SoftPAC Software-based Controller for PC-based Control

Features

- Operates like an Opto 22 hardware PAC, but runs in Microsoft® Windows®
- Programmed with PAC Control, just like any SNAP programmable automation controller
- Lets you take advantage of a PC's extensive memory, file space, and speed
- Ideal for machine builders and OEMs

Description

SoftPAC™ is a software-based programmable automation controller (PAC) designed for PC-based control. SoftPAC gives you the choice of running your control program in a Microsoft Windows environment rather than on a standalone or rack-mounted PAC.

SoftPAC is ideal for machine builders or OEMs who may already have a PC in their product or want to use one for a new design. SoftPAC can provide significant savings in hardware costs for some applications.

SoftPAC is especially useful for applications requiring extended file storage, frequent access to files, math-intensive processes, or a large number of control flowcharts running at the same time. For example, industrial engineers working with gas density calculations, solar tracking, and encryption can greatly reduce calculation time.

Using SoftPAC, you can take advantage of a PC's ability to quickly read and write to files as well as its greater space for data storage. A large refrigerated warehouse, for example, may need to log gigabytes of temperature, power, compressor, and door status data. SoftPAC handles large amounts of data with ease, because file operations are limited only by the size of the PC's hard drives and the available network volumes.

Another advantage is that SoftPAC can be run as a service. When SoftPAC runs as a service, an operator does not have to log in; the controller can start when the PC is turned on.

Because the same PAC Control strategy can run on both software and hardware controllers, you can even begin developing your strategy without hardware. If you decide to use a different controller later, there's no need to redevelop.

PAC Control includes all the features you need for control programming:

- A Strategy Tree that provides a graphical view of your control system, including I/O points and variables
- A set of more than 450 plain-English commands, including commands for analog process and digital sequential control, complex math, conditional branching, string handling, serial device control, PID loop control, data tables, and other complex functions
- Flowchart-based programming, which lets you write control strategies visually and is easier to learn and maintain
- OptoScript™ programming, an advanced scripting language ideal for experienced control engineers who prefer a procedural approach to program development
- Subroutines for more efficient programming (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

Programming

SoftPAC is programmed using PAC Control™, part of the PAC Project™ Software Suite for industrial automation, remote monitoring, and data acquisition.

Using PAC Control, you develop a control program (called a *strategy*). You then download the strategy to an Opto 22 PAC (software-based SoftPAC, standalone S-series, or rack-mounted R-series), and the controller runs it independently. (See "Configuring SoftPAC as a Control Engine" on page 5 for important information.)

Part Numbers

Part	Description
SOFTPAC	Software-based programmable automation controller for PC-based control, with PAC Project Basic software and documentation in PDF (download)
PACPROJECTPRO	PAC Project Professional complete software suite, including SoftPAC, and documentation (download and CD)

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SoftPAC can run up to 64 flowcharts simultaneously; many more can be included in the strategy. SoftPAC allows access to 64 MB RAM and 8 MB non-volatile RAM for your PAC Control strategy (flowcharts, variables, tables, subroutines, and so on). File operations are limited only by the size of your hard drive and the volumes available on your network.

PAC Control is just one part of the PAC Project Software Suite. For more information, see *"How to Obtain SoftPAC"* below.

I/O Compatibility

SoftPAC can be used with SNAP Ethernet-based I/O units:

SNAP-PAC-EB1	SNAP-PAC-R1
SNAP-PAC-EB1-FM	SNAP-PAC-R1-FM
SNAP-PAC-EB1-W	SNAP-PAC-R1-W
SNAP-PAC-EB2	SNAP-PAC-R2
SNAP-PAC-EB2-FM	SNAP-PAC-R2-FM
SNAP-PAC-EB2-W	SNAP-PAC-R2-W

All SNAP I/O modules can be used on these I/O units, including analog, digital, and serial modules.

SoftPAC can also be used with legacy SNAP Ethernet-based I/O units. It cannot be used with serial brains.

SNAP PAC System Compatibility

SoftPAC can also communicate peer-to-peer with any SNAP PAC S-series or R-series controller on the network. SoftPAC includes Scratch Pad areas of the OptoMMP memory map.

System Requirements

SoftPAC and PAC Project 9.3 and higher are supported on the following Microsoft operating systems only:

- Windows 7 Professional (32-bit and 64-bit)
- Windows Vista Business (32-bit)
- Windows XP Professional (32-bit, with SP2 or higher).

A minimum of 100 MB available disk space is required.

How to Obtain SoftPAC

SoftPAC is included in your purchase of the PAC Project Professional Software Suite (version 9.3 and higher), which also includes control programming, HMI development and runtime, OptoOPCServer for OPC communications, and OptoDataLink for data exchange with SQL databases.

