

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

NOTE: Due to the unavailability of essential parts, the SNAP-PAC-ROK kit is obsolete and unavailable as of November 2022. For assistance, contact Opto 22 Product Support.

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

Part Numbers

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

* Available until current stock is depleted.

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.

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.

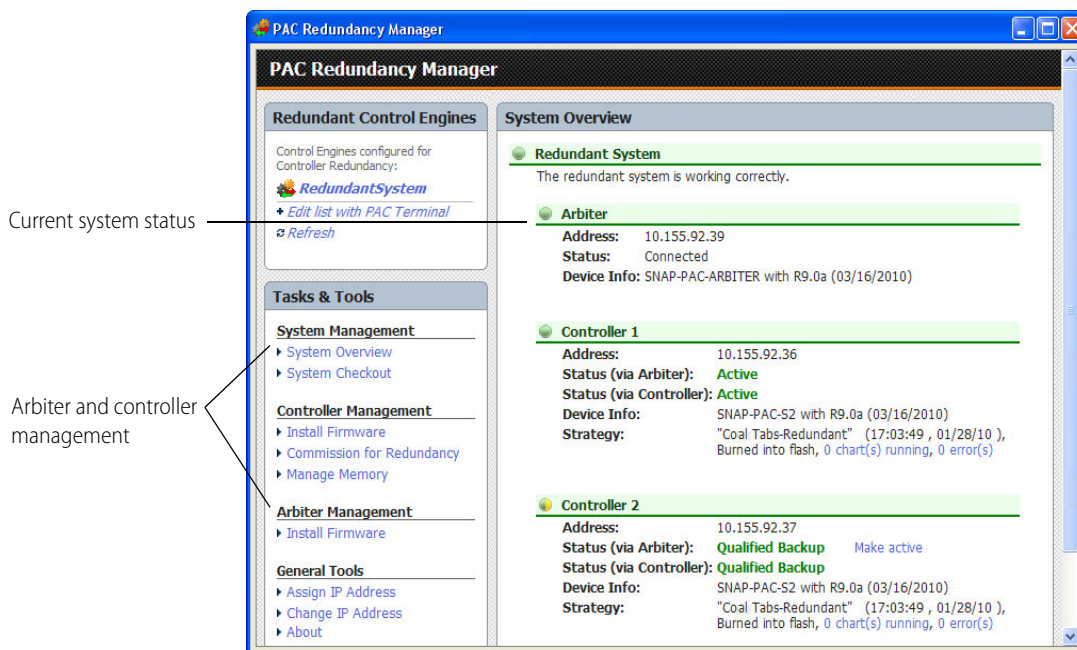
PAC Project Software

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 (HMIs), 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 image 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



These products are obsolete.

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SPECIFICATIONS

SNAP-PAC-SRA (Obsolete)

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 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 (Obsolete)

