SNAP PAC S-Series Controllers

Features

- Up to 32 ioControl flowcharts running simultaneously
- Two 10/100 Mbps Ethernet interfaces for host and I/O communication over standard Ethernet networks
- One RS-485 serial port for connection to Opto 22 *mistic* I/O units
- Two RS-232 serial ports (one with full handshaking) for PPP host connection or direct connections to serial devices
- Multiple protocol support: TCP/IP, SNMP, FTP, and OptoMMP™
- FTP server/client capability; includes file system

SNAP-PAC-S1 controller

Description

SNAP PAC S-series programmable automation controllers provide powerful, real-time control and communication to meet your industrial control, monitoring, and data acquisition needs. As part of an Opto 22 input/output (I/O) 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 ioControl™ 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.

Connectivity

SNAP PAC S-series 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 provide multiple serial interfaces for serial-based host and I/O system communication. Two RS-232 serial links (one with and one without handshaking) support Point-to-Point Protocol (PPP) modem connections—for creating TCP/IP networks over serial or PSTN (Public Switched Telephone Network) lines—as well as remote serial device communication. Also provided is an RS-485 serial interface for connecting to legacy Opto 22 *mistic*™ I/O units, including the serial B3000 brain and remote *mistic* bricks.

SNAP-PAC-S1

The **SNAP-PAC-S1** controller includes two 10/100 Mbps Ethernet interfaces for networking through an Ethernet switch to Ethernet hosts, as well as SNAP Simple and SNAP Ethernet I/O™ units, which provide 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 ioProject™ 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.

The SNAP-PAC-S1 simultaneously runs up to 32 ioControl flowcharts, although the ioControl 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.

Part Numbers

Part	Description
SNAP-PAC-S1	Ethernet-based programmable automation controller with 2 Ethernet ports
SNAP-PSDIN	SNAP controller DIN-rail adapter

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Serial Host Communication

Two RS-232 serial interfaces support a modem connection using PPP and general-purpose communication with serial devices. You can send and receive data from one or two serial devices connected directly to the controller. For additional serial host interfaces, you can add one or more SNAP serial communication modules on SNAP Ethernet-based I/O units connected to the controller.

Backward Compatibility

The SNAP-PAC-S1 controller also has an RS-485 serial interface for connecting to Opto 22 *mistic* I/O units. This connectivity with serial-based I/O systems, combined with ioControl 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.

Software

SNAP PAC controllers use Opto 22's **ioProject** Microsoft® Windows®-compatible automation software for programming, human-machine-interface (HMI) development, and OPC connectivity. Two versions of ioProject are available: **ioProject Basic** includes ioControl for developing control programs, ioDisplay™ for creating operator interfaces, and ioManager™ configuration software. **ioProject Professional** adds expanded versions of ioControl and ioDisplay plus OptoOPCServer™ software for exchanging data with OPC 2.0-compliant client software applications.

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

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

SNAP PAC S-Series Controllers

OptoOPCServer™ is a fast, efficient OPC 2.0-compliant server for communicating with many Opto 22 products, including SNAP PAC S-series controllers and other SNAP controller/brains running ioControl strategies; SNAP Ethernet-based I/O units that use SNAP brains like the SNAP-B3000-ENET or SNAP-ENET-M64; 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++®.

ioManager™ is a utility application for assigning IP addresses to SNAP PAC controllers, reading or changing basic controller configuration, and more. ioManager is also used to configure the I/O units that communicate with the controller.

Availability

ioProject Basic is included with SNAP PAC controllers and is a free download from the Opto 22 Web site. ioProject Professional is available for purchase on a CD with both Acrobat PDF format and printed documentation. To get ioProject Professional immediately, you can buy and download the software from the Opto 22 Web site at www.opto22.com; the CD and printed documentation will be shipped to you. You can also separately purchase ioControl Professional, ioDisplay Professional, and OptoOPCServer as needed. For additional information, see the ioProject data sheet, Opto 22 form #1473.

