MMC2000/200 Series

Mini Switching Media Converters

- AT-MMC2000/SC
- AT-MMC2000/ST
- AT-MMC2000/LC
- AT-MMC2000/SP
- AT-MMC2000LX/SC
- AT-MMC2000LX/LC
- AT-MMC200/SC
- AT-MMC200/ST
- AT-MMC200/LC
- AT-MMC200LX/SC
- AT-MMC200LX/ST

Installation Guide

613-002037 Rev C

Electrical Safety and Emissions Standards

This section contains the following:

US Federal Communications Commission

Radiated Energy

Note
This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Note
Modifications or changes not expressly approved of by the manufacturer or the FCC, can void your right to operate this equipment.

Industry Canada

Radiated Energy

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Emissions, Immunity and Electrical Safety Standards

RFI Emissions FCC Class A, EN55022 Class A, CISPR 22 Class A, VCCI Class A, RCM

Warning
In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. ✍ E84

EMC (Immunity) EN55024, EN61000-3-2, EN61000-3-3

Electrical Safety EN60950-1 (TUV), UL 60950-1 ($_{C}$UL$_{US}$)

Warning
Laser Safety: EN60825 ✍ L7

Translated Safety Statements

Important: The ✍ indicates that a translation of the safety statement is available in a PDF document titled *Translated Safety Statements* on the Allied Telesis website at **www.alliedtelesis.com/support**.

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Preface

This preface contains the following sections:

This guide contains the installation instructions for the following Mini Switching Media Converters.

- AT-MMC2000/SC
- AT-MMC2000/ST
- AT-MMC2000/SP
- AT-MMC2000/LC
- AT-MMC2000LX/LC
- AT-MMC2000LX/SC
- AT-MMC200/SC
- AT-MMC200/ST
- AT-MMC200/LC
- AT-MMC200LX/SC
- AT-MMC200LX/ST

Symbol Conventions

This document uses the following conventions:

Note
Notes provide additional information.

Caution
Cautions inform you that performing or omitting a specific action may result in equipment damage or loss of data.

Warning
Warnings inform you that performing or omitting a specific action may result in bodily injury.

Warning
Laser warnings inform you that an eye and skin hazard exists due to the presence of a Class 1 laser device.

Contacting Allied Telesis

If you need assistance with this product, you may contact Allied Telesis technical support by going to the Support & Services section of the Allied Telesis web site at **www.alliedtelesis.com/support**. You can find links for the following services on this page:

- 24/7 Online Support - Enter our interactive support center to search for answers to your questions in our knowledge database, check support tickets, learn about Return Merchandise Authorizations (RMAs), and contact Allied Telesis technical experts.
- USA and EMEA phone support - Select the phone number that best fits your location and customer type.
- Hardware warranty information - Learn about Allied Telesis warranties and register your product online.
- Replacement Services - Submit an RMA request via our interactive support center.
- Documentation - View the most recent installation guides, user guides, software release notes, white papers and data sheets for your product.
- Software Updates - Download the latest software releases for your product.

For sales or corporate contact information, go to **www.alliedtelesis.com/purchase** and select your region.

Chapter 1

Overview

This chapter contains the following sections:

Introduction

The AT-MMC2000/200 Series Mini Switching Media Converters are designed to extend the distance of your network by interconnecting LAN devices that are physically separated by large distances.

The AT-MMC2000/200 Series Mini Switching Media Converters include the following models:

- AT-MMC2000/SC
- AT-MMC2000/ST
- AT-MMC2000/SP
- AT-MMC2000/LC
- AT-MMC2000LX/LC
- AT-MMC2000LX/SC
- AT-MMC200/SC
- AT-MMC200/ST
- AT-MMC200/LC
- AT-MMC200LX/SC
- AT-MMC200LX/ST

Features

Here are the key features of the AT-MMC2000/200 Series converters:

- The media converter provides a smaller-sized space-saving alternative that allows enterprises to connect copper networks to fiber networks, offering a cost-effective method for integrating fiber-optic cabling into a 10/100/1000 or 10/100 UTP environment. See Table 1 for the specifications of the ports that the media converter is equipped with.

Table 1. Connecting Networks

Models	Fiber-optic Port		Copper Port
	Connector	L1 Standard	
AT-MMC2000/LC	LC	1000Base-SX	10/100/1000Base-T
AT-MMC2000/SC	SC		
AT-MMC2000/ST	ST		
AT-MMC2000LX/LC	LC	1000Base-LX	
AT-MMC2000LX/SC	SC		

Table 1. Connecting Networks (Continued)

Models	Fiber-optic Port		Copper Port
	Connector	L1 Standard	
AT-MMC200/LC	LC	100Base-FX	10/100/1000Base-T
AT-MMC200/SC	SC		
AT-MMC200/ST	ST		
AT-MMC200LX/SC	SC	100Base-LX	
AT-MMC200LX/ST	ST		
AT-MMC2000/SP	SFP slot	100/1000Base-X	

- The media converter operates at 1000Mbps full duplex (AT-MMC2000/SC, AT-MMC2000/ST, and AT-MMC2000/LC), 100/1000 Mbps full duplex (AT-MMC2000/SP, depending on the SFP type), or 100Mbps full duplex (AT-MMC200/SC, AT-MMC200/ST, and AT-MMC200/LC).
- The media converter can be installed on a desktop or can be wall mounted: easy to install and do not require any software configuration or management.
- Optional Speed/Duplex and Smart MissingLink™ (SML) settings may be configured using DIP switches.
- Auto Negotiation or fixed 100Mpbs full duplex and Auto MDI/MDI-X on 10/100/1000 twisted-pair port. The 10/100/1000 twisted-pair port negotiates automatically to match the existing copper infrastructure or can be forced to 100Mpbs full-duplex operation.
- Support for Jumbo frames up to 10kB
- LEDs for unit and port status
- SML DIP switch for activating the SML feature which notifies end nodes of connection failures
- 12 VDC external wall-mount AC power adapter
- The AT-MMC2000LX/nn and AT-MMC200LX/nn models operate with a single-mode fiber optic cable.
- The fiber port of the AT-MMC2000/*nn* model has a maximum operating distance of 500m.
- The fiber port of the AT-MMC200/*nn* model has a maximum operating distance of 2km.
- The fiber port of the AT-MMC2000/200LX/*nn* model has a maximum operating distance of 20km.

Note

For more details, see “Fiber-Optic Port Specifications” on page 58.

- The AT-MMC2000/SP has a plug-in SFP cage fiber connection. 100Mbps and 1Gbps modules are supported.

Note

For the AT-MMC2000/SP, you must purchase the SFP transceiver separately. For a list of supported transceivers, contact your Allied Telesis distributor or reseller.

Twisted-Pair Port

Here are the basic features of the twisted-pair (copper) port:

- 10/100/1000 Mbps (AT-MMC2000/SC, AT-MMC2000/ST, AT-MMC2000/LC, AT-MMC2000/SP) or 10/100 Mbps (AT-MMC200/SC, AT-MMC200/ST, AT-MMC200/LC)
- 10/100/1000Base-T compliant (AT-MMC2000/SC, AT-MMC2000/ ST, AT-MMC2000/LC, AT-MMC2000/SP) or 10/100Base-T compliant (AT-MMC200/SC, AT-MMC200/ST, AT-MMC200/LC)
- IEEE 802.3u Auto-Negotiation compliant
- Auto MDI/MDI-X
- 100 meters (328 feet) maximum operating distance
- RJ45 connector

Auto MDI/ MDI-X

An RJ45 twisted-pair port on a 100 Mbps Ethernet network device can have one of two possible wiring configurations: MDI or MDI-X. The RJ45 port on a PC, router, or bridge is typically wired as MDI, while the twisted-pair port on a switch or hub is usually MDI-X.

The media converter features Auto MDI/MDI-X. The twisted-pair port automatically determines the configuration of the port on the device to which it is connected and then configures itself appropriately.

For example, if a port on a media converter is connected to a port on a bridge, which is typically wired as MDI, the port on the media converter automatically configures itself as MDI-X.

This feature allows you to use a straight-through cable when connecting any type of device to the media converter, regardless of the wiring configuration of the port on the device.

LEDs

Figure 1 shows the PWR and SYS LEDs.

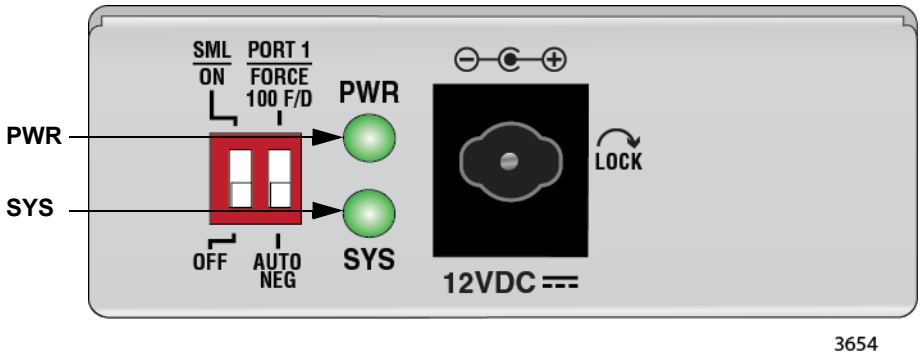

Figure 1. PWR and SYS LEDs

Figure 2 shows the port LEDs.

