

## INTRODUCTION

This technical note describes migration options for customers moving from older SNAP systems to the SNAP PAC System™. This note explains the SNAP PAC System (below) and its similarities to earlier systems ([page 4](#)), defines legacy products ([page 6](#)), and shows you how to migrate to PAC Project software ([page 7](#)) and mix old and new hardware ([page 11](#)).

### Legacy Software Migration Technical Notes

This technical note does not address the details of moving an existing control strategy or HMI project created using Opto 22's older Cyrano® or FactoryFloor software to PAC Project. For these conversions, see the following technical notes:

- [Opto 22 FactoryFloor® to PAC Project Migration](#) (form 1692)
- [Cyrano to OptoControl Migration](#) (form 1169)

### A Newer Option: groov EPIC

This technical note describes the SNAP PAC System, which was introduced in 2007. Still sold and supported, SNAP PAC Systems have been field-proven in thousands of applications worldwide. However, we introduced an even more capable system in 2018: [groov EPIC](#).

Designed for both automation and industrial internet of things (IIoT) applications, *groov EPIC* is fully compatible with the SNAP PAC System but offers significant additional performance as well as other features you may want to consider when migrating from older systems.

**Cybersecurity**—*groov EPIC* adds cybersecurity features to vulnerable industrial automation systems, including a configurable device firewall, data encryption, user accounts, and security certificate management.

**Control programming options**—Flowchart-based PAC Control, any IEC 61131-3 compliant language with the CODESYS® Development System, or custom applications you build with secure shell access (SSH) to the EPIC's Linux® operating system.

**Other included software**—Securely share system data with company and cloud-based software, legacy PLCs, SCADA systems, and more. Use *groov View* for your HMI, Node-RED for simple data flows, Ignition or Ignition Edge from Inductive Automation® for OPC connectivity, and MQTT for efficient data communication.

**UL Hazardous Locations approval**—Wide -20 to 70 °C operating temperature range, stainless steel construction, and ATEX compliance

**Integrated touchscreen**—High-resolution color touchscreen lets you commission, troubleshoot, view *groov I/O* specs and wiring diagrams, and see a *groov View* HMI on the spot. Or use the browser-based configuration software from a computer anywhere.

#### More about Cybersecurity

Cybersecurity has become a critical issue in automation systems. If you prefer a SNAP PAC System but need greater security, one option is to add a *groov EPIC* processor in front of that system.

Run your PAC Control strategy on the EPIC instead of a SNAP PAC controller and make sure all communication goes through the EPIC. You gain password protection for your system and other security features, as well as the ability to more easily share data with diverse legacy equipment, on-premises software, cloud services, and other places where you need it.

For more information, see [Products > Cybersecurity](#) and [Products > groov EPIC System](#) on the Opto 22 website. Or call us: **1-800-321-6786** (toll-free from the U.S.A. and Canada) or **+1-951-695-3000**

### For Help

If you are having trouble with migration issues and cannot find the help you need in this technical note or on our website, contact Opto 22 Product Support.

**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

*NOTE: Email messages and phone calls to Opto 22 Product Support are grouped together and answered in the order received.*

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

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

## ABOUT THE SNAP PAC SYSTEM

The SNAP PAC System is an integrated system of hardware and software from Opto 22 for industrial control, remote monitoring, and data acquisition applications.

One of our goals in designing the SNAP PAC System was to make it simpler to understand, select, buy, and apply automation hardware and software. To that end we substantially reduced the number of products in the SNAP PAC family, while increasing their power, consolidating features, and making certain that they all work together.

The components of the system are:

- PAC Project Software Suite
- SNAP PAC controllers
- SNAP PAC serial brains (see note, below)
- SNAP I/O™ modules

The diagram “[Building a SNAP PAC System](#)” on [page 3](#) helps explain these components.

*NOTE: The SNAP PAC System previously included SNAP PAC Ethernet brains (SNAP-PAC-EB1 and SNAP-PAC-EB2). But due to the unavailability of parts, as of March 1, 2022, we are no longer able to manufacture them. Instead, you can use a SNAP-PAC-R1 controller as a brain; it has all the same features plus additional power and programmability, if you need it.*

## Building a SNAP PAC System

### Step 1: Choose software



#### PAC Project Basic

- PAC Control Basic
- PAC Display Basic
- PAC Manager
- PAC Utilities



#### PAC Project Professional

- PAC Control Professional
- PAC Display Professional
- PAC Manager
- PAC Utilities
- OptoOPCServer
- OptoDataLink
- SoftPAC software-based controller

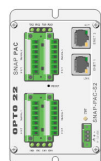
### Step 2: Choose controller



#### SoftPAC (software-based)

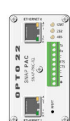
##### SNAP PAC S-series

- Standalone
- Dual independent Ethernet interfaces; multiple serial ports
- Built-in RESTful API and HTTP/HTTPS server
- Large distributed systems
- *mistic* serial support (with PAC Project Pro)



##### SNAP PAC R-series

- Rack mounted (see racks below)
- Dual independent Ethernet interfaces
- Built-in RESTful API and HTTP/HTTPS server
- Combination controller and robust brain (no step 3)
  - SNAP-PAC-R1: analog, serial, and high-speed digital
  - SNAP-PAC-R2: analog, serial, and simple digital



### Step 3: Choose brains



#### Ethernet: SNAP-PAC-R1

- Combination controller and robust brain
- Dual independent Ethernet interfaces
- Built-in RESTful API and HTTP/HTTPS server
- Analog, digital, and serial I/O
- High-speed digital functions

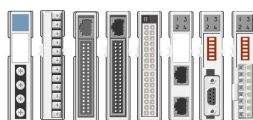
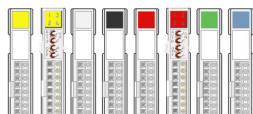


#### Serial: SNAP-PAC-SB1 or SNAP-PAC-SB2

- RS-485 (2-wire or 4-wire) serial
- Analog and digital I/O\*
- SB1 includes high-speed digital functions

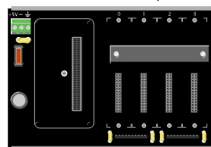


### Step 4: Choose I/O

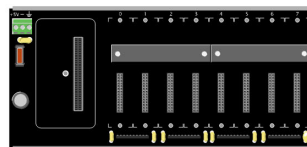


Choose from **all SNAP I/O modules**, a wide selection of analog, digital, and serial\* modules.

