SNAP PAC S-Series Controllers

Features

- Up to 32 PAC Control flowcharts running simultaneously
- Two 10/100 Mbps Ethernet interfaces for host and I/O communication over standard Ethernet networks
- SNAP-PAC-S1: One RS-485 serial port for connection to Opto 22 *mistic* I/O units and two RS-232 serial ports: one port has full handshaking for PPP host connection or direct connections to serial devices, the other port is for direct connections to serial devices.
- SNAP-PAC-S2: four serial ports that are software configurable for either RS-232 or RS-485 (2-wire or 4-wire) to connect to Opto 22 *mistic* I/O units, a PPP host, or directly to serial devices
- Multiple protocol support: TCP/IP, SNMP, FTP, and OptoMMP™
- FTP server/client capability; includes file system

SNAP-PAC-S2 controller

Description

The SNAP-PAC-S1 and SNAP-PAC-S2 programmable automation controllers provide powerful, real-time control and communication to meet your industrial control, monitoring, and data acquisition needs. As part of the Opto 22 SNAP PAC System, one of these compact, industrially hardened controllers can handle multiple control, automation, and data acquisition tasks involving digital and analog control, serial string handling, PID, and enterprise connectivity.

Connecting to Opto 22 serial- and Ethernet-based I/O systems, a SNAP PAC S-series controller runs control programs written in Opto 22's PAC Control™ software to monitor and control a wide range of devices and equipment. SNAP PAC S-series controllers are well-suited to original equipment manufacturers (OEMs), system integrators, and end-users in process control, discrete manufacturing, or hybrid industries and applications.

A SNAP PAC S-series controller simultaneously runs up to 32 PAC Control flowcharts, although the PAC Control strategy can actually contain a much larger number of flowcharts. The total number of flowcharts is limited only by the controller memory available for strategy storage.

Ethernet Communication

The SNAP PAC S-series programmable controllers communicate over standard 10/100 Mbps Ethernet networks and can be attached to existing wired or wireless Ethernet networks. The controllers can also be used in an independent control network built with standard, off-the-shelf Ethernet hardware.

SNAP PAC S-series controllers include two 10/100 Mbps Ethernet interfaces for networking through an Ethernet switch to Ethernet hosts, as well as SNAP PAC brains and I/O, which provide local intelligence and the connections to digital and analog sensors and actuators as well as serial devices. These independent Ethernet ports have separate IP addresses that can be used with PAC Project™ Professional software to set up redundant network links to safeguard the availability and reliability of an I/O system, or to segment a control system's network from the enterprise LAN.

Serial Communication

SNAP PAC S-series controllers provide RS-232 and RS-485 communication as follows:

The **SNAP-PAC-S1** has two RS-232 serial ports that support general-purpose communication with serial devices; you can send and receive data from one or two serial devices connected directly to the controller. Port 0 can be connected to a modem using PPP. The PAC S1 also has one pluggable two-wire RS-485 port that can be used for PAC or *mistic* serial I/O units. For additional serial interfaces, you can add one or more SNAP serial communication modules on SNAP PAC racks connected to the controller.

Part Numbers

Part	Description
SNAP-PAC-S1	Ethernet-based programmable automation controller with 2 Ethernet interfaces
SNAP-PAC-S2	Ethernet-based programmable automation controller with 2 Ethernet interfaces and 4 serial ports
SNAP-PSDIN	SNAP-PAC-S1 controller DIN-rail adapter
SNAP-S2DIN	SNAP-PAC-S2 controller DIN-rail adapter

Opto 22 • 43044 Business Park Drive • Temecula, CA 92590-3614 • www.opto22.com
SALES 800-321-6786 • 951-695-3000 • FAX 951-695-3095 • sales@opto22.com • **SUPPORT** 800-835-6786 • 951-695-3080 • FAX 951-695-3017 • support@opto22.com

The **SNAP-PAC-S2** has four serial ports that can be configured using PAC Manager as either RS-232 or RS-485 (2-wire or 4-wire) serial ports. The serial ports can be used for I/O or general purpose serial communication. One port on the SNAP-PAC-S2 may be used for PPP communication. For the default configuration settings of these ports, see form 1592, the *SNAP PAC S-series User's Guide*.

The RS-232 serial ports support remote serial device communication; and one of the ports can be configured as a Point-to-Point Protocol (PPP) modem connection for creating a TCP/IP network over PSTN (Public Switched Telephone Network) lines. The RS-485 serial ports connect to legacy Opto 22 *mistic*™ I/O units, including the serial B3000 brain and remote *mistic* bricks.

For additional serial host interfaces, you can add one or more SNAP serial communication modules on attached SNAP Ethernet-based I/O units.

Backward Compatibility

The SNAP-PAC-S1 controller has an RS-485 serial interface for connecting to Opto 22 *mistic* I/O units. The SNAP-PAC-S2 controller can be configured with up to four RS-485 serial ports for connecting to Opto 22 *mistic* I/O units. This connectivity with serial-based I/O systems, combined with PAC Control Professional software's ability to import control programs (or strategies) written in OptoControl™ software, provides a migration path to integrate older Opto 22 I/O systems into modern control hardware running on Ethernet networks. For detailed information on updating control strategies and integrating legacy control hardware into modern systems, see the FactoryFloor to *PAC Project Migration Technical Note* (Opto 22 form 1692).

Software

SNAP PAC controllers use Opto 22's **PAC Project** Microsoft® Windows®-compatible automation software for programming, human-machine-interface (HMI) development, and OPC connectivity. Two versions of PAC Project are available:

PAC Project Basic includes PAC Control for developing control programs, PAC Display™ for creating operator interfaces, and PAC Manager™ configuration software.

