

### Description

The M4SARCF adapter and M4SARCFR repeater are fiber optic ARCNET® network interface cards for Opto 22's M4 family of modular controllers. These interface cards provide the capability to construct a point-to-point, star, or multidrop topology fiber optic ARCNET network using 62.5/125 micrometer fiber-optic cable and ST-style connectors.

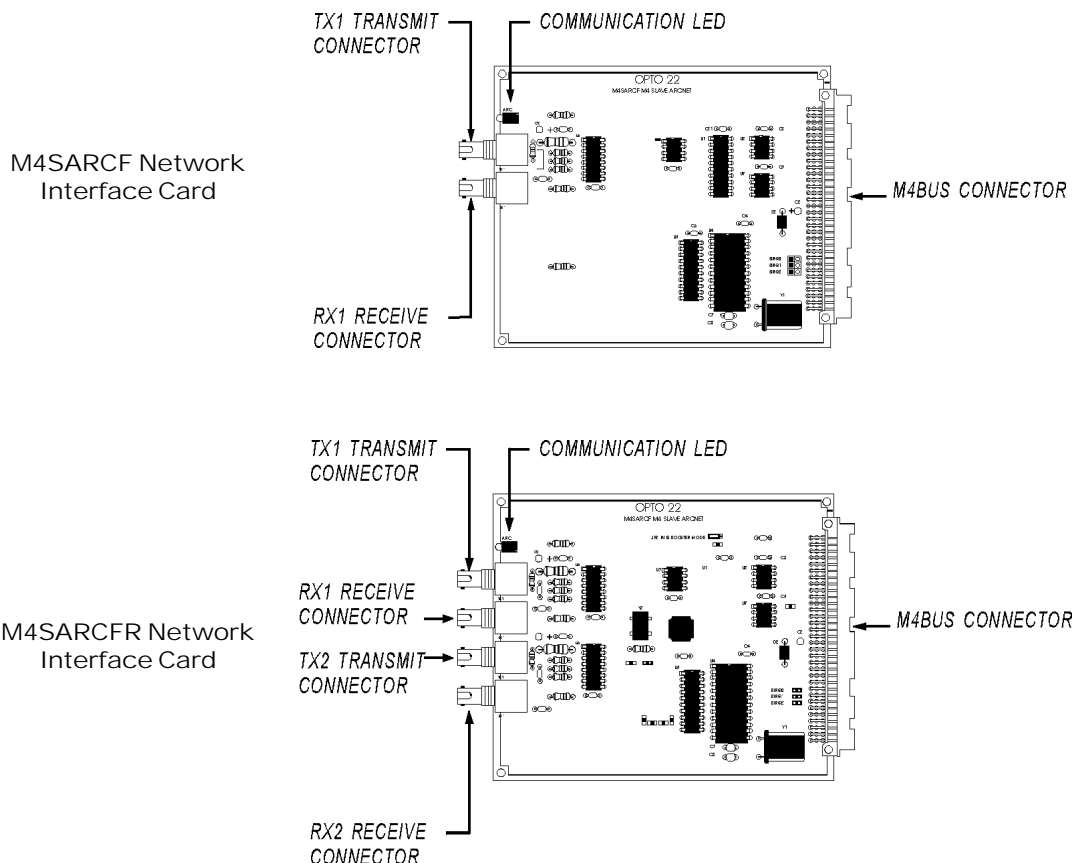
When installed in an Opto 22 M4-family controller such as the M4RTU or the SNAP-LCM4, the M4SARCF and M4SARCFR interface cards provide fiber optic ARCNET connections to form the physical layer of an Opto 22 controller network. For additional ARCNET connectivity, Opto 22's M4DUALARC twisted-pair ARCNET card can be installed concurrently with the M4SARCF or M4SARCFR cards in the same M4-family controller.

Part Number	Description
M4SARCF	M4 ARCNET Adapter Fiber Optic
M4SARCFR	M4 ARCNET Repeater Fiber Optic

### Primary Function

Opto 22 M4SARCF and M4SARCFR cards provide a primary transmit and receive channel on a fiber optic ARCNET network. Either two single-fiber optic cables or one duplex fiber optic cable can be used for connections between a PC, active hubs, and M4-family controllers. Active fiber optic ARCNET hubs can be used to establish a star topology Opto 22 controller network. The M4SARCFR contains a built-in repeater to repeat the signal back to the network for multidrop configurations.

