

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.

OptoEMU Sensors are also compatible with *groov* mobile operator interfaces you build yourself and use on any smartphone, tablet, or computer. For more information, visit [groov.com](#).

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.

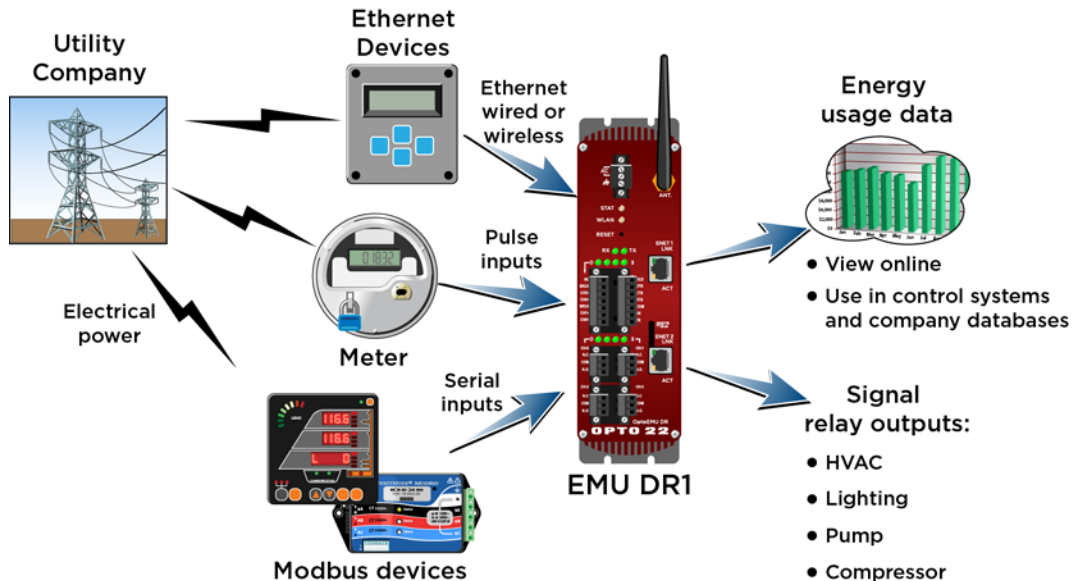
Each Form C output can be wired for normally open or normally closed.

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)

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OptoEMU Sensor DR



Configuration

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

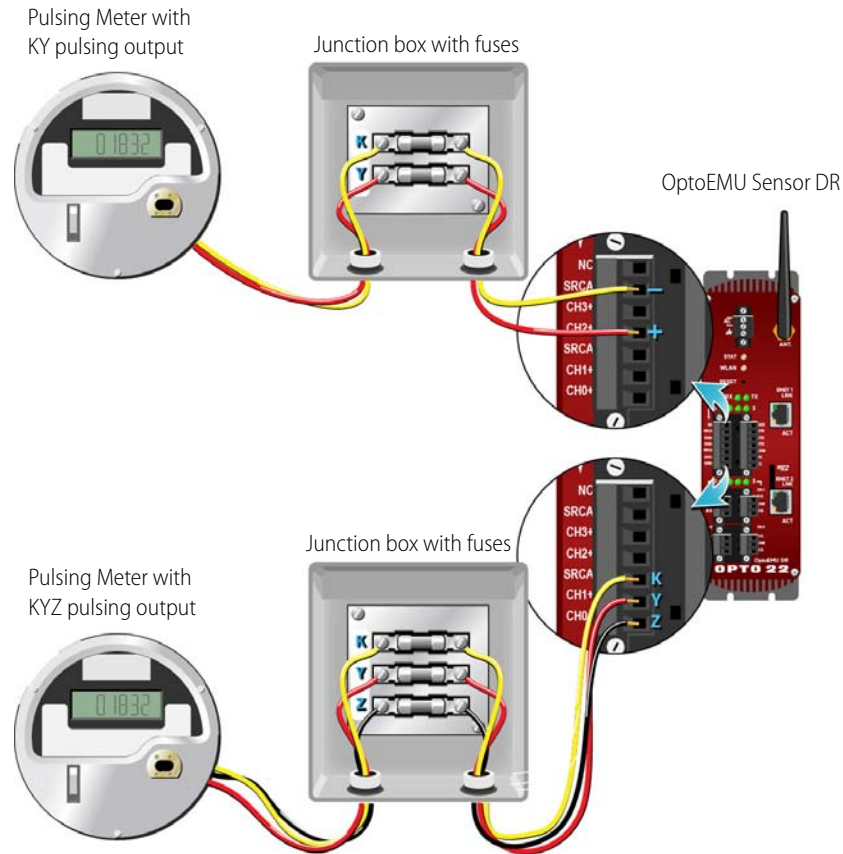
With the options of two wired Ethernet network interfaces or two wired plus an independent wireless interface, you have the flexibility to monitor devices in hard-to-reach areas and to set up networking suited to your business.

