

Welcome to PAC Project 9.5

Welcome to version 9.5 of Opto 22's PAC Project™ software suite for industrial automation, remote monitoring, and data acquisition applications.

PAC Project comes in two forms: PAC Project Basic and PAC Project Professional.

Additional information was added to these release notes on August 30, 2016.

PAC Project Basic

PAC Project Basic is included in your purchase of a SNAP PAC controller and can also be downloaded for free from our website, www.opto22.com. PAC Project Basic is all you need for most monitoring and control needs. It includes the following software applications:

- **PAC Control™** for developing control programs (*strategies*) to automate processes, monitor equipment, and acquire data from processes and equipment
- **PAC Display™** for creating HMIs (human-machine interfaces) for technicians and operators to use
- **PAC Manager™** for configuring hardware and troubleshooting

PAC Project Professional

PAC Project Professional is designed for more complex projects, especially those requiring OLE for Process Control (OPC), database connectivity, redundant networks, controller redundancy, or legacy hardware support.

PAC Project Professional can be purchased as a suite or as individual applications to suit your needs. The suite includes the following software applications:

- **PAC Control Professional** for developing control programs
- **PAC Display Professional** for creating HMIs
- **PAC Manager** for configuration
- **OptoOPCServer™**, an OPC 2.0-compliant server for serving SNAP PAC System I/O and variable data to OPC clients, including PAC Display and OptoDataLink. OptoOPCServer is strongly recommended for multiple seats of PAC Display and OptoDataLink communicating with the same controller(s).
- **OptoDataLink™** for exchanging SNAP PAC System data with databases (including Microsoft SQL Server, Microsoft Access, and MySQL), and text files
- **SoftPAC™**, software-based programmable automation controller (PAC) for PC-based control

More Information on PAC Project Basic and Pro

PAC Project works with all SNAP PAC controllers, SNAP PAC brains, SNAP PAC racks, and SNAP I/O modules. Free product support is included with both PAC Project Basic and PAC Project Professional. Free training and free pre-sales engineering help are also available.

- For product support, see [“For Help” on page 12](#).
- For training, see our website under [Support > Training](#) or email training@opto22.com.
- For pre-sales engineering, call 1-800-321-6786 (toll-free in the U.S. and Canada) or 1-951-695-3000.

For computer memory and operating system requirements, see [“Installation Requirements” on page 10](#).

For more information about PAC Project Basic and Professional, see the following documents:

- [PAC Project Software Suite Data Sheet](#), Opto 22 form 1699
- [PAC Project Basic and Professional Comparison Chart](#), Opto 22 form 1681

Click the link above, or go to our website, www.opto22.com, and [search on the document form number](#).

Notes for Customers with Older Systems (ioProject and FactoryFloor)

PAC Project is very similar to older Opto 22 software, but there are important things to know **before you install** and use it. If you’re moving to the SNAP PAC System from legacy systems, be sure to read these documents first:

- [PAC Project 8.0 Release Notes](#), form 1680. See the section, “Notes for Current ioProject Customers.”
- [SNAP PAC System Migration Technical Note](#), form 1688.
- (FactoryFloor customers only) [FactoryFloor to PAC Project Migration Technical Note](#), form 1692.

NOTE: If you are using a SNAP-LCE or Ultimate controller, do not upgrade to PAC Project 9.5. Instead, use either PAC Project 8.0 or ioProject. In order to use these controllers with PAC Project 8.0, use controller firmware version 7.2 and Ethernet brain firmware version 7.0 or newer. If you want to use PAC Project software version 8.1 or newer, you must use SNAP PAC controllers instead.

Firmware Change - The Newest Innovation in Automation: SNAP PAC REST API

Hello World! For the first time ever, you can securely access PAC Control strategy data in your SNAP PAC S-series or R-series controller and use it in databases, other applications, even the Internet of Things (IoT). Starting with firmware R9.5a, these PACs

include a built-in HTTP/HTTPS server with a RESTful API (application programming interface based on the REST architectural style).

