.  
*groov* opens first in *groov* View.

3. Click the gear icon on the top right-hand side and click Switch to *groov* Build.



## Opening Build on a *groov* Box

The first time you open *groov*, make sure to follow the instructions in [form 2103](#), the *groov* Quick Start for GROOV AR1. For additional information, see [form 2104](#), the *groov* Box User's Guide for GROOV AR1.

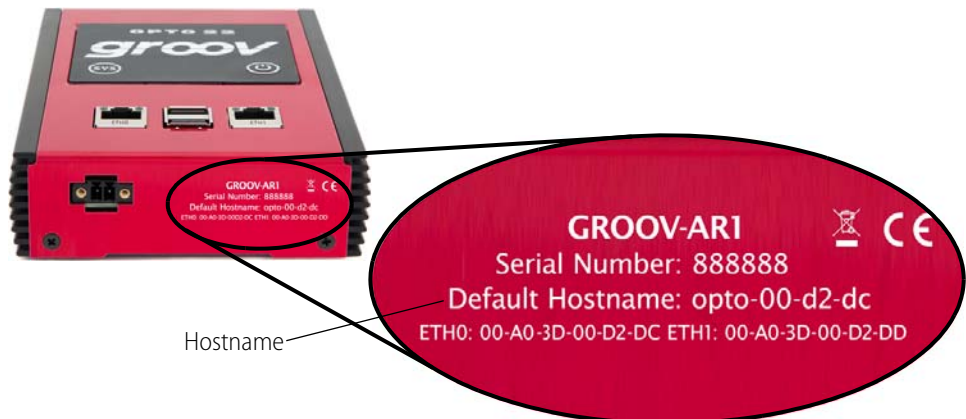
*NOTE: In order to use a URL hostname, your network must have a DNS. If it doesn't, see page 140 for information on how to use *groov* Find.*

1. Enter https:// and your *groov* Box's hostname as the URL. The hostname is printed on the bottom of the *groov* Box.

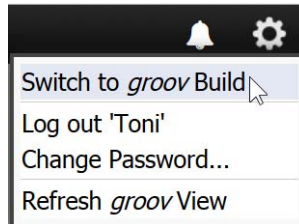
For example, if the hostname is `opto-00-d2-dc`, you type:

`https://opto-00-d2-dc`

*NOTE: If you've assigned a static IP address to the *groov* Box, use the IP address instead of the hostname to open *groov*.*



2. When *groov* opens, enter your username and password. *groov* opens first in *groov* View.
3. Click the gear icon on the top right-hand side and click Switch to *groov* Build.

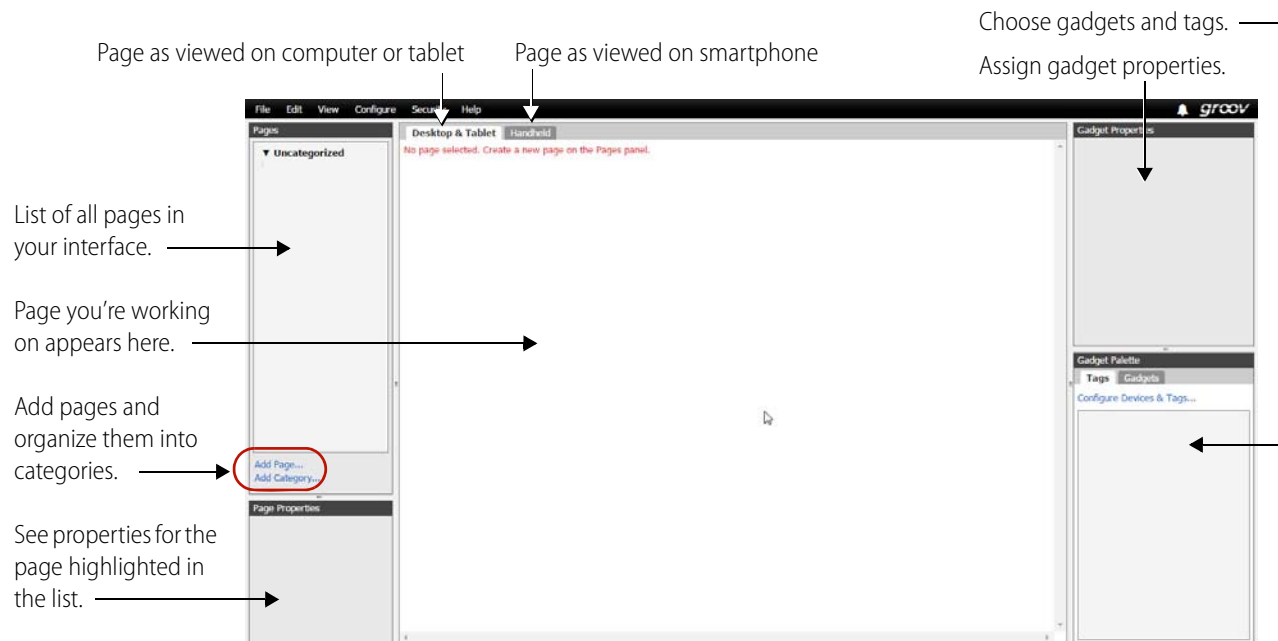


## Building a Sample Project

To get started, let's build a page using tags in the Data Simulator and then view it on the computer. Here's what we'll do:

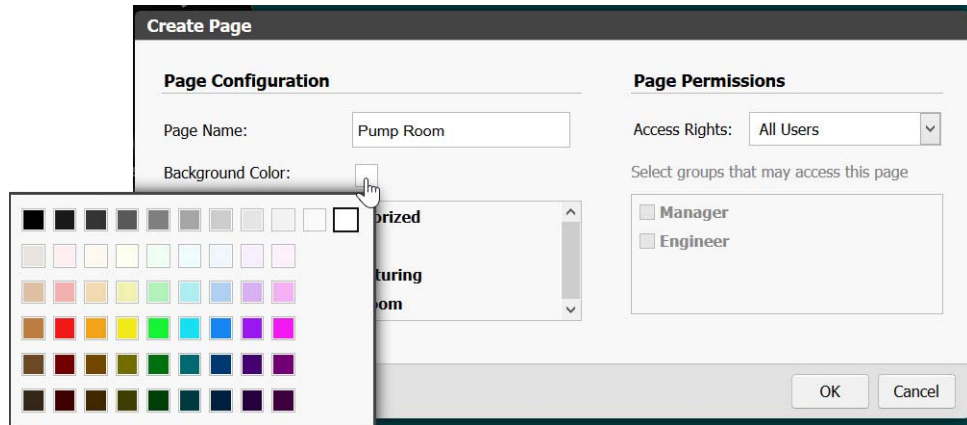
- Add a page
- Add device tags ([page 12](#))
- Add gadgets ([page 13](#))
- Save the project ([page 15](#))
- View the project on your computer ([page 15](#))
- Explore ([page 16](#))

When *groov* Build opens, you see the workspace where you'll build your operator interface:



### Add a Page

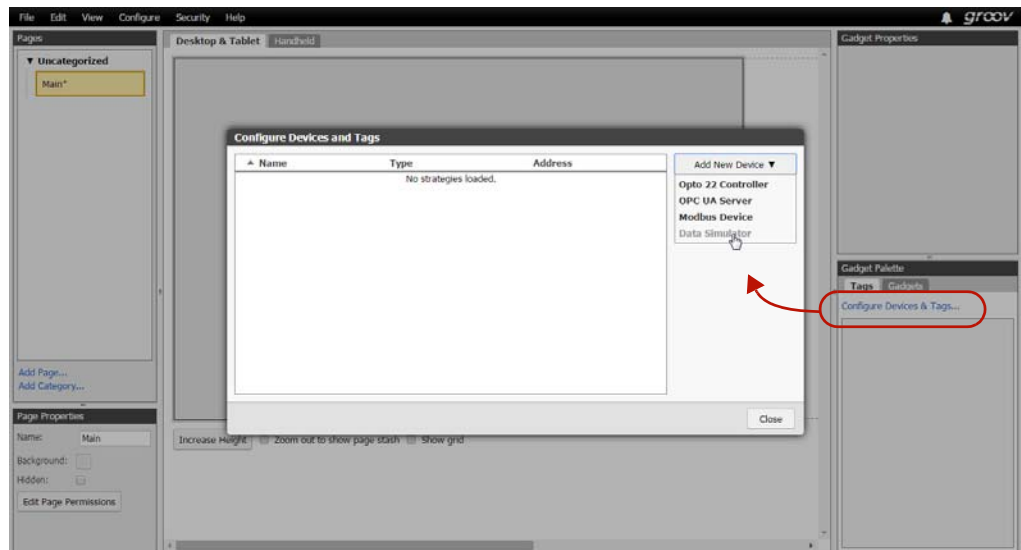
1. In the Pages panel on the left side of the workspace, click Add Page.



2. Give the page a name and click the color block to choose a background color. For now, leave the page as Uncategorized and leave Access Rights as All Users. Click OK.  
The blank page appears in the center of the workspace.

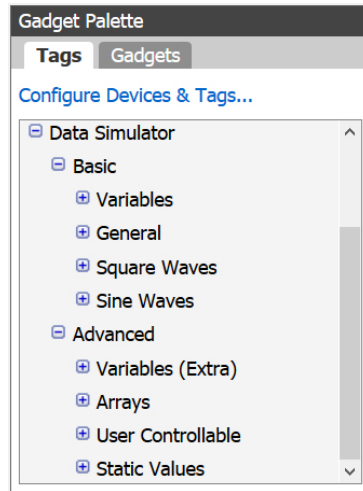
## Add Device Tags

1. In the Gadget Palette panel (lower right), click Configure Devices & Tags.



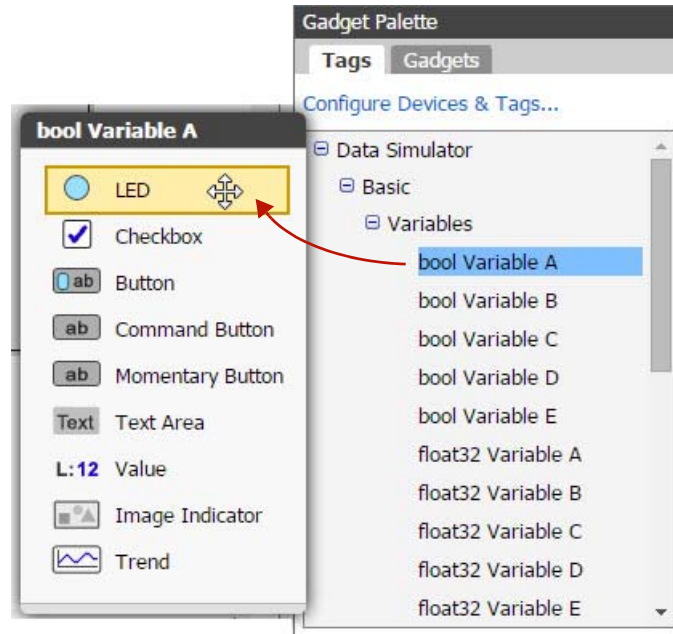
2. Click Add New Device and then choose Data Simulator.  
The Data Simulator appears in the device list.

3. Click Close, and notice that Data Simulator now appears in the Gadget Palette. Click the plus sign next to Data Simulator and other plus signs in the tree to see the tags in the device.

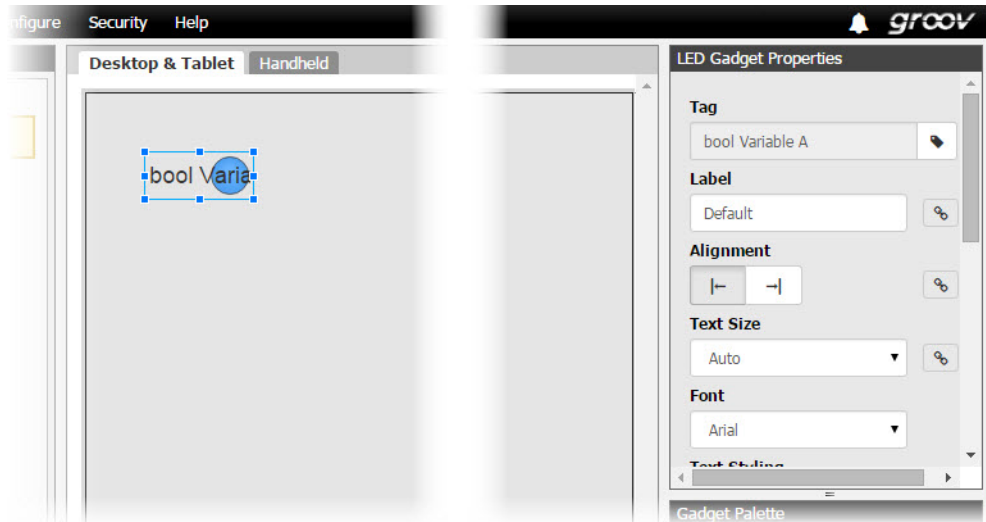


## Add Gadgets


1. Expand the tree to find *bool Variable A*. Click this tag.  
A list appears showing all the gadgets that work with this tag.



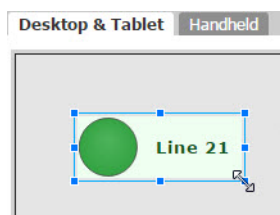
2. Click the LED gadget and drag it to the page you're building.
3. Click the gadget to highlight it and notice that properties appear in the Gadget Properties panel (upper right).



4. Scroll down to see all the possible properties you can choose and adjust. Enter the following properties and watch how the LED gadget changes after each one.

Property	You choose...	Result
Label	Line 21	Tag name is replaced with label.
Alignment	Right	Label moves to right of gadget.
Text Size	12	Label text becomes smaller (default is 16 pixels).
	Click 	Button changes to show link broken. This means that the label text size you just chose (12) will affect only the Desktop & Tablet view, not the Handheld view.
Font	Verdana	Font on the label text changes.
Text Styling	B	Label text is boldfaced (thicker).
Colors	Text: Deep Green	Text changes color.
	Background: Pale Green	Light green background appears in gadget area.
Graphic Size	Uncheck Auto and choose 6	LED becomes larger.
On/Off Colors	True: Dark Green	LED color changes.
	False: [Leave as is]	No change

5. Notice that part of the LED and its label text are hidden. Use your mouse to grab a corner handle on the gadget and pull it out so everything is visible.

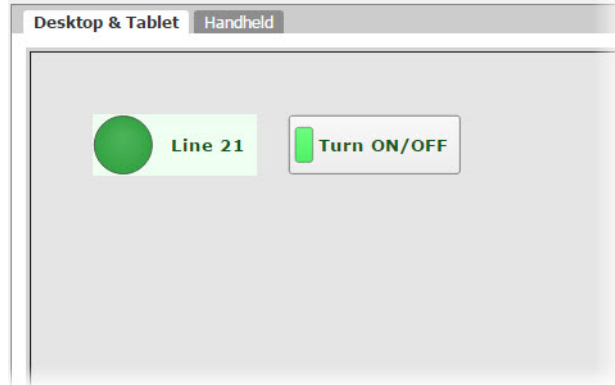


6. In the Gadget Palette, click *bool Variable A* again. Click Button and drag it to the page, next to the LED. Click to highlight it. In the Gadget Properties area, enter the following:

Property	You choose...	Result
Confirm Writes	Check the box	When someone pushes this button, they'll be required to verify the button's action before it happens.
Display Mode	[Leave as Button]	No change
Label	Turn ON/OFF	Button text changes.
Text Size	12	Text becomes smaller.
Font	Verdana	Text font changes.
Text Styling	B	Text is boldfaced.
Colors	On indicator: Green	LED embedded in the button changes color.
	Off indicator: [As is (black)]	No change.
	Text: Deep Green	Text color changes slightly.
	Button: White	Button color changes.

7. With the button highlighted, adjust its handles so it's about as large as the LED gadget. Make sure you can see all the text.

Your page now looks something like this:



## Save the Project

From the File menu, choose Save All Changes and Switch to *groov* View.


## View the Project on your Computer

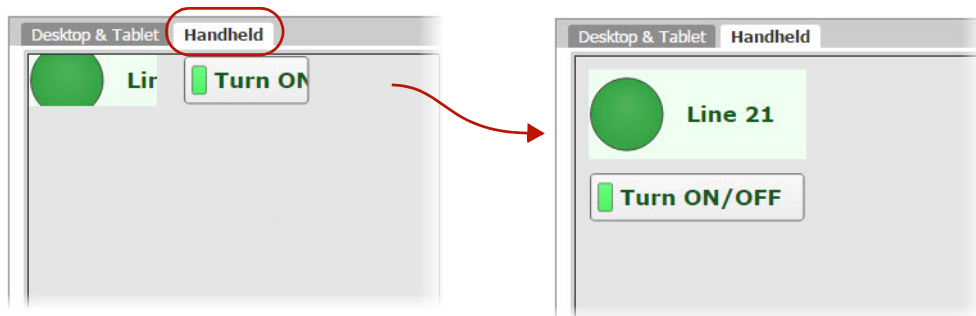
Your saved project opens in *groov* View.



Try it out! Click the button and see what happens.

### Explore

1. Go back to *groov* Build by clicking the gear icon in the upper-right corner of the window  and choosing Switch to *groov* Build.
2. Click the Handheld tab, just above your page in the center of the workspace.  
While you were building your page in the Desktop & Tablet tab, *groov* automatically put the same gadgets in the Handheld tab, which shows the page layout for a smartphone. However, you may want the page to look different on a phone. Maybe some data or controls are more important and should be at the top of the page. Or maybe some don't need to be on the phone at all. In this tab you can resize, rearrange, change, or delete gadgets to suit your needs.
3. Click to highlight each gadget and change its size and position the way you want.

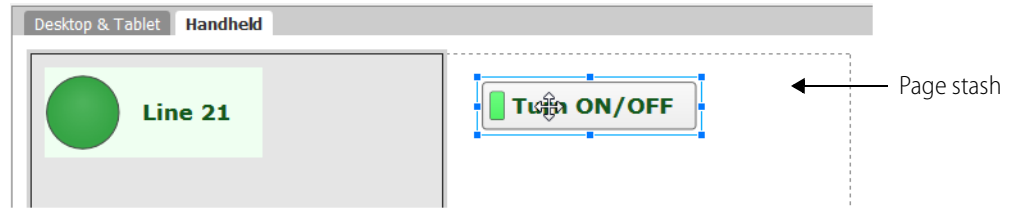


Remember that you made the text size smaller (12 instead of 16) for both the LED and the button? You also broke the link between the two views for that property, which means you changed it for one view only. So the text is smaller for Desktop & Tablet, but for Handheld it remains at the default of 16.

You can make the two views different in other ways as well. For example, suppose you want smartphone users to be able to see the status of Line 21 but not be able to turn it on or off. You can stash the Turn ON/OFF button so it's not visible in the Handheld view.

4. In the Handheld tab, notice the area off to the right of the page with a dotted line around it. Drag the Turn ON/OFF button into this area, which is called the page stash.





The button will still be shown on a computer or tablet but will not be visible on a smartphone. You can also stash gadgets in the Desktop & Tablet tab if you don't want them to appear on these devices, so you can customize the view on large and small devices.

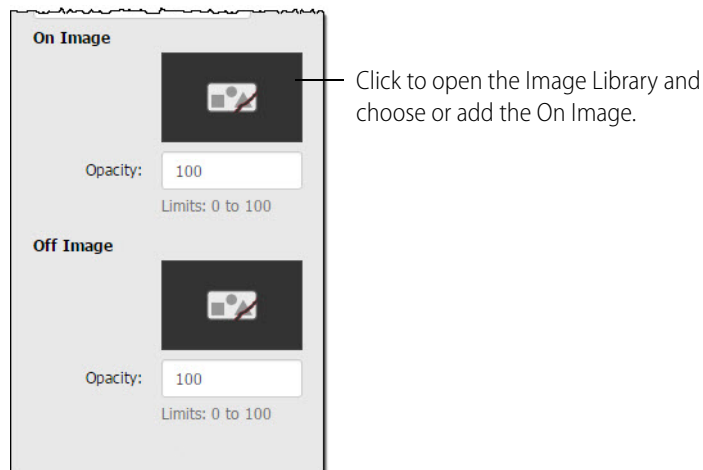
Now let's explore some more.

## Images

When we added the Turn ON/OFF button, one of the properties was Display Mode. Let's take another look at that now.

1. In the Desktop & Tablet tab, select the Turn ON/OFF button and look in the Properties panel.
2. For Display Mode, choose Image.

As you can see, instead of a simple button, you could skin the button with images: one image indicates that the button is On and the other that it is Off.



3. Click a broken image to open the Image Library, where you can add images to your project. All the images for your *groov* project are stored in the Library. You can add and delete images. You can use the same image in multiple places, and if you change it, it's automatically updated everywhere it's used. Compatible file types for images are BMP, GIF, PNG, JPG, and SVG. For more on the Image Library, see page 66.

Here's what the Image Library looks like before you've added any images:



4. For now, click Cancel to exit the Image Library. In the Properties panel, change Display Mode back to Button.

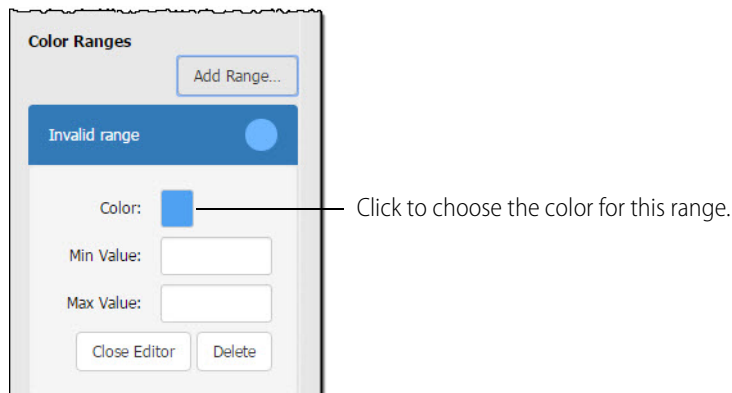
### Round Gauge

Let's look at a gauge.

1. In the Gadget Palette, expand the tag tree again. Under Basic > Variables, choose *float32 Variable A*. In the gadget list, click Round Gauge and drag it to your page.
2. Highlight the new gadget and look at its properties. To understand all the options, see "Round Gauge Gadget" on page 100. But for now, change only the following:

Property	You choose...	Result
Range	Min value 0, Max value 100	The gauge changes to show 0-100.
Units	Gallons	"Gallons" appears below the numeric value on the gauge.
Precision	0	Value will be shown in whole numbers (no digits after the decimal point).
Colors	Needle: Black Background: Dark Orange	Colors change on the gauge.

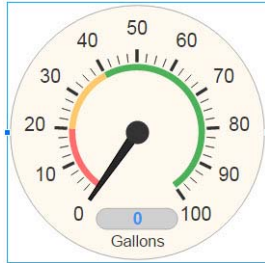
3. Scroll down to Color Ranges and click Add Range.



4. Click the blue rectangle and choose Red. Enter Min Value 0 and Max Value 20.

5. Click Add Range again. For Color, choose Orange. Enter Min Value 20 and Max Value 40.
6. Click Add Range again. For Color, choose Dark Green. Enter Min Value 40 and Max Value 100.

Your gauge now looks like this:



This gauge is easy for an operator to understand at a glance. Anything in the green range is OK, but if the needle dips down into the red, you have a problem.

The numeric value appears in blue at the bottom of the gauge.

## What's Next?

Now that you have an idea of what *groov* can do, you can get to work on your real project.

To **connect** to your systems and equipment, see these sections:

- [“Adding a Modbus/TCP Device” on page 28](#)
- [“Adding an Opto 22 PAC Controller” on page 26](#)
- [“Adding an OPC UA Server” on page 39](#)

For help on choosing **gadget properties**, see Chapter 4: Gadget Reference on page 83.

To set up **users and passwords** and control who accesses your *groov* interface, see “Managing User Access” on page 59.

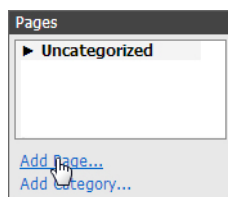
To **notify** authorized people when events occur, see Chapter 5: Using Events and Notifications on page 107.

## Working with Pages

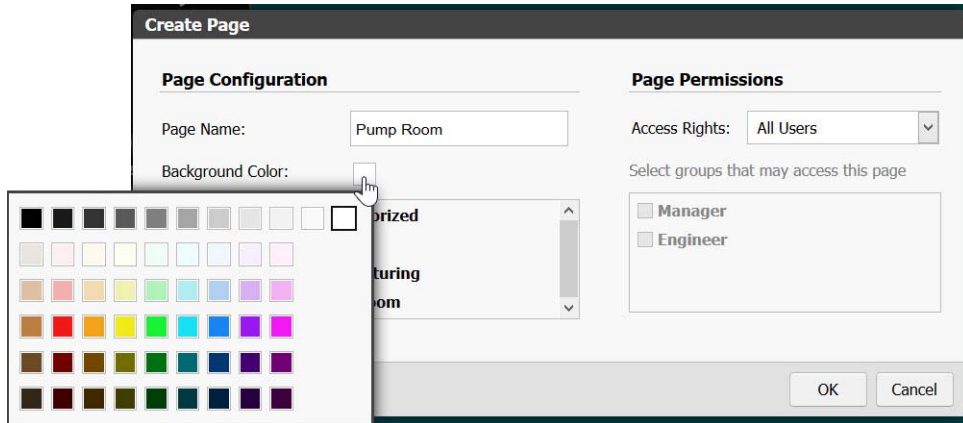
Your operator interface can consist of one or many pages, depending on your application’s needs. You may have separate pages for different functions, different people, or different locations. You use the Page Navigator gadget to provide a link so users can go from one page to another.

### Adding Pages

1. In *groov* Build, click Add Page in the Pages panel on the left side.



2. Type a name for the page.
3. If you wish, choose any of the following options:
  - Click the Background Color square to choose a color for your page.

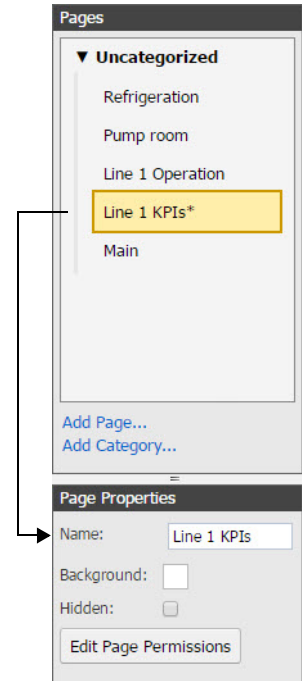
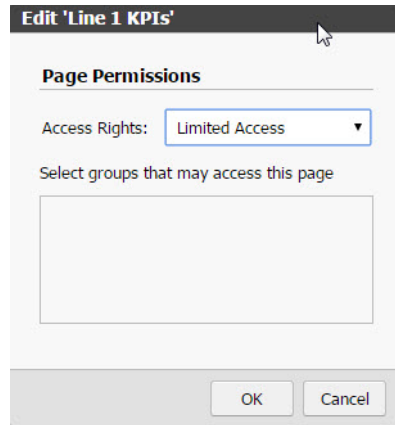


- If you have added page categories (see page 70), select a category for this page.
  - Limit access rights based on user security level (see “Creating a User” on page 60). Or, if you want only specific users to see this page, choose Limited Access. If the page is Limited Access and you have already added user groups (see page 59), select the groups that should see this page.
4. Click OK.  
Your new page appears in the middle of the workspace.

## Changing Page Properties

You can change an existing page’s name, permissions, or other properties.

1. In the Pages panel on the left side of the workspace, click the page you want to change.  
In the Page Properties panel just below, you see the current page properties. (Both panels are shown at right).
2. Change Name or background color as needed.
3. To hide the page so no users can see it, click Hidden (useful when you are building a new page).
4. To change user permissions for the page, click Edit Page Permissions.



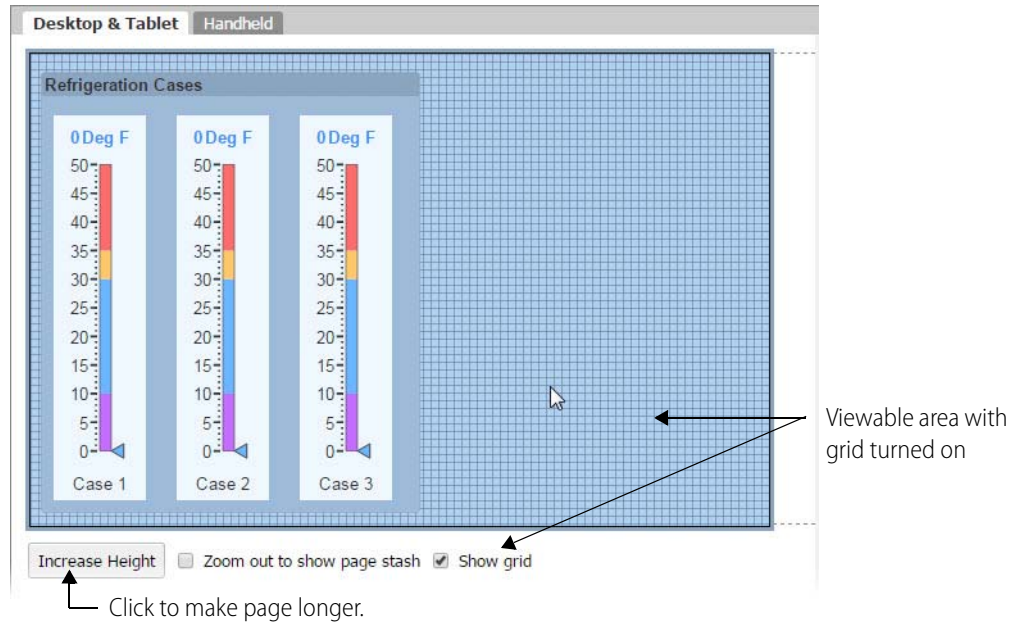
You can limit access rights based on user security level (see “Creating a User” on page 60). Or, if you want only specific users to see this page, choose Limited Access. If the page is Limited Access and you have already added user groups (see page 59), select the groups that should see this page.

5. Click OK.

## Page Size and Grid

As you fill your page with gadgets, you may find you need more room. Click the Increase Height button at the bottom of the work area. If you switch to another page and then return, the page will shrink to fit the content or return to the default page size, whichever is larger.

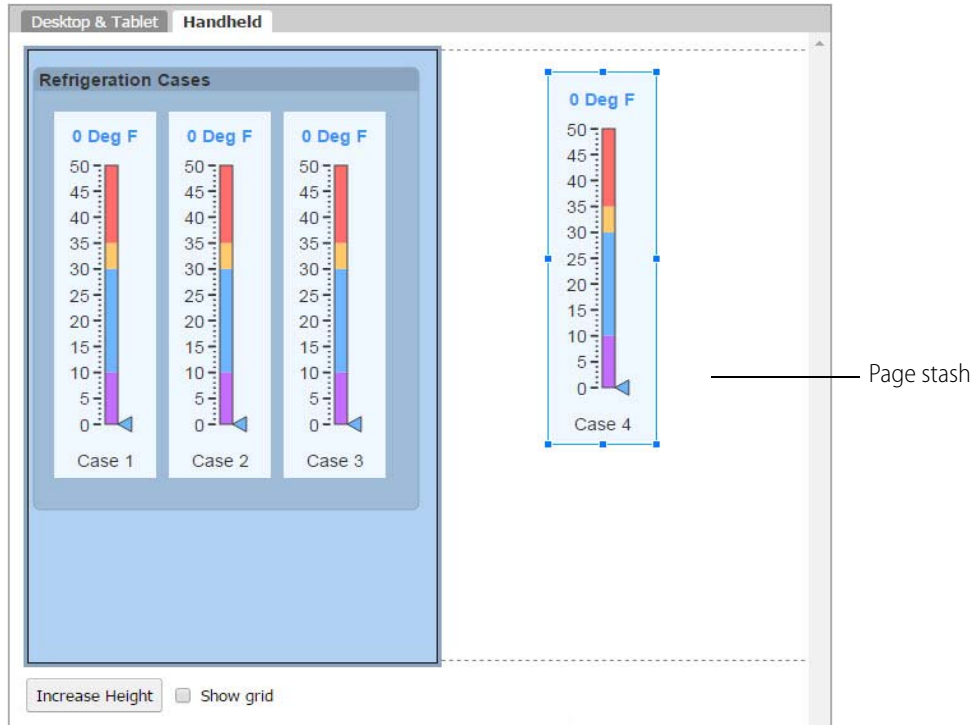
When you place or move gadgets on the page, they automatically snap to a grid so they are aligned. If you want to see the grid, at the bottom of the work area click “Show grid.”



## Using the Page Stash

The workspace for each page has a *page stash* where you can put gadgets that are not yet part of the project. Or if you don't want a gadget to appear in the Handheld layout, for example, you can move it to the page stash; the gadget will still appear in the Desktop & Tablet layout.

To see the page stash in the Desktop & Tablet view, select "Zoom out to show page stash" at the bottom of the work area. In the Handheld view, the page stash is always visible to the right.

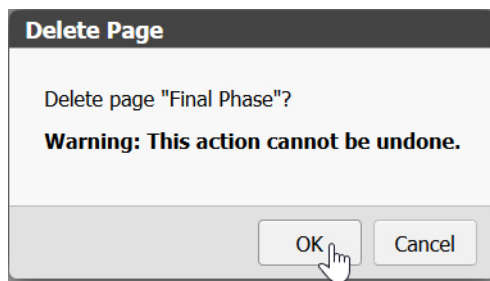


## Deleting a Page

1. In the Pages panel at left, hover over the page or category name, and then click the red **X** that appears.

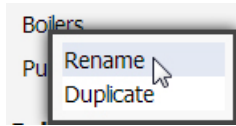


2. To verify, click OK.



## Renaming a Page

1. In the Pages panel, right-click the page name and select Rename.

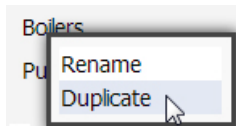


2. Enter a new label, and press Enter or left-click in the work area.

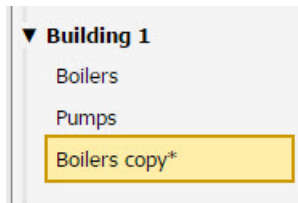


## Duplicating a Page

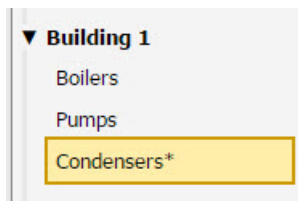
1. In the Pages panel, right-click the name and select Duplicate.



A copy appears in the same page category.

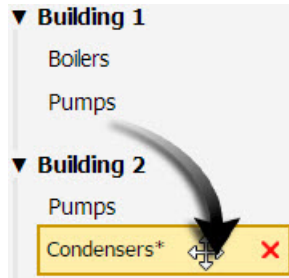


2. Right-click the copy and select Rename to give the page a new name.





3. If you want, you can drag it to a new position in the list or to a different page category.



## Adding a Device

Any device or system you want to monitor, control, or get data from—including *groov* itself—must be added to *groov*. When you add the device you also add its tags, so that you can tag the *groov* gadgets to make them operational. This section includes:

[“Adding Data Simulator Tags,” page 25](#)

[“Adding an Opto 22 PAC Controller,” page 26](#)

[“Adding a Modbus/TCP Device,” page 28](#)

[“Adding an OPC UA Server,” page 39](#)

[“Adding System Tags,” page 47](#)

[“Editing a Device’s Address,” page 49](#)

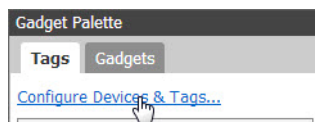
[“Deleting a Device,” page 51](#)

## Adding Data Simulator Tags

A Data Simulator is built into *groov* that provides simulated dynamic values for onscreen gadgets; for instance, a Graph gadget can use a simulator tag that provides changing values for a sine wave, or a gauge can use a simulator tag with an integer moving between high and low values. These simulator tags allow you to experiment with adding tags to gadgets, configuring the tags, and running your project in *groov* View. For descriptions of the tags available in the Data Simulator, see “Appendix C: Data Simulator Tags.”

Follow these steps to add a Data Simulator tag.

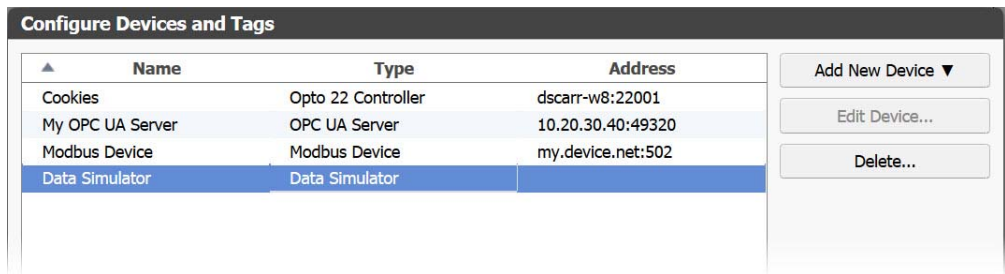
1. Under Gadget Palette on the right side, in the Tags tab, click [Configure Devices & Tags...](#), or select [Configure > Devices and Tags](#).



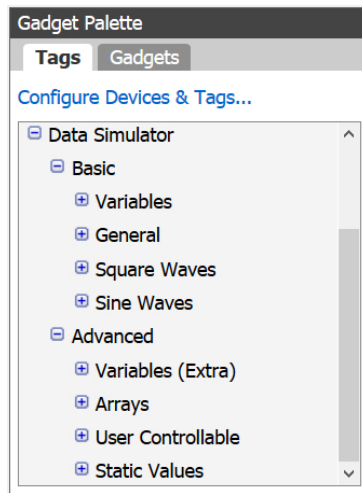
2. Click Add New Device and then select Data Simulator.



The Data Simulator appears in the device list.



3. Click Close, and notice that Data Simulator tags are added in the Gadget Palette. Click the plus signs to expand the tree and see the tags.



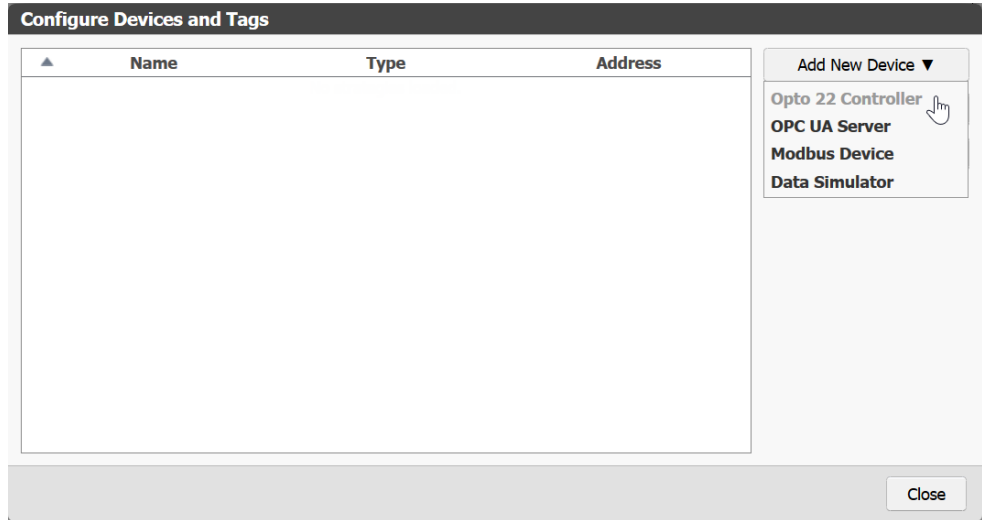
## Adding an Opto 22 PAC Controller

Follow these steps to add an Opto 22 controller that the operator interface will communicate with. When you add a controller and the .idb.txt file associated with the strategy that runs on the controller, the strategy's tags become available in *groov* for you to use. Repeat the steps to add additional Opto 22 controllers and tags.

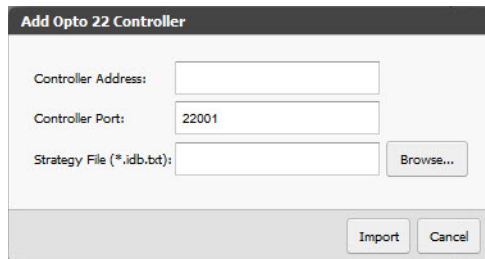
1. Under Gadget Palette on the right side, in the Tags tab, click Configure Devices & Tags, or select Configure > Devices and Tags.



2. Click Add New Device and then select Opto 22 Controller.



3. Enter the hostname or IP address of the controller running the strategy you want to use.



For a SoftPAC controller, use the full name of the computer running SoftPAC as in this example:

JAlvarez-w7.ACME.com

4. Click Browse to locate the .idb.txt file you want to use.

*NOTE: When PAC Control compiles a strategy it automatically generates an .idb.txt file and places it in the same directory as the strategy. If you are setting up groov on a computer other than the one used to develop the PAC Control strategy, copy the .idb.txt file into a directory that is accessible to the computer you are using to set up groov.*

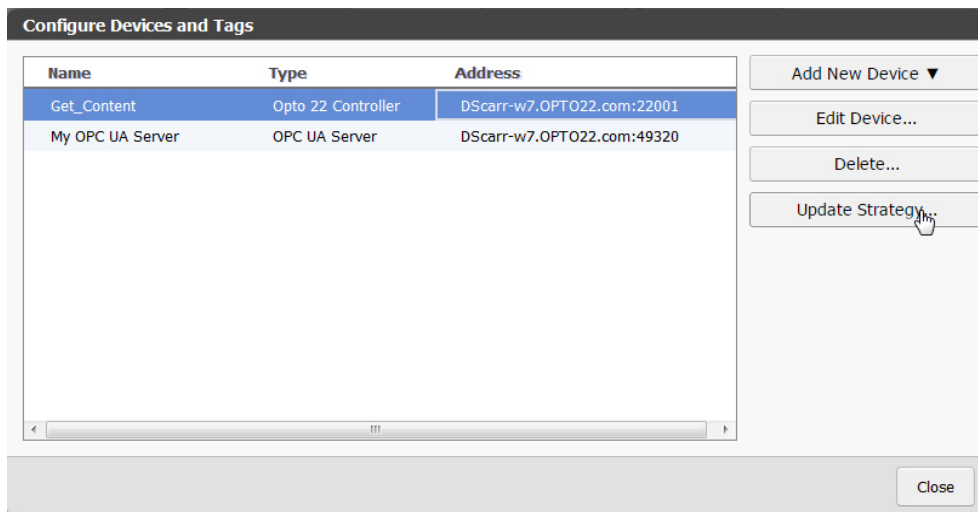
5. Click Import, and then click Close.

Build imports the .idb.txt file. In the Gadget Palette, you see the name of your strategy and the IP address of your SNAP PAC controller. Click the plus signs to expand the tree and see all the tags.