Using Opto 22 M4SARCF, M4SARCFR, and M4SARCFR ARCNET interface cards, plus the appropriate PC and active hub equipment, you can construct an extensive Opto 22 controller network consisting of both coaxial and fiber optic ARCNET.



### Description (continued)

One Opto 22 controller network can support up to 255 M4-family and other Opto 22 controllers. An Opto 22 controller network also supports peer-to-peer communications between all controllers on the network. More than one Opto 22 controller network can be linked to a single PC, allowing you to develop large, distributed control systems.

#### Advantages

Speed, distance, noise immunity and electrical isolation are the significant advantages of an Opto 22 controller network based on fiber optic ARCNET. A fiber optic ARCNET network transfers

data at 2.5 Mbps and allows longer total network distances than coaxial ARCNET.

The high noise immunity and electrically isolated properties of fiber optic cable provide a highly robust Opto 22 controller network ideal for noisy and/or hazardous environments, such as electrical substations, co-generation plants, and oil platforms.

#### Software

The M4SARCF and M4SARCFR interface cards are designed to work with FactoryFloor, Opto 22's powerful suite of 32-bit industrial automation software for Microsoft® Windows® 95,

### Specifications

Item	Specification
Transfer rate	2.5 Mb/sec.
Address range	1 to 255
Recommended fiber size	62.5/125 $\mu$ m
Recommended fiber optic cable	Belden P/N 225812 (duplex) Belden P/N 225811 (single, two required)
Connector	ST
Topology	Star and multidrop
Maximum cable length between Opto 22 devices <sup>1</sup>	16,000 ft. (approx. 3 miles)
Maximum repeaters on fiber segment (including hubs)	5
Transmitter characteristics (typical): Optical power output Peak emission wavelength Numerical aperture Optical port diameter	-10 dBm 820 nm 0.31 150 mm
Receiver characteristics (typical): Receiver sensitivity Equivalent numerical aperture Optical port diameter	-24 dBm 0.150 400 mm
Power requirement (at 5 VDC)	220 mA
Typical operating temperature	-20° C to 70° C
Storage temperature	-40° C to 85° C
Indicators	Single LED; lights when the controller is actively communicating on the ARCNET network., and during controller initialization upon reset.

<sup>1</sup> If you are using an active hub, consult the hub specifications for maximum link distances.

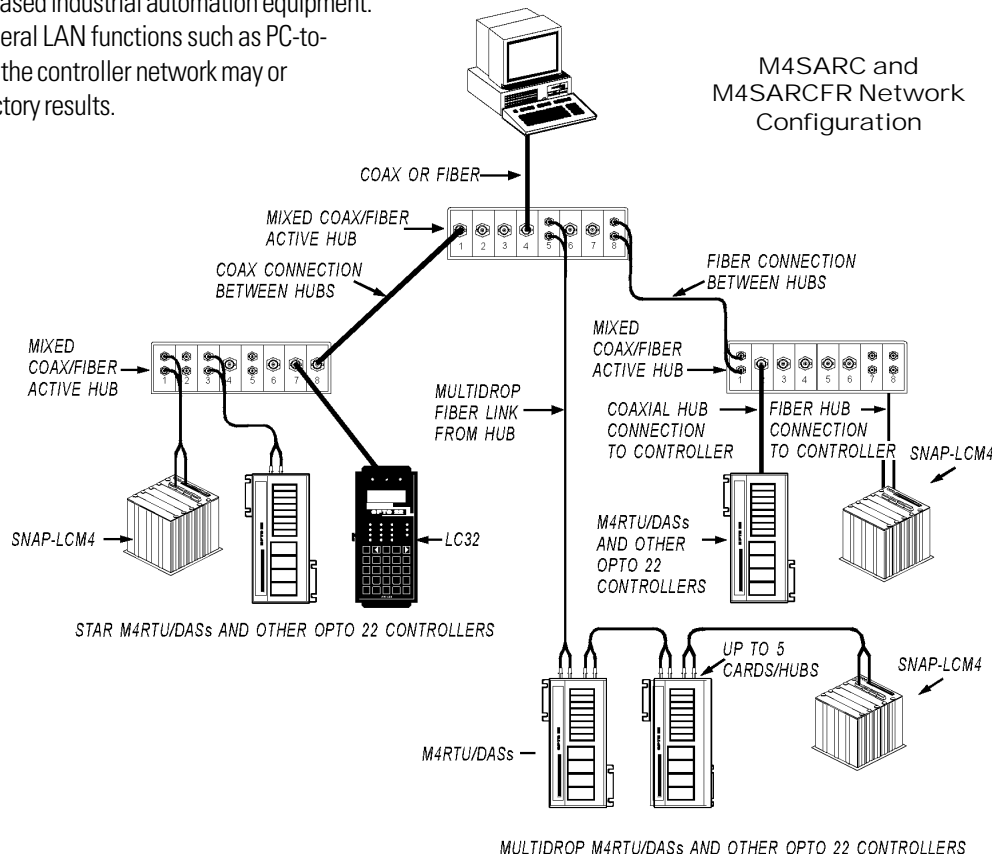
### Description (continued)

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.