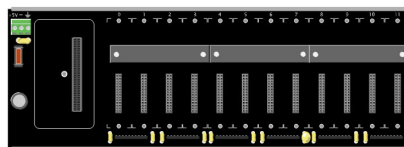
#### SNAP-PAC-RCK4 (4 modules)



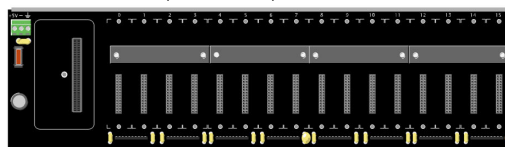
#### SNAP-PAC-RCK8 (8 modules)



#### SNAP-PAC-RCK12 (12 modules)



#### SNAP-PAC-RCK16 (16 modules)



Brain or rack-mounted controller and modules snap onto **SNAP PAC racks**.\*\*

\* SNAP PAC SB-series brains do not support serial modules.

\*\* SNAP-PAC-R1-B controller mounts on a legacy SNAP B-series rack.

## SYSTEM DIFFERENCES AND SIMILARITIES

Parts of the SNAP PAC System are the same as or very similar to legacy Opto 22 products, while other parts are different.

### PAC Project Software Suite

If you know ioProject, you know most of **PAC Project**. When we released version 8.0 of the ioProject software suite, we also rebranded the suite itself and some of the software in it so customers would know that it works with the SNAP PAC System. In addition, we added a new software application to PAC Project Professional. In a later release we also added a software-based controller for PC-based control to PAC Project Pro.

For complete information on current features in PAC Project, see form #1699, the [PAC Project Data Sheet](#). Also refer to form #1680, the *PAC Project 8.0 Release Notes*, and see the Release Notes for the most recent PAC Project release.

The following table compares the naming and contents of ioProject and PAC Project suites.

ioProject Basic (last release)	PAC Project Basic (any release)	ioProject Pro (last release)	PAC Project Pro
ioControl Basic 7.1	PAC Control Basic	ioControl Pro 7.1	PAC Control Pro
ioDisplay Basic 7.1	PAC Display Basic	ioDisplay Pro 7.1	PAC Display Pro
ioManager 7.1	PAC Manager	ioManager 7.1	PAC Manager
		OptoOPCServer	OptoOPCServer
			OptoDataLink
			SoftPAC

### SNAP PAC Controllers

The **SNAP PAC S-series and R-series controllers** were introduced in 2005 and 2006 for use with ioProject software. These controllers have more power than the older SNAP-LCE and SNAP Ultimate controllers they replaced and now offer important additional features, including a developer- and IoT-ready RESTful API (application program interface based on the REST architecture), a built-in HTTP/HTTPS server, dual independent Ethernet network interfaces and, on the S-series, SB serial brain and legacy serial *mistic* I/O unit support.

Current SNAP-PAC-S1s accept the wider range of 8–32 VDC power, and newer SNAP PACs include a microSD card slot for data storage.

The SNAP-PAC-S2 features four serial ports, and each port can be configured to use RS-232 or RS-485 (2-wire or 4-wire). This controller is ideal for communicating with legacy *mistic* systems that run on a serial network.

For backwards compatibility with older I/O units, the SNAP-PAC-R1-B rack-mounted controller can replace legacy SNAP Ultimate I/O or SNAP Ethernet I/O brains on a B-series rack without disrupting field wiring. (See more in [“About Mounting Racks” on page 13](#).)

**Software-based controller.** Also available as a separate purchase or as part of PAC Project Pro is **SoftPAC**, a software-based programmable automation controller that runs on a Microsoft® Windows® computer. SoftPAC runs the same PAC Control strategies as a hardware PAC. For more information, see [form 2020, the SoftPAC data sheet](#).

SNAP PAC and *groov* EPIC controllers are used with PAC Project software.

## SNAP PAC Brains

With the SNAP PAC System, **SNAP-PAC-R1 controller/brains and SNAP-PAC-SB brains** replace several older brains which have passed their limits of capability. SNAP PAC-R1 controller/brains support Ethernet networks, and SB-series brains operate over serial RS-485 networks. SNAP-PAC-R1s offer high performance as brains, with fast response times.

Unlike the older SNAP brains for Ethernet and serial networks, SNAP PACs use identical racks and handle all SNAP analog and digital modules in any position on the rack. (SB-series brains cannot use SNAP serial modules.) Ethernet- and serial-based SNAP PAC brains share the same set of features, although SNAP-PAC-R1 and SNAP-PAC-SB1 brains add the high-speed digital functions that some projects require. Note that since SB-series brains do not support Ethernet, Ethernet-based features such as FTP, email, SNMP, and event messages are not available.

Find more information in the [SNAP PAC Brains Data Sheet](#), form 1689.

## SNAP I/O

**SNAP I/O modules** were first introduced in 1996. Since then, the variety and density of new modules has outstripped the ability of older I/O processors to handle them. Four-channel analog modules and all serial modules are incompatible with older serial brains and require Ethernet-based controller/brains, and the higher density digital and analog modules now demand more capacity than the older Ethernet brains have.

Several modules released concurrently with the SNAP PAC System (and after its introduction) require SNAP PAC R-series controller/brains: 8- and 32-channel analog modules, 16-channel isolated digital inputs, and others. New modules we develop now typically require SNAP PAC processors.

**SNAP PAC racks**, although sporting a cool new black color, are the same boards inside as our older SNAP M-series racks (SNAP-M16, SNAP-M32, etc.). You can use the M-series and SNAP PAC racks interchangeably:

- SNAP-PAC-RCK4 is the same as SNAP-M16.
- SNAP-PAC-RCK8 is the same as SNAP-M32.
- SNAP-PAC-RCK12 is the same as SNAP-M48.
- SNAP-PAC-RCK16 is the same as SNAP-M64.

