

### Description

The M4SARC is a coaxial cable ARCNET® network interface card for Opto 22's M4 family of modular controllers. It provides the capability to construct a point-to-point or star topology ARCNET network using RG62A/U coaxial cable and BNC-style connectors. Both active and passive ARCNET hubs can be used to establish a star topology. Other Opto 22 M4 ARCNET cards, including the M4DUALARC and M4SARCF, can be installed concurrently with the M4SARC card in the same controller.

### Primary Function

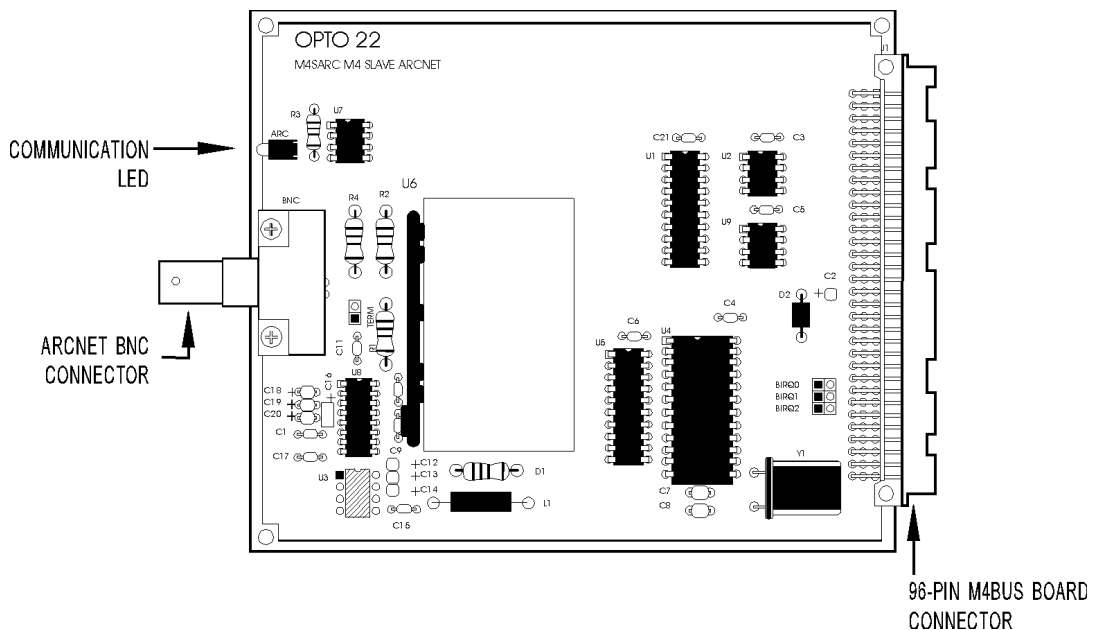
When installed in an Opto 22 M4-family controller, such as the SNAP-LCM4 or the M4RTU, the M4SARC interface card

Part Number	Description
M4SARC	M4 ARCNET Adapter

provides ARCNET connections to form the physical layer of an Opto 22 controller network that can be used by a PC and multiple M4-family Opto 22 controllers. One network of Opto 22 controllers can support up to 255 controllers and provides peer-to-peer communications between all controllers on the link. More than one network of Opto 22 controllers can be linked to a single PC, allowing a user to build large distributed control systems.

Using Opto 22 M4SARC, M4DUALARC, M4SARCF, and M4SARCFR ARCNET interface cards, plus the appropriate PC and active hub equipment, you can construct an extensive network of coaxial, twisted-pair, and fiber optic ARCNET for Opto 22 controllers.

M4SARC Network Interface Card



### Description (continued)

#### Advantages

Speed, distance, and ease of implementation are the significant advantages of an Opto 22 controller network based on coaxial ARCNET. The BNC-style connectors used for coaxial ARCNET also provide easy single-cable network installation. An Opto 22 ARCNET network transfers data at 2.5 Mbps and allows 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.) Using commercial hubs and repeaters, an ARCNET network of virtually any size can be created.

#### Software

The M4SARC 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:

