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Form 990-011107

Description

Part Number	Description
M4DUALARC	Dual twisted-pair ARCNET ports for M4 controllers

The M4DUALARC is a twisted-pair ARCNET® network interface card for Opto 22's M4 family of modular controllers. It provides the capability to construct a point-to-point or multidrop topology ARCNET network using CAT-3 or CAT-5 cable.

The two nodes on the M4DUALARC interface card can be used as separate communication ports, or they can be configured for redundant operation using Opto 22 FactoryFloor™ industrial automation software. If configured for redundant operation, you can use dual twisted-pair cable or maintain two completely separate data links. For convenience, screw-type connectors and RJ-11 modular jacks are provided, eliminating the need for special cable connections.

Primary Function

The M4DUALARC interface card controls one or more Opto 22 "HA" style SNAP brains when installed in an Opto 22 M4-family controller such as the M4RTU or the SNAP-LCM4. Other Opto 22 M4 ARCNET cards, including the M4SARC and M4SARCF, can be installed concurrently with the M4DUALARC card in the same controller. The M4-family controller connects to a SNAP brain with a single, twisted-pair cable daisy-chained from the M4DUALARC card to each SNAP brain.

M4DUALARC Network Interface Card

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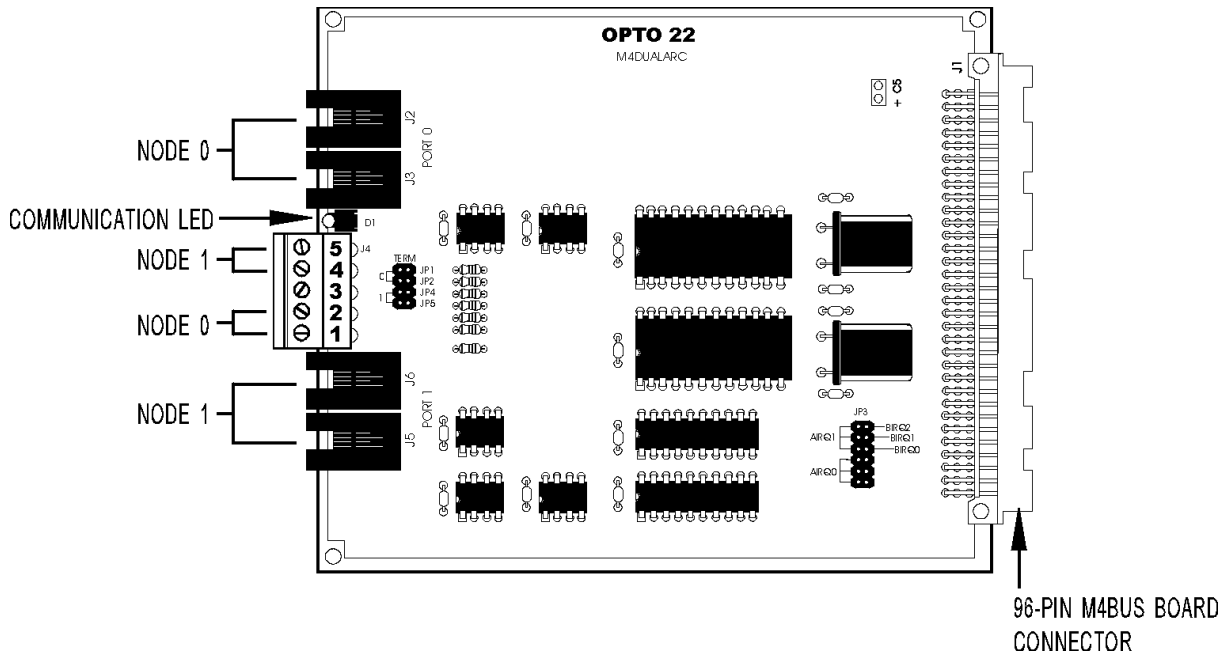
Description (continued)

FactoryFloor's multiple configuration options also let you use the M4DUALARC card for PC-to-M4 host communications. The M4DUALARC's flexibility allows peer-to-peer communication between all controllers using the twisted-pair ARCNET topology. One Opto 22 controller can use the ARCNET network to support up to 255 device addresses. (M4-family controller firmware currently does not support redundant communication with a PC or with other controllers.)