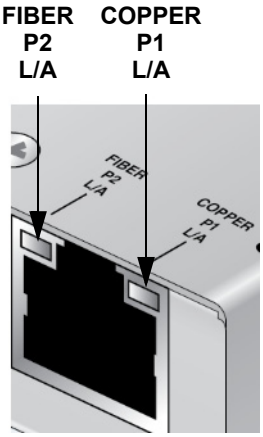

Figure 2. Port LEDs

Table 2 on page 20 describes the media converter's LEDs.

Table 2. Media Converter LED Functional Descriptions

LED	State	Description
PWR	Off	The media converter is not receiving power.
	Steady Green	The media converter is receiving power.
SYS	Off	The media converter is not operational and will not pass traffic.
	Solid Green (with Heartbeat)	The media converter is operational. **Note** The SYS LED will flicker briefly at a regular interval. This “heartbeat” indicates that the internal system is running normally.
	Slow Blinking Green	An error is present on the media converter.
COPPER P1 L/A (L = Link; A = Activity)	Off	The port has not established a link.
	Steady Green	The port has an established link to a network device, but it is not transmitting or receiving network packets.
	Rapid Blinking Green	The port is transmitting or receiving network packets.
	Slow Blinking Green	SML is on and detects a failure on the fiber port.
FIBER P2 L/A (L = Link; A = Activity)	Off	The port has not established a link.
	Steady Green	The port has an established link to a network device, but it is not transmitting or receiving network packets.
	Rapid Blinking Green	The port is transmitting or receiving network packets.
	Slow Blinking Green	SML is on and detects a failure on the copper port or the remote fiber port when operating in a back-to-back configuration with another AT-MMC2000/200 Series media converter.

Smart MissingLink™ (SML)

If one of the Ethernet connections to the media converter loses link, the Smart MissingLink™ (SML) feature allows you to determine which port still has a valid connection and which port requires troubleshooting. The value to this type of network monitoring and fault notification is that you can quickly determine which media converter port has failed and troubleshoot the specific area where the problem is occurring.

When the media converter detects a loss of connection on one of the ports, the port's L/A LED is turned off. At the same time, the media converter causes the opposite port's L/A LED to blink while simultaneously turning OFF that port's Ethernet connection to its end node. This occurs even though the properly operating port had a valid connection before the failure occurred: The reason for this is so that its end node is notified that the data path has been compromised, and immediate action is required.

For example, if the network connection to the media converter's twisted-pair port fails (as shown in Figure 5 on page 22), the FIBER P2 L/A LED blinks slowly while the fiber port's link is turned OFF. The COPPER P2 L/A LED is turned OFF, indicating a failed connection on the twisted-pair port.

If the failure had started with the fiber-optic cabling (as shown in Figure 4), then the COPPER P2 L/A LED would blink slowly, and the FIBER P2 L/A LED would turn OFF.

SML Example Scenarios

Following are example scenarios with one SML enabled media converter connected between two end nodes.

Figure 3 shows media converter and end node L/A LED behavior with SML enabled under normal conditions.

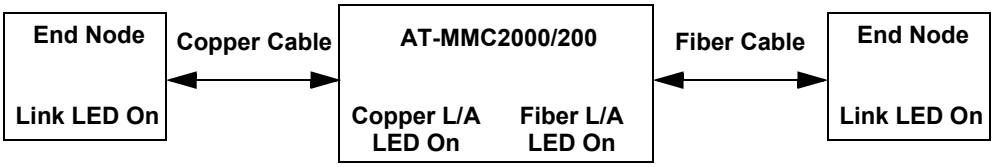

Figure 3. SML in Normal Condition

Figure 4 shows media converter and end node L/A LED behavior with SML enabled with a fiber connection down.

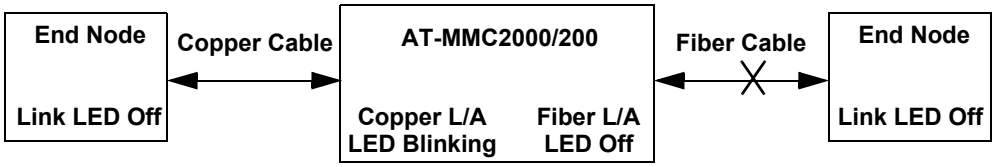

Figure 4. SML with Fiber Connection Down

Figure 5 shows media converter and end node L/A LED behavior with SML enabled with a copper connection down.

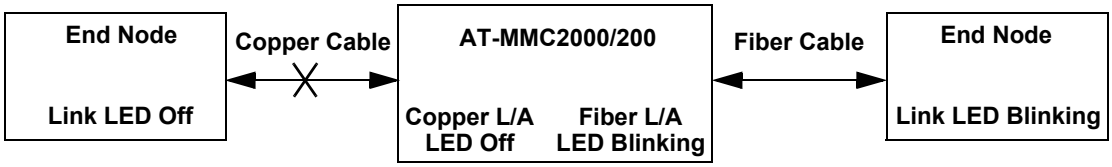

Figure 5. SML with Copper Connection Down

SML Example Scenarios with Two Connected Media Converters

Following are example scenarios with two SML enabled media converters connected back-to-back (bookend mode).

Figure 6 shows media converter and end node L/A LED behavior with SML enabled under normal conditions.

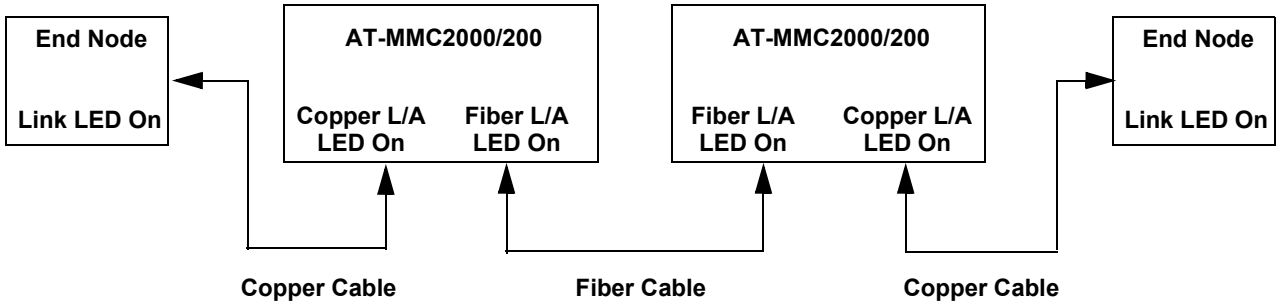

Figure 6. SML in Normal Condition with Two Media Converters

Figure 7 shows media converter and end node L/A LED behavior with SML enabled with a copper connection down between a media converter and an end node.

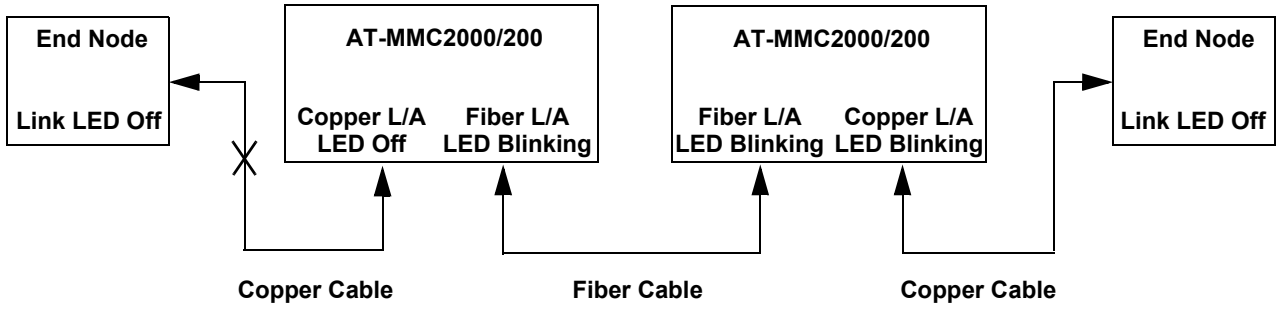

Figure 7. SML with Copper Connection to End Node Down

Figure 8 shows media converter and end node L/A LED behavior with SML enabled with a fiber connection down between two media converters.

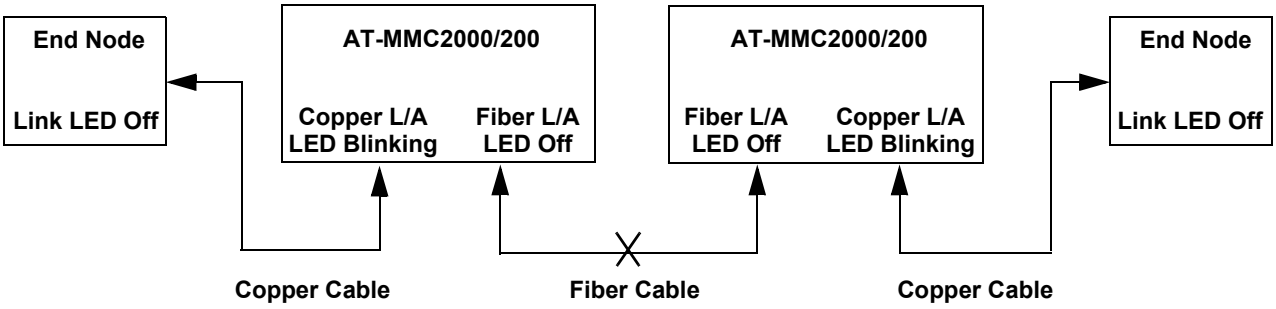

Figure 8. SML with Fiber Connection Between Media Converters Down

Enabling SML

To enable SML on the unit, set the SML ON/OFF DIP switch on the rear panel of the unit to the ON (up) position. See Figure 9.

