

# OptoEMU Sensor DR (Demand Response)

## Features

- Monitor real-time energy usage from utility meters and equipment
- See and analyze energy data online
- Shed loads on predefined usage thresholds
- Exchange data with a SNAP PAC System, OPC or Modbus/TCP systems, and SQL databases
- Communicate over standard 10/100 Mbps Ethernet or wireless LAN (802.11a, b, or g) or both
- UL listed in U.S. and Canada

## Description

The OptoEMU Sensor™ Energy Monitoring Unit with demand response (DR) monitors the electrical energy used in your facility and then signals electrical equipment to turn on or off in response to limits you define.

To reduce peak energy use that triggers demand charges, electrical equipment loads can also be shed on predefined usage thresholds.

The OptoEMU Sensor DR makes it easy to reduce your energy costs by managing energy consumption, taking advantage of demand response programs from utility providers, and gaining control over your energy pricing.

## Why Monitor Energy?

Traditionally, energy has been considered an overhead cost. Utility bills show few details about when and how electricity was used, and they arrive long after the energy was consumed.

However, new energy pricing structures are changing traditional ways of looking at energy costs. Increasingly, commercial and industrial businesses are finding that they can significantly improve the bottom line by managing energy in the same way as other business costs such as people, assets, and inventory.

In addition, new Demand Response (DR) programs from energy providers offer opportunities to turn what used to be an overhead cost into a source of revenue. The OptoEMU Sensor DR helps you take advantage of these opportunities.

## Gathering and Viewing Energy Data

The OptoEMU Sensor DR's digital inputs gather data from up to two metering devices that emit pulses (such as a utility



OptoEMU  
Sensor DR

meter or submeter). The Sensor DR can also monitor up to 64 data inputs from Modbus devices (over serial and Ethernet).

You can view this real-time and historical energy data through a secure online software service such as [Pulse Energy](#) or [eSight](#). You choose the service that's best for your business, and OptoEMU Sensor DR sends energy data directly to that service. Services usually provide graphs, energy usage comparisons, and other tools to analyze energy use in detail.

## Managing Energy Use

The OptoEMU Sensor DR includes four signal relay outputs that can be used to respond to usage limits you define. These outputs can signal equipment such as HVAC fans and chillers to turn on or off, or signal existing energy or building management systems to perform load shedding.

Each Form C output can be wired for normally open or normally closed.

## Configuration

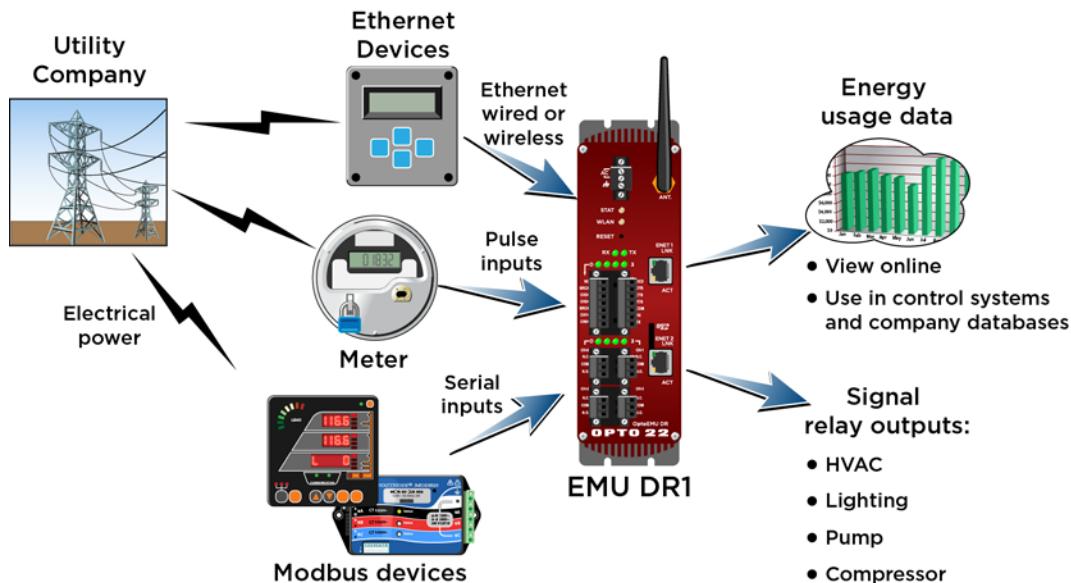
The Sensor includes an easy-to-use utility program for assigning an IP address for communication on your network,

## Part Numbers

Part	Description
OPTOEMU-SNR-DR1	Energy monitoring unit with Demand Response capability (Wired+Wireless)
OPTOEMU-SNR-DR2	Energy monitoring unit with Demand Response capability (wired Ethernet)

# OptoEMU Sensor DR (Demand Response)

## OptoEMU Sensor DR



configuring inputs and an online data service, and entering the appropriate responses for shedding load.

