OPTO 22

DATA SHEET

Form 664-070104

| Part Number	Description
M4SSER	M4 Serial Adapter Card

Description

The M4SSER expands the number of serial ports on the M4 Modular Controllers from two to four. Intrinsically, the M4's UART can support four communication ports. However, the M4 base unit provides connections for only two ports (COM0 and COM1). The M4SSER allows the user to take advantage of the two remaining ports (COM2 and COM3). The M4SSER can be used with any of Opto 22's M4 Modular Controllers except the SNAP-LCM4.

The two M4SSER ports are configurable as either RS-232 or RS-485/422 ports. They support communication speeds of up to 115.2 KBd, are modem-compatible, and support both ASCII and binary (Mistic) protocols. They may be used to link a host PC to the M4 Modular Controller, provide multiple host ports, network M4s or other Opto 22 controllers, connect additional I/O, or interface to application-specific third-party hardware.

Configured for RS-232, each port can also supply +5 VDC for powering devices with low current demands, such as barcode readers. This allows connection to a variety of application-specific devices requiring RS-232 capability.

Configured for RS-485/422, each port can be used for a remote serial I/O link, expanding the potential M4 base unit I/O from 4,096 channels to 12,288 channels. With the help of Opto 22 I/O units and AC38 repeaters, the M4SSER can allow a user to develop a robust distributed control system using M4 Modular Controllers. This configuration also allows connection to a variety of application-specific devices requiring RS-485/422 capability — such as a host port network of M4 Modular Controllers, multiple serial I/O links, and intelligent electronic devices. The two M4SSER ports can be configured for either full-duplex (4-wire) or half-duplex (2-wire), terminated, or not terminated operation. Both ports are configurable and addressable through OptoControl or Cyrano.