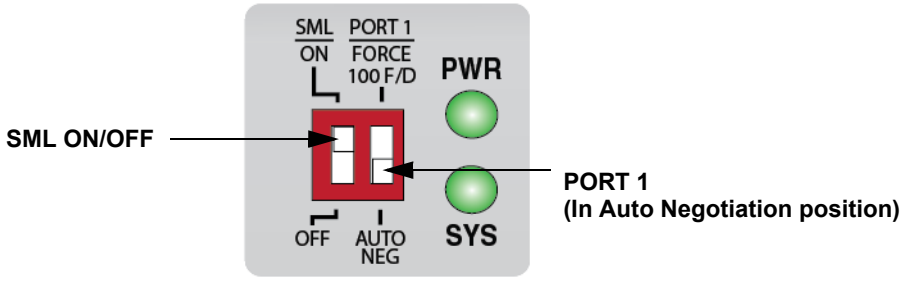

Figure 9. AT-MMC2000/200 Series Converter Rear Panel DIP Switches

External AC/DC Power Adapter

An external AC/DC power adapter is included with the media converter for standalone operation. The power adapter supplies 12 VDC to the media converter. Allied Telesis supplies a UL approved safety compliant AC power adapter for the 120 and 240 VAC versions with a regulated output of 12 VDC. The power required for the media converter is 12 VDC, 200 mA.

Note

The media converter power receptacle has a twist-and-lock barrel which is locked by turning the power cord clockwise one-quarter turn.

Front and Back Panels

Figure 10 illustrates the front panel of the AT-MMC2000/SC, AT-MMC2000LX/SC, AT-MMC200/SC, and AT-MMC200LX/SC Media Converters.

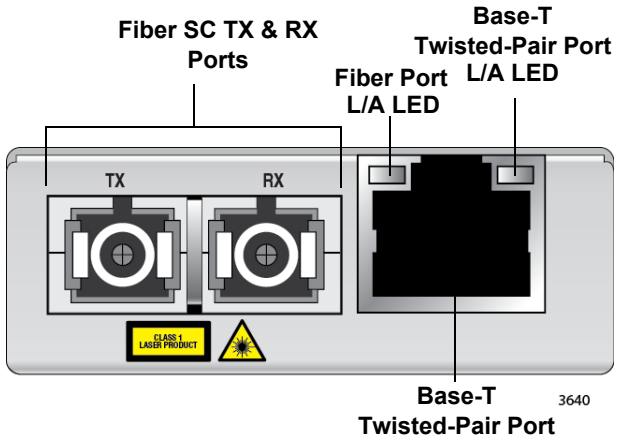

Figure 10. AT-MMC2000/200 Series *nn*/SC Front Panel

Figure 11 illustrates the front panel of the AT-MMC2000/ST, AT-MMC200/ST, and AT-MMC200LX/ST Media Converters.

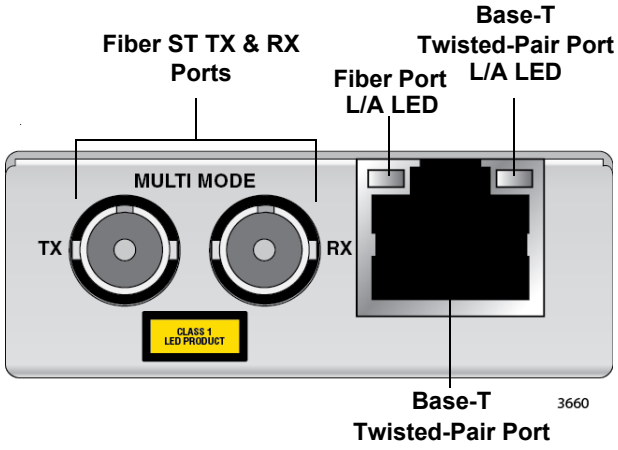

Figure 11. AT-MMC2000/200 Series *nn*/ST Front Panel

Figure 12 illustrates the front panel of the AT-MMC2000/LC, AT-MMC2000LX/LC, and AT-MMC200/LC Media Converters.

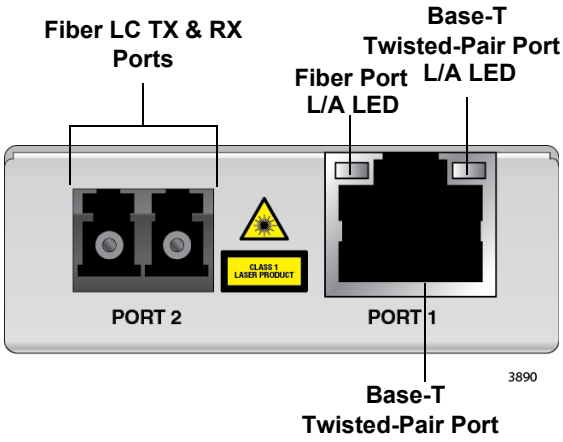

Figure 12. AT-MMC2000/200 Series *nn*/LC Front Panel

Figure 13 illustrates the front panel of the AT-MMC2000/SP Media Converter.

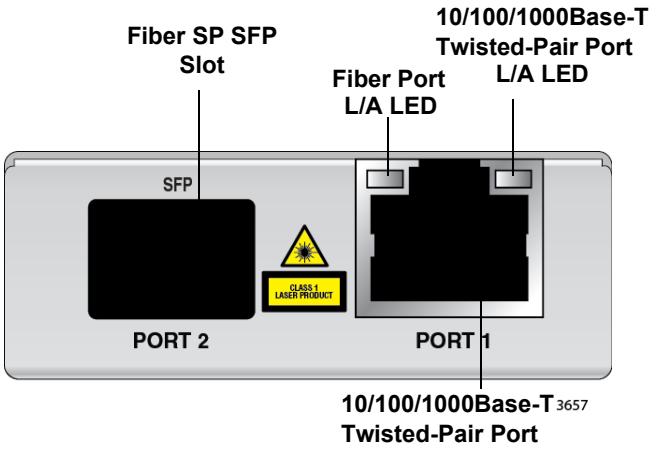

Figure 13. AT-MMC2000/SP Front Panel

Figure 14 illustrates the media converter back panel.

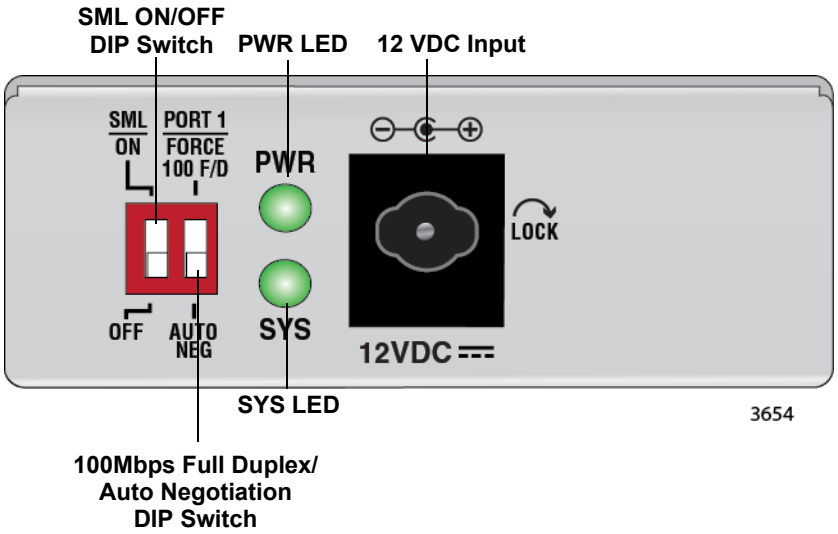

Figure 14. Media Converter Back Panel

Twisted-Pair Port

The twisted-pair port features an eight-pin RJ45 connector that uses four pins at 10 or 100 Mbps and all eight pins at 1000 Mbps. For the port pinouts, see “RJ45 Connector and Port Pinouts” on page 56.

The port has a maximum operating distance of 100 meters (328 feet). For twisted-pair port cabling specifications, refer to Table 3 on page 33.

You can set the twisted-pair port to 100 Mbps full-duplex mode or Auto-Negotiation mode using the PORT 1 (right) DIP switch of the two DIP switches on the rear panel. See Figure 9 on page 23.

- When this DIP switch is in the FORCE 100 F/D (up) position, the twisted-pair port is forced to 100 Mbps full-duplex mode, and Auto Negotiation is disabled.
- When in the AUTO NEG (down) position, the twisted-pair port operates in Auto-Negotiation mode.

Note

100 Mbps full-duplex mode should not be used unless absolutely necessary because forcing 100 Mbps full-duplex in most applications is likely to cause a duplex mismatch, in turn, causing poor network performance. 100 Mbps full-duplex mode should only be used when the link partner is already forced to 100 Mbps full-duplex operation, and Auto Negotiation is disabled on the link partner. In this specific case, using Auto Negotiation on the media converter would result in a duplex mismatch.

Reset the Media Converter

Reset the media converter by powering OFF then powering ON the unit.

Chapter 2

Installation

This chapter contains the following sections:

Reviewing Safety Precautions

Review the following safety precautions before you begin to install the chassis or any of its components.

Note

The ✍ indicates that a translation of the safety statement is available in a PDF document titled *Translated Safety Statements* on the Allied Telesis website at **www.alliedtelesis.com/support**.