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.

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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.

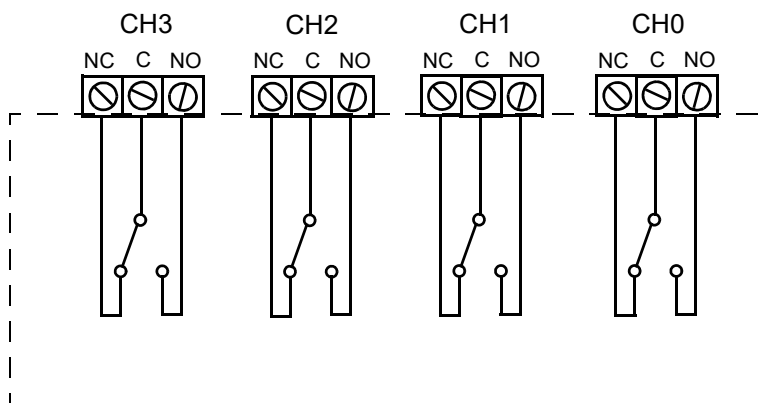
Contact your utility company if connections are not immediately apparent.

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.

NOTE: Transient protection must be used on inductive loads.

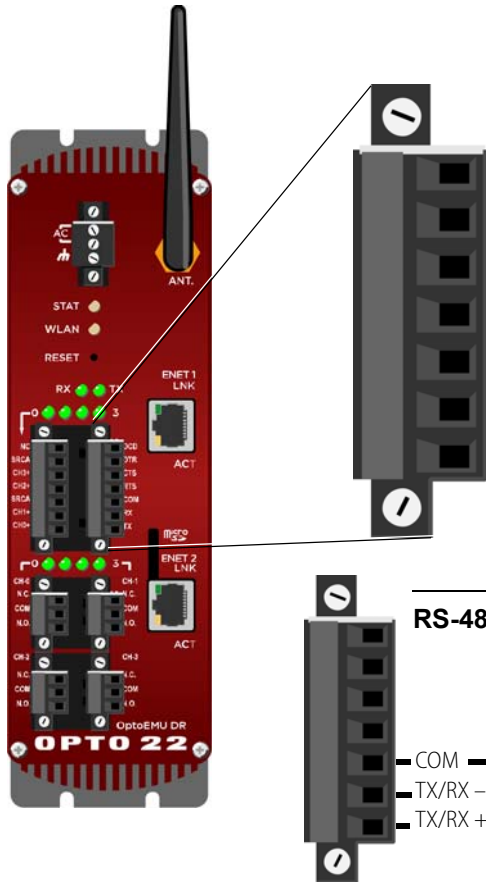


Current rating: 100 mA switching (max.)
@ 250 VAC/VDC (max.)

Wire size: 24–14 AWG

OptoEMU Sensor DR (Demand Response)