### Communicating with Other Systems

The OptoEMU Sensor DR can also communicate with other systems to coordinate energy management. Sensor data can be incorporated in a PAC Control strategy, a PAC Display HMI, and control systems that communicate through Modbus/TCP or OPC.

### Communication

The OptoEMU Sensor DR uses standard networks and protocols to communicate with online services and computer networks. Two DR models are available:

- **OPTOEMU-SNR-DR2** communicates over a standard 10/100 Mbps wired Ethernet network.
- **OPTOEMU-SNR-DR1** communicates over a 10/100 Mbps wired Ethernet network or over an 802.11a, b, or g wireless LAN (local area network). It can also communicate over

both, simultaneously. Security on the wireless LAN includes 802.11i WPA2/AES, currently considered the best wireless security, plus the older WPA security standard for backwards compatibility.

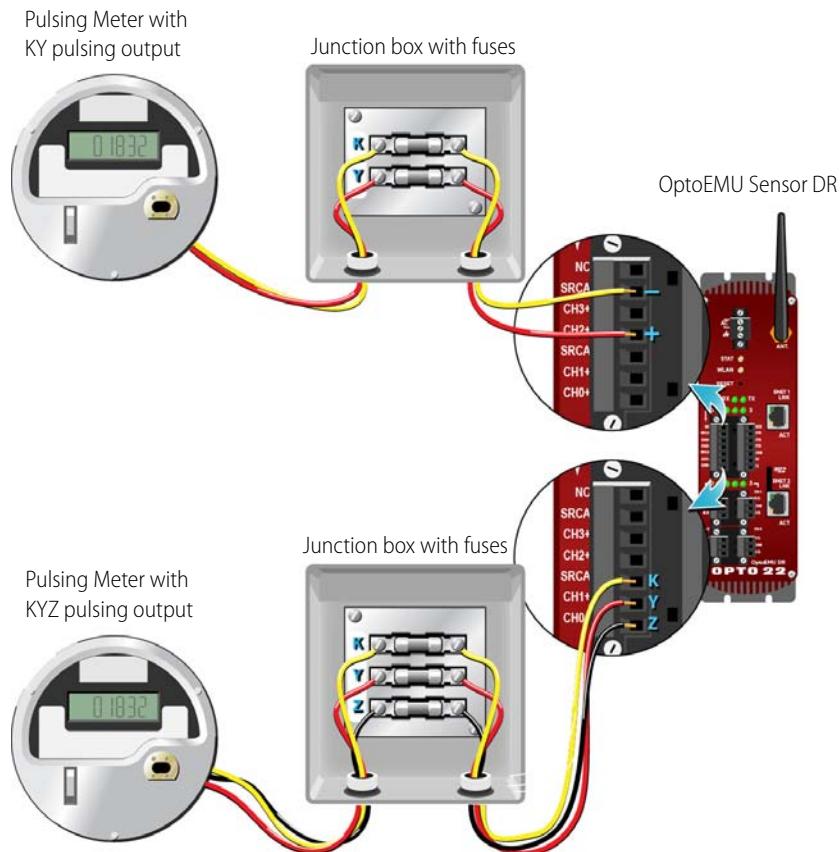
With the options of two wired Ethernet network interfaces or two wired plus an independent wireless interface, you have the flexibility to monitor devices in hard-to-reach areas and to set up networking suited to your business.

### Data Storage

The OptoEMU Sensor DR can store data internally. If communication with the software service is lost, the unit stores data for delivery when communication is restored.

# OptoEMU Sensor DR (Demand Response)

## Wiring for Pulsed Inputs



Use with either two-wire KY (Form A) or three-wire KYZ (Form C) pulsing devices.