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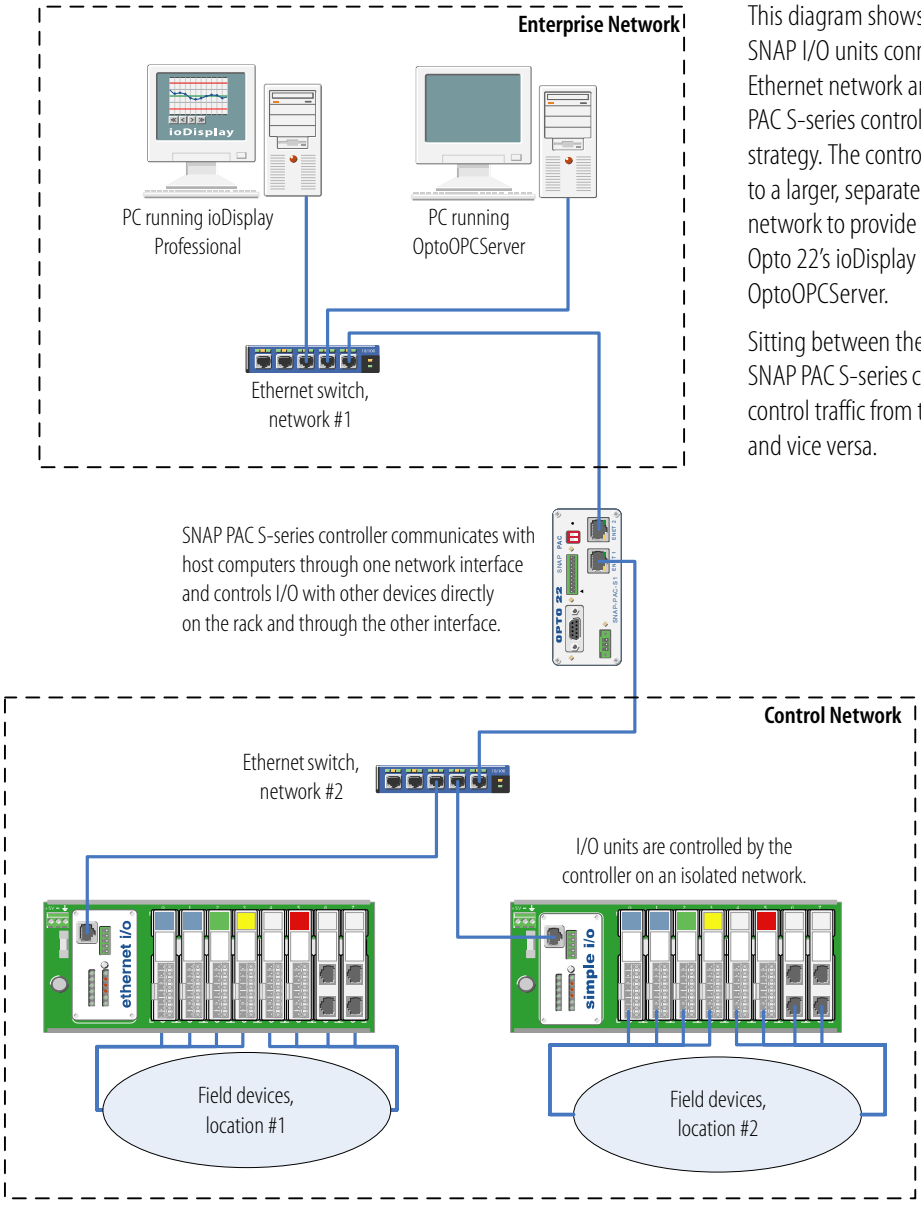
SNAP PAC S-Series Controllers

System Architecture

SNAP PAC S-series Controller on an Ethernet Network

The network shown in this diagram requires ioControl Professional and ioDisplay Professional.



