

groov

Features

- > Build your own mobile operator interface to monitor and control automation systems, OEM machines, and Internet of Things (IoT) devices and software.
- > Create a browser-based operator interface in minutes and view it on any mobile device or computer
- > No programming; just drag, drop, and tag
- > Event logging and notifications
- > Security through TLS/SSL encryption and username/password authentication
- > No tag limits; no client licenses required
- > Data Simulator for project testing without connecting to live machines or systems
- > Data Store with RESTful API for secure data exchange with databases, systems, and equipment
- > Free mobile apps available for iOS and Android



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. Or use any brand device, from a smartphone to a web-enabled big-screen TV, and 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

DESCRIPTION

groov is Opto 22's web-based Internet of Things (IoT) and operator interface system that is *simple*, *mobile*, and *connects easily* to automation systems, software, databases, and devices of all kinds.

Simple: *groov* requires only a web browser to connect to devices and build mobile interfaces so you can monitor and control them. *groov* 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 operator interfaces work on smartphones, tablets, and other mobile devices, and can be branded with your own logo and colors.

Part Numbers

Part	Description
GROOV-AR1-BASE	<i>groov</i> Solo: <i>groov</i> Box for one Modbus/TCP device, one SNAP PAC, or one Data Store; includes Node-RED
GROOV-SVR-WIN-BASE	<i>groov</i> Solo: <i>groov</i> Server for Windows for one Modbus/TCP device, one SNAP PAC, or one Data Store
GROOV-LIC-PLUS	<i>groov</i> Plus: Add to <i>groov</i> Solo for multiple Modbus/TCP devices, SNAP PACs, and Data Stores
GROOV-LIC-ENT	<i>groov</i> Enterprise: Add to <i>groov</i> Solo for systems that support OPC UA, in addition to multiple Modbus/TCP devices, SNAP PACs, and Data Stores.
GROOV-LIC-OPE	<i>groov</i> Enterprise: Add to <i>groov</i> Plus for systems that support OPC UA, in addition to multiple Modbus/TCP devices, SNAP PACs, and Data Stores
Maintenance	
GROOV-MNT1Y	One-year maintenance
GROOV-MNT3Y	Three-year maintenance

time and in any location. Using event notification, selected personnel can be alerted anywhere about system events based on one or more conditions.

Connects easily: You can connect *groov* to several data sources for monitoring and control in your mobile interface:

- Connect directly to Modbus/TCP devices and Opto 22 SNAP PAC controllers to access their data.
- Connect to PLCs and PACs from other manufacturers, such as Allen-Bradley ControlLogix and CompactLogix, Siemens SIMATIC S7, Schneider Electric Modicon, and GE PACSystems—and to any database or system supported by your server—through an OPC UA (Unified Architecture) server.
- Use your database, a cloud service, or an API (application program interface) to place data in or read data from a *groov* Data Store, where you can access it for use in your mobile interface.
- (GROOV-AR1 *groov* Box only) Use Node-RED (included) to create logical flows for data you use in *groov*. Also connect to serial devices—Modbus RTU/ASCII, weigh scales, and more—via a USB-to-serial converter and Node-RED.