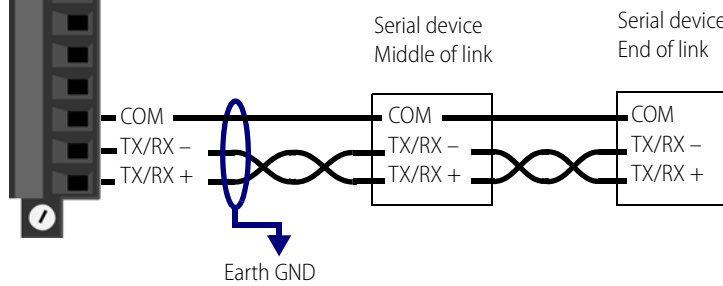
Wiring for Serial Ports



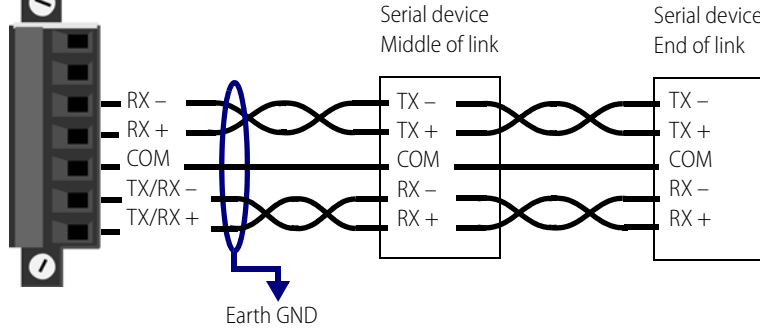
RS-232 and RS-485 Pinouts

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



RS-485 4-Wire



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>Security: AES - Compatible with WPA2 Personal (802.11i); TKIP - Compatible with WPA Personal</p> <p>Frequency 802.11a: 5.180–5.240 GHz, 5.745–5.825 GHz</p> <p>Frequency 802.11b/g: 2.412–2.472 GHz, 2.484 GHz</p> <p>Transmit Power: 15 dBm maximum</p> <p>Antenna Connector: Reverse polarity SMA (RP-SMA or RSMA)</p> <p>Roaming: 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	Status of unit Wireless: WLAN activity Serial: Receiving, Transmitting (future use) Ethernet interfaces (2): Link, Activity Pulse inputs: On/Off status Mechanical relay outputs: On/Off status	Status of unit Serial: Receiving, Transmitting (future use) Ethernet interfaces (2): Link, Activity Pulse inputs: On/Off status Mechanical relay outputs: On/Off status
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

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Specifications (continued)

Dry Contact Pulse Inputs

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

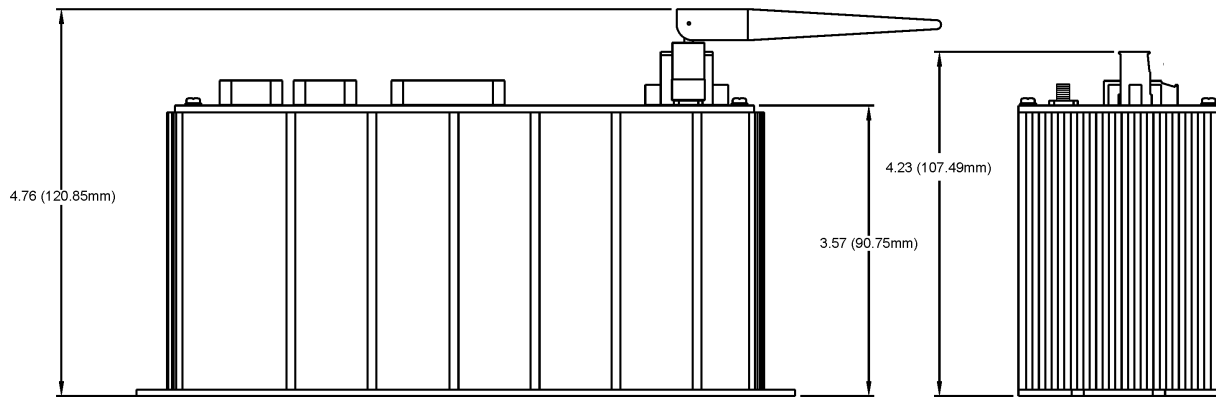
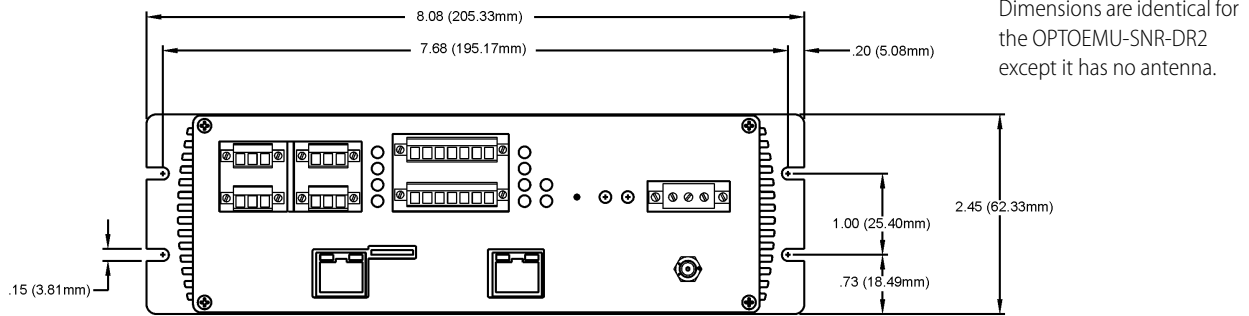
Open Circuit Voltage (Switch Open)	15 VDC typical (supplied by OptoEMU Sensor DR)
Short Circuit Current (Switch Closed)	7 milliamps nominal
Minimum Off Resistance	>20 K ohms
Maximum Allowable ON Resistance (Wire + Contact Resistance)	500 ohms
Turn-on Time	5 milliseconds
Turn-off Time	25 milliseconds
Input-to-output Isolation	1500 VAC/VDC
Minimum Pulse Width	>= 7 milliseconds
Maximum Frequency	<= 30 Hz
Status indicators	1 LED per channel

