Form 788-001113

Opto 22's SNAP Control System is a versatile combination of hardware and software to support a wide variety of business applications. The system consists of high-density digital, analog, and special-purpose I/O modules, compact industrial controllers, high-performance processor brains, and a series of mounting racks. Coupled with Opto 22's powerful FactoryFloor industrial automation software, SNAP offers unparalleled flexibility and power for your control, monitoring, and data acquisition needs.

### SNAP I/O MODULES

SNAP analog and digital input and output modules provide compact, high-density I/O, with top-mounted connectors for easy field wiring.

**SNAP digital modules** switch or sense either AC or DC signals. Each module includes four channels and provides 4,000 volts of optical isolation from the field side to the logic side.

**SNAP analog modules** provide two or four channels. They are factory calibrated and software configurable, handling a wide variety of signal levels.

**SNAP special-purpose modules** provide specific functionality. Using serial modules, for example, you can communicate with serial devices such as chart recorders and barcode readers. Data-logging modules provide data storage capacity, so that data from other modules on the same rack can be stored for later retrieval. PID modules monitor input signals and adjust output signals to control a proportional integral derivative (PID) loop, performing all PID calculations in the module.

**SNAP I/O Modules, Rack, and SNAP Ethernet Brain**

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# SNAP I/O
# Control System

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### SNAP BRAINS

SNAP brains are high-performance, intelligent processors designed to meet your distributed control needs. Capable of controlling up to 64 channels of mixed analog and digital I/O, or digital only, SNAP brains communicate in several ways. SNAP Ethernet brains communicate via TCP/IP over Ethernet at speeds up to 100 megabits per second. Within the TCP/IP packet are several protocols, including the IEEE 1394 Firewire packet and Modbus/TCP. SNAP Wireless LAN brains also communicate via TCP/IP but use wireless LAN for physical connections. The serial versions of the SNAP brain use Optomux, Mistic, or Modbus protocols. A Profibus-DP brain and ARCNET brains are also available. All SNAP-supported protocols developed by Opto 22 are freely distributed and fully documented.
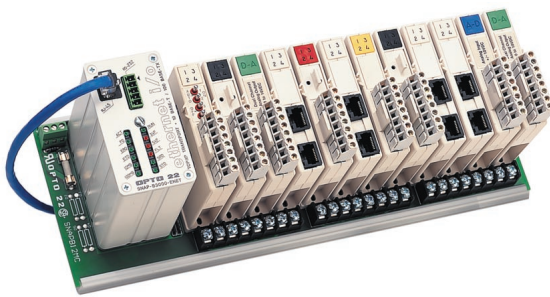
### SNAP INDUSTRIAL CONTROLLERS

Powerful SNAP controllers provide real-time control and communication to I/O systems, serial devices, motion controllers, and networks. SNAP controllers range from the cost-effective, small-footprint SNAP-LCSX, ideal for distributed automation, to the powerful SNAP-LCM4. Expansion options for the SNAP-LCM4 controller include adapter cards for twisted-pair and fiber optic ARCNET, as well as 100-Mbps Ethernet with TCP/IP.

### SNAP RACKS

SNAP racks come in four sizes to accommodate a maximum of 4, 8, 12, or 16 modules.

Versatile SNAP B-series racks accept both digital and analog modules on the same rack, and use SNAP brains to communicate with either an Opto 22 controller or a host computer.

SNAP D-series racks are designed for digital applications only. They can be populated with digital SNAP I/O modules and connected directly to a PC through an I/O adapter card, or be used with SNAP Ethernet, Profibus-DP, or other brains.

### 349 FACTORYFLOOR SOFTWARE

Closely integrated with the SNAP I/O system is Opto 22's FactoryFloor®, the full-featured software suite designed to help you solve control automation problems, build easy-to-use operator interfaces, and expand your manufacturing systems' connectivity. FactoryFloor includes OptoControl, OptoDisplay, OptoServer, and OptoConnect.

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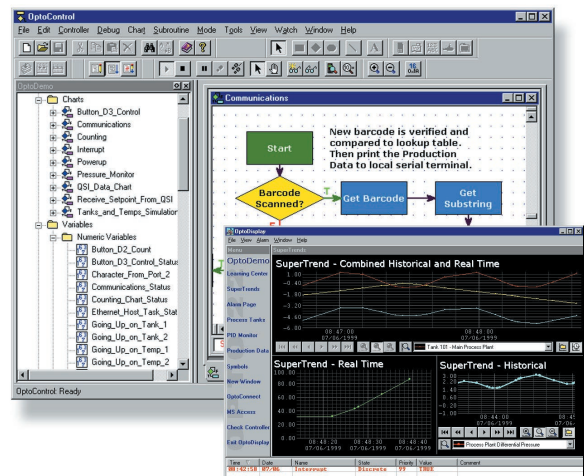
### CONTROLLERS

**SNAP-LCM4**\* ................................SNAP modular M4 controller

**SNAP-LCSX**\* .................................SNAP controller with 2 COM ports

**SNAP-LCSX-PLUS**\* ......................SNAP controller with 4 COM ports

**M4SENET-100**\* .............................Ethernet card for M4 series controllers

### BRAINS

**SNAP-B3000-ENET**\* .....................Analog/digital/serial Ethernet brain

**SNAP-ENET-D64** ...........................Digital-only Ethernet brain

**SNAP-ENET-RTC** ...........................Analog/digital/serial Ethernet brain with real-time clock

**SNAP-WLAN-FH-ADS** .................Analog/digital/serial wireless LAN brain

**B3000**\* ............................................Analog/digital brain, Mistic/Optomux protocol, serial

**B3000-HA** .......................................Analog/digital brain, Mistic/Optomux protocol, dual ARCNET

**SNAP-B3000-MODBUS** ................Analog/digital Modbus slave, ASCII or RTU protocol

**SNAP-BRS** ......................................Remote digital read/write brain, Mistic protocol, serial

**SNAP-BRS-HA** ...............................Remote digital read/write brain, Mistic protocol, dual ARCNET

**SNAP-B4** ........................................High-speed digital brain, Pamux protocol

**SNAP-B6** ........................................High-speed analog/digital brain, Pamux protocol

**SNAP-PDPRS64** .............................Profibus-DP digital slave brain

\* Factory Mutual (FM) approved

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# SNAP I/O
# Control System

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## B-SERIES RACKS

**SNAP-B4M**\* .................................. 4-module rack

**SNAP-B8M**\* .................................. 8-module rack

**SNAP-B8MC/MC-P** ....................... 8-module rack with extra terminal block for field wiring, (MC-P is pluggable)

**SNAP-B12M**\* ................................ 12-module rack

**SNAP-B12MC/MC-P** .................... 12-module rack with extra terminal block for field wiring, (MC-P is pluggable)

**SNAP-B16M**\* ................................ 16-module rack

**SNAP-B16MC/MC-P** .................... 16-module rack with extra terminal block for field wiring, (MC-P is pluggable)


## D-SERIES RACKS

**SNAP-D64RS** ................................ 16-module digital-only rack for Profibus or Ethernet SNAP brains

**SNAP-D4M** .................................. 4-module digital-only rack

**SNAP-D4MC/MC-P** ....................... 4-module digital-only rack with extra terminal block for field wiring, (MC-P is pluggable)

**SNAP-D6M** .................................. 6-module digital-only rack

**SNAP-D6MC/MC-P** ....................... 6-module digital-only rack with extra terminal block for field wiring, (MC-P is pluggable)

**SNAP-D8M** .................................. 8-module digital-only rack

**SNAP-D8MC/MC-P** ....................... 8-module digital-only rack with extra terminal block for field wiring, (MC-P is pluggable)

**SNAP-D12M** ................................. 12-module digital-only rack

**SNAP-D12MC/MC-P** .................... 12-module digital-only rack with extra terminal block for field wiring, (MC-P is pluggable)


\* Factory Mutual (FM) approved

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## DIGITAL MODULES

### AC INPUT

**SNAP-IAC5** .......................................... 4-channel, 90–140 VAC input, 5 VDC logic

**SNAP-IAC5A** ....................................... 4-channel, 180–280 VAC input, 5 VDC logic

**SNAP-IAC5MA** ................................... 4-channel, isolated, 90–140 VAC input, 5 VDC logic, manual/auto switch

**SNAP-IAC5FM**\* ................................... 4-channel, 90–140 VAC/VDC input, 5 VDC logic

**SNAP-IAC5AFM**\* ................................ 4-channel, 180–280 VAC input, 5 VDC logic

### DC INPUT

**SNAP-IDC5** .......................................... 4-channel, 10–32 VDC input, 5 VDC logic

**SNAP-IDC5FM**\* ................................... 4-channel, 10–32 VDC input, 5 VDC logic

**SNAP-IDC5D** ....................................... 4-channel, 2.5–28 VDC input, 5 VDC logic

**SNAP-IDC5DFM**\* ................................ 4-channel, 2.5–28 VDC input, 5 VDC logic

**SNAP-IDC5-FAST** ............................... 4-channel, high-speed, 2.5–16 VDC input, 5 VDC logic

**SNAP-IDC5-FAST-A** ........................... 4-channel, high-speed, 18–32 VDC input, 5 VDC logic

**SNAP-IDC5MA** ................................... 4-channel, isolated, high-speed, 10–32 VAC input, 5 VDC logic, manual/auto switch

**SNAP-IDC5Q** ....................................... SNAP two-axis quadrature position input

**SNAP-IAC5** .......................................... 4-channel, 90–140 VAC input, 5 VDC logic

**SNAP-IAC5A** ....................................... 4-channel, 180–280 VAC input, 5 VDC logic

\* Factory Mutual (FM) approved

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# Control System
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## DIGITAL MODULES (CONT.)

### AC OUTPUT

**SNAP-OAC5** ........................................ 4-channel, 12–280 VAC input, 5 VDC logic

**SNAP-OAC5FM**\* ................................ 4-channel, 12–280 VAC input, 5 VDC logic

**SNAP-OAC5MA** .................................. 4-channel, isolated, 12–280 VAC output, 5 VDC logic, manual/auto switch

**SNAP-OAC5-i** ..................................... 4-channel, isolated, 12–280 VAC output, 5 VDC logic

**SNAP-OAC5-iFM**\* .............................. 4-channel, isolated, 12–280 VAC output, 5 VDC logic

### DC OUTPUT

**SNAP-ODC5SRC** ................................. 4-channel, 5–60 VDC logic, source

**SNAP-ODC5SRCFM**\* ......................... 4-channel, 5–60 VDC logic, source

**SNAP-ODC5SNK** ................................ 4-channel, 5–60 VDC logic, sink

**SNAP-ODC5SNKFM**\* ......................... 4-channel, 5–60 VDC logic, sink

**SNAP-ODC5ASNK** .............................. 4-channel, 5–200 VDC output, 5 VDC logic, sink

**SNAP-ODC5R**..................................... 4-channel, dry contact output, normally open

**SNAP-ODC5RFM**\* .............................. 4-channel, dry contact output, normally open

**SNAP-ODC5R5** ................................... 4-channel, dry contact output, normally closed

**SNAP-ODC5R5FM**\* ............................ 4-channel, dry contact output, normally closed

**SNAP-ODC5MA** .................................. 4-channel, isolated, 5–60 VDC output, 5 VDC logic, manual/auto switch

**SNAP-ODC5-i** ..................................... 4-channel, isolated, 5–60 VDC output, 5 VDC logic

**SNAP-ODC5-iFM**\* .............................. 4-channel, isolated, 5–60 VDC output, 5 VDC logic

**SNAP-ODC5A-i** ................................... 4-channel, isolated, 5–200 VDC output, 5 VDC logic

**SNAP-ODC5A-iFM**\* ........................... 4-channel, isolated, 5–200 VDC output, 5 VDC logic

\* Factory Mutual (FM) approved

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## ANALOG MODULES

### INPUT

**SNAP-AICTD-4** ..................................... 4-channel, analog temperature input, ICTD

**SNAP-AIMA-4** ...................................... 4-channel, analog current input, -20mA to +20mA

**SNAP-AIR40K-4** .................................. 4-channel, analog thermistor input

**SNAP-AIMV-4** ...................................... 4-channel, -150 mV to +150 mV input **or** -75 mV to +75 mV

**SNAP-AIMV2-4** ................................... 4-channel, -50 mV to +50 mV input **or** -25 mV to +25 mV

**SNAP-AIV-4** ......................................... 4-channel, analog voltage input, -10 VDC to +10 VDC

**SNAP-AIARMS** ................................... 2-channel, AC/DC input, 0–10 amp RMS

**SNAP-AIVRMS** .................................... 2-channel, AC/DC input, 0–250 V RMS

**SNAP-AICTD** ....................................... 2-channel, analog temperature input, ICTD

**SNAP-AIMA** ........................................ 2-channel, analog current input, -20mA to +20mA

**SNAP-AIMA-i** ...................................... 2-channel, analog current input, isolated, -20mA to +20mA

**SNAP-AIRATE** ..................................... 2-channel, analog rate input, 0 to 25,000 Hz

**SNAP-AITM** ........................................ 2-channel, analog, type E, J, K thermocouple
**or** -150 mV to +150mV input **or** -75 mV to +75mV input

**SNAP-AITM-i** ...................................... 2-channel, analog, isolated, type E, J, K thermocouple
**or** -150 mV to +150mV input **or** -75 mV to +75mV input

**SNAP-AITM-2** ..................................... 2-channel, analog, type B, C, D, G, N, T, R, or S thermocouple
**or** -50 mV to +50mV DC input **or** -25 mV to +25mV DC input

**SNAP-AITM2-i** .................................... 2-channel, analog, isolated, type B, C, D, G, N, T, R, or S thermocouple
**or** -50 mV to +50mV DC input **or** -25 mV to +25mV DC input

**SNAP-AIRTD** ....................................... 2-channel, 100-ohm, platinum RTD input

**SNAP-AIV** ........................................... 2-channel, analog voltage input, isolated, -10 VDC to +10 VDC

**SNAP-AIV-i** ......................................... 2-channel, analog voltage input, isolated, -10 VDC to +10 VDC

**Note**: All 4-channel analog modules are for use with Ethernet and Wireless LAN brains only.

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# SNAP I/O
# Control System

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## ANALOG MODULES (CONT.)

### OUTPUT

**SNAP-AOA-23** ..................................... 2-channel, analog output current, 4–20mA

**SNAP-AOV-25** ..................................... 2-channel, analog output voltage, 0 to +10 VDC

**SNAP-AOV-27** ..................................... 2-channel, analog output voltage, -10 to +10 VDC

**SNAP-AOA-28** ..................................... 2-channel, analog output current loop, 0–20mA

**SNAP-AOD-29** ..................................... 2-channel, analog time-proportional digital output, 5–60 VDC

**SNAP-AOA-3** ..................................... Single-channel, analog output current, 4–20mA

**SNAP-AOV-5** ..................................... Single-channel, analog output voltage, 0 to +10 VDC

**SNAP-AOV-7** ..................................... Single-channel, analog output voltage, -10 to +10 VDC

### SPECIAL-PURPOSE MODULES

**SNAP-SCM-232** ................................. 2-channel, RS-232 serial communication module

**SNAP-SCM-485** ................................. 2-channel, RS-485 (two-wire) serial communication module

**SNAP-PID-V** ....................................... 2-channel 0–5 VDC or 0–10 VDC reference input, 4–20 mA **or** 0–10 VDC PID output

**SNAP-DATA** ....................................... Data-logging module with battery-backed real-time clock

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**Control System**

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## POWER SUPPLIES

**SNAP-PS5**\* .................................... Supplies 5 volts at 4 amps; 120 VAC input

**SNAP-PS5-24DC**\* ......................... Supplies 5 volts at 4 amps; 24 VDC input

**SNAP-PS24**\* ................................. Supplies 3/4 amp at 24 volts to power current loops

**SNAP-PSDIN** ................................. DIN-rail adapter for power supply

## ACCESSORIES/REPLACEMENT PARTS

### (FOR SNAP RACKS AND MODULES)

**SNAP-CDBBDIN** .......................... Classic digital brain DIN-rail adapter

**SNAP E-Z REMOVAL TOOL** ......... (no part number) shipped with SNAP modules

**SNAP-FIELDCONB** ........................ Module field connector

**SNAP-FUSE1AB** ........................... 1-amp fuse, 25-pack

**SNAP-FUSE4AB** ........................... 4-amp fuse, 25-pack

**SNAP-LABEL4B** ............................ 4-module label holder with labels, 25-pack

**SNAP-LABEL6B** ............................ 6-module label holder with labels, 25-pack

**SNAP-MODFUSEH** ........................ Digital output module fuse holder, 10-pack

**SNAP-MODLATCHB** ..................... Module release latch, 10-pack

**SNAP-RACKDIN** ........................... SNAP rack DIN-rail adapter clip

**SNAP-RACKDINB** ......................... SNAP rack DIN-rail adapter clip, 25-pack

**SNAP-RETN4** ............................... 4-module retention rail (OEM)

**SNAP-RETN4B** ............................. 4-module retention rail, 25-pack

**SNAP-RETN6** ............................... 6-module retention rail (OEM)

**SNAP-RETN6B** ............................. 6-module retention rail, 25-pack

**SNAP-STRAP**\* .............................. Jumper strap for SNAP module field wiring connector

**SNAP-WIRESTRAP**\* .................... Jumper for SNAP-STRAPS

\* Factory Mutual (FM) approved

## Overview

In 1974, Opto 22 introduced the first liquid epoxy-filled line of power solid-state relays (SSR). This innovation in SSR design greatly improved the reliability and reduced the cost of manufacturing. At that time, we also incorporated into our manufacturing process 100% testing of every relay produced under full load conditions. By 1978, Opto 22 had gained such a reputation for reliability that we were recognized as the world's leading manufacturer of solid-state relays. Through continuous manufacturing improvements and the same 100% testing policy established 22 years ago, Opto 22 is still recognized today for the very high quality and reliability of its complete line of solid-state relays.



