

# SNAP PAC Redundancy Option Kit

## Features

- Standalone arbiter monitors and controls the active and backup status of redundant controllers
- Redundancy power switch controlled by the arbiter enables remote rebooting of the controllers
- No other special equipment is required
- PAC Redundancy Manager provides quick and intuitive configuration and monitoring

## Description

The SNAP PAC Redundancy Option Kit, part number SNAP-PAC-ROK, provides you the tools you need to develop a control system with an increased level of reliability that can survive single points of failure and improve your system's mean time between failures (MTBF). In the unlikely event that a controller were to fail for whatever reason, a second identically configured controller takes over with almost no down time. This adds yet another layer of reliability to Opto 22's extremely reliable distributed intelligence architecture.

The SNAP PAC Redundancy Option Kit includes a **SNAP-PAC-SRA arbiter**, a **SNAP-RPSW redundant power switch**, and the *SNAP PAC Redundancy Option User's Guide*, form 1831. The PAC Redundancy Manager is included with PAC Control Professional.

To complete a redundant control system, you will also need the following items from Opto 22:

- Two S-series PACs (identical part numbers)
- One or more Opto 22 SNAP PAC Ethernet brain-based I/O units on the same Ethernet network as the controllers
- PAC Project Professional 9.0 or newer installed on a PC connected to the control network
- A PAC Control Professional strategy that makes use of special redundancy features such as checkpoint blocks and persistent/redundant variables.

## Advantages

When implemented in a redundant system, the Redundancy Option Kit provides a number of advantages, some of which are unique to Opto 22:

- Either controller can play the role of the active controller or backup controller. No prior designation is required.



- Either controller can switch its role in the redundancy scheme at any time.
- No special cables are required. Standard Cat 5 cable connects the controllers for synchronization.
- No special redundancy controllers are required, just standard S-series controllers.
- No special software is needed.
- Instead of requiring the entire control program to be synchronized, the developer tags specific data for redundancy and places checkpoint blocks at precise points in the logic where synchronization is to occur. This improves system performance and provides flexibility for the developer.
- The SNAP-RPSW redundancy power switch enables remote rebooting of the controllers for tasks such as resetting the controller and updating firmware.

## SNAP-PAC-SRA Arbiter

The SNAP-PAC-SRA arbiter is a standalone processor that connects via dedicated RS-485 links to two identically configured SNAP PAC S-series controllers. The arbiter controls which controller is active and which is backup, based on status information returned by each controller in response to the arbiter's periodic heartbeat requests. LEDs on the arbiter indicate system health.

## Part Numbers

| Part         | Description                                                                                                                          |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------|
| SNAP-PAC-ROK | SNAP PAC Redundancy Option Kit. Includes a redundancy arbitration processor (SNAP-PAC-SRA) and a redundant power switch (SNAP-RPSW). |
| SNAP-ROKDIN  | DIN-rail Mounting Kit for Arbiter or Redundant Power Switch                                                                          |

# SNAP PAC Redundancy Option Kit

The arbiter is responsible for the following things:

- Maintains the active/backup status of each controller
- Manages synchronization of strategy and control data
- Sends heartbeat requests at regular intervals to each controller in order to receive status information
- Qualifies the backup controller, which means that the backup controller is ready to take over as the active controller
- When a controller is disqualified, the arbiter tells the controller to reset itself
- Using its supply-voltage output, the arbiter drives normally closed relays in the SNAP-RPSW, thus controlling the power supply of each controller

## SNAP-RPSW Redundant Power Switch

The SNAP-RPSW redundant power switch is a relay device designed especially for use in an SNAP PAC redundant system. Connected to the SNAP-PAC-SRA arbiter and both controllers, this switch responds to the supply-voltage output from the arbiter, which allows it to reliably restart a controller in order to bring the controller back up or re-commission the controller after updating firmware.

## PAC Project Software

The SNAP PAC Redundancy Option Kit is designed for use with **SNAP PAC S-series programmable automation controllers**. The controllers run a control program built with PAC Control™ Professional, one component of PAC Project™ Professional software. **PAC Project Professional** is available for purchase and includes PAC Control Professional for developing control programs, PAC Display Professional for creating human-machine interfaces (HMI), PAC Manager for configuring and maintaining SNAP PAC devices, OptoOPCServer™ for OPC connectivity, and OptoDataLink™ for database communications.