PAC Project Professional adds expanded versions of PAC Control and PAC Display plus OptoOPCServer™ software for exchanging data with OPC 2.0-compliant client software applications and OptoDataLink™ for sharing SNAP PAC System data with ODBC-compliant databases.

The PAC Project software suite includes the following applications:

PAC Control Basic is a graphical, flowchart-based programming tool for machine control and process applications. Using PAC Control, you create, download, and run strategies on a SNAP PAC controller. In addition to flowchart programming with subroutine capability, PAC Control includes a powerful, built-in scripting language based on C and other procedural languages. **PAC Control Professional** adds the capability to import OptoControl strategies, support for *mistic* I/O units, and using a SNAP PAC controller's independent Ethernet ports to segment communication links.

PAC Display Basic is an intuitive HMI package for building operator interfaces, or *projects*, for communicating with a SNAP PAC controller. PAC Display offers a full-featured HMI including alarming, trending, and a built-in library of 3,000 industrial automation graphics. **PAC Display Professional** adds the ability to import projects created in OptoDisplay, part of the Opto 22 FactoryFloor® software suite, and to use redundant communication links on SNAP PAC controllers. PAC Display Professional can also connect to Ethernet-based FactoryFloor controllers running OptoControl strategies or ioProject controllers running ioControl strategies.

OptoOPCServer™ (PAC Project Professional only) is a fast, efficient OPC 2.0-compliant server for communicating with many Opto 22 products, including SNAP PAC controllers running PAC Control strategies, SNAP PAC brains, SNAP Ultimate controller/brains, SNAP Ethernet and SNAP Simple brains, and Ethernet-based FactoryFloor controllers running OptoControl strategies.

Using OptoOPCServer, you can consolidate data from all these Opto 22 systems into the OPC client software of your choice, such as third-party HMI and data acquisition packages, and custom software applications you create with tools such as Visual C++®.

OptoDataLink™ (PAC Project Professional only) transparently provides multiple connections for data exchange with popular databases such as Microsoft SQL Server, Microsoft Access, and MySQL. OptoDataLink connects your SNAP PAC system with the tools used for making business decisions, bringing realtime, accurate data to decision makers.

PAC Manager™ is a utility application for assigning IP addresses to SNAP PAC controllers and brains, reading or changing basic controller configuration, upgrading firmware, and inspecting or testing controllers and I/O.

Software Availability

PAC Project Basic is included with SNAP PAC controllers and is a free download from the Opto 22 Web site. PAC Project Professional is available for purchase. You can also separately purchase PAC Control Professional, PAC Display Professional, OptoOPCServer, and OptoDataLink as needed. For additional information, see the PAC Project Data Sheet, Opto 22 form 1699.

Opto 22 • 43044 Business Park Drive • Temecula, CA 92590-3614 • www.opto22.com
SALES 800-321-6786 • 951-695-3000 • FAX 951-695-3095 • sales@opto22.com • SUPPORT 800-835-6786 • 951-695-3080 • FAX 951-695-3017 • support@opto22.com