That means you don't need drivers, middleware, protocol converters, or even OPC to securely access strategy tags and use that data in other systems. You can use any common REST-compliant programming language (PHP, Python, JavaScript, .NET, etc.).

The complete API and instructions to get started are on developer.opto22.com.

New Features and Enhancements

PAC Project 9.5 includes a number of new features and enhancements to make creating, maintaining, and running your SNAP PAC System easier than ever. New features and enhancements have been added to PAC Control, PAC Display, PAC Manager, OptoOPCServer, OptoDataLink, and SoftPAC.

Windows 10 and Windows 8.1 Improvements

A new PAC Project folder has been added to the Windows desktop for easy access to PAC Project software and tools.

To make it easier for those of you who use both Basic and Professional versions of PAC Control or PAC Display, the version number and the designation Basic or Pro now appear in the File Description field of each executable.

Support for New I/O Modules

Two new I/O modules are supported in PAC Project 9.5:

- [The SNAP-OMR6T-C](#) mechanical power relay output module offers four isolated channels of switching for up to 250 VAC or 30 VDC, 6 amp loads—more current than any other SNAP output module. Each of the four mechanical contacts can be used as normally open or normally closed. This module includes integrated transient suppression while maintaining minimal leakage current.
- [The SNAP-AIRTD-8U](#) multi-function RTD/resistance analog temperature input module provides 8 points, each individually software configurable for a variety of behaviors, including a fixed temperature range for nickel, platinum, or copper RTD inputs; a fixed range in ohms; or two types of auto-ranging where the module scrolls within a range (in ohms) and chooses the best resolution. Commonly used for 3-wire RTD temperature inputs, the module is also suited to high-resolution resistance measurements.

PAC Control

Nested subroutines. Do you use subroutines? In PAC Control 9.5 you can nest subroutines. That means you can call a subroutine from another subroutine, not just from a

chart. (You cannot call subroutines recursively, though; that is, a subroutine cannot call itself, nor can a subroutine called by a subroutine call the original subroutine back.) Nested subroutines require SNAP PAC firmware R9.5a or higher. See more on subroutines in Chapter 12 of the *PAC Control User's Guide*.

Breakpoints inside OptoScript blocks. When debugging your PAC Control strategy, you can now place breakpoints inside OptoScript blocks in your flowchart.

E1/E2 I/O units—easier configuration, easier use. You can now configure E1 and E2 I/O units directly in PAC Control, just like other I/O units. In the Add Points dialog box you can choose G1, G4, or Quad Pak digital I/O points for an E1 brain board, or G1 analog I/O points for an E2 brain board. (This new feature requires E1/E2 Firmware R1.2a or higher and PAC firmware R9.5a or higher.)

Enhanced support for SSL/TLS. To communicate with devices that require SSL technology for secure communications, you can now open outgoing (client) SSL/TLS communication handles. (Previously, only the Send Email, HTTP Get, and HTTP Post commands supported SSL connections.)

New support for UDP. Support has been added for UDP (User Datagram Protocol) to provide a lightweight alternative to TCP communications.

Counter commands support 64-bit integers. These commands include Start Counter, Stop Counter, Clear Counter, Get Counter, and Get & Clear Counter.

More options to move modules and points. In addition to moving an I/O point, now you can move an entire I/O module and all its points to a different position on the same I/O unit or to an open slot on a different I/O unit.

Clearer markings for multiple strategies. If you have multiple instances of PAC Control open at once, the strategy name and its status appear in the Windows tray so you can more easily tell them apart and choose the one you want.

Configure analog inputs with offset, gain, and filter weight. On analog input modules, you can now set offset, gain, and average filter weight when you configure the input point. These are new options in the Configure I/O Point dialog box. (If you don't know the offset and gain values to set, you can use PAC Manager's Inspect mode to calibrate the point. Instructions are in the *PAC Manager User's Guide*.)

New reference counts menu item. The Tools menu now includes a Regenerate Reference Counts menu item. This enhancement makes it easier to fix reference counts in your strategy.

ID number in block title bar. When you open a block, its ID number appears in the title bar. This enhancement helps you keep track of where you are when blocks have similar names.