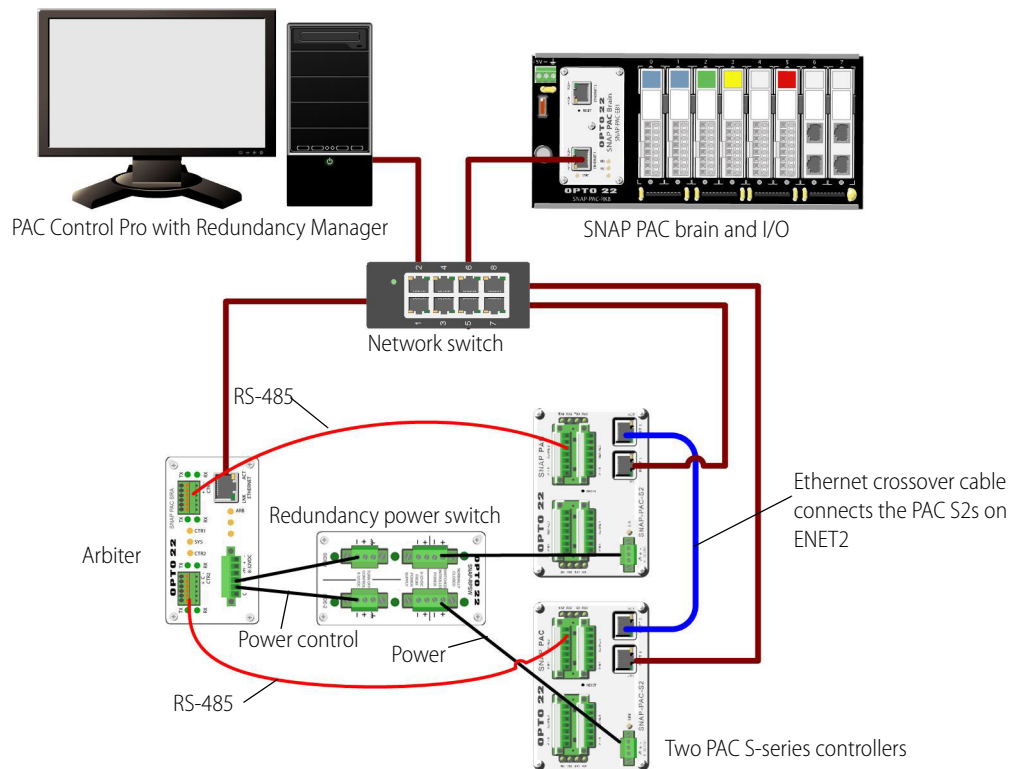
Max switch volts	32 VDC
Max switch current	4 amps DC at 70 °C
Operating range	VDC
Switch control (normally closed):	
Off	8–32 VDC (3 mA–15 mA)
On	< = 2 VDC (< 0.5 mA)

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.

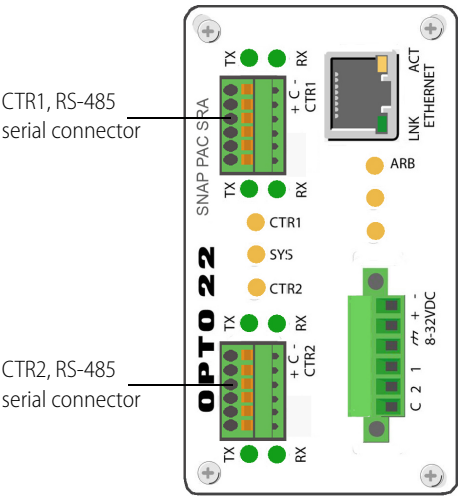
Ethernet, Serial, and Power Switch Connections



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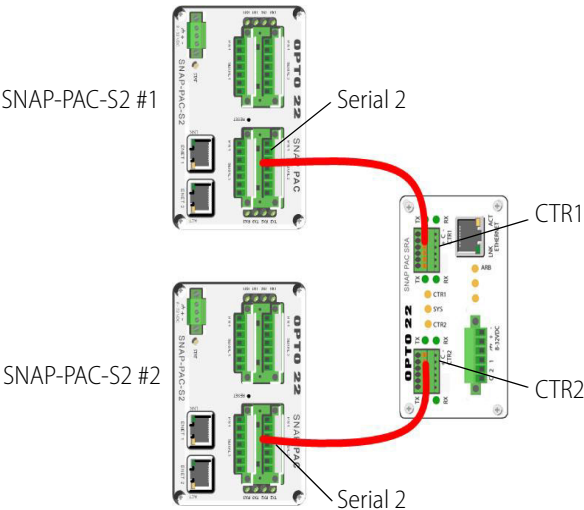
SNAP-PAC-SRA RS-485 SERIAL CONNECTIONS