Caution

Air vents must not be blocked and must have free access to the room ambient air for cooling. ✍ E6

Note

All Countries: Install product in accordance with local and National Electrical Codes. ✍ E8

Note

The power input must be provided from SELV source only, per IEC60950. Do not connect to a centralized DC battery bank. ✍ E31

Warning

Operating Temperature. This product is designed for a maximum ambient temperature of 50° degrees C. ✍ E57

Caution

Failing to pick up the ferrule tip when you reach the bottom of the cleaning surface can result in static electricity that can damage the fiber-optic cable. ✍ E82

Warning

In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. E84

Warning

An SFP transceiver can be damaged by static electricity. Be sure to observe all standard electrostatic discharge (ESD) precautions, such as wearing an antistatic wrist strap, to avoid damaging the transceiver. E86

Caution

Only use the power adapter supplied with the device. E102

Warning

Do not stare into the laser beam. L2

Warning

Do not look directly at the fiber-optic cable ends or inspect the cable ends with an optical lens. L6

Warning

Laser Safety: EN60825-1. L7

Selecting a Site for the Media Converter

Observe the following requirements when choosing a site for your media converter:

- If you are installing the media converter on a table, verify that the table is level and secure.
- The power outlet for the media converter should be located near the unit and should be easily accessible.
- The site should provide for easy access to the ports on the front of the media converter. This will make it easier for you to connect and disconnect cables, as well as view the media converter's LEDs.
- Air flow around the unit and through its vents on the side should not be restricted so that the media converter can maintain adequate cooling.
- Do not place objects on top of the media converter.
- Do not expose the media converter to moisture or water.
- You should use dedicated power circuits or power conditioners to supply reliable electrical power to the network devices.

Planning the Installation

Be sure to observe the following guidelines when planning the installation of your media converter.

- On the AT-MMC2000 media converters, the end node connected to the fiber connector on the media converter must operate at 1000 Mbps, except for the AT-MMC2000/SP when using a 100 Mbps SFP module.
- On the AT-MMC200 media converters, the end node connected to the fiber connector on the media converter must operate at 100 Mbps.
- The two end-nodes connected to the ports of the media converter must operate with the same duplex mode, either half- or full-duplex. The twisted-pair port on the media converter can operate in either mode with Auto Negotiation enabled.
- The devices connected to the two ports on the media converter can be a network adapter card, repeater, switch, media converter, or router.
- The twisted-pair port has a maximum operating distance of 100 meters (328 feet).
- The fiber port of the AT-MMC2000/*nn* model has a maximum operating distance of 500m.
- The fiber port of the AT-MMC200/*nn* model has a maximum operating distance of 2km.
- The fiber port of the AT-MMC2000/200LX/*nn* model has a maximum operating distance of 20km.

Note

For more details, see “Fiber-Optic Port Specifications” on page 58.

Table 3 contains the cable specifications for the twisted-pair port.

Table 3. Twisted-Pair Port Cabling Specifications

Speed	Type of Cable
10 Mbps	Standard TIA/EIA 568-B-compliant Category 3 or better shielded or unshielded cabling with 100 ohm impedance and a frequency of 16 MHz.

Table 3. Twisted-Pair Port Cabling Specifications

Speed	Type of Cable
100 Mbps	Standard TIA/EIA 568-A-compliant Category 5 or TIA/EIA 568-B-compliant Enhanced Category 5 (Cat 5e) shielded or unshielded cabling with 100 ohm impedance and a frequency of 100 MHz.
1000 Mbps	Standard TIA/EIA 568-A-compliant Category 5 or TIA/EIA 568-B-compliant Enhanced Category 5 (Cat 5e) shielded or unshielded cabling with 100 ohm impedance and a frequency of 100 MHz.

For speed/duplex interactions between the copper port on the AT-MMC2000 and the copper link partner, refer to Table 4 for allowable speed/duplex combinations.

Table 4. Copper Connection Speed/Duplex Settings and Resulting Speed - AT-MMC2000

AT-MMC2000 Copper Port Speed/Duplex Setting	**Copper Link Partner Port Setting**			
	Auto Negotiation	100Mbps Force Full Duplex	100Mbps Force Half Duplex	1000Mbps Force Full Duplex*
Auto Negotiation	1000Mbps full duplex connection for Gigabit Link Partners 100Mbps full duplex connection for 100Mbps Link Partners	Duplex mismatch – not supported	100Mbps half duplex connection	1000Mbps full duplex connection
100Mbps Full Duplex	Duplex mismatch – not supported	100Mbps full duplex connection	Duplex mismatch – not supported	No connection

Table 4. Copper Connection Speed/Duplex Settings and Resulting Speed - AT-MMC2000

AT-MMC2000 Copper Port Speed/Duplex Setting	**Copper Link Partner Port Setting**
*Although 1000Mbps connections require Auto Negotiation, some switches allow the option of only advertising 1000Mbps speed. Note: The fiber port always runs at 1000Mbps full duplex.	

For speed/duplex interactions between the copper port on the AT-MMC200 and the copper link partner, refer to Table 5 on page 36 for allowable speed/duplex combinations.

Table 5. Copper Connection Speed/Duplex Settings and Resulting Speed - AT-MMC200

AT-MMC200 Copper Port Speed/Duplex Setting	**Copper Link Partner Port Setting**			
	Auto Negotiation	100Mbps Force Full Duplex	100Mbps Force Half Duplex	1000Mbps Force Full Duplex*
Auto Negotiation	100Mbps full duplex connection	Duplex mismatch – not supported	100Mbps half duplex connection	No connection
100Mbps Full Duplex	Duplex mismatch – not supported	100Mbps full duplex connection	Duplex mismatch – not supported	No connection
*Although 1000Mbps connections require Auto Negotiation, some switches allow the option of only advertising 1000Mbps speed. Note: The fiber port always runs at 100Mbps full duplex.				

Note

The twisted-pair port on the media converter features Auto MDI/MDI-X when operating at 10, 100, or 1000 Mbps. The port is configured as MDI or MDI-X when it is connected to an end node. Consequently, you can use a straight-through twisted-pair cable when connecting any type of network device to the twisted-pair port on the media converter.

For the fiber-optic port specifications, refer to “Fiber-Optic Port Specifications” on page 58.

Unpacking the Media Converter

To unpack the media converter, perform the following procedure:

1. Remove all of the components from the shipping package.

   Note
   Store the packaging material in a safe location. You must use the original shipping material if you need to return the unit to Allied Telesis.

2. Place the media converter on a level, secure surface.

3. In addition to the media converter, verify that the shipping container includes the following items as follows:
   - Figure 15 on page 38 shows shipping container items for the AT-MMC2000/SC, AT-MMC2000LX/SC, AT-MMC200/SC, and AT-MMC200LX/SC.
   - Figure 16 on page 39 shows shipping container items for the AT-MMC2000/ST, AT-MMC200/ST, and AT-MMC200LX/ST.
   - Figure 17 on page 40 shows shipping container items for the AT-MMC2000/LC, AT-MMC2000LX/LC, and AT-MMC200/LC.
   - Figure 18 on page 41 shows shipping container items for the AT-MMC2000/SP.

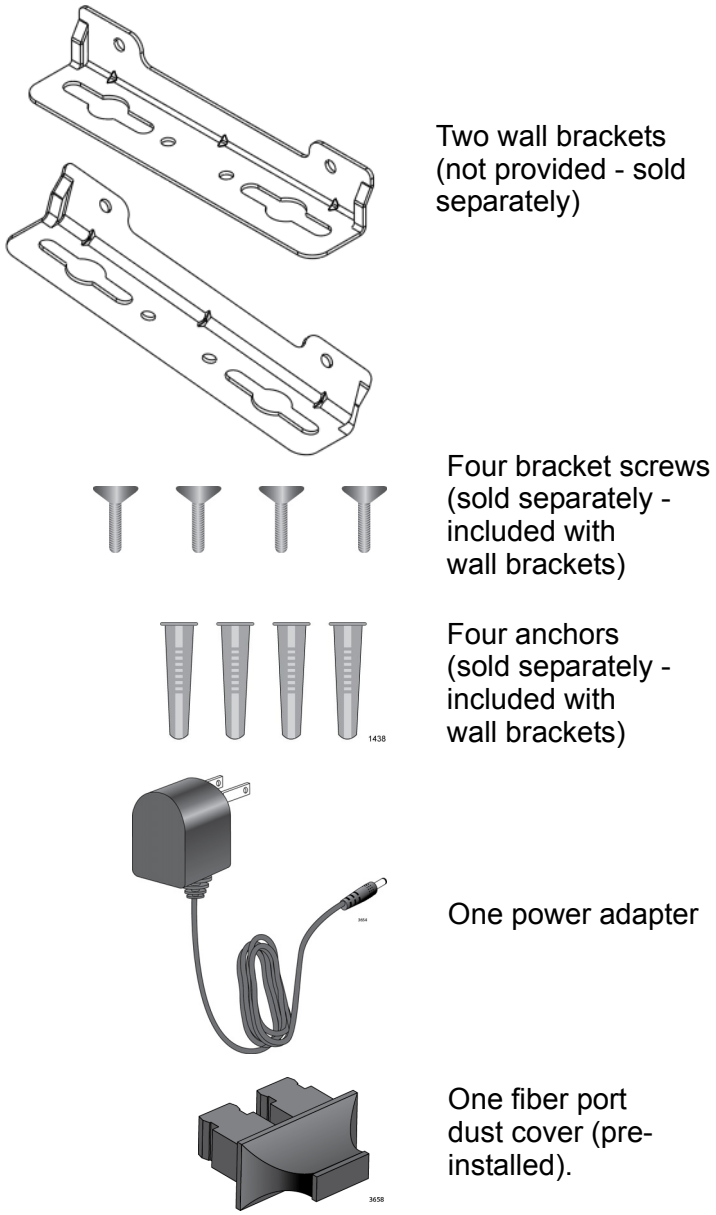

Figure 15. AT-MMC2000/SC, AT-MMC2000LX/SC, AT-MMC200/SC, and AT-MMC200LX/SC Shipping Package Contents