Signal Relay Outputs

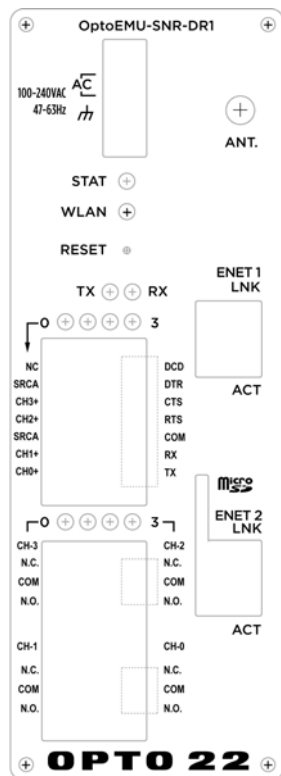
Contact Configuration	SPDT relay (with NO and NC contacts)
Line Voltage - Range	0–240 VAC or 0–30 VDC
Current Rating	100 mA switching @ 0–240 VAC or 0–100 VDC
Surge Current	600 mA
Minimum Load	0.1 VDC, 5 mA
Contact Resistance	≤ 100 milliohms
Peak Blocking Voltage	250 VAC/VDC
Channel-to-channel isolation	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 x 10 ⁶ operations
Operational Life	1 x 10 ³ operations
Status indicators	1 LED per channel

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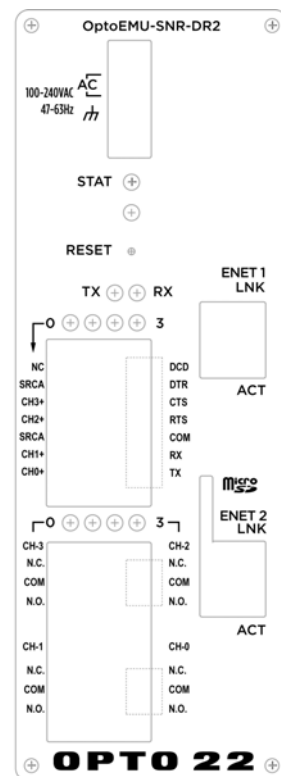
Dimensional Diagram—OPTOEMU-SNR-DR1



Faceplate,
OPTOEMU-SNR-DR1



Faceplate,
OPTOEMU-SNR-DR2



PRODUCTS

Opto 22 develops and manufactures reliable, easy-to-use, open standards-based hardware and software products used worldwide.

Industrial automation, process control, building automation, industrial refrigeration, remote monitoring, data acquisition, and Industrial Internet of Things (IIoT) applications all rely on Opto 22.



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Monitor and control your equipment from anywhere using your smartphone or tablet with groov. Build your own mobile app easily—just drag, drop, and tag. No programming or coding. Visit groov.com for more information and your free trial.

SNAP PAC System

Developer- and IIoT-ready, the SNAP PAC System connects physical assets to databases and applications using open standards. 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

SNAP PAC programmable automation controllers handle a wide range of digital, analog, and serial functions for data collection, remote monitoring, process control, and discrete and hybrid manufacturing.

For IIoT applications and easier integration with company systems, standalone and rack-mounted SNAP PACs include a built-in HTTP/HTTPS server and **RESTful API** (application program interface). The REST API gives you secure, direct access to I/O and variable data using your choice of programming languages. No middleware, protocol converters, drivers, or gateways needed.

Based on open Ethernet and Internet Protocol (IP) standards, SNAP PACs make it easier to 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 offers full-featured, cost-effective control programming, HMI (human machine interface), OPC server, and database connectivity software.

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. PAC Project Professional, available for separate purchase, adds one SoftPAC software-based controller, 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, local PID loop control, watchdog, totalizing, and much more.

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. Analog, digital, and serial modules are mixed on one mounting rack and controlled by a SNAP PAC brain or rack-mounted PAC.

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 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: how-to videos, user's guides, OptoKnowledgeBase, self-training guide, troubleshooting, 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 (toll-free in the U.S. and Canada) or 951-695-3000, or visit our website at www.opto22.com.