

# 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-MMC2000/T
- ❑ AT-MMC200/SC
- ❑ AT-MMC200/ST
- ❑ AT-MMC200/LC
- ❑ AT-MMC200LX/SC
- ❑ AT-MMC200LX/ST



## Installation Guide

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# Electrical Safety and Emissions Standards

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This section contains the following:

- “US Federal Communications Commission”
- “Safety Standards and Electromagnetic Compatibility” on page 3
- “Translated Safety Statements” on page 4

## US Federal Communications Commission

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### Radiated Energy

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#### 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.

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#### Note

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

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## Safety Standards and Electromagnetic Compatibility

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Safety	EN62368-1 (TUV), UL 60950-1 (CULUS)
Electromagnetic Compatibility (EMC)	FCC Class A, EN55024, EN55032 Class A, CISPR 32 Class A, VCCI Class A, RCM, EN61000-3-2, EN61000-3-3, ICES-003

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#### Warning

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

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## Translated Safety Statements

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**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](http://www.alliedtelesis.com/support).



# Contents

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<b>Preface</b> .....	11
Symbol Conventions .....	12
Contacting Allied Telesis.....	13
<b>Chapter 1: Overview</b> .....	15
Introduction .....	16
Front Panels .....	16
Back Panel .....	19
Features.....	20
Twisted-Pair Port.....	22
Auto MDI/MDI-X .....	22
Auto-Negotiation or 100 Mbps Full-Duplex Mode.....	22
External AC/DC Power Adapter .....	23
LEDs .....	24
V2 and V3 Series Media Converters.....	27
Differences Between V2 and V3.....	28
V2 Series Media Converters .....	29
Guidelines for the SML Mode for V2 .....	29
Example Scenarios in SML Mode .....	29
V3 Series Media Converters .....	30
Guidelines for the SML and ML Modes .....	30
Example Scenarios in ML and SML Modes.....	30
Smart MissingLink™ (SML) .....	31
Media Converter with SML Off .....	31
Standalone Media Converter in SML Mode.....	32
Media Converters in Pairs in SML Mode .....	33
Missing Link (ML).....	34
Standalone Media Converter in ML Mode .....	34
Reset the Media Converter .....	36
<b>Chapter 2: Installation</b> .....	37
Reviewing Safety Precautions .....	38
Selecting a Site for the Media Converter .....	40
Planning the Installation .....	41
Unpacking the Media Converter.....	44
Installing the Media Converter .....	47
Installing the Media Converter on a Desktop.....	47
Installing the SFP Transceiver .....	48
Powering On and Cabling the Media Converter.....	51
Cabling Guidelines .....	51
Applying Power and Connecting the Network Cables .....	51
<b>Chapter 3: Troubleshooting</b> .....	53
<b>Appendix A: Technical Specifications</b> .....	57
Physical Specifications.....	57
Environmental Specifications.....	57

Contents

Power Specifications .....	58
RJ45 Connector and Port Pinouts .....	58
Fiber-Optic Port Specifications .....	60
<b>Appendix B: AT-MMCWLMT Kit Installation .....</b>	<b>63</b>

# Figures

---

Figure 1: Front Panel for the MMC2000/200 Series Media Converters with the SC Connector.....	16
Figure 2: Front Panel for the MMC2000/200 Series Media Converters with the ST Connector.....	17
Figure 3: Front Panel for the MMC2000/200 Series Media Converters with the LC Connector.....	17
Figure 4: AT-MMC2000/SP Front Panel.....	18
Figure 5: AT-MMC2000/T Front Panel.....	18
Figure 6: Media Converter Back Panel of the MMC2000/200 V2 Series.....	19
Figure 7: Media Converter Back Panel of the MMC2000/200 V3 Series.....	19
Figure 8: PWR and SYS LEDs on the Back Panel.....	24
Figure 9: Port LEDs on the MMC2000/200 Series with a Fiber Port.....	25
Figure 10: Port LEDs on the AT-MMC2000/T Model.....	26
Figure 11: Two Media Converters in Pair.....	27
Figure 12: Possible Situation with Standalone Media Converter with SML.....	27
Figure 13: Standalone with ML When Copper Link is Down.....	28
Figure 14: Normal Condition.....	31
Figure 15: Fiber Connection Down with SML Off.....	31
Figure 16: Copper Connection Down with SML Off.....	32
Figure 17: SML in Normal Condition.....	32
Figure 18: SML with Fiber Connection Down.....	32
Figure 19: SML with Copper Connection Down.....	32
Figure 20: SML in Normal Condition with Two Media Converters.....	33
Figure 21: SML with Copper Connection to End Node Down.....	33
Figure 22: SML with Fiber Connection Between Media Converters Down.....	33
Figure 23: ML in Normal Condition.....	34
Figure 24: ML with Fiber Connection Down.....	34
Figure 25: ML with Copper Connection Down.....	35
Figure 26: MMC2000/200/SC Series and MMC2000/200/LX/SC Series Shipping Package Contents.....	44
Figure 27: MMC2000/200/ST Series and AT-MMC200LX/ST Shipping Package Contents.....	45
Figure 28: MMC2000/200/LC Series and AT-MMC2000/LX/LC Shipping Package Contents.....	45
Figure 29: AT-MMC2000/SP Shipping Package Contents.....	46
Figure 30: AT-MMC2000/T Shipping Package Content.....	46
Figure 31: Removing the Dust Plug from an SFP Slot.....	48
Figure 32: Inserting the SFP.....	49
Figure 33: Positioning the SFP Handle in the Upright Position.....	49
Figure 34: Connecting 12VDC Powered Unit.....	51
Figure 35: RJ45 Connector and Port Pin Layout.....	58
Figure 36: Attaching the Brackets to the Media Converter.....	64
Figure 37: Wall-mount Template.....	64
Figure 38: Placing the Template on the Wall.....	65
Figure 39: Securing the Media Converter to the Wall.....	66