You can also purchase SoftPAC separately and use the free PAC Project Basic Software Suite to program it. PAC Project Basic includes control programming and HMI development and runtime.
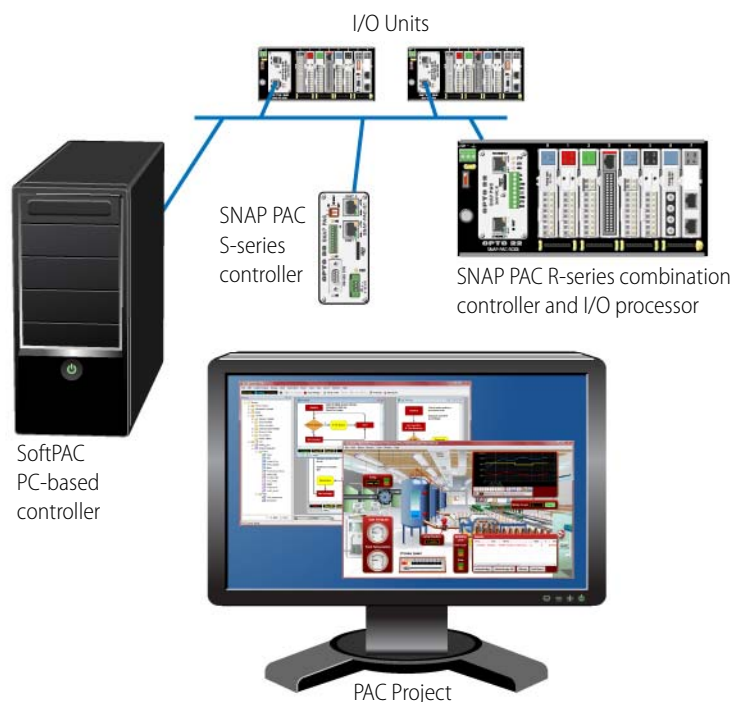
For more information about PAC Project, see the *PAC Project Data Sheet*, form 1699.

Your purchase of PAC Project Professional or SoftPAC is a single-seat license (one PC). Additional licenses can be purchased separately; contact your distributor or Opto 22 Sales for information about volume discounts.

The Choice is Yours

SoftPAC extends the options for your control system. You can run your control strategy:

- On a PC running SoftPAC
- On a standalone controller
- On a combination controller and I/O unit

I/O Units

SNAP PAC S-series controller

SNAP PAC R-series combination controller and I/O processor

SoftPAC PC-based controller

PAC Project

SoftPAC Software-based Controller for PC-based

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Opto 22 Controller Comparison Chart

The following table compares SNAP PAC controllers using minimum version 9.2a firmware and 9.2 PAC Project software.

		SNAP PAC Controllers							
		Software	Standalone				Rack-mounted			
		SoftPAC	SNAP-PAC-S1 / SNAP-PAC-S1-FM	SNAP-PAC-S2	SNAP-PAC-S1-W	SNAP-PAC-S2-W	SNAP-PAC-R1 / SNAP-PAC-R1-FM	SNAP-PAC-R2 / SNAP-PAC-R2-FM	SNAP-PAC-R1-W	SNAP-PAC-R2-W
Works with PAC Project software		●	●	●	●	●	●	●	●	●
Runs PAC Control strategies		●	●	●	●	●	●	●	●	●
Maximum PAC Control charts running at once (plus host task)		64	32	32	32	32	16	16	16	16
Compatible brains[a]	SNAP PAC EB brains	●	●	●	●	●	●	●	●	●
	SNAP PAC SB brains		●	●	●	●				
	Onboard I/O processor (brain)						●	●	●	●
Controller-to-brain communication	Ethernet (UDP/IP, 10/100 Mbps)	●	●	●	●	●	●	●	●	●
	Wireless LAN (802.11a, b, or g)	b			●	●			●	●
	Serial (RS-485)		●	●	●	●				
Controller-to-PC communication	Runs on PC	●								
	Ethernet (TCP/IP, 10/100 Mbps)	b	●	●	●	●	●	●	●	●
	Wireless LAN (802.11a, b, or g)	b			●	●			●	●
	PPP over dial-up modem, with hardware handshaking		●	●	●	●	●	●	●	●
Two independent Ethernet network interfaces (two IP addresses)		b	●	●	●	●	●	●	●	●
Wireless LAN interface (802.11a, b, or g)		b			●	●			●	●
Total number of RS-232 serial ports			2	4[c]	2	4[c]	1	1	1	1
Number of RS-232 serial ports usable for PPP (on dial-up modem)			1[d]	1[d]	1[d]	1[d]	1[d]	1[d]	1[d]	1[d]
Total number of RS-485 serial ports			1	4[c]	1	4[c]	-0-	-0-	-0-	-0-
EtherNet/IP™ (Allen-Bradley® RSLogix® systems and others)			●	●	●	●	●	●	●	●
Modbus®/TCP (slave)			●	●	●	●	●	●	●	●
OPC driver support		●	●	●	●	●	●	●	●	●
OptoMMP memory-mapped protocol		● e	●	●	●	●	●	●	●	●
SNMP (network management)			●	●	●	●	●	●	●	●
Direct access to file system (hard drive plus network)		●								
FTP server, file system			●	●	●	●	●	●	●	●
FTP client		●	●	●	●	●	●	●	●	●
PPP (for use with dial-up modems)			●	●	●	●	●	●	●	●
Email (SMTP client with authentication and attachments)		●	●	●	●	●	●	●	●	●
Scratch Pad area for peer-to-peer data (bits, floats, 32-bit integers, 64-bit integers, and strings)		●	●	●	●	●	●	●	●	●