Go to any block. In a large flowchart, easily find the block you want to see: right-click an empty space inside the chart and choose "Go to Block..." from the pop-up menu.

Add tags with OptoScript editor open. In an OptoScript block, you can use the Strategy Tree to add tags without closing the OptoScript editor.

Multiple monitors. If you use multiple monitors and shift to a single monitor, all dialog boxes will automatically move to the monitor in use.


Verification to delete a block. To avoid accidentally deleting a flowchart block, you'll now be asked to verify the action.

PAC Display

Enhanced operator interface security. To better and more easily control access to PAC Display Runtime, you can now create user “groups,” and then grant (or deny) access to operator-driven attributes at the group level. You can simply add new users to a group, and they automatically inherit the group’s permissions. For example, you can configure a “Supervisors” group, and when an operator is promoted to supervisor, you simply add him to the group so he can have the same permissions as other supervisors. (Previously, you had to modify an operator’s permissions separately for each window and graphic.) Operators can belong to more than one user group, and you can override group-level permissions to control access to specific objects for a particular user. Also, you can grant global operator permissions to individual users and groups, as well as to domain users.

When configuring users, a new time-saving feature lets you copy a user’s permissions and then assign them to a new user. And if an operator attempts to use a restricted window or graphic point, the system now displays an “access denied” message.

For convenience, you can also grant or deny global operator-driven attribute permissions to all graphic points in a project, simply by clicking a check box on the Configure > Runtime > Security tab. With this feature, you can be creative with user groups—for example, you can create a group with “view-only” access to a project. (When you create a new project, access is permitted globally by default.)

“Quick Tag” Feature. When configuring a tag, you no longer have to click the question icon  to make additional selections in the Tag Selection dialog box. Now, when you click inside the tag’s text box, fields are displayed where you can simply start typing the controller name, item type, and item name. As you type, PAC Display filters the list of matching values, so you can then use the down-arrow key to quickly and easily select the entry you want.

Support for Internet interactivity (Pro only). Runtime Professional now uses the Chrome browser (instead of Internet Explorer) to display websites and interactive web applications like *groov*. You can configure the URL refresh rate for displaying the page, and you can hide the browser’s navigation buttons to maximize the viewing area.

More data for your databases (Pro only). In addition to SuperTrend historical data, historical logs, and Runtime operator logs, you can now send data from alarm logs and event logs to ODBC-compliant databases such as Microsoft Access, SQL Server, and MySQL databases.

Load recipes to and from databases. (Pro only) Recipes can now be uploaded to and downloaded from ODBC-compliant databases. With this feature, you can, for example, save data from batch runs and scheduled jobs to create production snapshots of your data. (Previously, recipes could be saved only to text files on your local drive.) For storing and retrieving recipes from large applications, OptoDataLink is still your best bet; but for most applications, this new feature does the job.

Alarm point email enhancements. To send alarm point emails, you can now configure a user name, password, and email server. Supported servers include AOL Mail®, Hotmail®, Google Gmail™, Yahoo! Mail®, and Outlook Express®. For added security, emails sent via Gmail can be configured for either SSL or TLS cryptographic protocol; AOL Mail and Hotmail use TLS, and Yahoo Mail uses SSL.

Use color to prioritize warnings and alarms. To make warnings and alarms easier to detect, you can now change an alarm graphic's color based on priority. There are nine priority levels, and you can customize the colors for alarms and for warnings at each level (Configure > Alarming Setup > Options tab > Set priority alarm colors).

Write log files in ASCII format. If you prefer to get log files (alarm logs, event logs, historical data logs, and Runtime operator logs) in ASCII format instead of Unicode, a simple check box in PAC Display Configurator will take care of that. The check box is named "Save log files in ASCII format," and you'll find it in the Runtime Options on the Configure > Runtime > General tab.

New Table tool features. Four tables not enough? You can now select and configure up to 16 tables per table control in the Configure Table dialog box. Tired of seeing the index column labeled "Index"? Now you can give the index column a meaningful name.

View current Runtime user. PAC Display Runtime now displays the user name of the operator currently logged in (Security > View Logged-in User). You can set up this feature with a keyboard shortcut so that you can easily see who's logged in, even if the menu bar is disabled in Runtime. The feature also displays a message if no users are logged in.