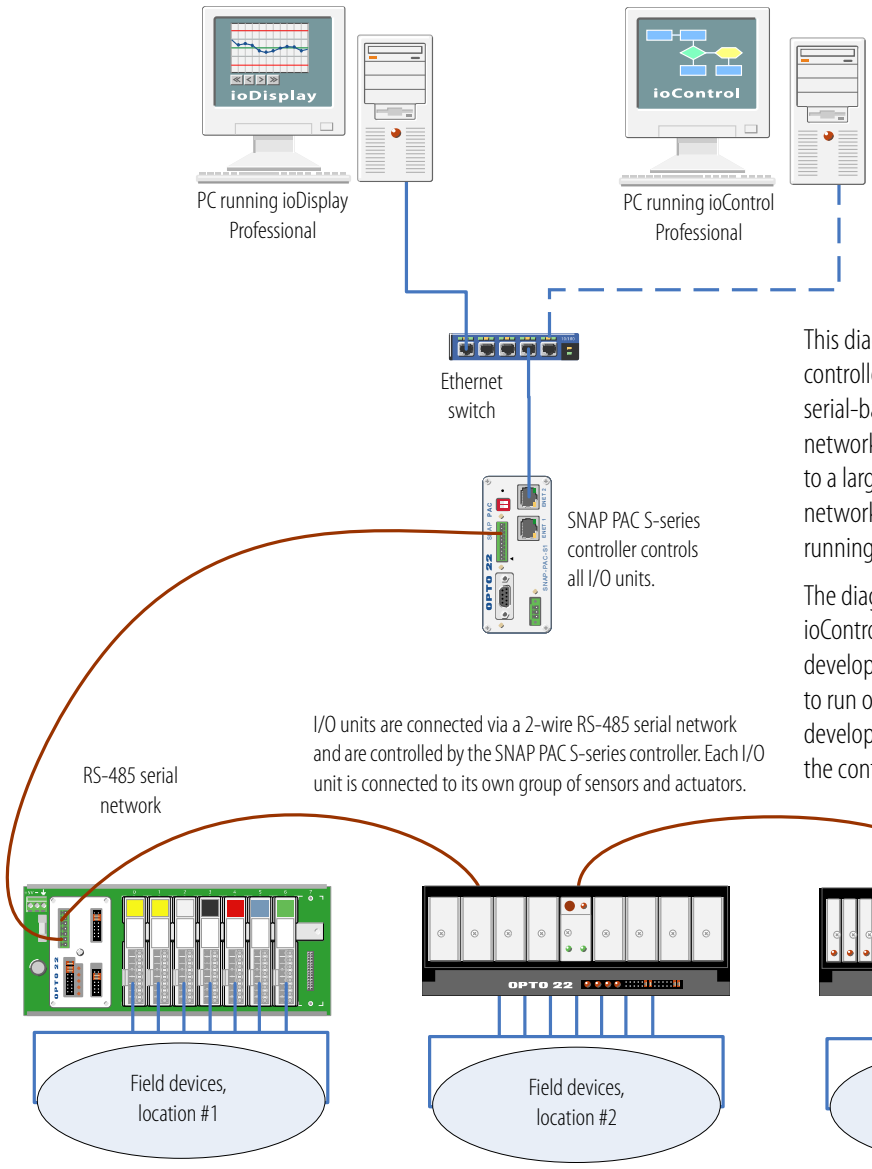
This diagram shows multiple Opto 22 SNAP I/O units connected together over an Ethernet network and controlled by a SNAP PAC S-series controller running a control strategy. The controller is also connected to a larger, separate enterprise Ethernet network to provide data to two PCs running Opto 22's ioDisplay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

System Architecture (continued)

SNAP PAC S-Series Controller and Serial-based I/O Units

The network shown in this diagram requires ioControl Professional and ioDisplay 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.