SNAP PAC S-Series Controllers

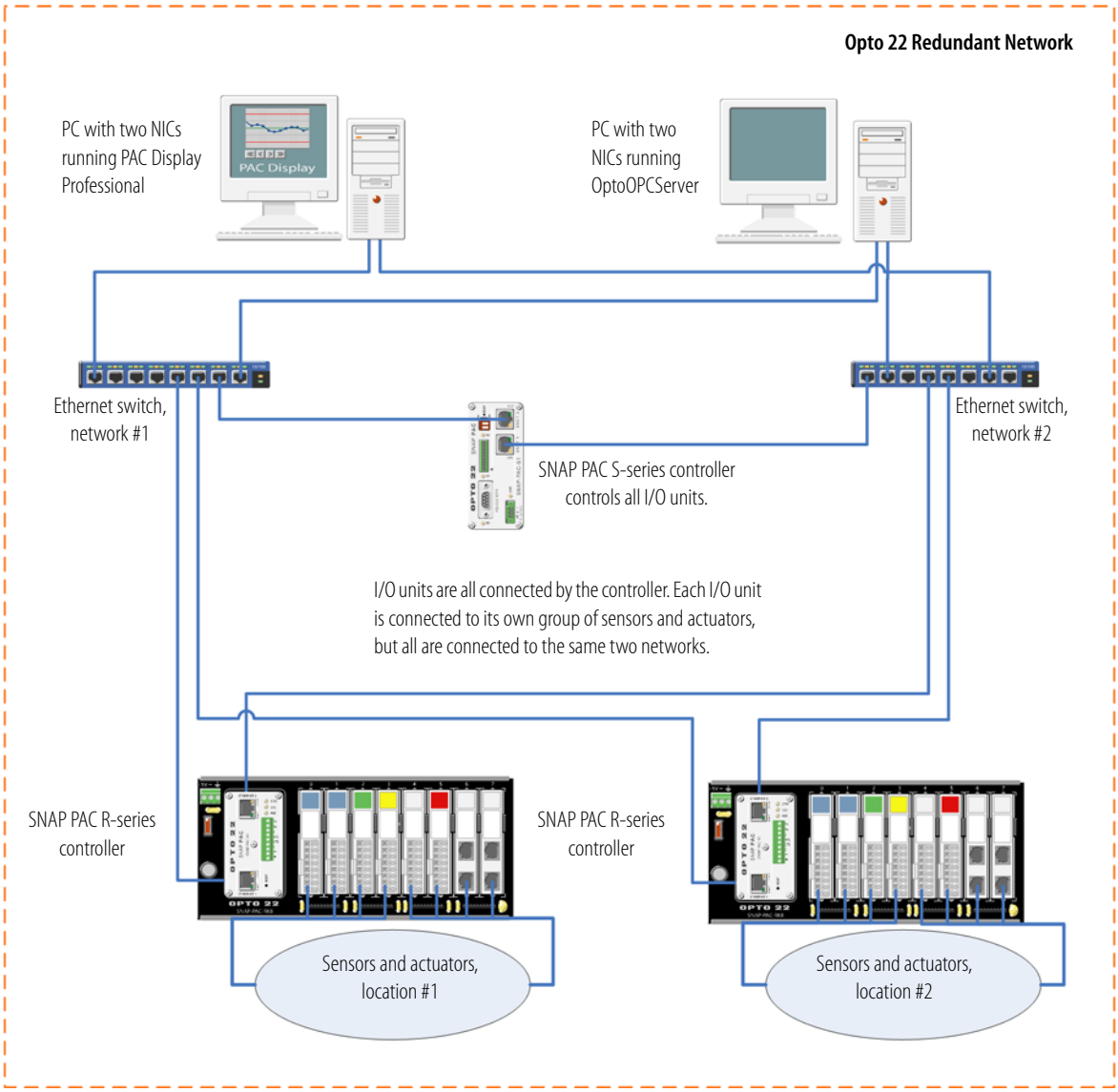
Technical Specifications

Processor	266 MHz 32-bit ColdFire® 5475 with integrated floating-point unit (FPU)
Memory Total RAM Battery-backed RAM Flash	 32 MB (16 MB available for PAC Control strategy) 8 MB 16 MB (7.5 MB available for PAC Control strategy; 4 MB available for file storage)
Backup battery	Rechargeable, 1-year power-off data retention
Ethernet Communication (host and I/O)	Two independent 10/100 Mbps Ethernet network interfaces (RJ-45 connectors). Each interface has a separate IP address.
Serial Communication SNAP-PAC-S1 RS-232 serial RS-485 serial SNAP-PAC-S2	 Two RS-232 serial ports (one DB-9 and one pluggable connector); one port has full handshaking. PPP is supported only on port 0. One RS-485 serial port (pluggable connector); two-wire RS-485; no *mistic* signal interrupts Four serial ports that can be used as general purpose ports or for serial I/O units; each port is software configurable as either RS-232 (Tx, Rx, COM, DTR, DCD RTS, CTS) or RS-485 (2-wire, 4-wire, optional termination, optional biasing)
I/O unit compatibility Ethernet-based I/O units Serial-based I/O units	 Opto 22 SNAP PAC R-series, SNAP PAC EB-series, SNAP SIO, SNAP EIO, and SNAP UIO brains SNAP PAC SB-series, Serial B3000, SNAP-BRS, B100/B200, *mistic* remote bricks (G4D16R, G4D32RS, G4A8R)
Power requirements	8–32 VDC ±0.5, 10 VA maximum (SNAP-PAC-S1 controllers with serial numbers below 500,000 use 8–24 VDC)
Environmental Operating temperature Storage temperature Humidity	 0 °C to 60 °C -40 °C to 85 °C 0% to 95% relative humidity, non-condensing
Software PAC Project Basic PAC Project Professional	 Includes programming, HMI software, and configuration software; included with purchase of controller. PAC Project Basic plus OPC 2.0-compliant OPC server, OptoControl strategy and OptoDisplay project importing, support for serial *mistic* I/O units, and Ethernet link redundancy support.
Other features	Multiple protocol support including TCP/IP, FTP, SNMP, and OptoMMP™. Real-time clock FTP server/client with file system Ethernet link redundancy or network segmenting

System Architecture

SNAP PAC S-Series Controller in Redundant Network Configuration

The network shown in this diagram requires PAC Control Professional and PAC Display Professional.



This diagram shows a SNAP PAC S-series controller connected to two separate Ethernet networks. This configuration addresses the concern that an Ethernet network may fail or need maintenance, leaving the PC running OptoOPCServer, the PC running ioDisplay, the controller, and the I/O units unable to communicate.

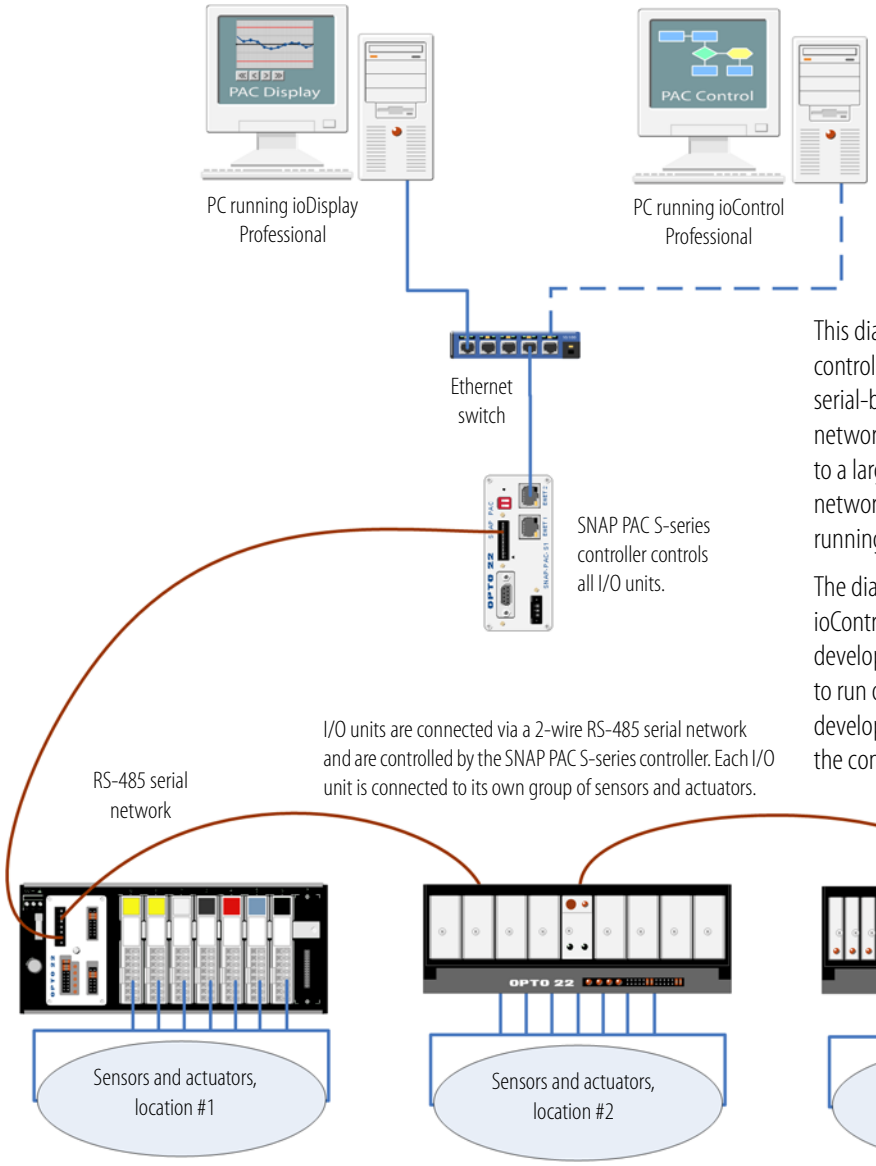
In this configuration, if one network goes down, devices can still communicate on the other. Each PC has two network interface cards (NICs), and the SNAP PAC S-series controller and the I/O units (SNAP PAC R-series) have two network interfaces as well.