## Updating a Strategy

If a controller's strategy has been changed, you need to update it in *groov* by importing its new .idb.txt file.

1. Select Configure > Devices and Tags.
2. Highlight the controller you want to update, and then click Update Strategy.



**CAUTION:** Be very sure you are updating the correct strategy. If you use the wrong one, all of the controller tag connections will break. This is critical because re-importing the correct strategy will not fix the broken gadgets. You can only fix the connections by restoring your project with a recent backup.


3. Browse to the strategy you want to use, select the new .idb.txt file, and then click Open.

*NOTE:* The .idb.txt file is in the same directory as the strategy. If *groov* is on a different computer than the strategy, copy the .idb.txt file into a directory accessible to the computer you are using for *groov*.

4. Close the Configure Devices and Tags dialog box.

## Adding a Modbus/TCP Device

Modbus is an open protocol widely used in automation and other industries. Although it was designed for a serial network, Modbus has since been adapted to work over Ethernet as well. Over Ethernet the protocol is called Modbus/TCP. *groov* has a communication driver that allows *groov* to act as a Modbus/TCP master and communicate with Modbus/TCP slave devices that have an Ethernet connection. Note that *groov* does not support communication with serial devices via a Modbus serial-to-TCP gateway, due to high latency in serial networks.

*TIP:* Additional help is provided in *groov*. When a help button  is available, click the button for information directly related to that part of *groov*.

Follow these steps to add tags for a Modbus/TCP slave device for use in the operator interface.

1. Under Gadget Palette on the right side, in the Tags tab, click Configure Devices & Tags, or select Configure > Devices and Tags.



- Click Add New Device and then select Modbus Device.



- In the Device tab, enter the following details:  
**Name:** Enter a name to identify this Modbus device.

 A screenshot of the 'Add Modbus Device' dialog box. It has two tabs: 'Device' and 'Access Config.'. The 'Device' tab is active. There are four input fields:
 

- Name:** A text box containing the placeholder text 'A name to help you and others identify this server'.
- IP Address:** A text box containing the placeholder text 'IPv4 Address'.
- Slave ID:** A text box containing the placeholder text '0 - 247'.
- Port:** A text box containing the placeholder text '502'.

 Each of the last three fields has a question mark icon to its right. At the bottom right of the dialog, there are two buttons: 'Add Device' and 'Cancel'.

**IP Address:** Enter the Modbus device's IP address or hostname. A hostname will be converted to an IP address by the DNS server.

Your device may have a static IP address, which you can find in the device's documentation. The device may also come with software that allows you to set its IP address or view the address assigned to it by a DHCP server.

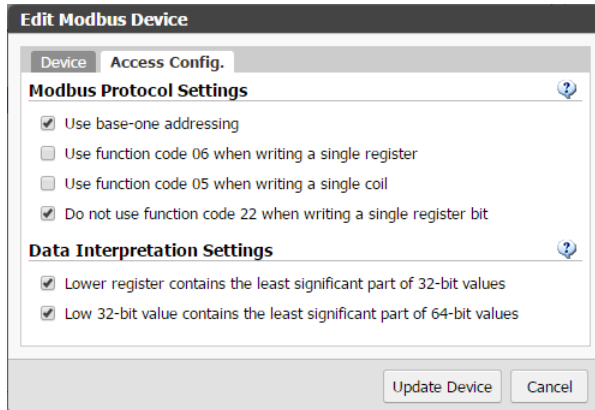
**Slave ID:** The Slave ID is typically used to address individual devices or memory segments located at a single IP address.

Check your device's documentation to determine whether the slave ID is required for any reason. If it is not, leave this box empty.

**Port:** If left blank, port 502 will be used.

Port 502 is the standard Modbus port. Some Modbus devices may use a different port. Refer to your device's documentation to determine which port number it uses.

- Click the Access Config tab and configure the following settings as necessary.



### Modbus Protocol Settings

Be sure to check the documentation that came with your Modbus device for additional information about these settings. For more information about Modbus function codes, see [www.modbus.org/docs/Modbus\\_Application\\_Protocol\\_V1\\_1b.pdf](http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b.pdf).

- *Use base-one addressing*  
If your device documentation specifies zero-based addressing or you simply prefer zero-based addressing, you can deselect this option to make tag addressing easier.
- *Use function code 06 when writing a single register*  
If your device does not support Modbus function code 06 (0x06, Write Single Register), deselect this option. If it is deselected, *groov* will use function code 16 (0x10 Write Multiple Registers) for single-register writes.  
If this option is checked in *groov* and your device does not support function code 06, you may receive errors. The error occurs with writes to any tag having a data type sized 16 bits or smaller.
- *Use function code 05 when writing a single coil:*  
If your device does not support Modbus function code 05 (0x05, Write Single Coil), deselect this option. If it is deselected, *groov* will use function code 15 (0x0F, Write Multiple Coils) for single coil writes.  
If this option is checked in *groov* and your device does not support function code 05, you may receive errors.
- *Do not use function code 22 when writing a single register bit:*  
If your device supports Modbus function code 22 (0x16, Mask Write Register), you can deselect this option to optimize writes. (Using function code 22 makes writes faster and ensures that the write operation is atomic.)  
If this option is checked, *groov* will use other functions to first read the whole register, modify the bit, and then write to the whole register. Note: Keep this option checked for an Opto 22 SNAP PAC controller or brain.

### Data Interpretation Settings

The Modbus protocol does not specify memory mapping. As a result, devices that store multi-register data types store the data differently. Use these settings to set the byte order of the data coming from your Modbus device for data types that span more than one 16-bit

register/address. See your device’s documentation to determine whether either of these settings needs to be changed. The device’s manual may use terms like high or low order or registers, or MSB (Most Significant Bit) or LSB (Least Significant Bit).

*NOTE: Setting either of these settings incorrectly may result in garbage values for the affected data types. If you receive data that makes no sense, try changing these settings.*

- *Lower register contains the least significant part of 32-bit values:* For 32-bit data types that span two 16-bit registers, this indicates that the first register read contains the *least significant byte* (LSB).
- *Low 32-bit value contains the least significant part of 64-bit values:* For 64-bit data types that span four 16-bit registers, this indicates that the LSB is contained within one of the first two registers read.

**Example:** Assume register values are:

- register 1 = A
- register 2 = B
- register 3 = C
- register 4 = D

Here’s how data will appear based on your settings:

Settings		Results	
“Lower register”	“Low 32-bit value”	32-bit value from registers 1 & 2	64-bit value from registers 1-4
Not checked	Not checked	AB	ABCD
Checked	Not checked	BA	BADC
Not checked	Checked	AB	CDAB
Checked	Checked	BA	DCBA

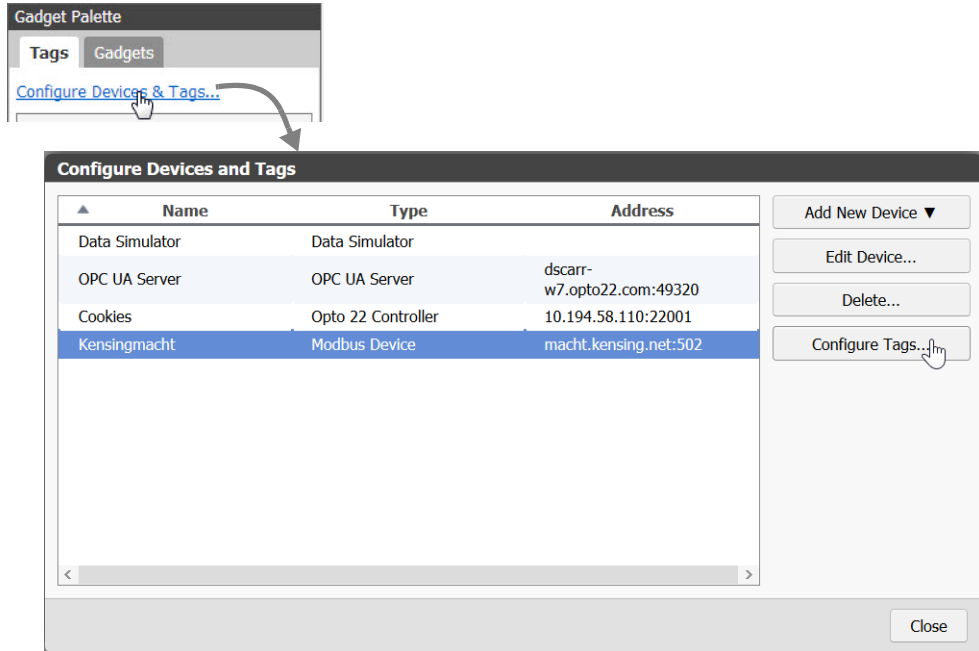
5. When finished, click Add Device.

The Modbus device appears in the list of configured devices. Now you’ll add tags, either manually (below) or by importing them from a file ([page 38](#)).

### Adding Modbus Tags Manually in groov

Use the steps below to manually add Modbus tags in *groov* Build. You can also add Modbus tags by importing them from a file. See [“Importing Modbus Tags from a CSV File” on page 38](#).

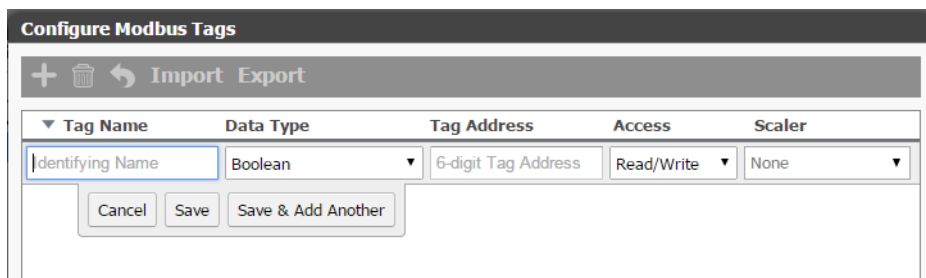
1. Under Gadget Palette on the right side, click Configure Devices & Tags, or select Configure > Devices and Tags.



- Highlight the Modbus device and click Configure Tags.



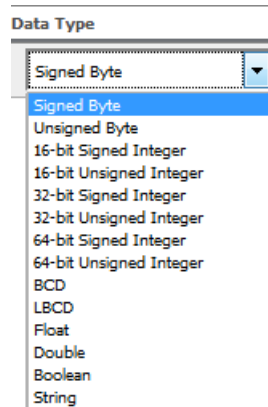
- Click the Add button **+**.



- Enter the following attributes.  
**Tag Name:** (Required) Use any alphanumeric characters. Do not use a comma, which is used as a delimiter in CSV files.



**Data Type:** (Required) Select the tag's data type. If your Modbus/TCP device's registers contain multiple status or command bits or bit fields in a single register, choose Boolean to access individual bits.

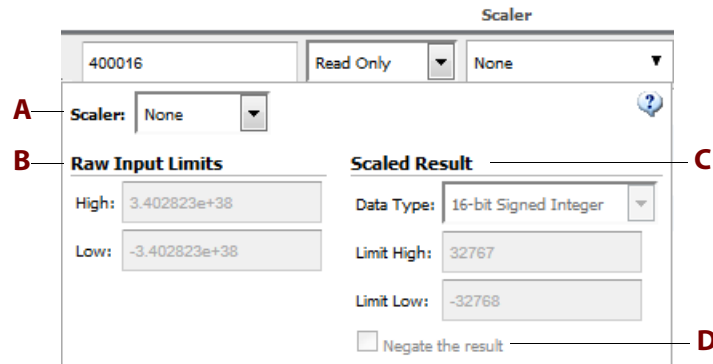


**Tag Address:** (Required) The Tag Address Builder helps you construct valid tag addresses. After you see what a valid tag address looks like, you can enter the addresses manually in the text box in order to save time. Available options depend on the data type.

- **Address Type:** Identifies which memory segment will be accessed. Discrete Inputs and Coils are single-bit registers that represent Boolean values only. Input and Holding Registers are 16-bit registers that can be used for any data type.  
Data types larger than 16 bits are mapped onto consecutive registers, starting at the register located at Start Address. Coils and Holding Registers are default Read/Write, while Discrete Input and Input Registers are Read Only.  
To access individual bits in a register, choose Input Registers (Read Only) or Holding Registers (Read/Write).
- **Start Address:** Specifies where the tag value starts in memory. Strings may span multiple registers. Data types larger than 16 bits always span multiple registers.  
To configure 0- or 1-based addressing, click Edit Device on the previous dialog box (Configure Devices and Tags) and then click the Access Config tab.
- **String Length:** Determines how many registers will be accessed to read or write the full string.  
Strings are composed of ASCII characters (1 byte), so a single register may hold up to 2 characters.
- **Byte Order:** Specifies how the characters are ordered within each register. H→L indicates that the first character, when read left to right, starts at the most significant bit (MSB) and the last character ends at the least significant bit (LSB). If you are unsure about order, you can play with this setting to determine which one works.
- **Bit Index:** Identifies the bit within a register to be accessed. Valid bit values are 0–15.
- **Array Size:** To access multiple (contiguous) values of this Data Type using the same tag, set this size to 2 or more (up to a maximum of 65535, depending on the Data Type).  
For example, if you want to access 10 contiguous floats that start with the specified Tag Address, set Array Size to 10.  
String arrays are not supported.

**Access:** (Optional) The options available depend on the data type. If you omit this value, the tag will assume the register type default setting.

**Scaler:** (Optional) Use the Scaler if a read/incoming value spans a much larger data range than you require, or to convert from one unit of measure to another. If you use this option, you must provide all components.



**A Scaler**

*None:* The raw input value is not modified in any way.

*Linear Scaler:* The raw input value is mapped linearly from the specified input range to the specified output range and data type. To flip the sign of the result (negative to positive or positive to negative), select “Negate the result” (D).

Here is the function used to scale the input:

$$\text{Output} = (((\text{Scaled High} - \text{Scaled Low}) / (\text{Raw High} - \text{Raw Low})) * (\text{Raw Value} - \text{Raw Low})) + \text{Scaled Low}$$

*Square Root Scaler:* The raw input value is mapped from the specified input range to the specified output range and data type using the following function:

$$\text{Output} = (\sqrt{((\text{Raw Value} - \text{Raw Low}) / (\text{Raw High} - \text{Raw Low})) * (\text{Scaled High} - \text{Scaled Low})}) + \text{Scaled Low}$$

**B Raw Input Limits**

*High/Low:* The High and Low Raw Input Limits must be within the range of values that the tag data type can store.

**C Scaled Result**

*Data Type:* Select an available data type. Not all Modbus data types are valid output types for scaled values, so some data types are not listed.

*Limit High and Limit Low:* These values must be within the range of values that the scaled output data type can store.

**D Negate the result:** Select this option to flip the sign of the result (negative to positive or positive to negative).

**Creating a Valid Modbus Tags Import File (CSV)**

See also “Exporting a Modbus Tags Import File (CSV)” on page 37.

A valid Modbus CSV file contains one tag per line and has this form:

```
Tag Name, Data type, Tag address [, [Read/Write setting] [, Value scaler name, Scaled output data type, Input limit low, Input limit high, Output limit low, Output limit high, Negate]]
```

When viewed in a text editor, a CSV file containing Modbus tags might look like this:

```

Tag Name      Data Type      Tag Address      Access
-----
1 Digital Input 0, Boolean, 100000, Read Only
2 Digital Input 1, Boolean, 100001, Read Only
3 Digital Output 6, Boolean, 000006, Read/Write
4 Digital Output 7, Boolean, 000007, Read/Write
5 Analog Input 16 (pot knob), Float, 300032, Read Only
6 Analog Output 8 (meter), Float, 400016, Read Only, Linear, 16-bit Signed
7 Integer, -3.4028235E38, 3.4028235E38, -32768, 32767, false
    
```

Scaler

Here is the same file viewed in Microsoft Excel:

	Tag Name	Data Type	Tag Address	Access								
	A	B	C	D	E	F	G	H	I	J	K	
1	Digital Input 0	Boolean	100000	Read Only								
2	Digital Input 1	Boolean	100001	Read Only								
3	Digital Output 6	Boolean	000006	Read/Write								
4	Digital Output 7	Boolean	000007	Read/Write								
5	Analog Input 16 (pot knob)	Float	300032	Read Only								
6	Analog Output 8 (meter)	Float	400016	Read Only	Linear	16-bit Signed Integer	-3.40E+38	3.40E+38	-32768	32767	FALSE	

Scaler

**Tag Name:** (Required) You can use any alphanumeric characters. Do not use a comma, which is used as a delimiter in CSV files.

**Data Type:** (Required)

**Tag Address:** (Required) Use a basic 6-digit address (exception: if you access individual bits within a register, the address includes 6 digits plus a point and the bit number, for example: 302000.12). The first digit defines the register type:

- 0 = Coil
- 1 = Discrete Input
- 3 = Input Register
- 4 = Holding Register

The next five digits are the start address:

- For devices with a base 0 addressing, the start address range is 0–65535.
- For devices with a base 1 addressing, the start address range is 1–65536.

*NOTE: The start address is decimal by default but may be expressed in hexadecimal format. For hex:*

- Place an “H” or “h” character in front of the entire address (for example, H30009F).
- Follow the H with the address type byte plus a 0 (zero).
- Then show the hex address using 4 hex bytes. The most significant digit will always be 0.

*Examples: 000001, 400203, H10FFFF*

Registers 0 (Coils) and 1 (Discrete Input) are single bit registers and may be used for *Boolean data types only*. All other data types must use one of the 16-bit register types (3 or 4).

There are limits on the tag start address. The following formula is used to determine if the tag address is within bounds of the registers:

$$\text{OK if: } 65536 \leq \text{Start Address} + (\text{ArraySize} * \text{Data Type Byte Size}) / 2$$

*For the String data type:* Use the basic address followed by a "." and then a decimal number in the range 2–240 to designate the number of characters in the string. Use either an "L" or "H" to designate character ordering within the registers. Only ASCII characters are supported (1 byte each); therefore each 16-bit register can contain up to 2 characters. "L" indicates a Low-to-High byte ordering (the first character contains the LSB) and "H" indicates the opposite.

Examples: 300001.20H, H4000F9.120L

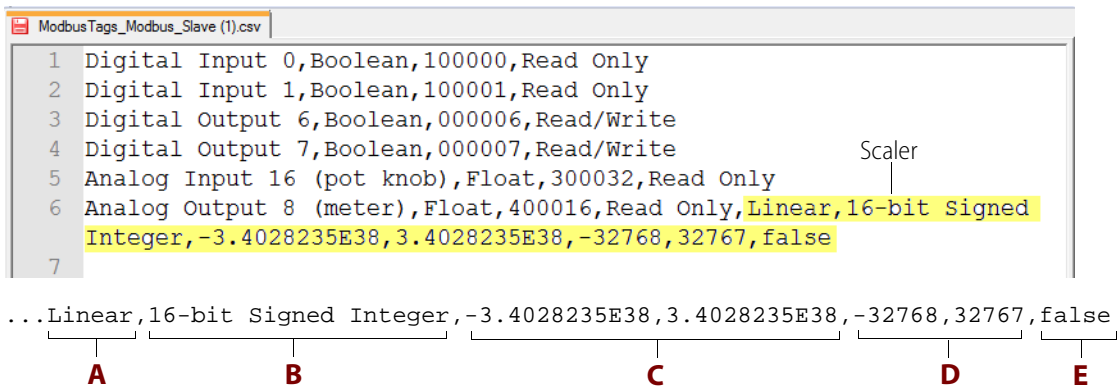
*For all other data types:* Data types other than strings may be represented as arrays using a basic address followed by a space, an opening bracket "[", a positive integer value in the range 2–65536, and a closing bracket "]".

Examples: 100003 [50], 300045 [20]

The array starts at the start address and extends through the designated number of elements. The start address + array size may not exceed 65536 registers. The size of the data type must also be factored in, as many data types span multiple registers.

**Access:** (Optional) This setting must match one of the options available for this data type in *groov* Build (for example, Read/Write, Read Only). It is not case sensitive. If this value is omitted, the tag will assume the register type default setting. If a value scaler is set, the Read/Write setting must be provided or an empty place reserved for it with commas (Tag address, Value scaler).

**Scaler:** (Optional) If this option is used, all components must be provided.



**A Scaler Name:** The scaler name must be None, Linear, or Square Root. The name is not case sensitive. The Scaler allows you to modify and control raw data values. This may be necessary if for example a raw value spans a much larger data range than you require. Or perhaps you need to digitize an analog value that comes in as a floating point number. There are many reasons why a scaled value may be useful or necessary. Below are the available scaling functions.

*None:* The raw input value is not modified in any way.

*Linear:* The raw input value is mapped linearly from the specified input range to the specified output range and data type. Selecting "Negate the result" causes the sign of the result to be flipped (negative to positive or positive to negative). Below is the function used to scale the input:

$$\text{Output} = (((\text{Scaled High} - \text{Scaled Low}) / (\text{Raw High} - \text{Raw Low})) * (\text{Raw Value} - \text{Raw Low})) + \text{Scaled Low}$$

*Square Root:* The raw input value is mapped from the specified input range to the specified output range and data type using the function below:

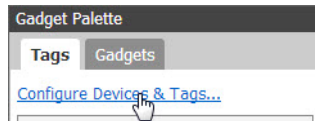
$$\text{Output} = (\sqrt{((\text{Raw Value} - \text{Raw Low}) / (\text{Raw High} - \text{Raw Low})) * (\text{Scaled High} - \text{Scaled Low})}) + \text{Scaled Low}$$

- B Data Type:** The scaled result data type must match one of those offered in the UI. Not all Modbus data types are valid output types for scaled values so check *groov Build* to see the current list of types.
- C Raw Input Limits:** The Low and High Raw Input Limits must be within the range of values that the tag data type can store.
- D Limit Low and Limit High:** Must be within the range of values that the scaled output data type can store.
- E Negate the result:** True or False. Causes the sign of the result to be flipped (negative to positive or positive to negative).

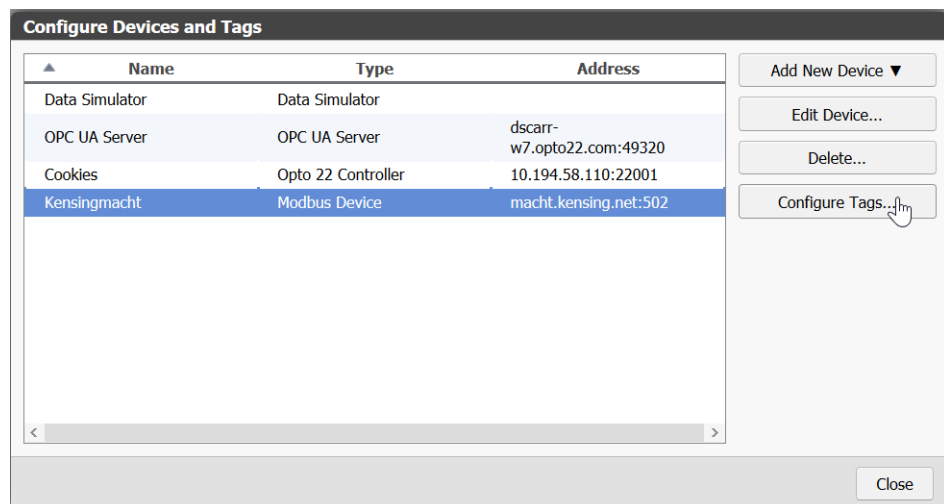
## Exporting a Modbus Tags Import File (CSV)

If you already have tags attached to the device, you can export a CSV file containing all of the device tags. Exporting some pre-configured tags is the fastest way to see what a valid tag CSV file looks like.

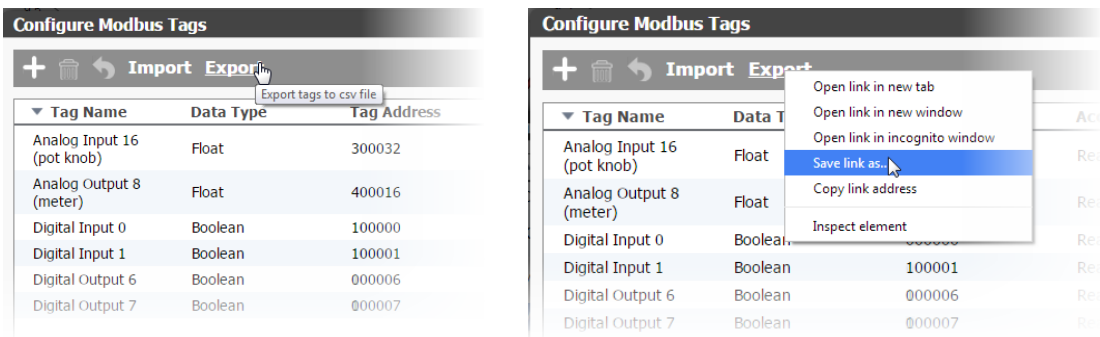
- Under Gadget Palette on the right side, click *Configure Devices & Tags*, or select *Configure > Devices and Tags*.



- Highlight the Modbus device and click *Configure Tags*.



3. Click Export to send the CSV file to the default downloads directory. Or, right-click Export and select "Save link as" to choose the target directory, and then click Save.

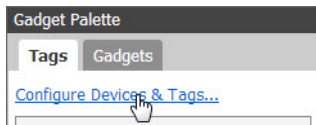


A CSV file with the Modbus device tags is created and downloaded to the default or designated directory.

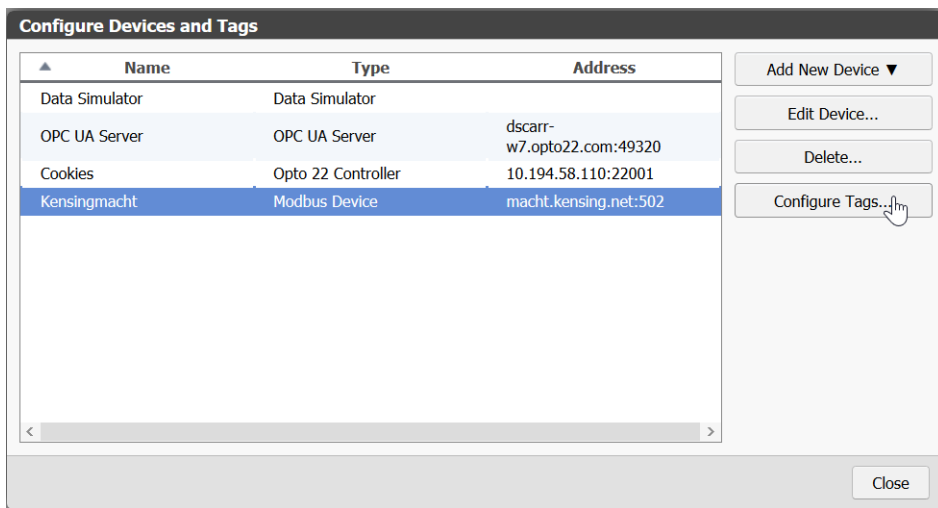
### Importing Modbus Tags from a CSV File

If you have a comma-separated values (CSV) file in the proper format with Modbus tags you want to use, you can import the tags directly into *groov*. See also, ["Creating a Valid Modbus Tags Import File \(CSV\)" on page 34](#)

1. Under Gadget Palette on the right side, click Configure Devices & Tags, or select Configure > Devices and Tags.



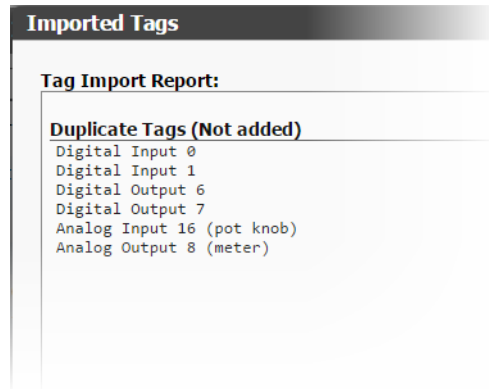
2. Highlight the Modbus device and click Configure Tags.



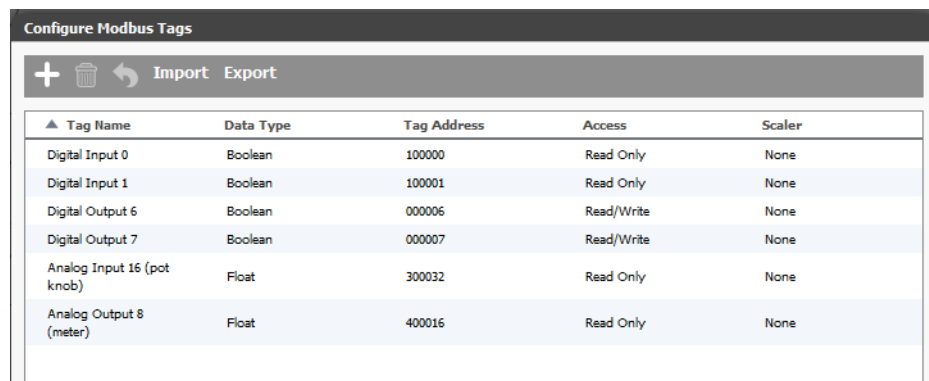
3. Click Import.



4. Browse to a valid comma-separated values (CSV) file that has a .csv extension, then click Open. A Tag Import Report appears.



5. Click Close. The tags appear in *groov*.



Tag Name	Data Type	Tag Address	Access	Scaler
Digital Input 0	Boolean	100000	Read Only	None
Digital Input 1	Boolean	100001	Read Only	None
Digital Output 6	Boolean	000006	Read/Write	None
Digital Output 7	Boolean	000007	Read/Write	None
Analog Input 16 (pot knob)	Float	300032	Read Only	None
Analog Output 8 (meter)	Float	400016	Read Only	None

## Adding an OPC UA Server

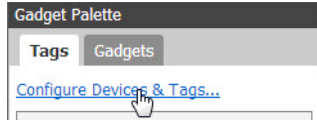
Equipment that is neither a Modbus/TCP device nor manufactured by Opto 22 can still be monitored and controlled in *groov* if you have an OPC UA server or if it is an OPC UA-compatible hardware device. If you need an OPC UA server, the KEPServerEX communication platform is

recommended by Opto 22 and tested to work with *groov*. For more information, go to [www.kepware.com/Products/products\\_OPCServers.asp](http://www.kepware.com/Products/products_OPCServers.asp).

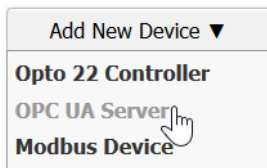
Also see [www.kepware.com/Support\\_Center/doc\\_auto\\_tag.asp](http://www.kepware.com/Support_Center/doc_auto_tag.asp)

Follow these steps to add an OPC UA-compliant server or equipment to *groov*.

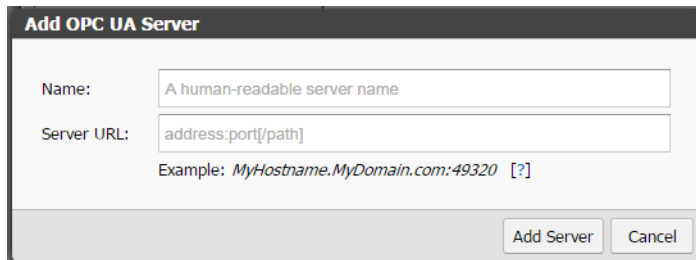
1. In the Gadget Palette in the lower-right corner of *groov* Build, click the Tags tab, and then click Configure Devices & Tags. Or select Configure > Devices and Tags from the menu bar.



2. Click Add New Device and then select OPC UA Server.



3. Enter the Name of the OPC UA server.



4. For the Server URL, using the following format, enter the IP address or hostname of the computer where the OPC UA server is installed, and enter the port (for Kepware the default is 49320). You can also enter the path of the OPC server endpoint.

`MyComputer.MyCompany.com:49320/path`  
 Computer hostname                      Port

Check your server for what these values should be.

**Example server URLs**

- 10.20.30.40:49320
- 10.20.30.40:49320/Path
- MyServer:49320
- MyServer:49320/Custom/Path
- MyServer.MyDomain.com:49320
- MyServer.MyDomain.com:49320/Path



**Default ports**

Different OPC UA servers use different ports. Here are the default ports for some servers:

KEPServerEX: 49320

TOP Server: 49380

Ignition Gateway: 4096

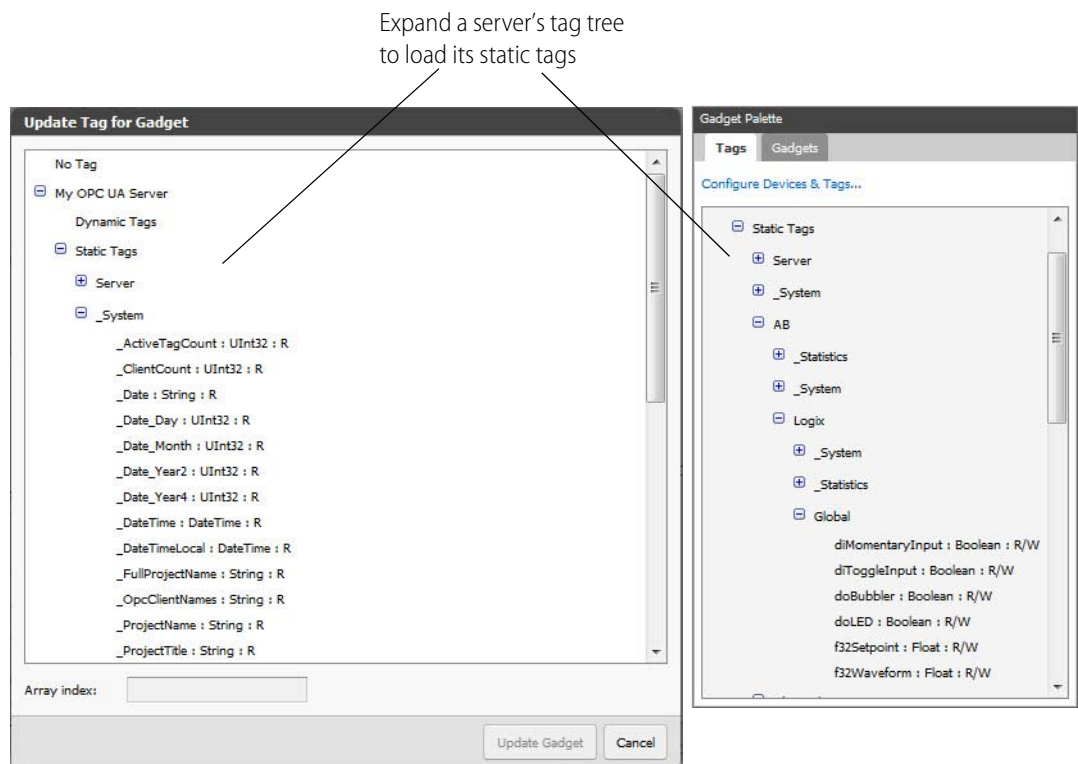
MatrikonOPC UA Wrapper: 21381

MatrikonOPC Universal Connectivity Server: 4846

5. Click Add Server.

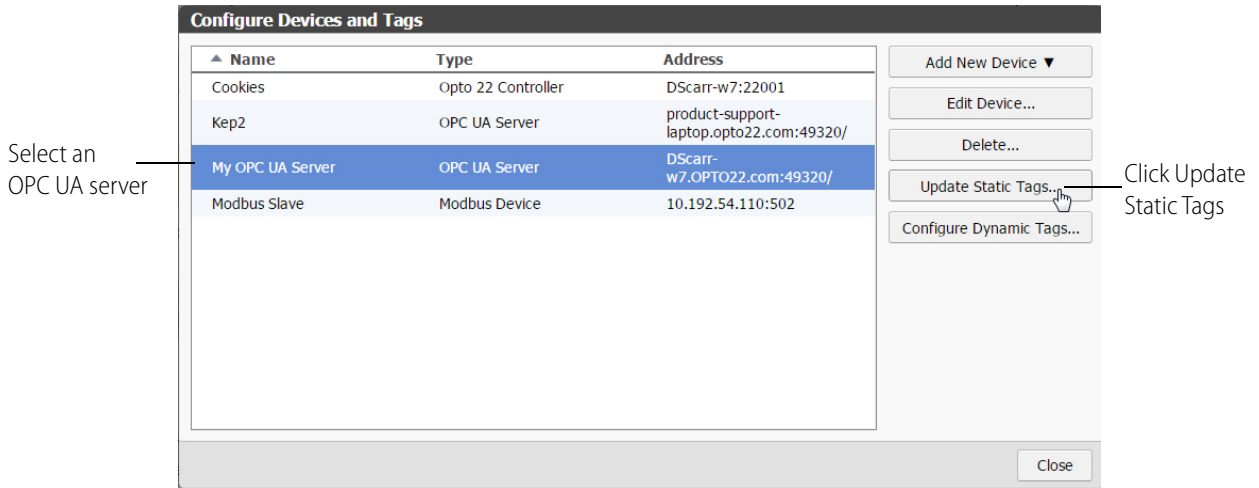
**Using Static Tags**

When you add an OPC UA Server, *groov* accesses the controller's *static* tags and makes them available so that you can directly browse the tags on the server. *groov* keeps the server's tag hierarchy and displays the tags in a tree format. As long as you are connected to the server you can browse to find the tag you need in the Gadget Palette or by clicking dynamic link next to "Tag" on a gadget's properties panel. The tags load automatically as you expand the tree.

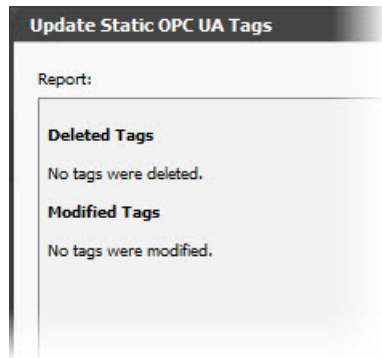
**Updating Static Tags**

If you know that static tags have changed, or if a link to a tag is broken, you can update the static tags on an OPC UA server. When you update the static tags, *groov* displays a report that lists any deleted or modified tags so that you can choose different tags as necessary.

To update static tags, select a OPC UA server in the Configure Devices and Tags dialog, and then click Update Static Tags.



Any deleted or modified tags will be listed in the Update Static OPC UA Tags dialog box.

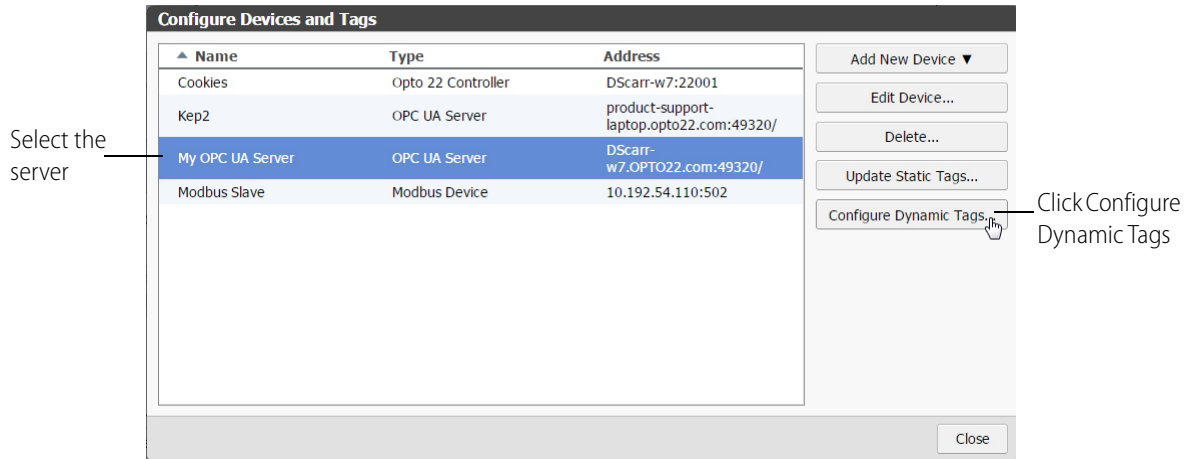


### Using Dynamic Tags

Dynamic Tags are tags used with an OPC UA server that you enter manually one at a time in *groov*. They are not configured on the OPC UA server. Dynamic tags allow you to add as many or as few tags to *groov* as you want making it easier to find specific tags if you only want to use a few.

Follow these steps to add dynamic tags to *groov*:

1. In the Configure Devices and Tags dialog, select the OPC UA server, and then click Configure Dynamic Tags.



2. In the Configure Dynamic Tags dialog box, click Add.
3. In the Add Dynamic Tag dialog box, enter a Name and select the Data Type. You must also make sure the Data Type selected in *groov* matches the type retrieved from the device.
4. If this tag is an array of objects with the same data type, select Array and enter the array size.
5. Choose the Access Read or Write attributes as needed.

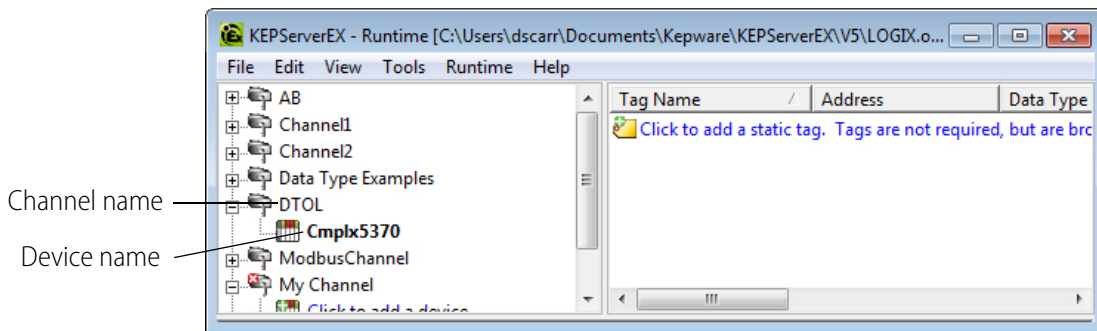
Leave this dialog box open while you identify the NodeId Value in the next step.

6. To find the NodId Value for your device, open your OPC UA server configurator and find the configured device associated with this tag.

You'll find part of the NodId information here. The remainder comes from the device itself. The addressing syntax is different for each type of device, so you'll need to check the OPC UA server's documentation for this tag's device type.

As an example, here's how you find the NodId for an Rockwell Automation Logix tag on a KEPServerEX 5 server:

- a. Open the KEPServerEX 5 Runtime configurator.
- b. Locate the device and tag from which the dynamic tag in *groov* will obtain data.