OPTO 22

DATA SHEET

Form 664-070104
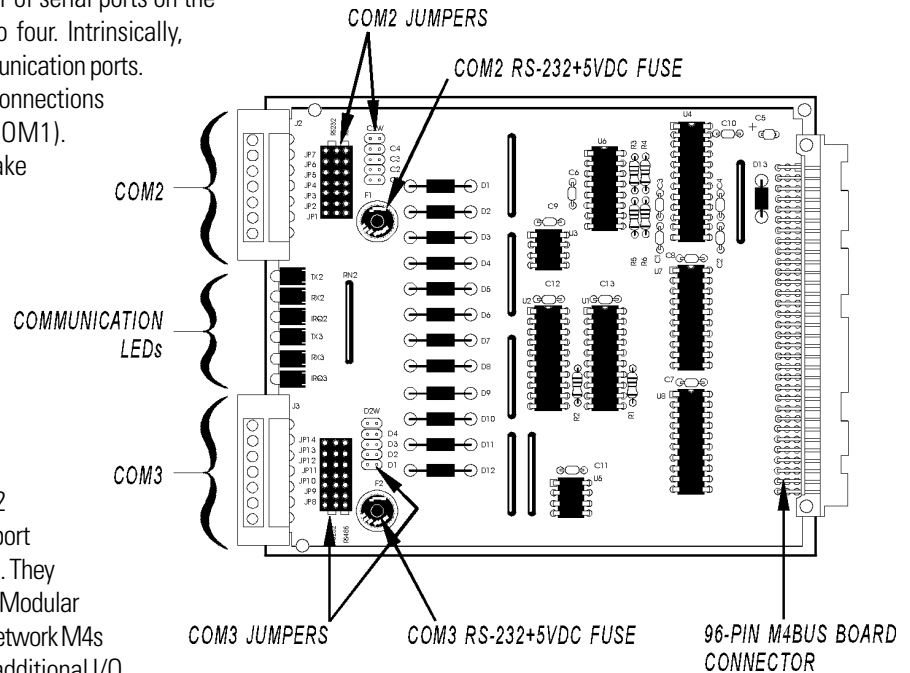
Specifications

LED SPECIFICATIONS

LED	Indication
TX2 (COM2 transmit)	This indicator illuminates whenever Com2 is transmitting serial data. If the LED fails to illuminate, it could indicate that the port is idle or a wiring problem exists.
RX2 (COM2 receive)	This indicator illuminates whenever COM2 is receiving serial data. If the LED fails to illuminate, it could indicate that the port is idle or a wiring problem exists.
IRQ2 (COM2 interrupt)	This indicator illuminates when a hardware interrupt is issued by the serial device.
TX3 (COM3 transmit)	This indicator illuminates whenever COM3 is transmitting serial data. If the LED fails to illuminate, it could indicate that the port is idle or a wiring problem exists.
RX3 (COM3 receive)	This indicator illuminates whenever COM3 is receiving serial data. If the LED fails to illuminate, it could indicate that the port is idle or a wiring problem exists.
IRQ3 (COM2 interrupt)	This indicator illumates when a hardware interrupt is issued by the serial device.

M4SSER GENERAL SPECIFICATIONS

| Item	Specification
Communication speed	300-115.2 KBd
Maximum connection distance	Up to 3,000 ft. (more with repeater)
Port configuration: COM2, RS-232 or RS-485/422 COM3, RS-232 or RS-485/422	RS-232: TX, RX, RTS, CTS, DTR (+V), +5V, GND RS-485: 2-wire, half-duplex; RS-422: 4-wire, half- or full-duplex
Cable specifications for RS-232 or RS-485/422	#24 gauge, 7x32 stranded, 100-ohm nominal impedance, 12.5 p/F/ft.
Connector: Manufacturer	Plug, 7-position screw terminal Phoenix Contact, P/N: MC1 5/7-ST-3, 81
Power requirement (at 5 VDC)	220 mA
Typical operating temperature	-20° C to 70° C
Storage temperature	-40° C to 85° C

OPTO 22

INTERFACES
CONTROLLER
MODULAR

DATA SHEET

page 3/7

Form 664-070104

Specifications (CONT.)

PIN CONNECTIONS FOR THE M4SSER COM2/COM3 PORTS

PIN	RS-232	RS-485/422 (2 Wire)	RS-485/422 (4 Wire)
1	Fused +5 VDC (1A)	Transmit/Recieve Plus (TX/RX+)	Transmit Plus (TX+)
2	Transmit (TX)	Transmit/Receive Minus (TX/RX-)	Transmit Minus (TX-)
3	Receive (RX)	Common Ground (GND)	Common Ground (GND)
4	Request-to-Send (RTS)	No Connection (NC)	Receive Plus (RX+)
5	Clear-to-Send (CTS)	No Connection (NC)	Receive Minus (RX-)
6	Passive DTR (pulled up to +9 V)	Interrupt Plus (IRQ+)	Interrupt Plus (IRQ+)
7	Ground (GND)	Interrupt Plus (IRQ-)	Interrupt Plus (IRQ-)

Important: Connectors wired for other Opto 22 controllers may not be compatible with the M4SSERs. Use the connectors provided with the M4SSER and refer to the pin connection label for wiring information.