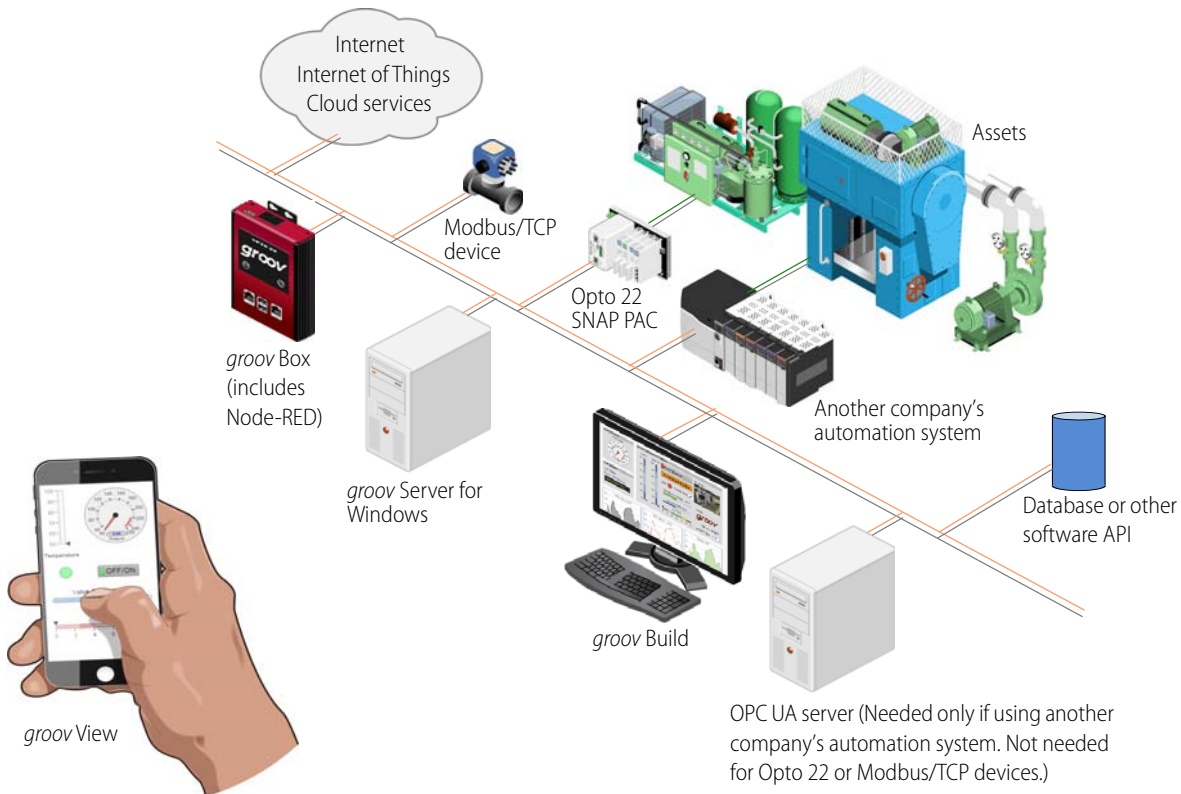
groov brings key data from process control, OEM machines, manufacturing and building systems, and the Internet of Things (IoT) into the hands of those who need it.



groov View on a tablet and a smartphone

BUILD AND VIEW YOUR INTERFACE

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 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 runs a *groov* operator interface that resides on a *groov* Box or *groov* Server. The interface is accessed using the free *groov* View app on an iOS or Android smartphone or tablet, or on any device with a web browser and a network connection to *groov*.

groov Admin is included with a *groov* Box and provides the tools to back up and restore your project, update software and firmware, set up wired and wireless networking, and use the built-in open-source programming environment Node-RED. (*groov* Admin is not needed for *groov* Server for Windows because its functions are provided by the Windows PC.)

SECURITY

When you're sending and receiving data to automation equipment and devices, security is critical. In addition to the security you provide in your network and firewall, *groov* offers four important ways to keep your data safe.

Encryption. All communications between your users and the *groov* Box or *groov* Server are encrypted using the latest TLS/SSL methods. This is the same encryption your bank uses.

Authentication. Usernames and passwords (or API keys for software users) are required for all users and are set up in *groov* Build by an Admin user. Make sure your users understand the importance of keeping their passwords and API keys secret.

Access limitations. Security levels for users (Admin, Editor, Operator, and Kiosk User) determine what each of your users can and cannot do in *groov*.

In addition, you can assign your users to groups and limit each group's access to specific pages in your *groov* interface. For example, pages for a group called Supervisors could show KPIs for production, while pages for a group called Technicians might include controls.

You also have the option to hide gadgets for users on phones while showing them to users on desktops and tablets, or vice versa.

Passcodes for mobile apps. If you use the free mobile device apps *groov* View for iOS and *groov* View for Android, you can also set up a passcode. Even if an unauthorized person has the phone or tablet, they have to know the passcode to see the *groov* interface.

EVENT LOGGING AND NOTIFICATIONS

groov logs events you configure, and you can view the current status of events as well as the event log in either *groov* Build or *groov* View. You can sort and filter what you want to see in the log and also download it as a text file. The log holds 200 MB of the most recent events (typically over a million entries).

Each event you configure is based on one or more conditions, such as a value equal to a value you specify, or a value outside a range you determine. When you set up multiple conditions for one event, the event can be configured to occur when all of them are true or when any one is true.

You can also choose to alert selected personnel when an event occurs. These event-based notifications are sent via email (or text message, through most carriers).