PAC Control Professional also provides the following tools for you to use with the Redundancy Option Kit:

- The **PAC Redundancy Manager** enables you to configure the arbiter, monitor the devices in a redundant system, install firmware on the arbiter and the controllers, and more. (See picture below.)
- A **checkpoint block tool**, which you use to insert a checkpoint block in your logic wherever you want synchronization to occur
- The **Persistent/Redundant variable option** that designates whether a variable is replicated to the backup controller

## PAC Redundancy Manager

Current system status

Arbiter and controller management

# SNAP PAC Redundancy Option Kit

## Specifications

### SNAP-PAC-SRA

|                                    |                                                                                                                                                 |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Power Requirements                 | 8–32 VDC, 4 W                                                                                                                                   |
| Memory                             | 16 MB RAM                                                                                                                                       |
| Backup battery for real-time clock | Rechargeable (recharges whenever the arbiter has power). 5-year life when power is off.                                                         |
| Operating Temperature              | 0 to 60 °C                                                                                                                                      |
| Storage Temperature                | -40 to 85 °C                                                                                                                                    |
| Humidity                           | 0–95% humidity, non-condensing                                                                                                                  |
| Wired Ethernet Network Interface   | IEEE 802.3 network, 10Base-T and 100Base-TX. Automatic MDC/MDI-X crossover (Ethernet crossover cable not required for direct connection to PC). |
| Maximum Ethernet Segment Length    | 100 meters with Category 5 or superior UTP<br>For 100 Mbps at this distance, use Category 5 or superior solid UTP.                              |
| Serial interfaces (2)              | RS-485 twisted pair(s), with shield                                                                                                             |
| Serial data rates                  | 300 baud to 230.4 Kbaud                                                                                                                         |

### SNAP-RPSW

|                                   |                       |
|-----------------------------------|-----------------------|
| Max switch volts                  | 32 VDC                |
| Max switch current                | 4 amps DC at 70 °C    |
| Operating range                   | VDC                   |
| Switch control (normally closed): |                       |
| Off                               | 8–32 VDC (3 mA–15 mA) |
| On                                | < = 2 VDC (< 0.5 mA)  |