**Power Series**



**Z Series**

**Index**

**P Series**



**MP Series**

## Specifications

### All Models

- 4,000 V optical isolation input to output

- Zero voltage turn-on

- Turn-on time: ½ cycle maximum

- Turn-off time: ½ cycle maximum

- Operating frequency: 25 to 65 Hz (operates at 400 Hz with six times off-state leakage)

- Coupling capacitance input to output: 8 pF maximum

- DV/DT Off-state: 200 volts per microsecond

- DV/DT commutating: snubbed for rated current at 0.5 power factor

- UL recognized

- CSA certified

- CE component

## Safety Cover

### Power Series
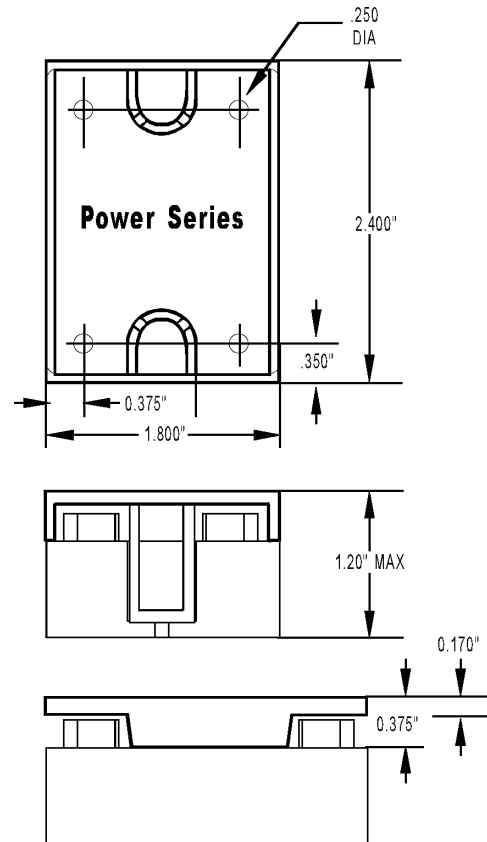


- Guards against accidental terminal contact

- Fits all Power Series SSRs

- Easy snap-on mounting

- Clear material and test probe holes — meet VDC specifications

- Part Number: SAFETY COVER

# OPTO 22

# SOLID-STATE RELAYS

## DATA SHEET

Form 859-000511

## Specifications

### AC Power Series - 120/240 Volt
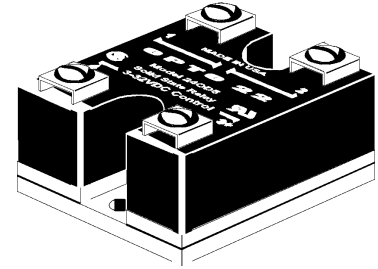
Opto 22 provides a full range of power series relays with a wide variety of voltage (110–575) and current options (3–45 amps). All Power Series relays feature 4,000 volts of optical isolation and have a high PRV rating.

| Model Number | Nominal AC Line Voltage | Nominal Current Rating (Amps) | 1 cycle Surge (Amps) Peak | Nominal Signal Input Resistance (Ohms) | Signal Pick-up Voltage | Signal Drop-out Voltage | Peak Repetitive Voltage Maximum | Maximum Output Voltage Drop | Off-State Leakage (mA) Maximum | Operating Voltage Range (Volts AC) | I²t Rating t=8.3 (ms) | Isolation Voltage | θjc* (°C/Watt) | Dissipation (Watts/Amp) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 120D3 | 120 | 3 | 85 | 1000 | 3VDC (32V allowed) | 1 VDC | 600 | 1.6 volts | 2.5mA | 12-140 | 30 | 4,000VRMS | 11 | 1.7 |
| 120D10 | 120 | 10 | 110 | 1000 | 3VDC (32V allowed) | 1 VDC | 600 | 1.6 volts | 7 mA | 12-140 | 50 | 4,000VRMS | 1.3 | 1.6 |
| 120D25 | 120 | 25 | 250 | 1000 | 3VDC (32V allowed) | 1 VDC | 600 | 1.6 volts | 7 mA | 12-140 | 250 | 4,000VRMS | 1.2 | 1.3 |
| 120D45 | 120 | 45 | 650 | 1000 | 3VDC (32V allowed) | 1 VDC | 600 | 1.6 volts | 7 mA | 12-140 | 1750 | 4,000VRMS | 0.67 | 0.9 |
| 240D3 | 240 | 3 | 85 | 1000 | 3VDC (32V allowed) | 1 VDC | 600 | 1.6 volts | 5 mA | 24-280 | 30 | 4,000VRMS | 11 | 1.7 |
| 240D10 | 240 | 10 | 110 | 1000 | 3VDC (32V allowed) | 1 VDC | 600 | 1.6 volts | 14 mA | 24-280 | 50 | 4,000VRMS | 1.3 | 1.6 |
| 240D25 | 240 | 25 | 250 | 1000 | 3VDC (32V allowed) | 1 VDC | 600 | 1.6 volts | 14 mA | 24-280 | 250 | 4,000VRMS | 1.2 | 1.3 |
| 240D45 | 240 | 45 | 650 | 1000 | 3VDC (32V allowed) | 1 VDC | 600 | 1.6 volts | 14 mA | 24-280 | 1750 | 4,000VRMS | 0.67 | 0.9 |
| 380D25 | 380 | 25 | 250 | 1000 | 3VDC (32V allowed) | 1 VDC | 800 | 1.6 volts | 12 mA | 24-420 | 250 | 4,000VRMS | 1.2 | 1.3 |
| 380D45 | 380 | 45 | 650 | 1000 | 3VDC (32V allowed) | 1 VDC | 800 | 1.6 volts | 12 mA | 24-420 | 1750 | 4,000VRMS | 0.67 | 0.9 |
| 120A10 | 120 | 10 | 110 | 33K | 85 VAC (280 allowed) | 10 VAC | 600 | 1.6 volts | 7 mA | 12-140 | 50 | 4,000VRMS | 1.3 | 1.6 |
| 120A25 | 120 | 25 | 250 | 33K | 85 VAC (280 allowed) | 10 VAC | 600 | 1.6 volts | 7 mA | 12-140 | 250 | 4,000VRMS | 1.2 | 1.3 |
| 240A10 | 240 | 10 | 110 | 33K | 85 VAC (280 allowed) | 10 VAC | 600 | 1.6 volts | 14 mA | 24-280 | 50 | 4,000VRMS | 1.3 | 1.6 |
| 240A25 | 240 | 25 | 250 | 33K | 85 VAC (280 allowed) | 10 VAC | 600 | 1.6 volts | 14 mA | 24-280 | 250 | 4,000VRMS | 1.2 | 1.3 |
| 240A45 | 240 | 45 | 650 | 33K | 85 VAC (280 allowed) | 10 VAC | 600 | 1.6 volts | 14 mA | 24-280 | 1750 | 4,000VRMS | 0.67 | 0.9 |

Notes: θjc* = Thermal resistance junction to base. Maximum junction temperature is 110°C.
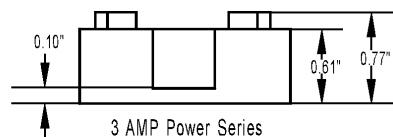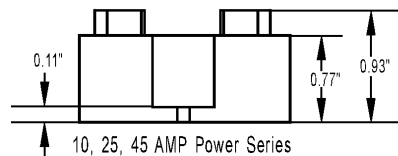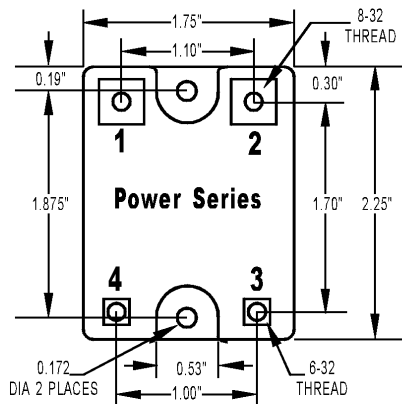
**O P T O 22**

## DATA SHEET

Form 859-000511

## Specifications:
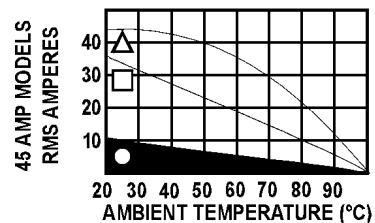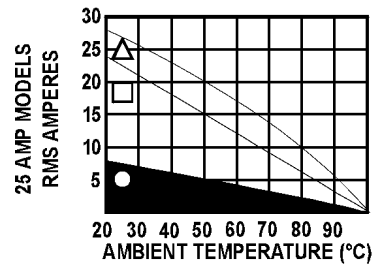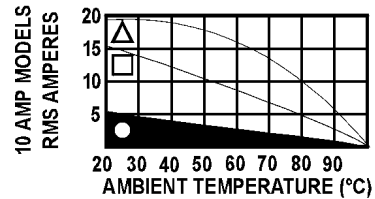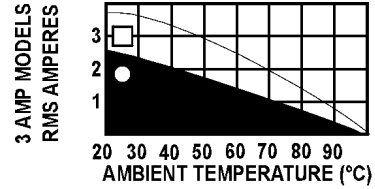### AC Power Series - 120/240 Volt (Continued)

**Surge Current Data**

| Time (Seconds) | Time* (Cycles) | 3-Amp Peak Amps | 10-Amp Peak Amps | 25-Amp Peak Amps | 45-Amp Peak Amps |
|---|---|---|---|---|---|
| 0.017 | 1 | 85 | 110 | 250 | 650 |
| 0.050 | 3 | 66 | 85 | 175 | 420 |
| 0.100 | 6 | 53 | 70 | 140 | 320 |
| 0.200 | 12 | 45 | 60 | 112 | 245 |
| 0.500 | 30 | 37 | 50 | 80 | 175 |
| 1 | 60 | 31 | 40 | 67 | 134 |
| 2 | 120 | 28 | 33 | 53 | 119 |
| 3 | 180 | 27 | 32 | 49 | 98 |
| 4 | 240 | 26 | 31 | 47 | 95 |
| 5 | 300 | 25 | 30 | 45 | 91 |
| 10 | 600 | 24 | 28 | 42 | 84 |

Note: *60 Hz.

**Thermal Ratings**



## Dimensional Drawings



Power Series

10, 25, 45 AMP Power Series

3 AMP Power Series

Form 859-000511

## Specifications
### AC Power Series - 480/575 Volt

DC SERIES: The DC Series delivers isolated DC control to large OEM customers worldwide.

AC SERIES: The AC Series offers the ultimate in solid-state reliability. All AC power series relays feature a built-in snubber and zero voltage turn-on. Transient proof models offer self-protection for noisy electrical environments.
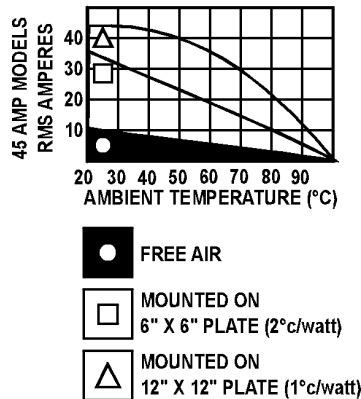
| Model Number | Nominal AC Line Voltage | Nominal Current Rating (Amps) | 1 cycle Surge (Amps) Peak | Nominal Signal Input Resistance (Ohms) | Signal Pick-up Voltage | Signal Drop-out Voltage | Peak Repetitive Voltage Maximum | Maximum Output Voltage Drop | Off-State Leakage (mA) Maximum | Operating Voltage Range (Volts AC) | I²t Rating t=8.3 (ms) | Isolation Voltage | θjc* (°C/Watt) | Dissipation (Watts/Amp) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 480D10-12 | 480 | 10 | 110 | 1000 | 3VDC (32V Allowed) | 1 VDC | 1200 | 3.2 volts | 11 mA | 100-530 | 50 | 4,000V$_{RMS}$ | 1.2 | 2.5 |
| 480D15-12 | 480 | 15 | 150 | 1000 | 3VDC (32V Allowed) | 1 VDC | 1200 | 3.2 volts | 11 mA | 100-530 | 50 | 4,000V$_{RMS}$ | 1.2 | 2.5 |
| 480D25-12 | 480 | 25 | 250 | 1000 | 3VDC (32V Allowed) | 1 VDC | 1000 | 1.6 volts | 11 mA | 100-530 | 250 | 4,000V$_{RMS}$ | 1.3 | 1.3 |
| 480D45-12 | 480 | 45 | 650 | 1000 | 3VDC (32V Allowed) | 1 VDC | 1000 | 1.6 volts | 11 mA | 100-530 | 1750 | 4,000V$_{RMS}$ | 0.67 | 0.9 |
| 575D15-12 | 575 | 15 | 150 | 1000 | 3VDC (32V Allowed) | 1 VDC | 1200 | 3.2 volts | 15 mA | 100-600 | 90 | 4,000V$_{RMS}$ | 1.2 | 2.5 |
| 575D45-12 | 575 | 45 | 650 | 1000 | 3VDC (32V Allowed) | 1 VDC | 1000 | 1.6 volts | 15 mA | 100-600 | 1750 | 4,000V$_{RMS}$ | 0.67 | 0.9 |

Note: θjc* = Thermal resistance junction to base. Maximum junction temperature is 110°C.

## Dimensional Drawings



10, 25, 45 AMP Power Series

3 AMP Power Series

## Thermal Ratings



45 AMP MODELS RMS AMPERES

AMBIENT TEMPERATURE (°C)

● FREE AIR

☐ MOUNTED ON 6" X 6" PLATE (2°c/watt)

△ MOUNTED ON 12" X 12" PLATE (1°c/watt)
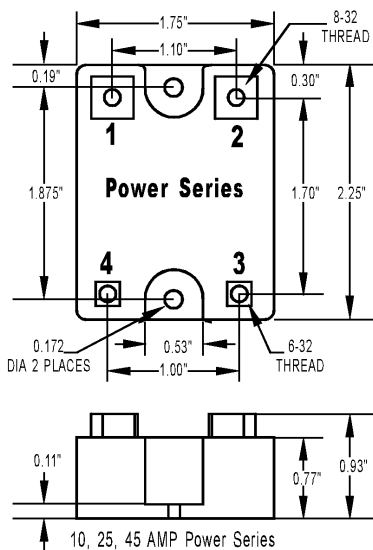
## Surge Current Data

| Time Second | Time*** (Cycles) | 10-Amp Peak Amps | 15-Amp Peak Amps | 25-Amp Peak Amps | 45-Amp Peak Amps |
|---|---|---|---|---|---|
| 0.017 | 1 | 110 | 150 | 250 | 650 |
| 0.050 | 3 | 85 | 140 | 175 | 420 |
| 0.100 | 6 | 70 | 110 | 140 | 320 |
| 0.200 | 12 | 60 | 90 | 112 | 245 |
| 0.500 | 30 | 50 | 70 | 80 | 175 |
| 1 | 60 | 40 | 55 | 67 | 134 |
| 2 | 120 | 33 | 49 | 53 | 119 |
| 3 | 180 | 32 | 47 | 49 | 98 |
| 4 | 240 | 31 | 43 | 47 | 95 |
| 5 | 300 | 30 | 40 | 45 | 91 |
| 10 | 600 | 28 | 35 | 42 | 84 |

Note: ***60 Hz

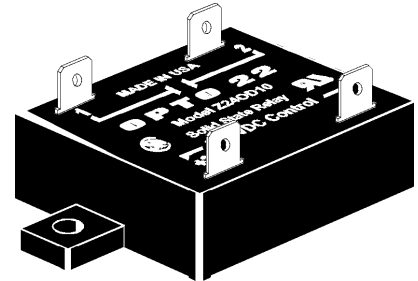# OPTO 22
# SOLID-STATE RELAYS
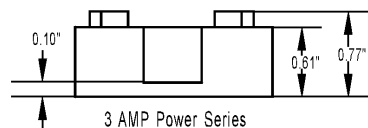
## DATA SHEET
Form 859-000511

## Specifications

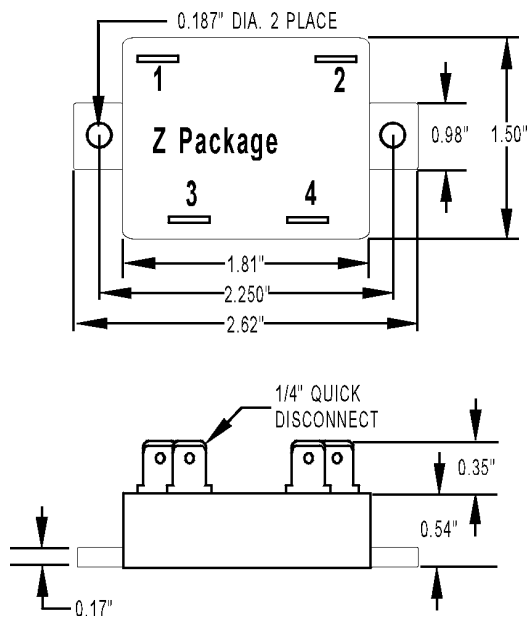### AC Power Series - 120/240 Volt
### Plastic Package (z series)

The Z Series employs a unique heat transfer system that makes it possible for Opto 22 to deliver a low-cost, 10-amp, solid-state relay in an all-plastic case. The push-on tool-free quick-connect terminals make the Z Series ideal for high-volume OEM applications.
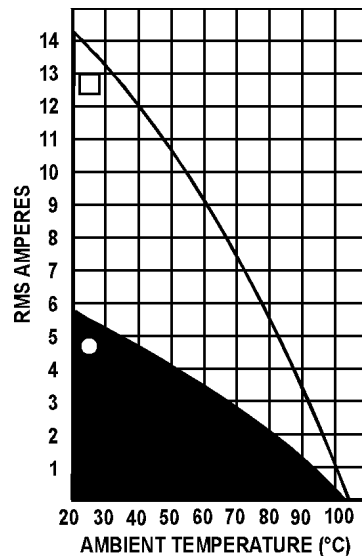
| Model Number | Nominal AC Line Voltage | Nominal Current Rating (Amps) | 1 cycle Surge (Amps) Peak | Nominal Signal Input Resistance (Ohms) | Signal Pick-up Voltage | Signal Drop-out Voltage | Peak Repetitive Voltage Maximum | Maximum Output Voltage Drop | Off-State Leakage (mA) Maximum | Operating Voltage Range (Volts AC) | I²t Rating t=8.3 (ms) | Isolation Voltage | θjc* (°C/Watt) | Dissipation (Watts/Amp) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Z120D10 | 120 | 10 | 110 | 1000 | 3VDC (32V allowed) | 1 VDC | 600 | 1.6 volts | 6 mA | 12-140 | 50 | 4,000 V$_{RMS}$ | 4 | 1 |
| Z240D10 | 240 | 10 | 110 | 1000 | 3VDC (32V allowed) | 1 VDC | 600 | 1.6 volts | 12 mA | 24-280 | 50 | 4,000 V$_{RMS}$ | 4 | 1 |

Notes: θjc* = Thermal resistance junction to base. Maximum junction temperature is 110°C.