Use this format for the NodId Value:

[Channel name].[Device name].[Tag group name].[protocol specific address]

So now you can extract the information you need from the server's configurator and the device itself:

[Channel name]=**DTOL**

[Device name]=**Cmplx5370**

[protocol specific address]=**Program:MainProgram.i32Counter@Long**

*NOTE: The protocol specific address is obtained from the device. If you have a Kepware server, the help file provides the protocol specific addressing information. To access help for a specific tag, click on the device name in the Kepware configurator, choose Properties, and click the Help button.*

*In this example, the "@Long" portion specifies the data type as an unsigned 32-bit integer. This forces the server to report data to this type. If the default data type on the Kepware server is different than the tag's data type, the link will fail in groov unless you specify the data type in the NodId Value. For more information on your specific data type, see the server's documentation.*

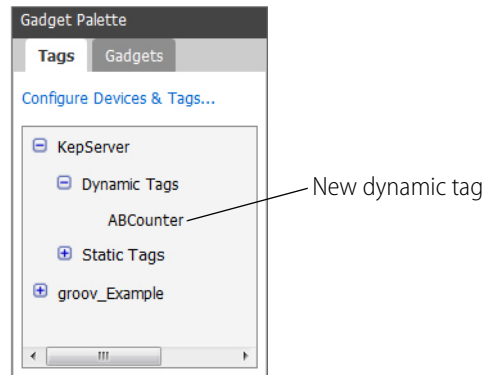
Putting it all together, here's the NodId Value for this dynamic tag:

**DTOL.Cmplx5370.Program:MainProgram.i32Counter@Long**

7. In the *groov* Add Dynamic Tag dialog box you left open in *groov* Build, enter the NodId Value.
8. In most cases, the Namespace Index should stay at 2. However, for some servers (such as Ignition by Inductive Automation) you should change the Namespace Index to 1.  
A tag's Namespace Index is an integer (0 or higher) that tells *groov* how to find the tag on the server.
9. Click Add Dynamic Tag.

10. Close the open dialog boxes.

The new dynamic tag appears in the Gadget Palette.



11. Now you're ready to add gadgets to a page using the new tags you just created. For instructions, see ["Adding Gadgets" on page 51](#).
12. After you've added some gadgets and associated tags to them, select File > Save All Changes and Switch to *groov* View.

It might take a few moments for the OPC UA connection to be established and live values to appear.

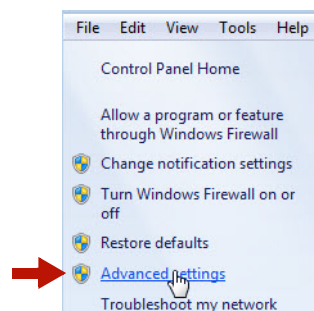
### Configuring the Windows Firewall for an OPC UA Server

If you are using *groov* Server installed on a different computer than the OPC UA server or a *groov* Box, inbound traffic to the OPC UA server needs to be able get through the firewall on the port used by the server. This requires adding an Inbound Rule to the Windows Firewall on the computer where the OPC UA server is installed.

*NOTE: If you are using groov Server and it is installed on the same computer as the OPC-UA server, you do not need to configure the Windows Firewall as described here.*

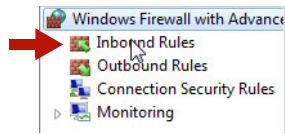
As an example, the following instructions describe how to add in Windows 7 the Inbound Rule for port 49320, the default port for the KEPServerEX 5 server.

1. After you have successfully installed the Kepware server, open the Windows Control Panel.
2. If icons are displayed in the Control Panel, click Windows Firewall. If categories are displayed in the Control Panel, click System and Security and then click Windows Firewall.
3. In the left panel, click Advanced settings.

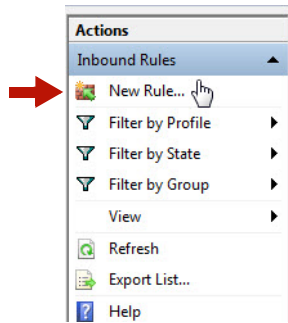


The Windows Firewall with Advanced Security dialog box opens.

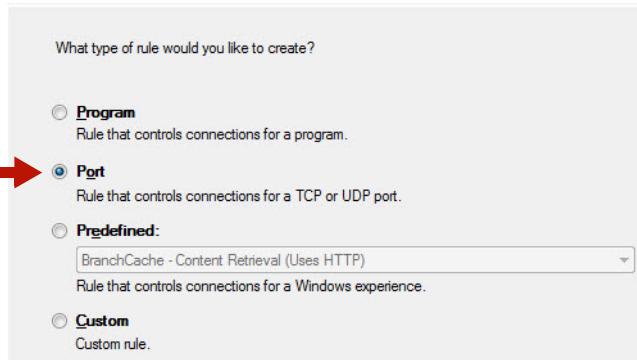
- 4. In the left panel, click Inbound Rules.



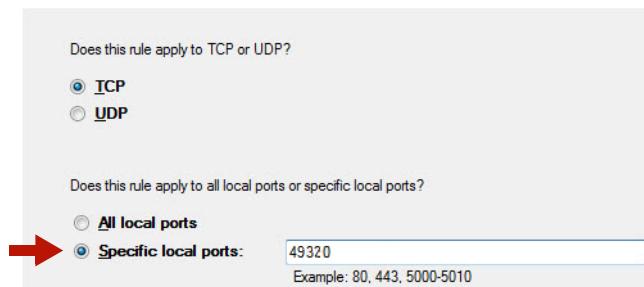
- 5. In the right panel, click New Rule.



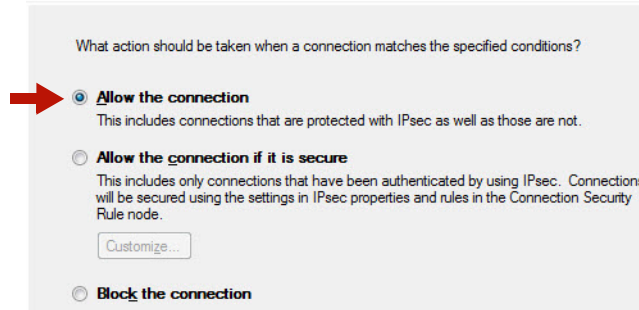
- 6. For Rule Type, select Port. Click Next.



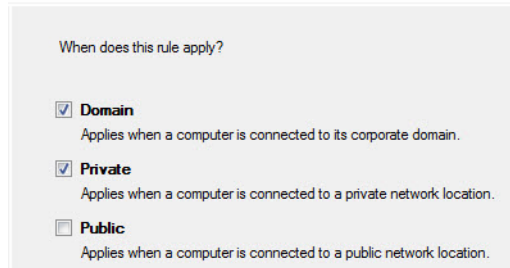
- 7. For Protocol and Ports, select Specific local ports and enter 49320 (the default Kepware port). Click Next.



- For Action, select “Allow the connection.” Click Next.



- For Profile, select Domain and Private. Click Next.



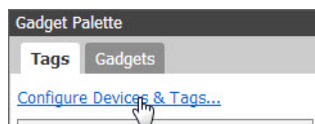
- For Name, enter a descriptive name such as “Kepware OPC-UA Server.”
- Click Finish.
- Exit the Windows Firewall and Control Panel dialog boxes.

## Adding System Tags

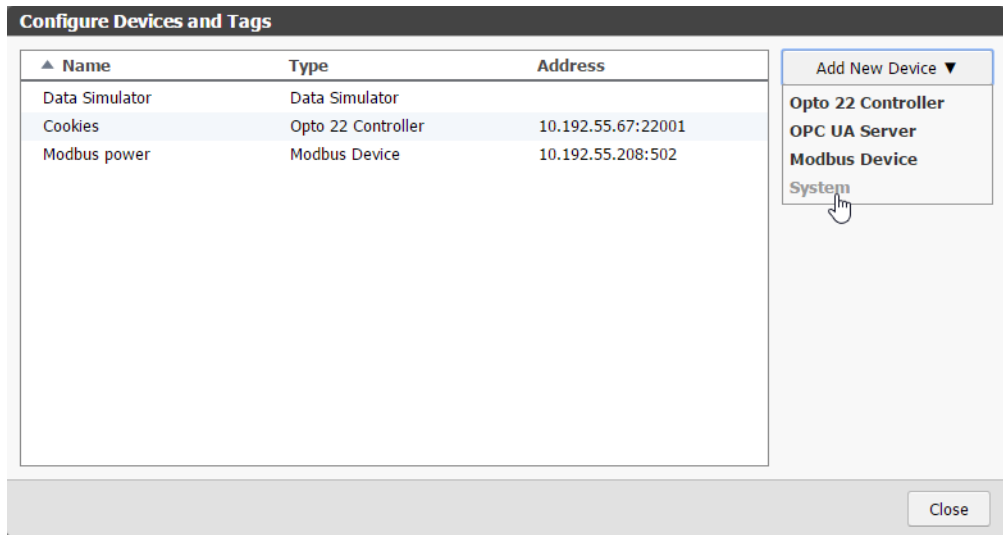
You can get tags for information about *groov* itself and use them in your mobile interface. For example, you might want to show operators the current time and date. Or an Admin page might include system uptime, number of current user sessions, and so on.

To make these tags available, you add System as another device.

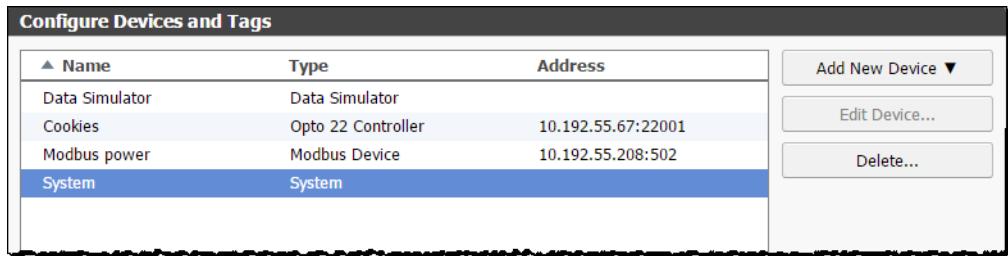
- Under Gadget Palette on the right side, in the Tags tab, click [Configure Devices & Tags](#), or select [Configure > Devices and Tags](#).



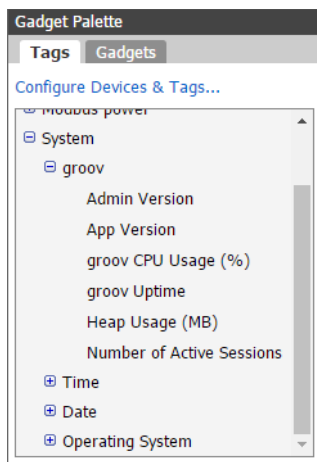
2. Click Add New Device and then select System.



3. System appears in the list of devices.



4. Click Close, and notice that System tags are added in the Gadget Palette. Click the plus signs to expand the tree and see all the tags.



All possible tags are shown in the list, but some may not apply to your *groov*. For example, *groov* Admin version applies only to a *groov* Box, not to *groov* Server.

The table below shows information about the tags.

*NOTE: It's possible to choose an LED or Image Indicator gadget for Time or Date, but since time and date values are strings, you cannot set a numeric range for these gadgets. For example, you can set an LED to be blue at exactly 8:00 and black at any other time, but you cannot set it to be blue between 8:00 and 12:00.*



## System tags

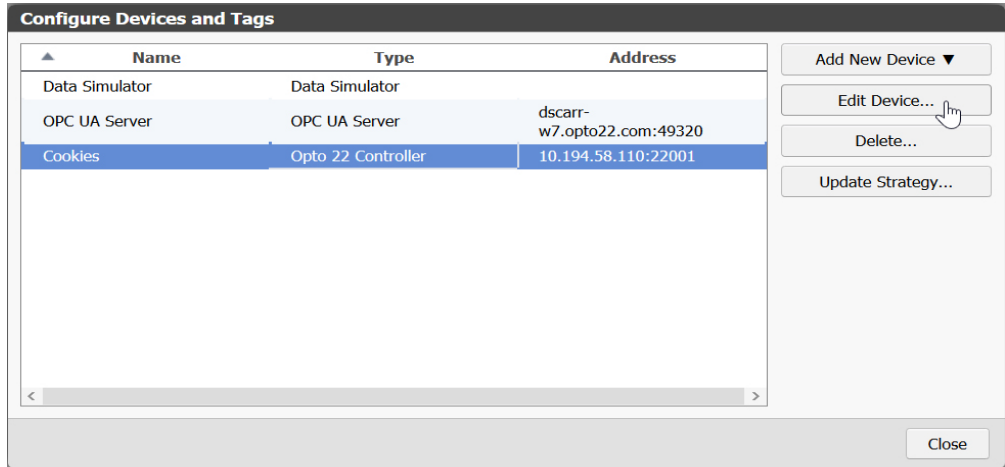
Tag	Meaning
groov > Admin Version	( <i>groov</i> Box only) Version of <i>groov</i> Admin running on the Box. (This information is also available in <i>groov</i> View; click the gear icon and choose About.)
groov > App Version	Version of <i>groov</i> App (Build and View) running on this <i>groov</i> . (This information is also available in <i>groov</i> View; click the gear icon and choose About.)
groov > groov CPU Usage (%)	Current CPU usage by the <i>groov</i> software on either the <i>groov</i> Box or the PC where <i>groov</i> Server is running, shown as a percentage. A negative value means the current CPU usage is not available.
groov > groov Uptime	How long <i>groov</i> software has been running
groov > groov Heap Usage (MB)	Amount of memory allocated within <i>groov</i> software. Normal values depend on the size of your <i>groov</i> project.
groov > Number of Active Sessions	Number of user sessions currently viewing your <i>groov</i> interface. Typically the number of current users, but one user logged in through two devices or browsers will be counted twice.
Time >	Time of day. For <i>groov</i> Server, the time on the PC <i>groov</i> Server runs on. For a <i>groov</i> Box, see the Box's user guide to set time, set time zone, or synchronize with a time server. Choose the format you want. HH indicates a 24-hour clock; hh indicates a 12-hour clock.
Date >	From the <i>groov</i> Box or from the PC <i>groov</i> Server runs on. Choose the format you want. MM means the month is shown in digits; MMM means the month is written out. For example, DD MMM YYYY might appear as 26 Jul 2017.
Operating System* > System CPU Usage (%)	Current CPU usage for the whole system, shown as a percentage. A negative value means the current CPU usage is not available.
Operating System* > System Uptime	How long the hardware (the <i>groov</i> Box or the PC <i>groov</i> Server runs on) has been running.

\* Operating System refers to the hardware the *groov* software runs on, either the *groov* Box or the PC that *groov* Server runs on.

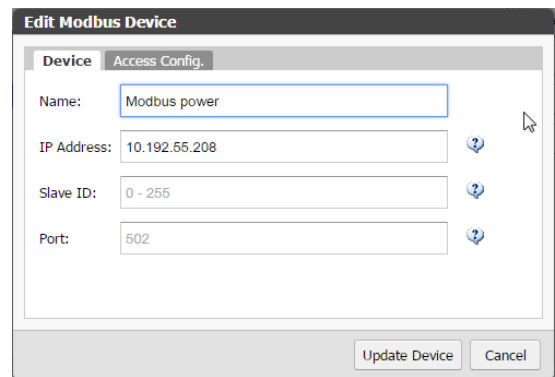
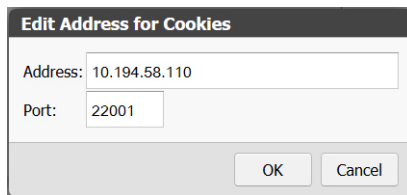
## Editing a Device's Address

If a device's hostname or static IP address has changed, you'll need to edit the hostname or address in Build.

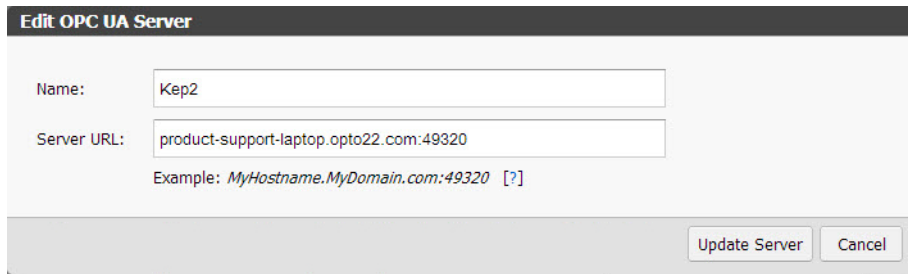
1. Select Configure > Devices and Tags.
2. Select the server and click Edit Device.



- For an Opto 22 controller or Modbus device, enter a new IP address or other information, and then click OK or Update Device.



For an OPC UA server, enter a new name or server URL, then click Update Server.

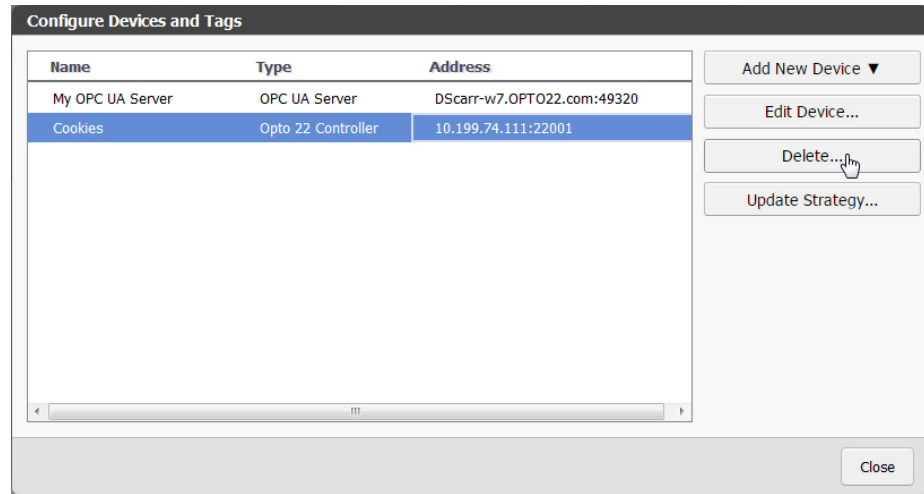


- Close the Configure Devices and Tags dialog box.

## Deleting a Device

You can delete a controller, a Modbus/TCP device, or an OPC UA server from your project. However, be aware that any tags associated with gadgets will be lost and have to be reassigned.

1. Select Configure > Devices and Tags.
2. Click Delete.



3. Click Delete Device.
4. Close the Configure Devices and Tags dialog box.

## Adding Gadgets

There are two basic methods for adding a gadget and associating a tag. You can start with a gadget and add a tag to it. Or, you can start with a tag and then add the tag's gadget.

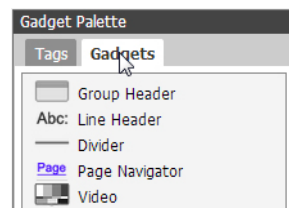
See [“Method 1: Add a Tag to a Gadget,”](#) page 51

See [“Method 2: Add a Gadget to a Tag,”](#) page 52

### Method 1: Add a Tag to a Gadget

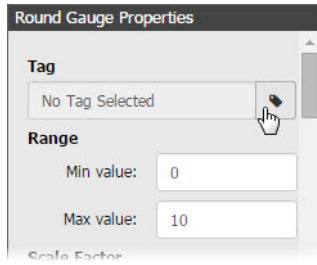
Drag a gadget from a toolbox onto the page, and then assign it a tag.

1. Select the Gadget tab in the Gadget Palette.



2. Either double-click a gadget or drag it to the work area.

3. Select the gadget in the work area and look at the Gadget Properties panel (upper right).

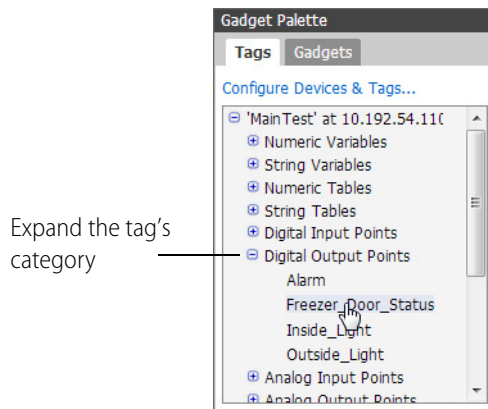


4. Click the little tag next to No Tag Selected.
5. In the Update Tag for Gadget dialog box, click the plus signs to browse to the tag you want to use, select it, and then click Update Gadget. (Or just double-click the tag in the list.)
6. Configure the gadget's properties. See ["Configuring Gadget Properties" on page 53.](#)
7. Choose File > Save All Changes.

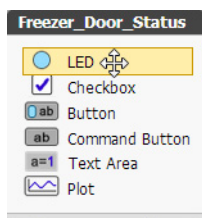
## Method 2: Add a Gadget to a Tag

Click a tag and assign an available gadget.

1. Click the Tags tab in the Gadget Palette panel, then click the plus signs to expand the tree and locate the tag you want.



2. Click the tag to see a list of gadgets that work with the selected tag.



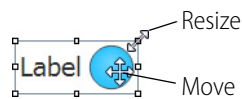
3. Either double-click a gadget or drag it to the work area.
4. Configure the gadget's properties. See ["Configuring Gadget Properties" on page 53.](#)

5. Select File > Save All Changes.

## Editing Gadgets

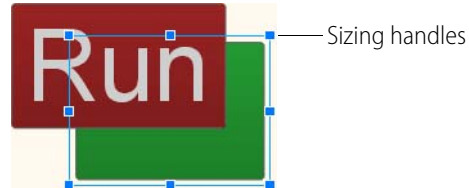
### Resizing and Moving Gadgets

When you resize or move gadgets in either the Desktop & Tablet layout or the Handheld layout, the change does *not* affect the other layout. See [“Optimizing Layouts” on page 56](#) for more information on layouts.



- To move a gadget, grab it with the left mouse button and drag it. To move multiple gadgets, click on an empty part of your page and drag a box around the gadgets. Or hold down the CTRL key while selecting gadgets.
- To resize a gadget, click it, grab a graphic handle, and drag to the new size.

If a gadget is behind another gadget, you can make its sizing handles available by clicking on an exposed portion of the gadget.




### Configuring Gadget Properties

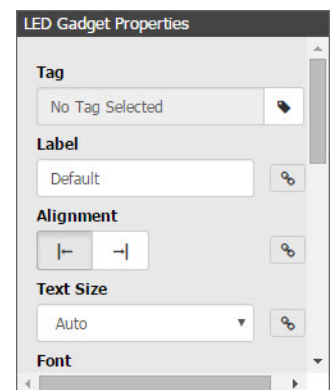
To configure a gadget, click the gadget to display its Properties panel (in the upper right corner of the workspace).

Each gadget has its own specific properties. For example, part of the LED Gadget Properties panel is shown at right.

See Chapter 4: Gadget Reference for information on specific gadget properties.

#### Properties and Layouts

Any property with a link icon  next to it can be changed in one layout (Desktop & Tablet, or Handheld) without affecting the other layout. See [“Optimizing Layouts” on page 56](#) for more information on layouts.




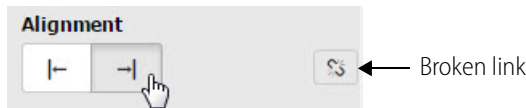
Depending on the gadget, you can change the gadget’s label name, text size, alignment, color of text and its background, value precision, indicator colors, whether it is oriented vertically or horizontally, and more.

For example, suppose you want a gadget’s label to appear on the left side of the gadget in the Desktop & Tablet layout, but on the right side in the Handheld layout. Here’s how to change it.

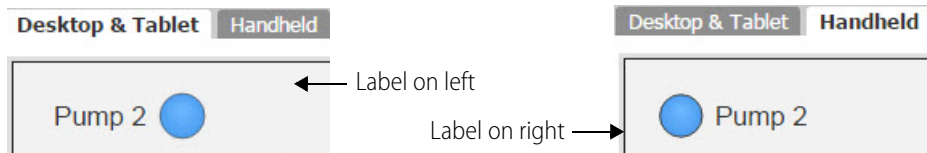
1. Click the Desktop & Tablet tab, and then click the gadget you want to change.
2. In the Properties panel, make sure Alignment is to the left.



3. Click the link icon so it changes to a broken link , indicating that changes to this property affect only the current layout.
4. Click the Handheld tab and click the same gadget.
5. In the Properties panel, notice that the link is broken. Change Alignment to the right.



6. Check both tabs to see how the label on this LED will appear in the two layouts:



### Languages in Buttons and Labels

When adding text to a gadget, *groov* has full Unicode support and uses very common fonts such as Arial with broad support for most languages.



### Cutting and Pasting Gadgets

- **To cut or copy** a gadget, right-click it to open the popup menu, and then select Delete, Duplicate, Copy, or Cut.
- **To paste** a copied or cut gadget, left-click the workspace, then right-click and select Paste from the popup menu.

- **To select more than one gadget** at a time, hold down the CTRL key as you click them. Or draw a box around multiple gadgets.

As indicated on the popup menus, you can also use keyboard shortcuts for Copy (CTRL + c), Cut (CTRL + x), and Paste (CTRL + v). Or choose Copy, Cut, or Paste from the Edit menu.

## Moving a Gadget to the Front or Back

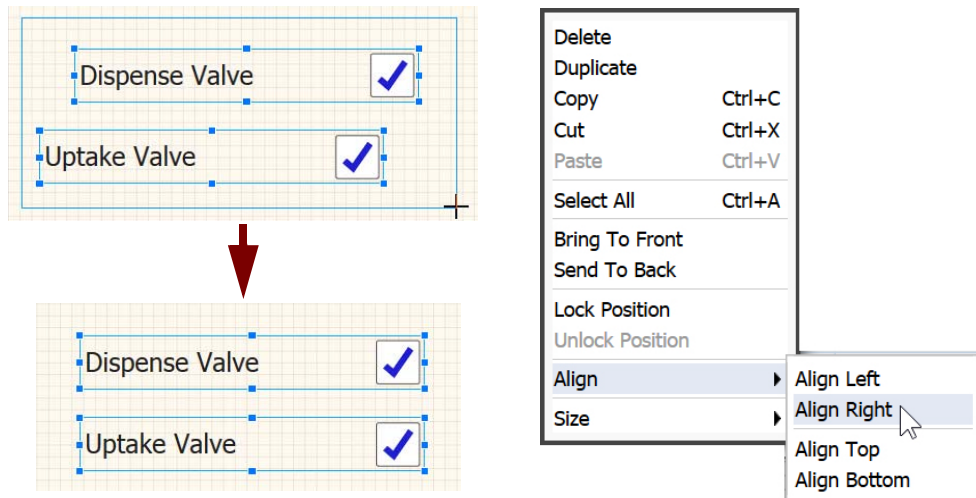
If gadgets overlap and you want to change the order of the stack, right-click a gadget and select Bring To Front or Send To Back.

If you don't want a gadget to move, choose Lock Position.

Or choose Bring To Front, Send To Back, or Lock Position from the Edit menu.

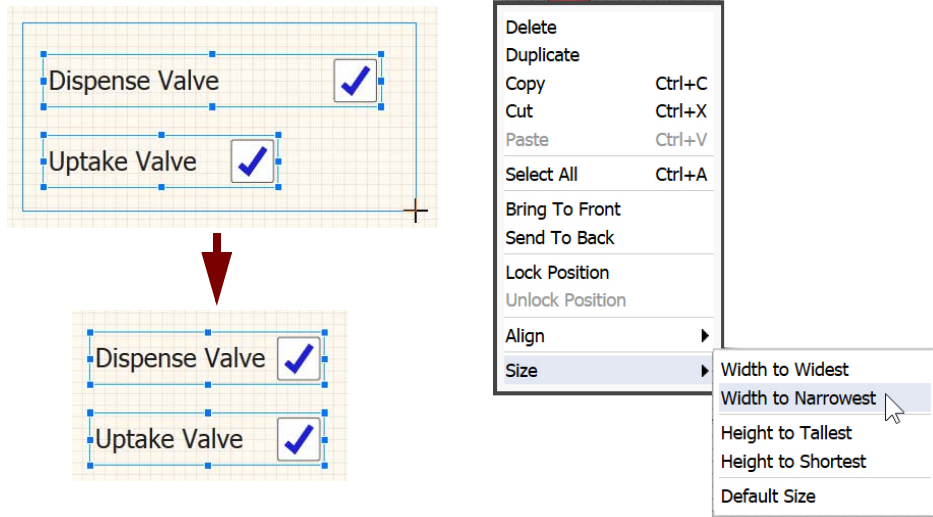
## Aligning Gadgets

To align multiple gadgets, click on an empty part of your page and drag a box around the gadgets (or hold down the CTRL key while selecting them), then right-click and choose the alignment type. The Align commands are also available in the Edit menu.



## Adjusting the Size of Multiple Gadgets

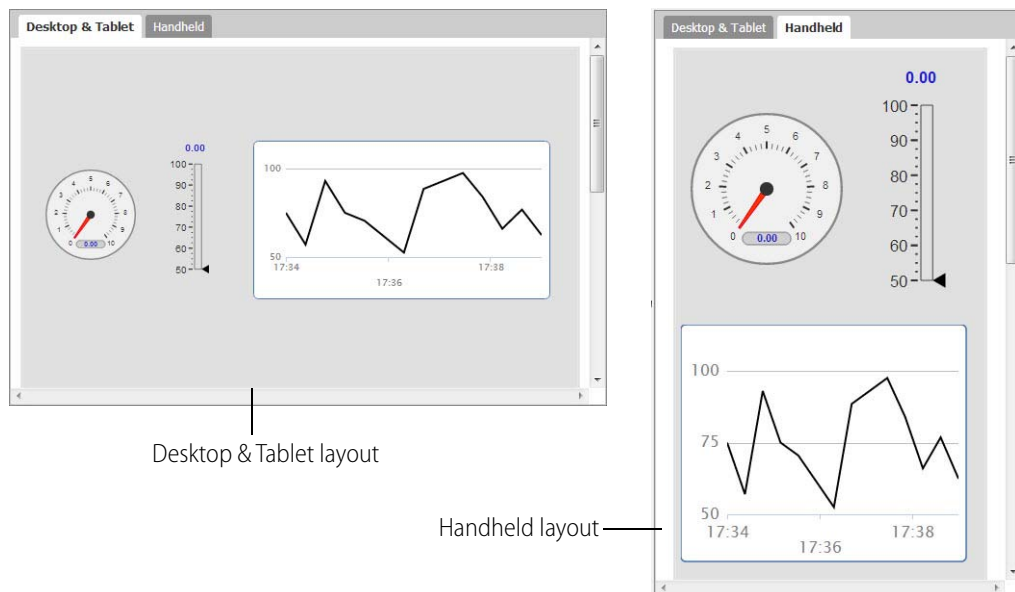
To make multiple objects the same size, drag the cursor around the gadgets (or hold down the CTRL key while selecting them), then right-click and choose how to size them. The Size commands are also available in the Edit menu.



## Optimizing Layouts

In *groov* Build there are two different layouts: Desktop & Tablet and Handheld. The Desktop & Tablet layout shows you how gadgets will appear when viewed on a computer monitor or a tablet. The Handheld layout is for viewing on a smaller handheld device such as a smartphone.

*groov* View automatically shows the appropriate layout for the device being used. Or, if you are using the *groov* View app for iOS or Android on a mobile device, you can choose which layout to view.

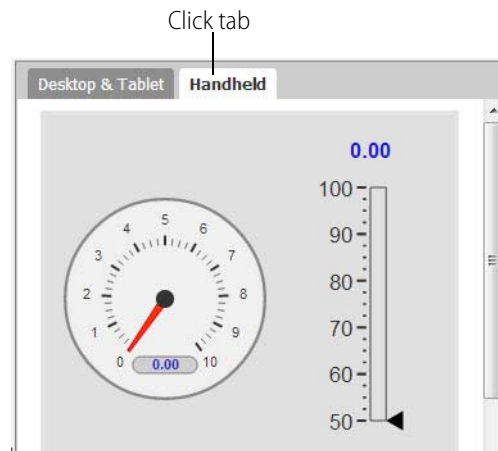




If most of your users will view your *groov* operator interface on a smartphone, you may want to start building your project in the Handheld layout tab. No matter where you start, you can adjust both layouts to optimize them for the people who will use them.

For any given page, by default both layouts contain identical gadgets and properties, but you can make the layouts different in several ways.

To work on a layout, click the tab for either Desktop & Tablet or Handheld at the top of the page.



You can switch between tabs as needed to make each layout the way you want. You can:

- Change a gadget's size and position in one layout without affecting the other one. For example, you can move the most important gadgets to the top in the Handheld layout. See [“Editing Gadgets” on page 53](#).
- Hide a gadget in one layout and show it in the other. See [“Using the Page Stash” on page 22](#).
- Change the size, color, and alignment of gadget text in one layout only, for example to fit more on a smaller screen. But be careful not to make text too small to read or controls too small to use with your finger. See [“Properties and Layouts” on page 53](#).
- Show a different gadget label on one layout than on the other. See [“Properties and Layouts” on page 53](#).
- Orient a gadget horizontally in one layout and vertically in the other. See [“Properties and Layouts” on page 53](#).

Each gadget has individual properties that may limit or expand what you can do with it in a layout. See [Chapter 4: Gadget Reference](#) for information on each gadget.



# 3: Managing *groov*

This chapter describes how to manage user accounts, back up and restore your project, update *groov* and your license, and more.

## In this chapter:

Managing User Access .....	59
Managing Images in the Image Library .....	66
Adding a Page Category.....	70
Viewing the Tags in Use.....	72
Viewing Log Messages.....	72
Changing the General Project Settings .....	74
Saving Your Project and Opening <i>groov</i> View .....	76
Backing Up and Restoring Your Project.....	76
Updating <i>groov</i> .....	78
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## Managing User Access

When you build or change your *groov* mobile operator interface, you have specific ideas in mind about who will use it and for what purposes.

For example, you may want a line operator to monitor and control equipment on the line, while a supervisor can see widget production but has no control over the equipment. Or you may want a central station to monitor equipment at remote sites, and field technicians to control it from a tablet.

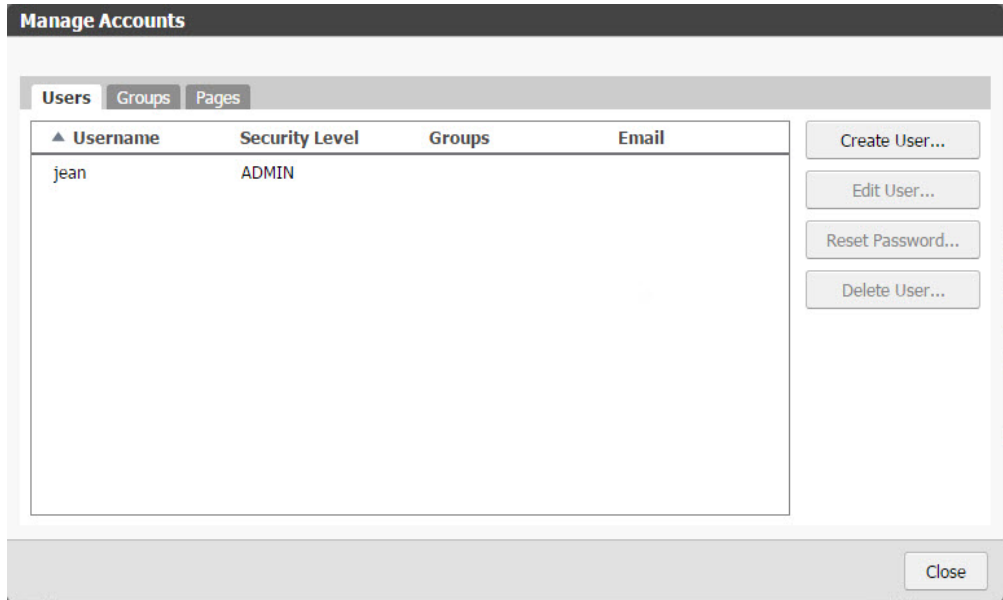
Because security is a top priority, you will restrict access to your *groov* interface—or to parts of it—to make sure that only authorized people can use it, and only in the ways you intended. Here are three ways you can manage access:

- **Create an account for each user.** Each person who uses your *groov* operator interface must have an account with a username and password. When they use your *groov* interface, their passwords are encrypted. Make sure users understand the importance of security and keep their passwords safe. See [“Creating a User,”](#) below.
- **Create pages for specific purposes.** If a line operator needs to monitor and control equipment, but a supervisor only needs to monitor it, create two pages, one for each purpose. The operator’s page includes controls; the supervisor’s doesn’t. See [“Working with Pages” on page 19.](#)
- **Create user groups to control page access.** With multiple users, groups are an easy way to define who sees which pages. For example, create one group for central station monitoring

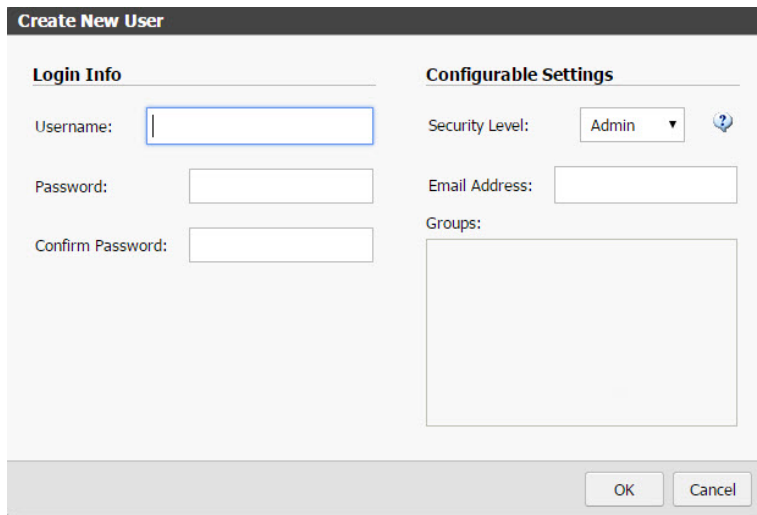
and two groups for field technicians. Then assign each user to the correct group. The *Central Station* group sees pages showing all remote sites for monitoring. The *Field Technicians West* group sees pages with controls for their geographic area; the *Field Technicians East* group sees similar pages for their area. See “Managing User Groups” on page 62.

## Creating a User

1. In *groov Build*, choose Configure > Accounts. Then click the Users tab.



2. Click Create User.



3. Enter a username and password (in both boxes) for the new user.
4. Select a security level (Admin, Editor, Operator, or Kiosk).

For example, if you want a user to be able to log in and out of *groov* View and change their password, choose the Operator security level. If you want a user to use View but not be able to log out or change their password, choose Kiosk.

This table shows the privileges available for each security level:

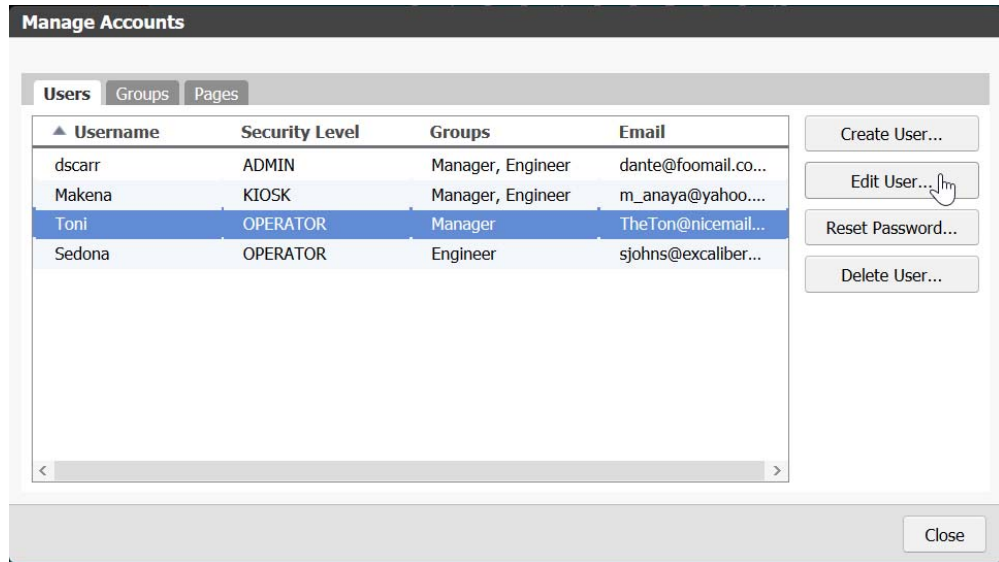
		Security Level			
		Admin	Editor	Operator	Kiosk
Privilege	Use and interact with the gadgets in <i>groov</i> View	●	●	● *	● *
	Log in and out, and change the password in <i>groov</i> View*	●	●	● *	
	Use <i>groov</i> Build to import strategies, make pages, and set groups on pages	●	●		
	Create users and groups, and assign users to groups	●			

\* Only for the user groups an Operator or Kiosk user belongs to. See [page 62](#).

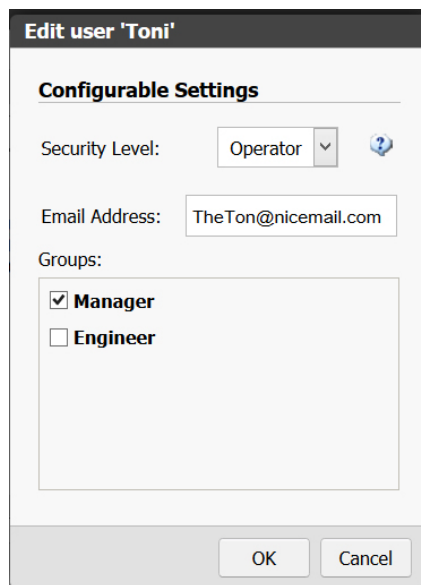
5. If you want this user to receive event notifications, enter his or her email address.  
When an event becomes active or inactive, a notification is emailed to all *groov* users with a configured email address. See Chapter 5: Using Events and Notifications.
6. If you have configured groups, select the groups the user belongs to.  
Groups are used to restrict access to particular pages for Operator and Kiosk level users. If a page is restricted to members of the group called *West Wing*, then a Operator or Kiosk level user must be in the West Wing group to access that page. See "[Managing User Groups](#)" on [page 62](#).
7. Click OK.

## Changing a User's Configurable Settings

1. In *groov* Build, choose Configure > Accounts, then click the Users tab.



2. Highlight a username and click Edit User.

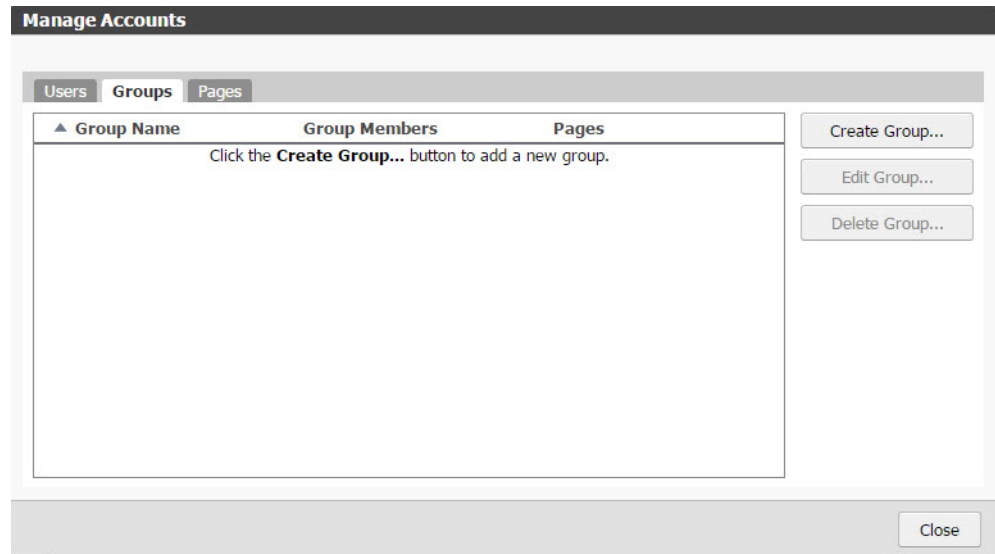


3. As needed, change the Security Level (Admin, Editor, Operator, or Kiosk), the user’s email address, or the groups the user belongs to. See more information in [“Creating a User” on page 60](#).
4. Click OK.