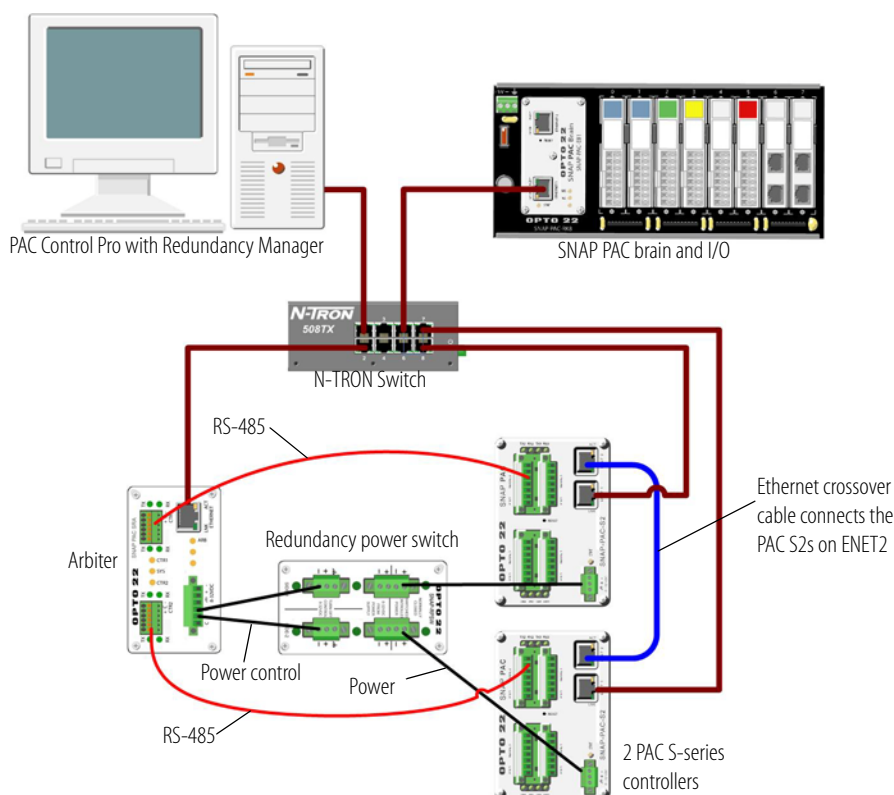
# SNAP PAC Redundancy Option Kit

## System Architecture

In the following simplified illustration of the redundancy architecture, two SNAP-PAC-S2 controllers are connected via Ethernet to the same I/O. A SNAP-PAC-SRA arbiter is connected to both controllers with dedicated RS-485 links. An Ethernet crossover cable connected to the ENET2 Ethernet ports enables

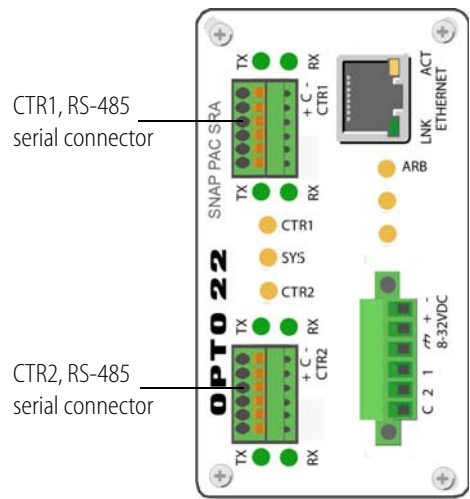
communication between the controllers. A SNAP-RPSW redundancy power switch connected to the arbiter controls power to the controllers. Separate power supplies for the arbiter and each of the controllers are not shown. For more information on connecting power, see [“Power Connections” on page 6](#).

## Ethernet, Serial, and Power Switch Connections



# SNAP PAC Redundancy Option Kit

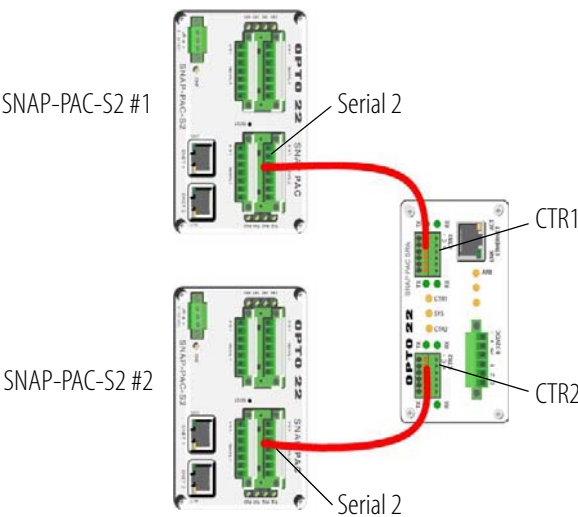
## SNAP-PAC-SRA RS-485 Serial Connections



CTR1 and CTR2 Pins

| Pin | Description |
|-----|-------------|
| -   | TX/RX-      |
| C   | Com         |
| +   | TX/RX+      |
|     | not used    |
|     | not used    |
|     | not used    |

Controller-to-Arbiter Wiring



SNAP-PAC-S2 #1

Arbiter

| Serial 1 |        |  | CTR1 |        |  |
|----------|--------|--|------|--------|--|
| 2        | TX/RX- |  | -    | TX/RX- |  |
| 3        | Com    |  | C    | Com    |  |
| 1        | TX/RX+ |  | +    | TX/RX+ |  |