The figure and the table show the location and function of each pin on the 7-position terminal block.
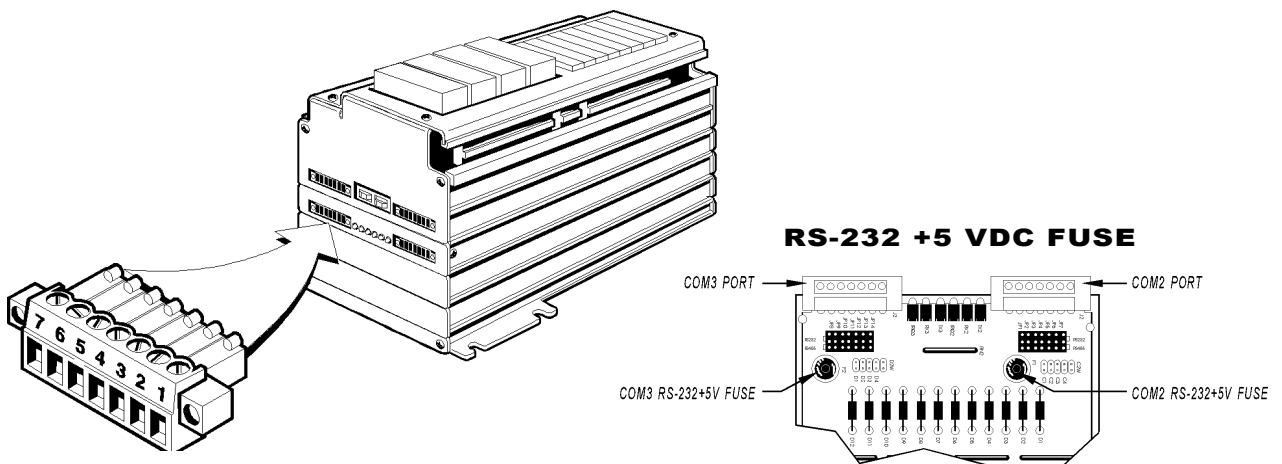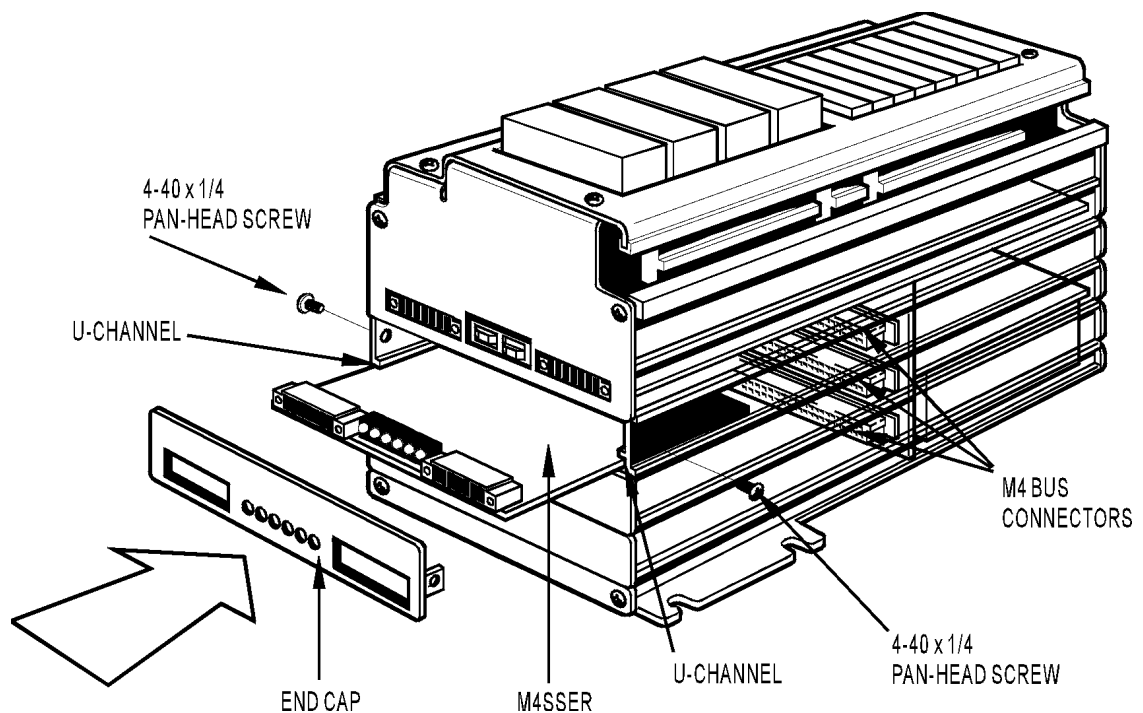

RS-232 +5 VDC FUSE

RS-232 +5 VDC Fuse
A +5 VDC fused source is available on Pin 1 from both the COM2 and COM3 ports. A maximum 0.5A load can be drawn through the 1-Amp rated fuse. The replacement part number for this fuse is Opto 22 P/N FUSE01G4 (Wickmann P/N 19373A).