Opto 22 • 43044 Business Park Drive • Temecula, CA 92590-3614 • www.opto22.com
SALES 800-321-6786 • 951-695-3000 • FAX 951-695-3095 • sales@opto22.com • **SUPPORT** 800-835-6786 • 951-695-3080 • FAX 951-695-3017 • support@opto22.com

System Architecture (continued)

SNAP-PAC-S1 Controller and Serial-based I/O Units

The network shown in this diagram requires PAC Control Professional and PAC Display Professional.



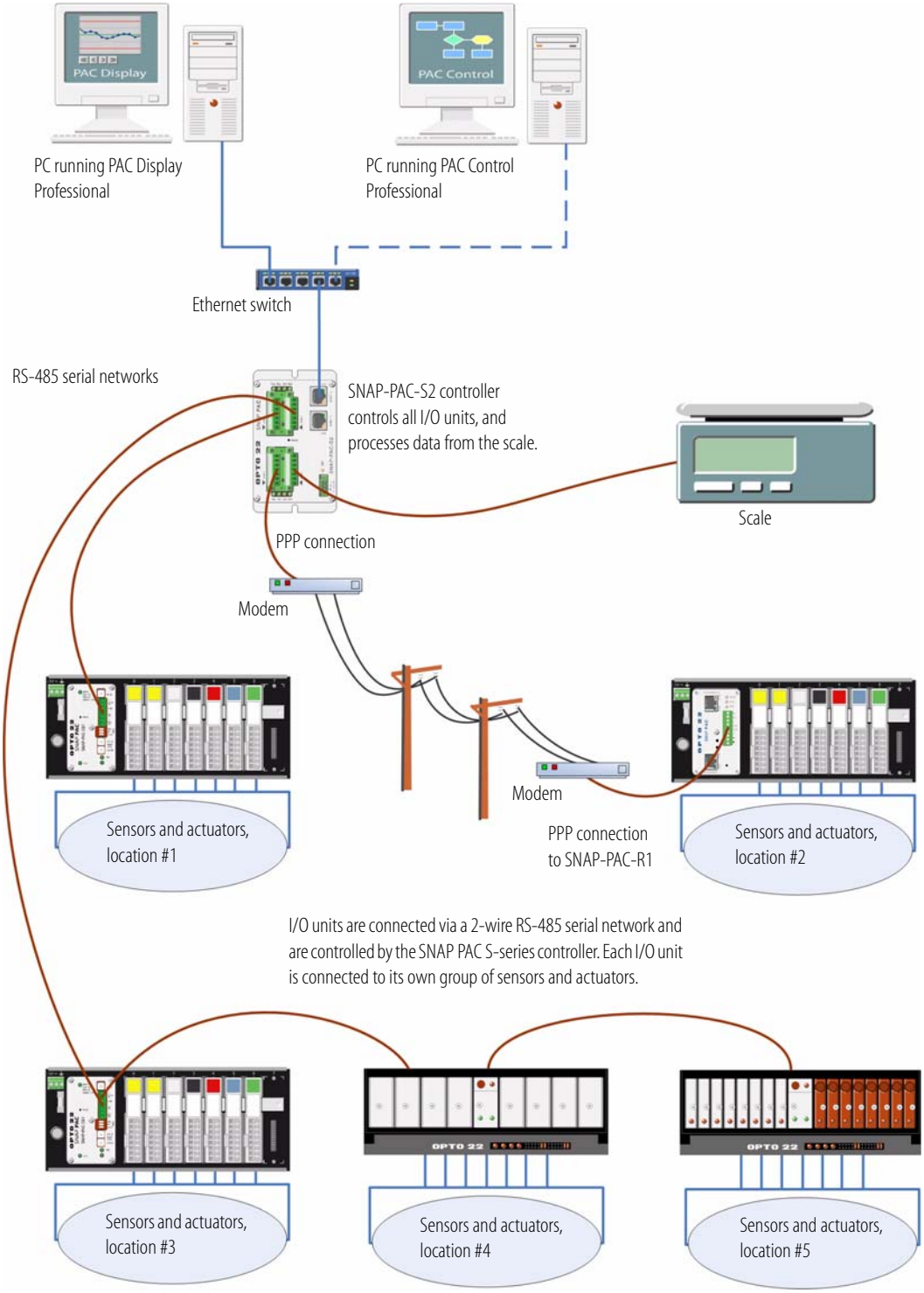
This diagram shows a SNAP PAC S-series controller connected to multiple Opto 22 serial-based I/O units over an RS-485 serial network. The controller is also connected to a larger, separate enterprise Ethernet network to provide process data to a PC running Opto 22's ioDisplay HMI software.