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	SoftPAC	SNAP-PAC-S1 / SNAP-PAC-S1-FM	SNAP-PAC-S2	SNAP-PAC-S1-W	SNAP-PAC-S2-W	SNAP-PAC-R1 / SNAP-PAC-R1-FM	SNAP-PAC-R2 / SNAP-PAC-R2-FM	SNAP-PAC-R1-W	SNAP-PAC-R2-W
	Software	**Standalone**				**Rack-mounted**			
SNAP PAC Controllers									
Security for wireless network (WPA2-AES, WPA-TKIP, WEP)	b			●	●			●	●
Security for wired Ethernet network (IP filtering, port access)	b	●	●	●	●	●	●	●	●
Realtime clock	b	●	●	●	●	●	●	●	●
Backup battery (recharges when controller has power)[f]		●	●	●	●	●	●	●	●
Physical RAM RAM availabe for Strategy Non-volatile or Battery-backed RAM Flash memory	b 64 MB 8 MB g	32 MB 16 MB 8 MB 16 MB		128 MB 64 MB 8 MB 16 MB		16 MB 4 MB 2 MB 8 MB		32 MB 10 MB 2 MB 8 MB	
32-bit processor	b	●	●	●	●	●	●	●	●
Floating-point unit (FPU)	b	●	●	●	●	●	●	●	●
Data storage space	b	approx. 2.5 MB				approx. 2 MB			
Removable data storage (microSD card slot)	b	2 GB max.				2 GB max.			
Power requirements	b	8–32 VDC[h] 10 W–11.3 W max[i]				5.0 to 5.2 VDC @ 1.2–1.5 A[i]			
Operating Temperature in degrees C Storage Temperature in degrees C	b	0 to 60 -40 to 85				0 to 60 -40 to 85			
Humidity (non-condensing)	b	0–95%				0–95%			
Uses SNAP PAC mounting rack (4, 8, 12, or 16 modules)	n/a	n/a				●	●	●	●
Combination controller and I/O processor						●	●	●	●
Maximum number of modules allowed on largest rack: Any mix of 16 digital, 16 analog, and 8 serial						● m	●	●	●

a   For compatibility with legacy Opto 22 hardware, see form #1693.

b   As provided by the Microsoft Windows-based computer the software runs on.

c   Serial ports are software configurable for RS-232 or RS-485.

d   One port on SNAP-PAC-S1 supports DTR, DSR, and CD signals and bidirectional flow control on RTS and CTS. All ports on SNAP-PAC-S2 support DTR and DCD signals and bidirectional flow control on RTS and CTS. The port on SNAP-PAC-R1 and -R2 supports DTR and CD signals, and bidirectional flow control on RTS and CTS.

e   SoftPAC includes Status Read, Status Write, and Scratch Pad areas of the memory map.

f   Models manufactured before August 2007 and S1s with serial numbers 625653 and lower have user- replaceable backup batteries. See original user guide.

g   Function of Flash memory is implemented via a file; size is limited only by available disk space.

h   Units with serial numbers lower than 500,000 have an 8–24 VDC input voltage rating. *Verify voltage on the unit's faceplate before applying power.*

i   Higher requirement applies to -W models.

m   SNAP-PAC-R1s with serial numbers lower than 600,000 are limited to eight 4-channel digital modules per rack.

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Configuring SoftPAC as a Control Engine

You can use PAC Control or PAC Terminal to configure SoftPAC as a control engine for use with any PAC Project software.

1. Open PAC Control or PAC Terminal.

2. Add a control engine (see the *PAC Control User's Guide* for instructions).

3. When you assign an IP address to the new control engine, use one of the following addresses:

   – If SoftPAC will run on the same PC that is running PAC Project software, use the loopback address:
      `127.0.0.1`

   – If SoftPAC will run on a different PC, use the IP address of the PC running SoftPAC. Note that this PC must have a fixed (static) IP address.

   Only one instance of SoftPAC can be running per PC.