OPTO 22

DATA SHEET

Form 664-070104

Installation

Before installing the M4SSER into the M4 Modular Controller expansion slot, make sure all jumpers have been properly set for RS-232 or RS-485/422 communications. Then follow the instructions below:

1. Remove all power from the M4 Modular Controller.
2. Remove the blank end cap for any of the three M4BUS expansion slots, located below the serial I/O connectors. Each end cap is held in place by two screws located on the side panel, adjacent to each end cap. (You may also need to remove one or two additional end caps to achieve proper card alignment.)
3. Align the edges of the M4SSER with the selected expansion slot U-channels located on the sides of the expansion bus cavity. Slide the card all the way in until it seats into the M4BUS connector.
4. Use the original screws to attach the new end cap (included with the M4SSER) to the end of the M4 Modular Controller unit.
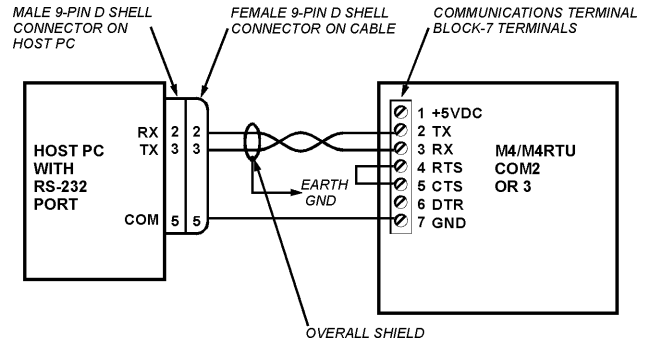5. Only one M4SSER may be added to an M4 controller.

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OPTO 22

DATA SHEET

Form 664-070104

Installation (WIRING)

Wiring to a PC

The figure on the right presents an example of RS-232 wiring between a host PC and the COM2 or COM3 port of an M4SSER installed on an M4. Verify that the pin connections at the host PC are the same as those called out in the diagram.

MALE 9-PIN D SHELL CONNECTOR ON HOST PC

FEMALE 9-PIN D SHELL CONNECTOR ON CABLE

COMMUNICATIONS TERMINAL BLOCK-7 TERMINALS

HOST PC WITH RS-232 PORT

RX 2 | 2
TX 3 | 3
COM 5 | 5

1 +5VDC
2 TX
3 RX
4 RTS
5 CTS
6 DTR
7 GND

M4/M4RTU COM2 OR 3
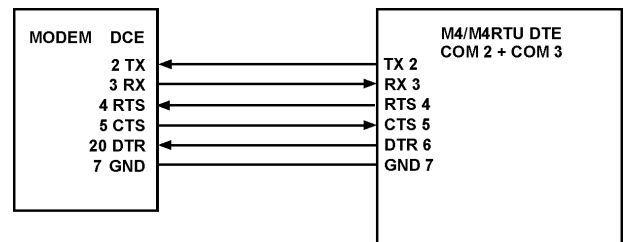
EARTH GND

OVERALL SHIELD

Wiring to a Modem

The figure on the right illustrates a connection from a generic modem to COM2 or COM3 on the M4SSER serial card of an M4 that does not use a carrier detect.
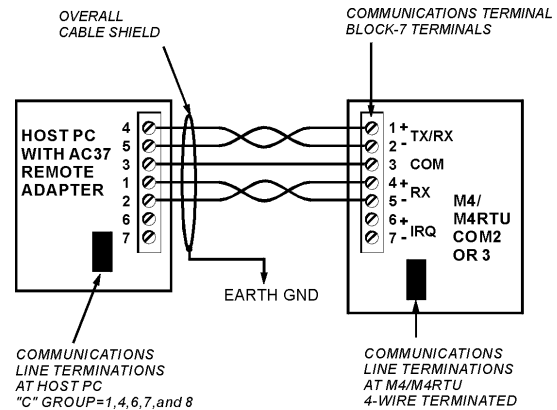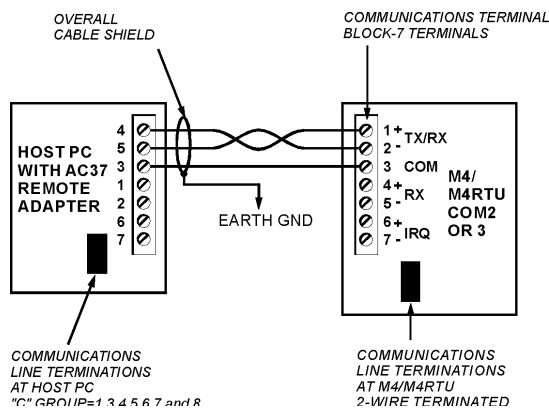
Refer to your modem documentation for detailed wiring information, possible jumper configuration, and initialization setup.

