PAC Project Software Suite

Features

- ❯ Control programming, HMI development, OPC communication, and database connectivity in one integrated package
- ❯ Single tag database is used by all components
- ❯ I/O points and variables have user-defined names; commands are in plain English
- ❯ Easy-to-use graphical interfaces for development and debugging
- ❯ Fully integrated with SNAP PAC controllers and the SNAP PAC System

PAC Project Software Suite

Description

The PAC Project Software Suite from Opto 22 provides the software you need for industrial automation, remote monitoring, and data acquisition applications in any field. One of four components of the SNAP PAC System, PAC Project software is fully integrated with SNAP PAC controllers, brains, and I/O, making it easy to understand, select, buy, and apply an automation system for your needs.

Easy to use and suitable for projects from simple equipment management to full industrial control, the PAC Project Software Suite comes in two forms: PAC Project Basic and PAC Project Professional.

PAC Project Basic is free and includes everything you need for most applications: control programming, HMI creation, and I/O configuration software.

PAC Project Professional adds OPC communication, database connectivity, and support for Ethernet link redundancy. Legacy hardware is supported with a SNAP PAC S-series controller.

Both PAC Project Basic and PAC Project Pro include the following:

- **PAC Control**™ for developing control applications to run on an Opto 22 SNAP PAC controller
- **PAC Display**™ for developing human-machine interface applications (HMIs) for technicians and operators
- **PAC Manager**™ for configuring and inspecting Opto 22 SNAP PAC controllers, brains, and I/O

In addition, PAC Project Professional adds:

- **OptoOPCServer**™ for OLE for Process Control (OPC) communication with OPC 2.0 clients
- **OptoDataLink**™ for sharing SNAP PAC System data with ODBC-compliant databases
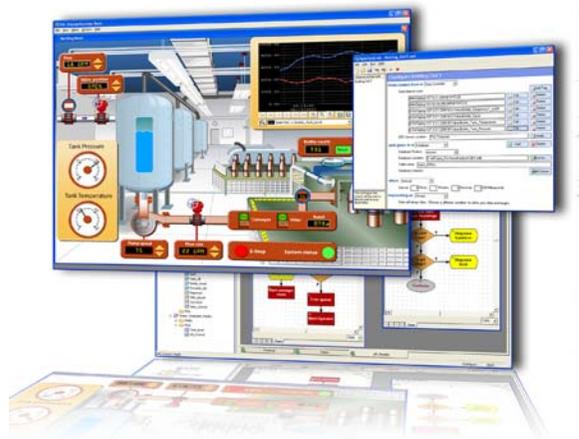
All of these applications run on Microsoft® Windows® 2000 and Windows XP workstation editions. Individual software components of PAC Project Pro are also available for separate purchase.

Part Numbers

Part	Description
PACPROJECTPRO	PAC Project Professional complete software suite and documentation on CD, plus printed documentation
PACPROJECTBAS	PAC Project Basic software suite and documentation (in PDF format) available for free download
PACCONTROLPRO	PAC Control Professional software and documentation on CD, plus printed documentation
PACCONTROLBAS	PAC Control Basic software and documentation (in PDF format) available for free download
PACDISPLAYPRO	PAC Display Professional software and documentation on CD, plus printed documentation
PACDISPLAYBAS	PAC Display Basic software and documentation (in PDF format) available for free download
OPTOOPCSERVER	OptoOPCServer software and documentation on CD, plus printed documentation
OPTODATALINK	OptoDataLink software and documentation on CD, plus printed documentation
PACMANAGER	PAC Manager software and documentation (in PDF format) available for download.

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The SNAP PAC System

PAC Project is one of four components of the SNAP PAC System. The other three are:

SNAP PAC controllers. SNAP PAC programmable automation controllers run PAC Control strategies. SNAP PAC R-series controllers mount on the rack with the input/output (I/O) modules and include I/O processing and communications as well as control. Standalone SNAP PAC S-series controllers offer more power for complex distributed systems and support for legacy hardware. Both the R-series and the S-series have dual, independent Ethernet network interfaces for segmented networks or Ethernet link redundancy.