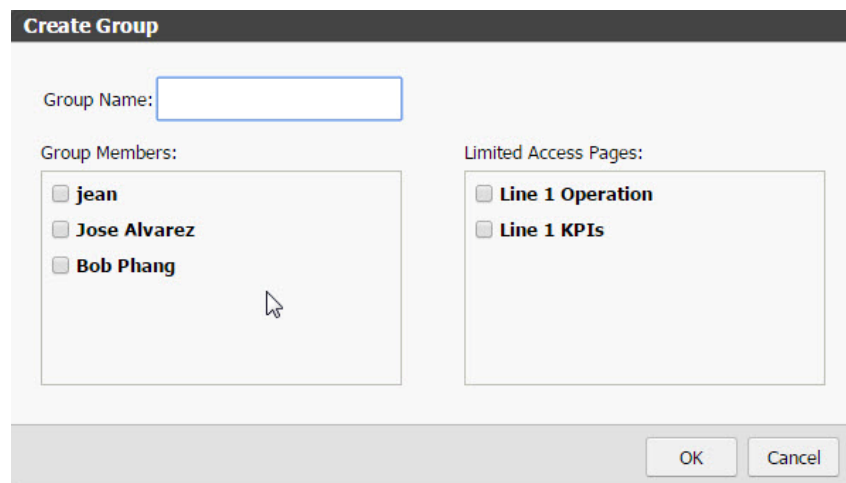
## Managing User Groups

Groups are used to restrict access to particular pages for Operator and Kiosk level users. For example, if a page is restricted to members of the group called *West Wing*, then an Operator or Kiosk level user must be in the West Wing group to access that page.

1. To add, edit, or delete a group, in Build choose Configure > Accounts. Then click the Groups tab.



- To delete an existing group, click the group name in the list and click Delete Group.
- To create a new group, click Create Group.
- To edit an existing group, click the group name in the list and click Edit Group.



2. Enter or change the Group Name, select the users to be included in the group, and select the pages to be included in the group.

*NOTE: You must have already designated page permissions as Limited Access, or the page will not appear here. To change a page's permissions, close this dialog box and click the Pages tab in the Manage Accounts dialog box. Select the page you want to change and click Edit Page. For more information on page permissions, see "Changing Page Properties" on page 20.*

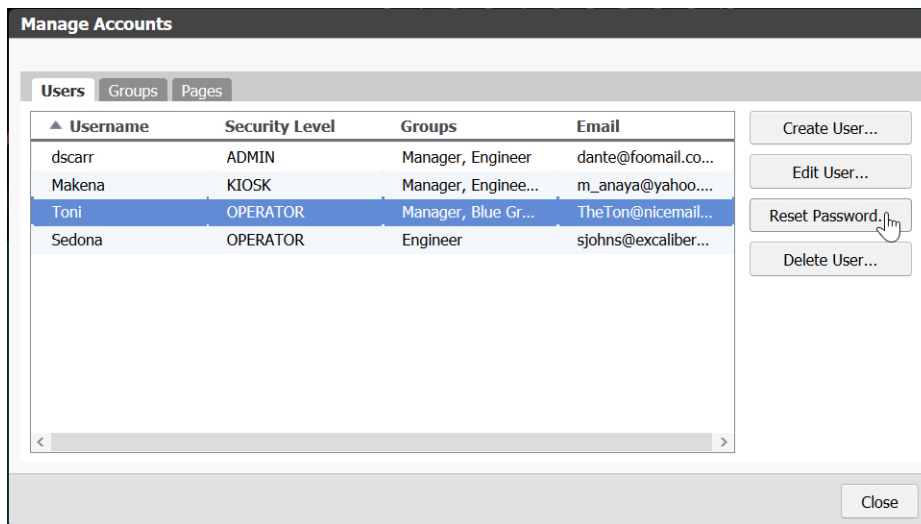
3. Click OK.

## Resetting a User Account Password

When you reset a password, a new password is generated automatically. This can be useful if a password is lost. To create a specific new password instead, see [“Changing the Current User’s Password” on page 65](#).

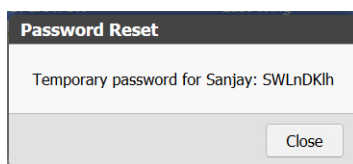
When a password is reset, your user will need to enter this new password the next time they log in. The password is case sensitive.

1. In *groov* Build, choose Configure > Accounts. Then click the Users tab.
2. Highlight a username and click Reset Password.



A message appears that your user will need to enter this new password the next time they log in. The password is case sensitive.

3. Click OK.  
A dialog box appears with a new temporary password. Give this password to the user.



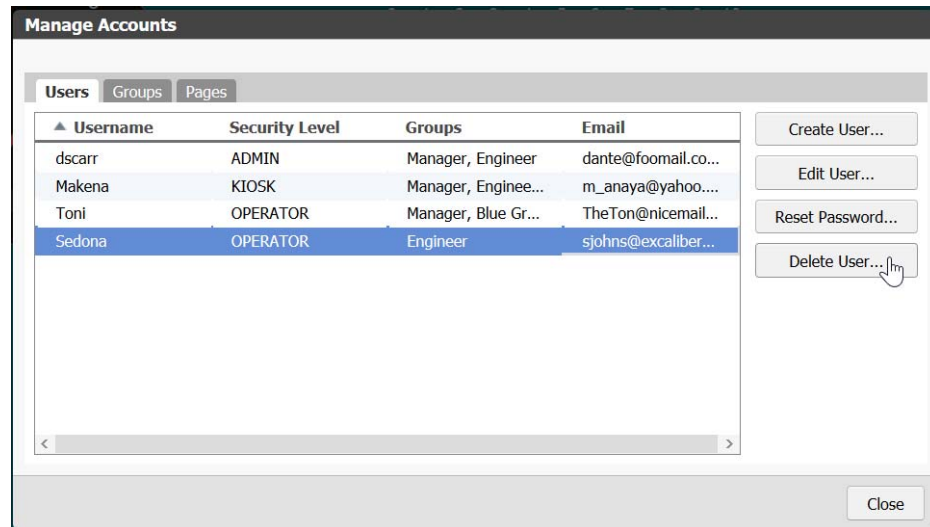
4. Click Close, and then click Close again.

## Deleting a User Account

1. In *groov* Build, choose Configure > Accounts, then click the Users tab.



- Highlight a username and click Delete User. The deleted user will no longer be able to log in.



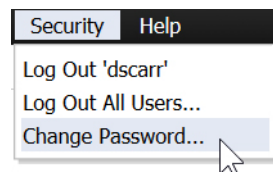
A confirmation message appears.

- Click OK to confirm.

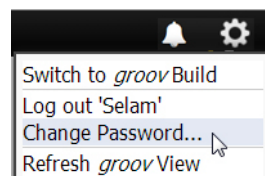
## Changing the Current User's Password

You can change the password for the current user in either Build or View, or users can change their own password in View. Your user will need to enter this new password the next time they log in. Also see ["Resetting a User Account Password" on page 64](#).

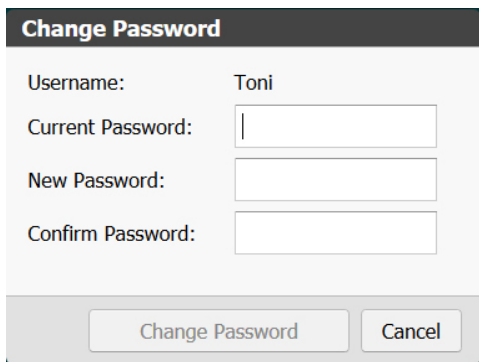
- In Build, you must be logged in as the user whose password you want to change. Choose Security > Change Password.



In View, click the gear icon and select Change Password.



2. Fill in the form with the old and new passwords, then click OK.

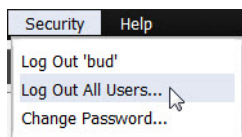


3. Tell the user the new password.

## Logging Out Users

An Admin user can log out all logged-in users in one step. The users will no longer be able to get gadget updates, write values, or change pages.

In Build, choose Security > Log Out All Users.



## Managing Images in the Image Library

All images you use in your *groov* project are stored in the Image Library. You can use the same image in any number of places in your project, and if you change the image, it is updated everywhere it appears.

*groov* accepts many different kinds of images, including photos, drawings, and logos with file types of BMP, GIF, PNG, JPG, and SVG. You can even use an animated GIF. For best performance, use images no larger than 2000 x 2000 pixels at 72 dpi with 8-bit color information, or a total of less than 300 KB in size per image.

You can upload images you make or obtain yourself and any of the drawings in the [SVG Library on the groov.com website](#). If you have Microsoft Visio 2003, you can also make a compatible image using any of our [free Visio libraries](#).

You can use images in a variety of ways:

- Use multiple images in the Image Indicator to show status or value (see page 99).
- Put your logo in the caption bar at the top of the page (see Groov View Styling in “[Changing the General Project Settings](#)” on page 74).
- Orient your users by showing an image of the location or device they’re monitoring.
- Skin a button with an image (see page 91, page 92, and page 93).

- Use an image as a link to another page or Internet location (see page 86).

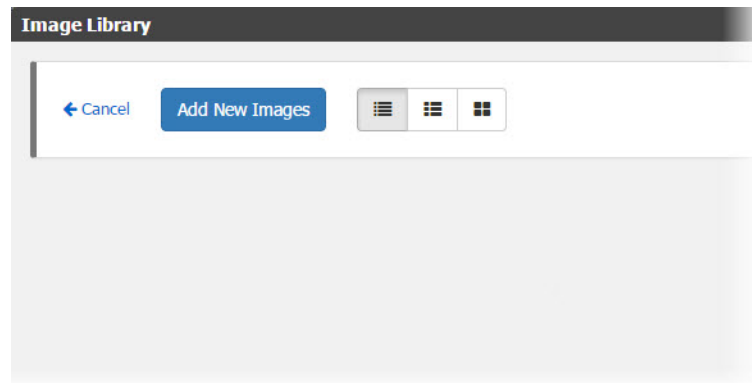
**One caution:** It's easy to overdo the use of images. Make sure you don't clutter your operator interface with unnecessary graphics. Animations are especially distracting for users and should be avoided. Use images that will help your users, not distract them from what's important on the screen.

## Adding Images

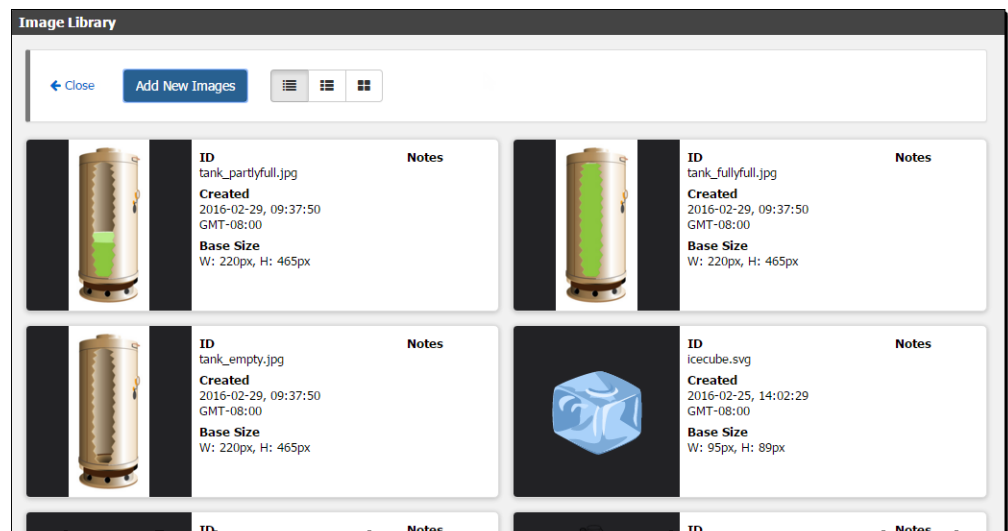
You can add images to the Image Library directly, or you can add them while you're assigning properties to gadgets.

### Adding Images Directly to the Image Library

1. To add images directly to the Image Library, choose Configure > Image Library.



2. Either click Add New Images and browse to the location of the image or images you want, or just drag the image(s) from their current location into the Image Library.



3. (Optional) Click inside the Notes area to add your own notes about the image.

## Adding an Image to a Gadget

1. To add an image while you're setting the gadget's properties, make sure the gadget is highlighted. In the Properties panel (upper right), depending on the gadget, click Add Image or choose Display Mode > Image and click the broken image button.
2. In the Image Library, select the image you want. Or click Add New Images, browse to the image, click Open, and then select it in the Library.

The library closes and you return to the main workspace to choose image properties. See Chapter 4: Gadget Reference for details on each gadget.

## Changing Image View

To see more details about the images in the library, or to view more images in the same space, choose a different view at the top of the library.

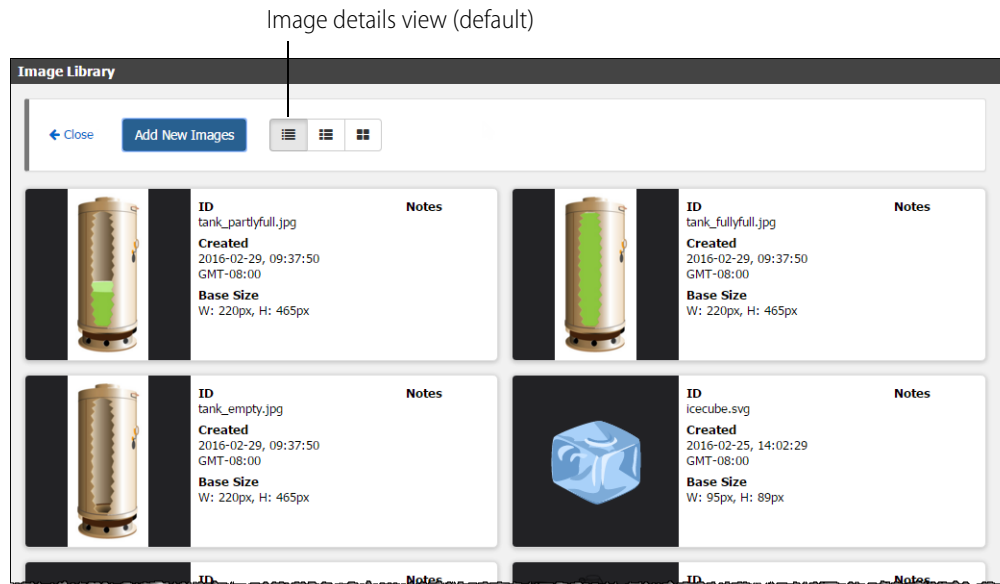


Image basics view

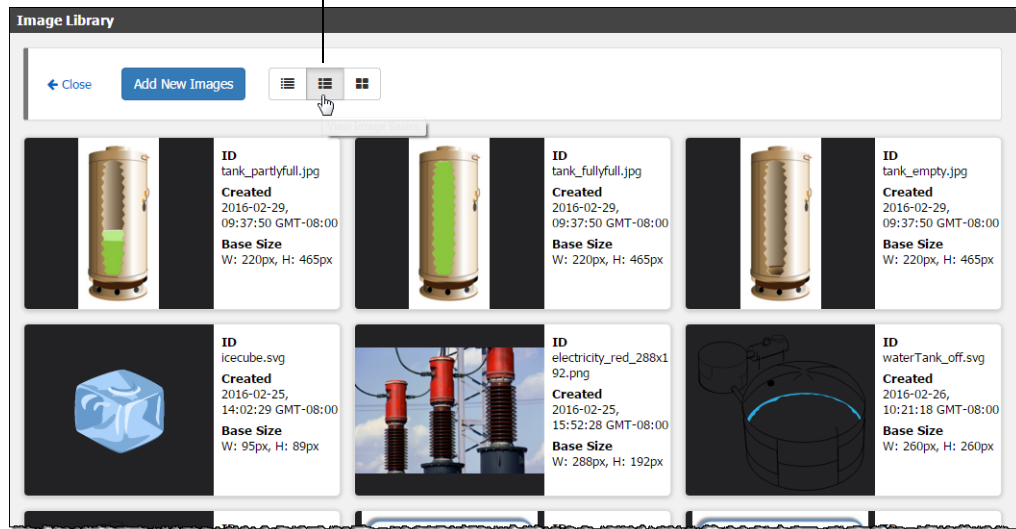
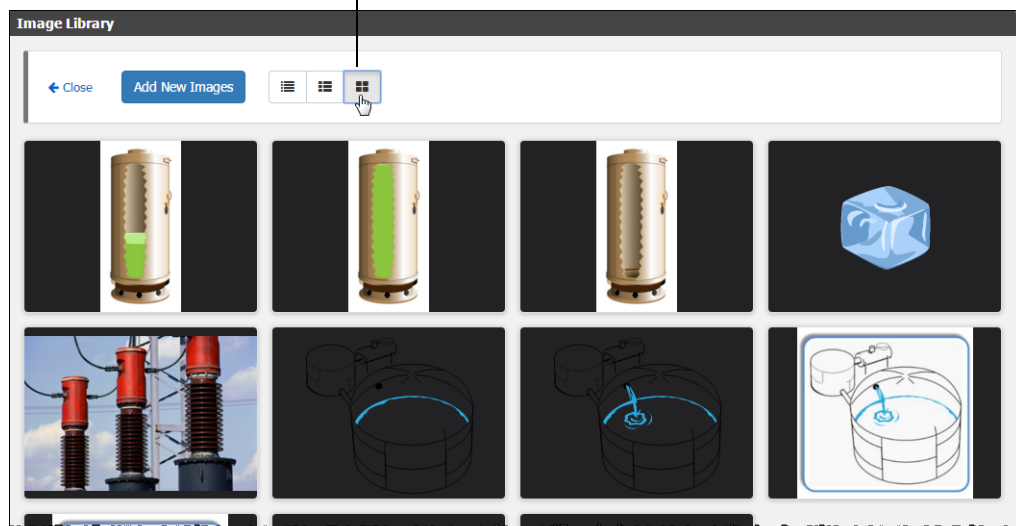


Image thumbnails view



## Changing an Image

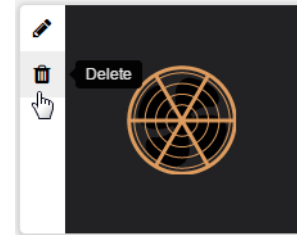
If you change an image, you can upload the new version to replace the older one in the Image Library. You must have already made the change to the image in another software program.

1. Choose Configure > Image Library and locate the image you want to change.
2. Click the pencil icon at the left of the image and browse to the new version of the image. Click Open to replace the image.



## Deleting an Image

1. Choose Configure > Image Library and locate the image you want to delete.
2. Click the trashcan icon at the left of the image.  
The image is deleted.



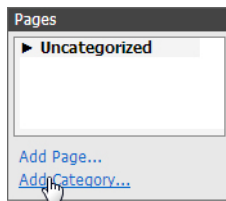
## Adding a Page Category

If you have a large project, you can organize pages in the operator interface by creating categories and assigning pages to them.

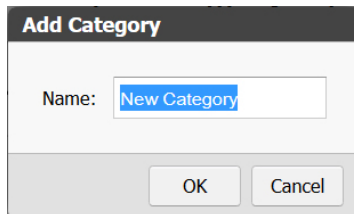
For example, if you have a multi-story building, you could make a category for each floor, and then add pages to it that apply only to that floor. Or categories can represent individual machines, or rooms, or any number of things.

When you create a new category, make sure to add at least one page to the category. Otherwise, the category will be deleted automatically when you save and open View. Also see [“Working with Pages” on page 19](#).

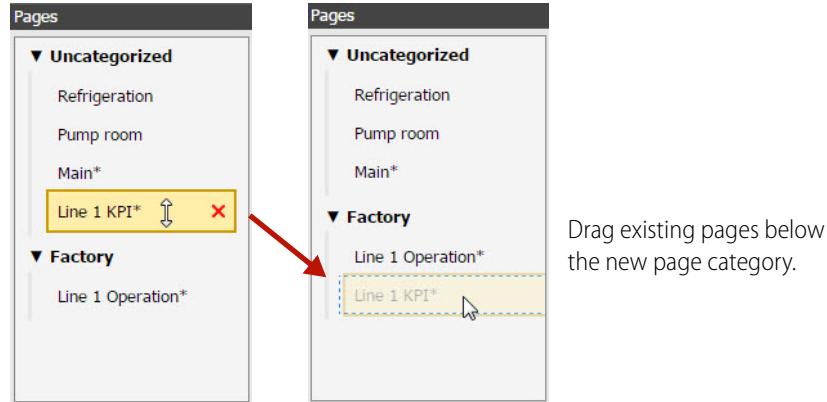
1. In *groov* Build, click Add Category under Pages on the left side.



2. Type a new name for the category.



3. Click OK.
4. To put existing pages in the new category, in the Pages panel, use your mouse to drag and drop them below the new category name.



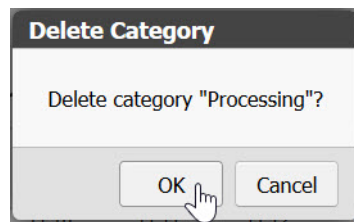
## Deleting a Category

The process for deleting a category is similar to deleting a page. However, you can only delete a category that doesn't have any pages assigned to it. To delete a category with pages, first move or delete the pages.

1. Hover over the page or category name in the Pages panel, then click the red **X** that appears.

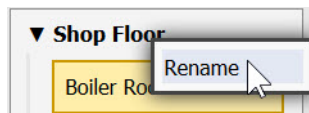


2. Click OK.



## Renaming a Category

1. Right-click the name and select Rename.

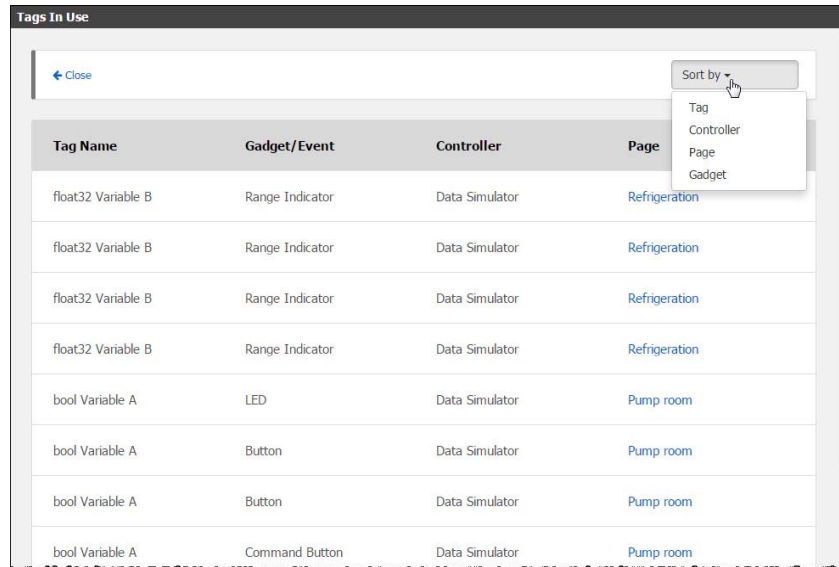


2. Enter a new label, and press Enter or left-click in the work area.



## Viewing the Tags in Use

To see all the tags being used in your project, select View > All Tags. The Tags in Use dialog box shows the tags in use and the gadget or event they are used in, the controller, and the page in your *groov* project.



Tag Name	Gadget/Event	Controller	Page
float32 Variable B	Range Indicator	Data Simulator	Refrigeration
float32 Variable B	Range Indicator	Data Simulator	Refrigeration
float32 Variable B	Range Indicator	Data Simulator	Refrigeration
float32 Variable B	Range Indicator	Data Simulator	Refrigeration
bool Variable A	LED	Data Simulator	Pump room
bool Variable A	Button	Data Simulator	Pump room
bool Variable A	Button	Data Simulator	Pump room
bool Variable A	Command Button	Data Simulator	Pump room

Click “Sort by” in the upper right to sort tags alphanumerically by tag name, controller, page, or gadget.

In the Page column, you can click the page name to go to the page. To return, choose View > All Tags again.

## Viewing Log Messages

*groov* continually logs messages about what it’s doing, including all activity that occurs while you are using *groov*, as well as events and event notifications. Seeing these messages in the Log Viewer can help you troubleshoot issues or track *groov* progress. All messages are logged, but you can choose what you want the Log Viewer to show.

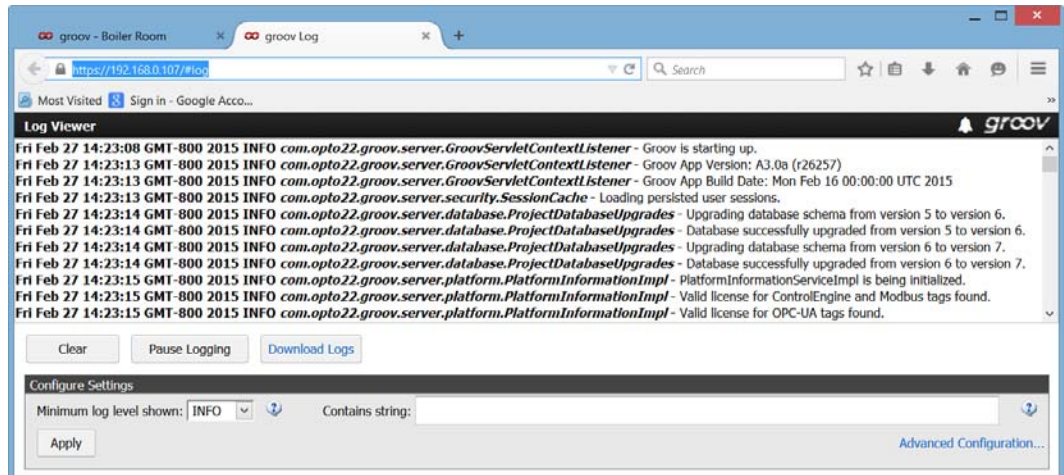
If you want to see the Event Message Logs, see “Viewing Events” on page 111.

Here’s how you use the Log Viewer:

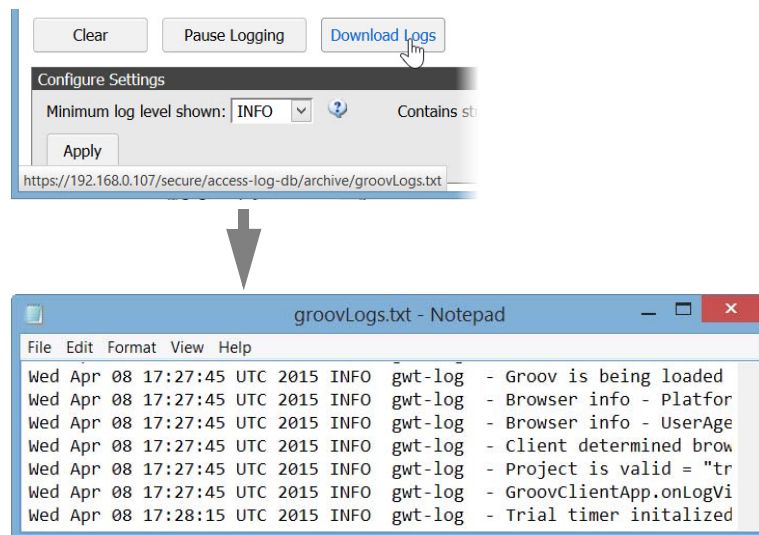
- **To view log messages**, choose Help > View logs.

The Log Viewer opens, showing the most recent 5000 messages. New messages are added to the Viewer as they occur and continue to be added until you close the Viewer. If you reopen it later, it will again show the most recent 5000 messages; older messages you saw before will not appear.

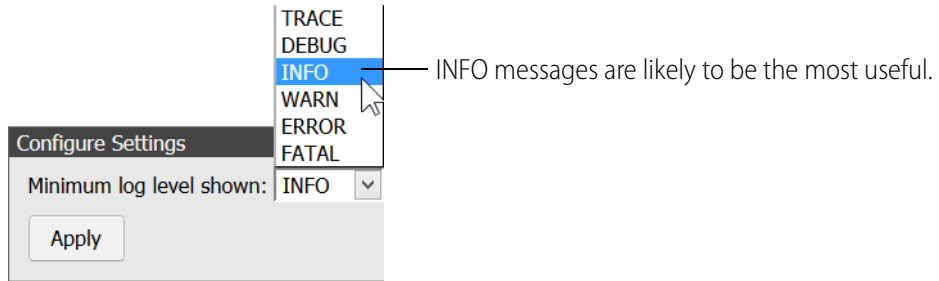




- **To save all messages to a text file**, click Download Logs. You can open the text file in Notepad or save the text file. This saves all of the messages, not just the ones currently in the Viewer. (For Admin/Editors only.)



- **To clear the messages** currently in the window, click Clear. This action does not clear all logged messages; you can retrieve them by clicking Download Logs. (For Admin/Editors only.)
- **To pause or resume** new messages being shown, click Pause or Resume.
- **To filter messages** by priority/log level, choose the level from the Minimum log level dropdown menu and then click Apply. When applied, logs having a priority below the selected level will not be shown. For example, selecting WARN excludes all INFO, DEBUG and TRACE level logs from the display.

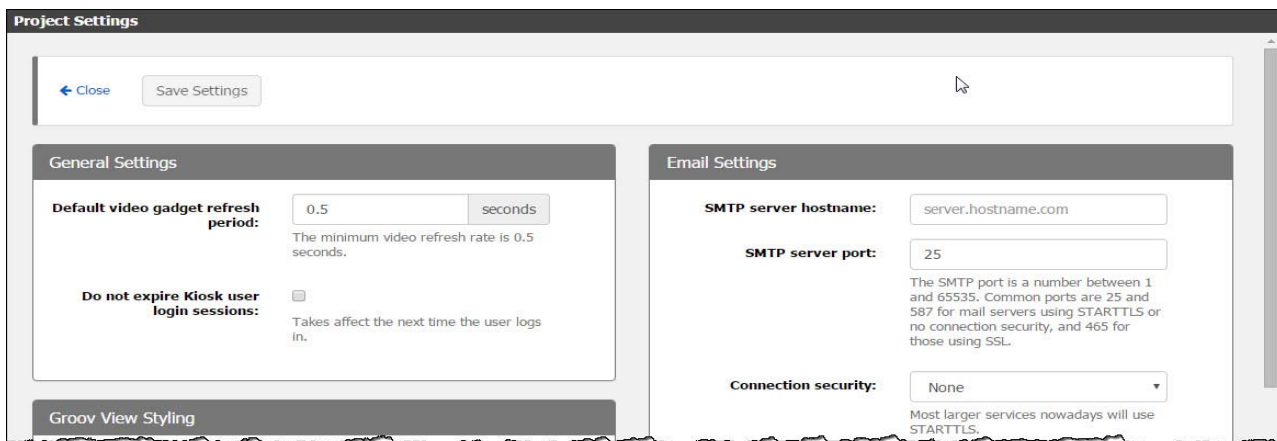


- **TRACE:** Extremely fine-grained information. This level is primarily for diagnosing problems with the help of Opto 22 Product Support.
- **DEBUG:** Fairly fine-grained information. Primarily for diagnosing problems with the help of Opto 22 Product Support.
- **INFO:** Messages about the general progress of the app.
- **WARN:** Information about unusual situations that may indicate a problem in *groov* or that *groov* is improperly configured.
- **ERROR:** Errors within *groov* that typically don't affect how *groov* runs.
- **FATAL:** Problems that cause *groov* to crash.
- **To filter messages using a text string**, enter the string in the Contains string field and click Apply. Only the messages that contain the string in the message body are shown. This filter is applied not just to messages currently in the window, but to all messages.
- **To diagnose problems when working with Opto 22 Product Support**, they may ask you to click the Advanced Configuration link to display a file that provides special features.

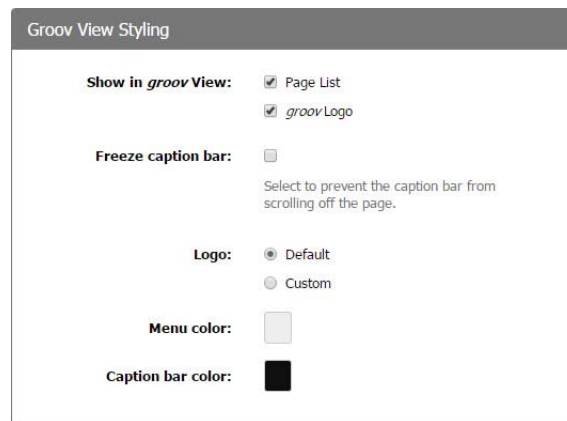
## Changing the General Project Settings

This section describes the General Settings for your project. To set up a *groov* email account, see “Setting Up Notifications” on page 113.

1. Select Configure > Project.



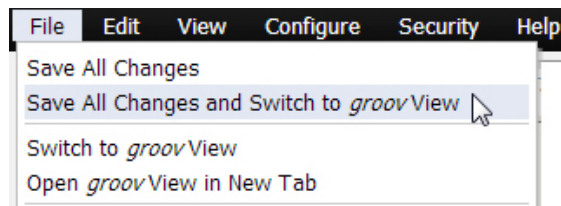
2. In the General Settings box, configure the following options:
  - **Default video gadget refresh period**—Sets how often in seconds *groov* refreshes the image from an IP camera. Use this option to set the default refresh period for video gadgets. The minimum video refresh rate is 0.5 seconds. Every instance of the video gadget will use this refresh period unless a different refresh period is set for an individual instance. To set an individual instance, see “Video Gadget” on page 87. For more information on how to use this setting, see “Changing the Video Gadget Refresh Period” on page 150.
  - **Do not expire Kiosk user login sessions**—Use this setting if you want kiosk users never to be logged out. This is helpful for TVs or other displays not associated with a particular user that need to remain on for long periods of time. Normally, a login lasts two weeks. If you have kiosk users, also see “Automatic Refresh” on page 126.
3. To change the look of your *groov* project (colors, logo, and so on), scroll down to the Groov View Styling box.



4. Configure the following options:
  - **Show in *groov* View**
    - Page List*—If you deselect this option, any user using View can only see the first viewable page. All other pages will not be available to view.
    - groov Logo*—Deselect this option to hide the *groov* logo. You can replace it with your own or have no logo.
  - **Freeze caption bar**
    - Check this box if you want the top bar (with or without a logo) to remain fixed at the top of the page, even when your user scrolls down.
  - **Logo**
    - Default*—Either the *groov* logo or no logo will appear, based on your choice above.
    - Custom*—To show a logo other than *groov*, click Custom and then click Choose Image. In the Image Library, locate or upload the image you want to use. A logo larger than 135 x 35 pixels will be resized smaller.
  - **Menu color and Caption bar color**
    - Click the box to change the default colors to match your brand or taste. Choose colors from the samples shown.
5. Scroll to the top and click Save Settings, and then click Close.

## Saving Your Project and Opening *groov* View

Click the File menu and select one of the following.



**Save All Changes**—Saves your latest changes, but it does not update any open iterations of View.

**Save All Changes and Switch to *groov* View**—Saves your latest changes and opens an updated *groov* View.

**Switch to *groov* View**—Opens *groov* View without incorporating any changes you have made since your last save.

**Open *groov* View in New Tab**—Use this option if you want to have both *groov* Build and View open at the same time in separate tabs.

To back up your *groov* project, see the next section.

## Backing Up and Restoring Your Project

You should back up *groov* frequently because there is no automatic backup. During backup, your project is saved to a file on your computer. *groov* project backups are interchangeable between the *groov* Box and *groov* Server. So you can restore to *groov* Server a project you backed up from a *groov* Box, and vice versa.

If you are using a *groov* Box, you can also back up using *groov* Admin. For more information, see [form 2104](#), the *groov* Box User's Guide for GROOV-AR1 or [form 2077](#), the *groov* Box User's Guide for GROOV-AT1.

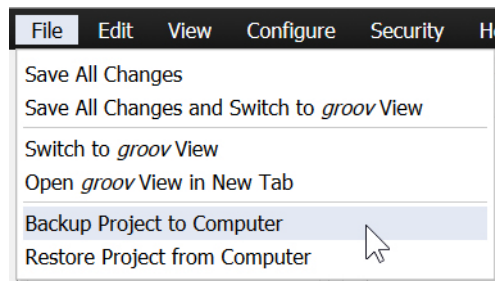
**IMPORTANT:** *Your groov project files are not encrypted or masked in any way. This means that most of the project information in them (except for the groov User passwords) can be read, including the following:*

- SMTP account info (including password)
- User email accounts (does not include the *groov* User passwords, which are securely encrypted before being stored)
- Device addresses
- Tag address information (PAC tag names, Modbus addresses, OPC node-id, etc.)

*Opto 22 recommends that you secure your backup files using file- or disk-based encryption provided either by the operating system or other software/hardware.*

*Also, be aware that if you send project files to Opto 22, our personnel will have access to the information listed above.*

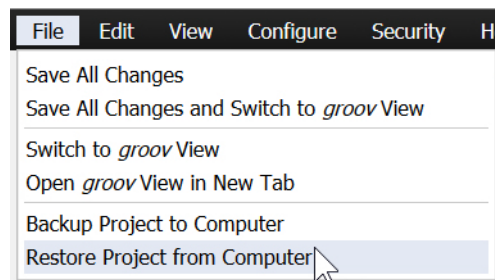
**To back up your project**, select File > Backup Project to Computer. A backup file is saved to the Downloads folder on your computer.



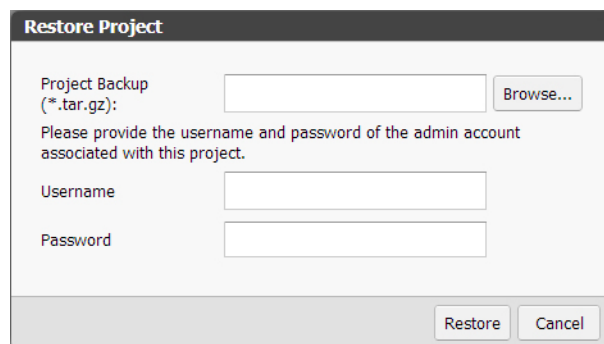
**To restore your project from a backup file:**

**CAUTION:** Only restore your project if you have to. You will lose all work done since the last backup, and all users will be logged out.

1. Select File > Restore Project from Computer.

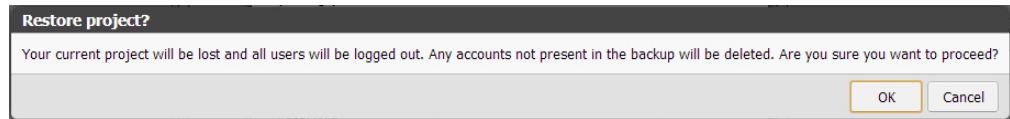


2. In the Restore Project dialog box, browse to your Download folder to locate the tar.gz backup file.



3. Enter the username and password for the Admin account.
4. Click Restore.

The following warning appears.



5. If you are sure you want to proceed, click OK.


When the restoration process is complete, the restored project opens in *groov* View.

## Updating *groov*

You are eligible to receive *groov* updates as long as your license is active. Updates add new capabilities and fix issues that may arise.

Each *groov* installation is treated independently, so you must activate each one; updates are valid for a specific *groov* installation only.

To see your version of *groov*:

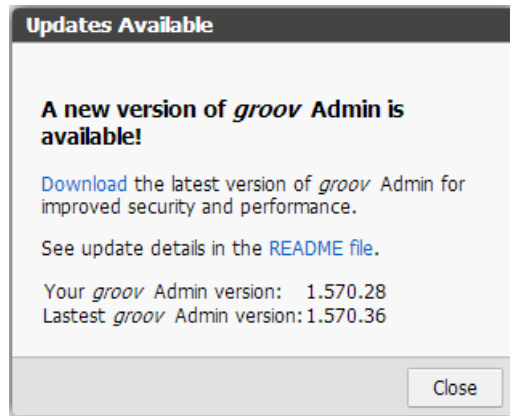
- In *groov* Build, choose Help > About.
- In *groov* View, click the gear icon  and choose About.

## Checking for Updates

If updates are available, an updates icon appears next to the *groov* logo in the upper-right corner of *groov* Build. Click the updates icon (or select Help > Check for Updates).



The Check for Updates dialog box tells you what kind of updates are available. Follow the onscreen instructions to download an update file or view a list of updates on the latest *groov* readme.



Another way to check for updates is to go directly to [manage.groov.com](http://manage.groov.com). If there is an update available for your *groov*, download the file. To install an update file, follow the instructions below for *groov* Server for Windows or *groov* Box.

Before updating the application, make sure to save any changes in your project so that they will still be there after the update takes effect.

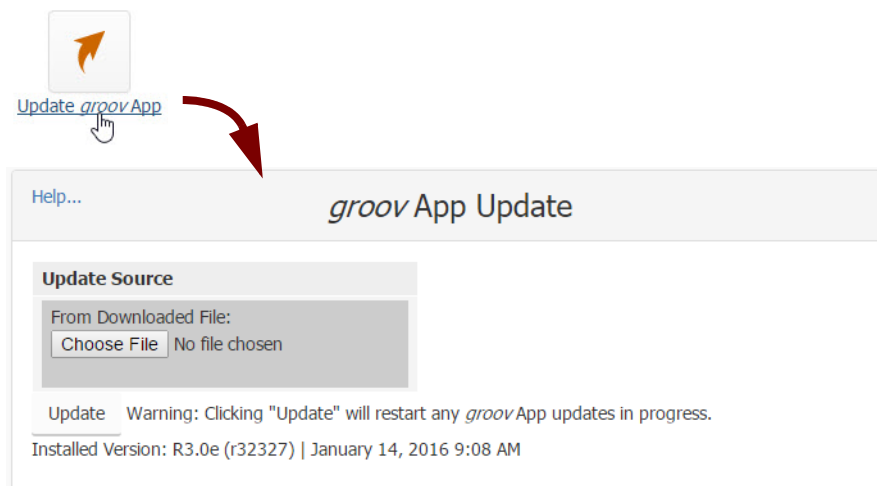
## Installing Updates on *groov* Server for Windows

To install an update for *groov* Server, double-click the downloaded update file and run the installation.