## Dimensional Drawings

0.187" DIA. 2 PLACE

1    2

Z Package

3    4

0.98"   1.50"

1.81"
2.250"
2.62"

1/4" QUICK DISCONNECT

0.35"
0.54"
0.17"

## Current vs. Ambient Ratings

RMS AMPERES

AMBIENT TEMPERATURE (°C)

■● FREE AIR

□ MOUNTED ON 6" X 6" PLATE (2°c/watt)

## Surge Current Data

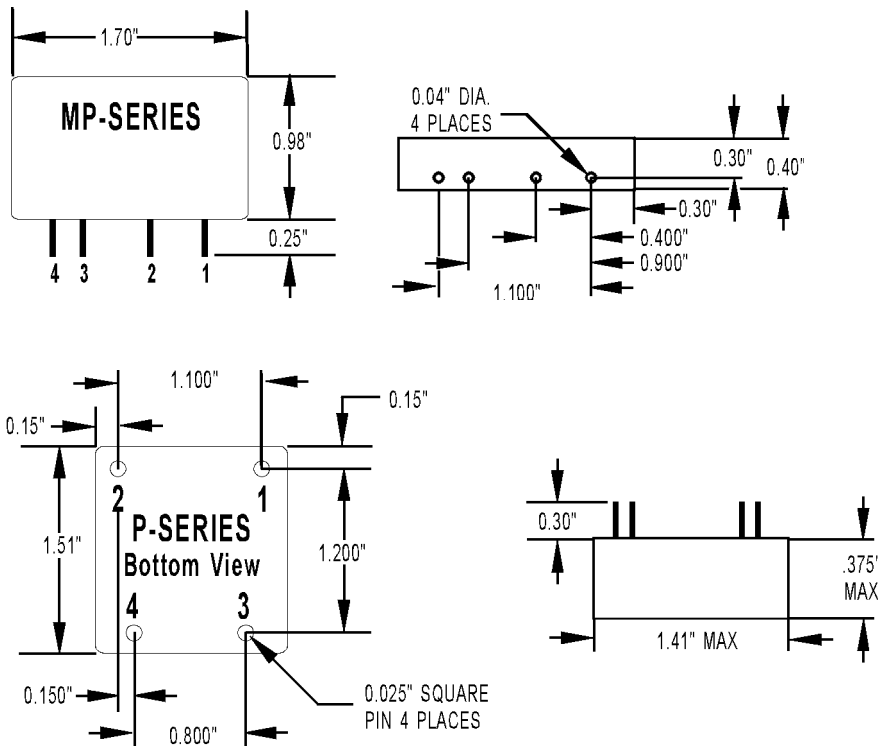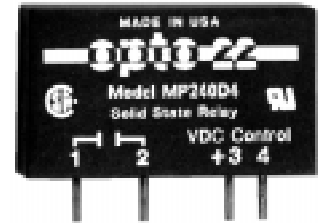| Time Second | Time*** (Cycles) | Peak Amps |
|---|---|---|
| 0.017 | 1 | 110 |
| 0.050 | 3 | 85 |
| 0.100 | 6 | 70 |
| 0.200 | 12 | 60 |
| 0.500 | 30 | 50 |
| 1 | 60 | 40 |
| 2 | 120 | 33 |
| 3 | 180 | 32 |
| 4 | 240 | 31 |
| 5 | 300 | 30 |
| 10 | 600 | 28 |

Note: ***60 Hz

## Specifications

### AC Power - Printed Circuit Package (P & MP Series)

| Model Number | Nominal AC Line Voltage | Nominal Current Rating Amps | 1 cycle Surge (Amps) Peak | Nominal Signal Input Resistance (Ohms) | Signal Pick-up Voltage | Signal Drop-out Voltage | Peak Repetitive Voltage Maximum | Maximum Output Voltage Drop | Off-State Leakage mA Maximum | Operating Voltage Range (Volts AC) | I²t Rating t=8.3 (ms) | Isolation Voltage | θjc* °C/Watt | Dissipation Watts/Amp |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MP120D2** or P120D2 | 120 | 2 | 20 | 1000 | 3VDC** (32V allowed) | 1 VDC | 600 | 1.6 volts | 5 mA | 12-140 | 2 | 4,000 V$_{RMS}$ | 20 | 1.2 |
| **MP120D4** or P120D4 | 120 | 4 | 85 | 1000 | 3VDC** (32V allowed) | 1 VDC | 600 | 1.6 volts | 5 mA | 12-140 | 30 | 4,000 V$_{RMS}$ | 6.5 | 1.2 |
| **MP240D2** or P240D2 | 240 | 2 | 20 | 1000 | 3VDC** (32V allowed) | 1 VDC | 600 | 1.6 volts | 5 mA | 24-280 | 2 | 4,000 V$_{RMS}$ | 20 | 1.2 |
| **MP240D4** or P240D4 | 240 | 4 | 85 | 1000 | 3VDC** (32V allowed) | 1 VDC | 600 | 1.6 volts | 5 mA | 24-280 | 30 | 4,000 V$_{RMS}$ | 6.5 | 1.2 |
| **MP380D4** | 380 | 4 | 85 | 1000 | 3VDC** (32V allowed) | 1 VDC | 800 | 1.6 volts | 5 mA | 24-420 | 30 | 4,000 V$_{RMS}$ | 6.5 | 1.2 |

Notes: θjc* = Thermal resistance junction to base. Maximum junction temperature is 110°C.
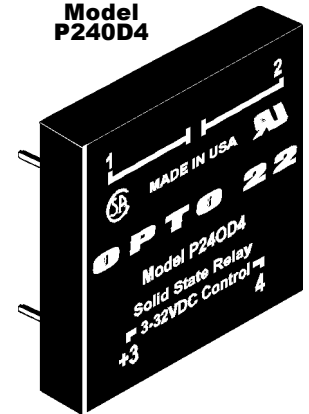** = MP Series 24 volts maximum.

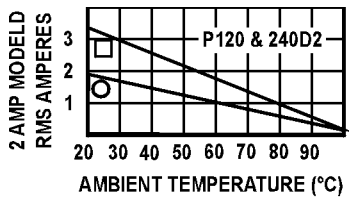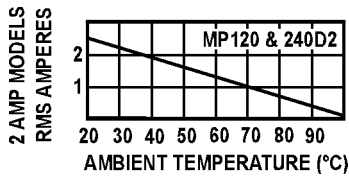## Dimensional Drawings

**Model  MP240D4**



**Model P240D4**

SHAPING THE FUTURE OF INDUSTRIAL AUTOMATION

## Specifications
### AC Power - Printed Circuit Package (P & MP Series)

**Thermal Ratings**



MP120 & 240D2

2 AMP MODELS RMS AMPERES

AMBIENT TEMPERATURE (°C)



P120 & 240D2

2 AMP MODELD RMS AMPERES

AMBIENT TEMPERATURE (°C)

○ FREE AIR

□ MOUNTED ON 6" X 6" PLATE (2° C/WATT)



MP120 & 240D4

4 AMP MODELS RMS AMPERES

AMBIENT TEMPERATURE (°C)



P120 & 240D4

4 AMP MODELS RMS AMPERES

AMBIENT TEMPERATURE (°C)
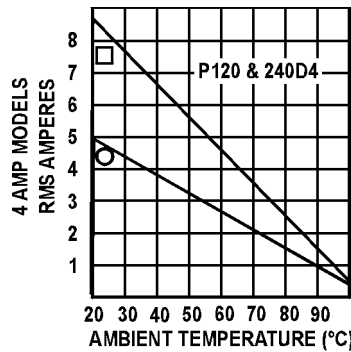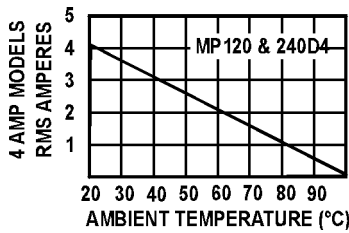
○ FREE AIR

□ MOUNTED ON 6" X 6" PLATE (2° C/WATT)

**Surge Current Data**

| Time Second | Time* (Cycles) | Peak Amps | Peak Amps |
|---|---|---|---|
| 0.017 | 1 | 20 | 85 |
| 0.050 | 3 | 18 | 66 |
| 0.100 | 6 | 15 | 53 |
| 0.200 | 12 | 11 | 45 |
| 0.500 | 30 | 9 | 37 |
| 1 | 60 | 8.5 | 31 |
| 2 | 120 | 8 | 28 |
| 3 | 180 | 7.5 | 27 |
| 4 | 240 | 7 | 26 |
| 5 | 300 | 6.5 | 25 |
| 10 | 600 | 6 | 24 |

Note: *60 Hz

## Description

### DC Switching Series

**MP Series**
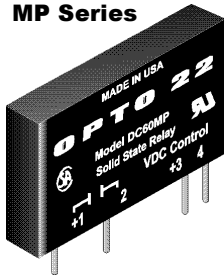
**P Series**
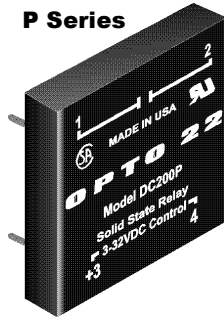
**Power Series**
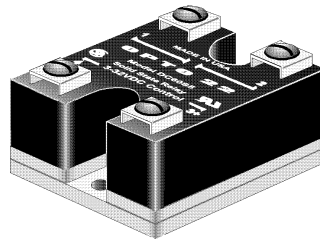
**Thermal Ratings**
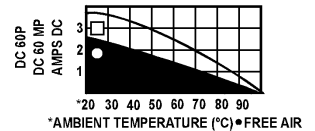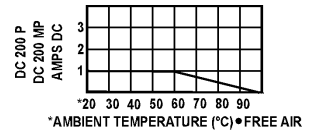
## Specifications

| | DC60P or DC60MP | DC200P or DC200MP | DC60S-3 | DC60S-5 |
|---|---|---|---|---|
| **Operating** Voltage Range | 5-60 VDC | 5-200 VDC | 5-60 VDC | 5-60 VDC |
| **Forward Voltage** Drop | 1.5 volts at 3 amps | 1.5 volts at 1 amp | 1.5 volts at 3 amps | 1.5 volts at 5 amps |
| **Nominal Current** Rating | 3 amps | 1 amp | 3 amps | 5 amps |
| **Off-State** Blocking | 60 VDC | 250 VDC | 60 VDC | 60 VDC |
| **Signal Pickup** Voltage | 3 VDC 32 Volts* allowed | 3 VDC 32 Volts* allowed | 3 VDC 32 Volts allowed | 3 VDC 32 Volts allowed |
| **Signal Dropout** Voltage | 1 VDC | 1 VDC | 1 VDC | 1 VDC |
| **Signal Input** Impedance | 1,000 ohms | 1,000 ohms | 1,000 ohms | 1,000 ohms |
| **1 Second Surge** | 5 amps | 2 amps | 5 amps | 10 amps |
| **Operating Temp.** Range | -40° C to 100° C | -40° C to 100° C | -40° C to 100° C | -40° C to 100° C |
| **Isolation Voltage** | 4,000 V$_{RMS}$ | 4,000 V$_{RMS}$ | 4,000 V$_{RMS}$ | 4,000 V$_{RMS}$ |
| **Off-state** Leakage | 1 mA maximum | 1 mA maximum | 1 mA maximum | 1 mA maximum |
| **Package Type** | P/MP series | P/MP series | Power series | Power series |

Note: *MP series maximum allowed control signal 24 VDC.

## Dimensional Drawings

**Power Series**

1.75"
1.10"
0.19"
8-32 THREAD
0.30"
1.875"
1.70"
2.25"
0.172 DIA 2 PLACES
0.53"
6-32 THREAD
1.00"

0.11"
0.77"
0.93"
**DC60S-5**

0.10"
0.61"
0.77"
**DC60S-3**

**Thermal Ratings charts:**
- DC 200 P / DC 200 MP — AMPS DC
- DC 60P / DC 60 MP — AMPS DC
- DC 60 S-5 — AMPS DC
- DC 60 S-3 — AMPS DC

*AMBIENT TEMPERATURE (°C) • FREE AIR
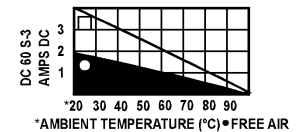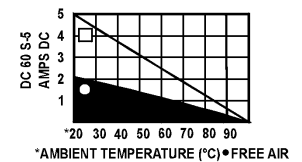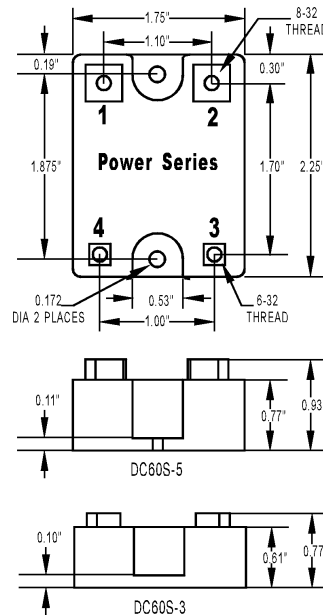
● FREE AIR
□ 2° C/WATT HEAT SINK (6" X 6" PLATE)

## Dimensional Drawings

**MP-SERIES**
1.70"
0.98"
0.25"
4 3 2 1

0.04" DIA. 4 PLACES
0.30"
0.40"
0.30"
0.400"
0.900"
1.100"

1.100"
0.15"
0.15"
0.15"
**P-SERIES** Bottom View
1.51"
1.200"
0.150"
0.800"
0.025" SQUARE PIN 4 PLACES

0.30"
.375" MAX
1.41" MAX
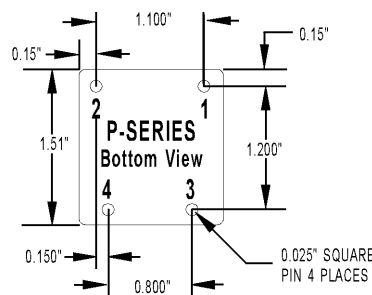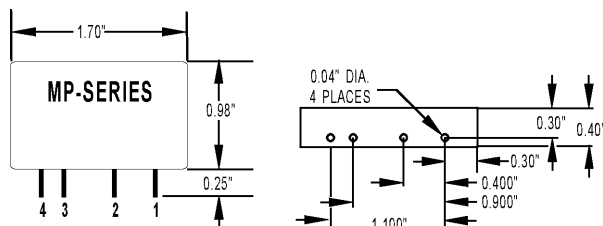
## Applications
### Tips

### Heat Sink Calculation

Like all semiconductor devices, SSR current ratings must be based on maximum junction temperature. All Opto 22 SSRs operate conservatively at maximum junction temperatures of 110° C. Determining an adequate heat sink for a given SSR conducting a given current is very simple.

Note: Thermally conductive grease must be used between the relay base and the heat sink.

```
110°C JUNCTION
         31.2°C RISE
78.8°C
HEAT SINK
         28.8°C RISE
         50°C AMBIENT AIR
```
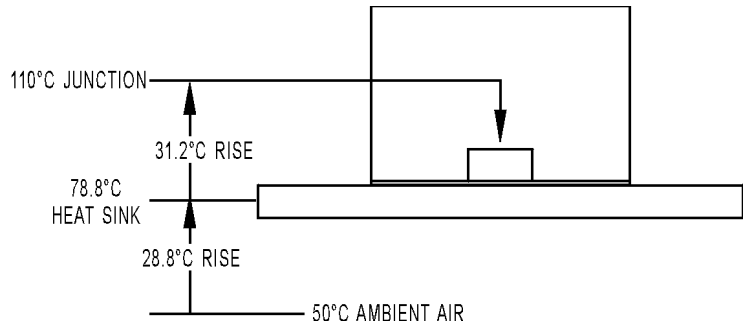
### Sample Calculation Given:

120-Volt, 20-Amp Load
50° C Ambient Air

Choose Model 120D25 SSR.

Calculate dissipation as:  **20 amps x 1.3 Watts per amp = 26 Watts**

Calculate temperature rise junction to SSR base as:  **26 Watts x 1.2° C per Watt = 31.2° C**

Calculate allowable temperature of heat sink by subtracting 31.2° C from 110° C allowable junction temperature:

**110° C-31.2 = 78.8° C**

The heat sink is in a 50°C ambient, therefore, allowable temperature rise on heat sink is:  **78.8° C-50° C = 28.8° C**

If heat sink is allowed to rise 28.8° C above ambient, then the thermal resistance of the heat sink is simply the 28.8° C rise divided by the 26 Watt. Any heat sink having a thermal resistance less than 1.1° C per Watt will be adequate.

### Duty Cycle Calculation

When solid-state relays are operated in an on/off mode, it may be advantageous to calculate the RMS value of the current through the SSR for heat sinking or determining the proper current rating of the SSR for the given application.