## WHY MIGRATE TO THE SNAP PAC SYSTEM?

Moving to SNAP PAC hardware and software can expand your control system's capabilities while maintaining your investment in I/O units, sensors/actuators, wiring, and other components. The SNAP PAC System offers ways to migrate over time from older products to current products.

If you have older Opto 22 products, migrating to the SNAP PAC System offers the following:

- Immediate use of existing ioControl strategies, ioDisplay projects, and ioManager configuration files
- More powerful controllers and brains with expanded network capabilities
- Secure access to control strategy variable and I/O point data for use in databases, integration with other systems, and Internet of Things (IoT) applications, via a standard RESTful API and HTTP/HTTPS server (data returned as standard format JSON)
- Compatibility with *groov* EPIC controllers (see ["A Newer Option: groov EPIC" on page 1](#)).
- Brains for serial networks that can be installed in a multi-drop (daisy-chain) configuration
- A universal rack for all SNAP PAC brains and rack-mounted controllers and all I/O modules, used in any position
- New higher density analog and digital I/O modules, plus easier ways to configure and work with points on high-density modules

- OptoDataLink software for communicating with databases such as Microsoft® SQL, Microsoft Access, and MySQL® (purchase OptoDataLink separately or as part of PAC Project Professional)
- A migration path for older *mistic* serial systems and conversion of older FactoryFloor files (requires PAC Project Professional)
- Simplified choices and a family of products that all work together, so that future projects are easier to specify and build

## WHAT IS A LEGACY PRODUCT?

When we use the term “legacy” product, we generally mean a product originally designed to work with pre-SNAP PAC systems. For example, brains that were designed for *mistic* or Optomux® systems are considered to be legacy products. Controllers designed to run FactoryFloor or ioProject software (and not capable of running PAC Project software) are also legacy products. FactoryFloor and ioProject are considered legacy products, too.

While legacy products may not contain our most up-to-date technology and features, we provide full technical support for them. We also continue to offer them for sale as long as possible in order to support customers with older Opto 22 systems, since these older systems continue to work and may not require updating.

We also try to provide upgrade and migration paths to protect your investments in field wiring, other hardware, labor, and development time. Usually we are able to offer you a new product that includes all the same features as a legacy product, plus more, and sometimes at a lower cost.

For new development we recommend the SNAP PAC System or *groov* EPIC System. In the SNAP PAC System, the hardware listed in the table below is considered legacy. To compare old and new SNAP product features and see which products work together, also see form #1693, [Legacy and Current SNAP Product Comparison and Compatibility Charts](#).

### Legacy Hardware

Part Number	Description	Most recent software providing full support	Notes
SNAP-LCM4 SNAP-LCSX SNAP-LCSX-PLUS G4LC32 series M4 and M4RTU series	FactoryFloor controller	FactoryFloor 4.1	Replaced by SNAP-PAC-S1 and SNAP-PAC-S2.
SNAP-LCE	ioProject controller	ioProject 7.1 PAC Project 8.0*	Replaced by SNAP-PAC-S1. Supported by PAC Project 8.0, but 8.0 features are limited. Not supported by PAC Project 8.1 and higher. Firmware 7.2 or higher required for use with PAC Project 8.0 or SNAP PAC brains.
SNAP-UP1-ADS	SNAP Ultimate I/O	ioProject 7.1 PAC Project 8.0*	Replaced by SNAP-PAC-R1. Supported by PAC Project 8.0, but 8.0 features are limited. Not supported by PAC Project 8.1 and higher. Firmware 7.2 or higher required for use with PAC Project 8.0 or SNAP PAC brains.
SNAP-UP1-M64 SNAP-UP1-D64			Replaced by SNAP-PAC-R1. Supported by PAC Project 8.0, but 8.0 features are limited. Not supported by PAC Project 8.1 and higher. Firmware 7.2 or higher required for use with PAC Project 8.0 or SNAP PAC brains.
SNAP-B3000-ENET SNAP-ENET-RTC	SNAP Ethernet I/O	ioProject 7.1	Replaced by SNAP-PAC-R1. Supported by PAC Project 8.0, but 8.0 features are limited. Not supported by PAC Project 8.1 and higher.
SNAP-ENET-D64			
SNAP-ENET-S64	SNAP Simple I/O	ioProject 7.1	

Part Number	Description	Most recent software providing full support	Notes
SNAP-PID-V	PID loop control module (one loop)	ioProject 7.1	Replaced by PID loop control built into SNAP-PAC-R1 controller/brains (96 loops).
B3000 B3000-B	Serial <i>mistic</i> analog/digital brain	PAC Project	Supported in PAC Project Professional with a SNAP PAC S-series controller. New products and features, including SNAP high-density and four-channel modules, are not supported.
SNAP-BRS	Serial <i>mistic</i> simple digital brain	PAC Project	Replaced by SNAP-PAC-SB1 and SNAP-PAC-SB2 serial brains. Supported in PAC Project Professional with a SNAP PAC S-series controller.
B100	Serial <i>mistic</i> digital brain board	PAC Project	
B200	Serial <i>mistic</i> analog brain board	PAC Project	
G4D16R	Serial <i>mistic</i> digital brick	PAC Project	
G4D32RS	Serial <i>mistic</i> simple digital brick	PAC Project	
G4A8R G4RAX	Serial <i>mistic</i> analog brick	PAC Project	

\* Not all 8.0 features are supported.

## Choosing Documentation

To make PAC Project software easier to use for new customers, the standard edition of several user's guides shows only the hardware, commands, and procedures directly related to the SNAP PAC and *groov* EPIC systems. **If you are using any of the legacy hardware listed above, use the legacy editions of these guides.** The legacy editions include *all* hardware, commands, and procedures.

Both standard and legacy editions of PAC Project documents are installed on your PC when you install PAC Project Pro. If you need printed versions of any documents, email us at [documentation@opto22.com](mailto:documentation@opto22.com) and request the ones you need.