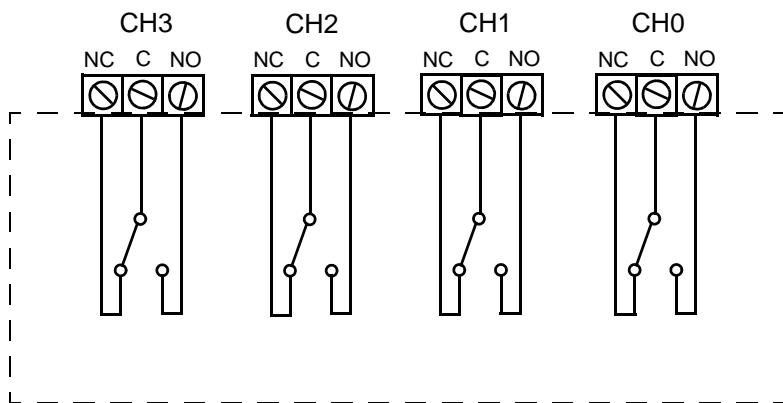
Pin 7 (labeled NC) is not used.

Contact your utility company if connections are not immediately apparent.

*NOTE: If this equipment is used in a manner not specified by Opto 22, the protection provided by the equipment may be impaired.*

## Wiring for Signal Relay Outputs (Form C)

Note: You must provide fusing.

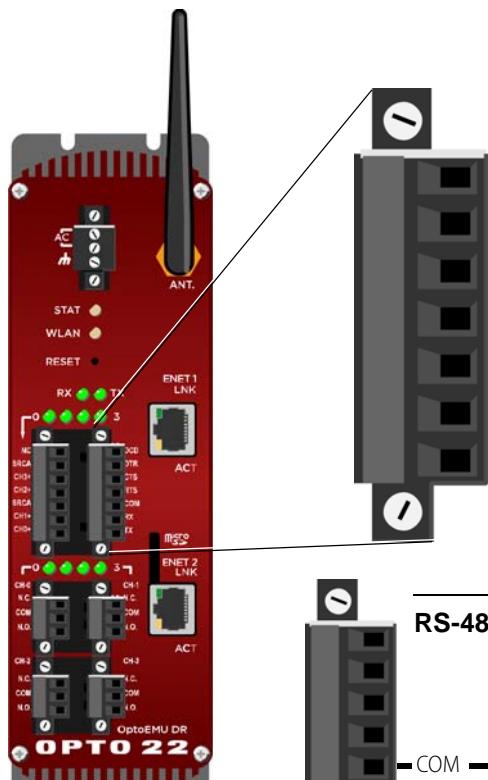


Current rating: 100 mA switching (max.)  
@ 250 VAC/VDC (max.)

Wire size: 24–14 AWG

# OptoEMU Sensor DR (Demand Response)

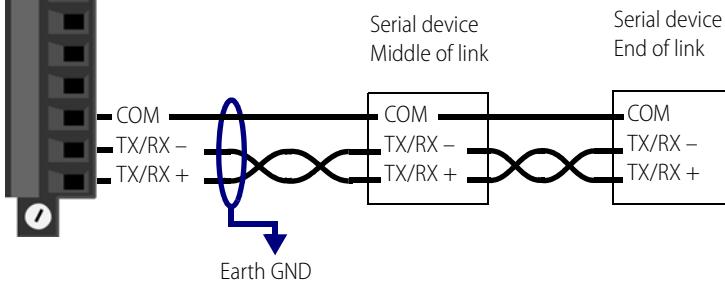
## Wiring for Serial Ports



RS-232 and RS-485 Pinouts

RS-232	Signal Direction	RS-485	Signal Direction
DCD	In	--	
DTR	Out	--	
CTS	In	RX- (4 wire)	In
RTS	Out	RX+ (4 wire)	In
COM		COM	
RX	In	TX/RX-	In/Out
TX	Out	TX/RX+	In/Out