$I_{RMS}$ = RMS value of load or SSR
$T_1$ = Time current is on
$T_2$ = Time current is off
$I_{ON}$ = RMS value of load current during on period

$$I_{RMS} = \sqrt{\frac{(I_{ON})^2 \times T_1}{T_1 + T_2}}$$

## Applications
### Tips (Continued)

### Transformer Loads

Careful consideration should be given to the selection of the proper SSR for driving a given transformer. Transformers are driven from positive saturation of the iron core to negative saturation of the core each ½ cycle of the alternating voltage. Large inrush currents can occur during the first ½ cycle of line voltage when a zero voltage SSR happens to turn on during the positive ½ cycle of voltage when the core is already in positive saturation. Inrush currents greater than 10 times rated transformer current can easily occur. The following table provides a guide for selecting the proper SSR for a given transformer rating.

| 120-Volt Transformers ||
|---|---|
| SSR MODEL | TRANSFORMER |
| P or MP 120D2 | 100 VA |
| Z120D10 | 500 VA |
| 120D3 | 100 VA |
| P or MP 120D4 | 250 VA |
| 120D10 or 120A10 | 500 VA |
| 120D25 or 120a25 | 1 KVA |
| 120D45 | 2 KVA |
| **240-Volt Transformers** ||
| P or MP240D2 | 200 VA |
| 7240D10 | 1 KVA |
| 120D3 | 200 VA |
| P or MP240D4 | 500 VA |
| 240D10 or 240A10 | 1 KVA |
| 240D25 or 240A25 | 2 KVA |
| 240D45 | 4 KVA |
| **480-Volt Transformers** ||
| SSR MODEL | TRANSFORMER |
| 480D10-12 | 5-Amp Primary |
| 480D15-12 | 5-Amp Primary |

### Solenoid Valve and Contactor Loads

All Opto 22 SSRs are designed to drive inductive loads such as solenoid valves and electromechanical contactors. The built-in snubber in each SSR assures proper operation into inductive loads. The following table is a guide in selecting an SSR to drive a solenoid or contactor.

| 120-Volt Coils |||
|---|---|---|
| SSR CURRENT RATING | SOLENOID | CONTACTOR |
| 2-Amp | 1-Amp | NEMA Size 4 |
| 4-Amp | 3-Amp | NEMA Size 7 |
| **240-Volt Coils** |||
| SSR CURRENT RATING | SOLENOID | CONTACTOR |
| 2-Amp | 1-Amp | NEMA Size 7 |
| 4-Amp | 3-Amp | NEMA Size 7 |

### Control Current Calculation

All Opto 22 DC controlled SSRs have a control circuit consisting of 1000 ohms in series with an LED. Since 3 volts is required to turn on any SSR, the maximum current required is (3 volt - 1 volt) divided by 1000 ohms which equals 2.0 mA. The 1 volt is subtracted from the 3 volt signal because 1 volt is dropped across the LED. For higher control voltages, an external resistor can be added in series with the control voltage to limit the control current. To limit the control current to 2 mA, calculate the external resistor $R_C = 500 (E_C - 3)$ where $E_C$ = the control voltage.
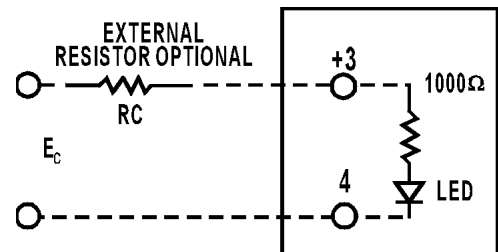
The DC control voltage range is 3–32 VDC. To calculate the control current for any voltage within the 3–32 VDC range, use the formula:

$$I_C = \frac{E_C - 1}{1000}$$

where $R_C$ = zero.

**With a 5V control signal,**

$$I_C = \frac{5 - 1}{1000} = 4 \text{ mA.}$$

Form 859-000511

## Applications

### Tips (Continued)

### Solid-State Relays In Series

In applications requiring greater current rating at higher voltage, two Opto 22 SSRs may be operated in series for double the voltage rating. The built-in snubber in each SSR assures proper voltage sharing of the two SSRs in series. In the diagram below, two 240-volt, 45-amp SSRs are connected in series for operation on a 480-volt line. The control is shown with a parallel hook-up but it should be noted that a serial connection can also be implemented.
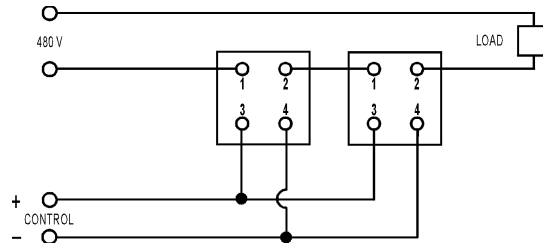


### Lamp Loads

Since all Opto 22 SSRs are zero voltage switching, they are ideal for driving incandescent lamps because the initial inrush current into a cold filament is reduced. The life of the lamp is increased when switched by a zero voltage turn on SSR. The following table is a guide to selecting an Opto 22 SSR for switching a given incandescent lamp.

| 120 Volt Lamps ||
|---|---|
| SSR CURRENT RATING | LAMP RATING |
| 2-Amp | 100 Watt |
| 4-Amp | 400 Watt |
| 10-Amp | 1 Kilowatt |
| 25-Amp | 2 Kilowatt |
| 45-Amp | 3 Kilowatt |
| 240 Volt Rating ||
| SSR CURRENT RATING | LAMP RATING |
| 2-Amp | 200 Watt |
| 4-Amp | 800 Watt |
| 10-Amp | 2 Kilowatt |
| 25-Amp | 4 Kilowatt |
| 45-Amp | 6 Kilowatt |

### Heater Loads

Care should be taken in selecting a SSR for driving a heater load if the load is cycled on and off in a continuous manner as might occur in a temperature control application. Constant cycling can cause thermal fatigue in the thyristor chip at the point where the chip bonds to the lead frame. Opto 22 employs a thick copper lead frame for mounting the SCR chips in the power series SSRs to eliminate thermal fatigue failures. In addition, Opto 22 recommends operating any SSR at 75% rated current for cycling heater loads to ensure complete reliability.

The following table is a guide to selecting the proper SSR for a given heater load.

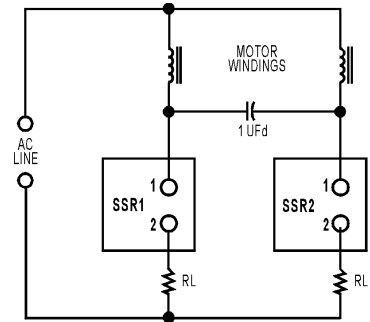| Nominal SSR Current Rating | Maximum Recommended Heater Current |
|---|---|
| 2-Amp | 1½-Amp |
| 4-Amp | 2½-Amp |
| 10-Amp | 7½-Amp |
| 25-Amp | 18-Amp |
| 45-Amp | 35-Amp |
| 10 480V | 8-Amp |
| 10 480V | 8-Amp |

## Applications

### Tips (Continued)

### Single-Phase Reversing Motor Control

The circuit diagram illustrates a typical 1 Ø motor winding inductance and the phase shift capacitor can cause twice line voltage to appear across the open SSR. A 240-volt SSR should be used for a 120-Volt line. During the transition period when one SSR is turned on and the other SSR is going off, both SSRs may be on. In this case, the capacitor may discharge through the two SSRs, causing large currents to flow, which may destroy the SSRs. The addition of RL as shown will protect the SSRs from the short circuit capacitor discharge current.
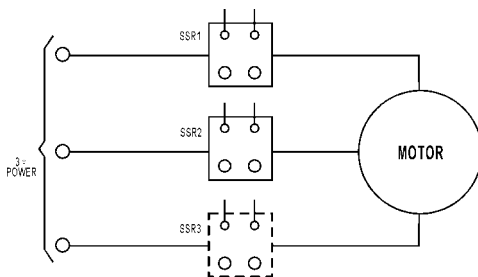
$$\text{CALCULATE RL as: } RL = \frac{1.4 \text{ EAC}}{10 \times \text{SSR full load rating}}$$

**EXAMPLE:** 10 amp SSR
120 V AC Line

$$RL = \frac{1.4 \times 120}{10 \times 10} = 1.7 \text{ ohm}$$



The resistors are unnecessary if the control circuit is designed to ensure one SSR is off before the other SSR is on.

### Three-Phase Motor Control



Three-phase motors may be controlled by solid-state relays as shown. A third SSR as shown is optional, but not necessary. The control windings may be connected in series or parallel. Care should be taken to ensure that surge current drawn by the motor does not exceed surge current rating of the SSR.

| 240-Volt 3θ Motors | |
|---|---|
| SSR MODEL | MOTOR |
| Z240D25 | 1/3 HP |
| Z240D10 | 3/4 HP |
| 240D10 | 3/4 HP |
| 240A10 | 3/4 HP |
| 240D25 | 2 HP |
| 240A25 | 2 HP |
| 240D45 | 3 HP |
| **480-Volt 3θ Motors** | |
| SSR MODEL | MOTOR |
| 480D10-12 | 1-½ HP |
| 480D15-12 | 1-½ HP |

### Three-Phase Reversing Motor Control
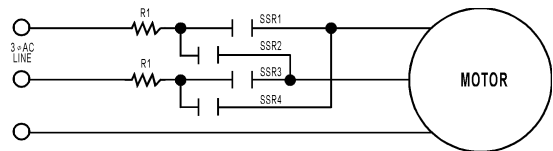


Three-phase reversing motor control can be implemented with four SSRs as shown in the connection diagram. The SSRs work in pairs with SSR1 and SSR3 operated for rotation in one direction and SSR2 and SSR4 operated for rotation in the reverse direction. The resistor R1 as shown in the connection diagram protects against line-to-line shorts if SSR1 and SSR4 or SSR3 and SSR2 are on at the same time during the reversing transition period. Use the following table as a guide to the proper selection of an SSR for this application.

| Opto 22 Relay | Motor Full Load Rating | Resistor for 120V line | Resistor for 240V line |
|---|---|---|---|
| 3-Amp | 1.25-Amp | 4 ohm 50 W | 8 ohm 50 W |
| 10-Amp | 5-Amp | 1 ohm 100 W | 2 ohm 100 W |
| 25-Amp | 8-Amp | .5 ohm 100 W | 1 ohm 100 W |
| 45-Amp | 16-Amp | .25 ohm 150 W | .5 ohm 150 W |
| 15-Amp | 5-Amp | 1 ohm 100 W | 2 ohm 100 W |

## Description

The **SNAP Ultimate brain** is the powerful I/O and communications processor at the core of the SNAP Ultimate I/O™ system from Opto 22. As an evolutionary step in Opto 22's proven SNAP Ethernet I/O™ technology for connecting I/O systems to standard Ethernet networks, SNAP Ultimate I/O brings increased processing power, programmability, networking capability, and enterprise connectivity to the I/O level itself.

This extra intelligence, programmability, and connectivity significantly simplifies your control system design and expands the range of application solutions you can deliver. Besides running control programs right at the I/O level and eliminating the need for separate controllers, the SNAP Ultimate brain also has the ability to simultaneously communicate with multiple devices using Modbus/TCP, SNMP, SMTP, and other protocols.

The SNAP Ultimate brain streamlines and simplifies the delivery of data to your enterprise databases and other information technology (IT) systems. In place of the special software, proprietary servers, and other middleware components usually needed to move factory data into enterprise systems, the SNAP Ultimate brain delivers this data directly to these systems using the widely accepted Extensible Markup Language (XML), a data exchange language that enterprise systems already understand.

The connectivity with standard TCP/IP Ethernet networks first introduced with SNAP Ethernet I/O also applies to the SNAP Ultimate brain. You can attach a SNAP Ultimate brain to existing Ethernet networks, making it easy to add monitoring and control capabilities. Or you can use standard Ethernet hardware to build an independent control network, connecting your PC directly to I/O.

Communication with a SNAP Ultimate brain can also be established via a modem connection using Point-to-Point Protocol (PPP). Wireless or wireline modem connections are ideal for remote locations where an Ethernet network is not practical.

The compact Ultimate brain interfaces with a mix of Opto 22 SNAP I/O™ analog, digital, serial, and PID modules. The brain includes 16 MB of RAM, 8 MB flash memory, and a battery-backed real-time clock to time stamp e-mail messages and data logs.

| Part Number | Description |
|---|---|
| SNAP-UP1-ADS | Analog/Digital/Serial Ultimate Brain |
| ULTIMATEIODOCS | Printed Document Set for SNAP Ultimate I/O Systems |



## Features

- 16 MB RAM, 8 MB flash memory
- 10/100 Mbps Fast Ethernet network connectivity
- Programmable using included ioControl™ flowchart-based control software
- Simultaneous communication using Modbus/TCP, XML, SNMP, SMTP, and other application-level protocols
- Compatible with standard Ethernet technology and legacy SNAP I/O hardware.

## Description (continued)

Used with standard SNAP B-series mounting racks and SNAP I/O modules, the brain is the core of a powerful and sophisticated I/O and communication handling system. Built-in functions of the SNAP Ultimate brain include the following:

- **Digital**—Input latching, on/off status, watchdog timer, and event/reactions. The brain also includes counters and quadrature counters.

- **Analog**—Thermocouple linearization (32-bit floating point for linearized values), minimum/maximum values, offset and gain, scaling, time-proportional output, filter weight, and watchdog timer.

Using SNAP I/O special-purpose modules such as the SNAP-SCM-232 serial module or the SNAP-PID-V PID module, SNAP

Ultimate brain functions include the following:

- **Serial**—Send and receive ASCII strings to and from attached serial devices, such as chart recorders and barcode readers.

- **PID**—Monitor input signals and adjust output signals to control one proportional-integral-derivative (PID) loop.

### Programming Options

The SNAP Ultimate brain is programmed using **ioControl™**, a graphical, flowchart-based programming tool for machine control and process applications. ioControl is used to create, download, and run control programs, or *strategies,* on the brain, and is included in the purchase price of the SNAP Ultimate brain. Online

Modem port
- Serial connection
- Programming
- Diagnostics

Convenient pluggable connector for removable top-mounted field wiring

Two isolated channels of high-speed serial data, RS-232 (shown) or RS-485

Ready access to standard fuses

Ethernet port

Highly visible LED status indicator for each channel

High-density digital I/O (4 channels per module)

Mix analog, digital, PID, and serial modules on the same rack.

High-density (2 or 4 channels per module), software-configurable, intelligent analog I/O

Quick and easy installation—modules "SNAP" securely onto racks, no screws required

Versatile DIN-rail or panel mounting

SNAP rack DIN-rail adapter clip mounting option

## Description (continued)

documentation and sample files are included with the software; printed documentation can be purchased for $99 US.



*A flowchart-based control strategy in ioControl*

In addition to its flowchart-based programming that lets you write control strategies visually, key features that make ioControl easy to use include:

- A **Strategy Tree** that provides a graphical view of your entire control system configuration, including I/O points and variables
- **OptoScript,** a powerful built-in scripting language based on C and other procedural programming languages
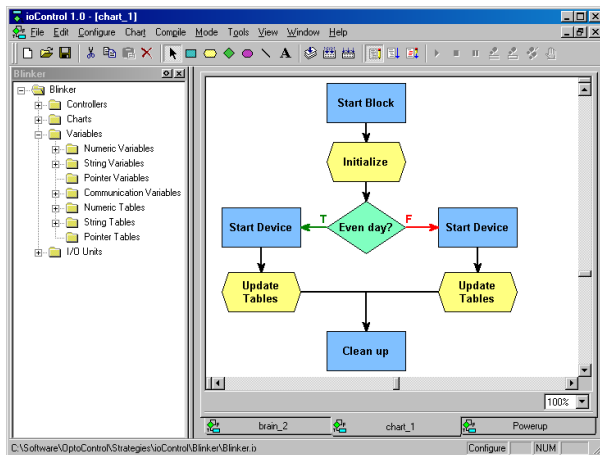- An animated **debugger** for stepping through a control program in real time.

ioControl has a similar look and feel to Opto 22's established OptoControl™ flowchart-based development environment and will be familiar to OptoControl users. However, ioControl is designed for use solely with SNAP Ultimate I/O systems, and cannot use control strategies developed in OptoControl.

Also available for use with the brain is **ioDisplay™**, an HMI and trending software application for building operator interfaces for your Microsoft® Windows®-based clients. ioDisplay can be purchased for $99 US. See Opto 22 form 1296, the ioDisplay data sheet, for more information.

The SNAP Ultimate brain also supports the *event/reactions* first made available in SNAP Ethernet brains. Event/reactions are configured using a Web browser and Web pages installed on your PC; no additional software is needed. (ioControl is needed to create control strategies.) The SNAP Ultimate brain has the same event/reaction capabilities as the SNAP Ethernet brain.

For setup and diagnostics, the SNAP Ultimate brain is easily configured using just a standard Web browser and Web pages installed on your PC. Two levels of security are available to limit access to the brain as necessary. Both data streaming and data logging are also supported.

The SNAP Ultimate brain provides both 10 and 100 Mbps Fast Ethernet compatibility, with automatic speed negotiation and a standard RJ-45 twisted-pair connector. Both 10Base-T and 100Base-TX are supported. The brain also includes a serial port for modem communication, programming, and diagnostics.

Utilities for use with the SNAP Ultimate brain, including a BootP utility for assigning IP addresses, are available from the Product Support section of our Web site at www.opto22.com/support.

### Communication Options

You can use any of the following methods—or all of them simultaneously—to interface with one or more SNAP Ultimate brains and I/O, using the RJ-45 or RS-232 connections:

- **Opto 22 ioControl and ioDisplay**—Create and download control programs with ioControl, and monitor and control the brain using an operator interface built with ioDisplay.
- **XML support**—I/O data is made available via XML for direct delivery to XML-ready enterprise applications such as databases, MRP, ERP, and other applications running on multiple computer platforms.
- **Modbus/TCP driver**—for interfacing with any third-party software or hardware that uses the Modbus/TCP protocol.
- **SNMP messaging**—for communicating with SNMP-based enterprise management software such as Computer Associates' Unicenter TNG® or Hewlett Packard's OpenView®.

*(Continued on next page)*

## Description (continued)

- **OPC 2.0 server**—providing OLE for Process Control (OPC) 2.0 access for OPC clients.

- **Opto 22's IEEE 1394-based memory map protocol**—for writing your own applications. This protocol is open and documented, and sample utilities with source code are available to get you started. You can also stream data from the brain using this protocol.

- **SNAP Ethernet I/O Driver Toolkit**—an easier, faster way to program applications for SNAP Ethernet and SNAP Ultimate brains. It includes an ActiveX® component and a C++ class, which hide the details of Ethernet communications and the memory map protocol.

- **Linux®/UNIX® support**—Demo utilities with source code are available.

### I/O Mounting Racks

SNAP Ultimate brains are connected to SNAP B-series I/O mounting racks, which are available with 4, 8, 12, or 16 positions for Opto 22 SNAP I/O modules. Analog, serial, and PID communication modules can be placed in any position on a B-series rack; digital modules can be placed in any of the first eight positions. (A maximum of eight serial modules or 12 PID modules can be used on a rack.) Because of the rack's flexibility in handling digital, analog, and special-purpose modules in many of the same positions, you can install the modules that fit your needs.

Each SNAP digital module contains four input or four output points. SNAP analog modules used with the SNAP Ultimate brain contain either two points or four points, depending on the module. SNAP serial communication modules provide two serial ports to connect serial devices to the Ethernet network.

## SNAP Ultimate I/O System Architecture

The diagram below and the diagrams on the following page show sample architectures for the SNAP Ultimate I/O system.