## Installing Updates on a *groov* Box

To install updates on a *groov* Box you must use the *groov* Admin app. For more information about *groov* Admin, see [form 2104](#), the *groov* Box User's Guide for GROOV-AR1 or [form 2077](#), the *groov* Box User's Guide for GROOV-AT1.

1. To open Admin, select Configure > *groov* Admin.
2. Click Quick Start and then the Update *groov* App button.



3. Click Choose File, navigate to the update file you downloaded, and then click Open.
4. Click Update.

Wait while the application is installed and restarted automatically, which may take several minutes. When the operation is complete, a success message appears.

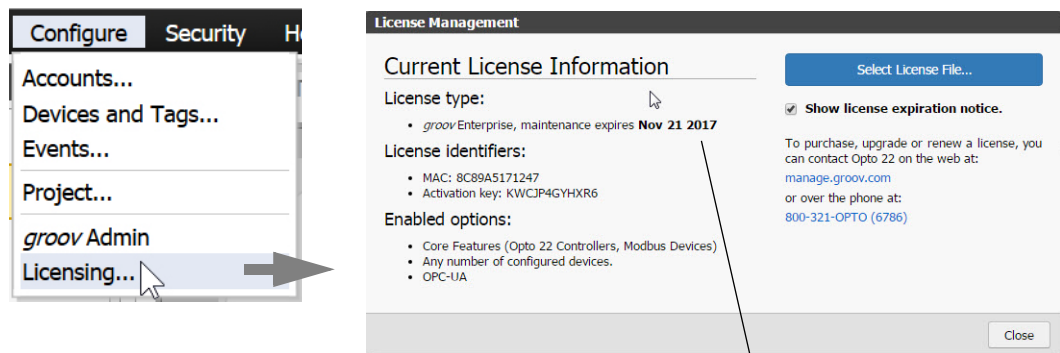


## Updating Your License

In order to use updates for *groov* or the options added in *groov Plus* and *groov Enterprise*, your license must be up to date. You may need to download and install a new license. For more information, see the [groov Maintenance Technical Note](#).

**IMPORTANT:** You must be logged into *groov Build* as an Admin in order to update your license. (If you're using a *groov Box*, make sure you use the Admin username and password for *groov Build*, not for the *Box*.)

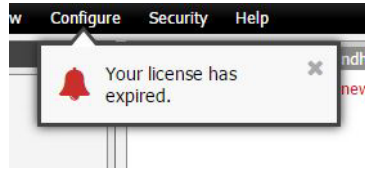
To check the enabled options and expiration date, select Configure > Licensing (this menu item appears only if you are logged into *groov Build* as an Admin user). The expiration date appears under License type.



License agreement expiration date

When your license is about to expire, a small notice appears when you first open *groov Build* to remind you to renew. Once the license has expired, you'll see a similar notice:





Click in the middle of the notice to go to the Licensing dialog box and renew your license. Or if you're not ready to renew, click the small x to dismiss the notice.

**To update your license:**





















1. Click the [manage.groov.com](https://manage.groov.com) link or go to: `manage.groov.com`  
Follow the on-screen instructions to purchase continued maintenance and acquire a new license file.
2. Save the license file to your computer.
3. Come back to the License Management dialog box (Configure > Licensing) and click the Select License File button.
4. Browse to the new license file, highlight it, and then click Open.
5. An Upload Successful message appears in the License Management dialog box.
6. Click Close.



# 4: Gadget Reference

groov Build provides a collection of gadgets that allow you to create a graphical, on-screen operator interface to monitor and manage Opto 22 control applications (or *strategies*) running on Opto 22 SNAP PAC controllers, OptoEMU sensors, and a wide variety of other systems and devices.

This chapter provides details on how to configure gadget properties.

Gadget	Go to
 Group Header	<a href="#">page 84</a>
 Line Header	<a href="#">page 85</a>
 Divider	<a href="#">page 85</a>
 Page Navigator	<a href="#">page 86</a>
 Video	<a href="#">page 87</a>
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 Checkbox	<a href="#">page 90</a>
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 Command Button	<a href="#">page 92</a>
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 Slider	<a href="#">page 94</a>
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 Round Gauge	<a href="#">page 100</a>
 Range Indicator	<a href="#">page 100</a>
 Trend	<a href="#">page 101</a>

## Group Header Gadget

Use the Group Header gadget to visually define a group of objects. Group related gadgets in the same area and place a Group Header as a box behind them. The box ties them together visually so operators know at a glance that they are related.

*TIP: If you need to move a Group Header (or any other gadget) behind another gadget, right click it and choose Send to Back.*

Group Header gadget

Other gadgets placed on top

Enter a title for the group.

Align title at the left, center, or right. Default is left.

Choose title text size. Default is 12.

Choose title font. Default is Arial.

Make title bold, italics, or both. Default is bold.

Change title text color (click the rectangle and choose).

*NOTE: For any property with a link button, you can click to break the link and choose the property value independently for Desktop & Tablet versus Handheld layouts. See "Properties and Layouts" on page 53.*

**Group Header Gadget Properties**

**Label**  
Header

**Alignment**  
Left, Center, Right

**Text size**  
12

**Font**  
Arial

**Text Styling**  
B I

**Text color**  
[Color Selector]

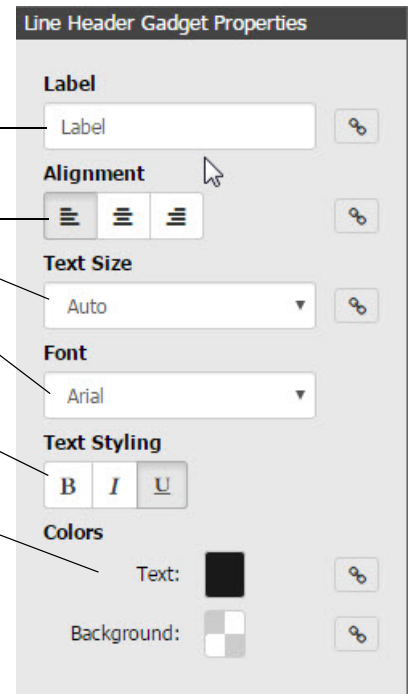
## Line Header Gadget

Use the Line Header gadget to provide a label or title for organizing gadgets on a page.

### Compressors

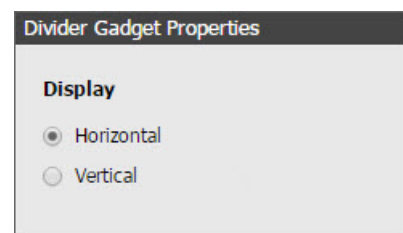
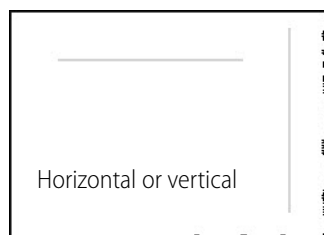
- Enter title text.
- Align title at the left, center, or right. Default is left.
- Leave title text size at Auto or choose size in pixels.
- Choose title font. Default is Arial.
- Make title bold, italics, or underlined. Default is underlined, and the underline extends past the title to the full width of the gadget.
- Change title text color and background color (click the rectangle and choose).

*NOTE: For any property with a link button, you can click to break the link and choose the property value independently for Desktop & Tablet versus Handheld layouts. See “Properties and Layouts” on page 53.*



## Divider Gadget

The Divider gadget provides a simple gray horizontal or vertical line to separate groups of objects. You can make the divider longer or shorter by selecting the object and dragging its handles.

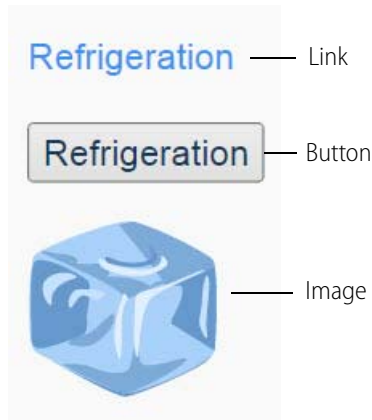


## Page Navigator Gadget

Use the Page Navigator gadget to link to another page in the project, to groov Event Status or Event Logs, or to a web page. The gadget can be displayed as a text link, a button, or an image.

- To link to a page in your groov project, select the page from the list or search on the page name (or partial name).
- To link to Event Status or Event Logs, just choose it in the Link To dropdown list.
- To link to a web page, choose Web Page in the Link To dropdown list, and enter a full URL (for example, <http://opto22.com>).

Page navigator gadget Display Modes



Choose where the link goes.

Choose whether to show the link as text, a Button, or an Image.

For a link or a button:

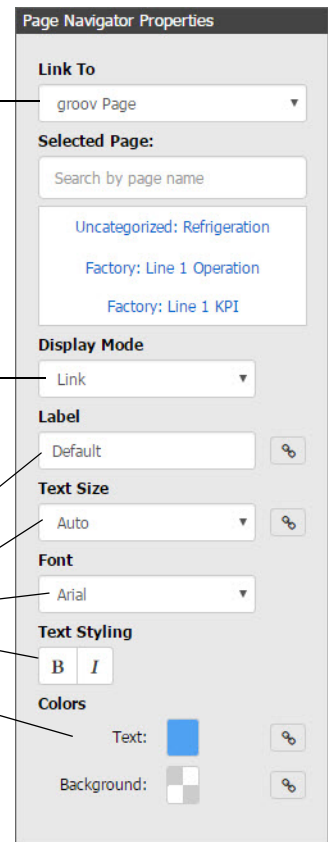
Enter the text for the link.

Leave link text at Auto or enter size in pixels.

Choose title font. Default is Arial.

Make title bold, italics, or both. Default is neither.

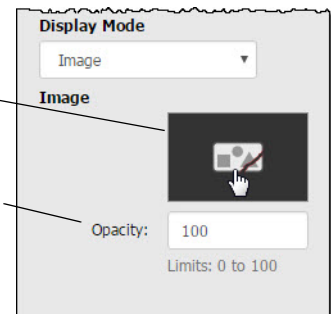
Change title text or background color (click the rectangle and choose).



For an image:

Click the broken image button and choose an image from the Image Library (see [page 66](#)).

To change how transparent an image is, enter a value between 0 and 100. Zero is completely transparent (invisible); 100 is completely opaque.



*NOTE: For any property with a link button, you can click to break the link and choose the property value independently for Desktop & Tablet versus Handheld layouts. See ["Properties and Layouts"](#) on [page 53](#).*

## Video Gadget

The Video gadget displays iFrame type video images from an IP camera; it does not interact with controller points/variables.

For information on entering a URL and setting up IP cameras, see the appendix on page 147 and your IP camera or server documentation.



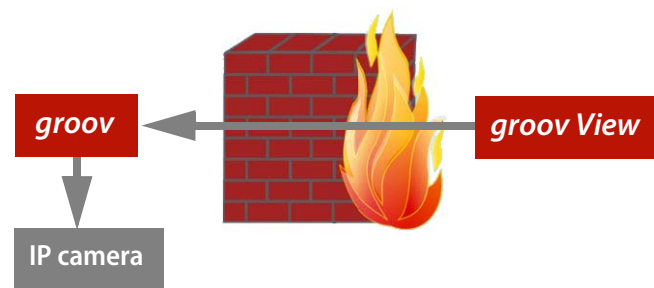
**Camera URL**—Enter the URL of an IP camera or video server that provides access to your IP camera’s static image feed. If you are using a video server, use the server’s URL. For more information on entering a URL, see the appendix on page 147.

**Update Period**—Set how often in seconds *groov* updates the image from an IP camera for this individual video gadget. To set the default update period for all video gadgets, see [“Changing the General Project Settings” on page 74](#). For more information about this setting, see [“Changing the Video Gadget Refresh Period” on page 150](#).

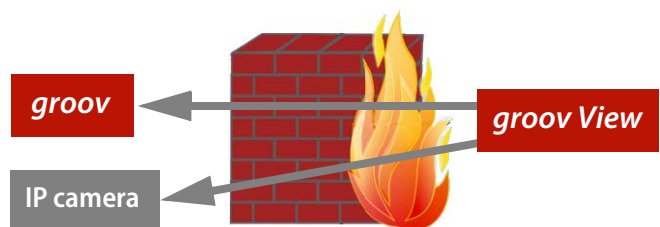
**Use groov as a proxy**—This feature provides a secure reverse proxy service for the video gadget. This service is useful when viewing from outside a firewall.

When the box is checked, the video gadget requests video from *groov*, which authenticates and forwards the request to the IP camera, eliminating the need to configure the firewall for each IP camera.

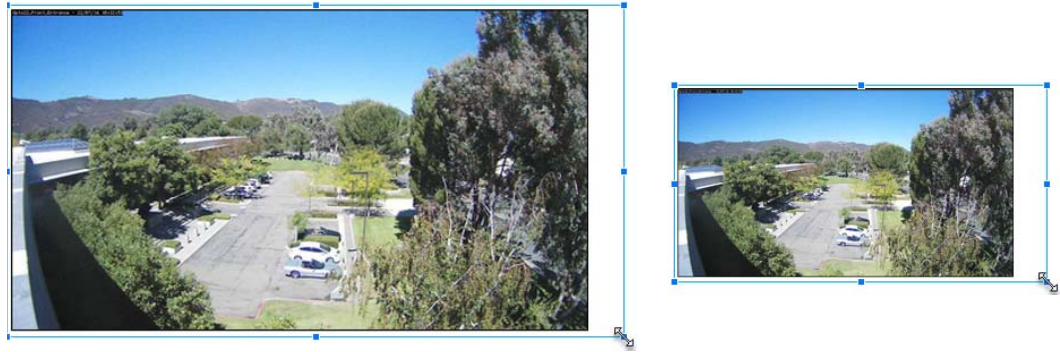
In this case, *groov* will poll the IP camera over the local network at the set update period (in seconds) and buffer the images. When you view your *groov* project, you will see the images over the same secure connection as the rest of your *groov* project.



When the box is *not* checked, the video gadget requests video directly from the IP camera. You must configure the firewall to allow the video feed for each IP camera.



**Maintain aspect ratio**—Check the box to keep the video at the same height-to-width ratio when the video gadget is resized.



**Test Feed**—Click the button to test the live IP camera feed in Build.

## Image Gadget

Use the Image gadget to place an image in your project. See more about using images in [“Managing Images in the Image Library” on page 66](#).

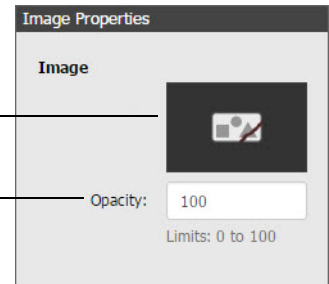


Image gadgets



Click here to open the Image Library.

To change how transparent an image is, enter a value between 0 and 100. Zero is completely transparent (invisible); 100 is completely opaque.

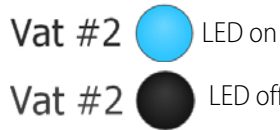




# LED Gadget

An LED is a read-only gadget that typically indicates the state of a numeric value. It can be used with boolean tags (on/off, true/false), with numeric values with multiple colors to indicate an exact value or a range, or with string values with multiple colors to indicate an exact match. For boolean tags, the LED is off when the value is 0 and on when the value is non-zero.

On and Off states for a blue LED



LEDs with multiple colors



Enter a label for the LED.

Align label on the left or right side of the LED. Default is left.

Leave label text at Auto or enter size in pixels.

Choose label font. Default is Arial.

Make label text bold, italics, or both. Default is neither.

Change label text or background color (click the rectangle and choose).

Leave graphic size at Auto or choose size in page grid units.

*For a boolean tag:*  
Click the colored circle and choose colors to indicate LED is on (True) or off (False).

*For a non-boolean tag:*  
Click the Add Range button to set colors for each range.

Choose the range color.

Choose when the color should appear:  
Exact: Color appears for the specified value.

Range: Color appears for any value within a range.

Negate: If checked, color appears if value is *outside* the specified value or range.

Enter a specific value for Exact, or the start and end values for Range.

Click to close editor for this range. To add another, click Add Range.

*NOTE: For any property with a link button, you can click to break the link and choose the property value independently for Desktop & Tablet versus Handheld layouts. See "Properties and Layouts" on page 53.*

## Checkbox Gadget

The Checkbox gadget is a read/write binary input which your user can toggle on or off by selecting the box. Off = zero, On = non-zero.

Outside Light  Checkbox gadgets

Inside Light

Click to require confirmation before a write.  Confirm writes

Enter a label for the Checkbox. Default

Align label on the left or right side of the LED. Default is left.

Leave label text at Auto or enter size in pixels.

Choose label font. Default is Arial.

Make label text bold, italics, or both. Default is neither.

Change label text or background color (click the rectangle and choose).

Leave gadget size at Auto or choose size in page grid units.

**Checkbox**

Tag: bool Variable B

Confirm writes:

Label: Default

Alignment: |← |→

Text Size: Auto

Font: Arial

Text Styling: **B** *I*

Colors: Text: [black swatch] Background: [white swatch]

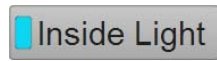
Graphic Size:  Auto 4 units

*NOTE: For any property with a link button, you can click to break the link and choose the property value independently for Desktop & Tablet versus Handheld layouts. See "Properties and Layouts" on page 53.*

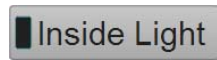
# Indicator Button Gadget

The Indicator Button gadget is a read/write binary button which your user can toggle on or off by clicking it. Off = zero, On = non-zero. This gadget can be displayed as a button (with an integral color to show status) or as two images (one for On and one for Off). See more about using images in ["Managing Images in the Image Library"](#) on page 66.

## Button display—configurable color



Button on



Button off

Click to require confirmation before a write.

Choose whether to display a button or images.

For a button, enter a label for the Checkbox.

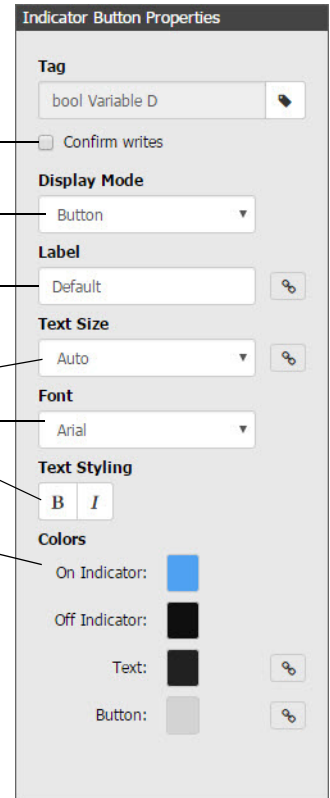
For a button:

Leave label text at Auto or enter size in pixels.

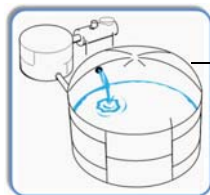
Choose label font. Default is Arial.

Make label text bold, italics, or both. Default is neither.

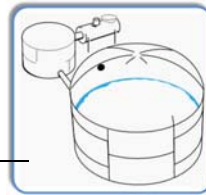
Change colors for On/Off indicator, button text, and button background (click the rectangle and choose).



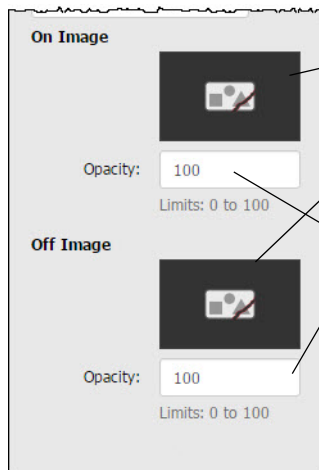
## Image display



Button on



Button off



For an image:

Click here to open the Image Library and choose an image to show when the button is On.

Choose a second image for when the button is Off.

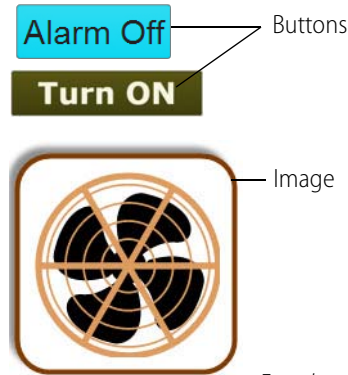
Opacity: To change how transparent an image is, enter a value between 0 and 100. Zero is completely transparent (invisible); 100 is completely opaque.

*NOTE: For any property with a link button, you can click to break the link and choose the property value independently for Desktop & Tablet versus Handheld layouts. See ["Properties and Layouts"](#) on page 53.*

# Command Button Gadget

The Command Button gadget sends a value to a numeric or string variable. The value is sent once when the button is pressed. This gadget can be displayed as a button or as an image. See more about using images in [“Managing Images in the Image Library” on page 66](#).

Command button gadgets—Display Modes

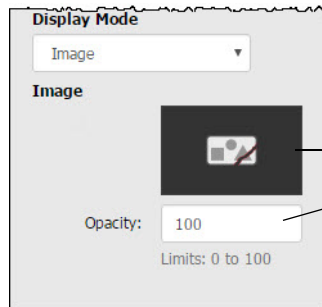
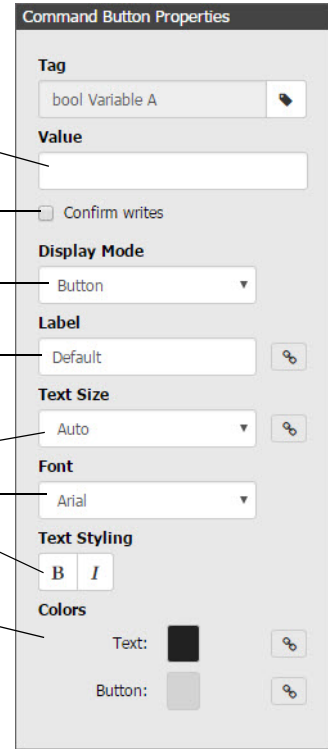


Buttons

Enter the value to write.  
Click to require confirmation before a write.  
Choose whether to display a button or an image.  
For a button, enter a label for the button.

Image

For a button:  
Leave label text at Auto or enter size in pixels.  
Choose label font. Default is Arial.  
Make label text bold, italics, or both. Default is neither.  
Change colors for On/Off indicator, button text, and button background (click the rectangle and choose).



For an image:  
Click here to open the Image Library.  
To change how transparent an image is, enter a value between 0 and 100. Zero is completely transparent (invisible); 100 is completely opaque.

*NOTE: For any property with a link button, you can click to break the link and choose the property value independently for Desktop & Tablet versus Handheld layouts. See [“Properties and Layouts” on page 53](#).*

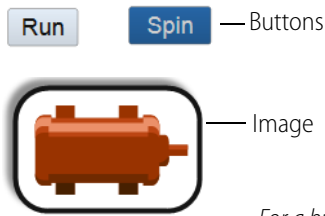
# Momentary Button Gadget

The Momentary Button gadget simulates a normally open button. It writes a value once when it is pressed, and another value once when released. This gadget might be used to drive a motor to raise and lower a crane, or to start and stop a drill. You can choose to display the button as a button or as an image. See more about using images in [“Managing Images in the Image Library” on page 66](#).

For a boolean tag, select either True or False for the Press Value.

For integers and floats, enter both a Press Value and a Release Value. Optionally, you can also enter a Toggle Value. When a Toggle Value is entered, while the button is pressed it will alternately write the Press value and the Toggle Value once per second. The Press value is always written first. When the button is released, the Release Value is written.

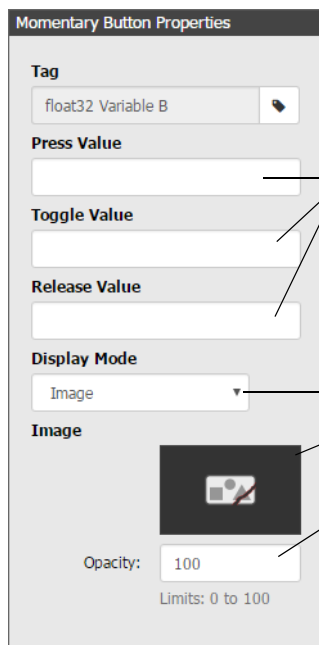
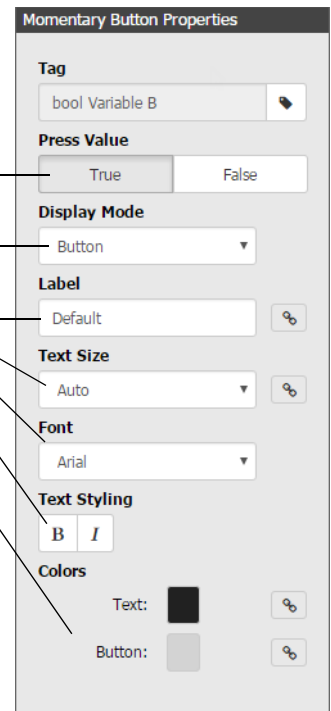
Momentary button gadget—Display Modes



For a boolean tag, select either True or False.

Choose whether to display a button or an image.

For a button:  
 Enter a label for the button.  
 Leave label text at Auto or enter size in pixels.  
 Choose label font. Default is Arial.  
 Make label text bold, italics, or both. Default is neither.  
 Change colors for button text and background (click the rectangle and choose).



For an integer or float, select a Press Value and a Release Value, and optionally a Toggle Value. A Toggle Value can help you detect a communication failure. Use controller logic to detect the failure while the button is pressed, and to implement a failsafe if needed.

Choose whether to display a button or an image.

For an image, click here to open the Image Library.

To change how transparent an image is, enter a value between 0 and 100. Zero is completely transparent (invisible); 100 is completely opaque.

*NOTE: For any property with a link button, you can click to break the link and choose the property value independently for Desktop & Tablet versus Handheld layouts. See [“Properties and Layouts” on page 53](#).*

# Slider Gadget

The Slider gadget is a read/write gauge that displays an analog or float-type value using a horizontal or vertical bar that fills to indicate the present position or value. This gadget is the same as the level indicator gadget except that a user can grab and move the slider button to change the value and write it to the controller. You might use this gadget for room temperature setpoints, alarm values, PID settings, and so on.

Check the box to continually write values as the slider is dragged. If unchecked, value is written once you let go.

Check to require confirmation before a new value is written.

Enter the slider's minimum and maximum values.

Choose a horizontal or vertical slider.

Choose to show the value as a value or a percent, or choose not to show the value.

Enter Engineering units for the value (gallons, amps, etc.).

Enter the number of places to the right of the decimal point to be displayed.

Enter a title (label) for the slider.

Leave text at Auto or enter size in pixels (controls both label and value text, if shown).

*For the label:*  
 Choose font. Default is Arial.  
 Make text bold, italics, or both. Default is neither.  
 Change color (click the rectangle and choose).

*For the value (if shown):*  
 Choose font. Default is Arial.  
 Make text bold, italics, or both. Default is neither.  
 Change color (click the rectangle and choose).

Change the slider's indicator color or background.

Leave gadget size at Auto or choose size in page grid units.

**Slider Gadget Properties**

**Tag**  
 float32 Variable B

Write continuously  
 Confirm writes

**Range**  
 Min value: 0  
 Max value: 10

**Orientation**  
 Horizontal

**Show Value As**  
 Value

**Units**

**Precision**  
 2  
 Limits: 0 to 6

**Label**  
 Default

**Text Size**  
 Auto

**Label Style**  
 Font: Arial  
 Styling: B I  
 Color: [Color Picker]

**Value Style**  
 Font: Arial  
 Styling: B I  
 Color: [Color Picker]

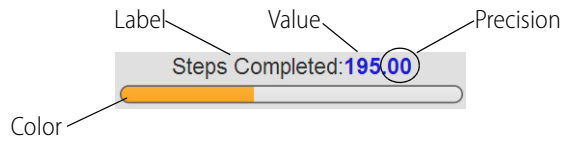
**Colors**  
 Track Fill: [Color Picker]  
 Background: [Color Picker]

**Graphic Size**  
 Auto  
 6 units

*NOTE: For any property with a link button, you can click to break the link and choose the property value independently for Desktop & Tablet versus Handheld layouts. See "Properties and Layouts" on page 53.*

## Level Indicator Gadget

The Level Indicator gadget is a read-only gauge that displays an analog or float-type value using a horizontal or vertical bar that fills to indicate the present position or value. You might use this gadget for a fuel gauge or a noise-level indicator, for example.



Enter the slider's minimum and maximum values.

Choose a horizontal or vertical slider.

Choose to show the value as a value or a percent, or choose not to show the value.

Enter Engineering units for the value (gallons, amps, etc.).

Enter the number of places to the right of the decimal point to be displayed.

Enter a title (label) for the slider.

Leave text at Auto or enter size in pixels (controls both label and value text, if shown).

*For the label:*

Choose font. Default is Arial.

Make text bold, italics, or both. Default is neither.

Change color (click the rectangle and choose).

*For the value (if shown):*

Choose font. Default is Arial.

Make text bold, italics, or both. Default is neither.

Change color (click the rectangle and choose).

Change the slider's indicator color or background.

Leave gadget size at Auto or choose size in page grid units.

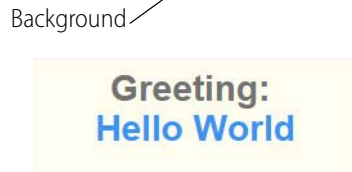
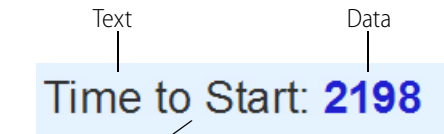
**NOTE:** For any property with a link button, you can click to break the link and choose the property value independently for Desktop & Tablet versus Handheld layouts. See ["Properties and Layouts"](#) on page 53.

The screenshot shows the 'Level Indicator Gadget Properties' panel with various settings:

- Tag:** int32 Variable A
- Range:** Min value: 0, Max value: 10
- Orientation:** Horizontal
- Show Value As:** Value
- Units:** (empty field)
- Precision:** 2
- Limits:** 0 to 6
- Label:** Default
- Text Size:** Auto
- Label Style:** Font: Arial, Styling: B I, Color: (black)
- Value Style:** Font: Arial, Styling: B I, Color: (blue)
- Colors:** Track Fill: (blue), Background: (grey)
- Graphic Size:**  Auto, 6 units

## Text Area Gadget

The Text Area gadget is a read-only gadget for displaying numerical or string data. Enter text just as you want it to appear, and use enough pound signs (#) to accommodate numeric data to be displayed. For example, ##.# could display 35.0, and ###.## could display 350.86. For string data, just use one #.



Enter text and enough pound signs (#) to display the tag's value.

Align text at the left, center, or right within the gadget. Default is left.

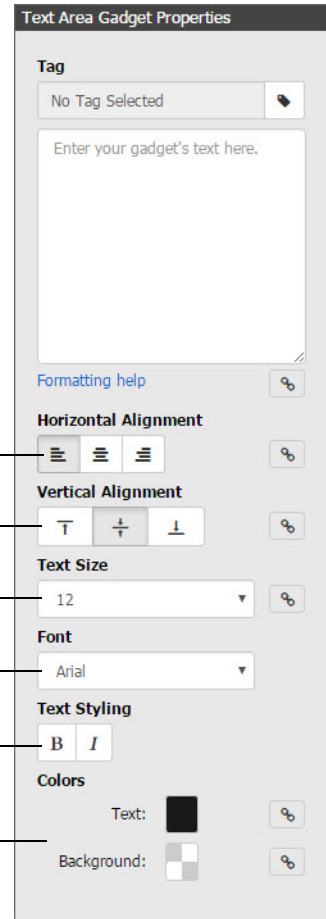
Align text at top, middle, or bottom within the gadget. Default is middle.

Choose text text size. Default is 12.

Choose text font. Default is Arial.

Make text bold, italics, or both. Default is neither.

Change text or gadget background color (click the rectangle and choose).



*NOTE: For any property with a link button, you can click to break the link and choose the property value independently for Desktop & Tablet versus Handheld layouts. See "Properties and Layouts" on page 53.*



## Text Box Gadget

The Text Box gadget is a write-only field that your user can change to send numerical or string data. When the user clicks in the Text Box, a dialog box pops up for entering data. Data is sent when the OK button is clicked or tapped.

Label—Duration: 95  
Value

Greeting: Hello World

For numerical data, enter the minimum and maximum values your user can enter.

Enter pre and post prompts for the Edit Value dialog box. The pre-prompt appears above the value they enter. The post-prompt appears below it, for example to indicate units.

Pre-prompt

String to write:  
Hello World

OK Cancel

Select a text box size for user input. If you choose Unlimited, you cannot enter a label.

Enter a label (title) for the Text Box.

Enter a title (label) for the slider.

Leave text at Auto or enter size in pixels (controls both label and value text).

*For the label:*  
Choose font. Default is Arial.  
Make text bold, italics, or both. Default is neither.  
Change color (click the rectangle and choose).

*For the value (if shown):*  
Choose font. Default is Arial.  
Make text bold, italics, or both. Default is neither.  
Change color (click the rectangle and choose).

Change gadget background color.

**Text Box Gadgets**

**Tag**  
int32 Variable B

**Range**  
Min value: 0  
Max value: 100

**Pre-prompt**  
[ ]

**Post-prompt**  
[ ]

**Format**  
#.##

**Input Size**  
Medium

**Label**  
Default

**Alignment**  
|← -|

**Text Size**  
Auto

**Label Style**  
Font: Arial  
Styling: B I  
Color: [ ]

**Value Style**  
Font: Arial  
Styling: B I  
Color: [ ]

**Background Color**  
[ ]

*NOTE: For any property with a link button, you can click to break the link and choose the property value independently for Desktop & Tablet versus Handheld layouts. See "Properties and Layouts" on page 53.*

# Value Gadget

The Value gadget is a read-only gadget for displaying numerical or string data. It has a uniform width to make it easy to line up multiple gadgets. The text format changes depending on the tag type, so you don't have to configure it manually. For example, a float-type tag will have ###, while an integer tag will have just #.

If you use a boolean tag, you can use the default ON and OFF text for true and false values, or enter your own labels, such as Running and Stopped. In the Label text box, enter text just as you want it to appear. The data will be blue, but the label text will be black.

Level: 5.12  
 Label      Data

Fan status: OFF  
 Label      Data

Value Gadget Properties

**Tag**  
 Ramp B (0 to 10, 60 sec)

**Format**  
 #.##  
[Formatting help](#)

**Field Width**  
 Medium

**Label**  
 Default

**Alignment**  
 | - | - |

**Text Size**  
 Auto

**Label Style**  
 Font: Arial  
 Styling: B I  
 Color: [Black]

**Value Style**  
 Font: Arial  
 Styling: B I  
 Color: [Blue]

**Background Color**  
 [White]

Format is entered for you based on the tag you choose. To add precision on a float, enter additional pound signs (#) after the decimal point.  
 For a string, use the default of #.##  
 For boolean tags, you can customize the true and false text.

Enter a label for the value.  
 Align label at left or right of value.  
 Leave text at Auto or enter size in pixels (controls both label and value text).

*For the label:*  
 Choose font. Default is Arial.  
 Make text bold, italics, or both. Default is neither.  
 Change color (click the rectangle and choose).

*For the value:*  
 Choose font. Default is Arial.  
 Make text bold, italics, or both. Default is neither.  
 Change color (click the rectangle and choose).

Change gadget background color.

*NOTE: For any property with a link button, you can click to break the link and choose the property value independently for Desktop & Tablet versus Handheld layouts. See "Properties and Layouts" on page 53.*

## Image Indicator Gadget

With the read-only Image Indicator gadget, you can use multiple images to represent the changing values of a tag. For example, you can use one image to indicate that a pump is on and one to indicate that it's off. Or show different images of a tank depending on how full the tank is.

The Image Indicator can be used with boolean tags (on/off, true/false), with numeric values with multiple images to indicate an exact value or a range, or with string values with multiple images to indicate an exact match.

You choose each image you want to use from the Image Library and assign the status or value range to that image. (See "Managing Images in the Image Library" on page 66.)

Image Indicator gadget changes the image based on the value of the tag (only one image appears).

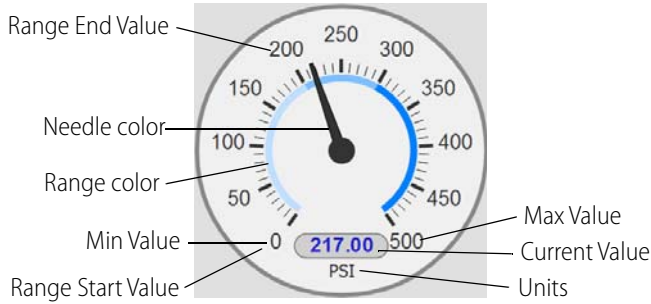


The screenshot shows the 'Image Indicator Properties' dialog box. It has a 'Tag' field set to 'float32 Variable C'. Below it is an 'Images' section with an 'Add Image...' button. A blue box represents an image currently added, showing a tank icon and the text 'Tag == 0.0'. Below this box is a 'Select Image' button. To the right of the 'Select Image' button are 'Opacity' controls: a text box with '100' and 'Limits: 0 to 100'. Below the opacity controls are 'Match Type' options: 'Exact' (selected), 'Range', and 'Negate'. Below 'Match Type' is a 'Value' text box with '0'. At the bottom are 'Close Editor' and 'Delete' buttons. Annotations with lines point to these various elements.

- Click to add image.
- Image currently added
- Click to change this image.
- To change how transparent the image is, enter a value between 0 and 100. Zero is completely transparent (invisible); 100 is completely opaque.
- Choose when the image should appear:
  - Exact: Image appears for specific value.
  - Range: Image appears for any value within a range.
  - Negate: If checked, image appears if the value is *outside* the specified value or range.
- Enter exact value; or for a range, enter Minimum and Maximum Values.
- Click to close editor for this image.
- Click Add image again to add the next image.

# Round Gauge Gadget

The Round Gauge gadget is a read-only gauge that displays an analog or float-type value using a rotating needle and decimal numerical display to indicate the present value. Possible uses include water or gas pressure gauges, the speed of a conveyer belt, and so on.



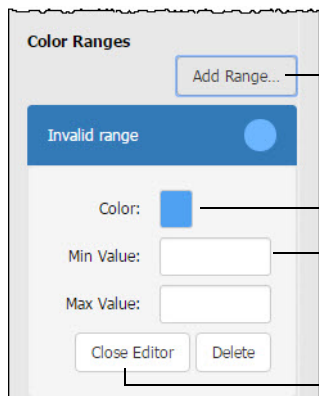
*NOTE: For any property with a link button, you can click to break the link and choose the property value independently for Desktop & Tablet versus Handheld layouts. See "Properties and Layouts" on page 53.*

### More on Markers

For both major and minor intervals, if you use the default (0), groov calculates the optimum number and spacing of tic marks to show on the gauge.

If the Custom intervals you enter create more than 200 tic marks (major and minor combined), groov overrides your entries and sets the number and spacing so markers and values are legible. (Your Custom entries still appear in the Properties panel but are not used.)

Panel continued from right.



Click here to add a color as a range indicator on the gauge.

Choose the range color.

Enter the start and end values for this range. These must be not more or less than the gauge's Min and Max values.

Click to close editor for this range. To add another, click Add Range.

Enter the gauge's minimum and maximum values.

If the value is very large (for example, 50,000 kilograms), you can scale the value so numbers are more readable.

Check to display the value in the gadget.

Enter Engineering units (gallons, PSI, etc.).

Enter the number of places to the right of the decimal point to be displayed.

*For the current value:*

Leave at Auto or choose size.

Choose font. Default is Arial.

Make text bold, italics, or both. Default is bold.

Change color (click the rectangle and choose).

*For the markers around the gauge:*

Leave at Auto or choose size.

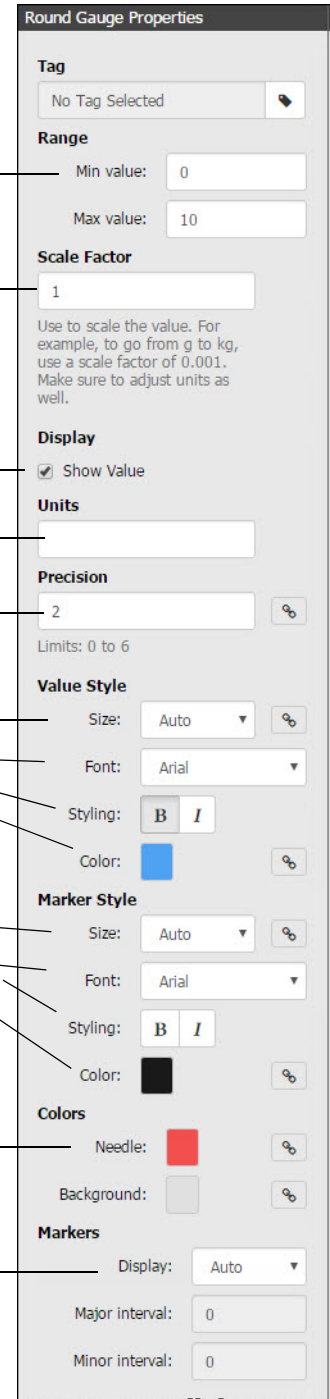
Choose font. Default is Arial.

Make text bold, italics, or both. Default is neither.

Change color (click the rectangle and choose).

Choose colors for the needle and the gauge's background.

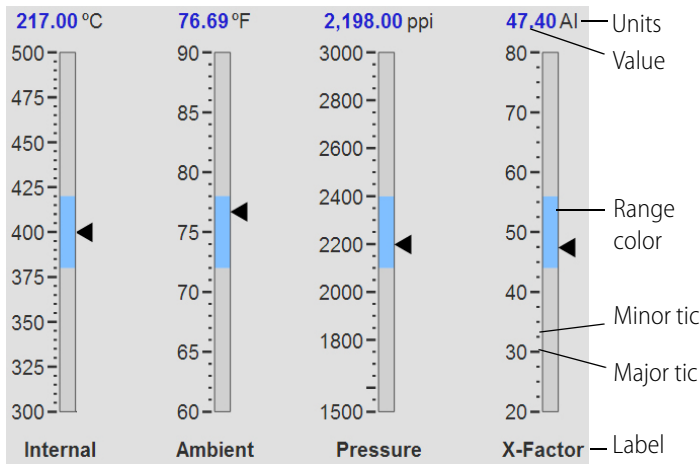
Choose Custom to override the default tic marks. See descriptions above left.



Panel continues at left.

# Range Indicator Gadget

Use the Range Indicator gadget to show on a horizontal or vertical scale where data appears in a range of numbers. This gadget is commonly used as a thermometer, but it can indicate any kind of data within a range. If you arrange several of these together on a page, an operator can tell at a glance if a machine is operating correctly or see the status of several similar devices.



Enter the gauge's minimum and maximum values.

If the value is very large (for example, 50,000 kilograms), you can scale the value so numbers are more readable.

Select a horizontal or vertical gauge.

Choose to show the value as a value, a percent, or not to show it.

Enter Engineering units (for example, degrees, GPM, PSI).