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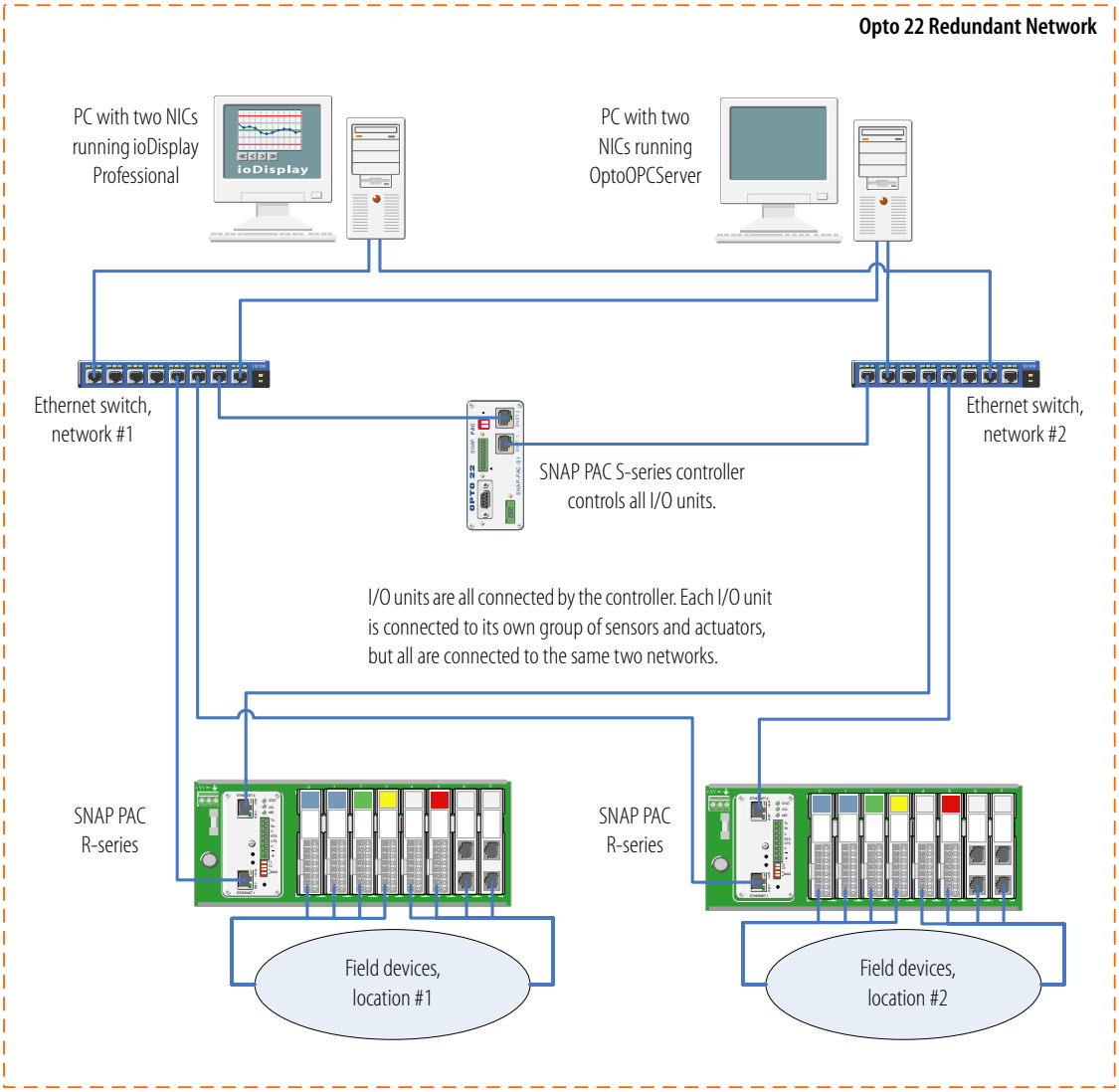
System Architecture (continued)

SNAP PAC S-Series Controller in Redundant Network Configuration

The network shown in this diagram requires ioControl Professional and ioDisplay 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.

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 ioControl strategy) 8 MB 16 MB (7.5 MB available for ioControl strategy; 4 MB available for file storage)
Backup battery	User-replaceable 3.6-volt TL 5242 /W lithium, 10-year minimum power-off data retention
Communication Ethernet (host and I/O) RS-232 serial (host only) RS-485 serial (I/O only)	 Two independent 10/100 Mbps Ethernet network interfaces (RJ-45 connectors). Each interface has a separate IP address. Two RS-232 serial ports (one DB-9 and one pluggable connector); one port has full handshaking. One RS-485 serial port (pluggable connector); two-wire RS-485; no *mistic* signal interrupts
I/O unit compatibility Ethernet-based I/O units Serial-based I/O units	 Opto 22 SNAP Simple I/O, SNAP Ethernet I/O, and SNAP Ultimate I/O units 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 ioProject Basic ioProject Professional	 Includes programming, HMI software, and configuration software; included with purchase of controller. ioProject Basic plus OPC 2.0-compliant OPC server, OptoControl strategy and OptoDisplay project importing, support for serial *mistic* I/O units, and Ethernet link redundanancy 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