To see the most current PAC Project documents, search for these form numbers on the [Opto 22 website](https://www.opto22.com):

If you're using	See these guides	Opto 22 Form #	
		Standard Edition	Legacy Edition
PAC Control	<i>PAC Control User's Guide</i>	1700	1710
	<i>PAC Control Command Reference</i>	1701	1711
	<i>PAC Control Commands Quick Reference Card</i>	1703	1713
PAC Display	<i>PAC Display User's Guide</i>	1702	1712
PAC Manager	<i>PAC Manager User's Guide</i>	1704	1714
SoftPAC	SoftPAC Quick Start Guide	2045	

## HOW TO MIGRATE TO THE SNAP PAC SYSTEM

### Migrating from ioProject to PAC Project with an Existing SNAP PAC Controller

If you have been using ioProject Basic or Professional with a SNAP PAC controller, migration to PAC Project Basic or Professional is simple. Because the individual programs within the suite are essentially the same (although they have new features and hardware support), you can simply use PAC Project to open and save your strategy, project, and other files created in ioProject. **For safety, we recommend you back up** all ioProject strategy and project files before opening them in PAC Project.



**CAUTION:** *ioControl strategies and ioDisplay projects you open and save in PAC Control and PAC Display cannot be opened later in ioControl and ioDisplay. Make sure you back up ioControl and ioDisplay strategy and project files before opening them in PAC Project.*

**IMPORTANT:** *Be sure to update PAC Control strategy files before updating PAC Display project files. Some additional naming checks are made in PAC Control (see [“Duplicate Naming Checks” on page 9](#)), and these may require that you rename some objects. Once these are renamed in PAC Control, most of them can be automatically changed in PAC Display. To do so, in PAC Display choose Tools > AutoCorrect Tags.*

If you need to know the details of where PAC Project is installed, names of executable files, and so on, see [“Software Suite Directory and Filename Changes” on page 9](#).

### Migrating from ioProject to PAC Project using a New SNAP PAC Controller

If you’ve been using ioProject with a SNAP-LCE or SNAP Ultimate controller and want to use PAC Project, your best choice is to upgrade to a SNAP PAC controller, which provides full PAC Project support. When you have your new controller, follow these steps.

1. Back up your ioControl strategy to a separate folder.
2. Open your strategy in PAC Control.
3. Open the Control Engines folder in the Strategy Tree. Right-click the existing controller and choose Modify from the pop-up menu. Add your new SNAP PAC controller.
4. Save the strategy and download it to the new controller. (If you receive errors when downloading, see [“Duplicate Naming Checks” on page 9](#).)
5. See [“Using I/O Units with SNAP PAC Controllers and PAC Control” on page 11](#) for additional things you need to know.

Similarly, ioDisplay projects can be backed up, then simply opened in PAC Display. If you configured the new SNAP PAC controller in PAC Control under a different name than the old controller, then in PAC Display, change the name of the control engine associated with the strategy so it is correct, and verify the path to the updated PAC Control strategy. Then choose Tools > AutoCorrect Tags. (See [“Duplicate Naming Checks” on page 9](#).) Save the PAC Display project.

If you are using OptoOPCServer, the changes you made to the control engine in PAC Display are automatically sent to the server. In any OPC client applications using OptoOPCServer, make whatever changes are necessary for the client to receive data from the new controller. See Chapter 2 of the OptoOPCServer User’s Guide.

If you need to know the details of where PAC Project is installed, names of executable files, and so on, see [“Software Suite Directory and Filename Changes” on page 9](#).

### Migrating from ioProject to PAC Project using a SNAP-LCE or SNAP Ultimate Controller

If you are currently using a SNAP-LCE or SNAP Ultimate controller with ioProject and cannot upgrade to a SNAP PAC controller right now, you have two choices:

- **Continue to use ioProject 7.1** with either 7.1 or 7.2 controller firmware. Please be aware that version 7.1 is the last version of ioProject we will release. New features will be released in PAC Project, not in ioProject.
- **Install PAC Project 8.0 and install version 7.2 firmware** on the controller. (There is no 8.0 firmware for these controllers.) Version 7.2 firmware is the final version of 7.x firmware for SNAP-LCE and SNAP Ultimate controllers, and is intended to help smooth the transition from them to SNAP PAC controllers.

*NOTE: SNAP-LCE and SNAP Ultimate controllers are not supported by PAC Project 8.1 and higher. They can only run strategies created with PAC Project 8.0 or ioProject.*



Version 7.2 firmware provides limited support for PAC Project 8.0 features. Here's what you can and cannot do with this combination:

- **You can** use the Set I/O Unit Configured Flag command and the View I/O Units dialog box in PAC Control. This dialog box gives you a more compact view of points in the I/O Unit Inspect dialog box.
- **You can** use the improved recipe management and improved table control for string tables in PAC Display.
- **You can** use the high-density I/O modules with SNAP PAC brains. You can also use the improved support for high-density modules, including individual point names and standard commands, on SNAP PAC brains.
- **You cannot** use the new high-density modules with legacy brains (SNAP Ultimate, Ethernet, or Simple brains). You can still use the original three high-density digital modules (SNAP-IDC-32, SNAP-ODC-32-SNK, and SNAP-ODC-32-SRC), but only with legacy HDD commands. Individual point names are not available with legacy brains.

See ["Mixing 8.0 and 7.2 Software and Firmware" on page 10](#) for additional information. See form #1680, the *PAC Project 8.0 Release Notes* for more information about new features.

Of course, you can also use SNAP Ultimate as an I/O unit with a SNAP PAC controller running PAC Project 8.0. See ["SNAP PAC Controllers with SNAP Ultimate, Ethernet, or Simple Brains" on page 12](#) for more information.

If you need to know the directories and filenames for PAC Project, see ["Software Suite Directory and Filename Changes" on page 9](#).