Important: For radio modems, connect RTS from the M4 to RTS on the radio. Do not use DTR on the M4.

MODEM   DCE

2 TX
3 RX
4 RTS
5 CTS
20 DTR
7 GND

M4/M4RTU DTE COM 2 + COM 3

TX 2
RX 3
RTS 4
CTS 5
DTR 6
GND 7

Wiring to an AC37

The figures on the right present examples of RS-485/422 wiring between a host PC with an Opto 22 AC37 and the COM2 or COM3 port of an M4SSER.


OVERALL CABLE SHIELD

COMMUNICATIONS TERMINAL BLOCK-7 TERMINALS

HOST PC WITH AC37 REMOTE ADAPTER

4
5
3
1
2
6
7

1 +
2 -   TX/RX
3   COM
4 +
5 -   RX
6 +
7 -   IRQ

M4/ M4RTU COM2 OR 3

EARTH GND

COMMUNICATIONS LINE TERMINATIONS AT HOST PC "C" GROUP=1,4,6,7,and 8

COMMUNICATIONS LINE TERMINATIONS AT M4/M4RTU 4-WIRE TERMINATED

OVERALL CABLE SHIELD

COMMUNICATIONS TERMINAL BLOCK-7 TERMINALS

HOST PC WITH AC37 REMOTE ADAPTER

4
5
3
1
2
6
7

1 +
2 -   TX/RX
3   COM
4 +
5 -   RX
6 +
7 -   IRQ

M4/ M4RTU COM2 OR 3

EARTH GND

COMMUNICATIONS LINE TERMINATIONS AT HOST PC "C" GROUP=1,3,4,5,6,7,and 8

COMMUNICATIONS LINE TERMINATIONS AT M4/M4RTU 2-WIRE TERMINATED

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OPTO 22

Installation JUMPERS

The two serial ports (COM2 and COM3) of the M4SSER may be configured by setting jumpers for either RS-232 or RS-485/422. Only one serial mode may be used at a time per port. Each communication port includes a set of 12 jumpers divided into two columns. These jumpers must be set according to the serial mode desired.

The figure below shows the two sets of jumpers as they appear on the M4SSER. Note that the two sets are identical except for the labeling (some jumpers are labeled with C designations for COM2 and D designations for COM3). In this figure, no jumpers have been installed.

- **For RS-232**, install all jumpers to the left. In addition, install all termination jumpers (C1–C4 or D1–D4) to ensure reliable communications, and remove the 2-wire/4-wire jumper (C2W or D2W).
- **For RS-485/422**, install all jumpers to the right. Choose jumper location for 2-wire/4-wire and for termination based on your system (see table below, right).
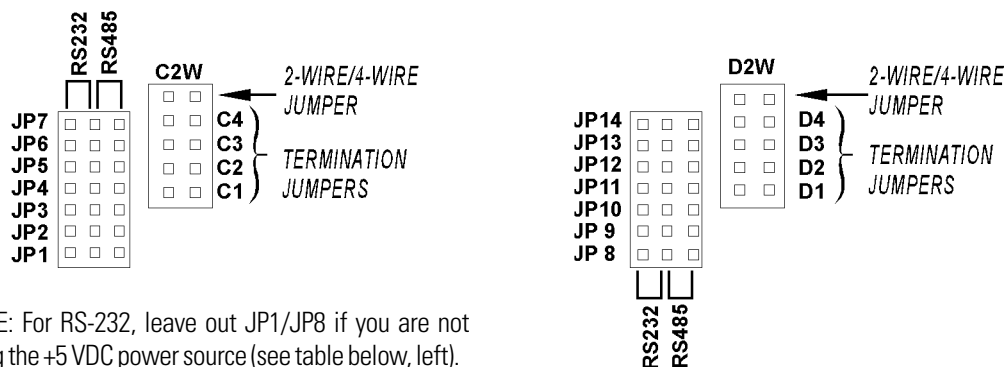
NOTE: For RS-232, leave out JP1/JP8 if you are not using the +5 VDC power source (see table below, left).