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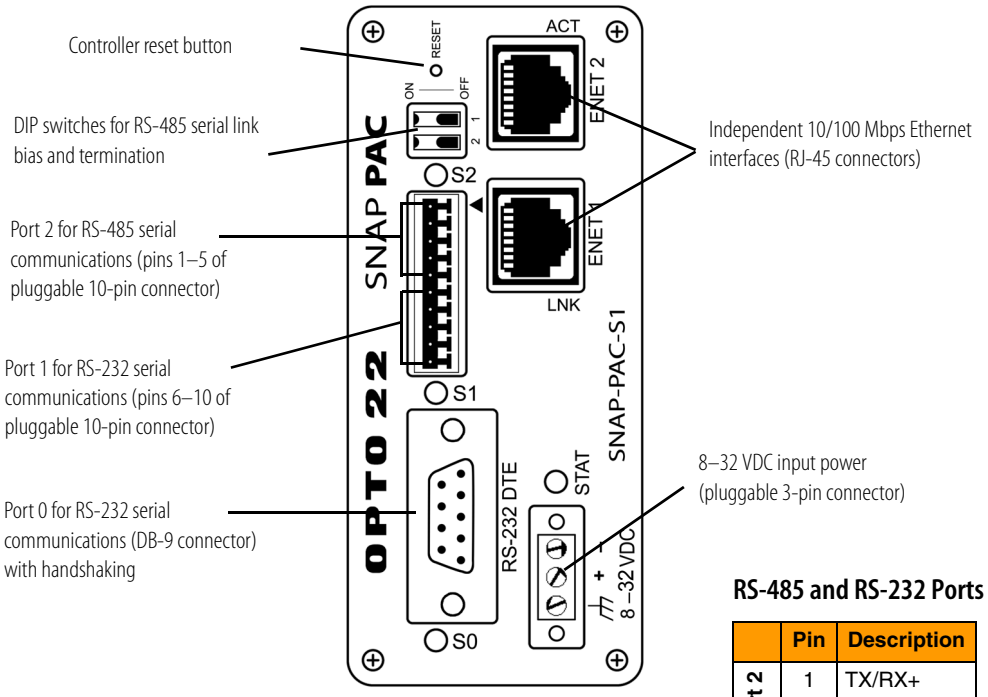
Connectors and Indicators



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

RS-232 DTE Port 0 (DB-9 connector)

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

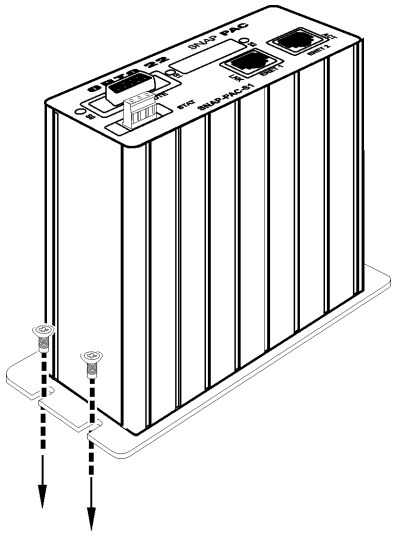
RS-485 and RS-232 Ports

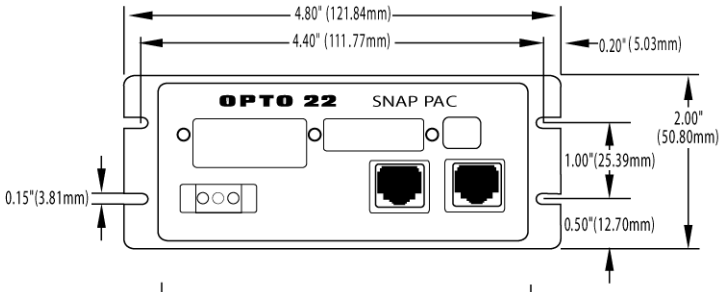
	Pin	Description
2-Wire RS-485 Port 2	1	TX/RX+
	2	TX/RX–
	3	SIG COM
	4	(not used)
	5	(not used)
RS-232 Port 1	6	TX
	7	RX
	8	GND
	9	RTS
	10	CTS