## Migrating from FactoryFloor to PAC Project

If you have been using the legacy FactoryFloor software suite (OptoControl, OptoDisplay, OptoServer), you can migrate to the SNAP PAC System using PAC Project Professional and a SNAP PAC S-series controller, which supports *mistic* serial I/O units. Follow the steps in Opto 22 form #1692, the [FactoryFloor to PAC Project Migration Technical Note](#).

## Duplicate Naming Checks

To resolve earlier problems in ioControl, PAC Control now checks for duplicate names of objects such as charts, subroutines, strategy variables, OptoScript command names, and reserved keywords (for example, *NULL*). If a naming conflict is found, you may need to rename an object. If you do rename objects in a strategy, also check any text files that are downloaded with the strategy and rename objects in them if necessary.

Once objects in the PAC Control strategy are renamed, the tag database is updated. Always update PAC Control strategy files before updating PAC Display project files.

When you open the project in PAC Display, use Tools > AutoCorrect Tags to make sure all references are updated. Note that PAC Display recipe files cannot be updated automatically. If you are using recipe files, search for and replace any renamed objects within them.

## Software Suite Directory and Filename Changes

With the change from ioProject 7.1 to PAC Project, some filenames and directory names have changed as shown below. Note that PAC Control strategy files continue to use the .idb extension, and that some .dll files have retained older names.

Old Name	Old Files and Directories	New Name	New Files and Directories
ioProject	\ioProject Software 7.1	PAC Project	\PAC Project Software

Old Name	Old Files and Directories	New Name	New Files and Directories
ioControl	ioControl.pro.exe ioControl.basic.exe ioControlHelp.chm ioControlCommands.chm readme_ioControl.txt \\ioControl Pro Examples \\ioControl Basic Examples	PAC Control	Control.pro.exe Control.basic.exe Control.chm ControlCommands.chm readme_Control.txt \\Control Pro Examples \\Control Basic Examples
ioDisplay Configurator ioDisplay Runtime	ioDisC.pro.exe ioDisR.pro.exe ioDsrX.pro.exe ioDisC.basic.exe ioDisR.basic.exe ioDsrX.basic.exe ioDisplayHelp.chm readme_ioDisplay.txt \\ioDisplayBasicExamples \\ioDisplayBasicSupportFiles \\ioDisplayProExamples \\ioDisplayProSupportFiles	PAC Display Configurator PAC Display Runtime	DisplayC.pro.exe DisplayR.pro.exe DisplayX.pro.exe DisplayC.basic.exe DisplayR.basic.exe DisplayX.basic.exe Display.chm readme_Display.txt \\DisplayBasicExamples \\DisplayBasicSupportFiles \\DisplayProExamples \\DisplayProSupportFiles
ioManager	OptoTagG.exe OPTOTAGG.HLP readme_ioManager.txt	PAC Manager	Manager.exe Manager.hlp readme_Manager.txt
ioTerminal	ioTerm.exe IOTERM.HLP readme_ioUtilities.txt	PAC Terminal	ioterm.exe ioterm.hlp readme_Uilities.txt
ioMessageViewer	ioMessageViewer.exe ioSniff.hlp	PAC Message Viewer	MessageViewer.exe MessageViewer.hlp

## MIXING 8.0 AND 7.2 SOFTWARE AND FIRMWARE

### Software Versions

You can maintain different ioProject and PAC Project software versions on the same computer without problems. For example, if you need to maintain multiple strategies or projects, some of which are in ioProject 7.1 and some of which are in PAC Project, just leave ioProject installed and install PAC Project, too.

## Firmware Versions

Hardware used with PAC Project should be upgraded to the correspondingly numbered firmware if it is available. Legacy controllers should be upgraded to 7.2 firmware. The following table shows the *minimum* firmware version required to support specific hardware features.

Hardware and features supported	PAC Project Software					ioProject Software				
	Controller firmware		Brain firmware			Controller firmware		Brain firmware		
	SNAP PAC	SNAP-LCE SNAP Ultimate	SNAP PAC brain	SNAP Ethernet or Simple		SNAP PAC	SNAP-LCE SNAP Ultimate	SNAP PAC brain	SNAP Ethernet or Simple	
SNAP-IDC-32, SNAP-ODC-32-SNK, and SNAP-ODC-32-SRC high-density digital (HDD) modules	Individual point names; use of standard digital commands		8.0	7.2*	8.0	n/a	n/a	n/a	n/a	n/a
	No individual point names; use of legacy HDD commands		8.0	7.2	8.0	6.1	7.0	6.1	8.0	6.1
All other HDD modules (Individual point names; use of standard digital commands)	8.0**	7.2*	8.0**	n/a		n/a	n/a	n/a	n/a	
SNAP-AITM-8, SNAP-AIV-32, and SNAP-AIMA-32 analog modules	8.0	7.2*	8.0	n/a		n/a	n/a	n/a	n/a	
All other analog modules with more than 4 points	8.0**	n/a	8.0**	n/a		n/a	n/a	n/a	n/a	
SNAP PAC EB- and SB-series brains***	8.0	7.2				n/a	n/a			

\*Only on SNAP PAC I/O units this controller controls; not on legacy I/O units nor on the SNAP Ultimate I/O unit acting as the controller.

\*\*New modules are introduced often. See firmware release notes for specific modules supported in each release.

\*\*\*SNAP SB-series brains must be connected to an S-series PAC controller.

If you use PAC Control with controllers running firmware versions lower than 7.2 and try to download a strategy that uses commands or configurations that require 7.2 or 8.0 firmware, you'll receive an error message.

The following commands require 7.2 or higher controller firmware:

- Move I/O Unit to Numeric Table
- Move Numeric Table to I/O Unit
- IVAL Move Numeric Table to I/O Unit

The following I/O unit configurations require 7.2 or higher controller firmware:

- Any I/O unit with a maximum digital or analog scantime set
- A Generic OptoMMP Device (This I/O unit configuration is used for a controller if you need to access its memory map, for example to read or write to its Scratch Pad area.)

## MIXING CURRENT AND LEGACY HARDWARE IN SNAP PAC SYSTEMS

### Using I/O Units with SNAP PAC Controllers and PAC Control

If you have a SNAP PAC controller, what changes will you experience when you use PAC Project? The answer depends on what brains you are using.