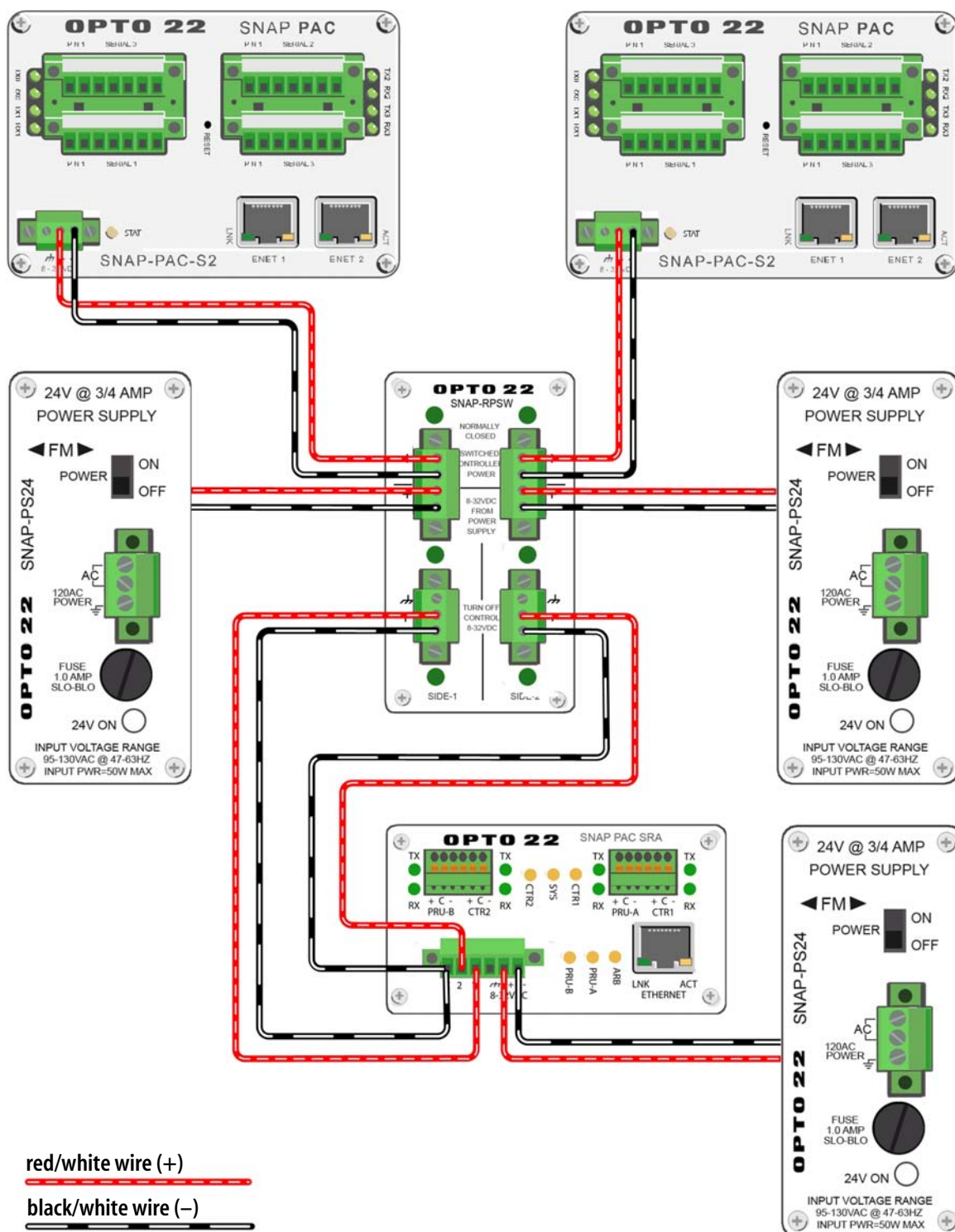
| Serial 1 |        |  | CTR2 |        |  |
|----------|--------|--|------|--------|--|
| 2        | TX/RX- |  | -    | TX/RX- |  |
| 3        | Com    |  | C    | Com    |  |
| 1        | TX/RX+ |  | +    | TX/RX+ |  |