# Tables

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Table 1. Port Specifications for the MMC2000/200 Series .....	20
Table 2. Port Specifications for the AT-MMC2000/T Model .....	21
Table 3. Media Converter LED on the Back Panel .....	24
Table 4. Port LEDs for the MMC2000/200 Series with a Fiber Port .....	25
Table 5. Port LEDs for the AT-MMC2000/T Model .....	26
Table 6. Differences between V2 and V3 .....	28
Table 7. Twisted-Pair Port Cabling Specifications .....	42
Table 8. Copper Connection Speed/Duplex Settings and Resulting Speed .....	43
Table 9. Physical Specifications .....	57
Table 10. Environmental Specifications .....	57
Table 11. Power Specifications .....	58
Table 12. MDI Pin Signals (10 or 100 Mbps) .....	58
Table 13. MDI-X Pin Signals (10 or 100 Mbps) .....	59
Table 14. Pin Signals (1000 Mbps) .....	59
Table 15. Fiber Type .....	60
Table 16. AT-MMC2000 Fiber-Optic Port Specifications .....	60
Table 17. AT-MMC200 Fiber-Optic Port Specifications .....	61
Table 18. AT-MMC2000LX Fiber-Optic Port Specifications .....	61
Table 19. AT-MMC200LX Fiber-Optic Port Specifications .....	61
Table 20. AT-MMCR WLMT Kit Contents .....	63



# Preface

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This preface contains the following sections:

- “Symbol Conventions” on page 12
- “Contacting Allied Telesis” on page 13

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-MMC2000/T
- AT-MMC200/SC
- AT-MMC200/ST
- AT-MMC200/LC
- AT-MMC200LX/SC
- AT-MMC200LX/ST

## Symbol Conventions

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This document uses the following conventions:

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**Note**

Notes provide additional information.

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**Caution**

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

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**Warning**

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

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**Warning**

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

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## Contacting Allied Telesis

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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](http://www.alliedtelesis.com/support)**. You can find links for the following services on this page:

- ❑ Helpdesk (Support Portal) - Log onto Allied Telesis 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.
- ❑ Product Documents - View the most recent installation guides, user guides, software release notes, white papers and data sheets for your product.
- ❑ Warranty - View a list of products to see if Allied Telesis warranty applies to the product you purchased and register your warranty.
- ❑ Allied Telesis Helpdesk - Contact a support representative.

For sales or corporate contact information, select your region and country, then go to **[www.alliedtelesis.com/contact](http://www.alliedtelesis.com/contact)**.



## Chapter 1

# Overview

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This chapter contains the following sections:

- “Introduction” on page 16
- “Features” on page 20
- “LEDs” on page 24
- “V2 and V3 Series Media Converters” on page 27
- “V2 Series Media Converters” on page 29
- “V3 Series Media Converters” on page 30
- “Smart MissingLink™ (SML)” on page 31
- “Missing Link (ML)” on page 34
- “Reset the Media Converter” on page 36

## Introduction

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The 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 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-MMC2000/T
- AT-MMC200/SC
- AT-MMC200/ST
- AT-MMC200/LC
- AT-MMC200LX/SC
- AT-MMC200LX/ST

### Front Panels

Figure 1 illustrates the front panel of the AT-MMC2000/SC, AT-MMC2000LX/SC, AT-MMC200/SC, and AT-MMC200LX/SC media converters.