### SNAP PAC Controllers with SNAP PAC Brains and R-series I/O Units

With current firmware, the SNAP PAC brains (SNAP-PAC-SB1 and SNAP-PAC-SB2 for serial networks) and R-series I/O units (SNAP-PAC-R1) support new I/O modules and all features in PAC Project, including the ability to configure and use high-density digital (HDD) modules like 4-channel modules. You assign names to the points on these modules, they appear in the Strategy Tree along with all other points, and you can use standard digital point commands for points on HDD modules. (Configuring an HDD point as a counter requires using a SNAP-PAC-R1 or -SB1 I/O unit, however. See [“Using High-Density Digital Modules with Mixed Systems” on page 13](#) for more information.)

The group of HDD commands, such as Get All HDD Module States, have been deprecated: they still work in existing strategies, but generally speaking, you don't need to use them and can treat a point on an HDD module exactly as you would any digital point.

When configuring points, you'll notice that points are now numbered by both their module position number and their point number on the module (for example, module 00, point 3; or module 12, point 26). This change makes it possible to configure a module with up to 32 points in any position on the rack.

You'll also notice that you can configure a 4-channel digital module in any position on the rack. The old position 0–7 limitation no longer exists with SNAP PAC brains and SNAP PAC racks. For information on mixing brains and racks, see [“About Mounting Racks” on page 13](#).

*NOTE: The position limitation does exist for all SNAP-PAC-R1-B controllers (which mount on B-series racks), and for SNAP-PAC-R1s with serial numbers less than 600,000. SNAP-PAC-R1s with serial numbers of 600,000 and greater support digital modules in any position on a SNAP PAC rack.*

### SNAP PAC Controllers with SNAP Ultimate, Ethernet, or Simple Brains

Firmware on these brains remains at 7.x.

SNAP Ultimate, Ethernet, and Simple I/O units retain all the features they had in 7.x. They cannot use the new I/O modules or the improved HDD support (see the previous section), but the PAC Control strategy will work with these I/O units the same way the older ioControl strategy did. See [“About Mounting Racks,”](#) below, for rack compatibility issues.

In PAC Project you'll see a difference in point numbering. ioProject 7.1 assumed a maximum of 64 points on any rack, and points on an I/O unit were numbered consecutively, 0–63. Now you'll see module number/point number designations in both PAC Control and PAC Manager. What used to be numbered point 4 will now be numbered module 01, point 0; point 63 becomes module 15, point 3, and so on. This change is visible when configuring I/O but won't make any difference in the strategy, because the strategy works with points by name, not by number.

If the SNAP Ultimate I/O is running a strategy, also see the next section, [“Using Legacy SNAP-LCE or SNAP Ultimate Controllers with Legacy or Current I/O Units.”](#)

### Using Legacy SNAP-LCE or SNAP Ultimate Controllers with Legacy or Current I/O Units

If you are using PAC Project 8.0 software with SNAP-LCE or SNAP Ultimate controllers, you'll need to upgrade the controller firmware to version 7.2.

*NOTE: SNAP-LCE and SNAP Ultimate controllers are not supported by PAC Project 8.1 and higher. They can only run strategies created with PAC Project 8.0 or ioProject.*

With the controller at 7.2 firmware and running PAC Project 8.0, the new modules and the 8.0 point numbering and point configuration features are available for SNAP PAC brains only. For legacy SNAP Ultimate, Ethernet, or Simple I/O, point numbering and point configuration remain the same as in ioControl 7.1. The

three HDD modules supported in 7.1 (SNAP-IDC-32, SNAP-ODC-32-SNK, SNAP-ODC-32-SRC) will still be supported in exactly the same way, using HDD commands. New modules are not supported with legacy brains.

For additional information, see [“Using R1-Based I/O Units with Legacy Controllers” on page 14](#) and [“Using High-Density Digital Modules with Mixed Systems” on page 13](#).

## About Mounting Racks

All SNAP PAC R-series controllers and SNAP PAC brains use the same black SNAP PAC racks. The only exception is the SNAP-PAC-R1-B, which uses a SNAP B-series rack.

Older SNAP Ultimate, Ethernet, and Simple brains used a variety of racks depending on the brain’s capabilities.

In some cases you can mix old and new brains and racks.

**M-series racks.** As noted on [page 5](#), SNAP PAC racks and M-series racks can be used interchangeably. If you have a SNAP Simple brain that you want to replace with a SNAP PAC brain, for example, you don’t have to change racks. Similarly, if you have a new black SNAP PAC rack and need to use an older SNAP-UP1-M64 on it, you can.

**B-series racks.** If you have an I/O unit on a B-series rack, you can replace its brain or controller with a **SNAP-PAC-R1-B** controller, which can be used either as a controller running a PAC Control strategy or simply as a powerful brain. With the SNAP-PAC-R1-B you can add to the rack any new SNAP I/O modules that require a SNAP PAC processor, such as 16-point digital input modules. However, due to limitations on the B-series rack, you cannot use 4-channel digital modules beyond the first eight module positions.

B-series racks do not work with any other R-series controllers, nor with any SNAP PAC brains.

You cannot use D-series racks with SNAP PAC devices. These racks must be changed.

For details on brain/controller/rack compatibility, see form #1693, [Legacy and Current SNAP Product Comparison and Compatibility Charts](#).

## Using High-Density Digital Modules with Mixed Systems

The section [“Using I/O Units with SNAP PAC Controllers and PAC Control” on page 11](#) mentioned the change in how high-density digital (HDD) modules are configured, as well as the fact that points on HDD modules used with SNAP PAC brains and R-series controllers are generally configured and used like any other digital point.

The exception is in the use of counters. A point on an HDD module used with a SNAP-PAC-R1 controller or a SNAP-PAC-SB1 brain can be configured as a counter, and you can use standard counter commands for the point.