SNAP PAC brains. These I/O and communication processors provide distributed intelligence under the control of a SNAP PAC controller. For Ethernet-based networks, choose a SNAP PAC EB-series brain; for serial networks, choose an SB-series brain used with an S-series controller. Both brains handle digital, analog, and special-purpose I/O modules.*

SNAP I/O modules. Opto 22 SNAP analog, digital, serial, and special-purpose input and output modules can be used with the SNAP PAC system.* SNAP I/O provides a wide range of signal types for any application. Modules, brains, and R-series controllers mount on SNAP PAC racks, which can hold 4, 8, 12, or 16 modules. Each module contains from 1 to 32 I/O points.

Advantages of the SNAP PAC System

The integrated software and hardware of the SNAP PAC system make it easier to understand, select, and apply an automation, monitoring, or data acquisition system for your needs. The components all work together and the system can be easily extended as your needs grow, requiring a minimum of reprogramming and rewiring.

Software is simple to use and commands are in plain English. A single tagname database is shared by all software components, so the I/O points and data elements you define during control programming are automatically available when you're building an HMI or configuring data to send to OPC clients and databases. And since you give I/O points and other data elements meaningful names that suit the way you are using them, troubleshooting and maintenance are easier.

PAC Control

PAC Control is an intuitive, flowchart-based programming and debugging tool for industrial automation, remote monitoring, and data acquisition applications. Using PAC Control, you create, download, and run control programs on a SNAP PAC standalone or on-the-rack controller.
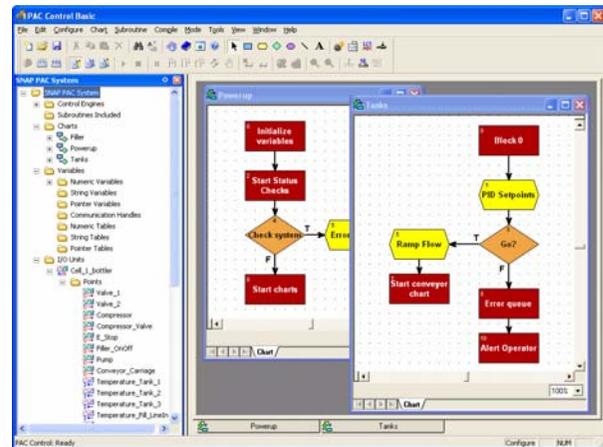
PAC Control Basic includes all the features you need for most applications, including:

- A **Strategy Tree** that provides a graphical view of your control system configuration, including I/O points and variables

- A **comprehensive, plain-English command set**, including commands for analog process and digital sequential control, complex math, conditional branching, string handling, serial device control, PID loop control, data arrays, and other complex functions

- **Flowchart-based programming**, which lets you write control strategies visually and offers a more intuitive alternative to ladder logic programming

- **OptoScript** programming, an optional advanced scripting language similar to C or Pascal, ideal for experienced control engineers who prefer a procedural approach to program development

- **Subroutines** for more efficient programming. Subroutines are especially useful for repeated tasks or processes that are used in multiple control strategies.

- A graphical **debugger** for stepping through a control program and its subroutines in real time

PAC Control Professional includes everything in PAC Control Basic and adds the following features:

- The ability to create redundant Ethernet links or a segmented control network

* SNAP PAC SB-series brains for serial networks do not support serial SNAP I/O modules. See Opto 22 form 1689, the SNAP PAC Brains data sheet, for specific compatibility information.

PAC Project Software Suite

- Additional features in I/O units, such as ramping, pulse generation, and frequency and period measurement

- Additional I/O-related data types in subroutines

- A migration path for Opto 22 FactoryFloor® customers, including support for serial-based *mistic* I/O units (requires SNAP PAC S-series controller) and a conversion utility to move older OptoControl™ 4.1 strategies to PAC Control

For a comparison of features available in PAC Control Professional and PAC Control Basic, see

PAC Control Strategy

Using PAC Control on a PC, you create and debug a program (called a control *strategy*) to automate a process. You then download your strategy to the memory of a SNAP PAC controller, which runs the strategy independently of the PC. You can easily modify the program when necessary using PAC Control; however, you can turn off your PC or use it for other applications while the controller runs the program. If needed, you can also download a second, alternate strategy to the controller and then switch rapidly between them with minimum downtime.