Event messages can be customized and sent to groups or individuals. Messages can include equipment data, time/date stamps, other key information, and even links back to the *groov* operator interface for one-click access to real-time, visual data for further investigation.

For example, if a machine overheats, stops working, or otherwise meets or exceeds one or more predefined criteria, a maintenance technician can receive a notification and click right to the *groov* screen for more data. With email available at almost any time or location thanks to mobile devices such as smartphones, notifications can get critical data into the right hands right away.

MOBILE DEVICE APPS

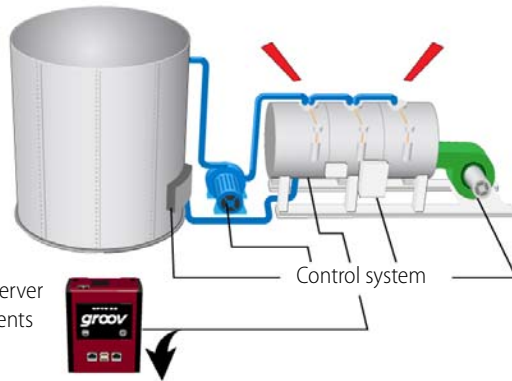
groov View for iOS and **groov View for Android** are free native apps for your tablet or smartphone. You can run *groov* in your browser, but these apps display your interface in full-screen mode.

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 *groov* Box or *groov* Server for Windows logs the events you configure.

See, sort, filter, and download the Events Log in *groov* View or *groov* Build.

- Tank level**
 - If Full → Email me
 - If Empty → Email me
- Boiler Temperature**
 - If Too Hot! → Text me



Event Logging and Notifications

All control system data is available for configuring events. You can base an event on one or multiple conditions. When an event occurs, you can optionally notify selected users by email (or text message, through some carriers).

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 runs only *groov*.

[Get groov View for iOS.](#)
[Get groov View for Android.](#)

default, you also have full control over graphic and text sizes and appearance. You can alter layouts to suit a PC/tablet or a smartphone. You can also brand your operator interface with your own logo and colors.

Changing the interface is as easy as building it, and changes are immediately visible to users as soon as they refresh their screens.

USING GADGETS

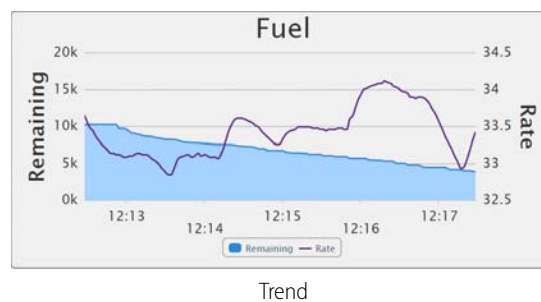
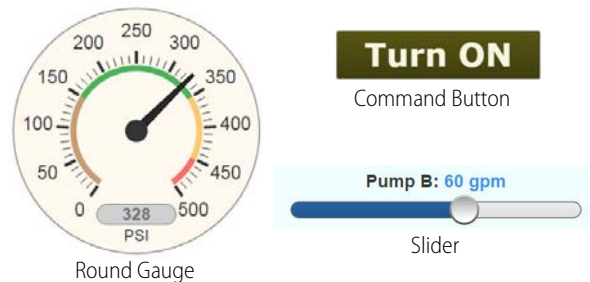
To build your project, you use *groov's* ready-made gadgets. Here are just a few examples; many other gadgets are included:

- A Round Gauge displays a value using a rotating needle and decimal numerical display.
- A Command Button sends a command.
- A Slider adjusts a variable.
- A Trend shows how a variable changes in real time.

To set up a gadget, you import tags from your system or device, select one of the tags from your tag database, and then associate it with a gadget available for that tag. Once you have set gadget-specific properties and saved your project, a gadget is immediately ready to use in View.

A number of gadgets give you display choices. For example, a button can be skinned with an image. Or a link to another page or a URL can appear as a text link, a button, or an image. The Image Indicator gadget uses multiple images to display current status or value.