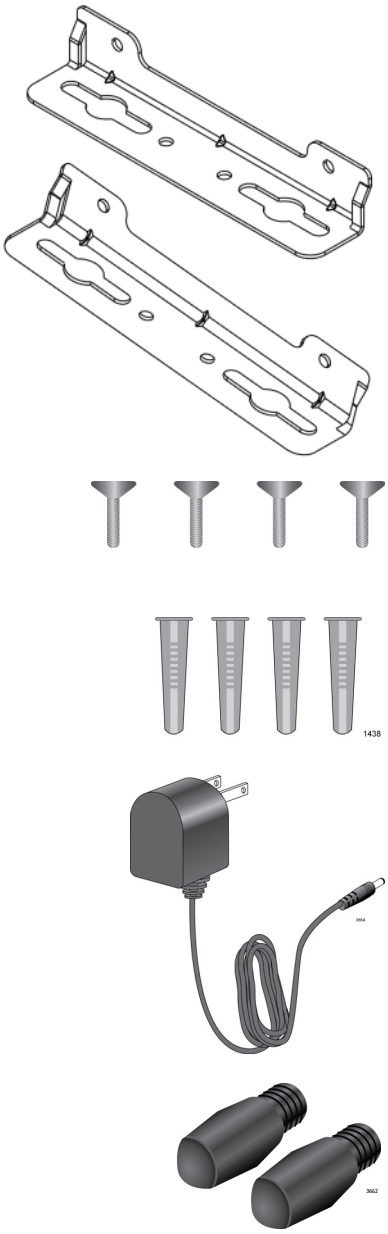

Figure 16. AT-MMC2000/ST, AT-MMC200/ST, and AT-MMC200LX/ST Shipping Package Contents

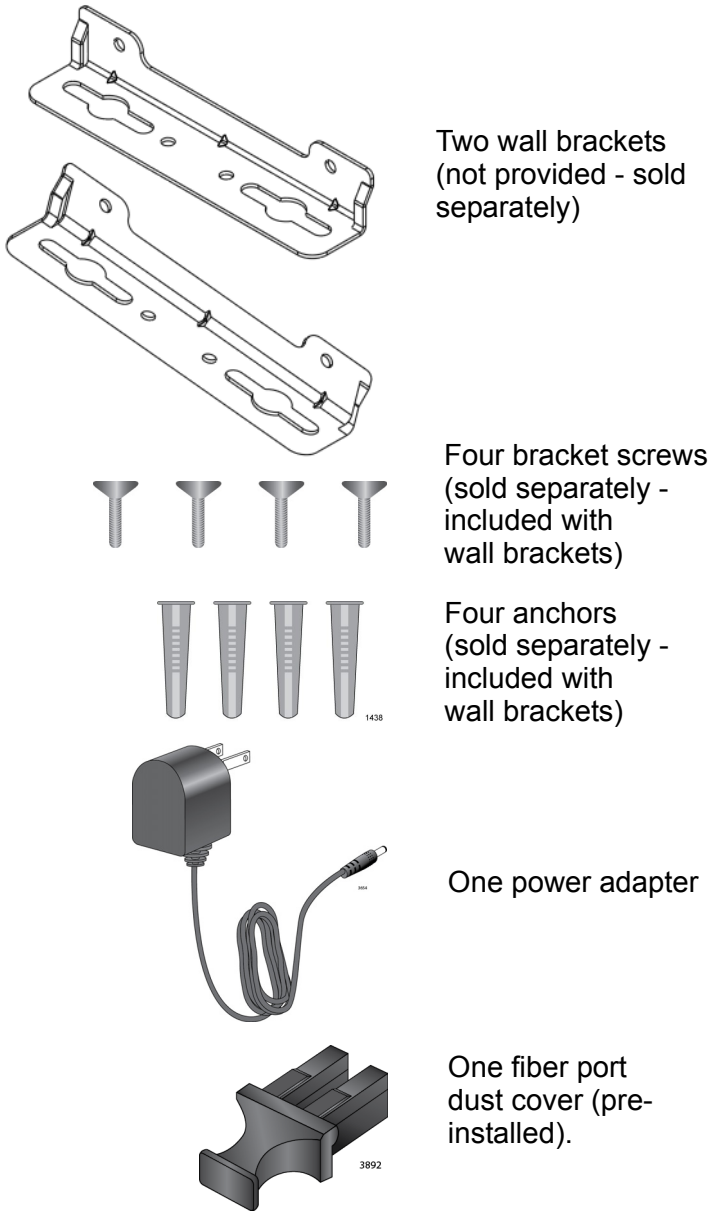

Figure 17. AT-MMC2000/LC, AT-MMC2000LX/LC, and AT-MMC200/LC Shipping Package Contents

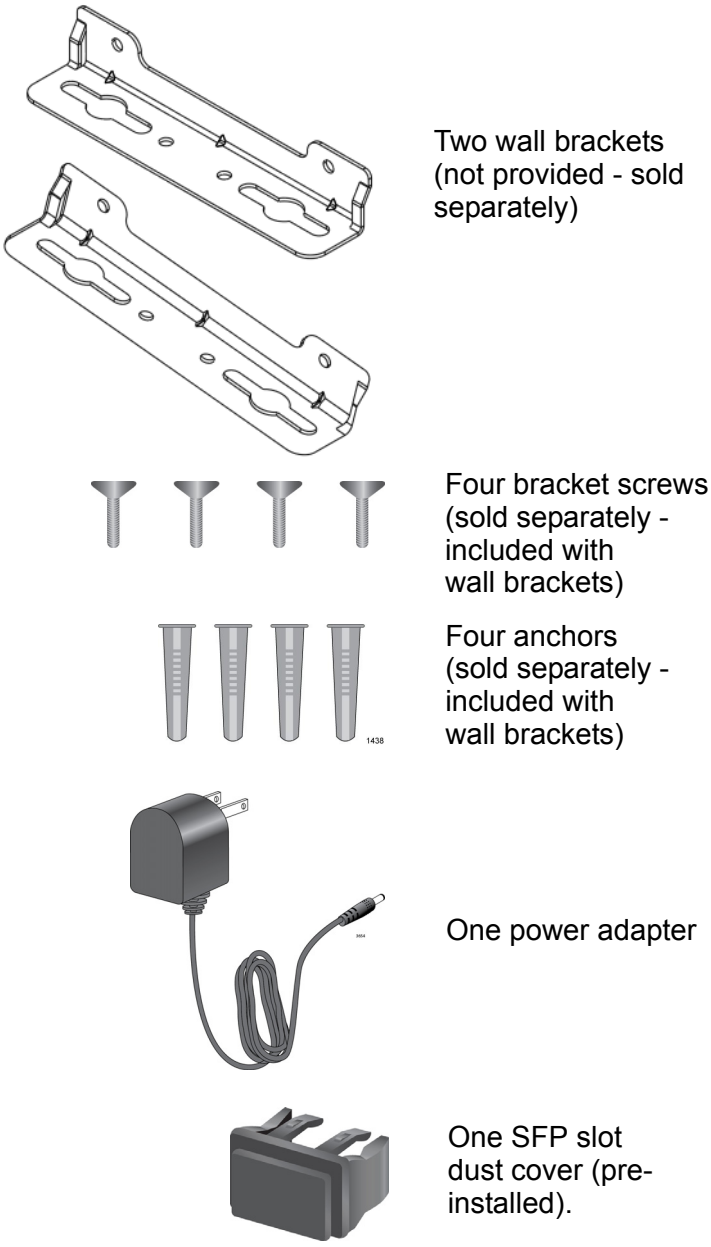

Figure 18. AT-MMC2000/SP Shipping Package Contents

Installing the Media Converter on a Desktop

You may install the media converter on a desktop or on a wall. To install the media converter on a wall, see “Installing the Media Converter on a Wall” on page 43.

To install the media converter on a desktop, perform the following procedure:

1. Place the media converter on a flat, secure surface (such as a desk or table), leaving ample space around the unit for ventilation.
2. Depending on the model, do one of the following:
   - For the AT-MMC2000/SP, go to “Installing the SFP Transceiver” on page 46.
   - For all other models, go to “Powering On and Cabling the Media Converter” on page 49.

Installing the Media Converter on a Wall

To install the media converter on a wall, perform the following procedure:

1. Place the media converter on a table.

2. Orient the brackets (separately-purchased) against the sides of the media converter, as shown in Figure 19, and secure them to the unit with the four brackets screws included with the brackets.

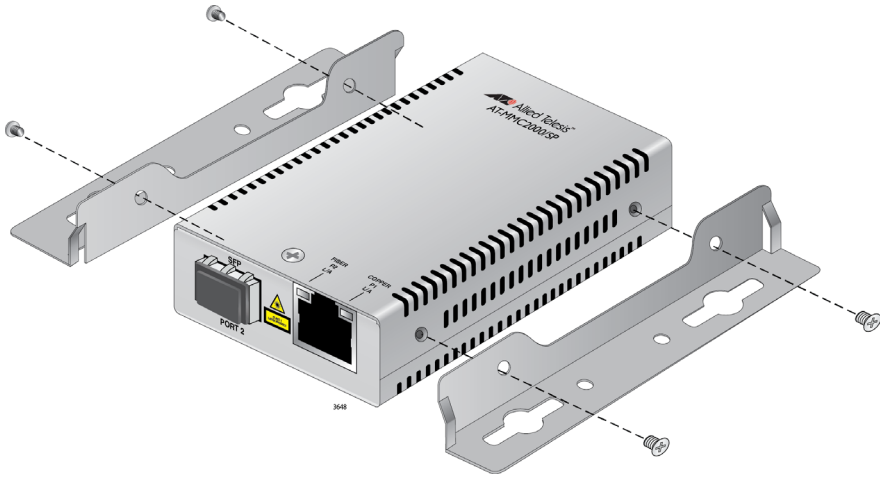

Figure 19. Attaching the Brackets to Install the Media Converter on a Wall

3. Use a pencil or pen to mark the wall with the locations of the four holes in the brackets. The media converter should be oriented as shown in Figure 20 on page 44.