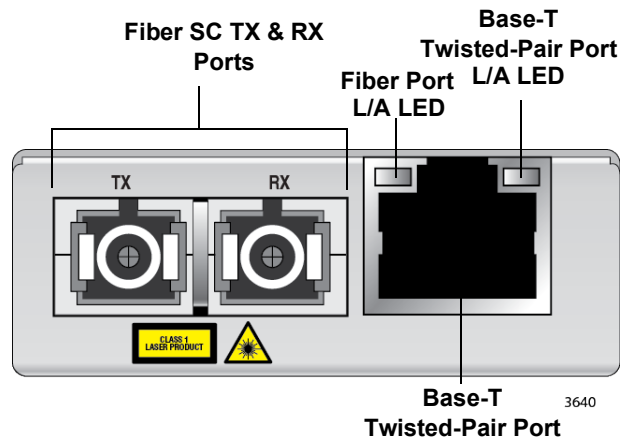


Figure 1. Front Panel for the MMC2000/200 Series Media Converters with the SC Connector

Figure 2 illustrates the front panel of the AT-MMC2000/ST, AT-MMC200/ST, and AT-MMC200LX/ST media converters.

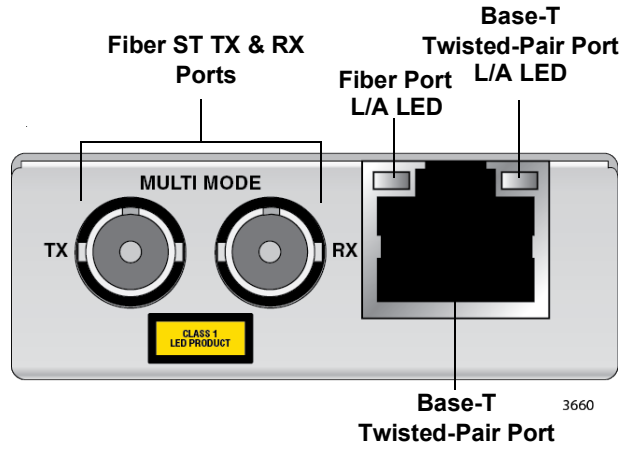


Figure 2. Front Panel for the MMC2000/200 Series Media Converters with the ST Connector

Figure 3 illustrates the front panel of the AT-MMC2000/LC, AT-MMC2000LX/LC, and AT-MMC200/LC media converters.

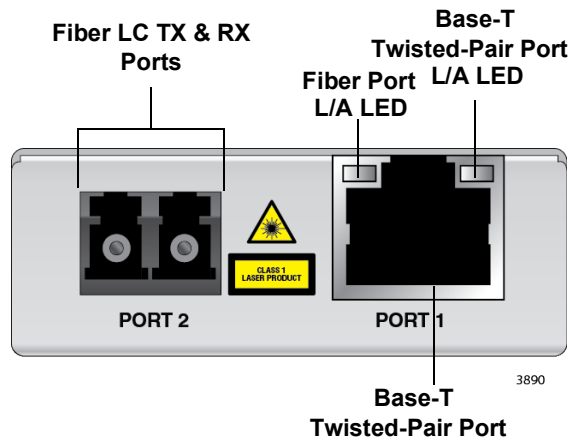


Figure 3. Front Panel for the MMC2000/200 Series Media Converters with the LC Connector

Figure 4 illustrates the front panel of the AT-MMC2000/SP media converter.

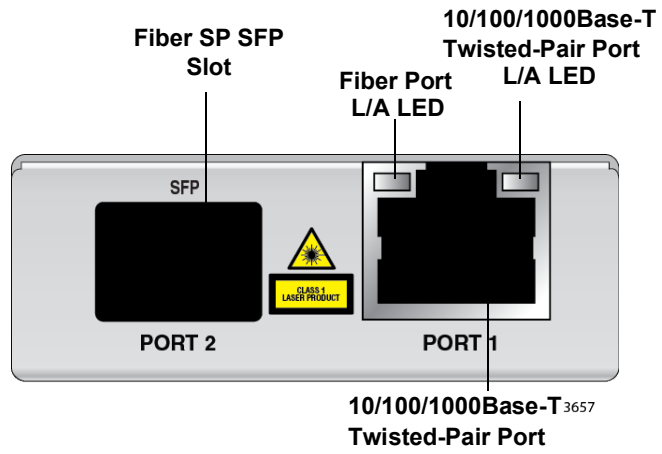


Figure 4. AT-MMC2000/SP Front Panel

Figure 5 illustrates the front panel of the AT-MMC2000/T media converter.