Advantages

Speed, distance, and ease of implementation are the significant advantages of an Opto 22 controller network based on twisted-pair ARCNET. An Opto 22 ARCNET network transfers data at 2.5 Mbps, and allows total network distances of up to 1,000 feet without a repeater. total network distances of up to 20,000 feet. (For data transfer at up to 100 Mbps, consider using an Ethernet network and Opto 22's M4SENET-100 interface card.) With commercial hubs and repeaters, an ARCNET network of virtually any size can be created.
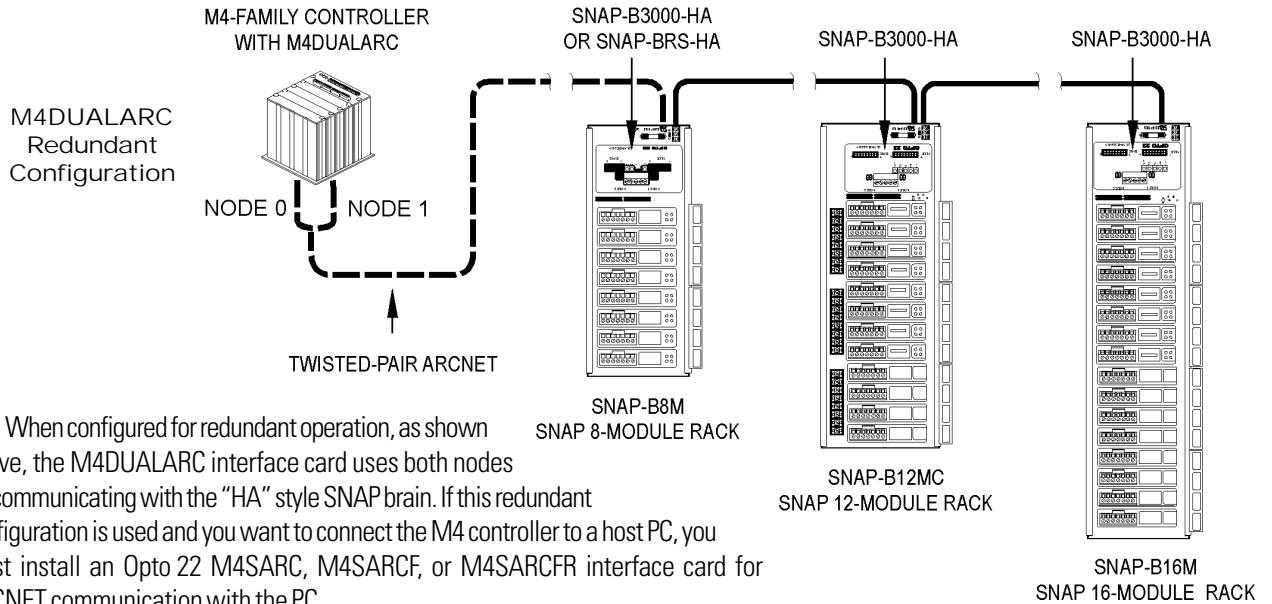
Software

The M4DUALARC interface card is designed to work with FactoryFloor, Opto 22's powerful suite of 32-bit industrial automation software for Microsoft® Windows® 95, Windows 98, and Windows NT®. FactoryFloor consists of four integrated components:

- OptoControl™, a graphical, flowchart-based development environment for machine control and process applications
- OptoDisplay™, an intuitive, shared database, human-machine interface (HMI) and trending package, including alarming
- OptoServer™, a robust, OPC-compliant data server that connects the controller network with the PC network
- OptoConnect™, a bidirectional link between the Opto 22 database in the controller and Microsoft's SQL Server and Access databases.