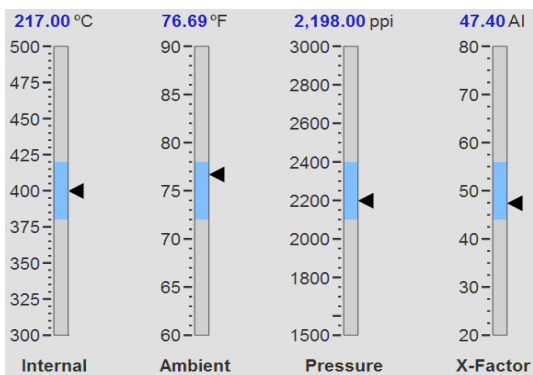
Gadgets and text in your interface default to usable sizes and colors, so you can build it rapidly. But if you want it to look different from the



When you build good HMI design into your *groov* project, your interface helps operators work more effectively.

For example, multiple Range Indicator gadgets that clearly show the normal range tell an operator at a glance whether a system is running as it should. A bank of indicators like this (see image below) gives operators context and is far more useful than just a list of numeric values.

For more information on good HMI design, see Opto 22 form 2061, *Building an HMI that Works*.



Range Indicators show system status at a glance.

IMAGE LIBRARY

All images used in your *groov* project are stored in the Image Library. The same image can be used in multiple places, and if you change the image, it is updated everywhere it is used.

It's easy to add images to the Library or delete them when no longer needed. The Image Library accepts many kinds of image files, including photos, drawings, and logos with file types BMP, GIF, PNG, JPG, and SVG. For each image, the Library includes the image itself plus filename, size, and date added. You can also add notes if you wish.

Many useful drawings (manufacturing, processing, building, and commercial equipment, field sensors and devices, and much more) are available in our free [SVG Image Library on groov.com](#) (choose Support > SVG Image Library). Select the drawing you want, choose colors, rotate if necessary, and download it ready to use in your *groov* interface.

DATA STORE

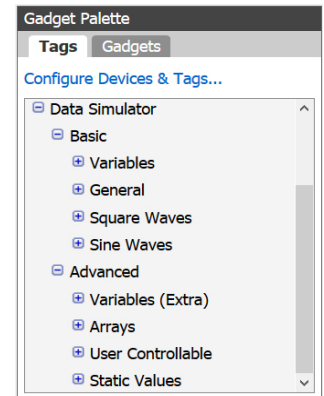
Visualize and use data from IoT devices, databases, cloud services, and more in your *groov* mobile operator interface. Create a Data Store device in *groov* and securely place or access data there using the Data

Store's RESTful API and the programming language of your choice. Your *groov* users can then view, control, see trends, and receive notifications on this data. If you have a *groov* Box, open-source Node-RED (included in the Box) is an easy way to wire these data sources together.

DATA SIMULATOR

A Data Simulator built into *groov* provides simulated dynamic and fixed values for onscreen gadgets, so you can explore or test before connecting to real-world systems and equipment.

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.



This feature can help test onscreen gadgets or simulate tags and variables during screen development.

CHOOSE YOUR GROOV

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. It also includes Node-RED, an open-source, multi-platform software tool for wiring together databases, cloud applications, and APIs to produce Internet of Things (IoT) applications quickly and inexpensively. Through Node-RED the *groov* Box can also use a USB-to-serial converter with FTDI chipset to connect to serial devices like weigh scales, Modbus RTU/ASCII devices, and more. The *groov* Box can communicate over a standard Ethernet network or wireless LAN (optional; requires third-party WiFi adapter), or both.



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.

Whether you serve *groov* software from a *groov* Box or a computer using *groov* Server for Windows, your *groov* operator interface 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.

- For more information on the *groov* Box, see the [groov Box User's Guide](#) (form 2104).
- For *groov* Server, see the [groov Server for Windows User's Guide](#) (form 2078).

COST-EFFECTIVE 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, Opto 22 SNAP PAC controllers, and Data Stores will be connected to *groov*, and whether an OPC UA server or OPC UA-compatible hardware device will be used. (The Data Simulator and *groov* System data are included with all platforms.)

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, or one Data Store. *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, Opto 22 SNAP PAC controllers, and Data Stores. *groov* Plus is best for multi-machine, system, and software 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, Opto 22 SNAP PAC controllers, and Data Stores.

Applications change, and if you need to connect more devices to *groov*, or add an OPC UA server or OPC UA-compatible equipment, you can quickly upgrade from one *groov* platform to the next.