OptoDispLS.exe removed. PAC Display Runtime no longer requires the OptoDispLS.exe Windows service. This change decreases memory usage of background services and simplifies the PAC Display installation process.

Improved password management. For better security, you can now change a Runtime user's password for logging in to Runtime.

Recalculate Reference Counts. A new Ref Count button in the Alarm Points dialog box recalculates the number of alarm graphs that display the selected alarm point (Configure > Alarm Points).

Adjust alarm column widths. When you configure an alarm, you can use your mouse to adjust the column widths (or use the Column Format button, if you prefer) and the columns will be the same size in Runtime.

Faster "Find and Replace Tags". The performance of the Find and Replace Tags feature has been optimized to more rapidly update tags.

PAC Manager

Support for HTTP/HTTPS server. SNAP PAC S-series and R-series controllers with firmware R9.5a and higher include a RESTful API and an HTTP/HTTPS server, so you can securely access data on the PAC using the programming software of your choice. PAC Manager includes a new configuration option to enable the HTTP or secure HTTPS server and choose the server's port.

Easier CA root certificate installation. A new "Install CA Root Certificate" command makes installing trusted root certificates easier. In addition, you don't have to manually upload CA root certificates for Gmail™ and Yahoo!® Mail anymore—these certificates are built into PAC firmware R9.5a.

Out-of-Range support for 32-bit SNAP PAC modules. A new out-of-range indicator is now available for SNAP I/O modules (such as the SNAP-AIRATE-HFi and SNAP-AIRTD-8U analog input modules) that return a 32-bit value.

The new indicator complements the existing Out of Range Value (16-bit) indicator, which is used by the majority of SNAP I/O modules.

The Out of Range Value (32-bit) indicator's default value is -2,147,483,648. If this value could be a legitimate value for your application, you can use the Status Write area in PAC Manager to change the default.






E1/E2 I/O units—easier configuration. You can now configure E1 and E2 I/O units directly in a PAC Manager configuration file or in the Inspect window, just like other I/O units. You can choose G1, G4, or Quad Pak digital I/O points for an E1 brain board, or G1 analog I/O points for an E2 brain board. (This new feature requires E1/E2 Firmware R1.2a or higher and PAC firmware R9.5a or higher.)

Multiple monitors. If you use multiple monitors and shift to a single monitor, all dialog boxes will automatically move to the monitor in use.

OptoDataLink

OptoDataLink Monitor. OptoDataLink Monitor is a lightweight utility that instantly shows you the status of OptoDataLink and your data links.

The utility starts automatically when you start your computer and appears in the Windows system tray. It displays one of five icons to indicate OptoDataLink's status:

-  —OptoDataLink has started and is evaluating the current status.
-  —The OptoDataLinkRuntime service is not running.
-  —The OptoDataLinkRuntime service is running, but no links are currently transferring data.
-  —Links are transferring data with no errors.
-  —One or more links are in an error state.

Hover your mouse pointer over the icon to get a message window with more information about the status.

If you right-click the icon, the OptoDataLink Monitor pop-up menu appears, with options to start OptoDataLink Configurator, view errors, and start all links.

Enhanced error messages more clearly explain the issue and display error codes.

Link deletion confirmation. To avoid accidentally deleting a link, you'll now be asked to verify the action.

Improved user's guide. The OptoDataLink User's Guide (form 1705) has been updated to provide additional information and screen shots.

Other new capabilities. Now you can:

- Copy a column of data from a database table to a controller table.
- Store only the most recent values of table data in the Destination File or Database.
- Transfer data from files and from database tables to strategy tables.

SoftPAC

One-click to the Message Queue; one-click to the controller status dialog box.

Clicking the number of messages in the SoftPAC Monitor Overview now displays the Message Queue, and clicking the Chart Running message now displays the controller status dialog box.

Special Notes

Windows XP and Windows 2000 No Longer Supported

The PAC Project Software Suite is no longer tested on and no longer supports Windows XP and Windows 2000 operating systems. Microsoft no longer supports these operating systems, and Opto 22 has followed suit to prevent potential system errors that an outdated operating system can cause.