Enter the number of places to the right of the decimal point to display.

Enter a label for the gauge.

*For the label:*

Leave at Auto or choose size.

Choose font. Default is Arial. Make text bold, italics, or both.

Default is bold. Change color (click the rectangle and choose).

*For the current value:*

Choose font. Default is Arial.

Make text bold, italics, or both. Default is bold.

Change color (click the rectangle and choose).

**Range Indicator**

**Tag**  
float32 Variable C

**Range**  
Min value: 0  
Max value: 10

**Scale Factor**  
1  
Use to scale the value. For example, to go from g to kg, use a scale factor of 0.001. Make sure to adjust units as well.

**Orientation**  
Horizontal

**Show Value As**  
Value

**Units**

**Precision**  
2  
Limits: 0 to 6

**Label**  
Default

**Text Size**  
Auto

**Label Style**  
Font: Arial  
Styling: B I  
Color:  

**Value Style**  
Font: Arial  
Styling: B I  
Color:

**Marker Style**

Font: Arial

Styling: B I

Color:  

**Background Color**  
 

**Markers**  
Display: Auto  
Major interval: 0  
Minor interval: 0

**Graphic Size**  
 Auto  
1 units

**Color Ranges**  
Add Range...

Invalid range

Color:  

Min Value:

Max Value:

Close Editor    Delete

*For the markers on the gauge:*

Choose font. Default is Arial. Make text bold, italics, or both. Default is neither. Change color (click the rectangle and choose).

Change background color for gauge.

Choose Custom to override the default tic marks. See descriptions on the following page..

Leave gadget size at Auto or choose size in page grid units.

Click here to add a color as a range indicator on the gauge.

Choose the range color.

Enter the start and end values for this range. These must be not more or less than the gauge's Min and Max values.

Click to close editor for this range. To add another, click Add Range.

*NOTE: For any property with a link button, you can click to break the link and choose the property value independently for Desktop & Tablet versus Handheld layouts. See "Properties and Layouts" on page 53.*

### More on Markers

For both major and minor intervals, if you use the default (0), groov calculates the optimum number and spacing of tic marks to show on the range indicator.

If the Custom intervals you enter create more than 200 tic marks (major and minor combined), groov overrides your entries and sets the number and spacing so markers and values are legible. (Your Custom entries still appear in the Properties panel but are not used.)

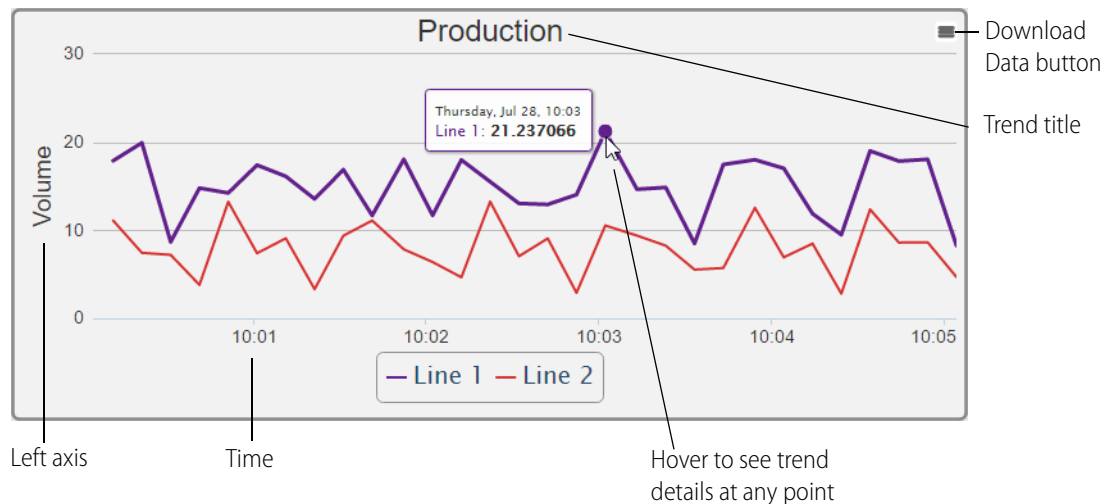
## Trend Gadget

Use the Trend gadget to create a trend that shows how a variable changes over time, up to a maximum of seven days. You can configure up to four pens per trend, each with a different tag.

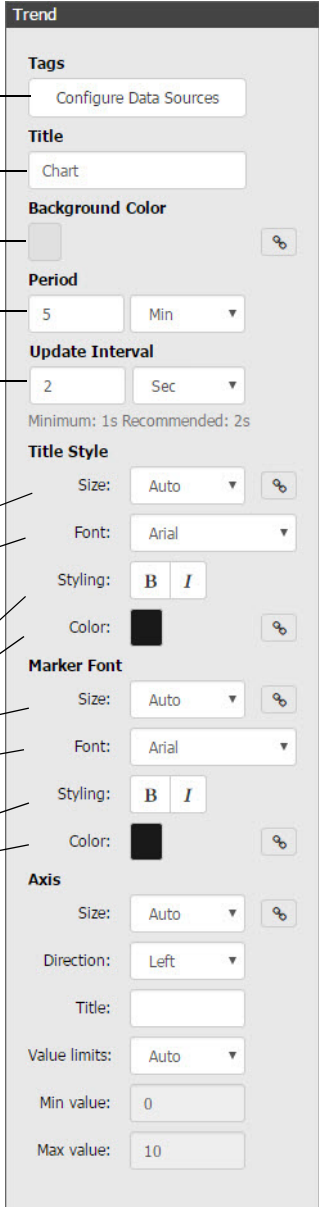
Trending starts in *groov* View when you save your changes. If a page in *groov* contains a Trend gadget that has accumulated data, when the page is opened in View, the Trend gadget is immediately full of data. The scanned values are retained if either *groov* Box or *groov* Server is restarted.

In *groov* View, you can download data from each pen to a .csv file, which you can open in an application like Microsoft Excel. See ["Downloading Data from a Trend" on page 105](#).

*NOTE: The current version of groov does not support historical trending.*



## Trend Gadget



Click here to add pens. See “Configuring Pens” below.

Enter a title for the trend.

Choose the trend’s background color.

Enter the Period in minutes, hours, or days (maximum 7 days).

Enter the Update Interval in seconds or minutes. A red text box indicates that you have entered a value less than the minimum. The Update Interval is the time between data captures. No data is captured between intervals. For better performance on a cell phone, a longer Update Interval uses less memory. The recommended 2 seconds is for a PC.

*For the trend title:*  
 Leave at Auto or choose size.  
 Choose font. Default is Arial.  
 Make text bold, italics, or both. Default is neither.  
 Change color (click the rectangle and choose).

*For the markers:*  
 Leave at Auto or choose size.  
 Choose font. Default is Arial.  
 Make text bold, italics, or both. Default is neither.  
 Change color (click the rectangle and choose).

*For the axes:*  
 Leave text size at Auto or choose size.  
 Select the axis you want to configure (left or right)  
 Enter the axis title. To enter a degree symbol, see [Appendix D](#).

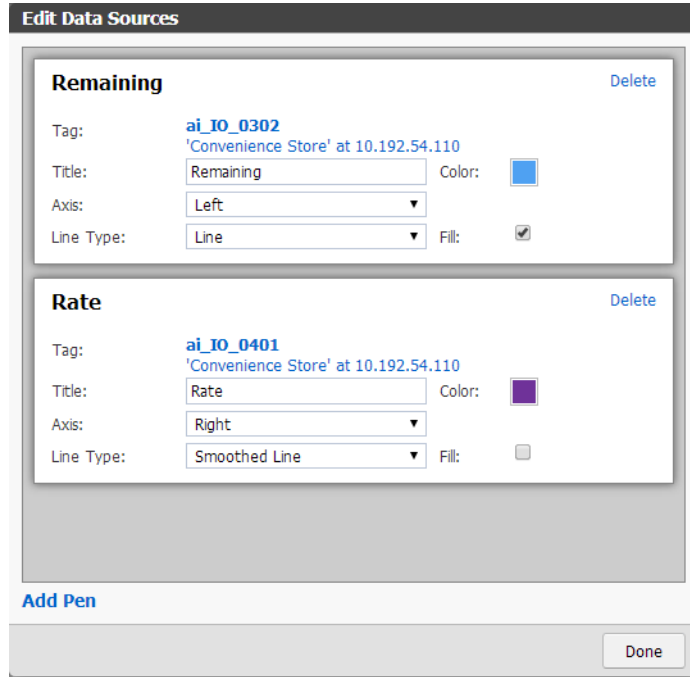
Choose Custom to set the Minimum and Maximum values that make sense for the configured tag (pen). Auto sets these values for you; in View the trend will zoom in or out to accommodate the real-time range of the pen. Also see “Configuring Value Limits and Min/Max Values” on page 104.

*NOTE: For any property with a link button, you can click to break the link and choose the property value independently for Desktop & Tablet versus Handheld layouts. See “Properties and Layouts” on page 53.*

## Configuring Pens

You can configure up to four pens for each trend. To add and configure a pen, do the following:

1. In the Trend Properties panel, click Configure Data Sources.



2. For the first pen, select a tag, enter a title, and choose either Left or Right axis, depending on where you want the axis located for this pen. Multiple pens can use the same axis.
3. Choose the line type, color, and whether you want to use a fill.
4. For each additional pen, click Add Pen and configure it as desired.
5. Click Done.

**Z-Order.** The pens are displayed in the order you configure them here. The first pen configured will be on the bottom of the z-order, and the last one will be on top. If you need to change the z-order, the quickest way is to change the tags configured for each pen. For example, if you want the bottom pen's tag to appear on top, re-configure the top pen with that tag and move the other tag to the bottom pen.

## Configuring Value Limits and Min/Max Values


The Minimum Value and Maximum Value change automatically even when Value Limits is set to Custom, because *groov* automatically adjusts the actual scaling lines and labels for optimum readability. For example, they may change when you do any of the following:

- Change the size of the gadget in Build
- Adjust the size of your browser in either Build or View
- Switch from Build to View
- Change the Minimum or Maximum values on the other axis



## Downloading Data from a Trend

You can download the data from any pen to a .csv file, which can be used by other applications or opened in an application like Microsoft Excel. The file consists of a Java/JavaScript timestamp and a value for each data update (determined by the trend's update interval) during the period shown in the trend.

1. In *groov* View, click the Download Data button  in the upper-right corner of the trend and choose the pen you want.
2. When the file has been downloaded, save it in the location you want.

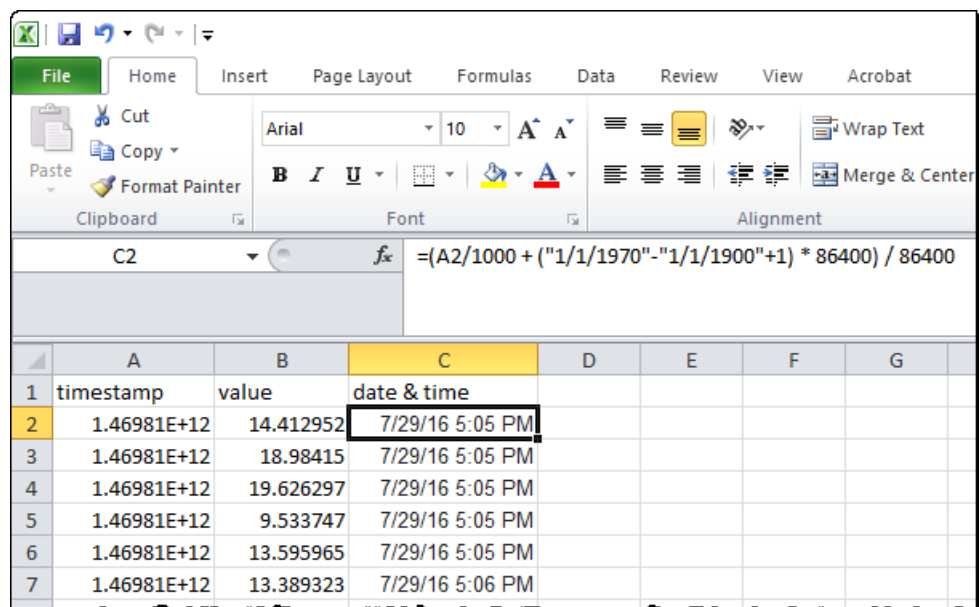
If you open the file in Excel, it looks something like this:

	A	B	C
1	timestamp	value	
2	1.46981E+12	14.412952	
3	1.46981E+12	18.98415	
4	1.46981E+12	19.626297	
5	1.46981E+12	9.533747	
6	1.46981E+12	13.595965	
7	1.46981E+12	13.389323	
8	1.46981E+12	19.766735	
9	1.46981E+12	16.010696	
10	1.46981E+12	12.363201	
11	1.46981E+12	14.523704	

3. To make the timestamp human-readable, add the following formula to cells in another column and change their cell data format to show the date and time as you want to see it.

$$=(A2/1000 + ("1/1/1970"-"1/1/1900"+1) * 86400) / 86400$$

Here's an example:



The screenshot shows the Microsoft Excel interface. The formula bar displays the formula:  $=(A2/1000 + ("1/1/1970"-"1/1/1900"+1) * 86400) / 86400$ . The spreadsheet below shows the data from the previous table, with a new column C added. Column C is labeled "date & time" and contains human-readable timestamps for each row, such as "7/29/16 5:05 PM".

	A	B	C	D	E	F	G
1	timestamp	value	date & time				
2	1.46981E+12	14.412952	7/29/16 5:05 PM				
3	1.46981E+12	18.98415	7/29/16 5:05 PM				
4	1.46981E+12	19.626297	7/29/16 5:05 PM				
5	1.46981E+12	9.533747	7/29/16 5:05 PM				
6	1.46981E+12	13.595965	7/29/16 5:05 PM				
7	1.46981E+12	13.389323	7/29/16 5:06 PM				



# 5: Using Events and Notifications

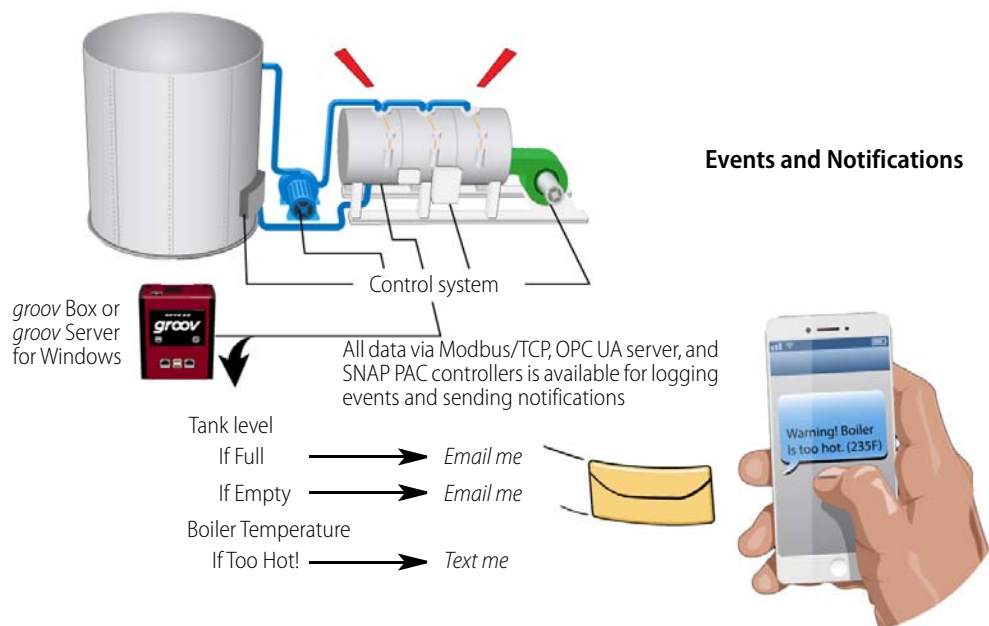
Use this chapter to set up event conditions in *groov* and view event logs. All events are logged, and authorized *groov* users can see them at any time from *groov*View or *groov* Build.

Also use this chapter to set up optional email or text notifications when an event occurs. For example, if a machine's temperature is critical, you can create an event and notify a maintenance technician via email or text message when the machine overheats. The technician can click a link in the notification taking him to the *groov* screen with more data on the machine.

You can customize messages, send them to groups or individuals, and include time/date stamps and other information. A notification can be sent when the event becomes active, inactive, or both.

## In this chapter:

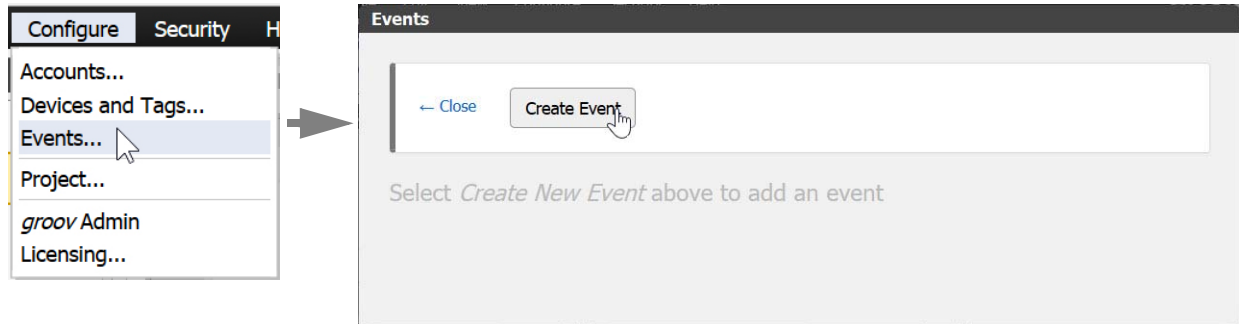
Creating Events.....	108
Viewing Events .....	111
Setting Up Notifications .....	113
Event Condition Types Reference.....	119
Using Multiple Conditions.....	121



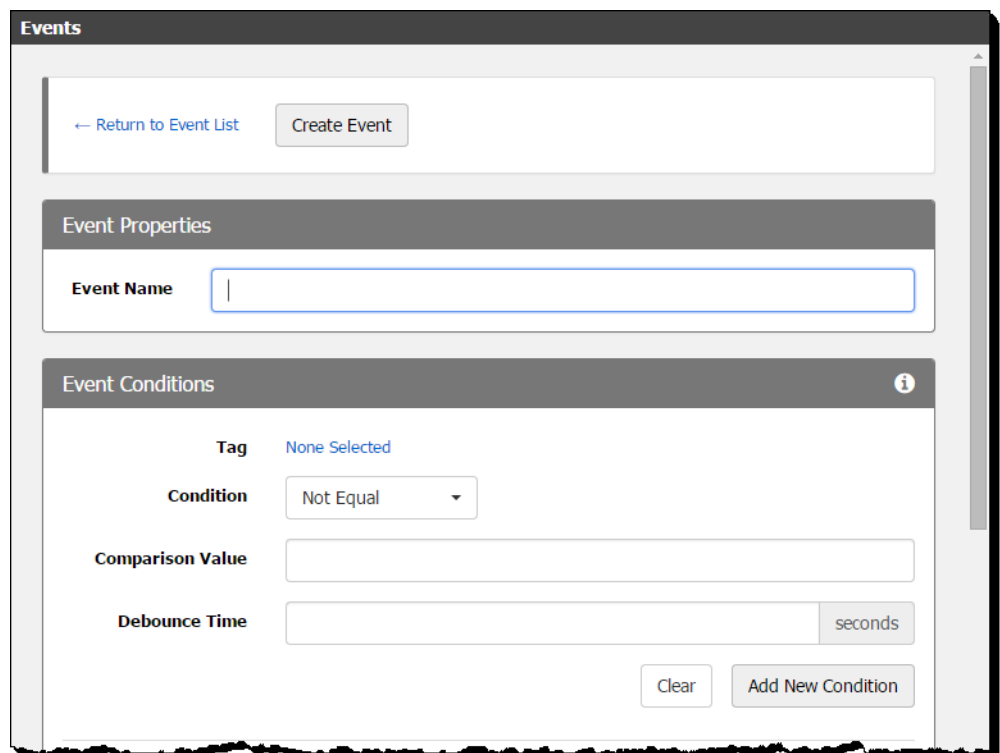
## Creating Events

You can create events based on one or more conditions.


1. In *groov* Build, select Configure > Events.

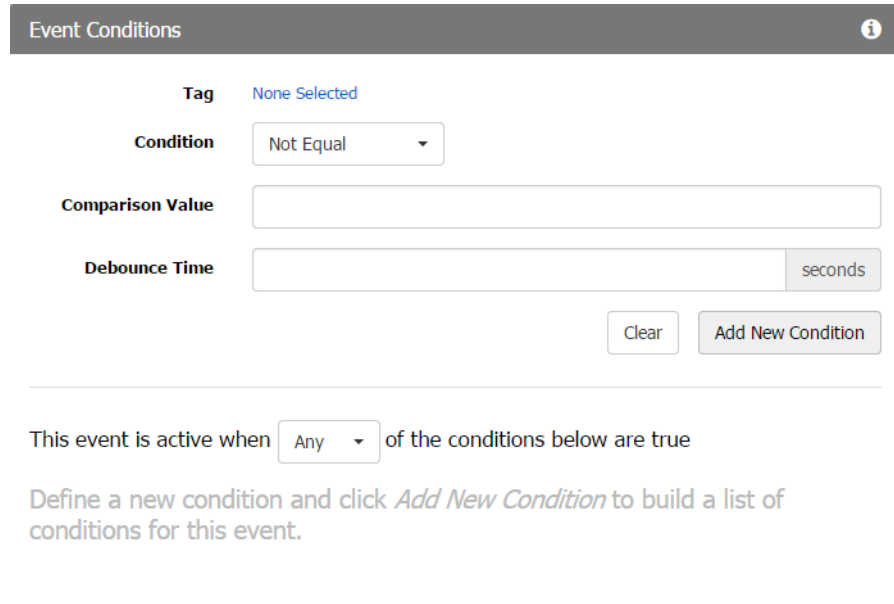


2. Click Create Event.



3. In Event Properties, give the event a name.

4. In Event Conditions, follow steps below to create one or more conditions that define the event. (For help in understanding the conditions and the fields to complete, click the Info icon .)



**Event Conditions**

Tag **None Selected**

Condition **Not Equal**

Comparison Value

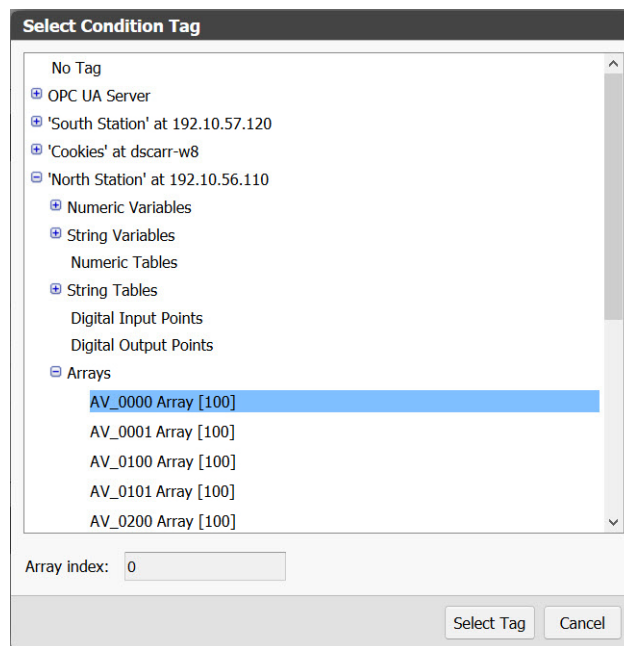
Debounce Time seconds

Clear Add New Condition

This event is active when **Any** of the conditions below are true

Define a new condition and click *Add New Condition* to build a list of conditions for this event.

- a. **Tag**—Click None Selected. In the Select Condition Tag dialog box, browse to a tag to monitor for this condition. If the tag is an array, also enter the array index. Then double-click the tag or click Select Tag.



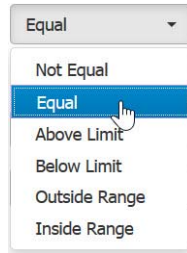
**Select Condition Tag**

- No Tag
- OPC UA Server
- 'South Station' at 192.10.57.120
- 'Cookies' at dscarr-w8
- 'North Station' at 192.10.56.110
  - Numeric Variables
  - String Variables
  - Numeric Tables
  - String Tables
  - Digital Input Points
  - Digital Output Points
  - Arrays
    - AV\_0000 Array [100]**
    - AV\_0001 Array [100]
    - AV\_0100 Array [100]
    - AV\_0101 Array [100]
    - AV\_0200 Array [100]

Array index: 0

Select Tag Cancel

- b. Condition**—Click the drop-down menu and choose the condition type for the event.

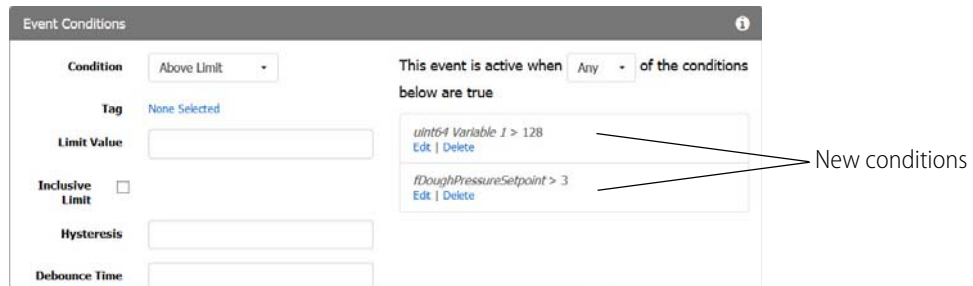


For details on conditions, see [“Event Condition Types Reference” on page 119](#).


- c.** Complete additional fields as needed for the tag type and condition type you chose. For example, for analog or numeric tags you enter a comparison value. For Above Limit, you enter the limit and choose whether the event should occur when the value is greater than the limit, or greater than or equal to the limit. In some cases you may also want to enter hysteresis values or debounce times. For more information, see [“Event Condition Types Reference” on page 119](#).
- d.** When you’ve completed the fields, click Add New Condition to save your entries. The new condition appears at the right (or below on a smaller screen).

*NOTE: Be sure to click Add New Condition. If no conditions appear, you’ll receive an error message when you try to save the event.*

- e.** If you want the event to depend on additional conditions, choose another tag, complete the fields for it, and then click Add New Condition again.

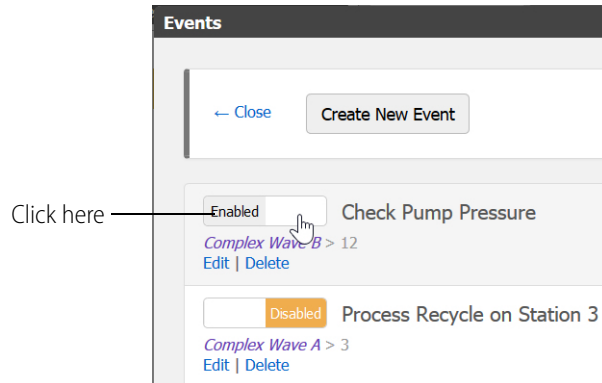


- f.** If the event depends on more than one condition, complete the “This event is active when...” sentence. Choose All if all of the conditions must be true to trigger the event. Choose Any if only one of them needs to be true to trigger the event. Also see [“Using Multiple Conditions” on page 121](#).
- 5.** (Optional) To show a custom message in the event log, scroll down to Notification Messages. The event message you will see in the log (and in an email or text notification, if you send one) contains default text to identify the event. Default text includes the event name, date/time, and whether the event began or ended. You can enter a custom message in this section if you wish.
- 6.** Click Create Event to save the new event. Click Close to return to the main workspace.

As soon as you save an event it is enabled, so if the event conditions become true it will be logged. *groov* continually scans for the event tags and monitors for event conditions even if *groov* View is closed. Click the events icon  in the upper-right corner of *groov* to view event status. Also see [“Viewing Events” on page 111](#).

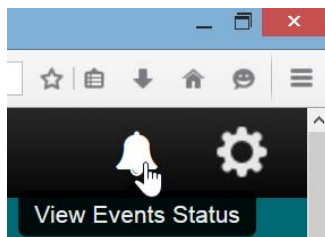
## Enabling and Disabling Events

When a configured event is enabled, the event is logged (and notifications are sent, if applicable) when the event conditions are met. To enable or disable an event, choose Configure > Events and find the event you want. Then click its Enabled/Disabled button.



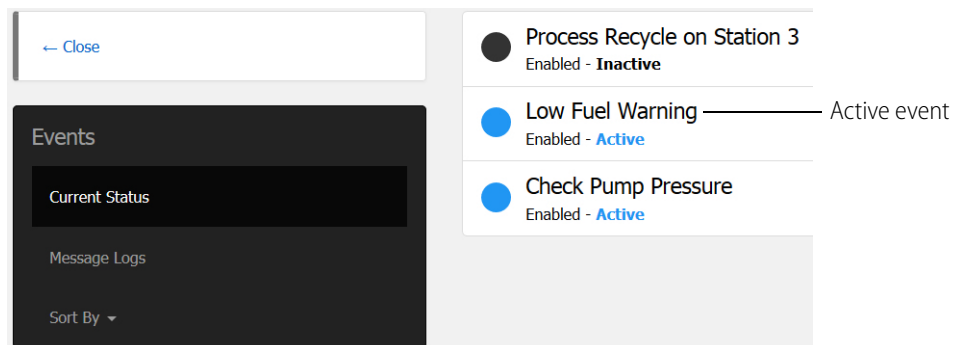
## Viewing Events

As soon as you create an event, it is enabled; when the event occurs, it is logged. To view, sort, and filter logged event messages, click the Events icon (the bell) in the top right corner of either *groov* Build or *groov* View.

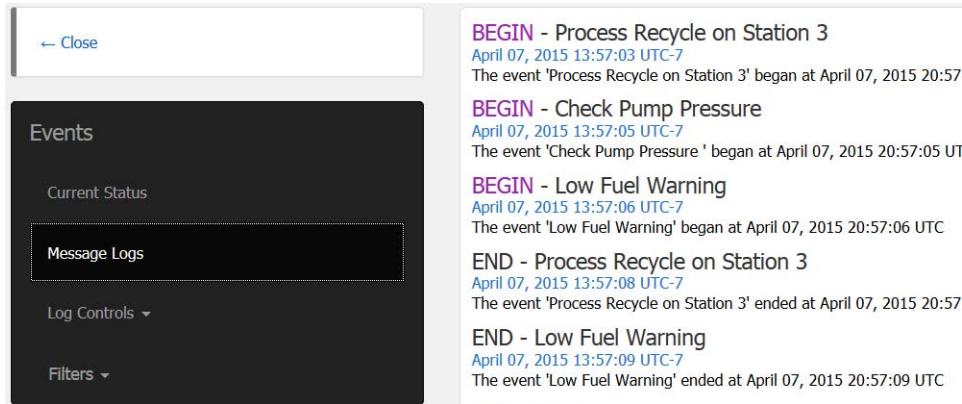


A list of configured events appears next to a menu of viewing options.

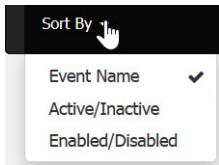
**To see the status of all events, choose Current Status.** You see a list of configured events and whether they are active (meaning that the event conditions have been met) or inactive. The text and indicator turn blue for events that are active; black for inactive.



To see a list of all logged event messages, choose **Message Logs**.



To sort logged event messages, click **Sort By** and choose Event Name, Active/Inactive, or Enabled/Disabled.

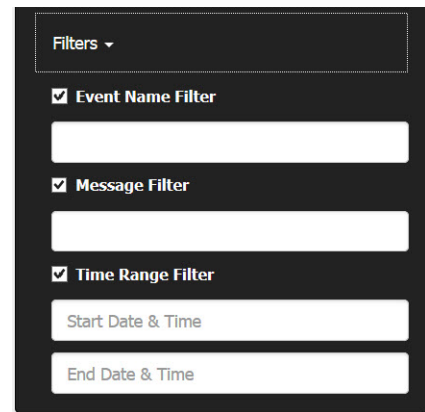


An active event is one that is enabled and is occurring right now. You can enable or disable events in *groov* Build (see [page 119](#)).

To see only some events in the event message log, choose **Filters** and complete the fields.

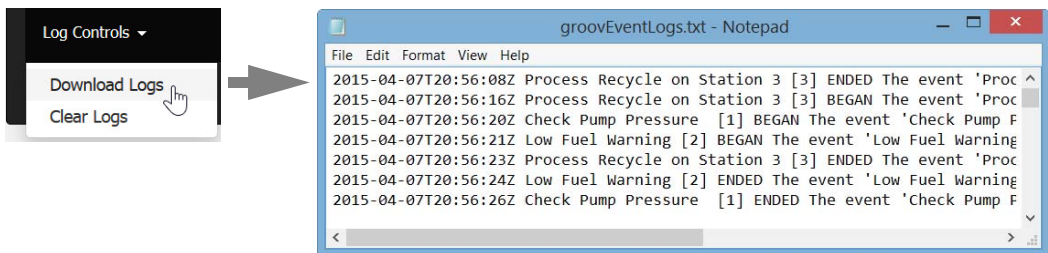
You can use one or a combination of these filters.

- In the fields for Event Name Filter and Message Filter, enter a text string.
- In the Start and End boxes for Time Range Filter, click in the field and select a date and time for each one.



To download a text file of all logged messages, click **Log Controls** and choose **Download Logs**.

You can open the text file in a text editor like Notepad or save the file for later viewing.



To delete all event messages from the log, click **Log Controls** and choose **Clear Logs**. Only users with a security level of Admin can clear logs.



## Event Message Log Capacity

*groov* checks the size of the Event Message Log every 30 minutes. If it is more than 200 MB (typically over a million entries), the oldest 25% of entries are trimmed. If this occurs, a message is posted to the Log Viewer noting that the oldest entries have been removed. For more on the Log Viewer, see “Viewing Log Messages” on page 72.

## Setting Up Notifications

You can choose to notify one or more authorized *groov* users when an event occurs, at the beginning of the event, the end of the event, or both. These steps assume you have already created the event (if not, see “Creating Events” on page 108).

Follow these steps to set up notifications:

1. Set Up the *groov* Email Account..... 113
2. Set Up *groov* Users To Receive Event Notifications ..... 115
3. Add Notifications to Events ..... 117

### 1. Set Up the *groov* Email Account

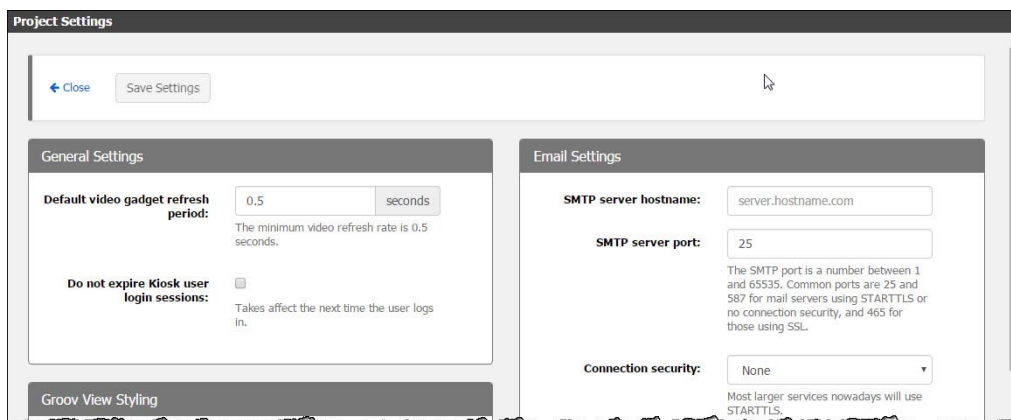
This section sets up the account that *groov* will use to send email and text notifications. If you want *groov* to send from a Gmail account, use the setup instructions on page 114 instead.

1. Create an email account that’s just used for this *groov*.

A separate email account makes it clear where the email is coming from, and it provides a record of all successfully sent notifications in the *Sent Mail* folder of the *groov* account. (Currently, *groov* does not buffer notifications that failed to send.)

Also, by creating a separate account for *groov*, you can make email setting changes and not impact your business or personal email account settings.

2. In *groov* Build, choose Configure > Project.



3. In the Email Settings window, set up the *groov* email account as follows:  
**SMTP server hostname**—Enter the SMTP server address.

**SMTP server port**—Consider the following:

- The SMTP port is a number between 1 and 65535. Common ports are 25 and 587 for mail servers using STARTTLS or no connection security, and 465 for those using SSL.
- If you are outside a company network, you may need to try port 587. Other email servers might need different port numbers. Check with your IT group if you are using a company email server to send the emails.

**Connection security**—Choose STARTTLS if you are using a large service such as Yahoo. Other email servers may need a different setting.

**Allow untrusted certificates**—Check this if your internal mail server uses a self-signed certificate.

**Sender address**—Enter the email address of the *groov* account you created previously. Some services might ignore this.

**Username**—Enter the username for the *groov* email account.

**Password**—Enter the password associated with the *groov* email account.

**Send a test email**—Enter an email address that can receive a test email and that you can easily check.

4. Click Send Test Email to test your connection settings

If a message in green letters appears that says **Test message sent!**, make sure it arrived the inbox of the email account you sent the message to. If you see a red error message, try different settings in the *groov* email account.

5. Scroll to the top and click Save Settings, then click Close.

Continue with step 2 on [page 115](#).

## Setting Up the *groov* Email Account Using Gmail

Follow these steps if you are using Gmail for the account *groov* sends email from. If you are using an email service other than Gmail, see the more general guidelines starting on [page 113](#).

1. Create a Gmail account that's just used for this *groov*.

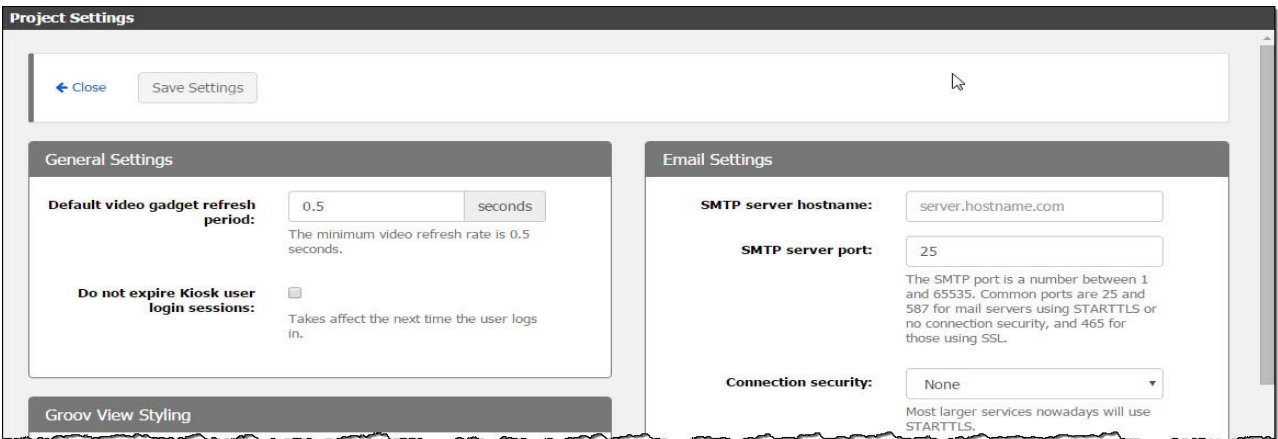
A separate email account makes it clear where the email is coming from, and it provides a record of all sent notifications in the *Sent Mail* folder of the *groov* account. The Sent Mail folder thus functions as a kind of automatic cloud-based log file. Also, by creating a separate account for *groov*, you can make email setting changes and not impact your company or personal email account settings.

2. Make sure to enable the account to send email by what Google calls “less secure apps.”

Follow these steps:

- a. Open a new *incognito* window in Chrome, or a *private* window in Firefox.
- b. Go to the following link:  
<https://www.google.com/settings/security/lessecureapps>
- c. Log in to the Gmail account you created for *groov*.
- d. Next to “Access for less secure apps,” select “Turn on.”

3. In *groov* Build, select Configure > Project.



4. In the Email Settings window, set up the *groov* email account as follows:
  - SMTP server hostname**—Enter *smtp.googlemail.com*.
  - SMTP server port**—Consider the following:
    - The SMTP port is a number between 1 and 65535. Common ports are 25 and 587 for mail servers using STARTTLS or no connection security, and 465 for those using SSL.
    - If you are inside a company network, you probably need port 25.
    - If you are outside a company network, you may need to try port 587.
  - Connection security**—Choose STARTTLS.
  - Allow untrusted certificates**—Make sure this option is not selected.
  - Sender address**—Enter the Gmail address of the *groov* account you created previously.
  - Username**—Enter the Gmail address, the same as the Sender address.
  - Password**—Enter the password associated with the *groov* Gmail account.
  - Send a test email**—Enter an email address that can receive a test email and that you can easily check.
5. Click Send Test Email to test your connection settings
 

If a message in green letters appears that says **Test message sent!**, make sure it arrived the inbox of the email account you sent the message to. If you see a red error message, try a different SMTP server port setting.
6. Scroll to the top and click Save Settings, then click Close.

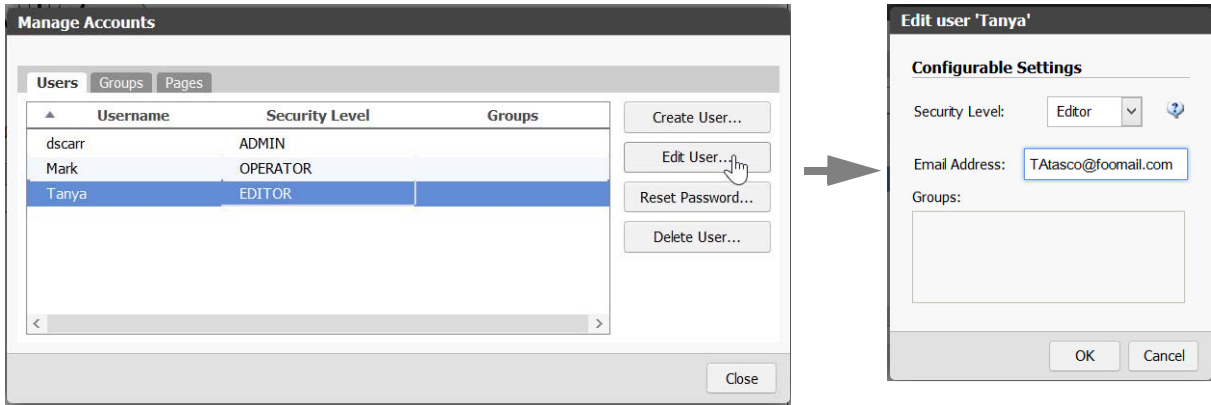
## 2. Set Up *groov* Users To Receive Event Notifications

This section sets up email addresses for all *groov* users who should receive event notifications, either as email or text messages.