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

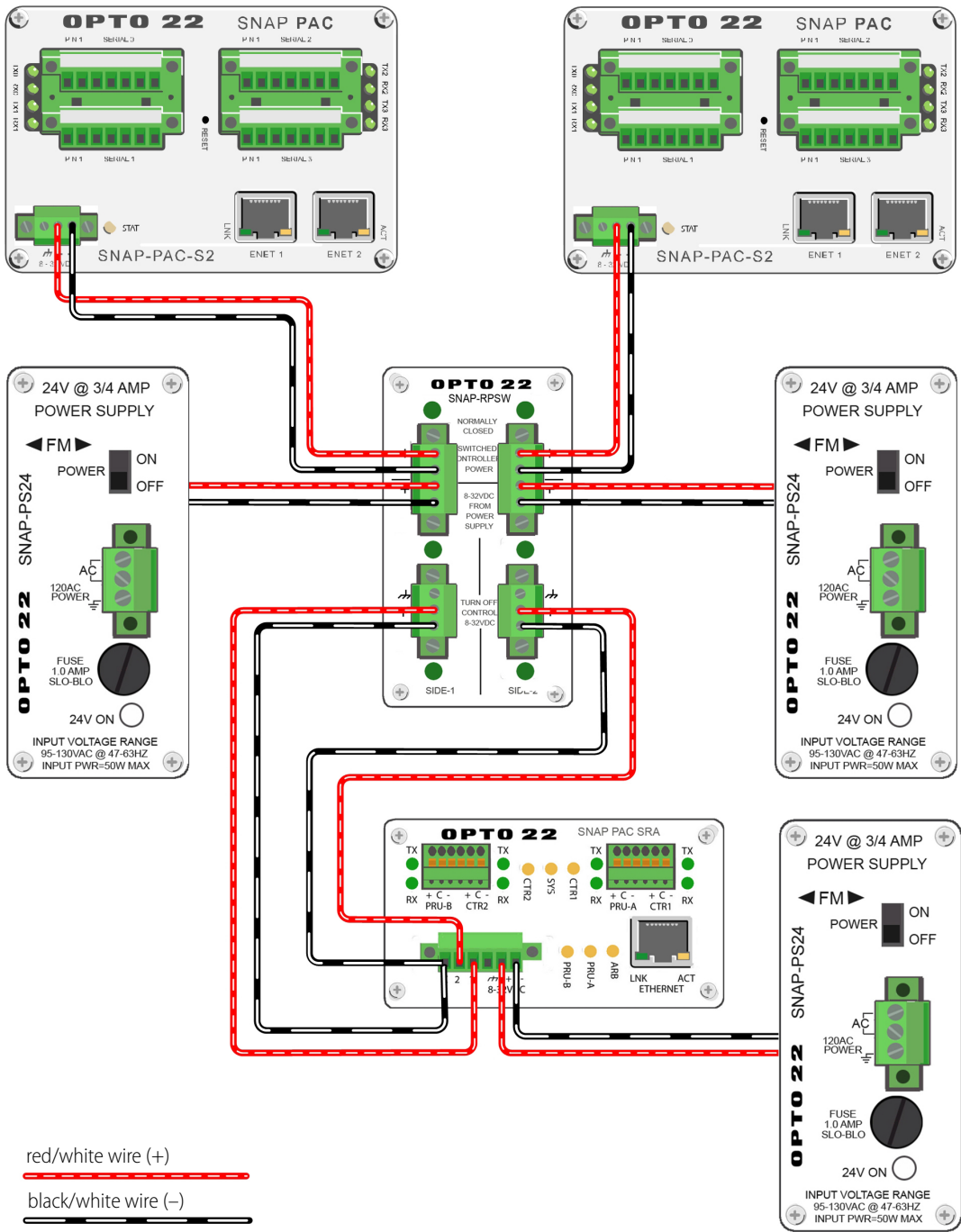
Serial 1		CTR1
2	TX/RX-	- TX/RX-
3	Com	C Com
1	TX/RX+	+ TX/RX+

SNAP-PAC-S2 #2

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

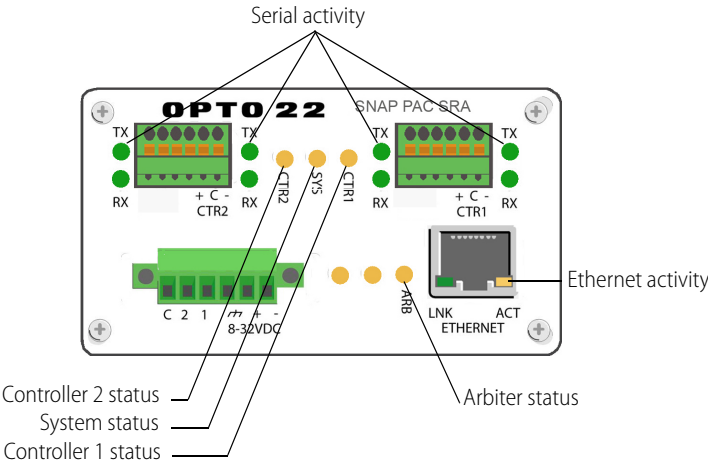
POWER CONNECTIONS

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.