**Modem Connection Example**

Computer — Modem — Telephone Lines — Telephone Lines — Modem — SNAP Ultimate Brain and I/O on Rack
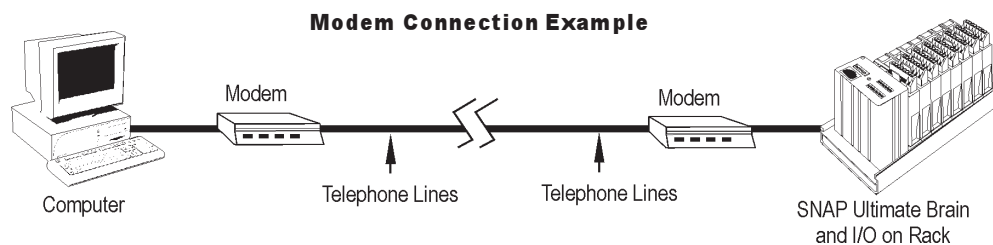


**Single I/O Unit Configuration Example**

Crossover cable
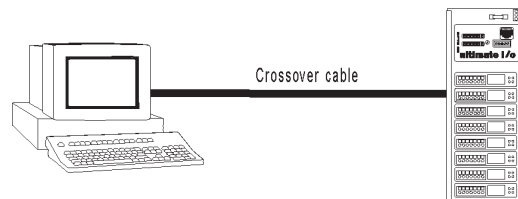
## SNAP Ultimate I/O System Architecture (continued)

**SNAP Ultimate Brain and Multiple I/O Units
Configuration Example**



Hub or Switch

SNAP Ultimate brain and I/O rack

SNAP Ultimate or Ethernet brains and I/O racks
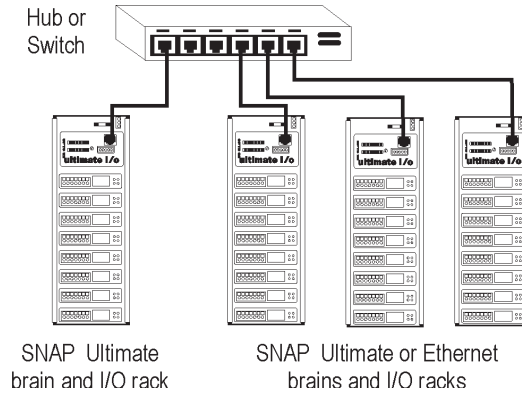
**Network Configuration Example**



SNAP Ultimate brain and I/O racks

SNAP Ultimate brain and I/O racks
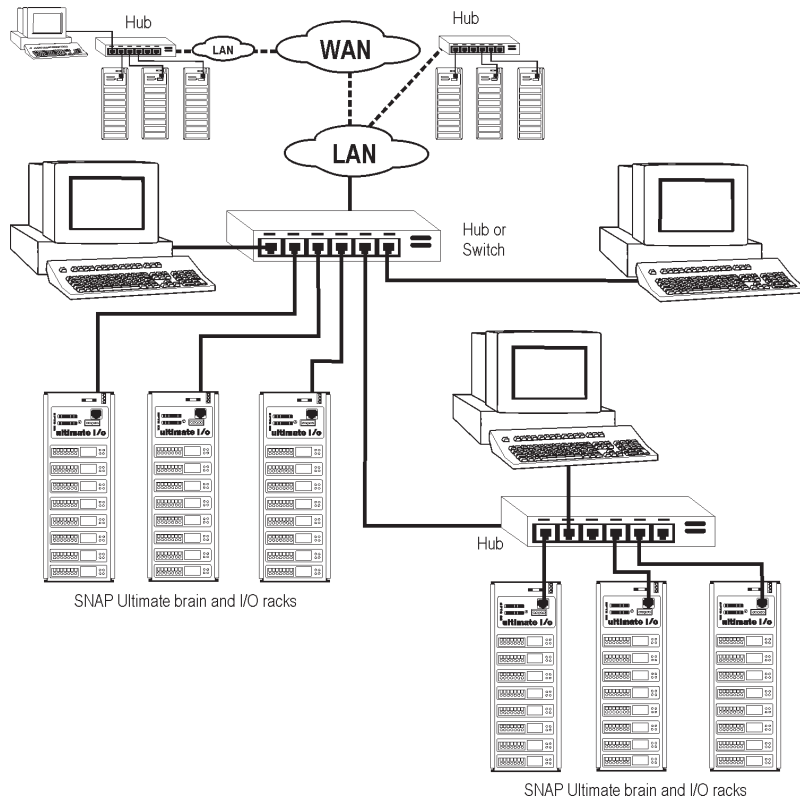
## Specifications

| | |
|---|---|
| Power Requirements | 5.0 VDC ± 0.1 VDC at 1.0 A maximum (does not include SNAP I/O module power requirements) |
| Operating Temperature | 0° C to 60° C |
| Storage Temperature | -40° C to 85° C |
| Humidity | 0–95% humidity, non-condensing |
| Memory | 16 MB RAM, 8 MB flash memory |
| Network Interface | IEEE 802.3 network, 10Base-T and 100Base-TX |
| Serial Port | RS-232 |
| Serial Data Rates | Default is 19,200 kBd; baud rate is soft-selectable from 2400 to 115,200 kBd. |
| Maximum Ethernet Segment Length | 100 meters with Category 5 or superior UTP. For 100 Mbps at this distance, use Category 5 solid UTP. |
| Jumpers (Internal) | Boot to kernel/boot to loader Reset to factory defaults |

**Top View: SNAP Ultimate Brain**

Pin 1

RJ-45 Ethernet Connector

**PC** **BRAIN**

**DB9**
2 RX — 1 TX
3 TX — 2 RX
5 SIGNAL GROUND — 3 COM

**DB25**
2 TX — 1 TX
3 RX — 2 RX
7 SIGNAL GROUND — 3 COM
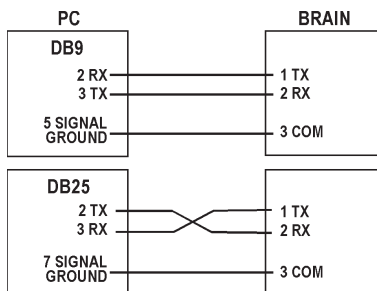
**Serial Connector Pinouts**

| Pin | RS-232 |
|-----|--------|
| 1 | TX |
| 2 | RX |
| 3 | COM |
| 4 | RTS |
| 5 | CTS |

For future use
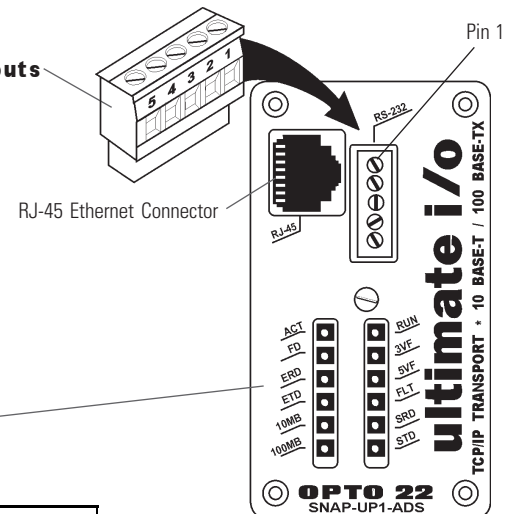
### LED Descriptions

| LED | Description | LED | Description |
|------|--------------------------------------|-------|----------------------|
| ACT | Network Activity | RUN | Normal Operation |
| FD | Full Duplex Mode | 3VF | 3 Volt Fault |
| ERD | Ethernet—Receive Data | 5VF | 5 Volt Fault |
| ETD | Ethernet—Transmit Data | FLT | Microprocessor Fault |
| 10MB | Ethernet Link Detection at 10 Mbps | SRD | Serial—Receive Data |
| 100MB | Ethernet Link Detection at 100 Mbps | STD | Serial—Transmit Data |

## Dimensions

The dimensions of the SNAP Ultimate brain are identical to those of the SNAP-B3000-ENET or SNAP-ENET-D64 Ethernet brains.

3.30 (83.82mm)

.062 (1.57mm)

3.5 (88.9mm)

.109 (2.77mm)

1.82 (46.18mm)

4.12 (104.65mm)

1.75 (44.35mm)

.062 (1.57mm)

3.5 (88.9mm)

SNAP I/O RACK BOARD

RACK .75*** (19.05mm)

FOR DIN CLIP ADD ADDITIONAL .06" TO OVERALL HEIGHT

SNAP RACK DIN RAIL ADAPTER CLIP MOUNTING OPTION (LOW PROFILE)

CUSTOMER SUPPLIED 35mm DIN RAIL
NOTE: BE SURE TO CONSIDER DIN RAIL DIMENSIONS.

SNAP RACK BASE EXTRUSION

TOLERANCE LEGEND
* +/- .010"
** +/- .020"
*** +/- .030"
**** +/- .060"
NO * REFERENCE ONLY

# OPTO 22

## DATA SHEET

Form 1296-010501

| Part Number | Description |
|---|---|
| IODISPLAY | Software for creating and running a human-machine interface (HMI) |

## Description

Opto 22's **ioDisplay**™ is an intuitive HMI package for building operator interfaces for your Microsoft® Windows®-based clients communicating with Opto 22 SNAP Ultimate I/O™ systems. For just $99 per seat, ioDisplay offers a full-featured HMI including alarming, trending, and a built-in library of 3,000 industrial automation graphics.

The power of ioDisplay lies in its close integration with Opto 22's powerful SNAP Ultimate I/O system. SNAP Ultimate I/O is the first input/output (I/O) system to combine I/O, control, Ethernet networking, and direct communication with enterprise systems, all in a single distributed package. See Opto 22 form #1291 for more information on SNAP Ultimate I/O and the SNAP Ultimate brain.

ioDisplay monitors SNAP Ultimate I/O hardware to give operators, technicians, and engineers the information they need at a glance, while transferring operator instructions to the control hardware. ioDisplay also archives and displays data trends and handles alarms.

### Integration

Designed to take full advantage of Opto 22's guaranteed-for-life SNAP I/O™ modules and the most advanced I/O system in the world, SNAP Ultimate I/O, ioDisplay offers a cost-effective HMI when you need an interface for technicians and operators.

The SNAP Ultimate I/O system is programmed using ioControl™, a graphical, flowchart-based programming tool for machine control and process applications. When you build a control application using ioControl, a plain-English, long-tagname database is created. Once I/O points and variables are named and defined, they are stored in the OptoControl database and referenced by name. This database is shared with ioDisplay, thereby eliminating duplicate databases and tagname-related errors.

### Ease of Use

With ioDisplay, you construct your operator interface, or *project,* by designing graphical objects. Onscreen windows can combine pictures, symbols, bitmaps, and 3-D graphics. You can create graphics using built-in drawing tools, import them from other applications, or select them from the Symbol Factory, ioDisplay's extensive library of industrial automation graphics. Displays can also include hardware-driven animations and operator-driven commands.

Developing ioDisplay projects is easy—just point, click, and associate. You can animate any

### Typical ioDisplay Screen
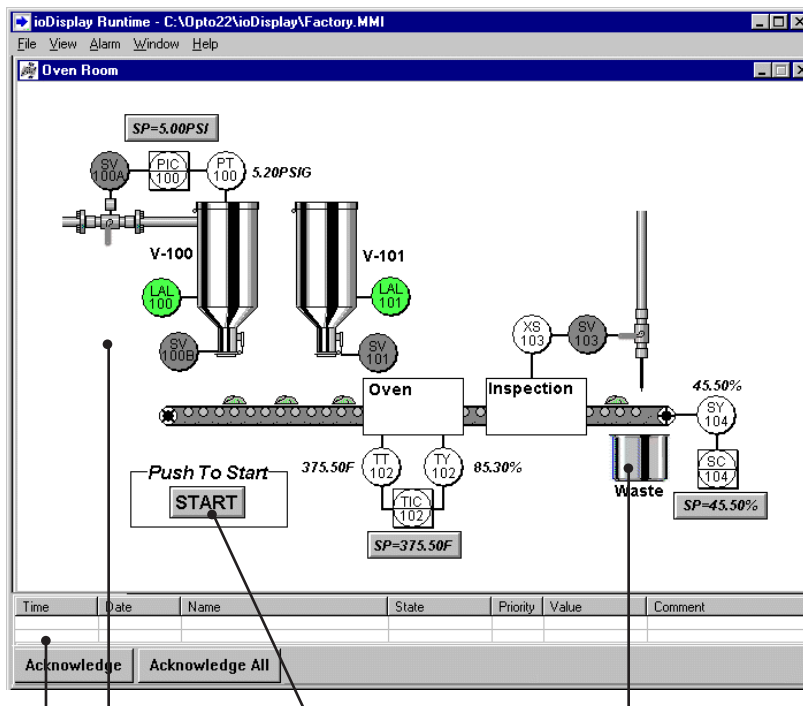


Multiple on-screen windows present operator and process information.

Operator-driven on-screen objects such as buttons and sliders can be easily added to the display.

Use a preconfigured graphic object from the included symbols or built-in Symbol Factory, or import custom bitmaps from your own application.

# OPTO 22

# SNAP Ultimate I/O

# ioDISPLAY SOFTWARE

# DATA SHEET

page 2/2

Form 1296-010501

graphical control object and associate it with real-world events by choosing a tagname from the shared ioControl database. Simply use your mouse to select the items you want from the ioControl strategy and associate them with your ioDisplay graphical objects or historical collection files.

## SuperTrends

With the SuperTrends feature in ioDisplay, you can plot trends using real-time data, historical data, or both, switching between current data and previously logged data with the click of a button.

With 16 available pens, you can plot 16 variables or I/O points per trend window. Point markers show you when data is actually sampled. For historical data, you can just click on a point to see the exact date, time, and value when the data was scanned.

You can zoom in or out on the x-axis to see a larger or smaller time span for the trend, and the y-axis scaling can be changed in real time for any pen. If the computer running the ioDisplay project doesn't have a mouse or you prefer not to use one, you can configure hot keys to provide control from the keyboard alone.

## Alarming

You can view and acknowledge alarms in ioDisplay, as well as see an alarm history for each alarm point. You can determine which alarm points to set up, define alarm thresholds, and choose colors for alarm states. Sound files can be added, and comments or messages can be displayed in alarm graphics while ioDisplay is running.

An automatic response to an alarm can be set up to provide immediate action, such as automatically closing a valve when a specific alarm goes off. You can also set priorities for alarms, so that an operator can choose to receive only higher priority alarms during startup, for example. As with trending, hot keys can be set up for mouse-free acknowledgment of alarms.

In addition, you can send the historical log of all alarms to a printer and also to a user-configurable ASCII text file that can be easily imported for analysis into Microsoft Excel, Access, or other applications.

For more information on ioDisplay or SNAP Ultimate I/O, contact Opto 22 Inside Sales at the phone number listed at the bottom of this page.

## ioDisplay SuperTrend Screen
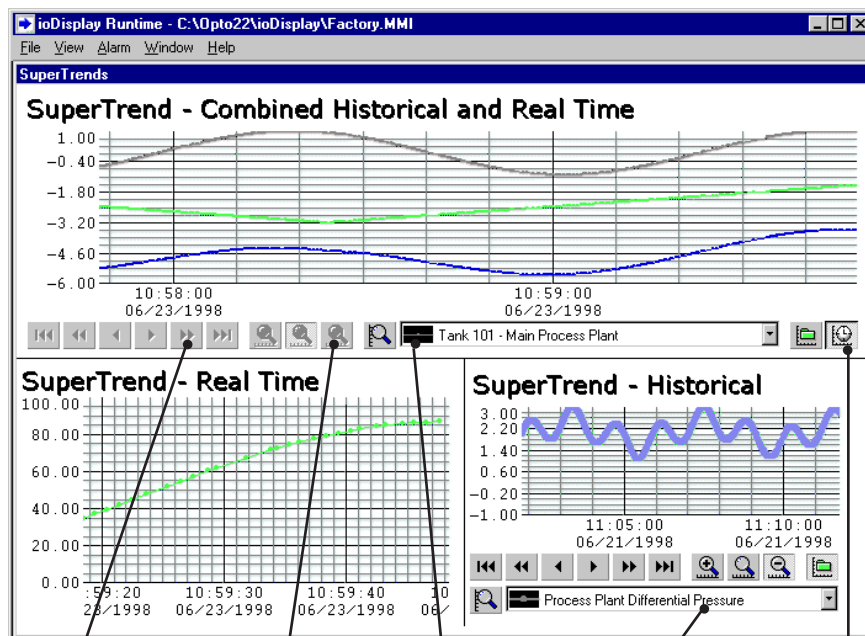


Scroll backward and forward in historical log files.

Zoom in and out along the x-axis.

Adjust y-axis scaling for the active pen.

Select the active pen.

Select real-time or historical mode.