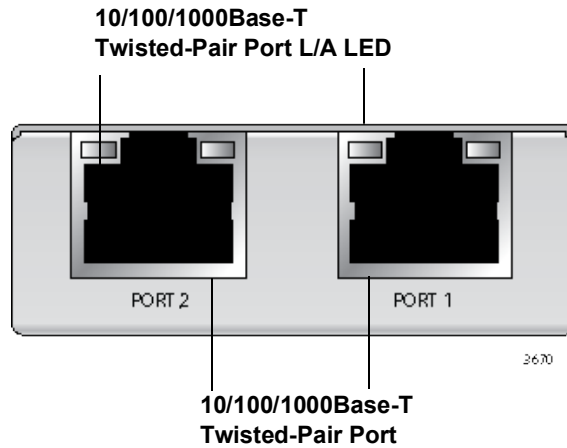


Figure 5. AT-MMC2000/T Front Panel

**Back Panel**

Figure 6 illustrates the back panel of the MMC2000/200 V2 series media converter.

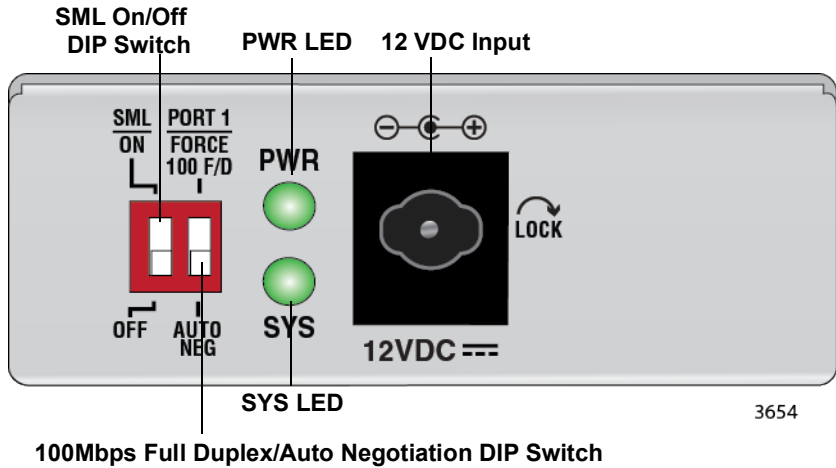


Figure 6. Media Converter Back Panel of the MMC2000/200 V2 Series

Figure 7 illustrates the back panel of the MMC2000/200 V3 series media converter.

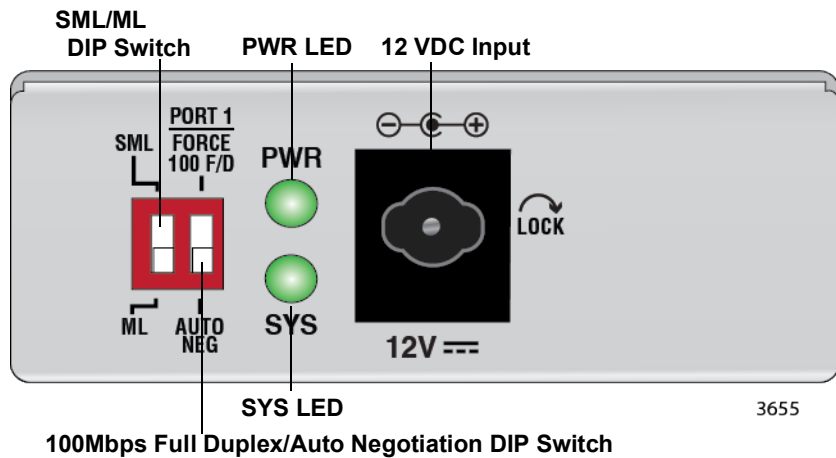


Figure 7. Media Converter Back Panel of the MMC2000/200 V3 Series

**Note**

For information on the FORCE 100 F/D and AUTO NEG switch, see “Auto-Negotiation or 100 Mbps Full-Duplex Mode” on page 22.

**Note**

For information on SML and ML, see “Smart MissingLink™ (SML)” on page 31 and “Missing Link (ML)” on page 34.