RS-485 2-Wire



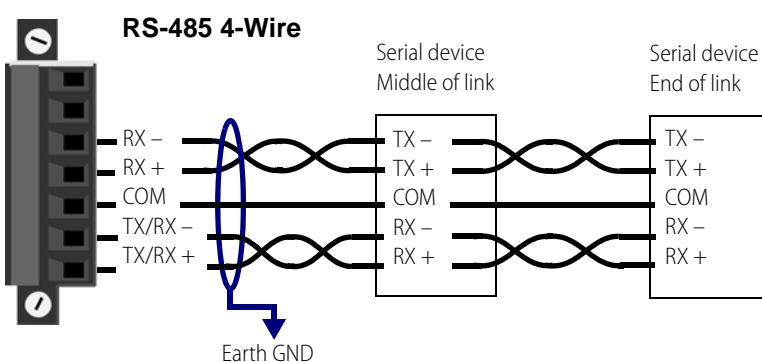
Serial device  
Middle of link

Serial device  
End of link

Serial device  
Middle of link

Serial device  
End of link

RS-485 4-Wire



Earth GND

# OptoEMU Sensor DR (Demand Response)

## Specifications: OptoEMU Sensor DR

### Overall Unit Specifications

	OPTOEMU-SNR-DR1	OPTOEMU-SNR-DR2
Power Requirements	100–240 VAC, 47–63 Hz, 0.4 A maximum, 8 W	100–240 VAC, 47–63 Hz, 0.4 A maximum, 8 W
Dimensions	Overall 2.45" w x 8.08" h x 4.76" d (6.23 cm x 20.53 cm x 12.09 cm)	Overall 2.45" w x 8.08" h x 4.76" d (6.23 cm x 20.53 cm x 12.09 cm)
Enclosure	Sturdy metal case	Sturdy metal case
Removable storage	MicroSD card slot (for future use)	MicroSD card slot (for future use)
Backup battery	Rechargeable (recharges whenever the unit has power), 3-year power-off data retention	Rechargeable (recharges whenever the unit has power), 3-year power-off data retention
Ethernet Communication (wired)	Two independent 10/100 Mbps Ethernet network interfaces (RJ-45 connectors), each with a separate IP address (separate subnets).	Two independent 10/100 Mbps Ethernet network interfaces (RJ-45 connectors), each with a separate IP address (separate subnets).
Ethernet Comm (wireless)	<p>Wireless LAN interface with separate IP address (separate subnet).</p> <p><b>Security:</b> AES - Compatible with WPA2 Personal (802.11i); TKIP - Compatible with WPA Personal</p> <p><b>Frequency 802.11a:</b> 5.180–5.240 GHz, 5.745–5.825 GHz</p> <p><b>Frequency 802.11b/g:</b> 2.412–2.472 GHz, 2.484 GHz</p> <p><b>Transmit Power:</b> 15 dBm maximum</p> <p><b>Antenna Connector:</b> Reverse polarity SMA (RP-SMA or RSMA)</p> <p><b>Roaming:</b> Supported within an SSID (Service Set Identifier) only</p>	No wireless capability
Serial Communication	One serial port, software configurable for RS-232 (TX, RX, COM, DTR, DCD, RTS, CTS) or RS-485 (2-wire, 4-wire, optional termination, optional biasing).	One serial port, software configurable for RS-232 (TX, RX, COM, DTR, DCD, RTS, CTS) or RS-485 (2-wire, 4-wire, optional termination, optional biasing).
Indicators	<p>Status of unit</p> <p>Wireless: WLAN activity</p> <p>Serial: Receiving, Transmitting (future use)</p> <p>Ethernet interfaces (2): Link, Activity</p> <p>Pulse inputs: On/Off status</p> <p>Mechanical relay outputs: On/Off status</p>	<p>Status of unit</p> <p>Serial: Receiving, Transmitting (future use)</p> <p>Ethernet interfaces (2): Link, Activity</p> <p>Pulse inputs: On/Off status</p> <p>Mechanical relay outputs: On/Off status</p>
Other features	Real-time clock	Real-time clock
Operating Temperature	0 to 60 °C (32 to 140° F)	0 to 60 °C (32 to 140° F)
Storage Temperature	-25 to 85 °C (-13 to 185° F)	-25 to 85 °C (-13 to 185° F)
Humidity	0% to 95% relative humidity, non-condensing	0% to 95% relative humidity, non-condensing
Agency Approvals	UL, cUL, CE, RoHS, DFARS Wireless: U.S., FCC Part 15 Subpart C; Canada, IC RSS-210	UL, cUL, CE, RoHS, DFARS
Warranty	30 months	30 months

# OptoEMU Sensor DR (Demand Response)

## Specifications (continued)

### Dry Contact Pulse Inputs

OptoEMU Sensor DR supplies 15 volts to each external dry contact switch and senses switch closure.