# Price Listing

**OPTO 22**

| ITEM | DESCRIPTION | 1 TO 9 |
|---|---|---|
| 120A10 | 120 VAC, 10 AMP, AC CONTROL | 19.00 |
| 120A25 | 120 VAC, 25 AMP, AC CONTROL | 21.00 |
| 120D10 | 120 VAC, 10 AMP, DC CONTROL | 16.00 |
| 120D25 | 120 VAC, 25 AMP, DC CONTROL | 20.00 |
| 120D3 | 120 VAC, 3 AMP, DC CONTROL | 12.50 |
| 120D45 | 120 VAC, 45 AMP, DC CONTROL | 30.00 |
| 240A10 | 240 VAC, 10 AMP, AC CONTROL | 18.50 |
| 240A25 | 240 VAC, 25 AMP, AC CONTROL | 26.00 |
| 240A45 | 240 VAC, 45 AMP, AC CONTROL | 34.00 |
| 240D10 | 240 VAC, 10 AMP, DC CONTROL | 19.00 |
| 240D10-17 | 240 VAC, 10 AMP, DC CONTROL, VDE APPROVED | 21.00 |
| 240D25 | 240 VAC, 25 AMP, DC CONTROL | 22.00 |
| 240D25-17 | 240 VAC, 25 AMP, DC CONTROL, VDE APPROVED | 24.00 |
| 240D3 | 240 VAC, 3 AMP, DC CONTROL | 13.00 |
| 240D45 | 240 VAC, 45 AMP, DC CONTROL | 31.00 |
| 240D45-17 | 240 VAC, 45 AMP, DC CONTROL, VDE APPROVED | 33.00 |
| 240D45-18 | POWER SERIES VDE COUPLR 700PRV | 34.00 |
| 380D25 | 380 VAC, 25 AMP, DC CONTROL | 30.00 |
| 380D45 | 380 VAC, 45 AMP, DC CONTROL | 52.00 |
| 480D10-12 | 480 VAC, 10 AMP, DC CONTROL, TRANSIENT PROOF | 28.00 |
| 480D15-12 | 480 VAC, 15 AMP, DC CONTROL, TRANSIENT PROOF | 30.00 |
| 480D25-12 | 480 VAC, 25 AMP, DC CONTROL, TRANSIENT PROOF | 28.00 |
| 480D45-12 | 480 VAC, 45 AMP, DC CONTROL, TRANSIENT PROOF | 32.00 |
| 575D15-12 | 575 VAC, 15 AMP, DC CONTROL, TRANSIENT PROOF | 36.00 |
| 575D25-E | POWER SERIES HIGH VOLTAGE SSR | 27.00 |
| 575D45-12 | 575 VAC, 45 AMP, DC CONTROL, TRANSIENT PROOF | 33.00 |
| AC24AT | ISA BUS SERIAL PORT RS422/485, ISOLATED | 190.00 |
| AC28 | ISA BUS TO PAMUX BUS ADAPTER | 170.00 |
| AC30A | RS485 MULTIDROP REPEATER 120 VAC | 105.00 |
| AC30B | RS485 MULTIDROP REPEATER 220 VAC | 105.00 |
| AC31A | ADDRESSABLE RS232 INTERFACE 120 VAC | 295.00 |
| AC31B | ADDRESSABLE RS232 INTERFACE 220 VAC | 295.00 |
| AC31C | ADDRESSABLE RS232 INTERFACE DC | 295.00 |
| AC36 | MULTIBUS TO PAMUX BUS ADAPTER | 120.00 |
| AC37 | ISA BUS HIGH SPEED SERIAL CO-PROCESSOR, RS485 | 550.00 |
| AC38A | HIGH SPEED RS485 REPEATER 120 VAC | 365.00 |
| AC38B | HIGH SPEED RS485 REPEATER 220 VAC | 365.00 |
| AC39 | ISA BUS TO LOCAL BUS ADAPTER-AT | 395.00 |
| AC40A | FIBER OPTIC REPEATER, 120 VAC | 550.00 |
| AC40B | FIBER OPTIC REPEATER, 240 VAC | 550.00 |
| AC40C | FIBER OPTIC REPEATER, 24 VDC | 590.00 |
| AC42 | ISA BUS FIBER OPTIC SERIAL CO-PROCESSOR | 550.00 |
| AC422AT | ISA BUS SERIAL PORT RS422/485, NON-ISOLATED | 155.00 |
| AC47 | DUAL TWISTED PAIR ARCNET | 315.00 |
| AC5 | ISA BUS TO CARD EDGE I/O RACK WITH 6-FT CABLE | 140.00 |
| AC7 | RS232 TO 422/485 CONVERTER | 85.00 |
| AC7A | RS232-RS422/485 CONVERTER 120V | 105.00 |
| AC7B | RS232-RS422/485 CONVERTER 220V | 105.00 |
| AC8 | HALF DUPLEX MODEM INTERFACE | 170.00 |
| AC8A | HALF DUPLEX MODEM INTERFACE 120 VAC | 250.00 |
| AC8B | HALF DUPLEX MODEM INTERFACE 220 VAC | 250.00 |
| AD10T2 | 100 OHM RTD INPUT ISOLATED | 120.00 |
| AD11 | -5 TO +5 VDC INPUT | 65.00 |
| AD11T | -5V TO +5V INPUT ISOLATED | 100.00 |
| AD12 | -10 TO +10 VDC INPUT | 65.00 |
| AD12T | +10V TO -10V INPUT ISOLATED | 100.00 |
| AD13T | 0 TO 100 MV INPUT ISOLATED | 120.00 |
| AD14T | 10 OHM RTD INPUT ISOLATED | 120.00 |
| AD15T | 28 TO 140 VAC INPUT ISOLATED | 100.00 |
| AD16T | 0 - 5 AMP INPUT ISOLATED | 120.00 |
| AD17T | TYPE R OR S THERMOCOUPLE INPUT ISOLATED | 120.00 |
| AD18T | T THERMOCOUPLE INPUT ISOLATED | 120.00 |
| AD19T | TYPE E THERMOCOUPLE INPUT ISOLATED | 120.00 |
| AD20 | O TO 10.8KHZ RATE INPUT | 120.00 |
| AD2T | 0 TO 20 MA INPUT ISOLATED | 100.00 |
| AD3 | 4 TO 20 MA INPUT | 45.00 |
| AD3T | 4 TO 20 MA INPUT ISOLATED | 100.00 |
| AD4 | ICTD INPUT | 60.00 |
| AD5 | J THERMOCOUPLE INPUT | 100.00 |
| AD5T | J THERMOCOUPLE INPUT ISOLATED | 120.00 |
| AD6 | 0 TO +5 VDC INPUT | 55.00 |
| AD6HS | 0 TO +5 VDC INPUT-HIGH SPEED | 55.00 |
| AD6T | 0 TO +5 VDC INPUT ISOLATED | 100.00 |
| AD7 | 0 TO +10 VDC INPUT | 55.00 |
| AD8 | K THERMOCOUPLE INPUT | 100.00 |
| AD8T | K THERMOCOUPLE INPUT ISOLATED | 120.00 |
| AD9T | 0 TO 50 MV INPUT ISOLATED | 120.00 |
| B1 | 16-CHANNEL DIGITAL BRAIN OPTOMUX PROTOCOL | 221.00 |
| B100 | 16-CHANNEL DIGITAL BRAIN MISTIC | 240.00 |
| B2 | 16-CHANNEL ANALOG BRAIN OPTOMUX PROTOCOL | 225.00 |
| B200 | 16-CHANNEL ANALOG BRAIN MISTIC | 250.00 |
| B3000 | SNAP ANALOG/DIGITAL BRAIN MISTIC/OPTOMUX PROTOCOL | 425.00 |
| B3000-HA | HIGH SPEED SNAP ANALOG/DIGITAL BRAIN MISTIC/OPTOMUX PROTOCOL WITH ARCNET/5 POS CONN VER | 550.00 |
| B4 | 32-CHANNEL DIGITAL BRAIN PAMUX | 158.00 |
| B5 | 16-CHANNEL DIGITAL BRAIN PAMUX | 151.00 |
| B6 | 16-CHANNEL ANALOG BRAIN PAMUX | 310.00 |
| BD-DEVNET | 16-CHANNEL DIGITAL BRAIN DEVICENET | 295.00 |
| BRACKET | BRACKET P RELAY  R1001 | 1.25 |
| BRICKSTRAP | BUS BAR FOR BRICK BASE | 5.00 |
| CA10 | 10-FT CABLE EDGE TO EDGE | 60.00 |
| CA2 | 2-FT CABLE EDGE TO EDGE | 36.00 |
| CA4 | 4-FT CABLE EDGE TO EDGE | 42.00 |
| CA6 | 6-FT CABLE EDGE TO EDGE | 48.00 |
| CA8 | 8-FT CABLE EDGE TO EDGE | 54.00 |
| CJC | COLD JUNCTION COMPENSATOR | 10.00 |
| CYRANO 200 | SOFTWARE-MISTIC 200 PROCESSOR | ##### |
| CYRANO 200 MANL | CYRANO 200 MANUAL | 100.00 |
| DA3 | 4-20 MA OUTPUT | 95.00 |
| DA3T | 4-20 MA OUTPUT ISOLATED | 105.00 |
| DA4 | 0 TO +5 VDC OUTPUT | 95.00 |
| DA4T | 0 TO 5 VDC OUTPUT ISOLATED | 105.00 |
| DA5 | 0 TO +10 VDC OUTPUT | 95.00 |
| DA6 | -5 TO +5 VDC OUTPUT | 110.00 |
| DA7 | -10 TO +10 VDC OUTPUT | 110.00 |

# Price Listing

| ITEM | DESCRIPTION | 1 TO 9 |
|---|---|---|
| DA8 | 0-20 MA OUTPUT | 95.00 |
| DC200MP | MP MODEL, 200 VDC, 1 AMP, DC CONTROL | 11.25 |
| DC200P | P MODEL, 200 VDC, 1 AMP, DC CONTROL | 11.25 |
| DC60MP | MP MODEL, 60 VDC, 3 AMP, DC CONTROL | 8.00 |
| DC60P | P MODEL, 60 VDC, 3 AMP, DC CONTROL | 8.00 |
| DC60S3 | 60 VDC, 3 AMP, DC CONTROL | 9.60 |
| DC60S5 | 60 VDC, 5 AMP, DC CONTROL | 15.00 |
| EX1 | PAMUX ADAPTER FOR LC4 | 140.00 |
| EX2 | SERIAL AND I/O RACK ADAPTER FOR LC4 | 140.00 |
| FACTORY FLOOR MANUA | FACTORYFLOOR MANUAL SET | 75.00 |
| FACTORYFLOOR | FACTORYFLOOR SUITE | 349.00 |
| FUSE.125 | 1/8-AMP FUSE, ANALOG I/O CHANNEL | 1.00 |
| FUSE01 | 1-AMP FUSE G1 DIGITAL LOGIC POWER | 1.00 |
| FUSE01G4 | 1-AMP FUSE G4 DIGITAL RACK LOGIC POWER, BRICK REGULATOR | 1.00 |
| FUSE02 | 2 AMP FUSE FOR 32-CHANNEL DIGITAL LOGIC | 1.00 |
| FUSE05 | 5-AMP FUSE FOR STANDARD DIGITAL OUTPUT MODULES | 1.00 |
| FUSEG4 | G4 4-AMP FUSE, R5026 TR5-F | 1.00 |
| G4 FUSE CLIP | G4 FUSE RETAINING CLIP 10 PACK | 2.50 |
| G4 FUSE SOCKETS | G4 FUSE SOCKET 100-PACK | 7.00 |
| G4-MOD-SOCKETS | G4 MODULE SOCKET 100-PACK | 10.00 |
| G4-PEM-NUTS | G4 PEM NUTS 100-PACK | 10.00 |
| G4A8R | REMOTE ANALOG 8-CHANNEL MULTIFUNCTION I/O UNIT MISTIC PROTOCOL | 615.00 |
| G4AC5 | ISA BUS TO HEADER I/O RACK WITH 6-FT CABLE | 140.00 |
| G4AD10 | 100 OHMS PLATINUM RTD INPUT | 125.00 |
| G4AD11 | -5 TO 5 VDC INPUT | 117.00 |
| G4AD12 | -10 TO 10 VDC INPUT | 117.00 |
| G4AD13 | 0 TO 100 MV INPUT | 125.00 |
| G4AD16 | 0 TO +5 AMP AC/DC INPUT | 167.00 |
| G4AD17 | TYPE R THERMOCOUPLE INPUT | 125.00 |
| G4AD18 | TYPE T THERMOCOUPLE INPUT | 125.00 |
| G4AD19 | TYPE E THERMOCOUPLE INPUT | 125.00 |
| G4AD20 | 0 TO 10.8KHZ RATE INPUT | 150.00 |
| G4AD22 | 0 TO 1 VOLT DC INPUT | 117.00 |
| G4AD23 | TYPE S THERMOCOUPLE INPUT | 125.00 |
| G4AD24 | TYPE B THERMOCOUPLE INPUT NO CJC REQD | 125.00 |
| G4AD25 | 0 TO 100 VOLT AC\DC INPUT | 125.00 |
| G4AD26 | DV/DT INPUT MODULE | 125.00 |
| G4AD3 | +4 TO +20 MA INPUT | 100.00 |
| G4AD4 | ICTD TEMPERATURE INPUT | 117.00 |
| G4AD5 | TYPE J THERMOCOUPLE INPUT | 125.00 |
| G4AD6 | 0 TO +5 VDC INPUT | 117.00 |
| G4AD6HS | 0 TO +5 VDC INPUT HIGH SPEED | 117.00 |
| G4AD7 | 0 TO +10 VDC INPUT | 117.00 |
| G4AD7HS | 0 TO +10 VDC INPUT HIGH SPEED | 117.00 |
| G4AD8 | TYPE K THERMOCOUPLE INPUT | 125.00 |
| G4AD9 | 0 TO +50 MV INPUT | 125.00 |
| G4AITM | 16-CHANNEL INPUT THERMOCOUPLE/MILLIVOLT | ##### |
| G4AIVA | 16-CHANNEL INPUT VOLTAGE/CURRENT | 995.00 |
| G4AOA | 16 PT. CURRENT OUTPUT | 865.00 |
| G4AOV | 16 PT. VOLTAGE OUTPUT | 725.00 |
| G4B1 | REMOTE DIGITAL 16-CHANNEL I/O UNIT OPTOMUX PROTOCOL | 435.00 |
| G4B2 | REMOTE ANALOG 8-CHANNEL I/O UNIT OPTOMUX PROTOCOL | 485.00 |
| G4BATT32 | 3.6V BATTERY FOR CONTROLLER MEMORY | 18.25 |
| G4BRICKBASE | MOUNTING BASE FOR BRICK ASSEMBLY | 75.00 |
| G4D16L | LOCAL DIGITAL 16 CHANNEL MULTIFUNCTION I/O UNIT MISTIC PROTOCOL | 615.00 |
| G4D16LS | LOCAL DIGITAL 16 CHANNEL I/O UNIT MISTIC PROTOCOL | 700.00 |
| G4D16R | REMOTE DIGITAL 16-CHANNEL MULTIFUNCTION I/O UNIT MISTIC PROTOCOL | 615.00 |
| G4D32RS | REMOTE DIGITAL 32-CHANNEL I/O UNIT MISTIC PROTOCOL | 450.00 |
| G4DA10 | TIMED PROPORTIONAL AC OUTPUT | 100.00 |
| G4DA3 | +4 TO +20 MA OUTPUT | 100.00 |
| G4DA4 | 0 TO +5 VDC OUTPUT | 117.00 |
| G4DA5 | 0 TO +10 VDC OUTPUT | 117.00 |
| G4DA6 | -5 TO +5 VDC OUTPUT | 117.00 |
| G4DA7 | -10 TO +10 VDC OUTPUT | 117.00 |
| G4DA8 | 0 TO +20 MA OUTPUT | 117.00 |
| G4DA9 | TIMED PROPORTIONAL DC OUTPUT | 100.00 |
| G4EXL | LOCAL ANALOG EXTENDER BRAIN CARD | 85.00 |
| G4EXR | REMOTE ANALOG EXTENDER BRAIN CARD | 85.00 |
| G4HDAR | REMOTE ANALOG 32-CHANNEL HIGH RESOLUTION MULTIFUNCTION I/O UNIT MISTIC PROTOCOL | 685.00 |
| G4IAC15 | G4 AC INPUT 90-140 VAC, 15 VDC LOGIC | 9.50 |
| G4IAC15A | G4 AC INPUT 180-280VAC, 15 VDC LOGIC | 10.50 |
| G4IAC24 | G4 AC INPUT 90-140 VAC, 24 VDC LOGIC | 9.50 |
| G4IAC24A | G4 AC INPUT 190-280 VAC, 24 VDC LOGIC | 10.50 |
| G4IAC5 | G4 AC INPUT 90-140 VAC, 5 VDC LOGIC | 9.50 |
| G4IAC5A | G4 AC INPUT 180-280 VAC, 5 VDC LOGIC | 10.50 |
| G4IAC5MA | G4 AC INPUT 90-140 VAC, 5VDC LOGIC W/SW | 21.00 |
| G4IDC15 | G4 DC INPUT 10-32 VDC, 15 VDC LOGIC | 9.50 |
| G4IDC24 | G4 DC INPUT 10-32 VDC, 24 VDC LOGIC | 9.50 |
| G4IDC5 | G4 DC INPUT 10-32 VDC, 5 VDC LOGIC | 9.50 |
| G4IDC5B | G4 DC INPUT 4-16 VDC, 5VDC LOGIC HIGH SPEED | 13.00 |
| G4IDC5D | G4 DC INPUT 2.5-28 VDC, 5 VDC LOGIC | 8.50 |
| G4IDC5G | G4 DC INPUT 35-60 VDC, 5 VDC LOGIC | 9.50 |
| G4IDC5K | G4 DC INPUT 2.5-16 VDC, 5 VDC LOGIC VERY HIGH SPEED | 13.00 |
| G4IDC5MA | G4 DC INPUT 10-32 VDC, 5 VDC LOGIC WITH HOA/SW | 21.00 |
| G4IDC5Q | G4 DC INPUT 2.5-16 VDC, 5 VDC LOGIC 2 CH QUADRATURE | 195.00 |
| G4IOR | REMOTE PANEL INTERFACE MISTIC PROTOCOL | 62.00 |
| G4LAX | LOCAL ANALOG 8 CHANNEL I/O UNIT EXTENDER | 335.00 |
| G4LC32 | OPTO 22 CLASSIC CONTROLLER | ##### |
| G4LC32ARC | CLASSIC ARCNET ADAPTER FOR G4LC32SX | 270.00 |
| G4LC32F1M | UPGRADE G4LC32 FLASH 4M | 400.00 |
| G4LC32ISA | OPTO 22 ISA CONTROLLER | ##### |
| G4LC32ISA-LT | OPTO 22 ISA LITE CONTROLLER | 635.00 |
| G4LC32ISAARC | ISA ARCNET ADAPTER FOR G4LC32ISA | 210.00 |
| G4LC32ISAF1M | UPGRADE G4LC32ISA FLASH 4M | 215.00 |
| G4LC32ISASER | ISA SERIAL ADAPTER FOR G4LC32ISA | 210.00 |
| G4LC32RAMEX.5M | CLASSIC CONTROLLER (G4LC32) 1MB RAM EXPANSION KIT | 280.00 |
| G4LC32RAMEX2M | CLASSIC CONTROLLER (G4LC32) 2MB RAM EXPANSION KIT | ##### |
| G4LC32RAMEX4M | CLASSIC CONTROLLER (G4LC32) 4MB RAM EXPANSION KIT | 800.00 |
| G4LC32SER | CLASSIC SERIAL ADAPTER FOR G4LC32SX | 270.00 |
| G4LC32SX | OPTO 22 CLASSIC SX CONTROLLER | ##### |
| G4LC32SXF1M | UPGRADE G4LC32SX FLASH 4M | 215.00 |
| G4MSERVO | G4 MOTION SERVO | ##### |
| G4OAC15 | G4 AC OUTPUT 12-140 VAC, 15 VDC LOGIC | 9.50 |
| G4OAC15A | G4 AC OUTPUT 24-280 VAC, 15 VDC LOGIC | 10.50 |
| G4OAC24 | G4 AC OUTPUT 12-140 VAC, 24 VDC LOGIC | 9.50 |
| G4OAC24A | G4 AC OUTPUT 24-280 VAC, 24 VDC LOGIC | 10.50 |