## Features

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

- The media converter provides a smaller-sized space-saving alternative to connect networks.
- The MMC2000/200 Series media converters except the AT-MMC2000/T model allow 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. Port Specifications for the MMC2000/200 Series

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		
AT-MMC2000/SP	SFP slot	100/1000Base-X	
AT-MMC200/LC	LC	100Base-FX	
AT-MMC200/SC	SC		
AT-MMC200/ST	ST		
AT-MMC200LX/SC	SC	100Base-LX	
AT-MMC200LX/ST	ST		

- The AT-MMC2000/T media converter is equipped with two twisted-pair (copper) ports that allow enterprises to connect two networks and double the distance between endpoints by connecting a 100m Ethernet cable on each port.



- Table 2 shows the specifications of the ports on the AT-MMC2000/T.

Table 2. Port Specifications for the AT-MMC2000/T Model

Model	Port1	Port2
	Copper	Copper
AT-MMC2000/T	10/100/1000Base-T	10/100/1000Base-T

- Smart MissingLink™ (SML)
- Missing Link for the V3 media converters
- Auto Negotiation and Auto MDI/MDI-X on the twisted-pair port
- Wall-mount
- Support for Jumbo frames up to 10kB
- LEDs for unit and port status
- DIP switch for activating the SML feature
- DIP switch for 100 Mbps full-duplex mode or Auto-Negotiation
- 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.

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**Note**

The parameter *nn* can be SC, ST, or LC.

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**Note**

For more details, see “Fiber-Optic Port Specifications” on page 60.

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

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**Note**

For the AT-MMC2000/SP model, you must purchase the SFP transceiver separately. The maximum operating distance of the AT-MMC2000/SP is dependent on the specific SFP module. For a list of supported transceivers, contact your Allied Telesis distributor or reseller.

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## Twisted-Pair Port

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

- IEEE 802.3u Auto-Negotiation compliant
- Auto MDI/MDI-X
- 100 meters (328 feet) maximum operating distance
- RJ45 connector

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 58.

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### Note

For twisted-pair port cabling specifications, refer to Table 7 on page 42.

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## 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.

## Auto-Negotiation or 100 Mbps Full-Duplex Mode

You can set the twisted-pair port to 100 Mbps full-duplex mode or Auto-Negotiation mode using the PORT 1 (right) DIP switch on the rear panel. See Figure 6 on page 19.

- 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.

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### Note

For the AT-MMC2000/T model, when the PORT 1 DIP switch is in the FORCE 100 F/D (up) position, *both* port 1 and port 2 are forced to 100 Mbps full-duplex mode.

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- When in the AUTO NEG (down) position, the twisted-pair port operates in Auto-Negotiation mode.

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**Note**

For the AT-MMC2000/T model, when the PORT 1 DIP switch is in the AUTO NEG (down) position, *both* port 1 and port 2 operate in Auto-Negotiation mode.

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**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.

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## 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.

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**Note**

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

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# LEDs

Figure 8 shows the PWR and SYS LEDs on the back panel.

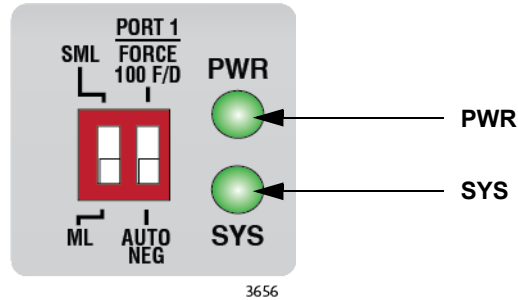


Figure 8. PWR and SYS LEDs on the Back Panel

Table 3 describes the media converter’s LEDs on the back panel.

Table 3. Media Converter LED on the Back Panel

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 does not pass traffic.
	Solid Green (with Heartbeat)	The media converter is operational.  <b>Note</b> 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.  For the AT-MMC2000/SP media converter, no SFP module is installed or an error is present.

Figure 9 shows the port LEDs on the MMC2000/200 Series media converters except the AT-MMC2000/T model.

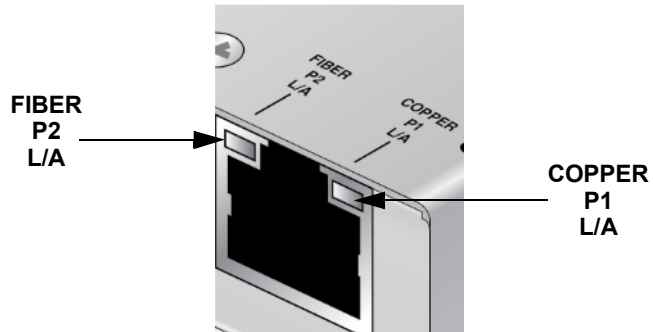


Figure 9. Port LEDs on the MMC2000/200 Series with a Fiber Port

Table 4 describes the port LEDs on the MMC2000/200 series media converters except the AT-MMC2000/T model.