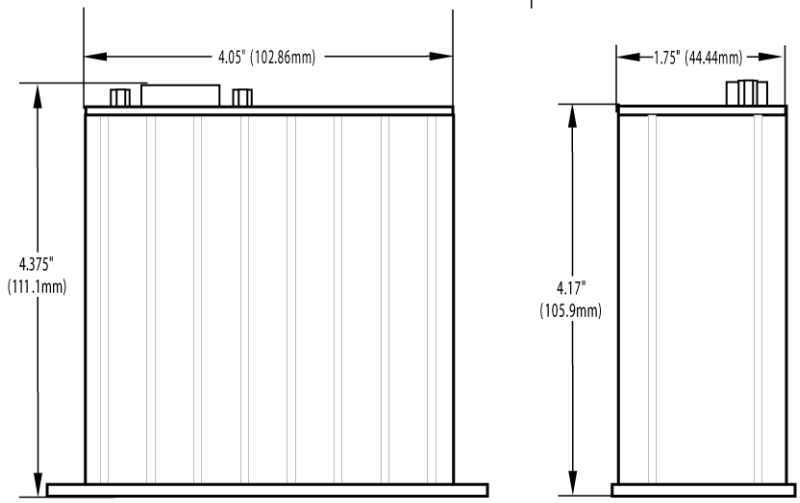
* The RS-485 interface does not support *mistic* signal interrupts. Contact Opto 22 Product Support for current information on this topic.

Dimensional Drawings

Panel Mounting and Dimensions







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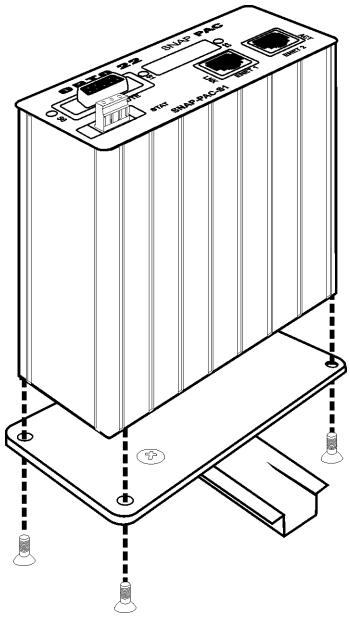
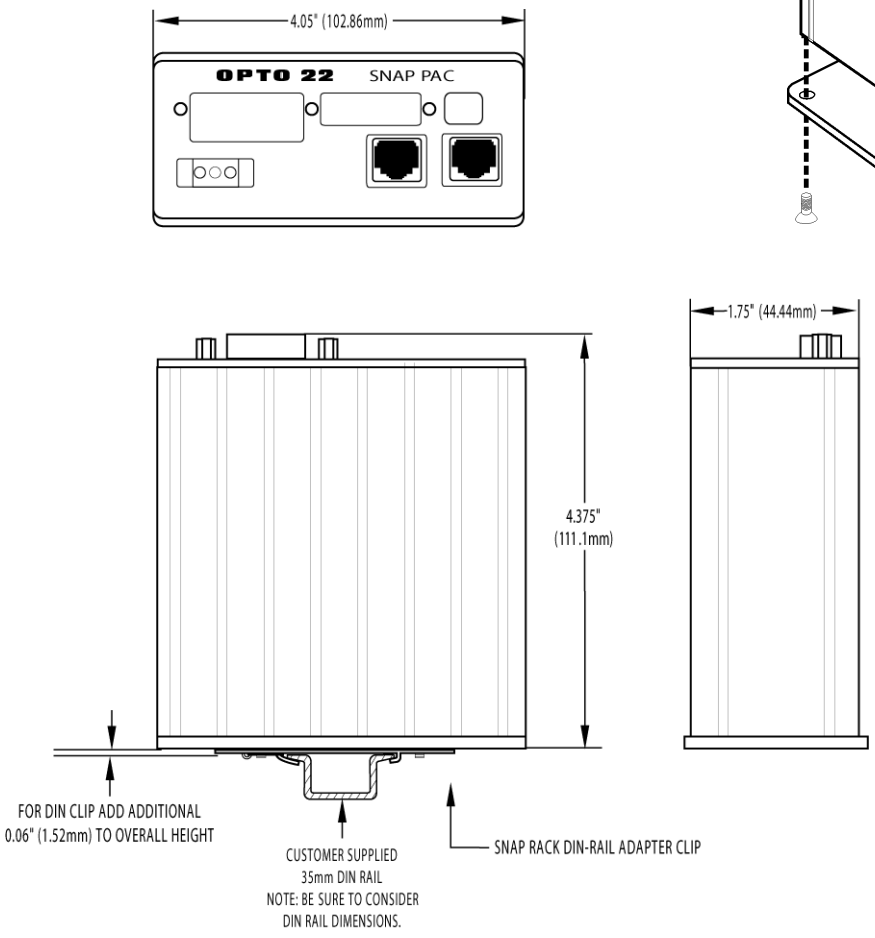
Dimensional Drawings (continued)