### M4SARCR and M4SARCFR System Architecture

**Important:** The Opto 22 controller network is not a generic ARCNET local area network (LAN). It is a controller bus intended to support Opto 22 PC-based industrial automation equipment. Trying to support general LAN functions such as PC-to-PC file transfers over the controller network may or may not yield satisfactory results.



### Installation

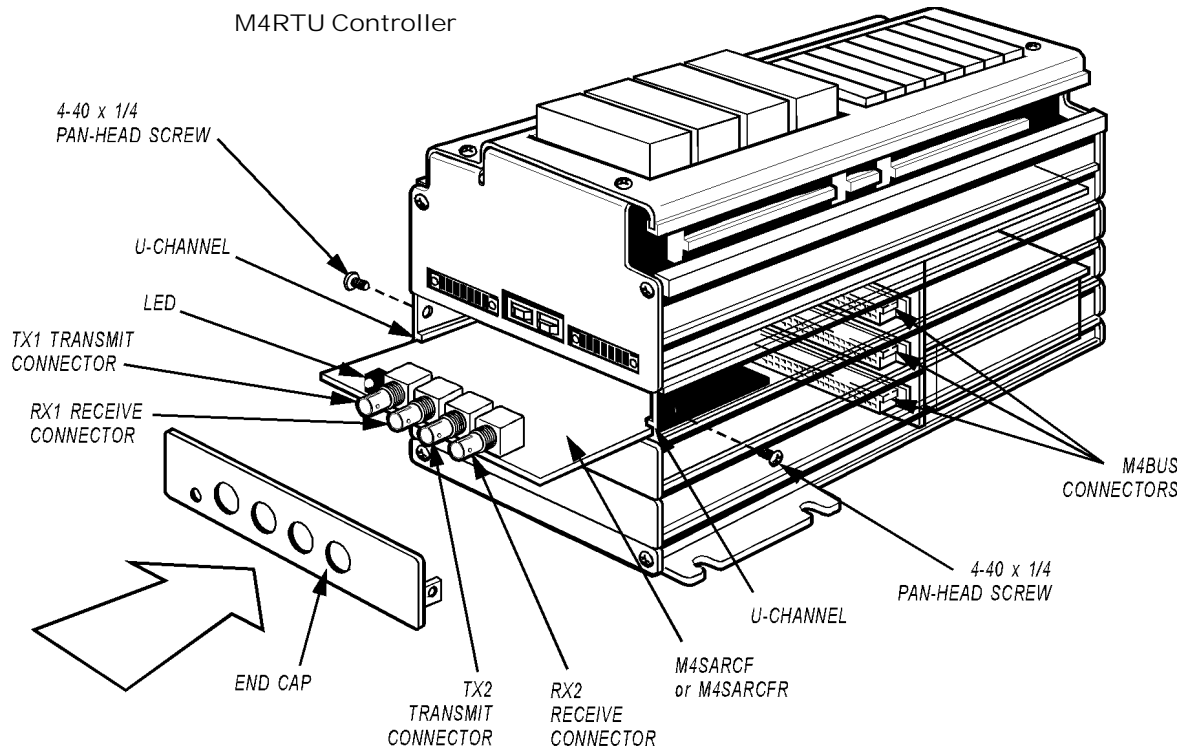
Opto 22 M4SARCF and M4SARCFR interface cards can be installed in an M4-family controller with the M4DUALARC ARCNET card.

**Warning:** Do not use the fiber optic connectors on the card as handles when installing or removing the M4SARCF or M4SARCFR interface card.

**Note:** Do not install IRQ jumpers on the M4SARCF or M4SARCFR card. Although there are several interrupt jumpers labeled 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 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 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 interface 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 end cap included with the M4SARCF or M4SARCFR to the M4-family controller.