SNAP-PAC-S2 #2

## SNAP PAC Redundancy Option Kit

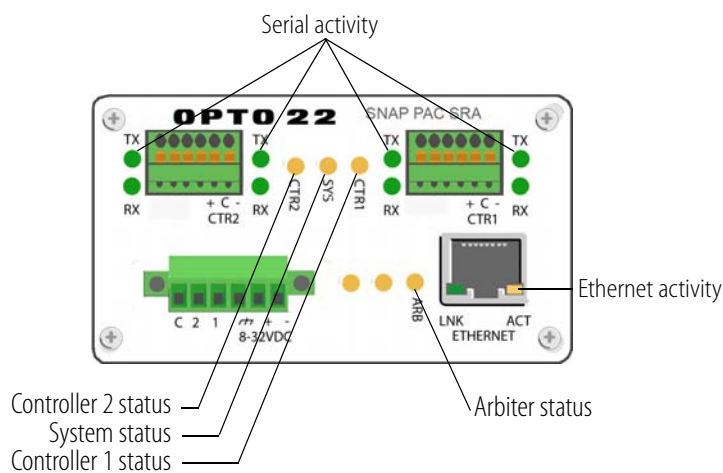
## Power Connections

The following diagram shows how power is connected from the power supplies to the arbiter and redundancy power switch, and from the power switch to the controllers.



# SNAP PAC Redundancy Option Kit

## SNAP-PAC-SRA LEDs



### Communication Status LEDs

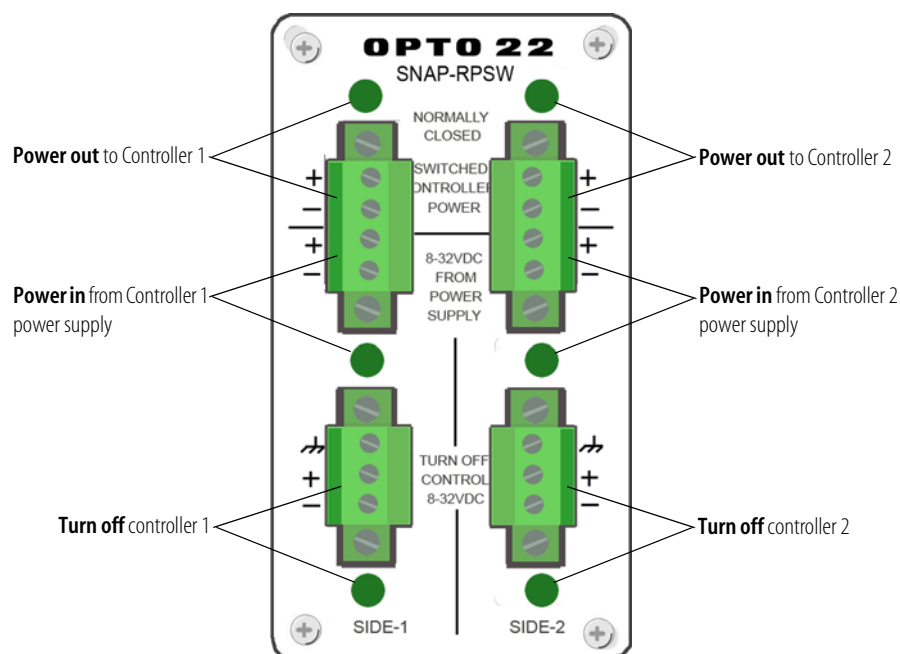
| LED | Indicates                              |
|-----|----------------------------------------|
| LNK | Link established with Ethernet network |
| ACT | Ethernet network activity              |
| TX  | Outgoing serial activity               |
| RX  | Incoming serial activity               |

### System Status LEDs

| LED  | Indicates                                                                                                                                                                                                                 |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ARB  | Arbiter status<br>Off = arbiter has failed or is not powered; LED2-6 values are undefined<br>Red = arbiter has failed<br>Orange = arbiter is starting<br>Green = arbiter is online                                        |
| SYS  | Controller redundancy status<br>Red = no controller is active<br>Orange = one controller is active, with no qualified backup<br>Green = one controller is active, with a qualified backup                                 |
| CTR1 | Primary controller status<br>Red = failed<br>Orange-blinking = backup qualified impaired or not qualified<br>Orange = backup qualified<br>Green-blinking = active impaired or becoming active<br>Green = active nominal   |
| CTR2 | Secondary Controller Status<br>Red = failed<br>Orange-blinking = backup qualified impaired or not qualified<br>Orange = backup qualified<br>Green-blinking = active impaired or becoming active<br>Green = active nominal |

# SNAP PAC Redundancy Option Kit

## SNAP-RPSW Redundancy Switch Connectors and LEDs



A green LED indicates a normal "ON" condition.