Comm. Terminals (Com 2 or Com 3)	RS-232 (Jumpers in Left 2 Columns)	RS-485 (Jumpers in Right 2 columns)	
		2-Wire (C2W/D2W Jumper In)	4-Wire (C2W/D2W Jumper Out)
1	+ 5 VDC[1]	TX/RX+	TX +
2	TX	TX/RX-	TX -
3	RX	GND	GND
4	RTS	NC	RX +
5	CTS	NC	RX -
6	DTR	IRQ +	IRQ +
7	GND	IRQ -	IRQ -

| Jumper	Function when Jumper In	Function When Jumper Out
C2W/D2W	2-Wire	4-Wire
C1/D1[2]	Terminated	Not Terminated
C2/D2[2]	Terminated	Not Terminated
C3/D3[2]	Terminated	Not Terminated
C4/D4[2]	Terminated	Not Terminated

[2] For RS-232, remove the C2W/D2W jumper and install jumpers on C1 through C4 or D1 through D4.
For RS-485/422, set jumpers C1 through C4 or D1 through D4 all the same, depending on whether the M4RTU/DAS is physically the last unit in the communication link (jumpers in) or not (jumpers out).

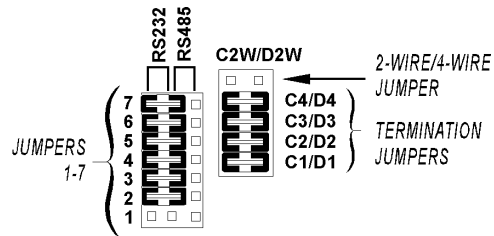[1] With RS-232, the +5 VDC may be used to power devices with light current demands such as barcode readers or hand-held terminals. Leave this jumper out if you do not need this voltage source.

OPTO 22

DATA SHEET

Form 664-070104

Installation JUMPERS (CONT.)
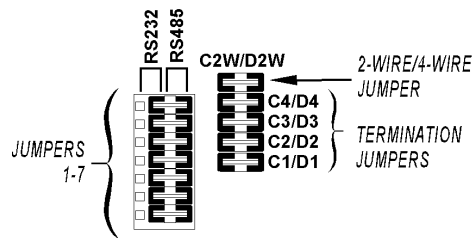
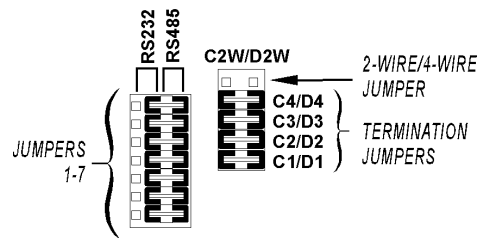### EXAMPLES OF JUMPER SETTINGS

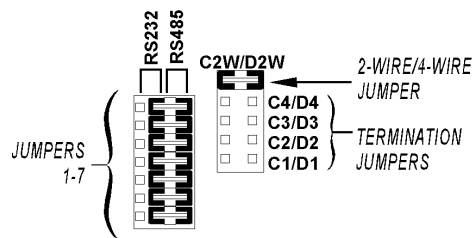**RS-232 with +5 VDC Enable**
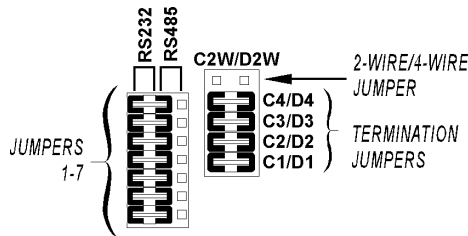
RS-232 with +5 VDC Disabled