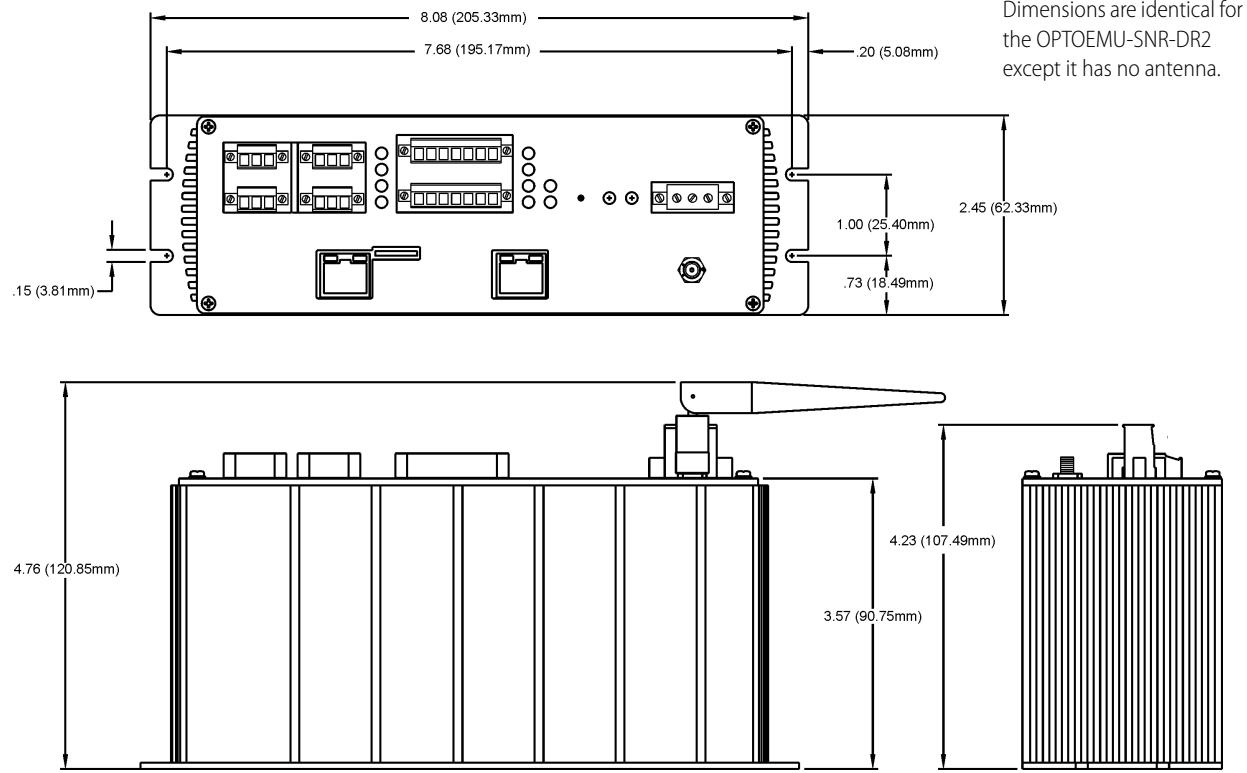
Open Circuit Voltage (Switch Open)	15 VDC typical (supplied by OptoEMU Sensor DR)
Short Circuit Current (Switch Closed)	7 millamps nominal
Minimum Off Resistance	>20 K ohms
Maximum Allowable ON Resistance (Wire + Contact Resistance)	500 ohms
Turn-on Time	5 msec
Turn-off Time	25 msec
Input-to-output Isolation	1500 VAC/VDC
Status indicators	1 LED per channel