**Power out:** Normally on. When off, no power goes to the controller.

**Power in:** On as long as power is received from the power supply.

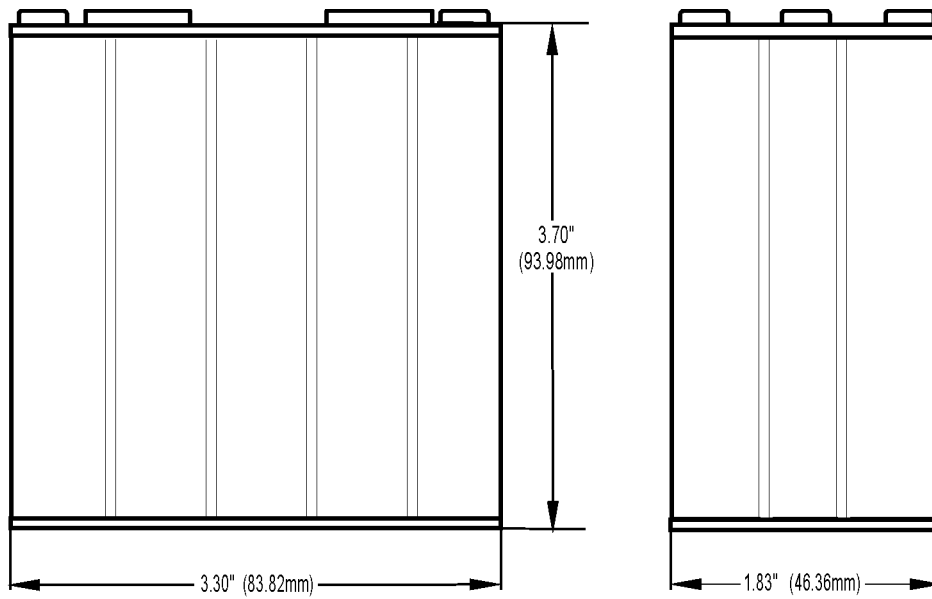
**Turn off:** Normally on. When a 8-32 VDC pulse is received from the arbiter, the SNAP-RPSW switches off power to the power out terminal, which shuts off the controller. A 2 VDC pulse switches power back on.

NOTE: The arbiter has its own power supply. If power is lost to the arbiter, power continues to be supplied to both controllers, and the active controller remains in control.

# SNAP PAC Redundancy Option Kit

## Dimensions

### SNAP-PAC-SRA and SNAP-RPSW



NOTE: The Arbiter and the Redundant Power Switch can be mounted on a panel or a DIN rail. For DIN-rail mounting, purchase one DIN-rail mounting kit (part number SNAP-ROKDIN) for each device. The DIN-rail clip adds an additional 0.375 inches (0.95 cm) to the device's height.

# More About Opto 22

## Products

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

### SNAP PAC System

Designed to simplify the typically complex process of understanding, selecting, buying, 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, multidomain, modular controllers based on open standards and providing an integrated development environment.

Opto 22 has been manufacturing PACs for many years. The latest models include 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 and are equally suited to 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 without the expense and limitations of proprietary networks and protocols.

### PAC Project Software Suite

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

These fully integrated software applications share a single tagname database, so the data points you configure in PAC Control™ are immediately available for use in PAC Display™, OptoOPCServer™, and OptoDataLink™. 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](http://www.opto22.com). PAC Project Professional, available for separate purchase, adds OptoOPCServer, OptoDataLink, options for Ethernet link 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, serial, and special-purpose 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 and with over 85 million devices sold, 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 Product Support Group offers free, comprehensive technical support for Opto 22 products. Our staff of support engineers represents decades of training and experience. Product support is available in English and Spanish, by phone or email, Monday through Friday, 7 a.m. to 5 p.m. PST.

## Free Customer Training

Hands-on training classes for the SNAP PAC System are offered at our headquarters in Temecula, California. Each student has his or her own learning station; classes are limited to nine students. Registration for the free training class is on a first-come, first-served basis. See our website, [www.opto22.com](http://www.opto22.com), for more information or email [training@opto22.com](mailto:training@opto22.com).

## 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](http://www.opto22.com).

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