Table 4. Port LEDs for the MMC2000/200 Series with a Fiber Port

LED	State	Description
COPPER P1 L/A	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	The media converter has entered the ML or SML mode.  See “Smart MissingLink™ (SML)” on page 31 and “Missing Link (ML)” on page 34.
FIBER P2 L/A	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	The media converter has entered the ML or SML mode.  See “Smart MissingLink™ (SML)” on page 31 and “Missing Link (ML)” on page 34.

Figure 10 shows the port LEDs on the AT-MMC2000/T media converter.

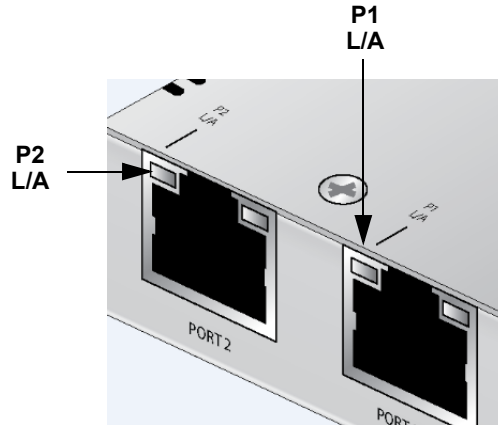


Figure 10. Port LEDs on the AT-MMC2000/T Model

Table 5 describes the port LEDs on the AT-MMC2000/T model.

Table 5. Port LEDs for the AT-MMC2000/T Model

LED	State	Description
P1 L/A	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	The media converter has entered the ML or SML mode.  See “Smart MissingLink™ (SML)” on page 31 and “Missing Link (ML)” on page 34.
P2 L/A	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	The media converter has entered the ML or SML mode.  See “Smart MissingLink™ (SML)” on page 31 and “Missing Link (ML)” on page 34.

## V2 and V3 Series Media Converters

The MMC2000/200 series media converters have two versions: V2 and V3. Both V2 and V3 have Smart MissingLink™ (SML). In addition to SML, the Missing Link (ML) feature is added to the V3 series media converters.

SML passes a link status from one port to the other so that user's managed endpoints can detect a failure at links where the endpoints are not directly connected. SML is intended for use when the media converters are installed in pair, connecting two copper endpoints, as shown in Figure 11.

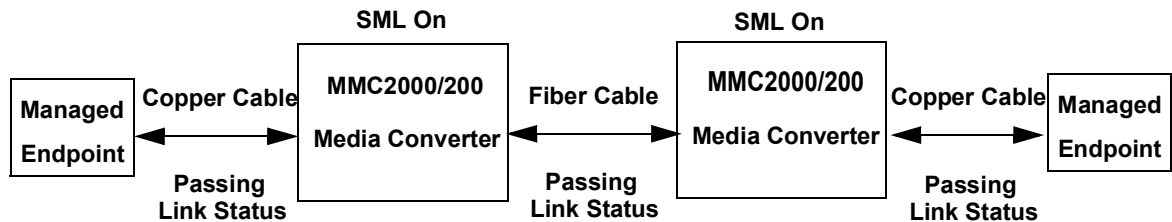


Figure 11. Two Media Converters in Pair

### Note

For detailed information about SML, see "Smart MissingLink™ (SML)" on page 31.

SML helps identify a link problem in two media converters in pair; however, when SML is used in the media converter in standalone, SML may cause problems in some situations.

Figure 12 illustrates a situation where a fiber port on the media converter is connected to a certain switch. When the copper link fails, the fiber link goes up and down and the switch detects it as a problem with the fiber link. As a result, the switch disables the fiber port so that the fiber port cannot reconnect even when the copper link is back.

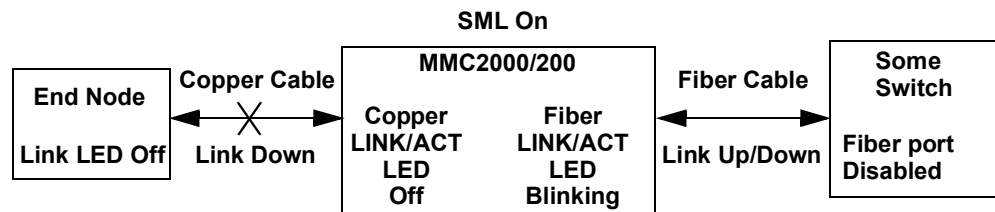


Figure 12. Possible Situation with Standalone Media Converter with SML

When encountering the problem, you either change the switch setting or turn off SML on the media converter.