# Price Listing

| ITEM | DESCRIPTION | 1 TO 9 |
|------|-------------|--------|
| G4OAC5 | G4 AC OUTPUT 12-140 VAC, 5 VDC LOGIC | 9.50 |
| G4OAC5A | G4 AC OUTPUT 24-280 VAC, 5 VDC LOGIC | 10.50 |
| G4OAC5A5 | G4 AC OUTPUT, 24-280 VAC, 5 VDC LOGIC, NC | 10.50 |
| G4OAC5A5FM | G4 AC OUTPUT 24-280 VAC, 5 VDC LOGIC , NC, FM | 11.50 |
| G4OAC5AFM | G4 AC OUTPUT 24-280 VAC, 5 VDC LOGIC, FACTORY MUTUAL APPROVED | 11.50 |
| G4OAC5AMA | G4 AC OUTPUT 24-280 VAC, 5 VDC LOGIC WITH HOA/SW | 21.00 |
| G4OAC5FM | G4 AC OUTPUT 12-140 VAC, 5 VDC LOGIC, FM APPROVED | 10.50 |
| G4OAC5MA | G4 AC OUTPUT 12-140 VAC, 5 VDC LOGIC WITH HOA/SW | 21.00 |
| G4OAX | OPTOMUX ANALOG EXTENDER | 335.00 |
| G4ODC15 | G4 DC OUTPUT 5-60 VDC, 15 VDC LOGIC | 9.50 |
| G4ODC24 | G4 DC OUTPUT 5-60 VDC, 24 VDC LOGIC | 9.50 |
| G4ODC24A | G4 DC OUTPUT 5-200 VDC, 24 VDC LOGIC | 15.40 |
| G4ODC5 | G4 DC OUTPUT 5-60 VDC, 5 VDC LOGIC | 9.50 |
| G4ODC5A | G4 DC OUTPUT 5-200 VDC, 5 VDC LOGIC | 15.40 |
| G4ODC5AFM | G4 DC OUTPUT 5-200 VDC, 5 VDC LOGIC, FM APPROVED | 16.40 |
| G4ODC5FM | G4 DC OUTPUT 5-60 VDC, 5 VDC LOGIC, FM APPROVED | 10.50 |
| G4ODC5MA | G4 DC OUTPUT 5-60 VDC, 5 VDC LOGIC WITH HOA/SW | 21.00 |
| G4ODC5R | G4 REED RELAY OUTPUT, 5 VDC LOGIC | 10.50 |
| G4ODC5R5 | G4 REED RELAY OUTPUT, 5 VDC LOGIC, NC | 10.50 |
| G4ODC5R5FM | G4 REED RELAY OUTPUT, 5 VDC LOGIC, NC, FM APPROVED | 11.50 |
| G4ODC5RFM | G4 REED RELAY OUTPUT, 5 VDC LOGIC, FM APROVED | 11.50 |
| G4PB16 | G4 16-CHANNEL I/O MODULE RACK | 62.00 |
| G4PB16H | G4 16-CHANNEL RACK W/HEADER CONNECTOR | 69.00 |
| G4PB16HC | G4 16-CHANNEL RACK W/HEADER CONNECTOR COMMON TB | 147.00 |
| G4PB16I | G4 16-CHANNEL I/O MODULE RACK ISOLATED CONTROL | 80.00 |
| G4PB16J | G4 DC INPUT 4-16VDC 16-CHANNEL INTEGRAL | 175.00 |
| G4PB16K | G4 DC INPUT 16-28VDC 16-CHANNEL INTEGRAL | 175.00 |
| G4PB16L | G4 DC OUTPUT 5-60VDC 16-CHANNEL INTEGRAL | 190.00 |
| G4PB16T | G4 16-CHANNEL I/O MODULE RACK EXTRA TERMINAL STRIP | 80.00 |
| G4PB24 | G4 24-CHANNEL I/O MODULE RACK | 97.00 |
| G4PB32DEC | G4 32-CHANNEL I/O MODULE RACK | 125.00 |
| G4PB32H | G4 32-CHANNEL RACK W/HEADER CONNECTOR FOR B4 BRAIN | 120.00 |
| G4PB4 | G4 4-CHANNEL I/O MODULE RACK | 21.00 |
| G4PB4R | G4 4-CHANNEL OUTPUT MODULE RACK | 25.00 |
| G4PB8 | G4 8-POINT I/O RACK WITH HEADER CONN | 38.00 |
| G4PB8H | G4 8-POINT RACK  W/HEADER CONN FOR BRAIN | 42.00 |
| G4PS245A | CLASSIC CONTROLLER POWER SUPPLY + 7 BRICKS 120VAC | 450.00 |
| G4PS245AFM | CLASSIC CONTROLLER POWER SUPPLY + 7 BRICKS 120VAC, FACTORY MUTUAL APPROVED | 450.00 |
| G4PS245B | CLASSIC CONTROLLER POWER SUPPLY + 7 BRICKS 220VAC | 450.00 |
| G4PS24XA | BRICK POWER SUPPLY 7 BRICKS 120 VAC | 345.00 |
| G4PS24XAFM | BRICK POWER SUPPLY 7 BRICKS 120 VAC FACTORY MUTUAL APPROVED | 345.00 |
| G4PS24XB | BRICK POWER SUPPLY 7 BRICKS 220 VAC | 345.00 |
| G4RA | REMOTE ANALOG 16 CHANNEL MULTIFUNCTION BRAIN MISTIC PROTOCOL | 495.00 |
| G4RAM1M | 1 MB MEMORY EXPANSION RAM CHIP FOR FLASH BASED CONTROLLERS | 50.00 |
| G4RAM4M | 4 MB MEMORY EXPANSION RAM CHIP FOR FLASHED BASED CONTROLLERS | 110.00 |
| G4RAX | REMOTE ANALOG 8-CHANNEL I/O UNIT EXTENDER | 335.00 |
| G4RCOMMKIT | REMOTE BRICK COMMUNICATION KIT | 142.00 |
| G4RD | REMOTE DIGITAL 16-CHANNEL MULTIFUNCTION BRAIN MISTIC PROTOCOL | 495.00 |
| G4REG | BRICK POWER REGULATION MODULE | 90.00 |
| G4RPANEL | REMOTE BRICK PANEL KIT | 290.00 |
| G4RS | REMOTE DIGITAL 32-CHANNEL BRAIN MISTIC PROTOCOL | 230.00 |
| G4STRAP | G4 16-POSITION STRAP SINGLE RACK, R5187 | 8.95 |
| G4SWIN | G4 INPUT SWITCH 5,15,24 VDC LOGIC | 19.00 |
| G4SWOUT | G4 OUTPUT SWITCH 250 VAC | 19.00 |
| G4TELEMETRY | MISTIC TELEMETRY EPROM & SOFTWARE | 200.00 |
| G4TERMR | REMOTE BRICK TERMINATOR | 35.00 |
| HH1.5 | 1.5-FT HEADER TO HEADER CABLE | 40.00 |
| HH10 | 10-FT HEADER TO HEADER CABLE | 64.00 |
| HH4 | 4-FT HEADER TO HEADER CABLE | 47.00 |
| HH6 | 6-FT HEADER TO HEADER CABLE | 54.00 |
| HH8 | 8-FT HEADER TO HEADER CABLE | 60.00 |
| HHG4H2 | PANEL TO PANEL HORIZONTAL LOCAL BRICK CABLE | 21.00 |
| HHG4V2 | PANEL TO PANEL VERTICAL LOCAL BRICK CABLE | 39.00 |
| IAC15 | AC INPUT 90-140 VAC, 15 VDC LOGIC | 9.50 |
| IAC15A | AC INPUT 180-280 VAC, 15 VDC LOGIC | 10.50 |
| IAC24 | AC INPUT 90-140 VAC, 24 VDC LOGIC | 9.50 |
| IAC24A | AC INPUT 180-280 VAC, 24 VDC LOGIC | 9.50 |
| IAC5 | AC INPUT 90-140 VAC, 5 VDC LOGIC | 9.50 |
| IAC5A | AC INPUT 180-280 VAC, 5 VDC LOGIC | 10.50 |
| IAC5AQ | 4-CHANNEL AC INPUT 180-280 VAC, 5 VDC LOGIC | 35.00 |
| IAC5P | P MODEL AC INPUT 90-140 VAC, 5 VDC LOGIC | 9.50 |
| IAC5Q | 4-CHANNEL AC INPUT 90-140 VAC, 5 VDC LOGIC | 35.00 |
| ICTD | TEMPERATURE PROBE | 30.00 |
| IDC15 | DC INPUT 10-32 VDC, 15 VDC LOGIC | 9.50 |
| IDC24 | DC INPUT 10-32 VDC, 24 VDC LOGIC | 9.50 |
| IDC5 | DC INPUT 10-32 VDC, 5 VDC LOGIC | 9.50 |
| IDC5B | DC INPUT 4-16 VDC, 5 VDC LOGIC HIGH SPEED | 13.00 |
| IDC5BQ | 4-CHANNEL DC INPUT 4-16 VDC, 5 VDC LOGIC, HIGH SPEED | 45.00 |
| IDC5D | DC INPUT 2.5-28 VDC, 5 VDC LOGIC | 8.50 |
| IDC5G | DC INPUT 35-60 VDC, 5 VDC LOGIC | 9.50 |
| IDC5P | P MODEL DC INPUT 10-32 VDC, 5 VDC LOGIC | 9.50 |
| IDC5Q | 4-CHANNEL DC INPUT 10-32 VDC, 5 VDC LOGIC | 35.00 |
| INPUT SWITCH | INPUT SWITCH 5,15,24 VDC LOGIC | 15.50 |
| IODISPLAY | HMI SOFTWARE FOR SNAP-UP1-ADS PER PC | 99.00 |
| JUMPERS | JUMPERS, QTY 10 | 1.00 |
| LC COMMUNICATOR | HAND HELD TERMINAL | 325.00 |
| LC4 | OPTO 22 LC CONTROLLER | 695.00 |
| LC4A | OPTO 22 LC CONTROLLER 120 VAC | 745.00 |
| LC4B | OPTO 22 LC4 CONTROLLER 220 VAC | 745.00 |
| LC4DC | OPTO 22 LC CONTROLLER DC FILTER BOARD | 745.00 |
| LICENSE OPTO DISPLAY | OPTODISPLAY LICENSE ONLY | 99.00 |
| LICENSE OPTOCNTL | OPTOCONTROL LICENSE ONLY | 99.00 |
| LICENSE OPTOSERVER | OPTO SERVER LICENSE SINGLE SITE | 99.00 |
| M4 | OPTO 22 MODULAR CONTROLLER | ##### |
| M4 I/O | OPTO 22 MODULAR I/O CONTROLLER | ##### |
| M4DUALARC | M4 DUAL ARCNET ADAPTER CARD | 315.00 |
| M4LCSX | UNAVAILABLE CNTRLR MODEL 400 | |
| M4PS120A | MODULAR CONTROLLER AC POWER SUPPLY 90-130V | 285.00 |
| M4PS125D | MODULAR CONTROLLER DC POWER SUPPLY 125V | 265.00 |
| M4PS12D | MODULAR CONTROLLER DC POWER SUPPLY 9-15V | 265.00 |
| M4PS240A | MODULAR CONTROLLER AC POWER SUPPLY 180-250V | 285.00 |
| M4PS24D | MODULAR CONTROLLER DC POWER SUPPLY 18-35V | 265.00 |
| M4PS48D | MODULAR CONTROLLER DC POWER SUPPLY 36-60V | 265.00 |
| M4PSF | MODULAR CONTROLLER DC FILTER BOARD | 145.00 |
| M4RTU | OPTO 22 MODULAR RTU/DAS CONTROLLER | ##### |
| M4RTUF1M | UPGRADE M4RTU FLASH 4M | 215.00 |

# Price Listing

| ITEM | DESCRIPTION | 1 TO 9 |
|------|-------------|--------|
| M4RTUX | OPTO 22 MODULAR CONTROLLER I/O EXTENDER | 335.00 |
| M4SARC | M4 ARCNET ADAPTER | 210.00 |
| M4SARCF | M4 ARCNET ADAPTER FIBER OPTIC | 350.00 |
| M4SARCFR | M4 ARCNET REPEATER FIBER OPTIC | 450.00 |
| M4SENET-100 | 100 BASE-TX M4 ETHERNET CARD | 695.00 |
| M4SENETC | M4 ETHERNET ADAPTER COAXIAL CABLE | 595.00 |
| M4SENETU | M4 ETHERNET ADAPTER UNSHEILDED TWISTED PAIR | 595.00 |
| M4SSER | M4 SERIAL ADAPTER CARD | 210.00 |
| MDS | MISTIC DATA SERVER | 995.00 |
| MISC PART | ITEM DESCRIBED IN COMMENTS | 0.00 |
| MISTIC MMI | MISTIC 200 WINDOWS MMI | ##### |
| MISTIC MMI/MDS | MISTIC 200 MMI AND MDS | ##### |
| MP120D2 | MP MODEL, 120 VAC, 2 AMP, DC CONTROL | 8.50 |
| MP120D4 | MP MODEL, 120 VAC, 4 AMP, DC CONTROL | 8.75 |
| MP240D2 | MP MODEL, 240 VAC, 2 AMP, DC CONTROL | 9.15 |
| MP240D4 | MP MODEL, 240 VAC, 4 AMP, DC CONTROL | 9.75 |
| MP240D4-17 | MP MODEL, 240 VAC, 4 AMP, DC CONTROL, VDE APPROVED | 10.50 |
| MP380D4 | MP MODEL, 380 VAC, 4 AMP, DC CONTROL | 10.50 |
| OAC15 | AC OUTPUT 12-140 VAC, 15 VDC LOGIC | 9.50 |
| OAC15A | AC OUTPUT 24-280 VAC, 15 VDC LOGIC | 10.50 |
| OAC24 | AC OUTPUT 12-140 VAC, 24 VDC LOGIC | 9.50 |
| OAC24A | AC OUTPUT 24-280 VAC, 24 VDC LOGIC | 10.50 |
| OAC24H | AC OUTPUT 24-280 VAC, 24 VDC LOGIC, HIGH CURRENT | 10.50 |
| OAC5 | AC OUTPUT 12-140 VAC, 5 VDC LOGIC | 9.50 |
| OAC5A | AC OUTPUT 24-280 VAC, 5 VDC LOGIC | 10.50 |
| OAC5A-11 | AC OUTPUT MODULE NON ZERO CROSS | 10.50 |
| OAC5A5 | AC OUTPUT 24-280 VAC, 5 VDC LOGIC, NC | 10.50 |
| OAC5P | P MODEL AC OUTPUT 12-140 VAC, 5 VDC LOGIC | 9.50 |
| OAC5Q | 4-CHANNEL AC OUTPUT 12-280 VAC, 5 VDC LOGIC | 35.00 |
| OD10 | 10-FT EDGE TO HEADER CABLE | 66.00 |
| OD2 | 2-FT EDGE TO HEADER CABLE | 39.00 |
| OD4 | 4-FT EDGE TO HEADER CABLE | 45.00 |
| OD6 | 6-FT EDGE TO HEADER CABLE | 52.00 |
| OD8 | 8-FT EDGE TO HEADER CABLE | 58.00 |
| ODC15 | DC OUTPUT 5-60 VDC, 15 VDC LOGIC | 9.50 |
| ODC15A | DC OUTPUT 5-200 VDC, 15 VDC LOGIC | 15.40 |
| ODC24 | DC OUTPUT 5-60 VDC, 24 VDC LOGIC | 9.50 |
| ODC24A | DC OUTPUT 5-200 VDC, 24 VDC LOGIC | 15.40 |
| ODC5 | DC OUTPUT 5-60 VDC, 5 VDC LOGIC | 9.50 |
| ODC5A | DC OUTPUT 5-200 VDC, 5 VDC LOGIC | 15.40 |
| ODC5AQ | 4-CHANNEL DC OUTPUT 5-200 VDC, 5 VDC LOGIC | 50.00 |
| ODC5P | P MODEL DC OUTPUT 5-60 VDC, 5 VDC LOGIC | 9.50 |
| ODC5Q | 4-CHANNEL DC OUTPUT 5-60 VDC, 5 VDC LOGIC | 35.00 |
| ODC5R | REED RELAY OUTPUT, 5 VDC LOGIC | 10.50 |
| ODC5RM | DC OUTPUT MODULE | 18.00 |
| OPTOCONTROL | obsolete | 99.00 |
| OPTODISPLAY | obsolete | 99.00 |
| OPTODRIVER | OPTODRIVER TOOLKIT | 295.00 |
| OPTOINFO CDB | OPTO INFO CD BULK 25 PACK | 25.00 |
| OPTOINTMB | OPTO INTEGRATION MOD BUS | 425.00 |
| OPTOSERVER | OPTOSERVER | 99.00 |
| OUTPUT SWITCH | OUTPUT SWITCH 250 VAC | 15.50 |
| P120D2 | P MODEL, 120 VAC, 2 AMP, DC CONTROL | 8.50 |
| P120D4 | P MODEL, 120 VAC, 4 AMP, DC CONTROL | 8.75 |
| P240D2 | P MODEL, 240VAC, 2 AMP, DC CONTROL | 9.15 |
| P240D4 | P MODEL, 240 VAC, 4 AMP, DC CONTROL | 9.75 |
| P240D4-17 | P MODEL, AC OUTPUT, 12-140 VAC, 5VDC LOGIC | 10.50 |
| PB16A | 16-CHANNEL I/O MODULE RACK | 62.00 |
| PB16AH | 16-CHANNEL ANALOG MOUNTING RACK | 170.00 |
| PB16C | 16-CHANNEL I/O MODULE RACK EXTRA TERMINAL STRIP | 95.00 |
| PB16H | 16-CHANNEL RACK W/HEADER CONNECTOR | 69.00 |
| PB16HC | 16-CHANNEL RACK W/HEADER CONNECTOR COMMON TB | 98.00 |
| PB16HQ | QUAD 4-MODULE POSITION RACK | 69.00 |
| PB16J | DC INPUT 4-16VDC 16-CHANNEL INTEGRAL | 115.00 |
| PB16K | DC INPUT 16-28VDC 16-CHANNEL INTEGRAL | 115.00 |
| PB16L | DC OUTPUT 5-60VDC 16-CHANNEL INTEGRAL | 115.00 |
| PB16T | 16-CHANNEL I/O MODULE RACK | 80.00 |
| PB24 | 24-CHANNEL I/O MODULE RACK | 97.00 |
| PB24HQ | QUAD 6-MODULE POSITION RACK WITH HEADER CONNECTOR | 115.00 |
| PB24Q | QUAD 6-MODULE POSITION RACK | 108.00 |
| PB32DEC | QUAD 8-MODULE POSITION RACK | 125.00 |
| PB32HQ | QUAD 8-MODULE RACK W/HEADER CONNECTOR FOR B4 BRAIN | 120.00 |
| PB4 | 4-CHANNEL I/O MODULE RACK | 21.00 |
| PB4AH | 4-CHANNEL ANALOG MOUNTING RACK | 85.00 |
| PB4H | 4-CHANNEL RACK W/HEADER CONNECTOR | 42.00 |
| PB4MOA | 4-CHANNEL SWITCH ASSEMBLY | 64.00 |
| PB4R | 4-CHANNEL OUTPUT MODULE RACK | 35.00 |
| PB8 | 8-CHANNEL I/O MODULE RACK | 38.00 |
| PB8AH | 8-CHANNEL ANALOG MOUNTING RACK | 125.00 |
| PB8H | 8-CHANNEL RACK W/HEADER CONNECTOR | 56.00 |
| PBSA | POWER SUPPLY 120 VAC | 70.00 |
| PBSB | POWER SUPPLY 220 VAC | 70.00 |
| PBSC | POWER SUPPLY 12/24 VDC | 95.00 |
| PCI-AC28 | PCI-AC28 ADAPTER CARD | 315.00 |
| PCI-AC5 | PCI-AC5 ADAPTER CARD | 315.00 |
| PITM UPGRADE | UPGRADE FOR PROVE IT TO ME TOOLBOX | 199.00 |
| PROVEITTOME | PROVE IT TO ME TOOLBOX | ##### |
| REMOTE CABLE200 | REMOTE BRICK INTERPANEL CABLE | 45.00 |
| SAFETY COVER | POWER SERIES STANDARD MODEL SSR COVER | 1.00 |
| SBTA | SINGLE BRICK TERMINAL ADAPTER | 25.00 |
| SBTA100 | SINGLE BRICK TERMINATOR LOCAL | 45.00 |
| SNAP-AIARMS | 0-10 AMP INPUT MODULE | 195.00 |
| SNAP-AICTD | SNAP 2-CHANNEL TEMPERATURE INPUT - AICTD | 182.00 |
| SNAP-AICTD-4 | SNAP 4 CHANNEL ICTD INPUT | 245.00 |
| SNAP-AIMA | 2-CHANNEL ANALOG CURRENT INPUT -20mA TO +20mA | 182.00 |
| SNAP-AIMA-4 | SNAP 4 CHANNEL ANALOG CURRENT INPUT | 245.00 |
| SNAP-AIMA-i | 2 CHANNEL AIMA ISOLATED | 265.00 |
| SNAP-AIMV-4 | SNAP 4 CHANNEL ANALOG +/-150 mV INPUT | 245.00 |
| SNAP-AIMV2-4 | SNAP 4 CHANNEL ANALOG +/-50 mV INPUT | 245.00 |
| SNAP-AIRATE | SNAP DUAL CHANNEL ANALOG RATE INPUT | 195.00 |
| SNAP-AIRTD | SNAP 2-CHANNEL TEMPERATURE INPUT - 100 OHM PT RTD | 195.00 |
| SNAP-AITM | 2-CHANNEL ANALOG TYPE E, J, K THERMOCOUPLE OR -150mV TO +150mV INPUT | 182.00 |
| SNAP-AITM-2 | SNAP 2-CHANNEL THERMOCOUPLE INPUT TYPES B,C,D,G,N,T,R,S | 182.00 |
| SNAP-AITM-i | 2 CHANNEL AITM ISOLATED | 245.00 |
| SNAP-AITM2-i | SNAP 2 CHANNEL ISOLATED THERMOCOUPLE / mV INPUT | 245.00 |
| SNAP-AIV | 2-CHANNEL ANALOG INPUT VOLTAGE -10VDC TO +10VDC | 182.00 |