TRY BEFORE YOU BUY

A fully functional version of the software-based *groov* Server for Windows is available to download and try so you can see system data on a smartphone, tablet, or other mobile device. Connect to a Modbus/TCP device, SNAP PAC controller, or *groov* Data Store; or use

the built-in Data Simulator to evaluate *groov* without connecting to a live machine or system.

If you want to connect to real data from an OPC UA server and don't have one, Kepware Technologies' KEPServerEX communication platform is also available for download and trial (www.kepware.com). It also operates for two hours without a license key.

Download and install *groov* Server for Windows from groov.com. Simple instructions walk you through software setup, connecting to one or more systems, and building a simple interface so you can quickly see realtime data on a mobile device.

NOTE: You must log onto your computer as an administrator to install groov Server for Windows.

groov Server operates for two hours without a license key. You can restart it as needed. When you purchase *groov*, the project you built during the trial will continue to work.

SYSTEM REQUIREMENTS

For groov Box and groov Server for Windows

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

- Any computer with a web browser (does not have to be a Windows PC)
- One or more of the following:
 - A Modbus/TCP device
 - A database, online service, or software program to get data from or put data into a Data Store using the *groov* API
 - An Opto 22 SNAP PAC controller (SNAP PAC S-series, R-series, or SoftPAC, with firmware R9.2a or newer), running a PAC Control strategy
 - Any OPC UA-compatible automation system or equipment, plus an OPC UA server and drivers for your equipment
 - A database, cloud application, API, or serial device accessible via a Node-RED node (*groov* Box only). Serial device requires a USB-to-serial converter with FTDI chipset, *groov* Admin R1.570.46 or higher, and Node-RED for *groov* Box version 3 or higher)

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: www.kepware.com/Products/products_OPCServers.asp. Also see: 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, it can be the same or a different 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 for the project you build.

GROOV MAINTENANCE

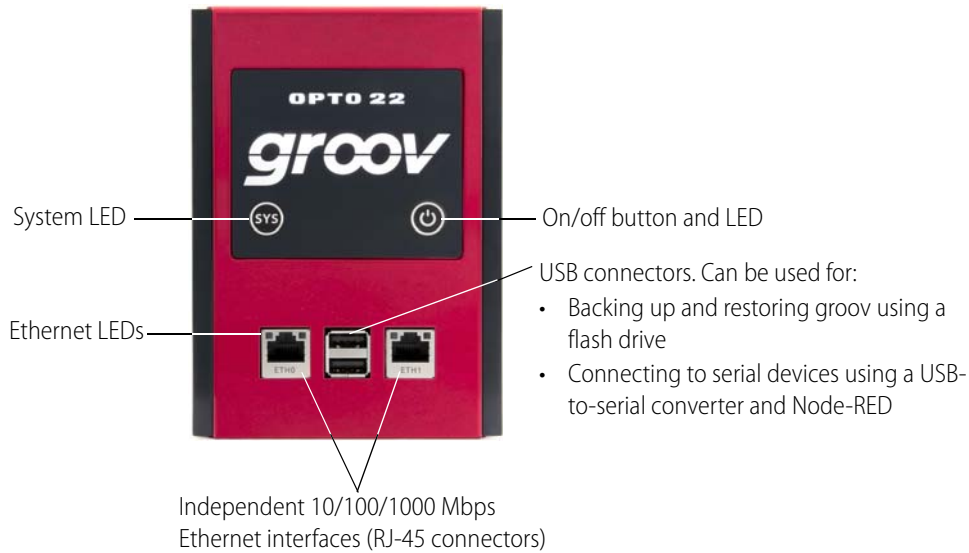
groov maintenance lets you get *groov* updates for free, including new features, enhancements, and bug fixes. One year of maintenance is included with your purchase of either a *groov* Box or *groov* Server for Windows. You can purchase additional maintenance for one year (part #GROOV-MNT1Y) or for three years (part #GROOV-MNT3Y). For more information about *groov* maintenance, see the [groov Maintenance Technical Note](#) (form 2130).