Specifications

Item	Specification
Transfer Rate	2.5 Mbps
Termination	Jumper selectable
Topology	Multidrop
Cable	CAT-3 or CAT-5 UTP
Connectors	Screw-type barrier strip and RJ-11 modular jacks
Indicators	Single LED; indicates when a node on the card is addressed

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M4DUALARC System Architecture

M4DUALARC Redundant Configuration

M4-FAMILY CONTROLLER WITH M4DUALARC

NODE 0   NODE 1

TWISTED-PAIR ARCNET

SNAP-B3000-HA OR SNAP-BRS-HA

SNAP-B3000-HA

SNAP-B3000-HA

SNAP-B8M
SNAP 8-MODULE RACK

SNAP-B12MC
SNAP 12-MODULE RACK

SNAP-B16M
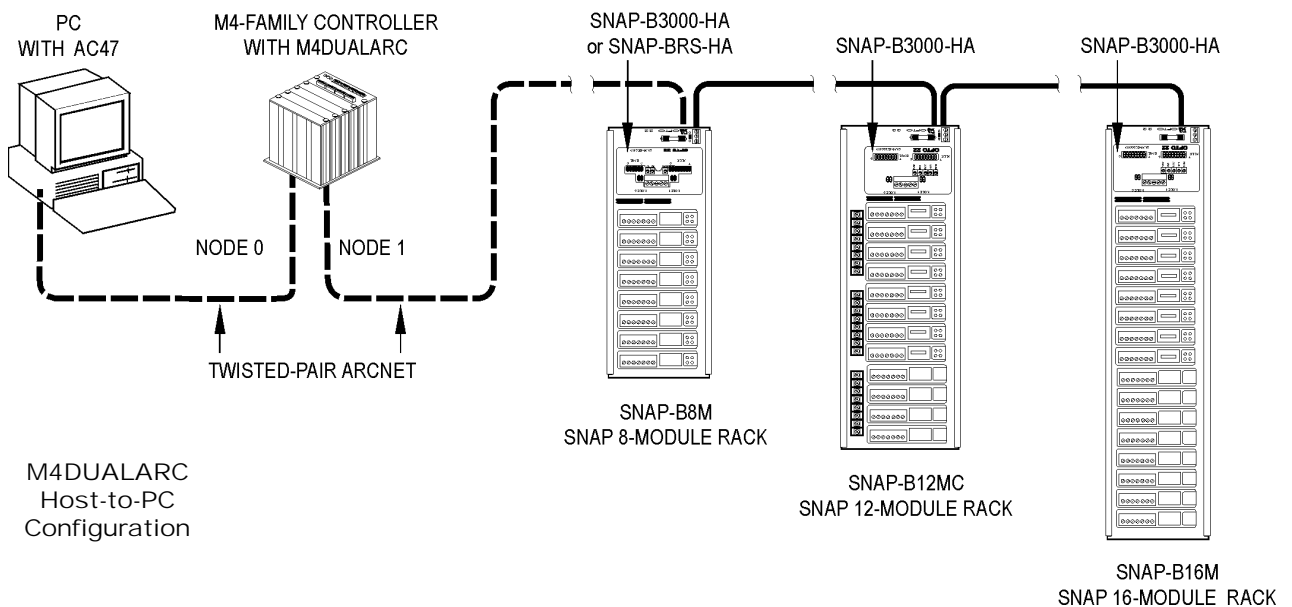SNAP 16-MODULE RACK

When configured for redundant operation, as shown above, the M4DUALARC interface card uses both nodes for communicating with the "HA" style SNAP brain. If this redundant configuration is used and you want to connect the M4 controller to a host PC, you must install an Opto 22 M4SARC, M4SARCF, or M4SARCFR interface card for ARCNET communication with the PC.

The use of a single twisted-pair node to talk to brains is also supported. The example below shows node 0 used for host-to-controller communication, and shows node 1 used to talk to "HA" style SNAP brains. (M4-family controller firmware currently does not support redundant communication with the host.)

Note: M4DUALARC card nodes are designated 0 and 1, but these should not be mistaken with the node IDs. Each ARCNET node in the controller has a node ID; it is the same as the controller's address.