# Price Listing

| ITEM | DESCRIPTION | 1 TO 9 |
|---|---|---|
| SNAP-AIV-4 | SNAP 4 CHANNEL ANALOG  AIV | 245.00 |
| SNAP-AIV-4S | SNAP 4 CHANNEL AIV FOR SPAIN (CALIB.1.25V) | 245.00 |
| SNAP-AIV-i | 2 CHANNEL AIV ISOLATED | 245.00 |
| SNAP-AIVRMS | 0-250 VRMS INPUT | 195.00 |
| SNAP-AOA-23 | SNAP 2-CHANNEL CURRENT LOOP OUTPUT - 4-20 MA | 182.00 |
| SNAP-AOA-28 | SNAP 2-CHANNEL CURRENT LOOP OUTPUT 0-20 MA | 195.00 |
| SNAP-AOA-3 | SINGLE-CHANNEL ANALOG OUTPUT CURRENT 4-20MA | 150.00 |
| SNAP-AOD-29 | SNAP TPO MODULE | 187.00 |
| SNAP-AOV-25 | SNAP 2-CHANNEL VOLTAGE OUTPUT - 0 TO 10 VOLTS DC | 182.00 |
| SNAP-AOV-27 | SNAP 2-CHANNEL VOLTAGE OUTPUT - BIPOLAR -10 TO + 10 VOLTS DC | 182.00 |
| SNAP-AOV-5 | SINGLE-CHANNEL ANALOG OUTPUT 0 TO 10VDC | 150.00 |
| SNAP-AOV-7 | SINGLE-CHANNEL ANALOG OUTPUT VOLTAGE -10 TO +10VDC | 95.00 |
| SNAP-B12M | 12-MODULE RACK | 112.00 |
| SNAP-B12MC | 12-MODULE RACK WITH EXTRA TERMINAL BLOCK FOR FIELD WIRING | 133.00 |
| SNAP-B12MC-P | 12-MODULE RACK WITH EXTRA TERMINAL BLOCK FOR FIELD WIRING, PLUGGABLE | 308.00 |
| SNAP-B16M | 16-MODULE RACK | 161.00 |
| SNAP-B16MC | 16-MODULE RACK WITH EXTRA TERMINAL BLOCK FOR FIELD WIRING | 182.00 |
| SNAP-B16MC-P | 16-MODULE RACK WITH EXTRA TERMINAL BLOCK FOR FIELD WIRING, PLUGGABLE | 420.00 |
| SNAP-B3000-ENET | SNAP B3000 ETHERNET BRAIN | 695.00 |
| SNAP-B3000-MODBUS | SNAP ANALOG/DIGITAL BRAIN MODICON MODBUS PROTOCOL | 425.00 |
| SNAP-B4 | SNAP 32-CHANNEL PAMUX PROTOCOL DIGITAL BRAIN BOARD | 225.00 |
| SNAP-B4M | SNAP 4 POSITION BRAIN RACK | 77.00 |
| SNAP-B6 | HIGH SPEED SNAP ANALOG/DIGITAL BRAIN | 550.00 |
| SNAP-B8M | 8-MODULE RACK | 94.00 |
| SNAP-B8MC | 8-MODULE RACK WITH EXTRA TERMINAL BLOCK FOR FIELD WIRING | 104.00 |
| SNAP-B8MC-P | 8-MODULE RACK WITH EXTRA TERMINAL BLOCK FOR FIELD WIRING, PLUGGABLE | 217.00 |
| SNAP-BRS | SNAP 32-CHANNEL MISTIC PROTOCOL REMOTE DIGITAL BRAIN BOARD | 245.00 |
| SNAP-BRS-HA | SNAP 32-CHANNEL MISTIC PROTOCOL REMOTE DIGITAL BRAIN BOARD WITH ARCNET (5 POS CONN VERS | 265.00 |
| SNAP-CDBBDIN | CLASSIC DIGITAL BRAIN BOARD DIN RAIL ADAPTER | 20.00 |
| SNAP-D12M | 12-MODULE RACK | 104.00 |
| SNAP-D12MC | 12-MODULE RACK WITH EXTRA TERMINAL BLOCK FOR FIELD WIRING | 123.00 |
| SNAP-D12MC-P | 12-MODULE RACK WITH EXTRA TERMINAL BLOCK FOR FIELD WIRING, PLUGGABLE | 294.00 |
| SNAP-D4M | 4-MODULE RACK | 42.00 |
| SNAP-D4MC | 4-MODULE RACK WITH EXTRA TERMINAL BLOCK FOR FIELD WIRING | 45.00 |
| SNAP-D4MC-P | 4-MODULE RACK WITH EXTRA TERMINAL BLOCK FOR FIELD WIRING, PLUGGABLE | 104.00 |
| SNAP-D64RS | SNAP 64 POINT DIGITAL RACK | 161.00 |
| SNAP-D6M | 6-MODULE RACK | 60.00 |
| SNAP-D6MC | 6-MODULE RACK WITH EXTRA TERMINAL BLOCK FOR FIELD WIRING | 70.00 |
| SNAP-D6MC-P | 6-MODULE RACK WITH EXTRA TERMINAL BLOCK FOR FIELD WIRING, PLUGGABLE | 160.00 |
| SNAP-D8M | 8-MODULE RACK | 81.00 |
| SNAP-D8MC | 8-MODULE RACK WITH EXTRA TERMINAL BLOCK FOR FIELD WIRING | 94.00 |
| SNAP-D8MC-P | 8-MODULE RACK WITH EXTRA TERMINAL BLOCK FOR FIELD WIRING, PLUGGABLE | 210.00 |
| SNAP-ENET-D64 | SNAP- ETHERNET D64 BRAIN | 695.00 |
| SNAP-FIELDCONB | MODULE FIELD CONNECTOR 10-PACK | 70.00 |
| SNAP-FUSE1AB | 1 AMP FUSE 25-PACK | 12.50 |
| SNAP-FUSE2AB | 2 AMP FUSE 25-PACK | 12.50 |
| SNAP-FUSE4AB | 4-AMP FUSE 25-PACK | 12.50 |
| SNAP-IAC5 | 4-CHANNEL AC INPUT 90-140 VAC, 5 VDC LOGIC | 42.00 |
| SNAP-IAC5A | 4-CHANNEL AC INPUT 180-280 VAC, 5 VDC LOGIC | 42.00 |
| SNAP-IAC5AFM | 4-CHANNEL AC INPUT 180-280 VAC FM | 47.00 |
| SNAP-IAC5FM | SNAP 4 CHANNEL AC INPUT FM | 47.00 |
| SNAP-IAC5MA | SNAP IAC5 MANUAL AUTO MODULE | 84.00 |
| SNAP-IDC5 | 4-CHANNEL DC INPUT 10-32 VDC, 5 VDC LOGIC | 42.00 |
| SNAP-IDC5-FAST-A | SNAP 4 CHANNEL HI-SPEED MODULE | 46.00 |
| SNAP-IDC5-SW | SNAP INPUT MODULE SELFWETTING N.C. | 56.00 |
| SNAP-IDC5D | SNAP DC INPUT DATA ACQUISITION | 42.00 |
| SNAP-IDC5DFM | SNAP DC INPUT DATA ACQUISITION FM | 47.00 |
| SNAP-IDC5FAST | SNAP 4-CHANNEL HI-SPEED DC INPUT 2.5 - 16VDC, 5VDC LOGIC | 46.00 |
| SNAP-IDC5FM | SNAP 4 CHANNEL DC INPUT FM | 47.00 |
| SNAP-IDC5MA | SNAP IDC5 MANUAL AUTO MODULE | 84.00 |
| SNAP-IDC5Q | SNAP QUADRATURE MODULE | 182.00 |
| SNAP-IT-PM-ADS | SNAP IT PANEL MOUNT | ##### |
| SNAP-IT-PM-ADS-PLUS | SNAP IT BOX WITH MODEM | ##### |
| SNAP-IT-RM-ADS | SNAP-IT RACK MOUNT ANA / DIG / SER | ##### |
| SNAP-IT-RM-D64 | SNAP 64 POINT DIGITAL MONITOR | ##### |
| SNAP-LABEL4B | 4-MODULE LABEL HOLDER WITH LABELS 25-PACK | 30.00 |
| SNAP-LABEL6B | 6-MODULE LABEL HOLDER WITH LABELS 25-PACK | 30.00 |
| SNAP-LCM4 | SNAP M4 LOCAL CONTROLLER | ##### |
| SNAP-LCSX | SNAP CONTROLLER SX,2 PORT | 575.00 |
| SNAP-LCSX-PLUS | SNAP CONTROLLER SX,4 PORT | 695.00 |
| SNAP-LEARNING CTR-US | SNAP LEARNING CENTER U.S. VERSION | ##### |
| SNAP-MODFUSEHLDRB | DIGITAL OUTPUT FUSE HOLDER 10-PACK | 7.00 |
| SNAP-MODLATCHB | MODULE RELEASE LATCH 10-PACK | 14.00 |
| SNAP-OAC5 | 4-CHANNEL AC OUTPUT 12-280 VAC, 5 VDC LOGIC | 42.00 |
| SNAP-OAC5-I | SNAP AC OUTPUT MODULE ISOLATED | 42.00 |
| SNAP-OAC5-IFM | SNAP AC OUTPUT MODULE ISOLATED FM | 47.00 |
| SNAP-OAC5FM | 4 CHANNEL AC OUTPUT 12-280VAC FM | 47.00 |
| SNAP-OAC5MA | SNAP OAC5 MANUAL AUTO MODULE | 84.00 |
| SNAP-ODC5-I | SNAP DC OUTPUT MODULE ISOLATED | 42.00 |
| SNAP-ODC5-IFM | SNAP DC OUTPUT MODULE ISOLATED FM | 47.00 |
| SNAP-ODC5A-I | SNAP DC OUTPUTMODULE ISOLATED | 42.00 |
| SNAP-ODC5A-IFM | SNAP DC OUTPUT MOD ISOLATED FM | 47.00 |
| SNAP-ODC5ASNK | SNAP ODC5A SINK MODULE | 42.00 |
| SNAP-ODC5MA | SNAP ODC5 MANUAL AUTO MODULE | 84.00 |
| SNAP-ODC5R | SNAP DC OUTPUT REED RELAY N.O. | 45.00 |
| SNAP-ODC5R5 | SNAP DC OUTPUT REED RELAY N.C. | 45.00 |
| SNAP-ODC5R5FM | SNAP DC OUTPUT REED RELAY N.C. | 50.00 |
| SNAP-ODC5RFM | SNAP DC OUTPUT REED RELAY FM | 50.00 |
| SNAP-ODC5SNK | 4-CHANNEL DC OUTPUT 5-60 VDC, 5 VDC LOGIC SINK | 42.00 |
| SNAP-ODC5SNKFM | 4 CHANNEL DC OUTPUT 5-60 LOGIC SINK FM | 47.00 |
| SNAP-ODC5SRC | 4-CHANNEL DC OUTPUT 5-60 VDC, 5 VDC LOGIC SOURCE | 42.00 |
| SNAP-ODC5SRCFM | 4 CHANNEL DC OUTPUT 5-60VDC FM | 47.00 |
| SNAP-PDPRS64 | PROFIBUS DP REMOTE SIMPLE 64 POINT BRAIN | 555.00 |
| SNAP-PS24 | SNAP POWER SUPPLY - LOOP POWER - 110 VAC TO 24 VDC | 200.00 |
| SNAP-PS5 | SNAP POWER SUPPLY - SINGLE RACK - 110 VAC TO 5 VDC | 200.00 |
| SNAP-PS5-24DC | SNAP DC TO DC POWER SUPPLY | 200.00 |
| SNAP-PSDIN | SNAP POWER DIN ADAPTER | 28.00 |
| SNAP-RACKDIN | SNAP RACK DIN RAIL ADAPTER CLIP | 11.25 |
| SNAP-RACKDINB | SNAP RACK DIN RAIL ADAPTER CLIP 25-PACK | 245.00 |
| SNAP-RETN4B | 4-MODULE RETENTION RAIL 25-PACK | 110.00 |
| SNAP-RETN6B | 6-MODULE RETENSION RAIL 25PACK | 135.00 |
| SNAP-SCM-232 | DUAL ISOLATED RS232 MODULE | 245.00 |
| SNAP-SCM-485 | DUAL ISOLATED RS485 MODULE | 245.00 |
| SNAP-STRAP | SNAP MODULE STRAP | 8.95 |
| SNAP-UP1-ADS | ANALOG/DIGITAL/SERIAL/ETHERNET ULTIMATE BRAIN | 995.00 |
| SNAP-WIRESTRAP | SNAP STRAP WIRE JUMPER | 5.50 |

# Price Listing

| ITEM | DESCRIPTION | 1 TO 9 |
|---|---|---|
| STRAP2 | 2-POSITION STRAP SINGLE RACK R0433 | 1.00 |
| STRAP2Q | 2-POSITION STRAP QUAD RACK R0432 | 1.00 |
| STRAP4Q | 4-POSITION STRAP QUAD RACK R0431 | 1.65 |
| STRAP8 | 8-POSITION STRAP SINGLE RACK R0430 | 1.65 |
| TERM 1 | PAMUX BUS TERMINATION CARD | 30.00 |
| TERM 2 | PAMUX BUS TERMINATON CARD SHIELDED CABLE | 30.00 |
| UCA4 | GENERAL PURPOSE PAMUX INTERFACE | 120.00 |
| ULTIMATEIODOCS | PRINTED DOCUMENTATION FOR SNAP ULTIMATE I/O | 99.00 |
| Z120D10 | Z MODEL, 120 VAC, 10 AMP, DC CONTROL | 9.80 |
| Z240D10 | Z MODEL, 240 VAC, 10 AMP, DC CONTROL | 10.00 |
| Z240D10-17 | Z MODEL, 240 VAC, 10 AMP, DC CONTROL, VDE APPROVED | 11.50 |