### Signal Relay Outputs

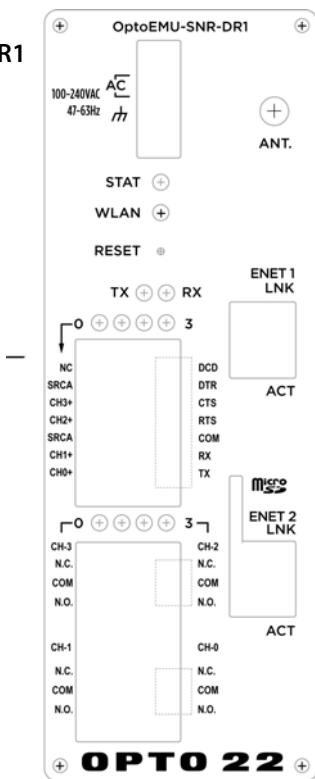
Contact Configuration	SPDT relay (with NO and NC contacts)
Line Voltage - Range	0–240 VAC or 0–30 VDC
Current Rating	100 mA switching @ 0–240 VAC or 0–100 VDC
Surge Current	600 mA
Minimum Load	0.1 VDC, 5 mA
Contact Resistance	≤ 100 milliohms
Peak Blocking Voltage	250 VAC/VDC
Channel-to-channel isolation	300 VAC (1500 V transient)
Turn-on Time	6 milliseconds
Turn-off Time	6 milliseconds
Temperature	0 to 70 °C, operating -30 to 85 °C, storage
Mechanical Life	5 × 10 <sup>6</sup> operations
Operational Life	1 × 10 <sup>3</sup> operations
Status indicators	1 LED per channel

# OptoEMU Sensor DR (Demand Response)

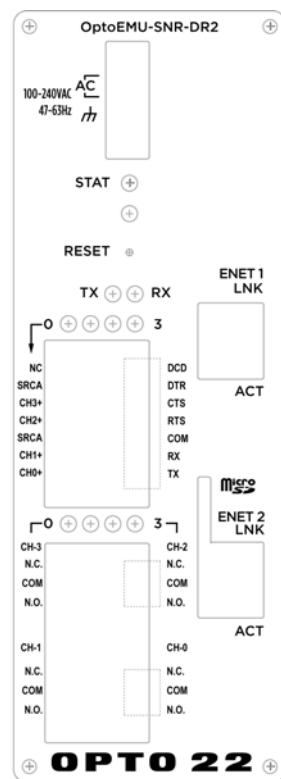
## Dimensional Diagram—OPTOEMU-SNR-DR1



Faceplate,  
OPTOEMU-SNR-DR1



Faceplate,  
OPTOEMU-SNR-DR2



# More About Opto 22

## Products

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

### groov

groov puts your system on your mobile device. With zero programming, you can build mobile operator interfaces to monitor and control systems from Allen-Bradley, Siemens, Schneider Electric, Modicon, and many more. Web-based groov puts mobile-ready gadgets at your fingertips. Tag them from your existing tag database, and they automatically scale for use on any device with a modern web browser. See [groov.com](http://groov.com) for more information and your free trial.

### SNAP PAC System

Designed to simplify the typically complex process of selecting 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, modular controllers based on open standards.

Opto 22 has been manufacturing PACs for over two decades. The standalone SNAP PAC S-series, the rack-mounted SNAP PAC R-series, and the software-based SoftPAC™ all handle a wide range of digital, analog, and serial functions for data collection, remote monitoring, process control, and discrete and hybrid manufacturing.

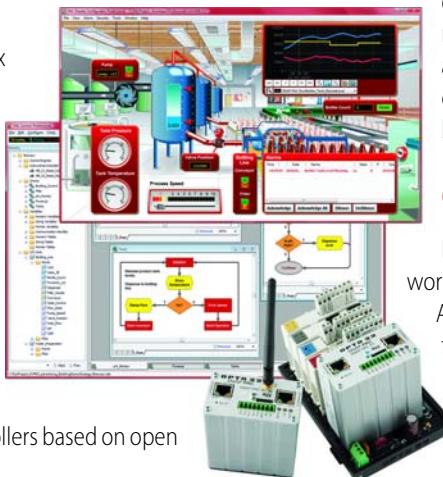
SNAP PACs are based on open Ethernet and Internet Protocol (IP) standards, so you can build or extend a system easily, without the expense and limitations of proprietary networks and protocols. Wired+Wireless™ models are also available.

### PAC Project Software Suite

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

Control programming includes both easy-to-learn flowcharts and optional scripting. 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 one SoftPAC, OptoOPCServer, OptoDataLink, options for controller 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, and serial 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, 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 only testing a sample of each batch, we can 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, comprehensive technical support for Opto 22 products. Our staff of support engineers represents 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.

Additional support is always available on our website: how-to videos, OptoKnowledgeBase, self-training guide, troubleshooting and user's guides, and OptoForums.

In addition, hands-on training is available for free at our Temecula, California headquarters, and you can [register online](#).

## 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)**

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