When you install any of the PAC Project software components (for example, PAC Control, PAC Display, and PAC Manager), the installation software checks the computer's operating system. If Microsoft doesn't support the operating system, the installation software displays an error message and then ends.

Also, Microsoft ended support for SQL Server 2005 on April 12, 2016. If you are using SQL Server 2005 or lower with PAC Display or OptoDataLink, you should consider upgrading.

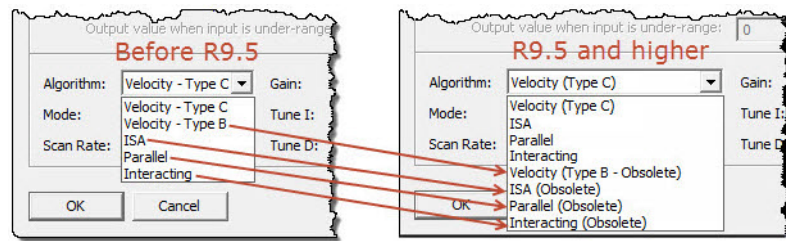
For a list of operating systems that PAC Project supports, see ["Installation Requirements"](#) on page 10.

New PID Algorithm Choices in PAC Control and PAC Manager

To resolve an issue caused when the input to a PID loop is supplied by the host ([KB82058](#)), new versions of the ISA, Parallel, and Interacting PID algorithms were added to PAC I/O unit firmware R9.4c and higher.

NOTE: This change doesn't affect PIDs that get their inputs directly from an I/O point or a PID output—but keep reading for information about changes to the algorithm names.

In PAC Project R9.5 and higher, the original algorithms were renamed to indicate they have a defect when they're configured to use Host for the input. Their names were changed to ISA (Obsolete), Parallel (Obsolete), and Interacting (Obsolete). The Velocity (Type B) algorithm was also renamed, because it's affected by the same defect. Velocity (Type C) didn't change, because it doesn't have the defect.



If you upgrade to the newest PAC software, you'll see the new names when you edit PID loops that were configured with an obsolete algorithm. This lets you know that your PID loop was configured with the original version of the algorithm. You can continue to use the obsolete algorithms, but Opto 22 recommends you use the new algorithms or Velocity (Type C) when you configure PID loops for a new application.

You don't need to change your PID loop configuration unless you are affected by this issue.

If you have PID loops that get their input from Host, here's what you can do to fix them:

- For PID loops that use Velocity (Type B), reconfigure them to use Velocity (Type C), and retune them.
- For PID loops that use ISA (Obsolete), Parallel (Obsolete), or Interacting (Obsolete), you must:
 - For I/O units (brains) that PID loops are configured on, upgrade the firmware to PAC R9.4c or higher.
 - Upgrade the software you use to configure PID loops. The lowest versions that support the new algorithms are:
 - PAC Control R9.5a
 - PAC Manager R9.5a
 - EtherNet/IP Configurator R3.0n
 - Reconfigure the PID loops to use the new algorithms.
 - Retune the PID loops.

For more information, see the [OptoKnowledgeBase article, KB82058](#) or the Algorithm Choices section of Opto 22 form 1700, the [PAC Control User's Guide](#), or Opto22 form 1704, the [PAC Manager User's Guide](#).

Bug Fixes

For a complete list of bug fixes in the 9.5 version of PAC Project, see the PAC Project Readme file.

In addition, see the readme file for your control engine or brain firmware, available on our website at www.opto22.com. To find firmware, click Support > Downloads and filter by Firmware. When you locate the firmware file for your device, in addition to downloading the firmware, click the Related Documents tab and download the readme file, too.

Here are some other useful sources of bug information on our website:

- **OptoKB Article Search**—Click the Support tab on our website and then click OptoKnowledgeBase to find articles by Article Number, Title, Text, or Product.
- **OptoSubscriptions**—Use your my.opto22.com account to subscribe to OptoNews.