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SNAP-PAC-SRA LEDS



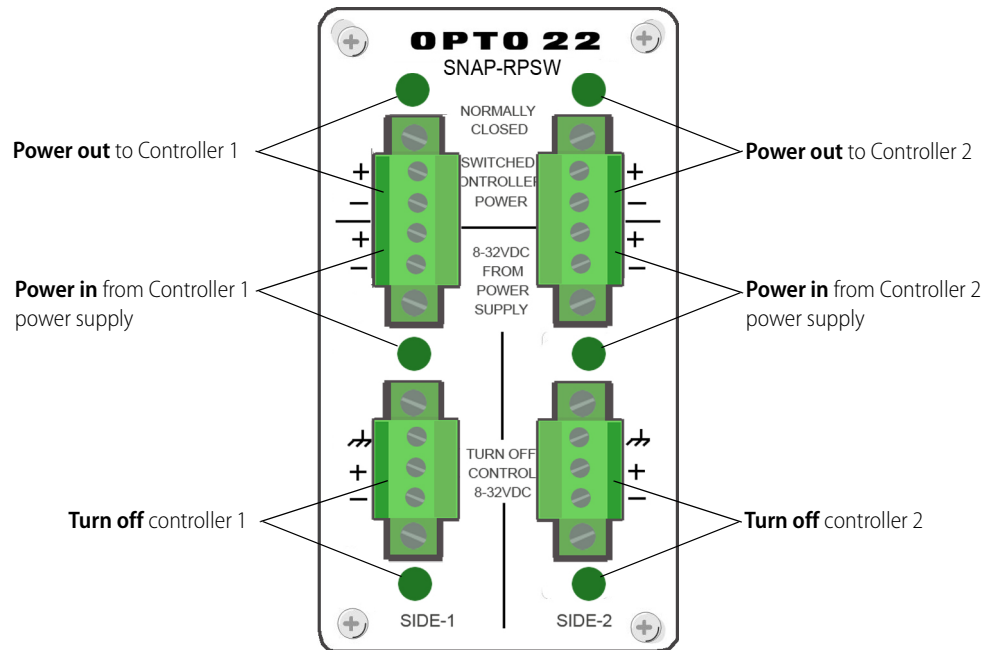
Communication Status LEDs

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

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.

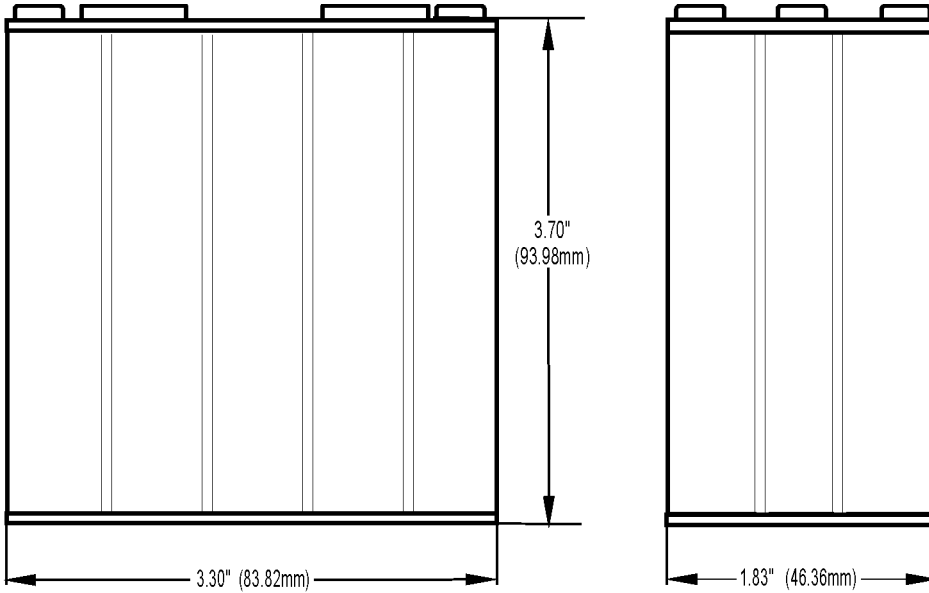
NOTE: The arbiter has its own power supply. If power is lost to the arbiter, power continues to be supplied to both controllers, and the active controller remains in control.