Once you've added SoftPAC as a control engine, you can select it like any other control engine in PAC Control, PAC Display, and other PAC Project software applications.

Note for PAC Control: Make sure that all loops in your PAC Control strategy include a delay. Even a 1 ms delay can keep your PC running smoothly. Without a delay, a loop can consume PC capacity and slow performance.

Running SoftPAC

To run the SoftPAC controller, you have to turn it on, just as you would power up a hardware controller. You turn on SoftPAC using SoftPAC Monitor, a utility installed with SoftPAC.

Once SoftPAC is turned on, you can download a PAC Control strategy to it, debug the strategy, and run it exactly as you would on a hardware controller.
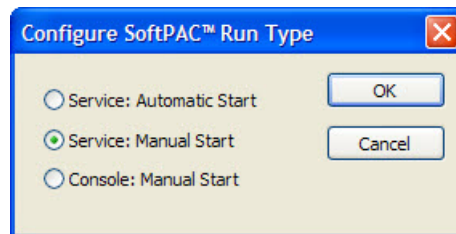
You can also use SoftPAC Monitor to change SoftPAC to run as a service, so that it automatically turns on when Windows is running.

1. Obtain SoftPAC and install it on your computer. See "How to Obtain SoftPAC" on page 2.

2. Start SoftPAC Monitor. From the Start menu, choose All Programs > Opto 22 > PAC Project > SoftPAC Monitor.

Displays the current run type

Opens the Configure Run Type dialog box

Turns SoftPAC on or off

Hides SoftPAC Monitor

Shows version and build for SoftPAC Monitor and SoftPAC (only when SoftPAC is running)

3. To manually turn SoftPAC on or off, click **Start/Stop SoftPAC**.

4. To change the way SoftPAC runs, click **Configure SoftPAC** and choose the run type.

Service: Automatic Start—SoftPAC runs automatically as a service whenever Windows is started.

Service: Manual Start—SoftPAC runs as a service, but you must start SoftPAC manually using SoftPAC Monitor.

Console: Manual Start—SoftPAC runs as an application instead of as a service. You must start it manually using SoftPAC Monitor. (No console window appears; icon in SoftPAC Monitor shows status—see below.)

Once you've turned SoftPAC on and optionally changed the way it runs, you can leave SoftPAC Monitor open, hide it, or close it. SoftPAC Monitor is separate from the SoftPAC controller, so hiding or closing SoftPAC Monitor has no effect on SoftPAC.

If you leave SoftPAC Monitor running (either open or hidden), you can **monitor SoftPAC's status** via an icon in the system tray (by default located at the bottom right of your screen). If it is hidden, right-click the tray icon to see it.

	Gray: SoftPAC Monitor is open, but the SoftPAC controller is not running.
	Orange: The SoftPAC controller is running, but a strategy is not.
	Green: A strategy is running in SoftPAC.

More About Opto 22

Products

Opto 22 develops and manufactures reliable, flexible, easy-to-use hardware and software products for industrial automation, energy management, remote monitoring, and data acquisition applications.

OptoEMU Energy Management System

The easy-to-use OptoEMU Sensor monitors electrical energy use in your facility and delivers detailed, real-time data you can see and analyze. The Sensor can monitor energy data from pulsing meters, electrical panels or subpanels, and equipment. View energy data online using a software service or incorporate the data into your control system for complete energy management.

SNAP PAC System

Designed to simplify the typically complex process of selecting and applying an automation system, 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

Programmable automation controllers (PACs) are multifunctional, modular controllers based on open standards.

Opto 22 has been manufacturing PACs for over two decades. The standalone SNAP PAC S-series and the rack-mounted SNAP PAC R-series both handle a wide range of digital, analog, and serial functions for data collection, remote monitoring, process control, and discrete and hybrid manufacturing.

SNAP PACs are based on open Ethernet and Internet Protocol (IP) standards, so you can build or extend a system easily, without the expense and limitations of proprietary networks and protocols.

PAC Project Software Suite

Opto 22's PAC Project Software Suite provides full-featured, cost-effective control programming, HMI (human machine interface) development and runtime, OPC server, and database connectivity software for your SNAP PAC System.

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

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; PID loop control; and optional high-speed digital counting (up to 20 kHz), quadrature counting, TPO, and pulse generation and measurement.

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, depending on the type of module and your needs. Analog, digital, and serial modules are all mixed on the same mounting rack and controlled by the same processor (SNAP PAC brain or rack-mounted controller).

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 do no statistical testing and each part is tested twice before leaving our factory, 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. Our staff of support engineers represents 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.

Additional support is always available on our website: how-to videos, OptoKnowledgeBase, self-training guide, troubleshooting and user's guides, 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 or 951-695-3000, or visit our website at www.opto22.com.

www.opto22.com