To solve the above situation, ML is added to V3 series media converters, intended for use in standalone.

Figure 13 illustrates the V3 series media converter in standalone in the ML mode. When the copper link fails, the fiber link goes down.

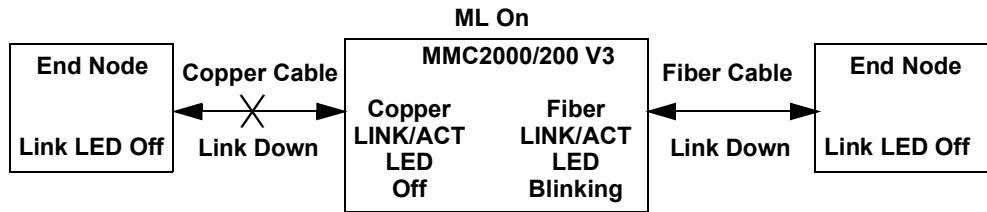


Figure 13. Standalone with ML When Copper Link is Down

**Note**

For detailed information about ML, see “Missing Link (ML)” on page 34.

Except the ML mode and DIP switch markings, the MMC2000/200 V2 and V3 series media converters are the same.

**Differences Between V2 and V3**

To find out the version number of your media converter, see the DIP switch markings on the bottom panel as shown in Figure 6 on page 19 and Figure 7 on page 19.

Table 6 summarizes the differences between V2 and V3.

Table 6. Differences between V2 and V3

	DIP Switch	SML	ML
V2 Media Converters		Supported	N/A
V3 Media Converters		Supported	Supported



## V2 Series Media Converters

---

The MMC2000/200 V2 series media converters have the SML feature to pass the link status from one port to the other for endpoints, make a connection problem visible, and help identify where troubleshooting is required.

---

**Note**

For the V3 series media converter, see “V3 Series Media Converters” on page 30.

---

---

**Note**

To find out whether your device is V2 or V3, see “Differences Between V2 and V3” on page 28.

---

### Guidelines for the SML Mode for V2

Here are guidelines for the SML mode:

- ❑ The MMC2000/200 V2 series media converter is set to either the SML mode on or off.
- ❑ Use the DIP switch to select ON or OFF.
- ❑ When two media converters are connected in pairs, turn the SML mode on. See “Media Converters in Pairs in SML Mode” on page 33.
- ❑ The SML feature of fiber link communication on a link failure can cause problems with some switches when the fiber port is directly connected to a switch. The SML mode is intended when the fiber port is connected to another Allied Telesis media converter.

### Example Scenarios in SML Mode

The following example scenarios explain how the V2 series media converter behaves with SML on and SML off:

- ❑ “Media Converter with SML Off” on page 31
- ❑ “Standalone Media Converter in SML Mode” on page 32
- ❑ “Media Converters in Pairs in SML Mode” on page 33

## V3 Series Media Converters

---

The MMC2000/200 V3 series media converters have the SML and ML features to pass the link status from one port to the other for endpoints, make a connection problem visible, and help identify where troubleshooting is required.

The SML mode is for two media converters in pair; the ML mode is for a media converter in standalone.

---

**Note**

For the V2 series media converter, see “V2 Series Media Converters” on page 29.

---

---

**Note**

To find out whether your device is V2 or V3, see “Differences Between V2 and V3” on page 28.

---

### Guidelines for the SML and ML Modes

Here are guidelines for the ML and SML modes:

- ❑ The MMC2000/200 V3 series media converter is set to either the ML or SML mode.
- ❑ Use the DIP switch to select ML or SML.
- ❑ Select the ML mode when a media converter is connected standalone between a fiber endpoint and copper endpoint. See “Standalone Media Converter in ML Mode” on page 34.
- ❑ Select the SML mode when two media converters are connected in pairs. See “Media Converters in Pairs in SML Mode” on page 33.
- ❑ The SML feature of fiber link communication on a link failure can cause problems with some switches when the fiber port is directly connected to a switch. The SML mode is intended when the fiber port is connected to another Allied Telesis media converter.

### Example Scenarios in ML and SML Modes

The following example scenarios explain how the V3 series media converter behaves in the ML or SML mode:

- ❑ “Standalone Media Converter in ML Mode” on page 34
- ❑ “Media Converters in Pairs in SML Mode” on page 33

## Smart MissingLink™ (SML)

The Smart MissingLink™ (SML) feature makes a connection problem visible and helps you identify where troubleshooting is required.

When one of the Ethernet connections to the media converter fails, SML disables the other port and causes its LED to blink to notify where a problem is occurring.