A strategy is composed of a series of process flowcharts or *charts*, each of which controls one aspect of the automated process. Each chart is made up of blocks connected by arrows, which show the process flow. Each block in a chart contains one or more commands or conditions, such as *Convert Number to String* or *Start Counter* or *Chart Running?* The shape of the block indicates its function. For example, a rectangle is an action, while a diamond is a condition.

An Opto 22 SNAP PAC S-series controller can run up to 32 charts simultaneously; the SNAP PAC R-series can run up to 16 charts at once. Many more charts can be included in the strategy.

PAC Display

PAC Display Basic is a user-friendly HMI package for building operator interface applications to communicate with SNAP PAC controllers. PAC Display offers rich features, including alarming, trending, security, and a built-in library of 3,000 industrial automation graphics. PAC Display uses a fast, multithreaded scanning engine.

PAC Display Professional adds the capability to use redundant scanners, redundant Ethernet links, or a segmented control network on SNAP PAC controllers. PAC Display Professional can connect to legacy ioProject controllers and Ethernet-based FactoryFloor controllers running OptoControl strategies, and it can also import projects created in OptoDisplay, a part of FactoryFloor.

The power of PAC Display lies in its close integration with Opto 22 controllers running control strategies. PAC Display monitors these systems to give operators, technicians, and engineers the information they need at a glance, while transferring operator instructions to the control hardware. PAC Display also displays data trends and x-y plots, logs historic data, and handles alarms.

Key Features in PAC Display

- Close integration with SNAP PAC controllers
- Data trending and logging
- Alarming
- Library of 3,000 industrial automation graphics
- Fast, multithreaded I/O scanner
- Operator authentication and data encryption
- Affordable per-seat licensing
- No tag limits

Integration

SNAP PAC industrial controllers are programmed using PAC Control. When you build a control program, or *strategy,* using PAC Control, the database of I/O and variables you create in PAC Control is automatically shared with PAC Display. This single tagname database eliminates the need to create duplicate databases and eliminates tagname-related errors.

Ease of Use

In PAC Display you construct your operator interface, referred to as a *project,* by designing graphical objects and then linking them to tags in the corresponding PAC Control strategy. On-screen windows can combine pictures, symbols, bitmap graphics, and graphics with 3D effects. You can create graphics using built-in drawing tools, import them from other applications, or select them from the

Symbol Factory, PAC Display's extensive built-in library of industrial automation graphics. Displays can also include controller-driven animations and operator-driven commands.

Security

PAC Display lets you control access to an operator interface based on users and groups defined in Microsoft Windows. Permissions can be defined for individual on-screen controls, and access to the interface itself can be password protected. Login and detailed usage information can be saved to an encrypted operator action log file. These security features can help applications meet U.S. FDA 21 CFR Part 11 regulations for digital data recording, storage, and handling.

SuperTrends

With PAC Display's SuperTrend feature, you can plot trends using real-time data, historical data, or both, switching between current data and previously logged data with the click of a button.

With 16 available pens, you can plot 16 variables or I/O points per trend window. Point markers show you when data is actually sampled. For historical data, you can just click on a point to see the exact date, time, and value when the data was scanned.

Alarming

You can view and acknowledge alarms in PAC Display, as well as see an alarm history for each alarm point. You can determine which alarm points to set up, define alarm thresholds, and choose colors for alarm states. Sound files can be added, and comments or messages can be displayed in alarm graphics while PAC Display is running.

An automatic response to an alarm can be set up to provide immediate action, such as automatically closing a valve when a specific alarm goes off. You can also set priorities for alarms, so that an operator can choose to receive only higher priority alarms during startup, for example.

In addition, you can send the historical log of all alarms to a printer and also to a user-configurable ASCII text file that can be easily imported for analysis into Microsoft Excel, Access, or other applications.