But if the module is used with a SNAP-PAC-SB2 (or -R2 or -EB2), the counter feature does not appear as an option when configuring the point in PAC Control or PAC Manager. Since counting on an HDD module is done in the module itself and is automatic, however, you can still use these counters in two ways:

- In a PAC Control strategy, use the deprecated HDD commands Get HDD Module Counter(s) and Get & Clear HDD Module Counter. (See [“Setting Legacy Options in PAC Control” on page 14](#).)
- In real time, read and clear counters in the PAC Manager Inspect window.

**Legacy I/O Units.** For SNAP Ultimate, Ethernet, and Simple brains, HDD modules are still treated as they were in ioProject 7.1. SNAP Ultimate, Ethernet, and Simple brains support only the following HDD modules:

- SNAP-IDC-32
- SNAP-ODC-32-SNK

- SNAP-ODC-32-SRC

Therefore, if you are running PAC Project on a system with a mix of SNAP PAC I/O units and legacy I/O units, your approach to HDD modules may be different depending on the I/O unit:

- With the SNAP PAC I/O units, you can use all HDD modules, configure them just like any other point, and use standard digital point commands with them (with the exception of counters as discussed above).
- With the legacy I/O units, you can use only a few HDD modules, you do not configure them, and you use HDD commands with them, exactly as before. HDD commands are deprecated but still available for use. (To use them in a new strategy, see [“Setting Legacy Options in PAC Control” on page 14.](#))

### Using R1-Based I/O Units with Legacy Controllers

If you need to replace an older SNAP Ultimate, Ethernet, or Simple brain in a system controlled by a SNAP Ultimate I/O or SNAP-LCE controller, you can replace it with a SNAP-PAC-R1 controller/brain. (See [“About Mounting Racks” on page 13](#) for rack considerations.) Whether you are running ioProject or PAC Project, upgrade the controller’s firmware to 7.2.

*NOTE: If you are using PPP over a modem with a legacy brain, you’ll need to replace the brain with a SNAP PAC R-series controller/brain, not an EB brain. EB brains do not have a serial port for PPP, but R-series controllers do.*

If the I/O unit name and IP address remain the same, you don’t care that the I/O unit type shown in the strategy is incorrect, and you’re not planning on using the new I/O modules, either an ioProject or a PAC Project strategy can use the new brain without further changes.

If the new brain will have a different IP address, if you need the I/O unit type shown in the strategy to match the physical I/O unit, or if you want to use new I/O modules on the I/O unit, then the replacement is more complicated. In this situation, you must:

1. Upgrade controller firmware to 7.2.
2. Change the I/O unit in the strategy.
  - a. In the control strategy, rename the I/O unit you are replacing and give it a fictitious IP address.
  - b. Add a new I/O unit with the original name, using the correct new IP address and, if running PAC Project, the I/O unit type (SNAP PAC brains are not an available I/O unit type in ioProject). Copy all the points to this new I/O unit.
  - c. Delete the I/O unit you’ve replaced.

All existing points will work as they did before. If you’re running PAC Project, you can use new I/O modules supported by PAC Project 8.0 with the new brain. If you’re running ioProject, you cannot use the new modules, since they are not recognized by ioProject 7.1.

## USING OPTODATALINK WITH LEGACY HARDWARE

OptoDataLink was designed to be used with SNAP PAC controllers and brains. In addition, however, it also supports the following legacy hardware:

- SNAP-LCE and SNAP Ultimate controllers running control strategies created in ioControl
- SNAP Ethernet-based brains whose configuration has been saved in an .otg file using ioManager or PAC Manager, or exported from ioControl into an .otg file.

## SETTING LEGACY OPTIONS IN PAC CONTROL

Because our focus in PAC Project is on the SNAP PAC System, PAC Control initially shows only SNAP PAC I/O units and the commands used with them. When you’re using the SNAP PAC system only, hiding legacy I/O

units and commands makes it simpler and less confusing to build your strategy. However, the legacy capabilities are still there and can be made visible in a specific strategy as needed.

### Existing Strategies

When you open an existing ioControl strategy in PAC Control, either Basic or Professional, PAC Control will automatically show the I/O units and commands appropriate to that strategy. For example, if you have been using SNAP Ultimate I/O, SNAP Ultimate I/O units will be visible in the strategy. In addition, commands used with SNAP Ultimate I/O but now deprecated because they are not needed with SNAP PACs—such as High-Density Digital commands—will also be available.

Similarly, if you open an existing strategy that contains *mistic* serial I/O units, all the *mistic* I/O unit types and commands—such as event/reaction and *mistic* PID commands—will automatically be shown.

### New Strategies

When you create a new strategy in PAC Control, either Basic or Professional, the strategy will show only the SNAP PAC System. This means:

- When you use a command such as *Get I/O Unit as Binary Value*, the only I/O units shown for Argument 1 will be SNAP PAC I/O units (SNAP-PAC-R1, SNAP-PAC-R2, SNAP-PAC-EB1, SNAP-PAC-EB2, SNAP-PAC-SB1, and SNAP-PAC-SB2).
- Commands that are used only with legacy hardware—such as *Enable Communication to Mistic PID Loop* or *Clear HDD Module Off-Latches*—won't be listed.

Since some Opto 22 customers work with multiple systems, legacy options can be set individually for each strategy or subroutine. If you are using legacy hardware, you can choose the options that apply to each strategy you're working with, without affecting other strategies.

**IMPORTANT:** *Once you have enabled a legacy option for a specific strategy or subroutine, you cannot disable it later for the same strategy or subroutine.*

Here's how to set legacy options:

1. In PAC Control, open the strategy or subroutine for which you want to change options.
2. Choose File > Strategy Options. Click the Legacy tab.  
Depending on the hardware you're using, you can set one or more of the following options:
  - Enable Ethernet, Ultimate, and Simple I/O units and commands (see [page 16](#)).
  - Enable high-density digital commands (see [page 16](#)).
  - Enable *mistic* I/O units and commands (PAC Control Pro only; see [page 16](#)).
3. Click the option you want to enable. At the confirmation dialog box, make sure it is correct, and then click Yes. Repeat to enable other options.  
The options are changed permanently for the strategy or subroutine.