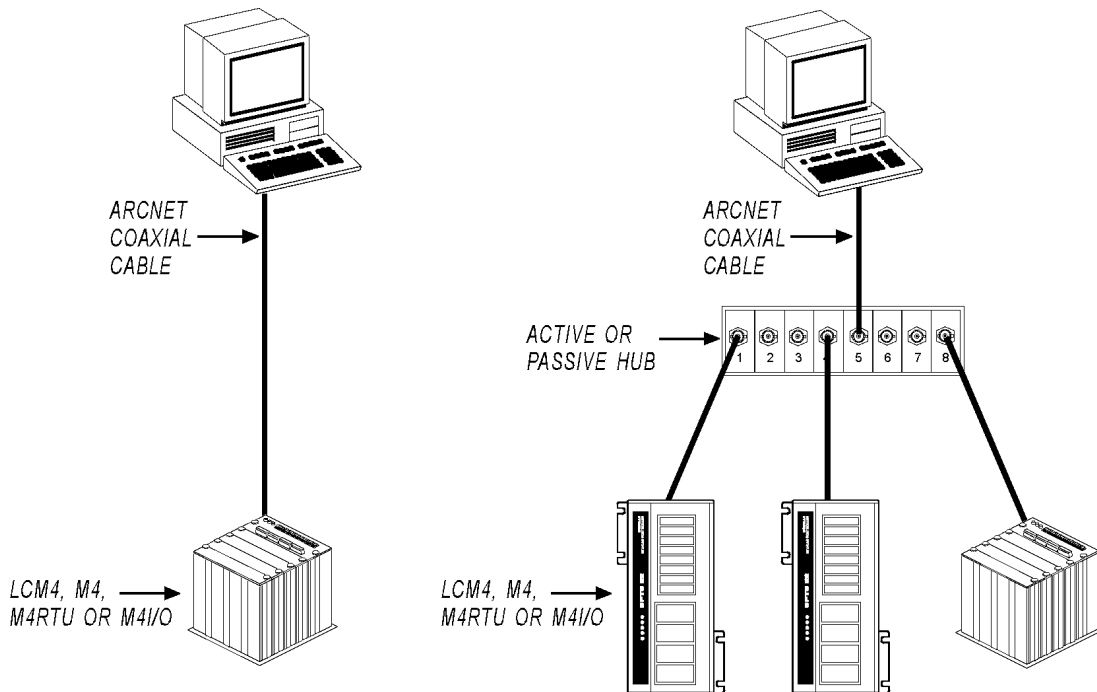
- OptoControl™, a graphical, flowchart-based development environment for machine control and process applications
- OptoDisplay™, an intuitive, shared database, human-machine interface (HMI) and trending package, including alarming
- OptoServer™, a robust, OPC-compliant data server that connects the 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	93 Ohms
Address range	1 to 255, 0 not used
Topology	Star
Cable	RG65A/U
Connectors	BNC
Normal signal levels	20 VPP output, 7.5 VPP input
Minimum signal levels	16 VPP output, 6.0 VPP input
Access time	Deterministic (token passing)
Distances:	
Total network	20,000 ft. (6,096 m.)
Active hub to active hub	2,000 ft. (610 m.)
Active hub to M4-series controller	2,000 ft. (610 m.)
Active hub to passive hub	100 ft. (30 m.)
Passive hub to M4-series controller	100 ft. (30 m.)
Power requirement (at 5 VDC)	140 mA
Typical operating temperature	-20° C to 70° C
Storage temperature	-40° C to 85° C
Indicators	Single LED; indicates when a node on the card is addressed

### M4SARC System Architecture

M4SARC Network Configuration



### Installation

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

**Note:** Before installing and activating the M4SARC, terminate all unused ARCNET nodes and nodes located at the physical end of the ARCNET network. This termination is required for the controller and the interface card to operate correctly.

### Preparing the Card for Installation

The M4SARC interface card itself has built-in termination and does not need to be terminated.

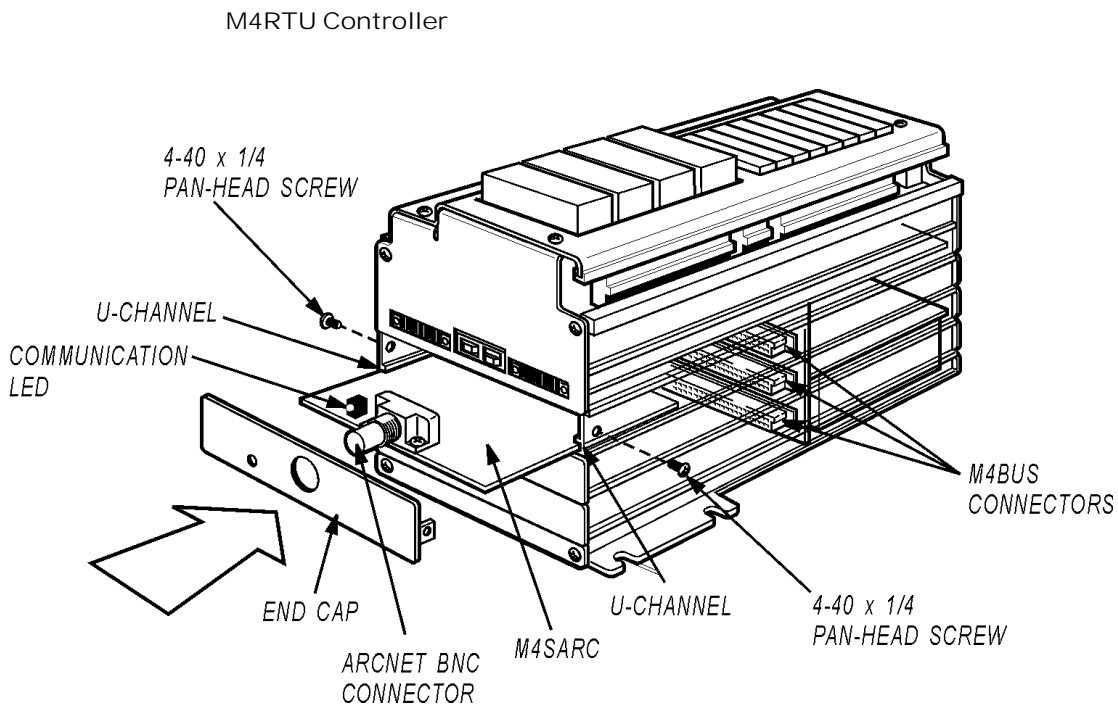
**Note:** Do not install a terminating jumper on the TERM jumper on the M4SARC card. This jumper is not used, and the interface card will not operate if this jumper is terminated.