GROOV BOX (GROOV-AR1-BASE) SPECIFICATIONS

Ethernet Communication (wired)	Two independent 10/100/1000 Mbps RJ-45 connectors, each with a separate IP address (separate subnets)
Ethernet Comm (wireless)	802.11 b/g/n (optional; requires purchase of a third-party commercial USB WiFi adapter that has been tested and approved by Opto 22)
Security (wireless)	WEP64 WEP128 WPA PSK (also known as WPA Personal) WPA2 PSK (also known as WPA2 Personal)
Backup battery	BR2032 button cell lithium battery with a nominal voltage of 2.8 volts. Lasts 8 years at 25 °C. This battery maintains the date and time.
Power Consumption	8-36 VDC, 24 VDC @ 500mA (Power supply included; input 100-240 VAC. Use international adapter if needed.)
Housing	Compact and sturdy metal. Fanless operation.
USB	USB 2.0 (three: used for backing up, restoring, WiFi, and connecting to serial devices via a USB-to-serial converter with an FTDI chipset)
Indicators	Ethernet interfaces (2): Link/Activity and Speed System: SYS & PWR
Operating Temperature	0 to 70 °C (32 to 158° F)
Storage Temperature	-20 to +80 °C (-4 to 176° F)
Operating Humidity	10% to 90% relative humidity, non-condensing
Storage Humidity	5% to 95% relative humidity, non-condensing
Agency Approvals	CE, RoHS, DFARS
Warranty	30 months



GROOV BOX CONNECTORS AND INDICATORS

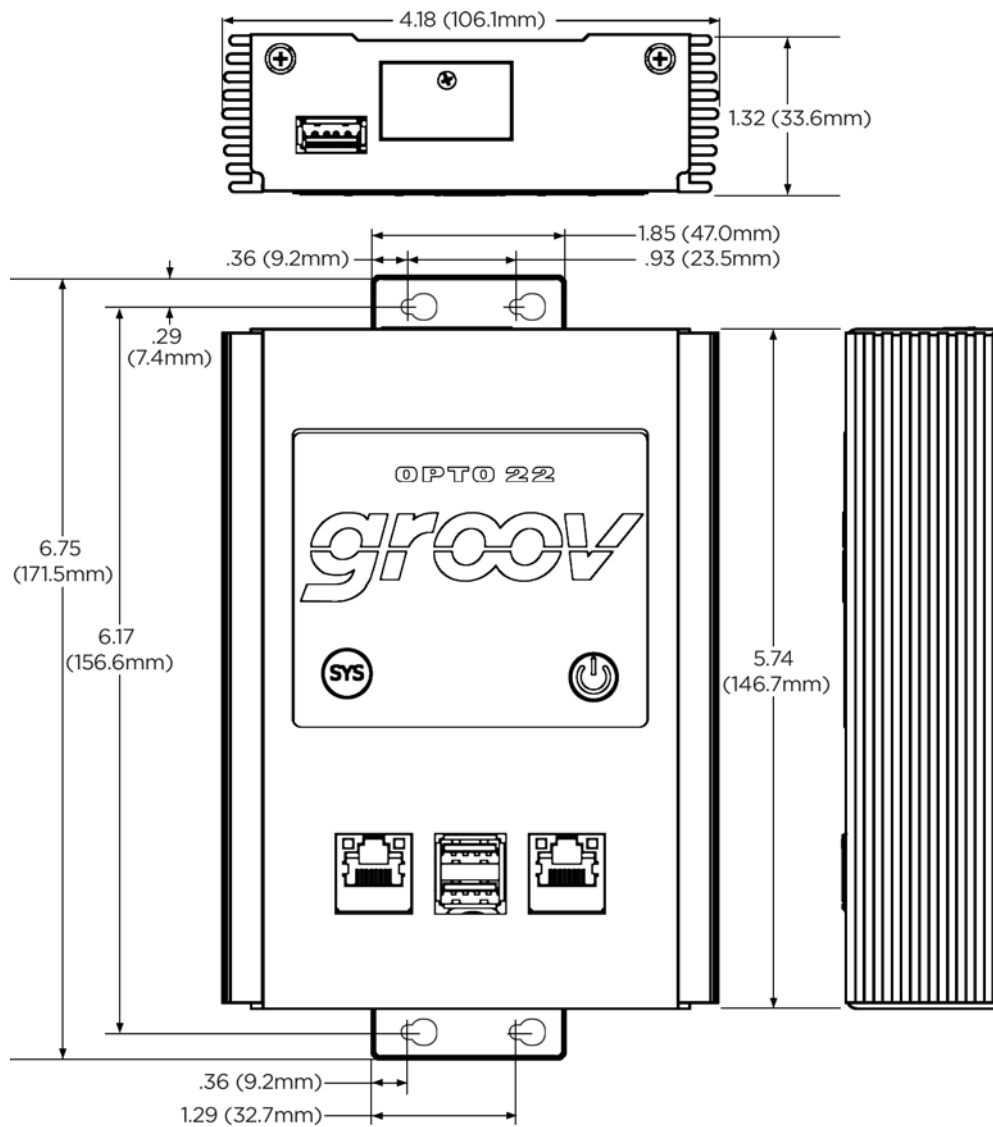


- USB connector, used for:
- Connecting an approved WiFi adapter
 - Connecting to serial devices using a USB-to-serial converter and Node-RED