### Installation (continued)

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

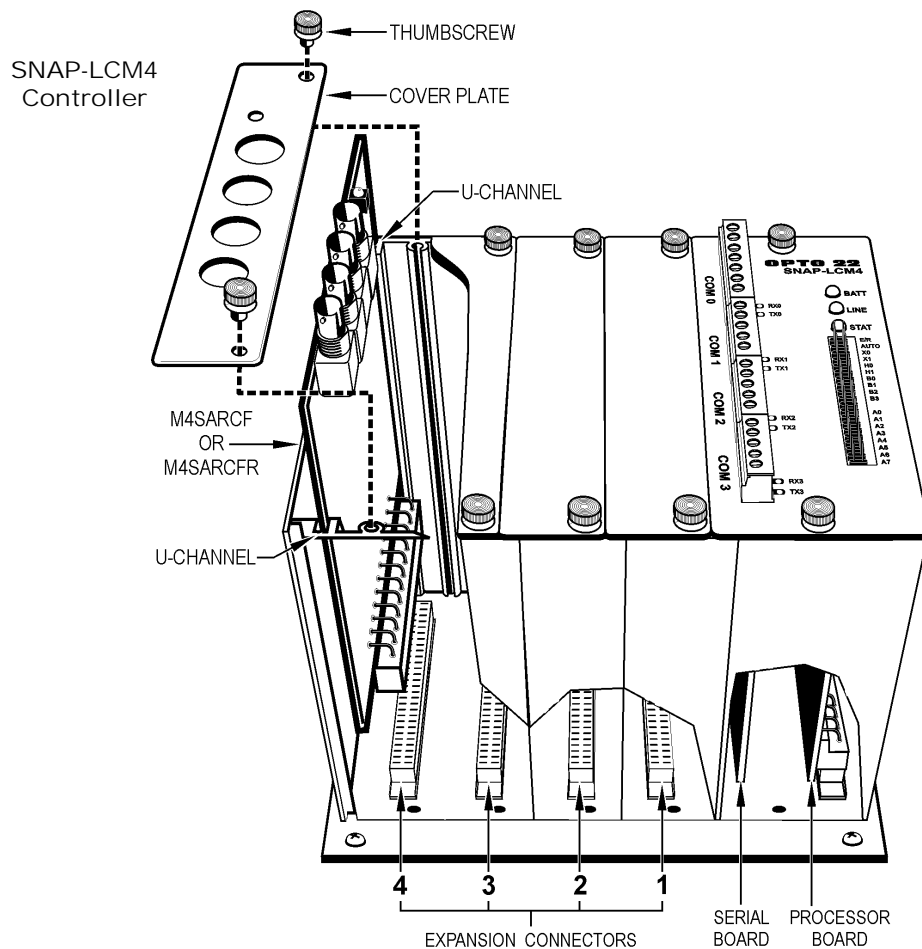
1. Turn off the controller.
2. Select an unused M4BUS expansion slot and remove the cover plate. Cover plates are located to the left of the serial connectors on the top of the SNAP-LCM4, as shown in the illustration below. Each cover plate is held in place by two thumbscrews. Save these thumbscrews after you remove them.
4. Align the edges of the interface 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 cover plate included with the M4SARCF or M4SARCFR to the SNAP-LCM4 controller.

#### Setting ARCNET Host Port Jumpers

To configure your controller to use an Opto 22 ARCNET interface card, change controller jumper settings to match those shown in the table "Controller Jumper Settings for ARCNET Host Port."

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



### Installation (continued)

The host jumpers on the controller determine which port is used for communication with the host 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 M4SARCF or M4SARCFR fiber optic ARCNET card and an M4DUALARC twisted-pair ARCNET card are both installed in a controller (with host port jumpers set for ARCNET), the fiber optic ARCNET port on the M4SARCF 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.

Controller Jumper Settings  
for ARCNET Host Port

	<b>All M4-Family Controllers</b>	
	Jumpers	
	<b>H0</b>	<b>H1</b>
<b>COM0</b>	In	In
<b>COM1</b>	Out	In
<b>ARCNET</b>	In	Out
<b>Ethernet</b>	Out	Out

### Connecting the Controller to a Network

To connect the M4-family controller to an Opto 22 controller network, attach 62.5/125 micrometer fiber optic cable with ST-style connectors to the Transmit (TX) and Receive (RX) connectors on the M4SARCF or M4SARCFR card.

When you connect devices on a fiber-optic ARCNET network, make sure the TX connector of one device connects to the RX connector of the next device on the network. Likewise, make sure the RX connector of one device connects to the TX connector of the next device on the network. Incorrectly connecting TX and RX connectors will prevent your network from operating correctly.

### 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.



## 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.