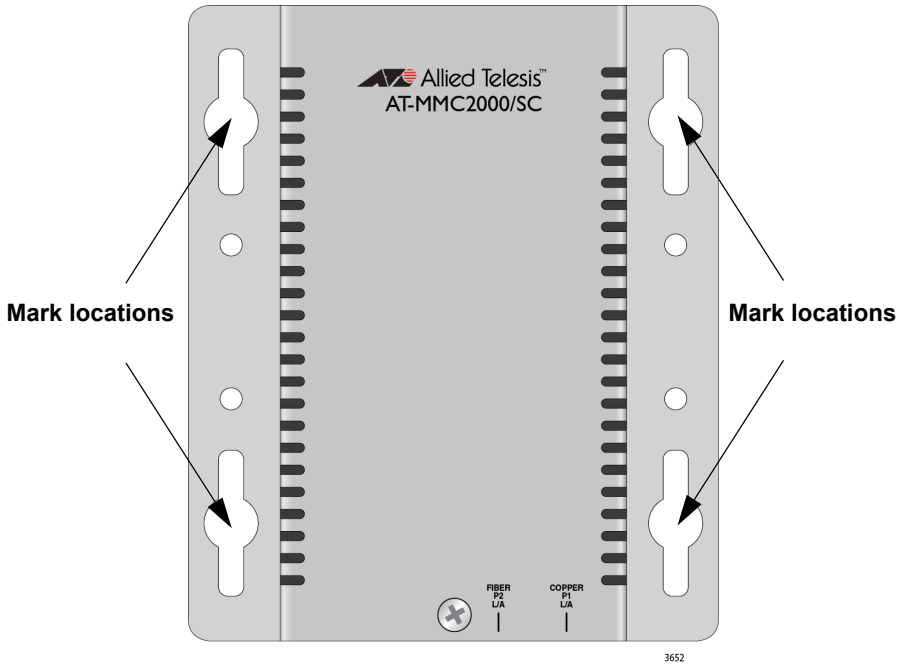

Figure 20. Marking the Screw Hole Locations

4. Install four plastic anchors (included with separately purchased brackets) into the wall, at the locations marked in the previous step.

5. Secure the media converter to the wall using four wall mounting screws (not provided). See Figure 21 on page 45.

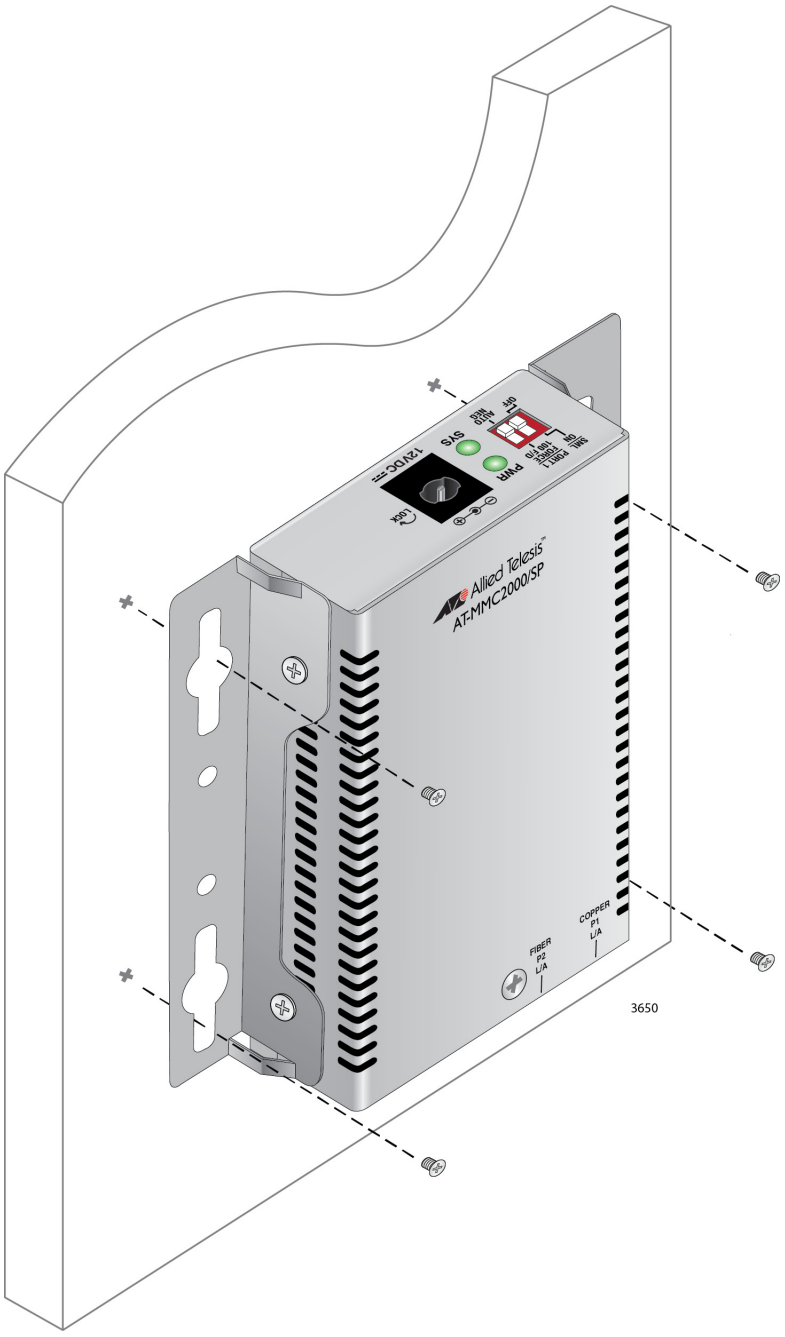

Figure 21. Securing the Media Converter to the Wall

6. Depending on the model, do one of the following:

   - For the AT-MMC2000/SP, go to “Installing the SFP Transceiver” on page 46.
   - For all other models, go to “Powering On and Cabling the Media Converter” on page 49.

Installing the SFP Transceiver

To install an SFP transceiver, perform the following procedure:

Note

The transceiver can be hot-swapped; you do not need to power off the media converter to install a transceiver. However, always remove the cable before removing the transceiver.

Note

You should always install the transceiver before connecting the fiber-optic cable to it.

1. Remove the transceiver from its shipping container and store the packaging material in a safe location.

Warning

An SFP transceiver can be damaged by static electricity. Be sure to observe all standard electrostatic discharge (ESD) precautions, such as wearing an antistatic wrist strap, to avoid damaging the transceiver. E86

2. Remove the dust plug from the SFP slot. See Figure 22.

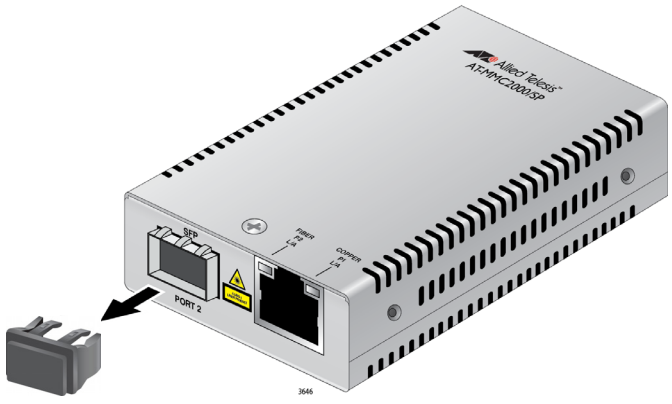

Figure 22. Removing the Dust Plug from an SFP Slot

3. Position the SFP transceiver with the label facing up.

4. Slide the transceiver into the SFP slot until it clicks into place. See Figure 23.

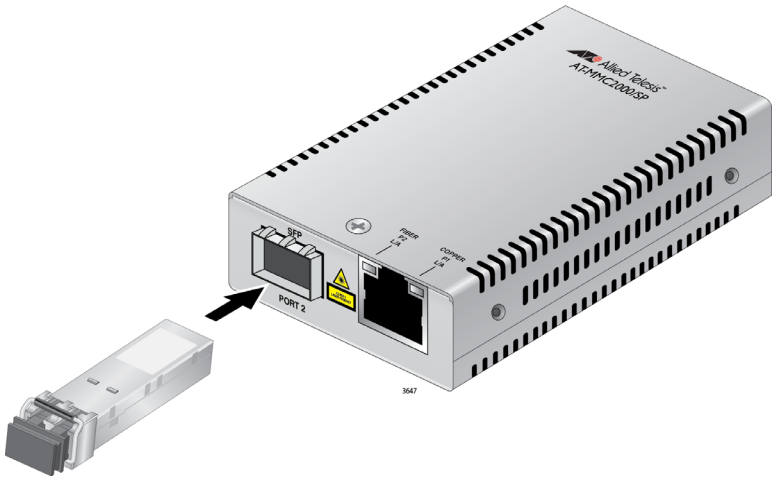

Figure 23. Inserting the SFP

5. Verify that the handle on the transceiver is in the upright position, as shown in Figure 24. This secures the transceiver and prevents it from being dislodged from the slot.