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DIMENSIONS

SNAP-PAC-SRA and SNAP-RPSW (Obsolete)



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.

PRODUCTS

Opto 22 develops and manufactures reliable, easy-to-use, open standards-based hardware and software products. Industrial automation, process control, remote monitoring, data acquisition, and industrial internet of things (IIoT) applications worldwide all rely on Opto 22.

groov RIO®

[groov RIO edge I/O](#) offers a single, compact, PoE-powered industrial package with web-based configuration and IIoT software built in, support for multiple OT and IT protocols, and security features like a device firewall, data encryption, and user account control.

Standing alone, *groov* RIO connects to sensors, equipment, and legacy systems, collecting and securely publishing data from field to cloud. Choose a universal I/O model with thousands of possible field I/O configurations, with or without Ignition from Inductive Automation®, or a [RIO EMU energy monitoring unit](#) that reports 64 energy data values from 3-phase loads up to 600 VAC, Delta or Wye.

You can also use *groov* RIO with a Modbus/TCP master or as remote I/O for a *groov* EPIC system.

groov EPIC® System

Opto 22's [groov Edge Programmable Industrial Controller \(EPIC\)](#) system gives you industrially hardened control with a flexible Linux®-based processor with gateway functions, guaranteed-for-life I/O, and software for your automation and IIoT applications.

groov EPIC Processor

The heart of the system is the *groov* EPIC processor. It handles a wide range of digital, analog, and serial functions for data collection, remote monitoring, process control, and discrete and hybrid manufacturing.

In addition, the EPIC provides secure data communications among physical assets, control systems, software applications, and online services, both on premises and in the cloud. No industrial PC needed.

Configuring and troubleshooting I/O and networking is easier with the EPIC's integrated high-resolution color touchscreen. Authorized users can manage the system locally on the touchscreen, on a monitor connected via the HDMI or USB ports, or on a PC or mobile device with a web browser.

groov EPIC I/O

groov I/O connects locally to sensors and equipment. Modules have a spring-clamp terminal strip, integrated wireway, swing-away cover, and LEDs indicating module health and discrete channel status. *groov* I/O is hot swappable, UL Hazardous Locations approved, and ATEX compliant.

groov EPIC Software

The *groov* EPIC processor comes ready to run the software you need:

- Programming: Choose flowchart-based PAC Control, CODESYS Development System for IEC61131-3 compliant programs, or secure shell access (SSH) to the Linux OS for custom applications
- Node-RED for creating simple IIoT logic flows from pre-built nodes
- Efficient MQTT data communications with string or Sparkplug data formats
- Multiple OPC UA server options
- HMI: *groov* View to build your own HMI viewable on touchscreen, PCs, and mobile devices; PAC Display for a

Windows HMI; Node-RED dashboard UI

- Ignition or Ignition Edge® from Inductive Automation (requires license purchase) with OPC-UA drivers to Allen-Bradley®, Siemens®, and other control systems, and MQTT communications

Older products

From solid state relays, to world-famous G4 and SNAP I/O, to SNAP PAC controllers, older Opto 22 products are still supported and working hard at thousands of installations worldwide. You can count on us for the reliability and service you expect, now and in the future.

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 test each product twice before it leaves our factory rather than testing a sample of each batch, we can afford to 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 technical support for Opto 22 products from engineers with 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.

Support is always available on our website, including [free online training](#) at OptoU, how-to [videos](#), [user's guides](#), the Opto 22 KnowledgeBase, and [OptoForums](#).

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** (toll-free in the U.S. and Canada) or **+1-951-695-3000**, or visit our website at www.opto22.com.