### Installation (continued)

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

1. Turn off the controller.
2. Select an unused M4BUS expansion slot and remove the end cap. 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

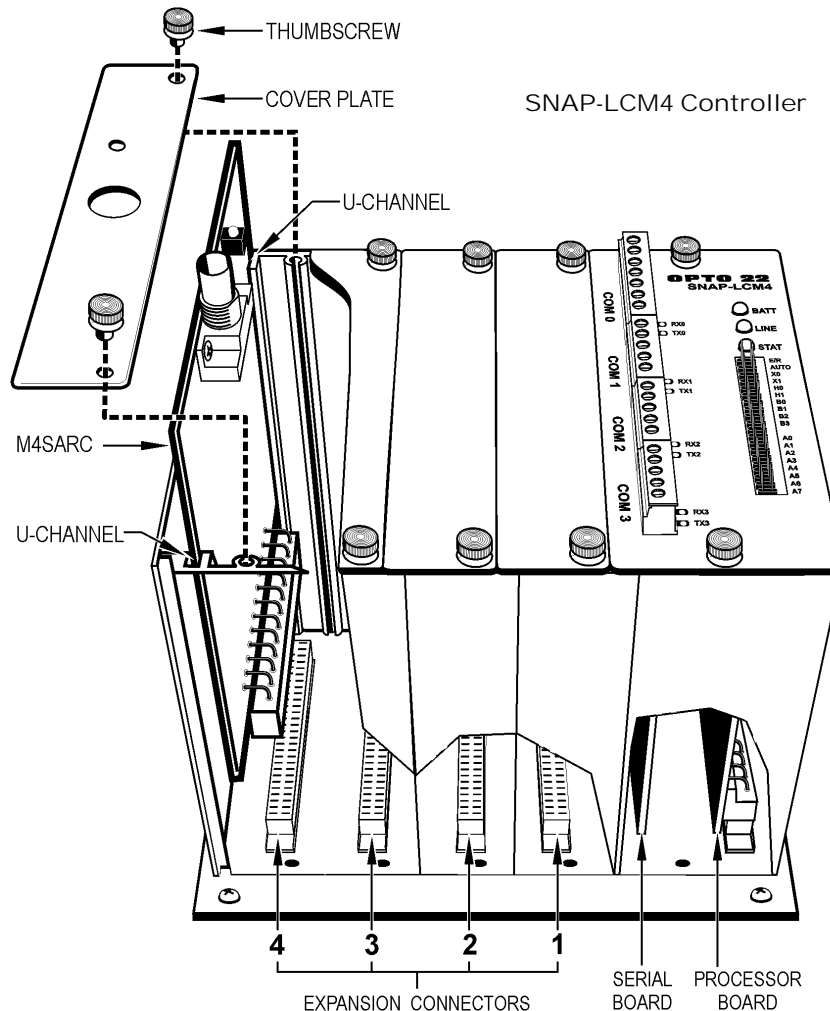
4. Align the edges of the M4SARC card with the U-channels on the sides of the selected expansion slot, and then slide the card in until it is seated firmly in the M4BUS connector.
5. Use the screws from the original end cap to attach the included M4SARC end cap to the M4-family controller.



### Installation (continued)

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

1. Turn off the controller.
2. Select an unused M4BUS expansion slot and remove the cover plate. 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 M4SARC 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 M4SARC cover plate to the SNAP-LCM4 controller.



### Installation (continued)

#### Connecting the Controller to a Network

To connect the M4-family controller to an Opto 22 controller network, attach the appropriate RG62A/U coaxial cable to the M4SARC card's BNC-style connector.

#### Setting ARCNET Host Port Jumpers

To configure your controller to use the M4SARC interface card, change controller jumper settings to match those shown in the table below.

**Warning:** Jumpers must be set correctly for the M4SARC 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 twisted-pair 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.

#### Setting an ARCNET Node Address

To communicate on an ARCNET network, each M4-family controller on the network must have a unique node address between 1 and 255. The node address is set using the controller's address jumpers. See the user's guide for your controller for specific information on configuring address jumpers.

#### 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](mailto:info@ccontrol.com)

Web: [www.ccontrol.com](http://www.ccontrol.com) (or [www.ccontrols.com](http://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



## 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](http://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](http://www.opto22.com)
- [nvio.opto22.com](http://nvio.opto22.com)
- [www.internetio.com](http://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.