## Enable Ethernet, Ultimate, and Simple I/O Units and Commands

If you're using any of the I/O unit types shown in the following table, you should enable Ethernet, Ultimate, and Simple I/O units and commands. When you do, both the I/O unit types and the commands shown in the table will become available in the strategy.

I/O Unit Types	Commands
SNAP-ENET-D64	IVAL Set Digital-64 I/O Unit from MOMO Masks [DEPRECATED]
SNAP-B3000-ENET	IVAL Set Mixed 64 I/O Unit from MOMO Masks [DEPRECATED]
SNAP-ENET-RTC	IVAL Set Mixed I/O Unit from MOMO Masks [DEPRECATED]
SNAP-UP1-D64	IVAL Set Simple 64 I/O Unit from MOMO Masks [DEPRECATED]
SNAP-UP1-ADS	Set Digital-64 I/O Unit from MOMO Masks [DEPRECATED]
SNAP-UP1-M64	Set Mixed 64 I/O Unit from MOMO Masks [DEPRECATED]
SNAP-ENET-S64	Set Mixed I/O Unit from MOMO Masks [DEPRECATED]
	Set Simple 64 I/O Unit from MOMO Masks [DEPRECATED]

## Enable High Density Digital Module Commands

All SNAP high-density digital modules are fully supported by the SNAP PAC System using regular digital point commands. However, three of our older HDD modules can also be used with SNAP Ultimate, SNAP Ethernet, and SNAP Simple I/O units, if you use the older "deprecated" HDD commands. (Remember that digital-only I/O units do not support HDD modules.)

If you are using SNAP-ODC-32-SNK, SNAP-ODC-32-SRC, or SNAP-IDC-32 HDD modules with these older I/O units, you should enable High Density Digital module commands. When you do, the following commands become available in the strategy:

Commands	
Clear HDD Module Off-Latches	Get All HDD Module On-Latches
Clear HDD Module On-Latches	Get All HDD Module States
Get & Clear All HDD Module Off-Latches	Get HDD Module Counters
Get & Clear All HDD Module On-Latches	Get HDD Module Off-Latches
Get & Clear HDD Module Counter	Get HDD Module On-Latches
Get & Clear HDD Module Counters	Get HDD Module States
Get & Clear HDD Module Off-Latches	Set HDD Module from MOMO Masks
Get & Clear HDD Module On-Latches	Turn Off HDD Module Point
Get All HDD Module Off-Latches	Turn On HDD Module Point

## Enable *mistic* I/O units and commands

If you're using legacy *mistic* hardware with a SNAP PAC S-series controller and PAC Control Professional, you should enable *mistic* I/O units and commands. When you do, the

following types and commands (see next page) will become available in the strategy:

I/O Unit Types	Other Types
G4D16R	Mistic PID Loop
G4D32RS	Digital Event/Reaction
G4A8R, G4RAX	Analog Event/Reaction
B100	Event/Reaction Group
B200	
B3000, B3000-B (Digital)	
B3000, B3000-B (Analog)	
SNAP-BRS	

**Commands**

Clamp Mystic PID Output	Get Analog Square Root Value
Clamp Mystic PID Setpoint	Get Analog Totalizer Rate
Clear All Event Latches	Get Event Latches
Clear Event Latch	Get Frequency
Clear I/O Unit Interrupt	Get Mystic PID Control Word
Convert Mystic I/O Hex String to Float	Get Mystic PID D Term
Convert Number to Mystic I/O Hex String	Get Mystic PID I Term
Disable Communication to Event/Reaction	Get Mystic PID Input
Disable Communication to Mystic PID Loop	Get Mystic PID Mode
Disable Event/Reaction Group	Get Mystic PID Output Rate of Change
Disable Interrupt on Event	Get Mystic PID Output
Disable Mystic PID Output Tracking in Manual Mode	Get Mystic PID P Term
Disable Mystic PID Output	Get Mystic PID Scan Rate
Disable Mystic PID Setpoint Tracking in Manual Mode	Get Mystic PID Setpoint
Disable Scanning for All Events	Get Off-Time Totalizer
Disable Scanning for Event	Get On-Time Totalizer
Disable Scanning of Event/Reaction Group	Get Period
Enable Communication to Event/Reaction	Get Period Measurement Complete Status
Enable Communication to Mystic PID Loop	Interrupt Disabled for Event?
Enable Event/Reaction Group	Interrupt Enabled for Event?
Enable Interrupt on Event	IVal Set Digital Binary [DEPRECATED]
Enable Mystic PID Output Tracking in Manual Mode	IVal Set Frequency
Enable Mystic PID Output	IVal Set Mystic PID Control Word
Enable Mystic PID Setpoint Tracking in Manual Mode	IVal Set Mystic PID Process Term
Enable Scanning for All Events	IVal Set Off-Totalizer
Enable Scanning for Event	IVal Set On-Totalizer
Enable Scanning of Event/Reaction Group	IVal Set Period
Event Occurred?	Mystic PID Loop Communication Enabled?
Event Occurring?	Read Event/Reaction Hold Buffer
Event Scanning Disabled?	Set Digital I/O Unit from MOMO Masks
Event Scanning Enabled?	[DEPRECATED]
Event/Reaction Communication Enabled?	Set Mystic PID Control Word
Event/Reaction Group Communication Enabled?	Set Mystic PID D Term
Generating Interrupt?	Set Mystic PID I Term
Get & Clear Analog Filtered Value	Set Mystic PID Input
Get & Clear Analog Totalizer Value	Set Mystic PID Mode to Auto
Get & Clear Event Latches	Set Mystic PID Mode to Manual
Get & Restart Off-Time Totalizer	Set Mystic PID Output Rate of Change
Get & Restart On-Time Totalizer	Set Mystic PID P Term
Get & Restart Period	Set Mystic PID Scan Rate
Get Active Interrupt Mask	Set Mystic PID Setpoint
Get Analog Filtered Value	Transmit/Receive Mystic I/O Hex String
Get Analog Square Root Filtered Value	