PAC Manager

PAC Manager is a configuration and maintenance tool used for:

- Assigning IP addresses
- Setting up security on Opto 22 Ethernet devices
- Upgrading firmware
- Configuring I/O points and I/O unit features
- Inspecting, reading from, or writing to devices for testing

PAC Manager includes tools for configuring multiple Ethernet devices at once. For example, if you have I/O units that use the same configuration, you can configure all of them simultaneously.

OptoOPCServer

OptoOPCServer is part of PAC Project Professional and can also be purchased separately. A fast and efficient OPC 2.0-compliant server, OptoOPCServer handles communications between multiple OPC clients and Opto 22 devices. It lets OPC client software interface with the following Opto 22 hardware:

- SNAP PAC System controllers running PAC Control strategies
- Independent SNAP PAC EB brains
- Legacy independent Ethernet-based I/O units
- Controllers running legacy ioControl™ and Ethernet-based OptoControl strategies

OptoOPCServer can manage communication with Opto 22 devices not only for OPC clients, but also for OptoDataLink and for multiple seats of PAC Display. Because OptoOPCServer uses a report-by-exception method of communicating with clients, it is strongly recommended when multiple clients need to access Opto 22 systems. OptoOPCServer reduces network traffic on the industrial automation and manufacturing network, and systems run faster.
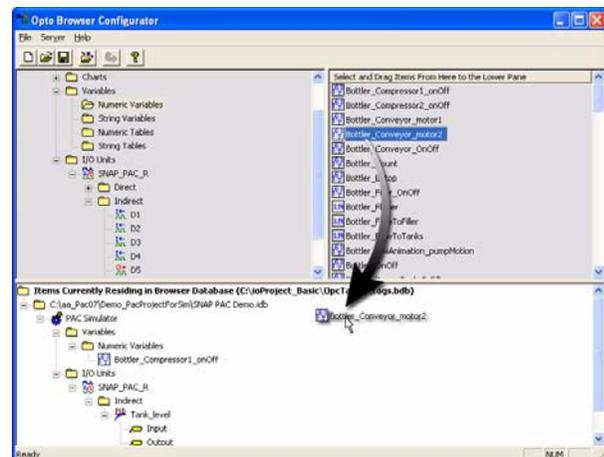
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Where multiple PCs are running the same or different PAC Display projects, OptoOPCServer works closely with PAC Display to provide fast data scanning. In fact, OptoOPCServer is the critical component for scaling up a PAC Display monitoring system for optimum performance.

Since OptoOPCServer can communicate with both the SNAP PAC System and legacy Ethernet-based Opto 22 systems, you can consolidate data from all these systems into the OPC client software of your choice.

Client software can include PAC Display (either Basic or Pro), OptoDataLink, OPC 2.0-compliant products, third-party HMI and data acquisition packages, and custom software applications you create with tools such as Visual C++®.

PAC Display Basic or Pro clients
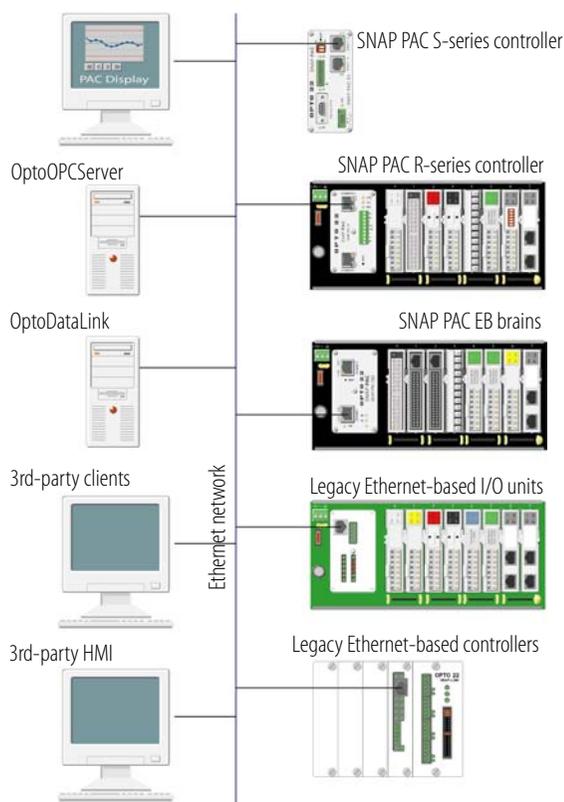
OptoOPCServer includes these software components:

- Opto Browser Configurator, which provides an easy drag-and-drop method of building OPC databases from the tag databases already created in your control strategies.
- OptoOPCServer, which runs on a Windows-based PC.