Text message notifications are valuable when cell coverage is weak and you're only able to receive phone calls and plain text messages (SMS); even when your email client can't update you'll still get

important notifications. SMS messages are generally limited to 160 characters, but limits vary by carrier and country, so check with your local carrier.

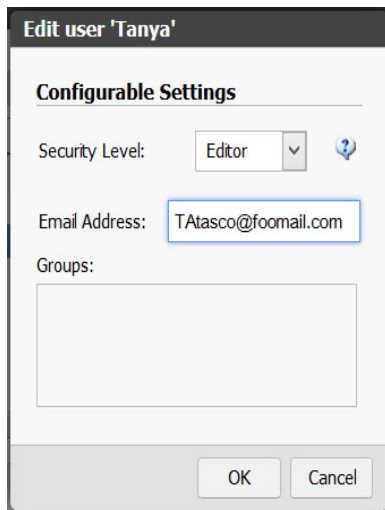
1. In *groov* Build, choose Configure > Accounts. Then click the Users tab.
2. Highlight the user's name and click Edit User.



3. Enter one of the following for the Email Address:
  - **For email notifications**, enter a valid email address. For example TAtasco@foomail.com
  - **For text message notifications**, enter the user's phone number followed by the domain used by the carrier to send text messages to phones. For example, to send a text message to a Verizon phone, use the recipient's mobile phone number followed by "@vtext.com". If the phone number is 555-123-4567, you type 5551234567@vtext.com

For a list of carriers and email addresses, see the next section, "[Email Addresses for Text Messaging](#)."

*NOTE: if you want the same person to get both email and text message notifications, you will need to create two user accounts.*



4. Click OK, then click Close.

## Email Addresses for Text Messaging

By using an email-to-SMS (Short Message Service) email address you can send a text message notification from *groov*. Check with your carrier for SMS character limits.

Here is a list of common cell phone carriers in the U.S. and Canada and the email-to-SMS email addresses they use for sending text messages via email to a cell phone. Choose the carrier for the phone you want to receive event notifications.

Carrier	Email-to-SMS Email Address
AT&T	10digitphonenumber@txt.att.net
Comcast	10digitphonenumber@comcastpcs.textmsg.com
MCI	10digitphonenumber@pagemci.com
Nextel	10digitphonenumber@messaging.nextel.com
Qwest	10digitphonenumber@qwestmp.com
Sprint	10digitphonenumber@messaging.sprintpcs.com
T-Mobile	10digitphonenumber@tmomail.net
US Cellular	10digitphonenumber@email.uscc.net
Verizon	10digitphonenumber@vtext.com

For carriers not listed here, see the following websites:

<http://martinfitzpatrick.name/list-of-email-to-sms-gateways/>

<http://www.emailtextmessages.com/>

## 3. Add Notifications to Events

1. In *groov* Build, choose Configure > Events.
2. Click the name of the event you want to send a notification for.
3. Scroll down to Notification Recipients.

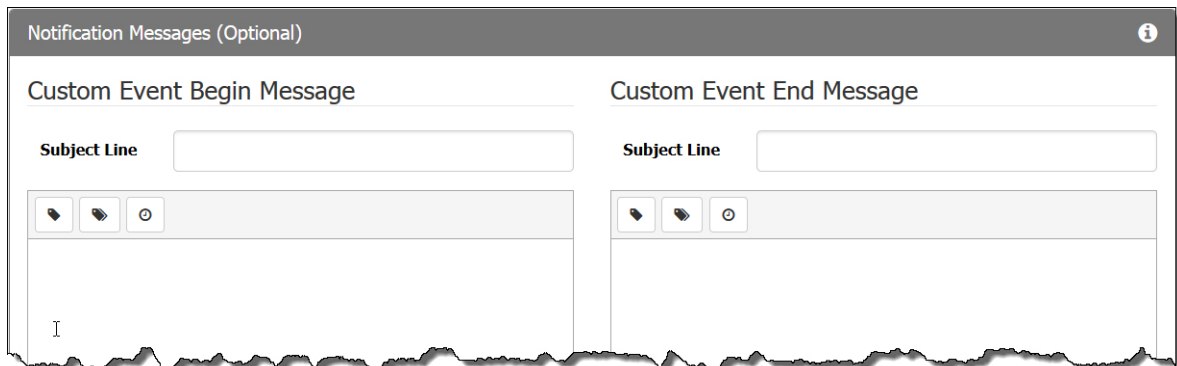
- a. Check the boxes to send the email when the event begins, when it ends, or both.
- b. Do one of the following:
  - Select “Send to every user with an assigned email address.” The To: list is ignored.
  - In the textbox next to To, click to select users that you want to be notified.

All recipients must have an email address configured to receive event notifications. You can add users who don’t have email addresses, but they’ll only receive notifications when

addresses have been assigned. To assign and edit user email addresses, choose Configure > Accounts > Create/Edit User (see [page 115](#)).

*TIP: If you have configured a group, you can add the group to your list, and all the users in that group will receive the notification.*

4. Customize your message in the Notification Messages window. If you leave the subject line or message empty, a default subject line or message will be used.



You can add Condition Tags, Project Tags, or a Time stamp to a message. When you add a Condition Tag or a Project Tag to a message, the < Tag Name > placeholder will be replaced in the email by the tag's value at the time of the event beginning or end.




**Condition Tags**—The tags that you have referenced in the conditions for this event. When using condition tags, if you alter the conditions for this event, make sure that your tag references in these messages are updated to match.

**Project Tags**—All of the device tags in this *groov* project.

**Time stamps**—All < Time-stamp > placeholders are replaced in the email by the current local time of the event beginning or ending.

- In *groov* Server for Windows, the time stamp uses the local time that the PC is set to.
- On a *groov* Box, make sure your time zone is correctly set in *groov* Admin. By default, the *groov* Box is set to UTC. If you change the time zone in *groov* Admin, you must restart the *groov* Box for the change to propagate through all of *groov*. Once restarted, event time stamps use the configured time zone. For more information, see “Changing the Time Zone” in [form 2104](#), the *groov* Box User’s Guide for GROOV-AR1 or [form 2077](#), the *groov* Box User’s Guide for GROOV-AT1.

5. Scroll back up to the top of the window and click Update Event. Then click Close to return to *groov* Build.

Once you save or update an event it becomes active, so if the event conditions become true a notification will be sent to *groov* View even while you are in Build. *groov* continually scans for the event tags and monitors for event conditions even if *groov* View is closed. Click the events icon  in the upper-right corner of *groov* to view event status. Also see “[Viewing Events](#)” on page 111.

## Event Condition Types Reference

Use the information in this section when creating events ([page 108](#)). If you want to use multiple conditions, also see “[Using Multiple Conditions](#)” on page 121.

### Not Equal

The event is active when the tag value is not equal to the Comparison Value. The event is inactive when the tag value is equal to the Comparison Value.

**Debounce Time.** Debounce time filters out tag value noise. It specifies how long the tag’s value must satisfy the condition before the event becomes active or inactive. If in that time the tag returns to a value that does not satisfy the condition, the event will not become active (or inactive).

Debounce time is an integer value in units of seconds.

### Equal

The event is active when the tag value is equal to the Comparison value. The event is inactive when the tag value is not equal to Comparison Value.

**Debounce Time.** Debounce time filters out tag value noise. It specifies how long the tag’s value must satisfy the condition before the event becomes active or inactive. If in that time the tag returns to a value that does not satisfy the condition, the event will not become active (or inactive).

Debounce time is an integer value in units of seconds.

### Above Limit

The event is active when the tag value is greater than (or equal to) the Limit value. To become inactive, the tag value must drop to the Limit minus the hysteresis offset or below.

**Hysteresis.** A hysteresis offset value is used to determine when an active event may be considered inactive. It establishes an offset from the condition limit that the tag must reach before the event may transition from an active state to inactive.

For Above Limit conditions with hysteresis, the tag value must drop below the Limit value minus the hysteresis offset. For example, if you want to know if a boiler’s temperature exceeds a safe limit of 200 degrees, you could create an Above Limit condition that monitors the tag assigned to the boiler temperature sensor.

Setting the Limit Value to 200 and a Hysteresis to 20 indicates that if the boiler temperature exceeds 200 degrees, it should not be considered safe/stable until the temperature drops to 180 degrees or below, rather than the maximum 200 degree limit.

**Debounce Time.** Debounce time filters out tag value noise. It specifies how long the tag's value must satisfy the condition before the event becomes active or inactive. If in that time the tag returns to a value that does not satisfy the condition, the event will not become active (or inactive).

Debounce time is an integer value in units of seconds.

## Below Limit

The event is active when the tag value is less than (or equal to) the Limit value. To become inactive, the tag value must rise up to the Limit plus the hysteresis offset or above.

**Hysteresis.** A hysteresis offset value is used to determine when an active event becomes inactive. It establishes an offset from the condition limit that the tag must reach before the event changes from an active state to inactive.

For Below Limit conditions with hysteresis, the tag value must rise above the Limit value plus the hysteresis offset. For example, if you want to monitor a settling pond to determine when it is below capacity and is ready to receive more water, you could create a Below Limit condition that monitors the tag assigned to a water level sensor.

Setting the Limit Value to 4 (meters) and a Hysteresis of 2 indicates that if the pond drops below 4 meters in depth, it should not be considered to be at capacity until the level reaches 6 meters or greater, rather than the minimum 4 meter limit.

**Debounce Time.** Debounce time filters out tag value noise. It specifies how long the tag's value must satisfy the condition before the event becomes active or inactive. If in that time the tag returns to a value that does not satisfy the condition, the event will not become active (or inactive).

Debounce time is an integer value in units of seconds.

## Outside Range

The event is active when the tag value is less than (or equal to) the Lower limit or greater than (or equal to) the Upper Limit. To become inactive, the tag value must rise up to or above the Lower Limit plus the Lower Hysteresis, or drop to or below the Upper Limit minus the Upper Hysteresis.

The hysteresis values are used to determine when an active event tag becomes inactive. They establish a value range that the tag must reach before the event changes from an active state to inactive. The Upper Hysteresis and Lower Hysteresis are independent of each other and either one may be left blank.

Also, for an Outside Range condition, hysteresis must be less than the difference between the Upper Limit and Lower Limit.

**Debounce Time.** Debounce time filters out tag value noise. It specifies how long the tag's value must satisfy the condition before the event becomes active or inactive. If in that time the tag returns to a value that does not satisfy the condition, the event will not become active (or inactive).

Debounce time is an integer value in units of seconds.



## Inside Range

The event is active when the tag value is between the Lower and Upper limits. To become inactive, the tag value must drop to or below the Lower Limit minus the Lower Hysteresis, or rise up to or above the Upper Limit plus the Upper Hysteresis.

The hysteresis values are used to determine when an active event tag becomes inactive. They establish a value range that the tag must reach before the event changes from an active state to inactive. The Upper Hysteresis and Lower Hysteresis are independent of each other and either one may be left blank.

## Using Multiple Conditions

Using multiple conditions for a single event is a good way to reduce event duplication and to capture events that depend on the state of multiple tags. When using more than one condition for an event, the “event is active when” statement has the following effect:

**Any:** The event is active when condition 1 is active OR condition 2 is active OR condition 3 and so on. The event becomes inactive only when ALL of the conditions are inactive.

*Example uses:*

- You have multiple tags that all monitor the same type of condition.
- You want to be notified of a problem in your process that could be caused by any one of a number of sub processes.

**All:** The event is active when condition 1 is active AND condition 2 is active AND condition 3 and so on. The event becomes inactive when ANY of the conditions is inactive.

*Example uses:*

- Multiple components along a process line turn off sequentially when not in use. It is normal to have some components off at any given time. If all of the components are off at the same time, however, that may indicate a problem.
- You have a system monitoring multiple boilers. If any one of those boilers becomes too hot, a separate, per-boiler event notification is sent to your onsite technicians. If several boilers all become too hot at the same time, a notification is sent to your on-call technicians and your engineers.



# 6: Viewing Your Operator Interface

The operator interface developed in *groov* Build can be accessed using *groov* View in a computer's browser, and in a smartphone, tablet, or other mobile device that has the *groov* View mobile app or a modern browser.

## In this chapter:

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Changing Your Password.....	125
Refreshing the Operator Interface .....	125
Automatic Refresh.....	126
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Using <i>groov</i> over the Internet.....	134

## Opening View

1. Open your web browser or mobile device app (*groov* View for iOS or *groov* View for Android). These steps are for a web browser. For the app, see “Setting Up *groov* Mobile Apps” on page 126.

### For *groov* Server:

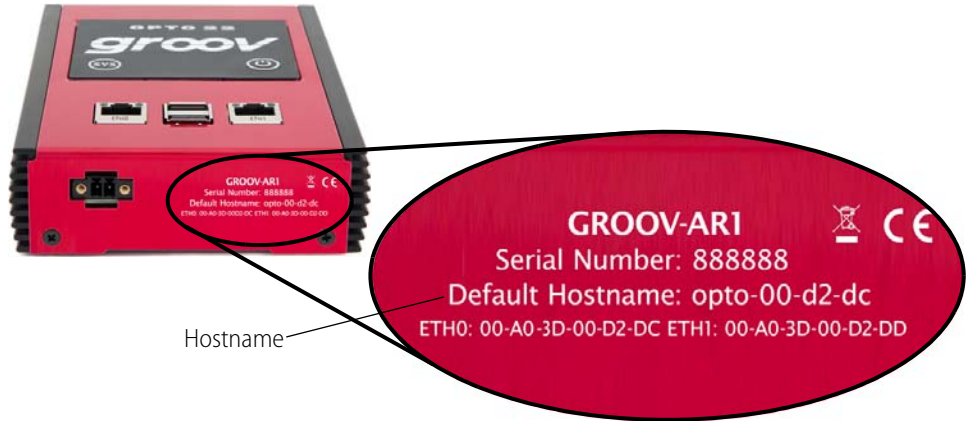
- If *groov* Server is installed on the same computer, type `https://localhost` in the address bar of your browser.
- If *groov* Server is installed on a different computer, type `https://` and the computer's hostname. For example, if the computer's hostname is `RStarr-w7`, you type `https://RStarr-w7`

You can use the IP address of the host PC instead of the hostname. However, if the PC is on a network with DNS and DHCP, the IP address is subject to change.

Make sure you type the **s**: `https://`

### For *groov* Box:

Type `https://` and the *groov* Box's hostname or IP address as the URL. The hostname is printed on the bottom of the *groov* Box. (Your hostname will be different from this example.)



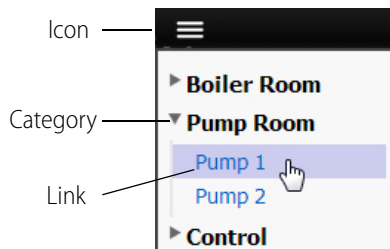
For example, if the hostname is opto-00-d2-dc, you type `https://opto-00-d2-dc`,  
Make sure you type `https`. The `s` indicates it is a secure connection.

*NOTE: If you've assigned a static IP address to the groov Box, use the IP address instead of the hostname to open groov.*

2. Log in with your username and password.

## Opening a Page

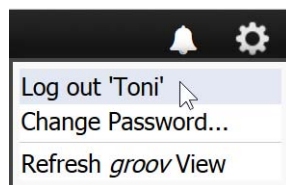
1. Click the navigation icon in the upper left of the screen.



2. Expand the page's category.
3. Click the link.

## Logging Out

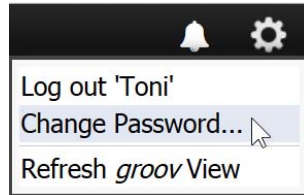
1. Click the gear icon on the top right-hand side.



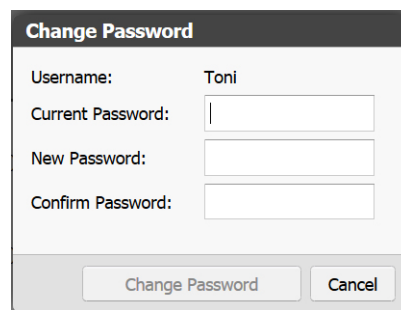
2. Click Log out '*Username*'.  
The login dialog box appears.

## Changing Your Password

1. Click the gear icon on the top right-hand side.
2. Click Change Password.



3. Enter the current password and the new password two times.

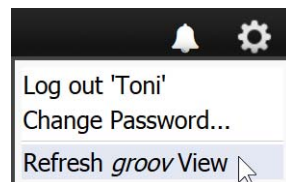
A screenshot of a 'Change Password' dialog box. The title bar says 'Change Password'. It contains four input fields: 'Username:' with the value 'Toni', 'Current Password:', 'New Password:', and 'Confirm Password:'. At the bottom, there are two buttons: 'Change Password' and 'Cancel'.

4. Click Change Password.

## Refreshing the Operator Interface

If changes have been made and saved in *groov* Build, you can refresh View at any time and the new changes will appear.

1. Click the gear icon on the top right-hand side.
2. Click Refresh *groov* View.



## Automatic Refresh

Starting with version R3.2a, when your *groov* version is updated (for example, from R3.2a to R3.2b), clients will also be automatically updated.

Different browsers may handle the refresh differently: some may simply refresh, but others may show a dialog box that requires the user to acknowledge the change. Since browsers constantly change, we can't know for certain which browsers will require a response.

**If you have kiosk users**, be aware that you may need to respond on the kiosk device when you update your version of *groov*.

## Setting Up *groov* Mobile Apps

Opto 22's free *groov* View apps for iOS and Android are the best way to view your operator interfaces on your iPhone, iPad, or Android smartphone or tablet. In the app you can see one or more *groovs* in full-screen mode without the address bar, toolbars, and other things you see in a browser.

To connect to *groov* the first time:

1. Download the app:
  - [groov View for iOS](#)
  - [groov View for Android](#)
2. Install the app on your iOS or Android device.
3. Tap the *groov* icon to start the app.

Continue with the instructions for iOS or Android:

["Using the iOS Mobile App"](#) (below)

["Using the Android App"](#) on page 131

### Using the iOS Mobile App

In this section:

["Adding a groov to the iOS App"](#)

["Connecting, Editing, and Setting a groov as the Default Using the iOS App"](#)

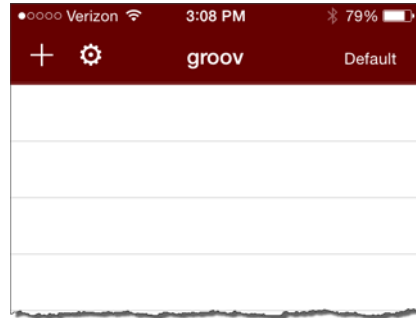
["Using the iOS App Settings"](#)

["Navigating groov with the iOS App"](#)

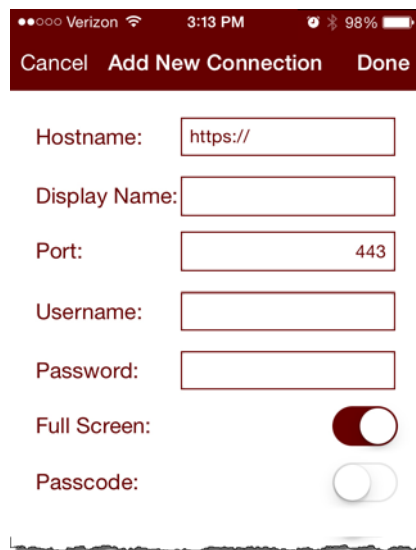
#### Adding a *groov* to the iOS App

Follow these steps in your iOS app to connect to *groov* the first time or whenever you want to add another *groov* connection.

1. Tap the *groov* icon to open a list view for adding one or more connections.



2. Tap  to open the configurator.



3. Enter the following information. (Tap on the screen outside of the text boxes to hide the keyboard and reveal any hidden options.)
  - **Hostname**—Type `https://` and *groov*'s hostname or IP address.
 

*NOTE: If you are within the company network and have a valid hostname that is registered with the domain server, you still might have to type the fully qualified domain name. For example, if the hostname is "Petrovsgroov" and the domain name is "somecompany.com", you would type "Petrovsgroov.somecompany.com".*
  - **Display Name**—Create a name that will appear in the connection list.
  - **Port**—Enter the port number, usually 443.
  - **Username** and **Password**—Enter the username and password for this connection.
  - **Full Screen**—Enable this option to hide navigation to the *groov* list. (With this option enabled, swipe right to go back to the *groov* list.)
  - **Passcode**—When enabled, the next time you connect to this *groov*, you will be prompted to enter a new passcode which will then be needed each time you attempt to view this connection.

- **Handheld Layout** (iPad only)—Enable this option to force the display to use *groov*'s handheld layout rather than the desktop layout.

4. Tap Done.

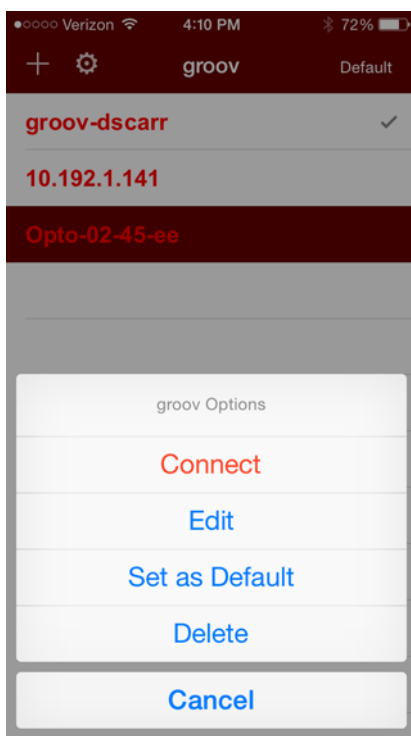
### Connecting, Editing, and Setting a *groov* as the Default Using the iOS App

Follow these steps in your iOS app to connect to *groov*, edit the configuration settings, or set a default connection.

1. Start the *groov* app to open a list of connections.

If you haven't connected a *groov*, see ["Adding a \*groov\* to the iOS App."](#) If you have set and enabled a default connection, *groov* View automatically attempts to connect to the default *groov* connection. To return to the list view, swipe right.

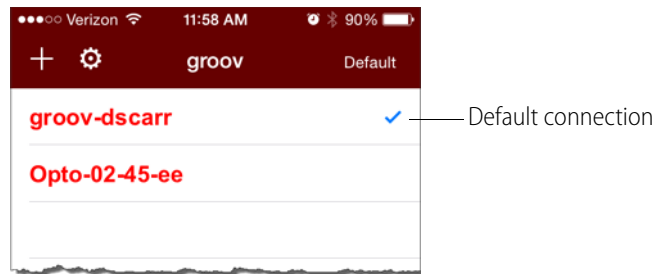
2. Tap a connection in the list to open its *groov* Options.



- **Connect**—Connects to the selected connection.
- **Edit**—Opens the configurator for the selected connection for you to edit the connection settings. The configurator screen is filled with the data from the selected connection, and the title is the Display name (if configured) or the hostname of the connection. For information about the options, see ["Adding a \*groov\* to the iOS App."](#)
- **Set as Default**—Sets the selected *groov* connection as the default so that when you start the *groov* View app it bypasses the connection list and opens the default connection automatically. For this to work, also turn on Enable Default Connection in the app settings.



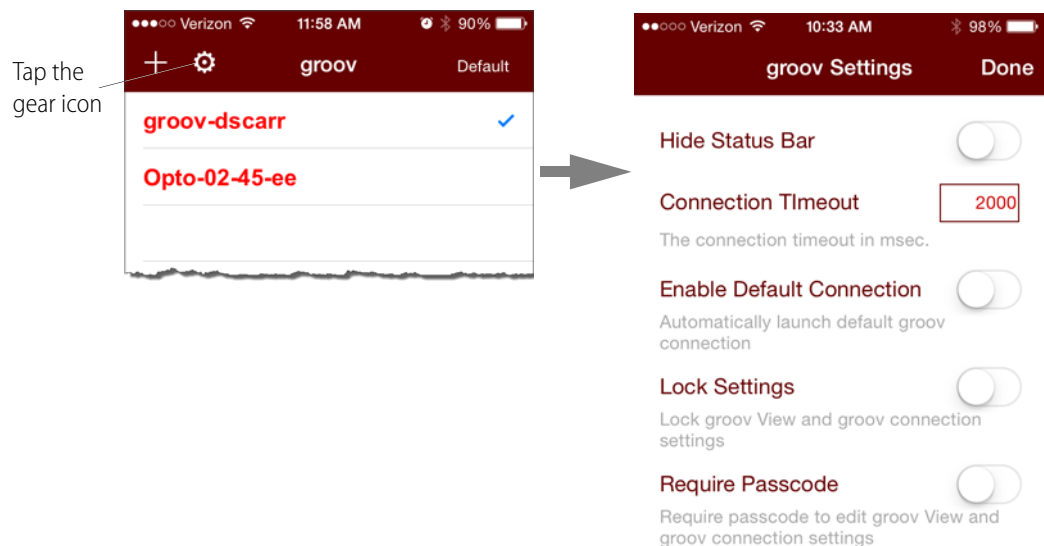
See “Using the iOS Mobile App Settings.” The default connection is indicated with a check mark. Only one connection can be the default.



- **Delete**—Deletes the selected connection from the list.
- **Cancel**—Exits *groov* Options.

### Using the iOS Mobile App Settings

To configure the iOS *groov* app settings, tap the gear icon.



groov View for iOS

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- **Hide Status Bar**—Hides the status bar that normally appears at the top of the screen.
- **Connection Timeout**—Set how long the app will spend trying to connect to the *groov* connection. The timer starts as soon as the Connect menu option is selected.
- **Enable Default Connection**—Use this option if you want to bypass the connection list when starting the *groov* app and go directly to the default connection. You will also need to assign a

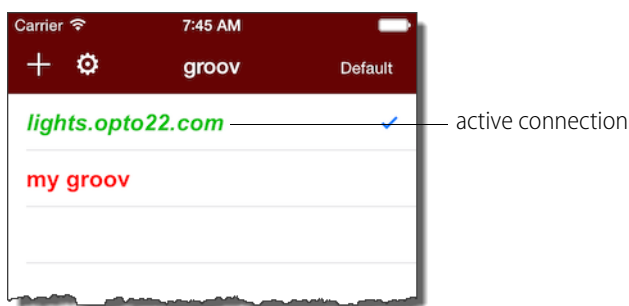
default connection in the *groov* Options. See “Connecting, Editing, and Setting a *groov* as the Default Using the iOS App.”

- **Lock Settings**—When enabled, no connections can be added, modified, or deleted, and the settings themselves can’t be changed. When using this option you’ll also want to require a passcode. Otherwise, anyone can unlock the settings.
- **Require Passcode**—When enabled, the user must enter a passcode to change the settings, or add, modify, and delete connections. You’ll be prompted to enter a new passcode when you enable the option.

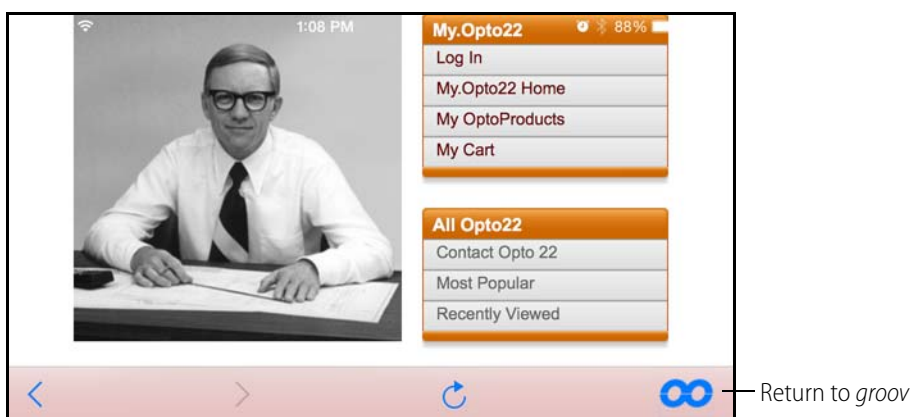
### Navigating *groov* with the iOS App

Use the following techniques to navigate the iOS app:

- **To return to the connection list** without closing the current *groov* connection, simply swipe right. This works in normal view or with Full Screen enabled (see “Adding a *groov* to the iOS App”). The active connection will be shown in green.



- **To return to the current connection**, do one of the following:
  - Swipe left from the connection list.
  - Tap the active connection and choose Resume from the menu.
- **To disconnect from the current connection**, tap the connection in the list, and choose Disconnect.
- **To navigate an external webpage** that opens when you tap a URL link while viewing a *groov* connection, a navigation bar is provided at the bottom of the page. To return to *groov*, click the *groov* icon.



## Using the Android App

In this section:

[“Adding a groov to the Android App”](#)

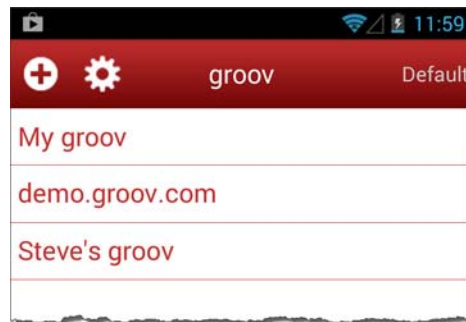
[“Connecting, Editing, and Setting a groov as the Default Using the Android App”](#)

[“Navigating groov with the Android App”](#)

### Adding a *groov* to the Android App

Follow these steps in your Android app to connect to *groov* the first time or whenever you want to add another *groov* connection.

1. Tap the *groov* icon to open a list view for adding one or more *groovs*.



2. Tap  to open the configurator.

 A screenshot of the "Add New groov" configurator screen. The title bar is dark red with the text "Add New groov" in white. Below the title bar are several input fields: "Hostname:" with "https://" entered, "Display Name:" (empty), "Port:" with "443" entered, "Username:" (empty), and "Password:" (empty). At the bottom, there are three toggle switches: "Full Screen" (set to "No"), "Require Passcode" (set to "No"), and "Handheld Layout" (set to "Yes"). At the very bottom are two buttons: "Cancel" and "OK".


3. Enter the following information.

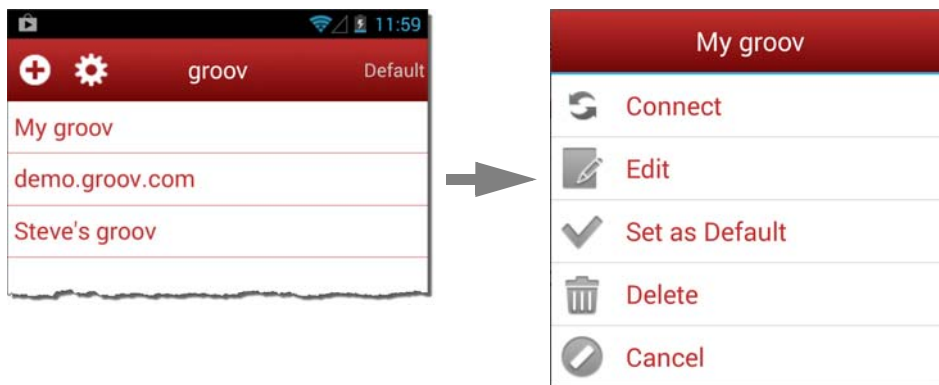
- **Hostname**—Type https:// and *groov*'s hostname or IP address.  
*NOTE: If you are within the company network and have a valid hostname that is registered with the domain server, you still might have to type the fully qualified domain name. For example, if the hostname is "Petrovsgroov" and the domain name is "somecompany.com", you would type "Petrovsgroov.somecompany.com".*
- **Display Name**—Create a name that will appear in the connection list.
- **Port**—Enter the port number, usually 443.
- **Username** and **Password**—Enter the username and password for this connection.
- **Full Screen**—Enable this option to hide navigation to the *groov* list. (With this option enabled, swipe right to go back to the *groov* list.)
- **Require Passcode**—When enabled, the next time you connect to this *groov*, you will be prompted to enter a new passcode which will then be needed each time you attempt to view this connection..
- **Handheld Layout**—Enable this option to force the display to use *groov*'s handheld layout rather than the desktop layout.

4. Tap OK.

### Connecting, Editing, and Setting a *groov* as the Default Using the Android App

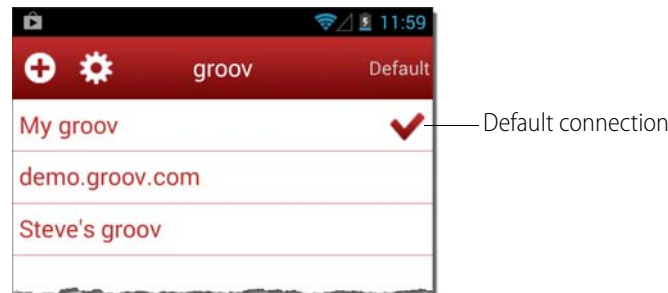
Follow these steps in your Android app to connect to a *groov*, edit the configuration settings, or set a default connection.

1. Start the *groov* app to open a list of connections.  
If you haven't connected a *groov*, see ["Adding a \*groov\* to the Android App."](#) If you have set and enabled a default connection, *groov* View automatically attempts to connect to the default *groov* connection. To return to the list view, tap the back button  or swipe right.
2. Tap a connection in the list to open its *groov* Options.



- **Connect**—Connects to the selected connection.
- **Edit**—Opens the configurator for the selected connection for you to edit the connection settings. The configurator screen is filled with the data from the selected connection, and the title is the Display name (if configured) or the hostname of the connection. For information about the options, see ["Adding a \*groov\* to the Android App."](#)

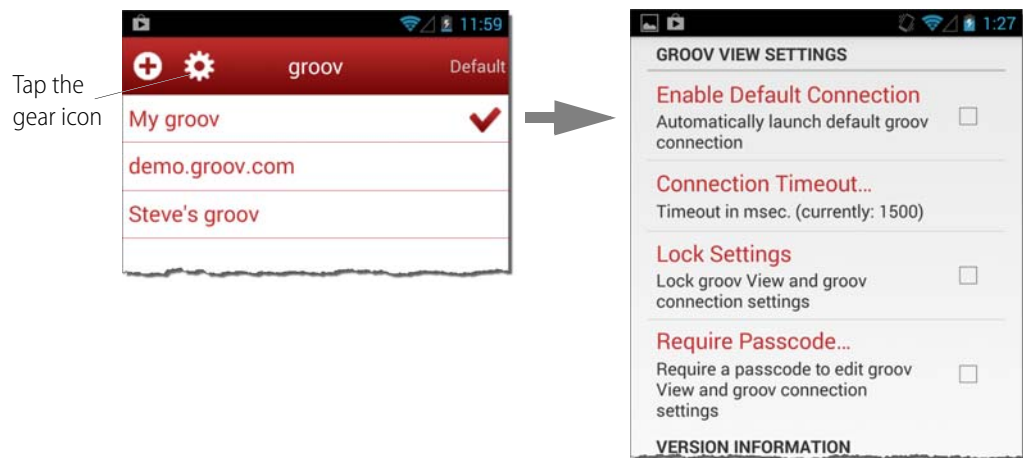
- **Set as Default**—Sets the selected *groov* connection as the default so that when you start the *groov* View app it bypasses the connection list and opens the default connection automatically. For this to work, also turn on Enable Default Connection in the app settings. See “[Using the Android Mobile App Settings](#).” The default connection is indicated with a check mark. Only one device can be the default.



- **Delete**—Deletes the selected *groov*.
- **Cancel**—Exits *groov* Options.

### Using the Android Mobile App Settings

To configure the Android *groov* app settings, tap the gear icon.



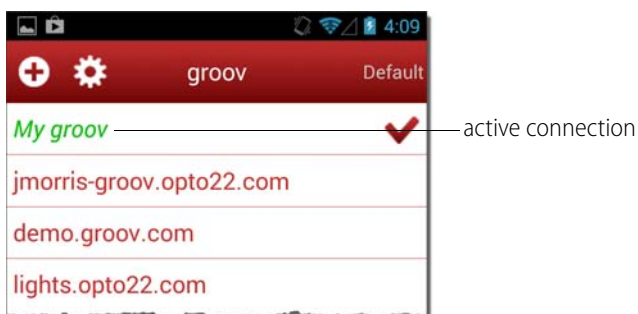
- **Enable Default Connection**—Use this option if you want to bypass the connection list when starting the *groov* app and go directly to the default connection. You will also need to assign a default connection in the *groov* Options. See “[Connecting, Editing, and Setting a \*groov\* as the Default Using the Android App](#).”
- **Connection Timeout**—Set how long the app will spend trying to connect to the *groov* device (called a *connection*). It starts as soon as the Connect menu option is selected.
- **Lock Settings**—When enabled, no devices can be added, modified, or deleted, and the settings themselves can’t be changed. When using this option you’ll also want to require a passcode. Otherwise, anyone can unlock the settings.

- **Require Passcode**—When enabled, the user must enter a passcode to change the settings, or add, modify, and delete devices. You'll be prompted to enter a new passcode when you enable the option.

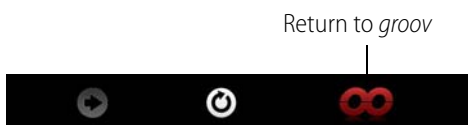
### Navigating *groov* with the Android App

Use the following techniques to navigate the Android app:

- **To return to the connection list** without closing the current *groov* connection, simply swipe right. This works in normal view or with Full Screen enabled (see “Adding a *groov* to the Android App.” The active connection will be shown in green.



- **To return to the current connection**, do one of the following:
  - Swipe left from the connection list.
  - Tap the active connection and choose Resume from the menu.
- **To disconnect from the current connection**, tap the connection in the list, and choose Disconnect.
- **To navigate an external webpage** that opens when you tap a URL link while viewing a *groov* connection, a navigation bar is provided at the bottom of the page. To return to *groov*, click the *groov* icon.



## Using *groov* over the Internet

If you're using a PC or mobile device to communicate with *groov* over the Internet rather than from inside your local area network, you can use either a VPN (virtual private network) or port forwarding. However, a VPN is strongly recommended because it is much more secure. Talk with your IT Department to get a VPN set up. For more information on using a VPN and port forwarding, see [form 1796](#), the *Guide to Networking Opto 22 Products*.

With a less-secure port forwarding connection, *groov* uses the following ports:

Port	For communication with
443 or 8443	<i>groov</i> Build and <i>groov</i> View (443 is the default)
10000	<i>groov</i> Admin (applies to <i>groov</i> Box only)





# 7: Troubleshooting and Additional Help

This chapter provides troubleshooting information and answers questions you may have about *groov*.

## In this chapter:

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Working with <i>groov</i> .....	144
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## Troubleshooting

In addition to the questions and answers in this chapter, see [“Viewing Log Messages” on page 72](#). Admins for *groov* may also find it useful to create an Admin-only page to show system information, such as uptime, number of user sessions, CPU usage, and so on. See [“Adding System Tags” on page 47](#).

### **Q: In *groov* View on my laptop/HDTV/phone/tablet, all I see is a blank page. What's the matter?**

**A:** Two possibilities:

- Your web browser may not fully support the modern standards *groov* is based on. Try downloading the latest version of your browser. Or try a different browser. We generally recommend Firefox or Chrome, but your device might work better with Safari or Internet Explorer.
- You may be logged in as a user who doesn't have access to any pages. Go to *groov* Build and check your users and groups to make sure the user has access. See [“Managing User Access” on page 59](#) for help.

### **Q: In *groov* View on my mobile device, I can't get the pages to load. How do I get to them?**

**A:** First, make sure you have at least the minimum OS for your device:

- Android: 4.0.1 (Ice Cream Sandwich)
- iOS: 5.0

If you're still having problems, don't worry. We've seen some quirks depending on your device and browser. Here are some things to try.

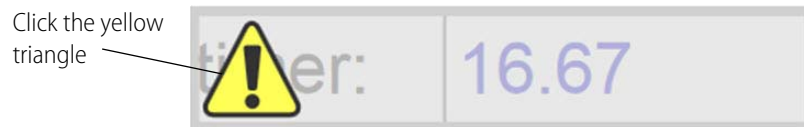
- Try adding your own company domain to the hostname of the *groov* Box or *groov* Server PC. Sometimes the DNS (domain name server) won't resolve the hostname unless you add your domain. Example: instead of `https://opto-02-81-c2` try `https://opto-02-81-c2.opto22.com` (Your domain will be different. Note the period between the hostname and domain.)
- Try adding the port number to the hostname. Port 443 is the default; port 8443 is the secondary, so try them in that order. For example: instead of `https://opto-02-81-c2` try `https://opto-02-81-c2:443` (Note the colon between the hostname and port.)

**Q: I'm in *groov* View, and some of the gadgets are grayed out with a yellow triangle. What's going on?**

**A:** If a gadget is grayed out with a yellow triangle, one of these communication problems is occurring:

- *groov* View isn't communicating with the *groov* Box or Server.
- *groov* isn't communicating with the Modbus/TCP device, PAC controller, or OPC UA server.
- The Modbus device, PAC controller, or OPC UA server is not communicating with your control system or equipment.

Click the yellow triangle to display an information dialog box.



If the information box says that a tag is not available on the controller, make sure the strategy running on that controller matches the `idb.txt` you have associated with that IP address.

Once you've fixed communications, *groov* View will automatically restore the gadget to working order.

*NOTE: The *groov* Box or *groov* Server polls the controller, OPC UA server, or Modbus device for data once per second. This frequency cannot currently be changed.*

**Q: In *groov* View, some of the gadgets are grayed out with a manilla tag. What does this mean?**

**A:** If a gadget is grayed out with a *no-tag* symbol, the gadget does not have a properly configured tag associated with it.

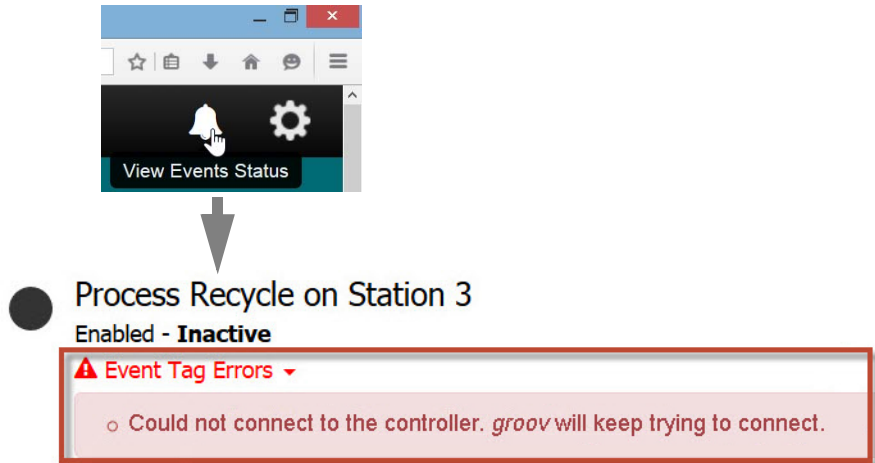


Once you've configured a tag for the gadget, *groov* View will automatically restore the gadget to working order.