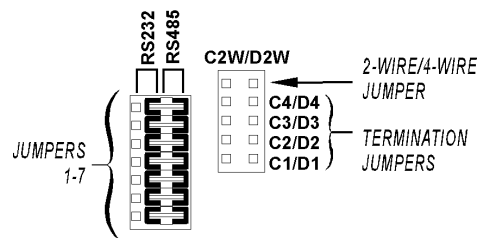**RS-485/422, 2-Wire Terminated**

RS-485/422, 4-Wire Terminated

RS-485/422, 2-Wire Non-Terminated

RS-485/422, 4-Wire Non-Terminated

Products

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

SNAP Ethernet Systems

Based on the Internet Protocol (IP), SNAP Ethernet systems offer flexibility in their network connectivity and in the software applications they work with. The physical network may be a wired Ethernet network, a cellular wireless network, or a modem. A wide variety of software applications can exchange data with SNAP Ethernet systems, including:

- Opto 22's own ioProject™ suite of control and HMI software
- Manufacturing resource planning (MRP), enterprise management, and other enterprise systems
- Human-machine interfaces (HMIs)
- Databases
- Email systems
- OPC client software
- Custom applications
- Modbus/TCP software and hardware.

SNAP Ethernet system hardware consists of controllers and I/O units. Controllers provide central control and data distribution. I/O units provide local connection to sensors and equipment.

SNAP OEM Systems

Opto 22 SNAP OEM I/O systems are highly configurable, programmable processors intended for OEMs, IT professionals, and others who need to use custom software with Opto 22 SNAP I/O modules.

Linux® applications running on these systems can read and write to analog, simple digital, and serial I/O points on SNAP I/O modules using easily implemented file-based operations. Applications can be developed using several common development tools and environments, including C or C++, Java, and shell scripts.

M2M Systems

Machine-to-machine (M2M) systems connect your business computer systems to the machines, devices, and environments you want to monitor, control, or collect data from. M2M systems often use wireless cellular communications to link remote facilities to central systems over the Internet, or to provide monitoring and control capability via a cellular phone.

Opto 22's Nvio™ systems include everything you need for M2M—interface and communications hardware, data service plan, and Web portal—in one easy-to-use package. Visit nvio.opto22.com for more information.

Opto 22 Software

Opto 22's ioProject and FactoryFloor® software suites provide full-featured and cost-effective control, HMI, and OPC software to power your Opto 22 hardware. These software applications help you develop control automation solutions, build easy-to-use operator interfaces, and expand your manufacturing systems' connectivity.
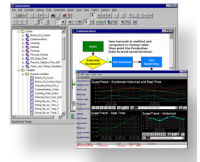
Quality

In delivering hardware and software solutions for worldwide device management and control, Opto 22 retains the highest commitment to quality. We do no statistical testing; each product is made in the U.S.A. and is tested twice before leaving our 160,000 square-foot manufacturing facility in Temecula, California. That's why we can guarantee solid-state relays and optically-isolated I/O modules *for life*.

Product Support

Opto 22's Product Support Group offers comprehensive technical support for Opto 22 products. The staff of support engineers represents years of training and experience, and can assist with a variety of project implementation questions. Product support is available in English and Spanish from Monday through Friday, 7 a.m. to 5 p.m. PST.

Web Sites

.opto22.com
opto22.com
.internetio.com (live Internet I/O demo)

Other Resources

- OptoInfo CDs
- Custom integration and development
- Hands-on customer training classes.

About Opto 22

Opto 22 manufactures and develops hardware and software products for industrial automation, remote monitoring, enterprise data acquisition, and machine-to-machine (M2M) applications. Using standard, commercially available Internet, networking, and computer technologies, Opto 22's input/output and control systems allow customers to monitor, control, and acquire data from all of the mechanical, electrical, and electronic assets that are key to their business operations. Opto 22's products and services support automation end users, OEMs, and information technology and operations personnel.

Founded in 1974 and with over 85 million Opto 22-connected devices deployed worldwide, the company has an established reputation for quality and reliability.

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