The diagram also shows a PC running ioControl Professional, an application for developing control programs (or strategies) to run on the SNAP controller. Once developed, the strategy is downloaded to the controller and runs independently.

System Architecture (continued)

SNAP-PAC-S2 Controller and Serial-based I/O Units

The network shown in this diagram requires PAC Control Professional and PAC Display Professional.

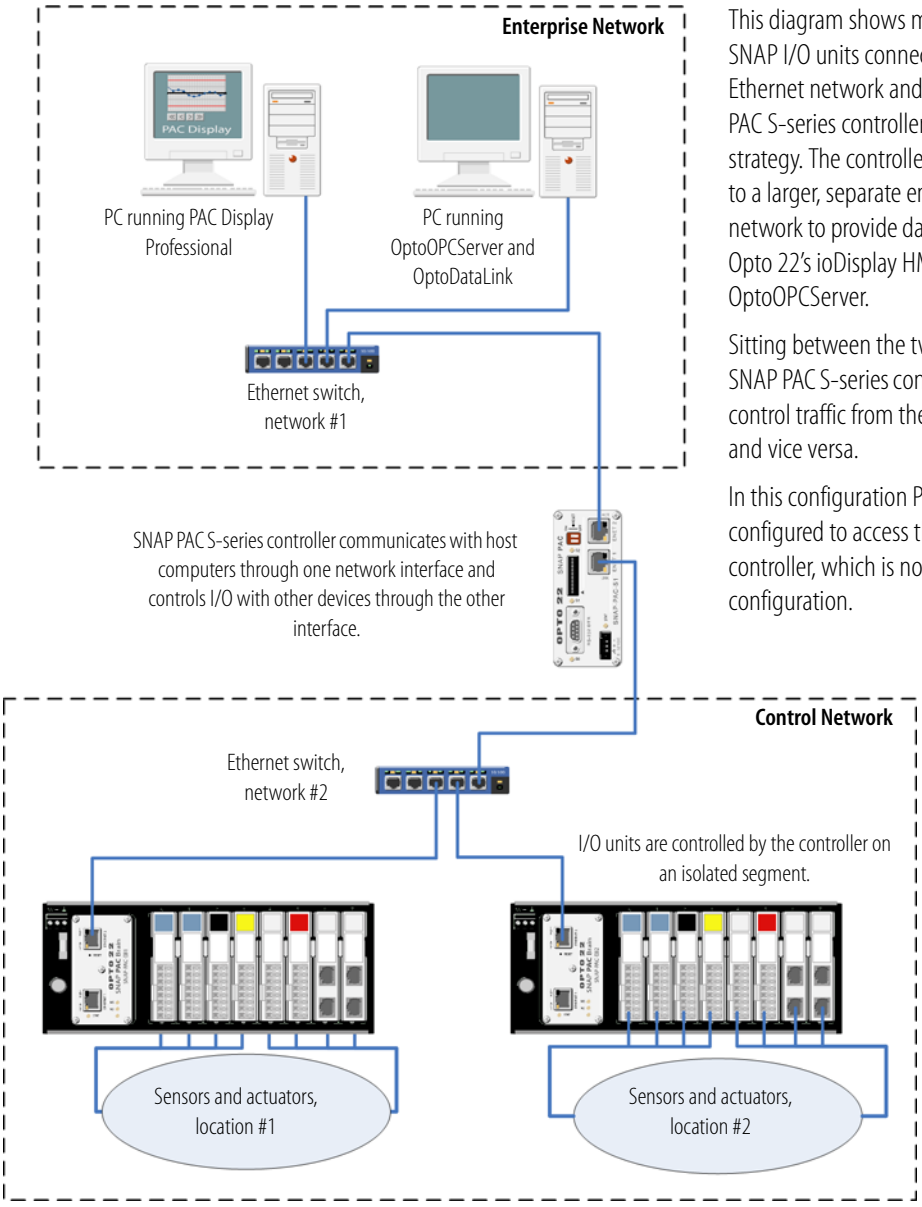


Opto 22 • 43044 Business Park Drive • Temecula, CA 92590-3614 • www.opto22.com
SALES 800-321-6786 • 951-695-3000 • FAX 951-695-3095 • sales@opto22.com • **SUPPORT** 800-835-6786 • 951-695-3080 • FAX 951-695-3017 • support@opto22.com

System Architecture (continued)

SNAP PAC S-series Controller on an Ethernet Network

The network shown in this diagram requires PAC Control Professional and PAC Display Professional.