DIN-Rail Mounting and Dimensions

Requires a SNAP-PSDIN adapter (purchased separately).





More About Opto 22

Products

Opto 22 develops and manufactures a broad array of reliable, flexible hardware and software products for industrial automation, remote monitoring, data acquisition, and machine-to-machine (M2M) applications.

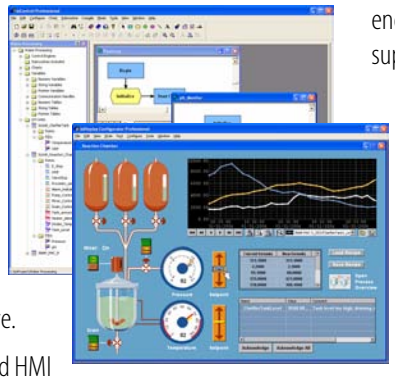
SNAP PACs (Programmable Automation Controllers)

Programmable automation controllers (PACs) are multifunctional, multidomain, modular controllers based on open standards and providing an integrated development environment. 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.

ioProject Software Suite

Opto 22's ioProject Software Suite provides full-featured and cost effective control, HMI (human machine interface), and OPC software to power your Opto 22 hardware.



These fully integrated software applications share a single tagname database, so the data points you configure in ioControl™ are immediately available for use in ioDisplay™ and OptoOPCServer™. Commands are in plain English; variables and I/O point names are fully descriptive.

ioProject Basic offers control and HMI tools and is included in your purchase of a SNAP PAC controller. ioProject Professional, available for separate purchase, adds OptoOPCServer, options for Ethernet link redundancy or segmented networking, and support for legacy Opto 22 mistic™ I/O units.

SNAP Ethernet I/O

Based on worldwide standards Ethernet and Internet Protocol (IP), SNAP Ethernet I/O systems offer flexibility in their network connectivity and in the software applications they work with, including:

- Opto 22's own ioProject suite of control, HMI, and OPC software
- Modbus®/TCP software and hardware
- Third-party HMIs and other OPC client software
- Database, email, network management, and other enterprise systems
- Custom applications developed with the free OptoMMP Driver Toolkit

SNAP Ethernet I/O also works with SNAP PACs to build a complete automation system: PACs provide central control and data distribution; SNAP Ethernet I/O provides local connection to sensors and equipment and includes distributed intelligence for local control, counting, latching, thermocouple linearization, PID loop control, and more.

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 SNAP PACs, ioProject software, and SNAP Ethernet I/O 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 training.opto22.com for more information.

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 visit the website at www.opto22.com.

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