Installation

CAUTION: *If you are upgrading to version 9.5 from a version of ioProject older than 7.0, do NOT uninstall ioProject before running the PAC Project version 9.5 installation. If you uninstall first, you will lose all configured control engines.*

Installation Requirements

Here's what you need to install and run PAC Project 9.5 software:

- A computer with at least the minimum processor and memory required for your version of Microsoft Windows. Additional memory may be required for some configurations.
- One of the following operating systems:
 - Microsoft Windows 10 Professional (32-bit or 64-bit)
 - Windows 8.1 Professional (32-bit or 64-bit)
 - Windows 7 Professional (32-bit or 64-bit)
 - Windows Vista® Business (32-bit only)
 - (OptoOPCServer and OptoDataLink only) Windows Server 2012 R2 and Windows Server 2008 R2

NOTE: Other versions of Windows operating systems and embedded Windows operating systems are not tested or supported.

- Ethernet capability.
- VGA or higher resolution monitor (Super VGA recommended). Minimum size: 800x600 with small fonts.
- Mouse or other pointing device.
- (Optional) Installed Windows printer.

Hard Disk Space Requirements

Application	PAC Project Professional	PAC Project Basic
PAC Control	76.2 MB	74.9 MB
PAC Display	154.9 MB	138.3 MB
OptoOPCServer	16.1 MB	(not included)
OptoDataLink	18.3 MB	(not included)
SoftPAC	6.2 MB	(not included)
PAC Manager	42.3 MB	42.3 MB
Tools (PAC Utilities)	8.6 MB	8.6 MB
EtherNet/IP Configurator	17.7 MB	17.7 MB
Total	271.5 MB*	213.2 MB*

* Installing both Pro and Basic requires a total of 318 MB of hard disk space.

Important Notes on Firmware

Opto 22 hardware is shipped with the most recent firmware, but you should check the website for additional updates that may be available.

For details on the features each firmware version includes, see the firmware readme file for your device. To find the readme, go to www.opto22.com and search on the PAC's or brain's part number. When you get to the product page, look under the Documents tab for the readme. The readme can also be found under the Related Documents tab on the firmware download page.

NOTE: If you are using a SNAP-LCE or Ultimate controller, do not upgrade to PAC Project 9.5. Instead, use either PAC Project 8.0 or ioProject. In order to use these controllers with PAC Project 8.0, use controller firmware version 7.2 and Ethernet brain firmware version 7.0 or newer. If you want to use PAC Project software version 8.1 or newer, you must use SNAP PAC controllers instead.

For additional compatibility information, see form 1693, the [Legacy and Current Product Comparison and Compatibility Charts](#). To obtain this form, click the link or go to the Opto 22 website, www.opto22.com, and search on the form number, 1693.

PAC Project Examples Location

In order to comply with Microsoft's rules regarding directory structure, we place all PAC Project application examples in this folder on your hard drive:

C:\Users\Public\Public Documents\Opto 22\PAC Project 9.5

For Help

If you have any difficulty using software, documents, or firmware, contact Opto 22 Product Support by email or phone:

Phone:	800-TEK-OPTO (800-835-6786 toll-free in the U.S. and Canada) 951-695-3080 Monday through Friday, 7 a.m. to 5 p.m. Pacific Time	<i>NOTE: Email messages and phone calls to Opto 22 Product Support are grouped together and answered in the order received.</i>
Fax:	951-695-3017	
Email:	support@opto22.com	
Opto 22 website:	www.opto22.com	

In addition, the OptoKnowledgeBase (OptoKB) provides the latest information on support issues and workarounds. For more information, click the Support tab on our www.opto22.com website, and then click the link for the Opto 22 KnowledgeBase.

Sign Up for My.Opto 22

We recommend signing up at My.Opto22. With a My.Opto22 account, you can purchase products online, try out our easy-to-use *groov* mobile operator interface tool, sign up for free training classes, build and save bills of materials (BOMs) in the [SNAP I/O Configurator](#), and more.

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Checking for Updates Manually

To manually check for new releases or patches for your Opto 22 software, firmware, or documentation, go to the [Support > Downloads](#) section of the Opto 22 website.