- OptoOPCServer debug monitor, for viewing the activity between OPC clients, OptoOPCServer, and Opto 22 devices

OptoDataLink

Providing data exchange with popular databases such as Microsoft SQL Server, Microsoft Access, and MySQL, OptoDataLink connects your SNAP PAC System with the tools used for making business decisions, bringing realtime, accurate data to decision makers.

OptoDataLink is included in PAC Project Professional and is also available for separate purchase.

OptoDataLink transparently provides multiple connections for exchanging data. Thanks to PAC Project's single tagname database, the data elements you created when programming your PAC Control strategy—such as I/O points and variables—are automatically available for use in OptoDataLink.

Simply choose data elements from the list, and use OptoDataLink's flexible configuration tool to create a data connection, or *link,* between the data source and data destination. The data destination can be a text file as well as a database.
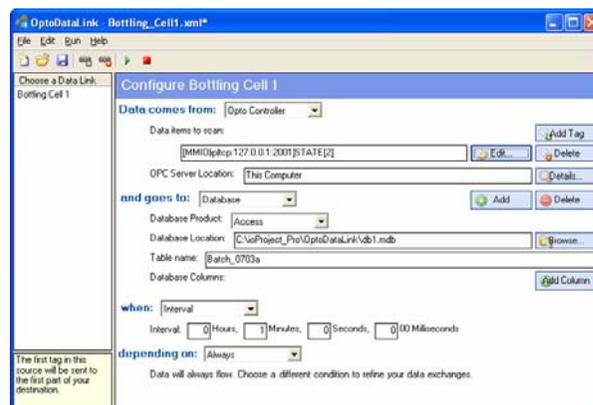
Computer Requirements

To use PAC Project applications with your PC, you must have the following minimum computer configuration:

- A computer with at least the minimum processor required for your version of Microsoft Windows (1 GHz Pentium®-class or better recommended) and Ethernet capability
- VGA or higher resolution monitor (Super VGA recommended). Minimum size: 800x600 with small fonts.
- Mouse or other pointing device
- Installed Windows printer (optional)

- Microsoft Windows XP (with Service Pack 2) or Windows 2000® (with Service Pack 4) workstation operating system. Microsoft Windows server and 64-bit versions of Windows workstation operating systems are not supported.

- At least 256 MB RAM (512 MB RAM or more is recommended)

- At least 124 MB of available hard drive space for PAC Project Basic, or 154 MB for PAC Project Pro

How to Obtain PAC Project

PAC Project software suite. You can obtain the PAC Project software suite as follows:

- Get **PAC Project Basic** free on the CD that comes with any SNAP PAC controller. Or download it for free from our website, www.opto22.com.

- Purchase **PAC Project Professional** on CD, including all software, with complete documentation in both printed and Adobe Acrobat PDF format. Or, to get PAC Project Pro sooner, buy and download the software from the Opto 22 website at www.opto22.com; the CD and printed documentation will be shipped to you.

PAC Control Pro, PAC Display Pro, OptoOPCServer, or OptoDataLink. Purchase PAC Control Pro, PAC Display Pro, OptoOPCServer, or OptoDataLink either separately or as part of the complete PAC Project Professional software suite. The purchase price for PAC Control Pro or PAC Display Pro is for one seat.

NOTE: OptoOPCServer is strongly recommended for multiple seats of PAC Display and is required for OptoDataLink.

PAC Project Software Suite

PAC Project Basic and Professional Comparison

The following table compares the features of PAC Project™ Basic and PAC Project Professional. See Opto 22 form #1677, the *SNAP PAC Controller and Brain Comparison Chart*, for more details on controllers.