PC WITH AC47

M4-FAMILY CONTROLLER WITH M4DUALARC

NODE 0   NODE 1

TWISTED-PAIR ARCNET

M4DUALARC Host-to-PC Configuration

SNAP-B3000-HA or SNAP-BRS-HA

SNAP-B3000-HA

SNAP-B3000-HA

SNAP-B8M
SNAP 8-MODULE RACK

SNAP-B12MC
SNAP 12-MODULE RACK

SNAP-B16M
SNAP 16-MODULE RACK

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Installation

The M4DUALARC interface card can be installed in an M4-family controller with other Opto 22 M4 ARCNET cards such as the M4SARC or M4SARCF.

Note: Before installing and activating the M4DUALARC, terminate all unused ARCNET nodes and nodes located at the physical end of the twisted-pair ARCNET network. This is required for the controller and the interface card to operate correctly.

To configure and install an M4DUALARC interface card, perform the steps in each of the following sections:

Preparing the Card for Installation

If required, install ARCNET termination jumpers on the interface card. Since the two ports on the M4DUALARC can be used independently or configured as a redundant pair, you can configure node termination individually for node 0 and node 1. Install ARCNET termination jumpers as follows:

- For node 0, install TERM jumpers JP1 and JP2.
- For node 1, install TERM jumpers JP4 and JP5.
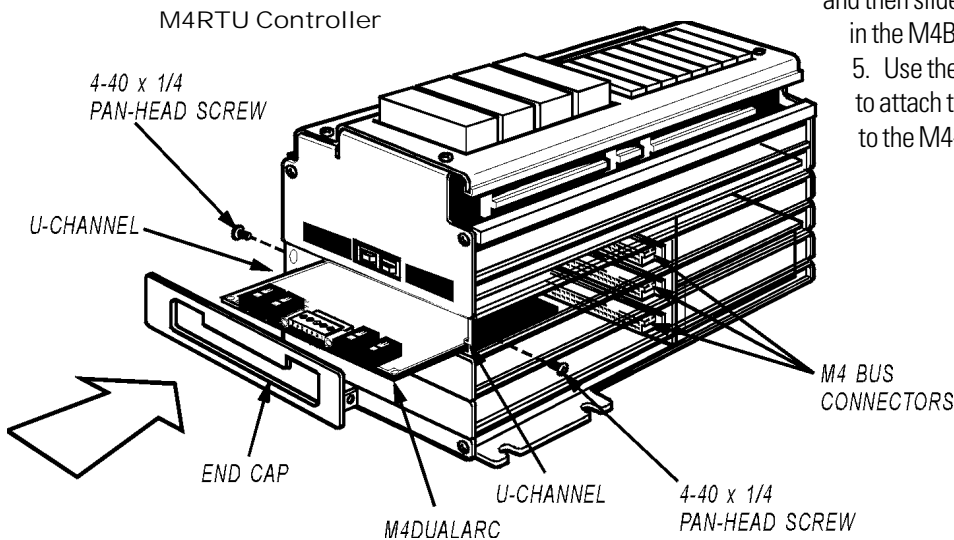- Do not install jumpers for nodes in the middle portion of the ARCNET network.

Note: Do not install IRQ jumpers on the M4DUALARC card. Although there are several interrupt jumpers labeled AIRQ and BIRQ, interrupt functions are not used.

Inserting the Card in an M4-Family Controller (except SNAP-LCM4)

1. Turn off the controller.
2. Select an unused M4BUS expansion slot. Port numbers for the two ports on the M4DUALARC card are set automatically when the card is inserted in the controller. Port numbers for all M4-family controllers except the SNAP-LCM4 are shown below:

M4 Expansion Slot	Controller Port Numbers
Top	12 and 13
Center	14 and 15
Bottom	16 and 17

3. Remove the end cap of the expansion slot you selected. End caps are located below the serial connectors, as shown in the illustration below.