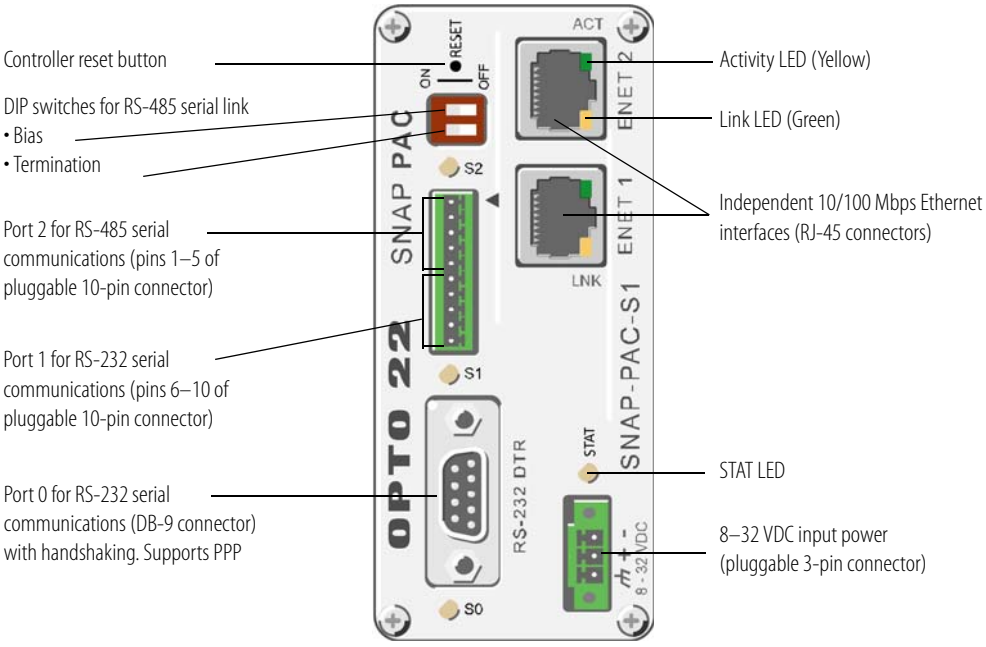


This diagram shows multiple Opto 22 SNAP I/O units connected together over an Ethernet network and controlled by a SNAP PAC S-series controller running a control strategy. The controller is also connected to a larger, separate enterprise Ethernet network to provide data to two PCs running Opto 22's ioDisplay HMI software and OptoOPCServer.

Sitting between the two networks, the SNAP PAC S-series controller isolates I/O and control traffic from the enterprise network, and vice versa.

In this configuration PAC Display must be configured to access the I/O through the controller, which is not the default configuration.

SNAP-PAC-S1 Connectors and Indicators



Status and Activity LEDs

Indicator	Description
S0	RS-232 serial activity on port 0
S1	RS-232 serial activity on port 1
S2	RS-485 serial activity
STAT	Startup status and control program operational status
ACT	Ethernet network activity
LINK	Link established with Ethernet network

Port 0 for RS-232 serial (DB-9 connector)

Pin	Description	Signal Direction
1	DCD	In
2	RX	In
3	TX	Out
4	DTR	Out
5	COM	
6	DSR	In
7	RTS	Out
8	CTS	In
9	RI	In

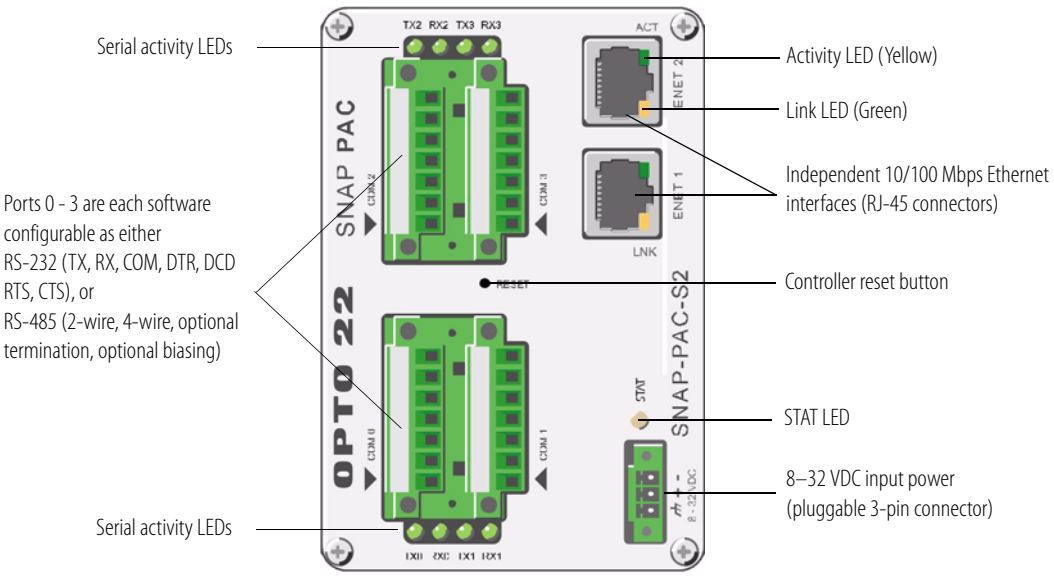
Ports 1 and 2 for RS-485 and RS-232 serial

	Pin	Description	Signal Direction
Port 2 for RS-485 serial (2-Wire)	1	TX/RX+	In/Out
	2	TX/RX–	In/Out
	3	SIG COM	
	4	(reserved)	
	5	(reserved)	
Port 1 for RS-232 serial	6	TX	Out
	7	RX	In
	8	GND	
	9	RTS	Out
	10	CTS	In

NOTE: The RS-485 interface does not support *mistic* signal interrupts. Contact Opto 22 Product Support for current information on this topic.