**Q: I am not receiving event notifications for properly configured events. What's wrong?**

**A:** You may have lost connection with your Modbus/TCP device, PAC controller, or OPC UA server. If so, *groov* can't check the tags it's supposed to be watching, so you won't receive event notifications for those tags.

Click the Events (bell) icon to open the Events Viewer. If you see the “Could not connect...” error, you’ll need to track down what happened to your lost connection. Also see “Viewing Events” on page 111.



**Q: In *groov* Build, I can’t see the dialog box buttons. How do I make them visible?**

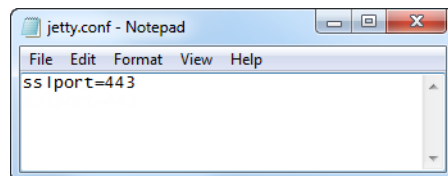
**A:** If you can’t see dialog box buttons, your browser’s font size may be set too high. Reduce the browser’s font size so that you can see them.

**Q: I have *groov* Server and I’m not able to open *groov*. What should I do?**

**A:** There might be a conflict with another service running on your computer. In this case, you might need to change one or both of the ports *groov* Server uses to run.

To change a port number, first consult with your IT manager, and then do the following:

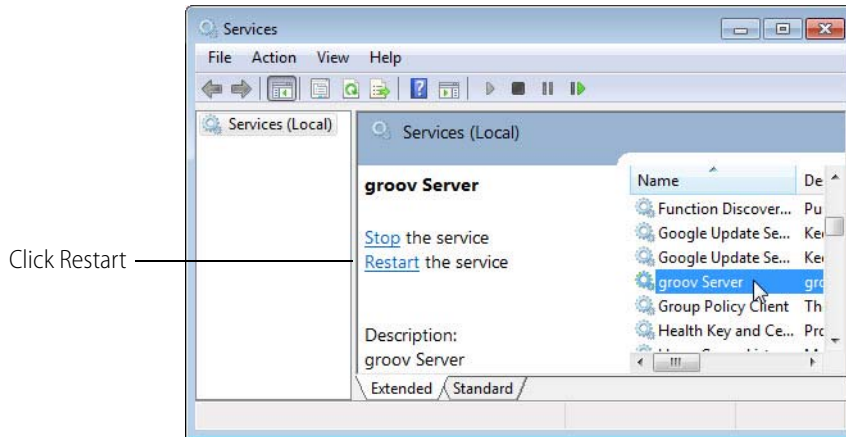
1. Open the `jetty.conf` file installed on the *groov* Server computer. You’ll find the file in `Opto22\groov\jetty`.



2. Change the port as necessary.
3. Save and close the file.
4. Restart *groov* Server and try again.

**To restart *groov* Server:**

5. Open the Windows Control Panel and click Administrative Services.
6. Select *groov* Server.
7. Click Restart.

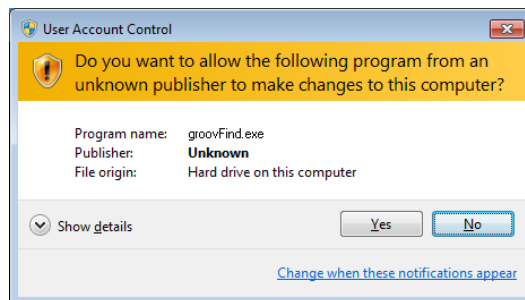


**Q: I have a *groov* Box and a Windows computer, and I'm not able to locate my *groov* Box on the network. What should I do?**

**A:** If you are using a Windows computer, you can use *groov* Find to locate the *groov* Boxes on your network. You *must* use *groov* Find if your network does not have DNS.

1. Insert the *groov* CD in your CD-ROM drive, then click the link to copy the Find application file to your computer.
2. Open the Find application file.

If you have User Account Control (UAC) turned on, a message appears asking if you want Find to be allowed to make changes to your computer. Click Yes.

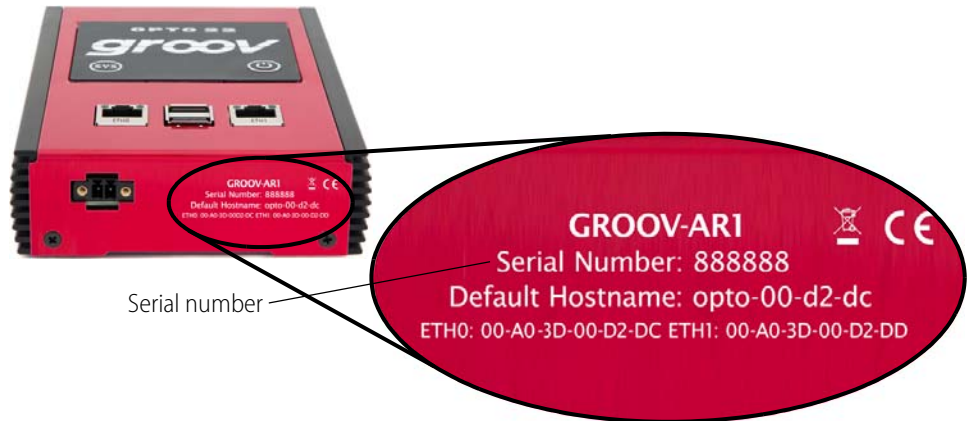


*NOTE 1: If you are using a Windows account that does not have Administrator privileges (such as Guest), you will need to enter the Administrator User Name and Password in order to use *groov* Find. If you do not have this information, contact your IT department.*

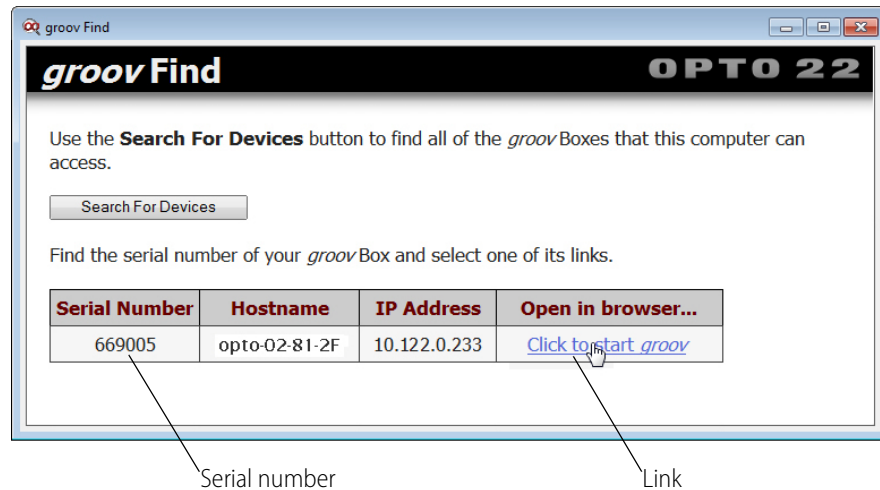
*NOTE 2: Clicking Yes permits Find to have temporary administrative privileges to create an additional temporary IP address for each network interface on the computer. This enables Find to locate a *groov* Box on a network that does not have DNS and DHCP. If the network does not have DNS and DHCP, you will need to assign a static IP address to the *groov* Box in order to maintain communication. (See the *groov* Box User's Guide.) If the network does have DNS and DHCP, the temporary IP address is not used and is removed when you exit Find.*

*groov* Find opens and automatically searches for *groov* Boxes on the network.

3. Find the serial number on the bottom of the *groov* Box.



4. Locate the matching serial number in Find.



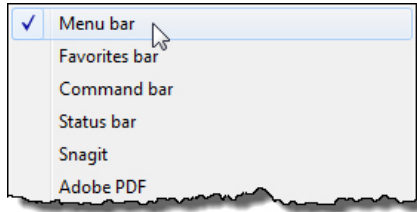
If you do not see the serial number right away, wait 60 seconds and click Search for Devices.

5. Click the link "Click to start *groov*."

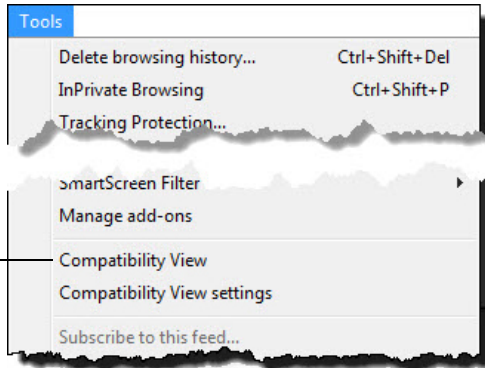
**Q: I'm having trouble using Internet Explorer 10 with *groov*. What should I do?**

**A:** You can try Chrome or Firefox instead if those browsers are available. But if you want to use Internet Explorer 10, do the following steps to make sure the browser is not reverting back to version 9 mode; *groov* is not compatible with Internet Explorer 9.

1. Open Internet Explorer 10.
2. If the menu bar is not already showing, right-click anywhere in the top border of the browser and select the Menu bar option.

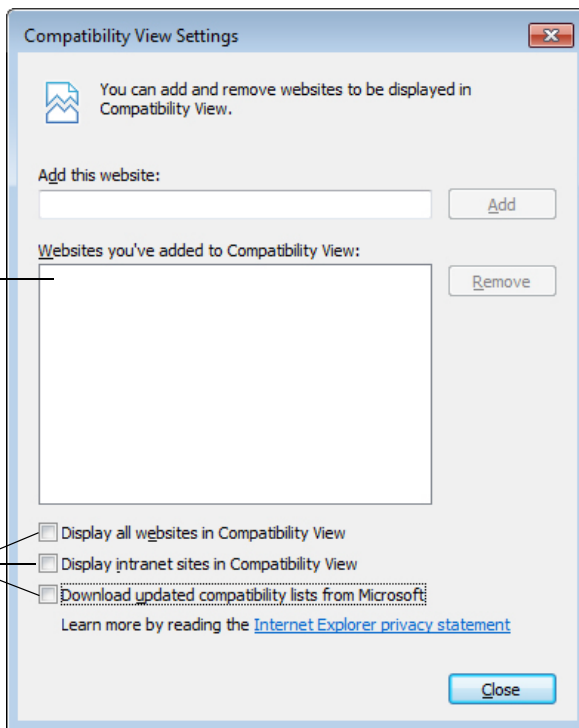


3. Open the Tools menu, and make sure that Compatibility View is not selected.



Make sure this option is not selected.

4. Select Tools > Compatibility View settings.
5. In the Compatibility View Settings dialog box, make sure that no *groov* IP addresses or hostnames are listed under "Websites you've added to Compatibility View."
6. Also, make sure that the compatibility options at the bottom of the dialog box are not checked.



Make sure no *groov* IP addresses or hostnames are listed.

Make sure these options are not checked.

7. Click Close

**Q: My cell phone disconnects from *groov* after about 30 seconds. What should I do?**

**A:** The settings on your phone can cause a connection to the soft access point on the *groov* AR1 to disconnect.

**If you are a Sprint customer:** Try turning off the Connections Optimizer. On your phone, go to Settings > More... > Mobile Networks > Connections Optimizer and uncheck the box for this feature.

**If you are not a Sprint customer:** On your phone, go to Settings > Wifi > Advanced and make sure that the “Avoid poor Internet connection” and “Internet Unavailable” options are unchecked.

**Q: I can't read (or write to) my Modbus/TCP device OR the data I get from my Modbus/TCP device doesn't make sense. What's wrong?**

**A:** Modbus/TCP devices, though based on a standard protocol, may be set up differently from one another. Some use zero-based addressing and some use one-based addressing. Some devices don't support all Modbus functions. Modbus/TCP devices also vary in the way they present float data. And device documentation sometimes doesn't specify how the device is set up.

If you're having trouble reading or writing to your device, or if the data is clearly wrong, start by reading the sections “Modbus Protocol Settings” and “Data Interpretation Settings” on [page 30](#). Consult your device's documentation for help, and change the settings for your Modbus device in Configure > Devices and Tags. You may need to try different combinations of settings to see what works.

If data from the Modbus device doesn't make any sense (looks like garbage or is completely abnormal), change the “Use base one addressing” setting. Or change the combination of Data Interpretation Settings.

Probably the best way to figure out how to connect with any Modbus/TCP device and get the data presented in the right format is to use a Modbus/TCP test utility, like [ModScan32](#) from [www.Win-Tech.com](#). Our Product Support Group recommends this utility.

You can also use the utility [Wireshark](#) ([www.wireshark.org](#)) to see the Modbus/TCP traffic between your devices, so you know exactly what message was sent and what the specific reply was.

If you need help, be sure to contact Opto 22 Product Support (see [page 8](#)). Product support is free.

**Q: I want to check when my license expires or renew my license, but I don't see the Licensing item in the Configure menu. Why not?**

**A:** You must be logged into *groov* Build as an Admin security level user in order to see licensing information or update your license. If you're logged in as an Editor, you won't see Licensing in the Configure menu.

*NOTE: If you're using a *groov* Box, it's easy to confuse *groov* Admin, the software that administers the Box, with the Admin user security level in *groov* Build. What you need for licensing is the Admin username and password for *groov* Build.*

**Q: Is there a forum for *groov*?**

**A:** Yes! There's a [groov OptoForum](#). Find it at [www.opto22.com](#): click Community > OptoForum > *groov*. This is the place to ask and answer questions about *groov*. Experienced engineers and integrators all over the world contribute to OptoForums, so it's a great way to get help at any time.

## Working with *groov*

### Q: How safe is *groov* in terms of information security?

**A:** *groov* uses the same security as your bank: the latest 256-bit encryption, plus authentication with usernames and passwords. For communications over the Internet, we recommend a virtual private network (VPN).

### Q: Can I VPN directly into my *groov* Box?

**A:** No, the *groov* Box is not a VPN server, which is required if you want to use VPN to communicate with *groov*. Find out if your company network has a VPN server. Many do, usually to let employees safely access the network from home or a remote site. Most smartphones have a VPN client built into them. For more information, see form 2161, the [Guide to Networking \*groov\*](#).

### Q: How often does the *groov* operator interface update the data from my control system?

**A:** Your interface in *groov* View polls the Modbus/TCP device, PAC controller, or OPC UA server once per second, so you'll see the live data updated every second. Currently you can't change this rate.

### Q: Why are there two passwords for the *groov* Box?

**A:** When you first set up the *groov* Box, you have to enter two username and password combinations. That's because they're for two separate purposes:

- One is for administering the *groov* Box using *groov* Admin. Here you do things like change network settings or check the status of the Box.
- The other is for building and viewing your operator interfaces using *groov* Build and *groov* View. Here you'll also set up usernames and passwords for the other people in your company who will be using *groov*.

For system security, it's extremely important that you guard these login credentials carefully. Treat them as if they were passwords for your bank account. And **don't lose them**. Since they cannot be retrieved, **you will lose your work if you lose them**.

### Q: What's the hostname?

**A:** The hostname is the name your network uses for a *groov* Box or other devices, like computers, on your network. The default hostname for a *groov* Box is on the label on the Box. The default hostname for a *groov* Server PC is the name of the PC on the network.

To get to *groov*, you type `https://` and the hostname in your web browser.

Example: If the hostname on a *groov* Box label is `opto-02-2b-a6`, you open a browser and type: `https://opto-02-2b-a6`

Example: If the hostname of the PC where *groov* Server is installed is `win8-server`, you open a browser and type: `https://win8-server`

Notice that you have to type `https`, not just `http`. The "s" indicates it's a secure connection.

You can change the hostname from the default to whatever you want to use. See ["Editing a Device's Address" on page 49](#).



**Q: Can I change more than one tag with a single gadget, or stack gadgets to do two things at once?**

**A:** Sorry, not for control. Currently *groov* supports only one tag per gadget. And if you stack gadgets, the one on top wins: it's the only one that will be functional.

From a monitoring standpoint, though, if indicators on the gadget at the back are still visible with another gadget in front, stacking gadgets can work. See [Chapter 4: Gadget Reference](#) for details on each gadget, including transparency (opacity) options and using images or colors to indicate values within a range.

**Q: Can gadgets be restricted to particular operators?**

**A:** Operator permissions are based on a page, so everything on one page must be OK for everyone in a user group to see and change. If some operators should be able to see a gauge and some should not, for example, just create two pages—one that includes the gauge and one that doesn't. Then assign user rights to the pages appropriately. See ["Managing User Groups" on page 62](#).

A page can be different for operators using it on a desktop or tablet versus those using it on a handheld device, however. You can stash individual gadgets so they don't appear in one view while still visible in the other. See ["Using the Page Stash" on page 22](#).

**Q: Can you choose who can edit which pages?**

**A:** At present anyone designated as an Editor can edit all pages on one *groov*. A second *groov* would give you the option to assign different Editors to different pages.

## Opto 22 Systems

**Q: I'm talking to Opto 22 equipment and I can't find my strategy .idb.txt file. Where is it?**

**A:** Your SNAP PAC controller is running the control program (strategy) you built in PAC Control. When you saved that strategy, the .idb.txt file was automatically created on your PC in the same directory as your other strategy files. If you're now using a different PC, you'll need to get the .idb.txt file from the other computer.

If your computer hides common file type extensions (some do), you'll see two files with the same name, the name of your strategy. Just select the file that does not have the PAC Control icon next to it.

*NOTE: If you're using groov with an OptoEMU Sensor, you can get the OptoEMU Sensor.idb.txt file on [opto22.com](http://opto22.com).*

**Q: What's the minimum PAC firmware requirement for groov?**

**A:** The SNAP PAC controller your *groov* connects to must be running 9.2 or newer firmware. If you're using *groov* with an OptoEMU Sensor, you need update file R3.0a or newer.

**Q: How do I set up groov on my network so it connects to my SNAP PAC controller?**

**A:** Take a look at the [Guide to Networking Opto 22 Products](#). This guide gives you details on how to connect *groov* with SNAP PACs inside your facility on the same network or on separate networks, and also how to connect over the Internet.

**Q: If a PAC controller is connected to B3000 serial brains, can I get those tags in *groov*?**

**A:** Yes. If the tag is in the controller, it can be displayed in *groov*.

**Q: Can I use *groov* with my FactoryFloor system? I have an Ethernet card.**

**A:** Yes, but not directly. *groov* works with all SNAP PACs running 9.2 firmware or higher (SNAP PAC S-series controllers, SNAP PAC R-series controllers, SoftPAC software-based controller), and with OptoEMU Sensor energy monitoring units running update file R3.0a or newer.

*groov* does not work with Opto 22 FactoryFloor, SNAP Ultimate I/O, SNAP-LCSX, or other legacy controllers, or pre-9.2 SNAP PACs.

However, it's still possible to use *groov* with these legacy systems by installing KEPServerEX with the OPC Connectivity Suite. Connect to your FactoryFloor OPC Server (which is an OPC-DA server). Then *groov* (which is an OPC UA client) connects to KEPServerEX, and you can import your tags.

Normally *groov* references the names of I/O points in a SNAP PAC controller running a PAC Control strategy; *groov* does not directly access Opto 22 brains. If you have the Kepware Opto 22 Ethernet OPC Server, however, you can add tags to connect directly to I/O.

**Q: Can I use *groov* to access I/O points on my SNAP PAC brain?**

**A:** Yes, through a SNAP PAC controller. *groov* does not access the brain directly; it works through a SNAP PAC controller running a PAC Control strategy.

**Q: Can I use tables in *groov*?**

**A:** You can select individual elements (indices) of a table. *groov* supports all of these data types: integer, float, and string variables and tables, and analog and digital I/O.

**Q: How do I use timers/PIDs/Scratch Pad in *groov*?**

**A:** *groov* supports integer, float, timer, and string variables and tables, and analog and digital I/O. To use elements in a PID loop, memory-map Scratch Pad elements, or other data you need in a *groov* interface, just periodically move the data you want into a variable. Voilà! *groov* can see and use it.

# A: IP Cameras

The Video gadget works with IP cameras that can serve a single image in response to an http request without the need for an ActiveX control. Make sure that the IP camera or server is configured to provide a single frame at a time. IP cameras serve content in a variety of ways, but single-frame display is a very common configuration option.

We have successfully used the following IP cameras in our projects:

- Foscam Fi8910w
- Foscam Fi9802w
- Vivotek FD8361
- Vivotek IP8352

If you are using a make or model IP camera other than ones listed here, you can try using one of the example URLs described in the sections below.

## In this appendix:

<a href="#">Serving a Single Image in Response to an HTTP request.....</a>	147
<a href="#">Setting up the IP Camera's Username and Password .....</a>	148
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## Serving a Single Image in Response to an HTTP request

*groov* does not support streaming. Instead it uses a web browser to retrieve a sequence of images from an IP camera. Therefore, when you set up a Video gadget you cannot simply paste the IP camera's IP address (like you can in your browser). Nor can you use the link that leads to the IP camera video stream. Instead you need to construct a link that will retrieve a single image from your IP camera is. Your link will look something like this:

```
http://123.123.123.123/snapshot.cgi
```

Every IP camera is different so you will have to look in your IP camera's documentation to find out what your specific IP camera uses. It might be called either a *snapshot* or *single shot*.

*TIP: To find URL information for your IP camera on the Internet, try doing a search using your IP camera model number and the word "snapshot."*

## Setting up the IP Camera's Username and Password

If your IP camera requires a password, you will need to include the user name and password in the URL that the browser passes to the IP camera.

*NOTE: Not all IP cameras use the same format, so you will need to refer to your IP camera's documentation for the exact syntax.*

1. Construct the URL to include the user name and password.

For example:

```
http://123.123.123.123/snapshot.cgi?user=yourusername&pwd=yourpassword
```

Make sure to use your IP camera's IP address and link information, and use the appropriate user name and password to replace *yourusername* and *yourpassword*. If you do not provide the user name and password in the URL, View will display an empty box instead of the image and prompt you for the user name and password.

*NOTE: The link will not be secure because you are passing the username and password in plain text, so it is easy to sniff.*

2. Open the URL in a new browser tab.

You should see a static picture.

3. Try clicking Refresh or Reload in the browser.

If the static picture updates to a new picture, this means you've got a IP camera and a URL that will work with the *groov* app.

4. Copy and paste the URL into the video gadget, and then save the project.

In View the image is refreshed at the rate set in Configure > Project in *groov* Build.

*NOTE: It is the browser that polls the IP camera, not the groov box. So the browser that needs to have network access, permissions, etc to access the IP camera, not the groov box.*

If you use this procedure and cannot get the web browser to display a static image from the IP camera, it is not a *groov* issue. It is an issue with the IP camera itself or its configuration, the browser or browser settings, the network (e.g. not on same subnet), or network permissions. For more information, see "[Viewing a IP Camera Outside the Network](#)" on page 149.

## Foscam IP Cameras

### Foscam Fi8910w

#### Sample URL:

```
http://123.123.123.123/snapshot.cgi?user=UUUU&pwd=PPPP
```

Change the IP address to match your internal or external IP address. Change UUUU to the username for the IP camera, and change PPPP to the password for the IP camera.

## Foscam Fi9802w

### Sample URL:

```
http://123.123.123.123/cgi-bin/CGIProxy.fcgi?cmd=snapPicture2&usr=UUUU&pwd=PPPP
```

1. Change the IP address to match your internal or external IP address.
2. Change UUUU to the username for the IP camera, and change PPPP to the password for the IP camera.
3. If you are using a different port than port 80, you will need to add that to the URL.  
For example, some Foscam IP cameras use port 88, so 88 is added to the URL as follows:

```
http://123.123.123.123:88/cgi-bin/CGIProxy.fcgi?cmd=snapPicture2&usr=UUUU&pwd=PPPP
```

## Vivotek IP Cameras

IP cameras tested:

- Vivotek FD8361
- Vivotek IP8352

For details on how to construct a URL for a Vivotek IP camera and configure security, see the documentation that came with the IP camera.

### Example URL:

Here is an example of a URL to use with a Vivotek IP camera that is compatible with *groov*.

```
http://opto22.groov.com:8082/cgi-bin/viewer/video.jpg?channel=1&resolution=640x480&quality=3
```

This IP camera is on port 8082, and it has been configured with a user *viewer* that has no username or password. Your IP camera may be configured differently.

## Viewing a IP Camera Outside the Network

If you wish to view your IP camera image from outside your network, you have two options.

- Option 1: Ensure your IP camera can be accessed from out the local area network it is configured on. Please discuss this with your IT department to set up A VPN or allow a port forward on your router to the IP camera.
- Option 2: Use the Proxy option for the video gadget. In this case *groov* will poll the IP camera over your local area network and present the updated video frames to the client at the rate (in seconds) set on the video gadget.

**CAUTION:** *Be aware that anyone with access to groov Build can view the username and password to the IP camera in clear text. This should be accounted for when setting up access to groov Build and access to the IP camera.*

## Changing the Video Gadget Refresh Period

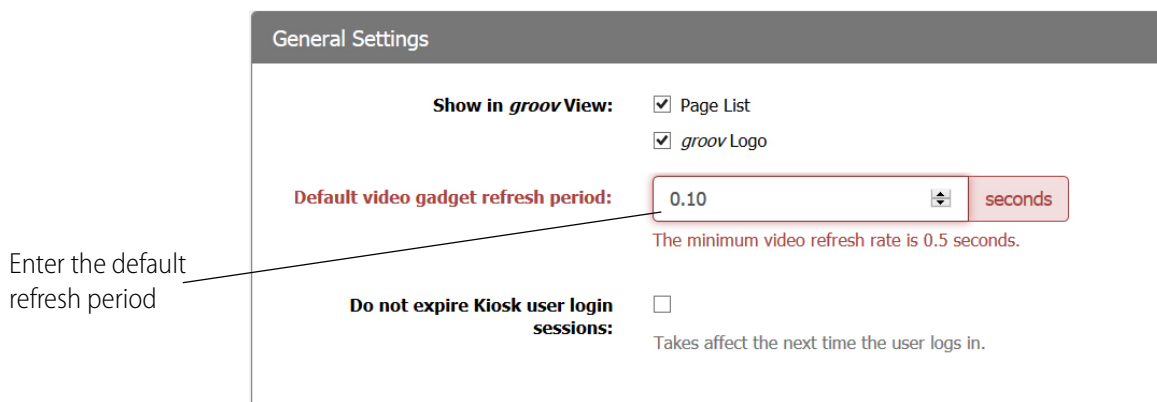
The video gadget refresh period sets how often in seconds *groov* refreshes the image from an IP camera. You can set the default update period for all instances of the video gadget, or you can set the refresh period for an individual instance.

If you have a fast Internet connection and are not concerned about data use, then you can use the fastest setting (0.5 seconds) for a smoother video. However, if you have slower connection, the video might not be able to keep up, and you should back off the rate by entering a bigger value. Also, if you have a data use cap, you should probably back off the rate.

Satellite or cell modem networks may require refresh rates of 5 seconds or slower. For example, the default 0.5 seconds may be too fast for some ADSL connections.

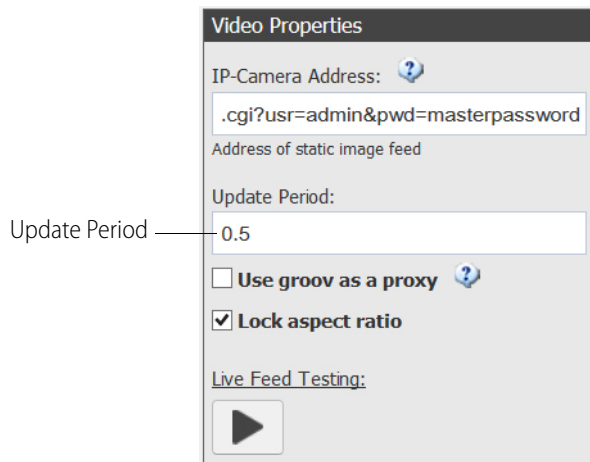
### To set the default update period for all video gadgets, do the following:

In Build, go to Configure > Project. In the General Settings window, enter a value for the “Default video gadget refresh period.” Click Save Settings, and then click Close.



### To set the update period for an individual instance of the video gadget, do the following:

In Build, click the video gadget to display the Video Properties. Enter a value for the Update Period.



# B: OPC UA Data Types Supported

The table below shows the official Browse Name for OPC UA data types and the corresponding names used in *groov*. The official OPC UA data type names are defined in the [UA Specification \(Part 5, Section 12\)](#). For information about the data types supported by a specific OPC UA server, see that company's documentation.

OPC UA Type	<i>groov</i>
Boolean	Boolean
String	String
SByte	Signed Byte
Int16	16-bit Signed Integer
Int32	32-bit Signed Integer
Int64	64-bit Signed Integer
Byte	Unsigned Byte
UInt16	16-bit Unsigned Integer
UInt32	32-bit Unsigned Integer
UInt64	64-bit Unsigned Integer
Float	Single Float
Double	Double Float





# C: Data Simulator Tags

The tags provided with *groov*'s built-in Data Simulator allow you to experiment with adding tags to gadgets, configuring the tags, and running your project in *groov* View. This appendix lists the Data Simulator tags and briefly describes what they do. The first section describes the Basic Tags. For Advanced Tags, see [page 157](#).

## Basic Tags

"Variables" (below)

"General" on [page 154](#)

"Square Waves" on [page 156](#)

"Sine Waves" on [page 156](#)

### Variables

Unlike many other tags in the Data Simulator, you can read and write these basic variable tags. There are five each of boolean, float 32, integer 32, and string data types.

Variable Name	Data Type
bool Variable A	boolean
bool Variable B	boolean
bool Variable C	boolean
bool Variable D	boolean
bool Variable E	boolean
float32 Variable A	32-bit float
float32 Variable B	32-bit float
float32 Variable C	32-bit float
float32 Variable D	32-bit float
float32 Variable E	32-bit float

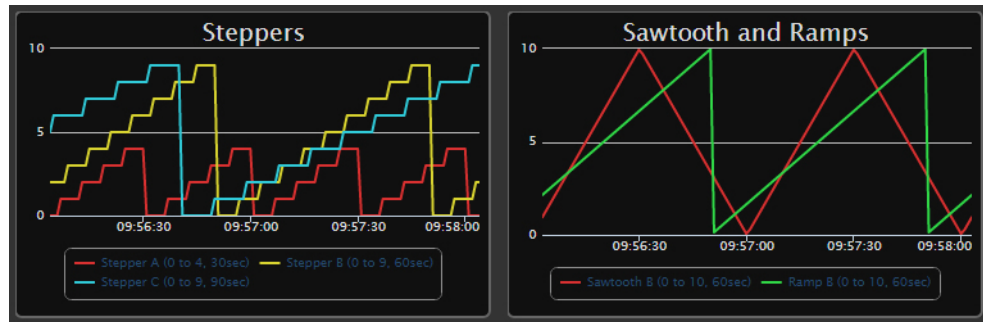
Variable Name	Data Type
int32 Variable A	32-bit integer
int32 Variable B	32-bit integer
int32 Variable C	32-bit integer
int32 Variable D	32-bit integer
int32 Variable E	32-bit integer
string Variable A	string
string Variable B	string
string Variable C	string
string Variable D	string
string Variable E	string

## General

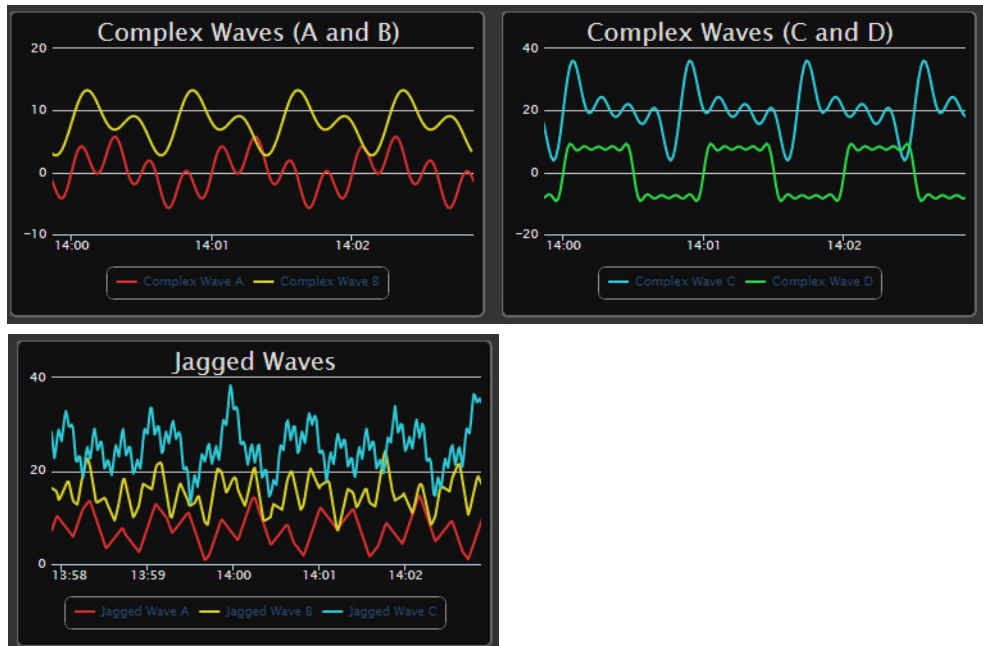
The complex and jagged waves have various ranges so that they don't overlap too much when placed on the same Trend.

Variable Name	Data Type	Description
Complex Wave A	32-bit float	A complex but smooth wave, composed of various sine waves, with values ranging from -6 to 6.
Complex Wave B	32-bit float	A complex but smooth wave, composed of various sine waves, with values ranging from 2 to 14.
Complex Wave C	32-bit float	A complex but smooth wave, composed of various sine waves, with values ranging from 0 to 40.
Complex Wave D	32-bit float	A complex but smooth wave, composed of various sine waves, with values ranging from -10 to 10.
Jagged Wave A	32-bit float	A jagged wave, composed of various sawtooth patterns, with values ranging from 0 to 15.
Jagged Wave B	32-bit float	A jagged wave, composed of various sawtooth patterns, with values ranging from 5 to 25.
Jagged Wave C	32-bit float	A jagged wave, composed of various sawtooth patterns, with values ranging from 10 to 40.
Ramp A (0 to 10, 30 sec)	32-bit float	A ramp pattern, from 0 to 10, with a 30 second period.
Ramp B (0 to 10, 60 sec)	32-bit float	A ramp pattern, from 0 to 10, with a 60 second period.
Sawtooth A (0 to 10, 30 sec)	32-bit float	A sawtooth pattern, from 0 to 10, with a 30 second period.
Sawtooth B (0 to 10, 60 sec)	32-bit float	A sawtooth pattern, from 0 to 10, with a 60 second period.
Stepper A (0 to 4, 30 sec)	32-bit integer	Steps from values 0 to 4 over a period of 30 seconds.
Stepper B (0 to 9, 60 sec)	32-bit integer	Steps from values 0 to 9 over a period of 60 seconds.
Stepper C (0 to 9, 90 sec)	32-bit integer	Steps from values 0 to 9 over a period of 90 seconds.

### Sample Stepper, Sawtooth, and Ramp Waves



### Sample Complex and Jagged Waves



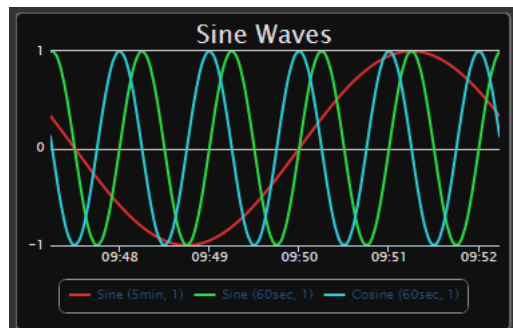
## Square Waves

Variable Name	Data Type	Description
Square Wave A (1 sec true/false)	boolean	A square wave with a period of 2 seconds: TRUE for 1 second then FALSE for 1 second
Square Wave B (2 sec true/false)	boolean	A square wave with a period of 4 seconds: TRUE for 2 seconds then FALSE for 2 seconds
Square Wave C (5 sec true/false)	boolean	A square wave with a period of 10 seconds: TRUE for 5 seconds then FALSE for 5 seconds
Square Wave D (10 sec true/false)	boolean	A square wave with a period of 20 seconds: TRUE for 10 seconds then FALSE for 10 seconds
Square Wave E (Random period)	boolean	A square wave with random TRUE/FALSE periods. Each TRUE and FALSE state will be within 2 and 4 seconds.
Square Wave F (Random period)	boolean	A square wave with random TRUE/FALSE periods. Each TRUE and FALSE state will be within 4 and 8 seconds.
Square Wave G (Random period)	boolean	A square wave with random TRUE/FALSE periods. Each TRUE and FALSE state will be within 6 and 12 seconds

## Sine Waves

Wave Name	Data Type	Description
Cosine (30 sec)	32-bit float	Cosine wave with a 30 second period and amplitude of 1
Cosine (60 sec)	32-bit float	Cosine wave with a 60 second period and amplitude of 1
Sine (15 min)	32-bit float	Sine wave with a 15 minute period and amplitude of 1
Sine (30 min)	32-bit float	Sine wave with a 30 minute period and amplitude of 1
Sine (30 sec)	32-bit float	Sine wave with a 30 second period and amplitude of 1
Sine (5 min)	32-bit float	Sine wave with a 5 minute period and amplitude of 1
Sine (60 sec)	32-bit float	Sine wave with a 60 second period and amplitude of 1

## Sample Sine Waves



## Advanced Tags

[“Variables \(Extra\)”](#) (below)

[“Arrays”](#) on page 158

[“User Controllable”](#) on page 158

[“Static Values”](#) on page 159

### Variables (Extra)

These variables have data types that are used less often. Unlike many other tags in the Data Simulator, you can read and write these variable tags. There are three of each type.

Variable Name	Data Type
float64 Variable A	64-bit float
float64 Variable B	64-bit float
float64 Variable C	64-bit float
int16 Variable A	16-bit integer
int16 Variable B	16-bit integer
int16 Variable C	16-bit integer
int64 Variable A	64-bit integer
int64 Variable B	64-bit integer
int64 Variable C	64-bit integer
int8 Variable A	8-bit integer
int8 Variable B	8-bit integer
int8 Variable C	8-bit integer
uint16 Variable A	16-bit unsigned integer
uint16 Variable B	16-bit unsigned integer
uint16 Variable C	16-bit unsigned integer
uint32 Variable A	32-bit unsigned integer
uint32 Variable B	32-bit unsigned integer
uint32 Variable C	32-bit unsigned integer
uint64 Variable A	64-bit unsigned integer
uint64 Variable B	64-bit unsigned integer
uint64 Variable C	64-bit unsigned integer
uint8 Variable A	8-bit unsigned integer
uint8 Variable B	8-bit unsigned integer
uint8 Variable C	8-bit unsigned integer

## Arrays

The arrays have the most common data types. Like the variables, you can read and write to the elements in the array tags.

Array Name	Data Type
bool Array [100]	boolean table
float32 Array [100]	32- bit float table
int32 Array [100]	32-bit integer table
string Array [100]	string table

## User Controllable

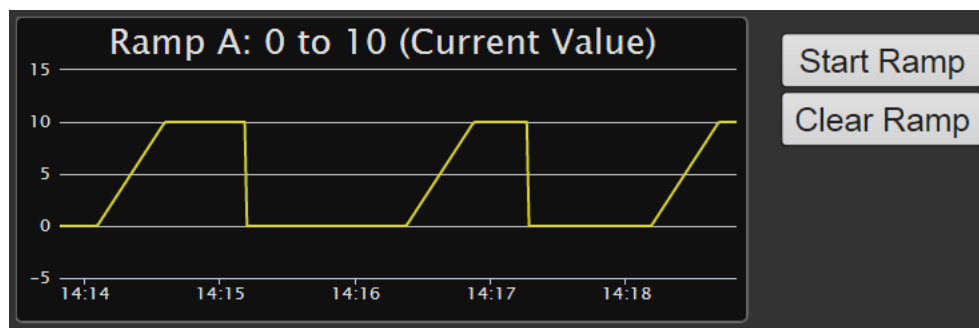
There are two user-controllable waves (or patterns) that provide you something to interact with in the *groov* interface.

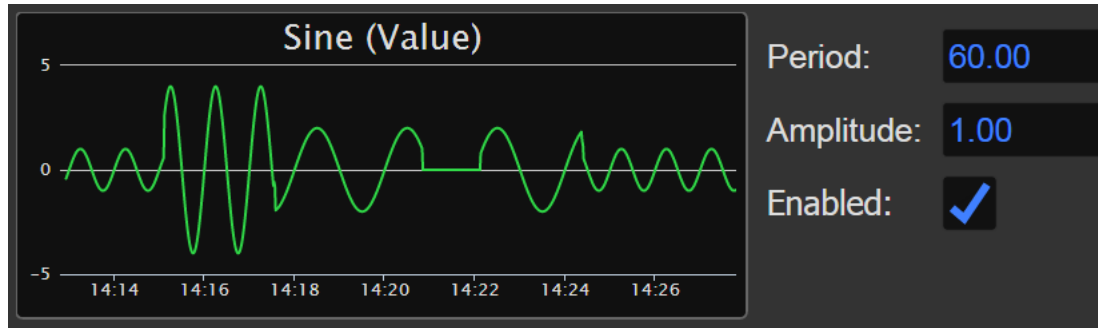
**Ramp A: 0 to 10** is a ramping float32 value that you can start and then clear it back to 0.

**Sine** is a sine wave that you can control the period and amplitude. You can also disable the sine wave, during which time it has a value of 0.

Wave Name	Data Type	Notes
Ramp A: 0 to 10 (Clear Flag)	boolean	A boolean flag to clear the ramp
Ramp A: 0 to 10 (Current Value)	32-bit float	The current value of the ramp
Ramp A: 0 to 10 (Start Flag)	boolean	A boolean flag for starting the ramp
Sine (Amplitude, 1 to 1000)	32-bit float	The amplitude of the sine wave (0 to 1000)
Sine (Enabled Flag)	boolean	The enable flag for the sine way (Setting this tag to False will disable the sine wave and set its current value to 0.)
Sine (Period, 1 to 1000 sec)	32-bit float	The period of the sine wave (1 to 1000 seconds)
Sine (Value)	32-bit float	The current value of the sine wave.

## Sample Ramp and Sine Waves





## Static Values

These tags have static values, which means that they never change.

Static Value Name	Data Type	Notes
bool Always False	boolean	Always boolean "false"
bool Always True	boolean	Always boolean "true"
float32 Always +INF	32-bit float	Always float32 "+INF"
float32 Always -INF	32-bit float	Always float32 "-INF"
float32 Always 0.0	32-bit float	Always float32 "0.0"
float32 Always 1.0	32-bit float	Always float32 "1.0"
float32 Always NaN	32-bit float	Always float32 "NaN"
float64 Always +INF	64-bit float	Always float64 "+INF"
float64 Always -INF	64-bit float	Always float64 "-INF"
float64 Always NaN	64-bit float	Always float64 "NaN"
int32 Always 0	32-bit integer	Always an int32 "0"
int32 Always 1	32-bit integer	Always an int32 "1"
string Always ABC	string	Always a string of "ABC"
string Always Opto 22	string	Always a string of "Opto 22"





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