    Each end cap is held in place by two screws located on the side panel, adjacent to each end cap. Save these screws after you remove them. To correctly align the interface card, you may need to remove additional end caps from the controller.
4. Align the edges of the M4DUALARC card with the U-channels on the sides of the selected expansion slot, and then slide the card in until it is seated firmly in the M4BUS connector.
5. Use the screws from the original end cap to attach the included M4DUALARC end cap to the M4-family controller.

M4RTU Controller

4-40 x 1/4 PAN-HEAD SCREW

U-CHANNEL

END CAP

M4DUALARC

U-CHANNEL

4-40 x 1/4 PAN-HEAD SCREW

M4 BUS CONNECTORS

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Installation (continued)

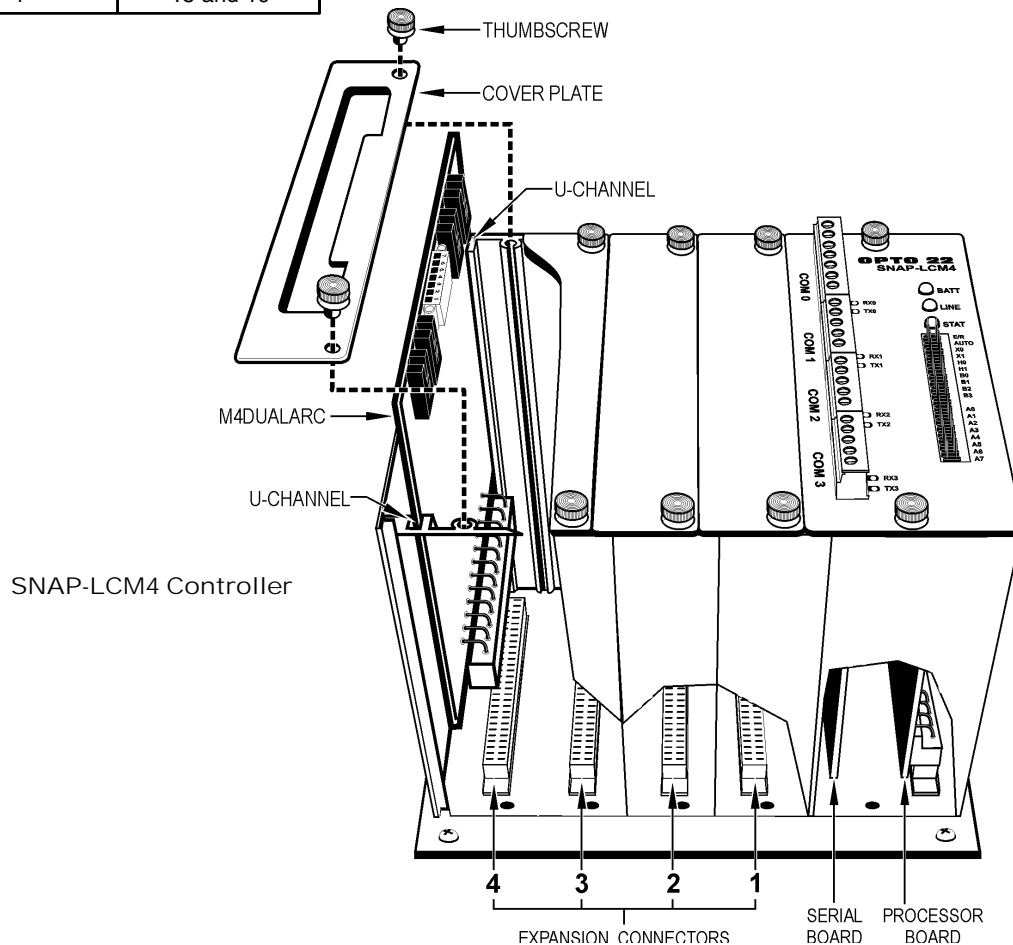### Inserting the Card in a SNAP-LCM4 Controller

1. Turn off the controller.
2. Select an unused M4BUS expansion slot. Port numbers for the two ports on the M4DUALARC card are set automatically when the card is inserted in the controller. Port numbers for the SNAP-LCM4 are shown below.