Opto 22 • 43044 Business Park Drive • Temecula, CA 92590-3614 • www.opto22.com
SALES 800-321-6786 • 951-695-3000 • FAX 951-695-3095 • sales@opto22.com • SUPPORT 800-835-6786 • 951-695-3080 • FAX 951-695-3017 • support@opto22.com

SNAP-PAC-S2 Connectors and Indicators



RS-485 and RS-232 Ports[1]

Pin	RS-232	Signal Direction	RS-485	Signal Direction
1	TX	Out	TX/RX+	In/Out
2	RX	In	TX/RX-	In/Out
3	COM		COM	
4	RTS	Out	RX+ (4 wire)	In
5	CTS	In	RX- (4 wire)	In
6	DTR	Out	IRQ+[2]	In
7	DCD	In	IRQ-[2]	In

Status and Activity LEDs

Indicator	Description
TX0/RX0	Serial activity on port 0
TX1/RX1	Serial activity on port 1
TX2/RX2	Serial activity on port 2
TX3/RX3	Serial activity on port 3
STAT	Startup status and control program operational status
ACT	Ethernet network activity
LINK	Link established with Ethernet network

[1] **CAUTION**: **Do not use communication port connectors from a legacy OptoControl controller***. Legacy connectors will fit in a SNAP-PAC-S2, but the pin orientation is different. Instead, use the connectors supplied with the SNAP-PAC-S2 controller.

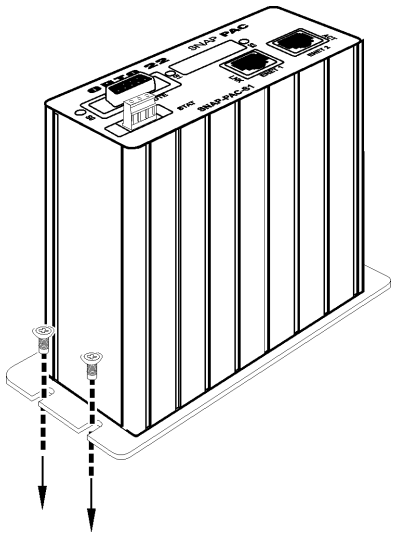
*Legacy OptoControl Controllers:

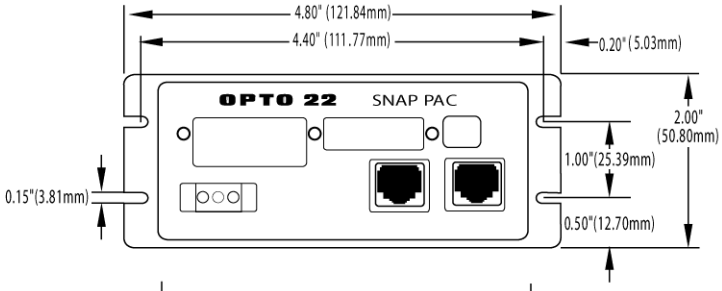
G4LC32	G4LC32ISA-LT	M4RTU
G4LC32SX	M4	SNAP-LCM4
G4LC32ISA	M4IO	SNAP-LCSX/PLUS

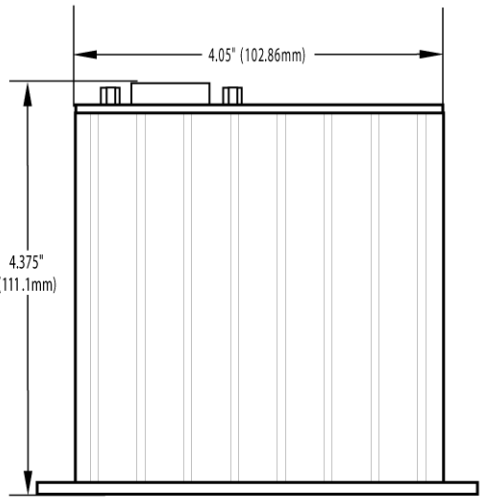
[2] **NOTE**: The RS-485 interface does not support *mistic* signal interrupts. Contact Opto 22 Product Support for current information on this topic.