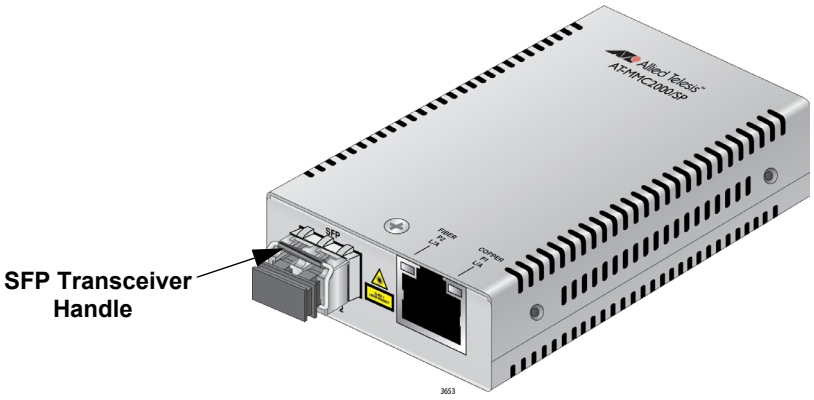

Figure 24. Positioning the SFP Handle in the Upright Position

Note

SFP transceivers are dust-sensitive. Always keep the plug in the optical bores when a fiber-optic cable is not installed, or when storing the SFP. When you do remove the plug, keep it for future use.

Note

Unnecessary removal and insertion of an SFP can lead to premature failure.

For information on the cable specifications of the SFP, consult the documentation shipped with the SFP.

6. Go to “Powering On and Cabling the Media Converter” on page 49.

Powering On and Cabling the Media Converter

Cabling Guidelines

Observe the following guidelines when connecting twisted-pair and fiber-optic cables to the ports on the media converter:

- The connector on the cable should fit snugly into the port on the media converter. The tab on the connector should lock the connector into place.
- Because the twisted-pair port has Auto MDI/MDI-X, you may use straight-through twisted-pair cable to connect any type of network device to that port.
- For the fiber optic cables, refer to the cable manufacturer specification for the minimum bend radius.

Applying Power and Connecting the Network Cables

To apply power to the media converter and connect the network cables, perform the following steps:

1. Plug the DC of the external power adapter to the power receptacle connector labeled 12VDC on the back panel of the media converter and turn the cord clockwise one-quarter turn to lock, as shown in Figure 25.

Figure 25. Connecting 12VDC Powered Unit

2. Plug the power adapter to a power outlet. Refer to “Power Specifications” on page 56 for power requirements.

3. Verify that the PWR LED is lit green. If the PWR LED is off, refer to “Troubleshooting” on page 51.

4. Verify that the SYS LED is lit green. If the SYS LED is off, refer to “Troubleshooting” on page 51.

5. Remove the dust cover from the fiber-optic connector and connect the cable to the fiber-optic port.

   On media converters other than the AT-MMC2000/SP: Verify that the media converter’s transmitter port (TX) is connected to the end node’s receiver port (RX) and that the media converter’s receiver port (RX) is connected to the end node’s transmitter port (TX).

   For example, on the AT-MMC2000/ST media converter, connect the red TX connector on the fiber-optic cable to the transmitter port on the AT-MMC2000/ST media converter and connect the other connector to the receiver port on the end node. Then connect the black RX connector on the fiber-optic cable to the receiver port on the AT-MMC2000/ST media converter and connect the other connector to the transmitter port on the end node.

6. Connect the twisted-pair cable to the twisted-pair port. For speed/duplex interactions between the copper port and the copper link partner, refer to Table 4 on page 34 for allowable speed/duplex combinations.

7. Power on the end nodes.

The media converter is now ready for use.

Chapter 3
Troubleshooting

This chapter contains information on how to troubleshoot the media converter if a problem occurs.

> **Note**
> For further assistance, please contact Allied Telesis Technical Support at **www.alliedtelesis.com/support**.

Problem 1: The POWER LED on the media converter is off.

Solutions: The unit is not receiving power. Try the following:

- Verify that the power cord is securely connected to the power source and to the DC connector on the back panel of the media converter.
- Verify that the power outlet has power by connecting another device to it.
- Try using another power adapter of the same type that came with your media converter.
- Verify that the voltage from the power source is within the required levels for your region.

Problem 2: The SYS LED on the media converter is off.

Solution: An internal component on the unit is damaged or not working properly. Try power cycling the unit. If power cycling does not clear the fault, return the unit to Allied Telesis.

Problem 3: The SYS LED on the media converter is blinking slowly.

Solutions: An error is present on the unit. Try power cycling the unit.

If an AT-MMC2000/SP unit, a transmit fault may be occurring on the SFP module. The media converter will try to clear this error, but if the error persists, try the following:

- Remove and re-seat the SFP module.
- Try a different SFP module.
- Verify the SFP module is the correct type for your application.

Problem 4: The twisted-pair port on the media converter is connected to an end node, but the port's COPPER P1 L/A LED is off.

Solutions: The port is unable to establish a link to an end node. Try the following:

- Verify that the end node connected to the twisted-pair port is powered on and is operating properly.
- Verify that the twisted-pair cable is securely connected to the port on the media converter channel and to the port on the remote end-node.
- Verify that the port is connected to the correct twisted-pair cable. This is to eliminate the possibility that the port is connected to the wrong end-node, such as a powered-off device.
- Try connecting another end node to the twisted-pair port with a different cable. If the twisted-pair port is able to establish a link, then the problem is with the cable or the other end-node.
- Verify that the twisted-pair cable does not exceed 100 meters (328 feet).
- Verify that the end node connected to the media converter is operating at the same speed.
- Verify that you are using the appropriate category of twisted-pair cable: Category 3 or better for 10 Mbps operation and Category 5 and Category 5E for 100 and 1000 Mbps operation.

Note
A 1000Base connection may require 5 to 10 seconds to establish a link.

Problem 5: The FIBER P2 L/A LED for the fiber-optic port is off.

Solutions: The fiber-optic port on the transceiver is unable to establish a link to an end node. Try the following:

- Verify that the end node connected to the fiber-optic port is operating properly.
- Verify that the fiber-optic cable is securely connected to the port on the media converter channel and to the port on the remote end-node.
- Verify that the end node connected to the media converter is operating at the same speed.
- On media converters other than the AT-MMC2000/SP: Verify that the media converter's transmitter port (TX) is connected to the end node's receiver port (RX) and that the media converter's receiver port (RX) is connected to the end node's transmitter port (TX).
- On the AT-MMC2000/SP, check that the SFP module is fully inserted in the slot.

- On the AT-MMC2000/SP, verify that the operating specifications and wave lengths of the fiber-optic port on the SFP transceiver and the remote end-node are compatible.
- Verify that the correct type of fiber-optic cabling is being used.
- Verify that the wavelength between the media converter and end node matches, and the media converter fiber port is connected to a multi-mode (not single-mode) port on the end node.
- Verify that the port is connected to the correct fiber-optic cable. This is to eliminate the possibility that the port is connected to the wrong remote end-node, such as a powered-off device.
- Try connecting another end node to the fiber-optic port using a different cable. If the port is able to establish a link, then the problem is with the cable or with the other end node.
- If the remote end-node is a management device, use its management firmware to determine whether its port is enabled.
- Test the attenuation on the fiber-optic cable with a fiber-optic tester to determine whether the optical signal is too weak (sensitivity) or too strong (maximum input power).

Problem 6: Network performance between the twisted-pair port on the media converter and an end node is slow.

Solution: There might be a duplex mode mismatch between the port and the end node. This occurs when a twisted-pair port using Auto Negotiation is connected to a device with a fixed duplex mode of full duplex. If this is the cause of the problem, adjust the duplex mode of the port on the end node or on the media converter so that both ports are using the same duplex mode.

Appendix A

Technical Specifications

Below are the technical specifications for the media converters. The specification categories are as follows:

Physical Specifications

Table 6. Physical Specifications

Dimensions W x D x H	50.8 mm x 99.1 mm x 20.3 mm (2.0 in x 3.9 in x 0.8 in)
Weight	0.2 kg (0.4 lb)

Environmental Specifications

Table 7. Environmental Specifications

Operating Temperature	0° C to 50° C (32° F to 122° F)
Storage Temperature	-15° C to 65° C (-5° F to 149° F)
Operating Humidity	5% to 90% non-condensing
Storage Humidity	5% to 95% non-condensing
Operating Altitude Range	Up to 3,000 m (9,843 ft)

Power Specifications

The following specifications apply to the DC power connector on the media converter.

Table 8. Power Specifications

Input supply voltage	12 VDC
Input current	1.0 A

Safety and Electromagnetic Emissions Certifications

Table 9. Safety and Electromagnetic Emissions Certifications

Safety	UL60950-1, EN60950-1, EN60825-1
Emissions (EMI)	FCC Class A, CISPR 22 Class A, EN55022 Class A, RCM, VCCI Class A
Immunity	EN55024, EN61000-3-2, EN61000-3-3
Environmental Compliance	EU-RoHS compliant, WEEE China RoHS compliant

RJ45 Connector and Port Pinouts

Figure 26 illustrates the pin layout for the RJ45 connector and port.

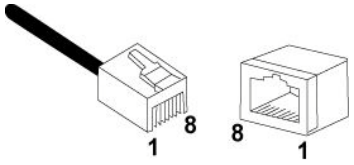

Figure 26. RJ45 Connector and Port Pin Layout

Table 10 lists the pin signals when a port is operating in the MDI configuration at 10 or 100 Mbps.