SNAP-LCM4 Expansion Slot	Controller Port Numbers
1	12 and 13
2	14 and 15
3	16 and 17
4	18 and 19

3. Remove the cover plate of the expansion slot you selected. Cover plates are located to the left of the serial connectors on the top of the SNAP-LCM4, as shown in the illustration below.

    Each cover plate is held in place by two thumbscrews. Save these thumbscrews after you remove them.
4. Align the edges of the M4DUALARC card with the U-channels on the sides of the selected expansion slot, and then slide the card in until it is seated firmly in the M4BUS connector.
5. Use the thumbscrews from the original cover plate to attach the included M4DUALARC cover plate to the SNAP-LCM4 controller.

SNAP-LCM4 Controller

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Installation (continued)

Setting ARCNET Host Port Jumpers

To configure your controller to use the M4DUALARC interface card, change jumper settings to match those shown in the table below.

Warning: Jumpers must be set correctly for the M4DUALARC card to operate. Verify your jumper settings carefully before turning on the controller.

The host jumpers on the controller determine which host port is used for ARCNET communication when the controller is powered up or reset. Only the lowest numbered ARCNET port in the controller can be a host port. For example, if an M4SARC coaxial ARCNET card and an M4DUALARC card are both installed in a controller (with host port jumpers set for ARCNET), the coaxial ARCNET port on the M4SARC card will be the host port because it has the lowest ARCNET port number (4).

If an M4-family controller has jumper settings configured for ARCNET, but an ARCNET card is not installed, COM0 will be the host port by default.

Connecting the Controller to a Network or to SNAP Brains

To connect the M4-family controller to an Opto 22 controller network or to one or more SNAP "HA" style brains, attach twisted-pair ARCNET cable to either the screw-type connectors or the RJ-11 modular jacks on the M4DUALARC card. The screw-type connectors and RJ-11 modular jacks are illustrated below.

Warning: Connect the unused pairs (wires) to ground at one end only.

Warning: When you connect devices on a twisted-pair ARCNET network, be careful to connect the positive terminal of one device to the positive terminal of the next device on the network. Likewise, connect the negative terminal of one device to the negative terminal of the next device. Connecting terminals incorrectly may prevent the network from operating correctly. If you are not sure of a terminal's polarity, check it with a voltage meter.

Recommended ARCNET Networking Hardware

Opto 22 recommends ARCNET cards and networking components from the following manufacturer:
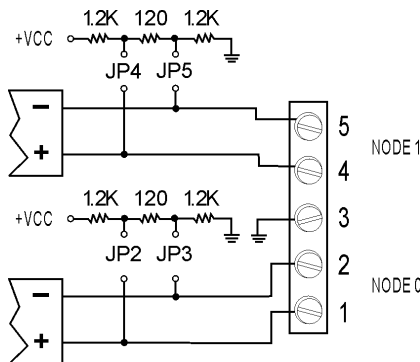
Contemporary Control Systems, Inc. (CCSI)
2431 Curtiss Street
Downers Grove, IL 60515

Phone: (630) 963-7070
FAX: (630) 963-0109

E-mail: info@ccontrol.com
Web: www.ccontrol.com (or www.ccontrols.com)

See Opto 22 form 1294 for more information about using Contemporary Control Systems' ARCNET equipment with Opto 22 products, or contact Opto 22 Product Support. Contact information appears at the bottom of the page.
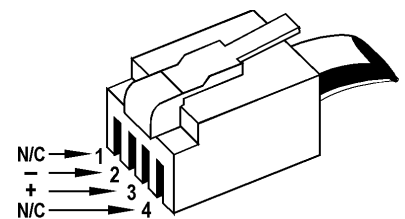
Controller Jumper Settings for ARCNET Host Port

All M4-Family Controllers		
	Jumpers	
	H0	**H1**
COM0	In	In
COM1	Out	In
ARCNET	In	Out
Ethernet	Out	Out

Screw-Type Connector ARCNET Connections

Pinouts for RJ-11 Modular Jacks

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More About
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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.

Opto 22 Web Sites
- www.opto22.com
- nvio.opto22.com
- www.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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