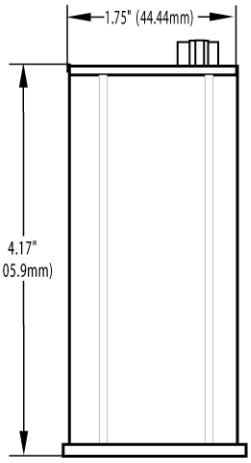
Dimensional Drawings

SNAP-PAC-S1 Panel Mounting and Dimensions







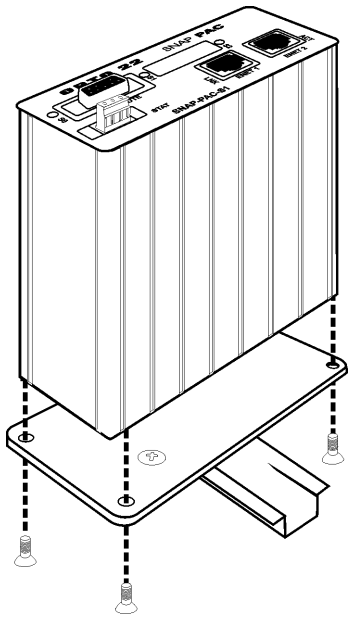


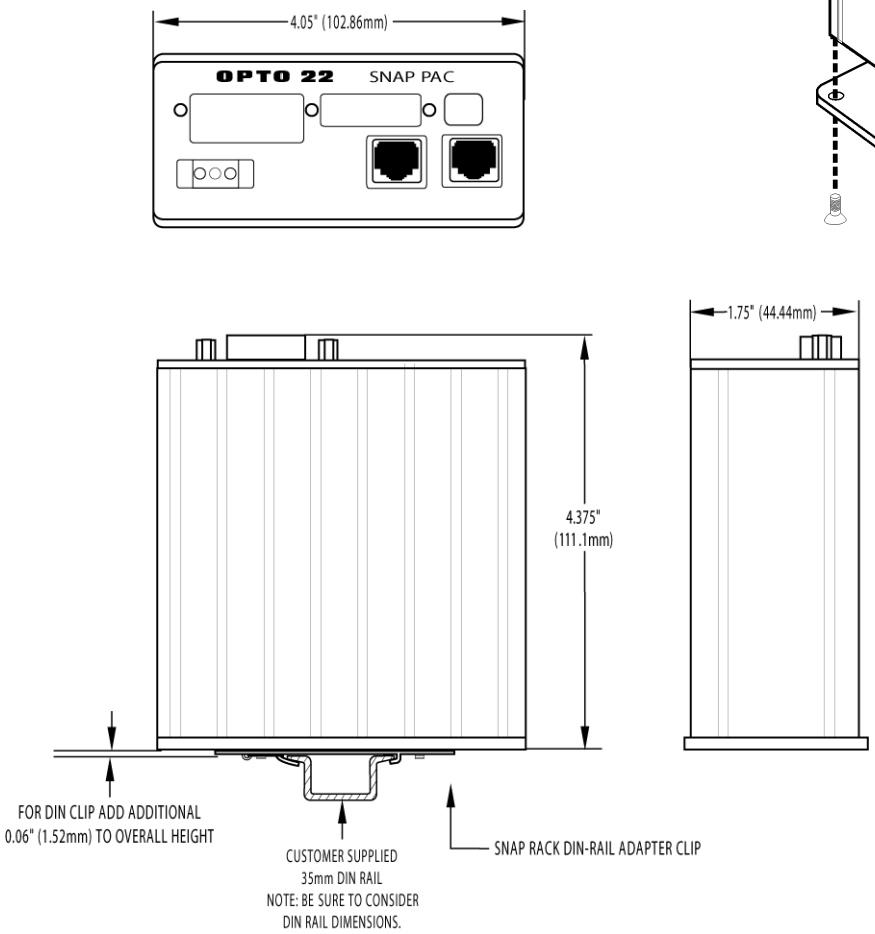
Opto 22 • 43044 Business Park Drive • Temecula, CA 92590-3614 • www.opto22.com
SALES 800-321-6786 • 951-695-3000 • FAX 951-695-3095 • sales@opto22.com • SUPPORT 800-835-6786 • 951-695-3080 • FAX 951-695-3017 • support@opto22.com

Dimensional Drawings (continued)

SNAP-PAC-S1 DIN-Rail Mounting and Dimensions

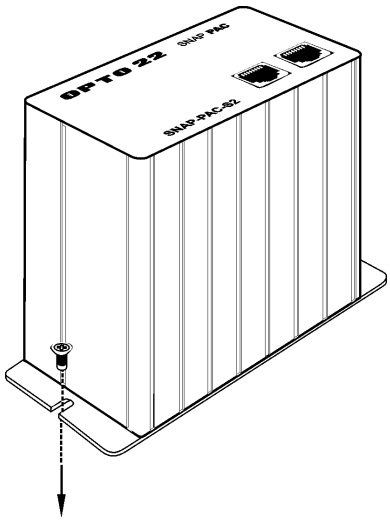
Requires a SNAP-PSDIN adapter (purchased separately).

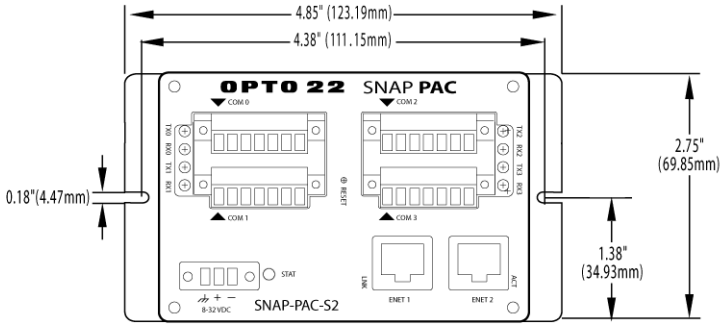


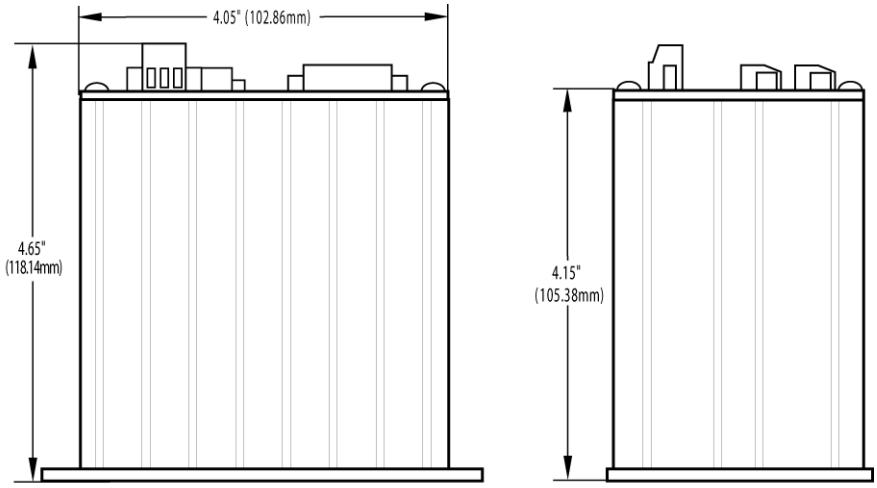


Dimensional Drawings (continued)

SNAP-PAC-S2 Panel Mounting and Dimensions







Opto 22 • 43044 Business Park Drive • Temecula, CA 92590-3614 • www.opto22.com
SALES 800-321-6786 • 951-695-3000 • FAX 951-695-3095 • sales@opto22.com • **SUPPORT** 800-835-6786 • 951-695-3080 • FAX 951-695-3017 • support@opto22.com

Dimensional Drawings (continued)

SNAP-PAC-S2 DIN-Rail Mounting and Dimensions

Requires a SNAP-PSDIN adapter (purchased separately).