Table 10. MDI Pin Signals (10 or 100 Mbps)

Pin	Signal
1	TX+
2	TX-
3	RX+
6	RX-

Table 11 lists the pin signals when a port is operating in the MDI-X configuration at 10 or 100 Mbps.

Table 11. MDI-X Pin Signals (10 or 100 Mbps)

Pin	Signal
1	RX+
2	RX-
3	TX+
6	TX-

Table 12 lists the pin signals when a port is operating at 1000 Mbps.

Table 12. Pin Signals (1000 Mbps)

Pin	Pair	Signal
1	1	TX and RX+
2	1	TX and RX-
3	2	TX and RX+
4	3	TX and RX+
5	3	TX and RX-
6	2	TX and RX-
7	4	TX and RX+
8	4	TX and RX-

Fiber-Optic Port Specifications

Note
Fiber optic port specifications for the AT-MMC2000/SP are dependent upon the type of SFP inserted.

The fiber types for the MMC2000/200 series media converters are shown in Table 13.

Table 13. Fiber Type

Models	Fiber Type
AT-MMC2000/LC AT-MMC2000/SC AT-MMC2000/ST AT-MMC200/LC AT-MMC200/SC AT-MMC200/ST	Multi mode
AT-MMC2000LX/LC AT-MMC2000LX/SC AT-MMC200LX/SC AT-MMC200LX/ST	Single mode

Table 14 lists fiber-optic port specifications for the AT-MMC2000 media converters.

Table 14. AT-MMC2000 Fiber-Optic Port Specifications

Fiber Optic Diameter (microns)	Optical Wavelength	Launch Power (dBm)[1]		Receive Power (dBm)			Max. Distance
		Min.	Max.	Min.	Typical	Saturation	
50/125	850 nm	-9.5	-4	-17	-20	-3	500 m (1,640 ft)
62.5/125	850 nm	-9	-4	-17	-20	-3	220 m (722 ft)

1. The launch power is measured 1 meter (3.28 feet) from the transmitter.

Table 17 lists fiber-optic port specifications for the AT-MMC200 media converters.

Table 15. AT-MMC200 Fiber-Optic Port Specifications

Fiber Optic Diameter (microns)	Optical Wavelength	Launch Power (dBm)[1]		Receive Power (dBm)			Max. Distance
		Min.	Max.	Min.	Typical	Saturation	
50/125	1310 nm	-19	-14	-32	-34	-3	2 km (6,562 ft)
62.5/125	1310 nm	-22.5	-14	-32	-34	-3	2 km (6,562 ft)

1. The launch power is measured 1 meter (3.28 feet) from the transmitter.

Table 17 lists fiber-optic port specifications for the AT-MMC2000LX media converters.

Table 16. AT-MMC2000LX Fiber-Optic Port Specifications

Fiber Type	Fiber Optic Diameter (microns)	Optical Wavelength	Launch Power (dBm)[1]		Receive Power (dBm)			Max. Distance
			Min.	Max.	Min.	Typical	Saturation	
OS2	9/125	1310	-10	-1	-22	-24	-1	20 km (65,617 ft)
OS1	9/125	1310	-10	-1	-22	-24	-1	10 km (32,808 ft)

1. The launch power is measured 1 meter (3.28 feet) from the transmitter.

Table 17 lists fiber-optic port specifications for the AT-MMC200LX media converters.

Table 17. AT-MMC200LX Fiber-Optic Port Specifications

Fiber Type	Fiber Optic Diameter (microns)	Optical Wavelength	Launch Power (dBm)[1]		Receive Power (dBm)			Max. Distance
			Min.	Max.	Min.	Typical	Saturation	
OS2	9/125	1310	-15	-5	-32	-34	-3	20 km (65,617 ft)
OS1	9/125	1310	-15	-5	-32	-34	-3	15 km (49,213 ft)

1. The launch power is measured 1 meter (3.28 feet) from the transmitter.

Appendix B

Cleaning Fiber-Optic Connectors

This appendix contains the following sections:

This appendix describes how to clean fiber-optic connectors.

Introduction

The fiber-optic connector consists of a fiber-optic plug and its adapter. The end of the fiber-optic cable is held in the core of the ferrule in the plug. Light signals are transmitted through the core of the fiber. Even minor smudges, or dirt, on the end face of the fiber (completely invisible to the naked eye) can disrupt light transmission and lead to failure of the component or of the entire system. Therefore, it is of utmost importance to clean all fiber-optic connectors before use.

Figure 27 shows the ferrule in an SC connector.

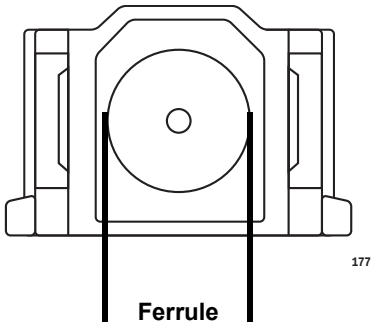

Figure 27. Ferrule in an SC Connector Plug

The end face of an unclean and clean ferrule are shown in Figure 28.

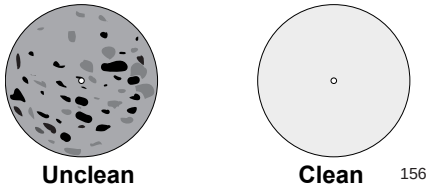

Figure 28. Unclean and Clean Ferrule

Using a Cartridge-Type Cleaner

Fiber-optic cartridge cleaners, shown in Figure 29, are available from many vendors and are typically called “cartridge cleaners”.

Figure 29. Cartridge Cleaner

Note
Do not use compressed air or aerosol air to clean a fiber-optic connector.

To clean a fiber-optic connector using a cartridge cleaner, perform the following procedure.

1. With one hand, hold the cartridge cleaner and push the lever on the cleaning cartridge in the direction of the arrow to expose the cleaning surface, as shown in Figure 30 on page 63.

2. Place the ferrule tip on the exposed cleaning surface and rub the ferrule in a downward direction, as shown in Figure 30 on page 63.

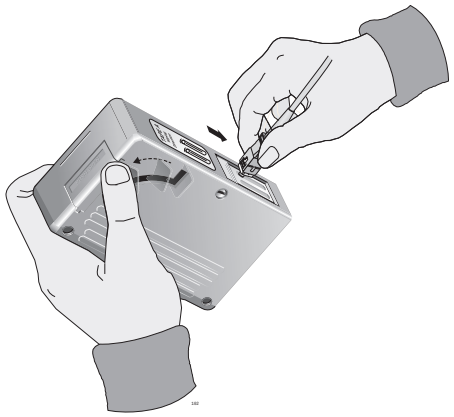

Figure 30. Rubbing the Ferrule Tip on the Cleaning Surface

Note
Rub the ferrule tip on the cleaning surface in one direction only.

3. When you reach the end of the cleaning surface, pick up the ferrule tip, rotate and place it at the top, and rub downwards at least two times.

Caution
Failing to pick up the ferrule tip when you reach the bottom of the cleaning surface can result in static electricity that can damage the fiber-optic cable. E82

4. If desired, repeat Step 2 and Step 3.

5. If a fiber inspection scope is available, use the scope to inspect the ferrule end face to make sure that it is clean.

6. Reconnect the cable to the port or protect the ferrule tip with a dust cap.

Note
Always keep a dust cap on a fiber-optic cable when it is not in use.

Note
Do not touch the end face of the ferrule in the connector.

Warning
Do not stare into the laser beam. L2

Warning
Do not look directly at the fiber-optic cable ends or inspect the cable ends with an optical lens. L6

Using a Swab

Specially treated swabs, or stick cleaners, are available for cleaning inside connector adapters or hard-to-reach ferrule tips. These swabs, often referred to as “lint-free” or “alcohol-free” swabs, shown in Figure 31, are available from many vendors. Stick cleaners are available in both 2.5 mm and 1.25 mm sizes for use on SC and MU connectors, respectively.

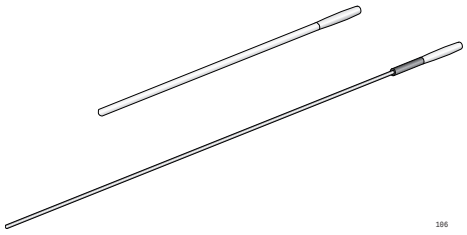

Figure 31. Lint-Free and Alcohol-Free Swabs

Note
Never use a household cotton swab and alcohol to clean a fiber-optic connector. This may leave a residue on the ferrule tip.

Note
Do not used compressed air or aerosol air to clean a fiber-optic connector.

To clean a recessed ferrule using a swab, perform the following procedure.

1. Insert the swab into the adapter as shown in Figure 32. Rub the ferrule tip with the swab.

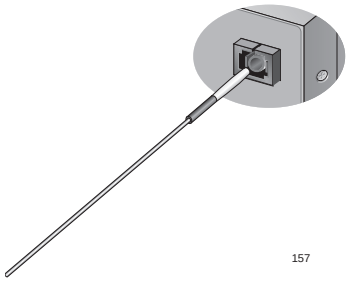

Figure 32. Cleaning a Recessed Ferrule

2. If desired, repeat Step 1.

3. If a fiber inspection scope is available, use the scope to inspect the connector to make sure that it is clean and to check for scratches, pits, or other problems that may affect performance.

Note
Always keep a dust cap on a fiber-optic cable when it is not in use.

Warning
Do not stare into the laser beam. L2

Warning
Do not look directly at the fiber-optic cable ends or inspect the cable ends with an optical lens. L6