Power connector

GROOV BOX DIMENSIONS



PRODUCTS

Opto 22 develops and manufactures reliable, easy-to-use, open standards-based hardware and software products used worldwide.

Industrial automation, process control, building automation, industrial refrigeration, remote monitoring, data acquisition, and Industrial Internet of Things (IIoT) applications all rely on Opto 22.



groov

Monitor and control your equipment from anywhere using your smartphone or tablet with groov. Build your own mobile app easily—just drag, drop, and tag. No programming or coding. Visit groov.com for more information and your free trial.

SNAP PAC System

Developer- and IIoT-ready, the SNAP PAC System connects physical assets to databases and applications using open standards. The SNAP PAC System consists of four integrated components:

- SNAP PAC controllers
- PAC Project™ Software Suite
- SNAP PAC brains
- SNAP I/O™

SNAP PAC Controllers

SNAP PAC programmable automation controllers handle a wide range of digital, analog, and serial functions for data collection, remote monitoring, process control, and discrete and hybrid manufacturing.

For IIoT applications and easier integration with company systems, standalone and rack-mounted SNAP PACs include a built-in HTTP/HTTPS server and **RESTful API** (application program interface). The REST API gives you secure, direct access to I/O and variable data using your choice of programming languages. No middleware, protocol converters, drivers, or gateways needed.

Based on open Ethernet and Internet Protocol (IP) standards, SNAP PACs make it easier to build or extend a system without the expense and limitations of proprietary networks and protocols.

PAC Project Software Suite

Opto 22's PAC Project Software Suite offers full-featured, cost-effective control programming, HMI (human machine interface), OPC server, and database connectivity software.

Control programming includes both easy-to-learn flowcharts and optional scripting. Commands are in plain English; variables and I/O point names are fully descriptive.

PAC Project Basic offers control and HMI tools and is free for download on our website, www.opto22.com. PAC Project Professional, available for separate purchase, adds one SoftPAC software-based controller, OptoOPCServer, OptoDataLink, options for controller redundancy or segmented networking, and support for legacy Opto 22 serial *mistic*™ I/O units.

SNAP PAC Brains

While SNAP PAC controllers provide central control and data distribution, SNAP PAC brains provide distributed intelligence for I/O processing and communications. Brains offer analog, digital, and serial functions, including thermocouple linearization, local PID loop control, watchdog, totalizing, and much more.

SNAP I/O

I/O provides the local connection to sensors and equipment. Opto 22 SNAP I/O offers 1 to 32 points of reliable I/O per module. Analog, digital, and serial modules are mixed on one mounting rack and controlled by a SNAP PAC brain or rack-mounted PAC.

QUALITY

Founded in 1974, Opto 22 has established a worldwide reputation for high-quality products. All are made in the U.S.A. at our manufacturing facility in Temecula, California.

Because we test each product twice before it leaves our factory, rather than only testing a sample of each batch, we can guarantee most solid-state relays and optically isolated I/O modules for life.



FREE PRODUCT SUPPORT

Opto 22's California-based Product Support Group offers free, comprehensive technical support for Opto 22 products from engineers with decades of training and experience. Support is available in English and Spanish by phone or email, Monday–Friday, 7 a.m. to 5 p.m. PST.

Support is always available on our website: how-to videos, user's guides, OptoKnowledgeBase, self-training guide, troubleshooting, and OptoForums. In addition, hands-on training is available for free at our Temecula, California headquarters, and you can [register online](#).

PURCHASING OPTO 22 PRODUCTS

Opto 22 products are sold directly and through a worldwide network of distributors, partners, and system integrators. For more information, contact Opto 22 headquarters at 800-321-6786 (toll-free in the U.S. and Canada) or 951-695-3000, or visit our website at www.opto22.com.