Feature	PAC Project Basic	PAC Project Professional
Included software	• PAC Control™ Basic • PAC Display™ Basic • PAC Manager™	• PAC Control Professional • PAC Display Professional • PAC Manager • OptoOPCServer™ • OptoDataLink™
Control software		
Name	PAC Control Basic	PAC Control Professional
Compatible controllers	• SNAP PAC S-series standalone industrial controllers • SNAP PAC R-series on-the-rack controllers	• SNAP PAC S-series standalone industrial controllers • SNAP PAC R-series on-the-rack controllers
Compatible brains	• Built-in I/O unit (in SNAP PAC R-series controllers) • SNAP PAC brains	• Built-in I/O unit (in SNAP PAC R-series controllers) • SNAP PAC brains • E1 and E2 • Serial *mistic*™ brains/bricks*: B3000, SNAP-BRS, B100, B200, G4D16R, G4D32RS, G4A8R
Network	• *Controller to PC:* Ethernet or serial (using PPP) • *Controller to I/O:* S-series—Ethernet and serial to SB brains; R-series—Ethernet only • *Controller to third-party devices:* Serial or Ethernet	• *Controller to PC:* Ethernet or serial (using PPP) • *Controller to I/O:* S-series—Ethernet and serial to SB and *mistic* brains; R-series—Ethernet only • *Controller to third-party devices:* Serial or Ethernet • Support for Ethernet link redundancy or segmented control network
Main features	• Flowchart programming • OptoScript™ programming • Subroutines (debuggable) • Graphical debugger	• Flowchart programming • OptoScript programming • Subroutines (debuggable), with additional data types • Graphical debugger • Conversion utility for OptoControl strategies (version 4.1 and newer) • Support for serial *mistic* I/O units* • Ethernet link redundancy
Maximum charts running at once	• 32 on SNAP PAC S-series (plus host task) • 16 on SNAP PAC R-series (plus host task)	• 32 on SNAP PAC S-series (plus host task) • 16 on SNAP PAC R-series (plus host task)
Proportional-integral derivative (PID) loops	• 4 PID algorithms available • 96 loops per SNAP PAC brain • Graphical tuner	• 4 PID algorithms for Ethernet • 1 PID algorithm for *mistic* serial* • 96 loops per SNAP PAC brain • 8 loops per *mistic* brain/brick* • Graphical tuner for Ethernet and *mistic** PID loops
Ethernet link redundancy	n/a	• Primary and secondary IP addresses for controllers and I/O units • PAC Control commands can be used to control redundancy algorithm
Additional toolkits	• Allen-Bradley® DF1 Integration Kit • Modbus®/TCP Integration Kit • Modbus/Serial Integration Kit • OptoMMP™ Communication Toolkit	• Allen-Bradley DF1 Integration Kit • Modbus/TCP Integration Kit • Modbus/Serial Integration Kit • OptoMMP Communication Toolkit

Feature	PAC Project Basic	PAC Project Professional
HMI software		
Name	PAC Display Basic	PAC Display Professional
Main features	• Alarming • Trending • Security • 3000-graphic library	• Alarming • Trending • Security • 3000-graphic library • Conversion utility for OptoDisplay projects • Ethernet link redundancy • Scanner redundancy
Controllers supported	SNAP PAC controllers	• SNAP PAC controllers • Controllers running ioProject • Controllers running FactoryFloor on Ethernet network
Ethernet link redundancy	n/a	• Primary and secondary IP addresses for control engine • Primary and secondary scanner
OPC server		
Name	Not included; purchase separately. (OptoOPCServer supports PAC Project Basic and is strongly recommended for multiple seats of PAC Display.)	OptoOPCServer
OPC version	n/a	OPC 2.0-compliant
Ethernet link redundancy	n/a	PAC Display primary and secondary IP addresses for control engine
Database connectivity		
Name	Not included; purchase separately.	OptoDataLink
Databases supported	n/a	Microsoft® SQL Server Microsoft Access MySQL
Other data destinations	n/a	Text files

* Requires SNAP PAC S-series controller