This section explains following scenarios:

- “Media Converter with SML Off” on page 31
- “Standalone Media Converter in SML Mode” on page 32
- “Media Converters in Pairs in SML Mode” on page 33

### Media Converter with SML Off

Following are example scenarios when the media converter is connected between two end nodes and SML is off.

#### Note

The scenarios with SML off apply only to the V2 series media converters. The V3 series media converter does *not* have the SML off option.

Figure 14 shows media converter and end node LINK/ACT LED behavior with SML off under normal conditions.

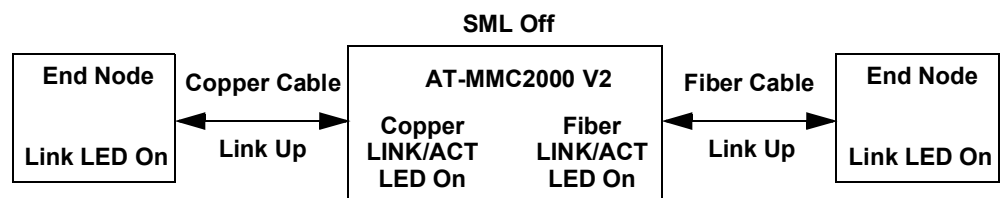


Figure 14. Normal Condition

Figure 15 shows media converter and end node LINK/ACT LED behavior with SML off with a fiber connection down.

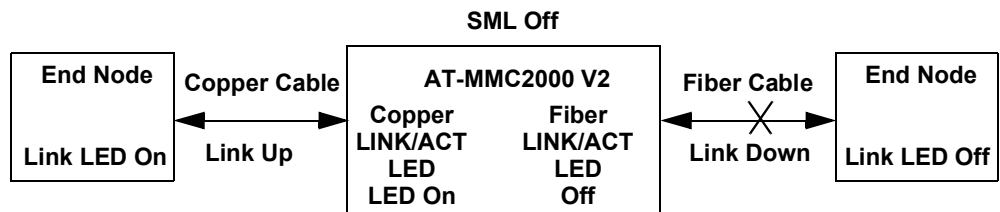


Figure 15. Fiber Connection Down with SML Off

Figure 16 shows media converter and end node LINK/ACT LED behavior with SML off with a copper connection down.

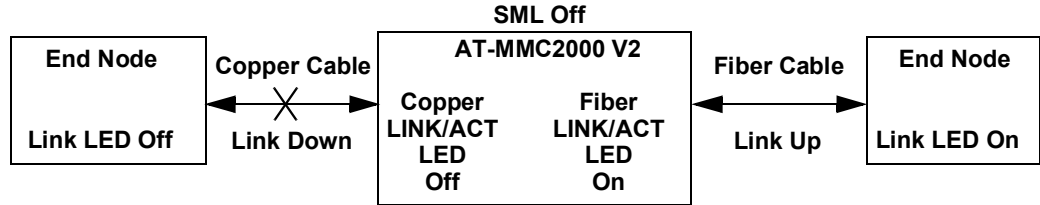


Figure 16. Copper Connection Down with SML Off

**Standalone Media Converter in SML Mode**

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

Figure 17 shows media converter and end node LINK/ACT LED behavior with SML enabled under normal conditions.

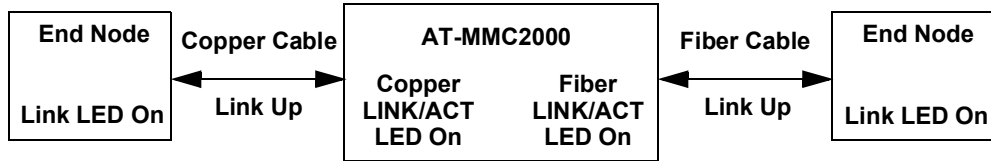


Figure 17. SML in Normal Condition

Figure 18 shows media converter and end node LINK/ACT LED behavior with SML enabled with a fiber connection down.

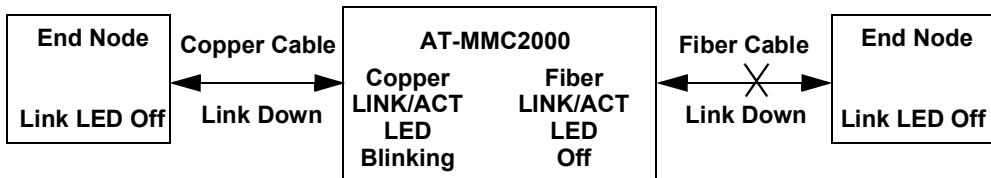
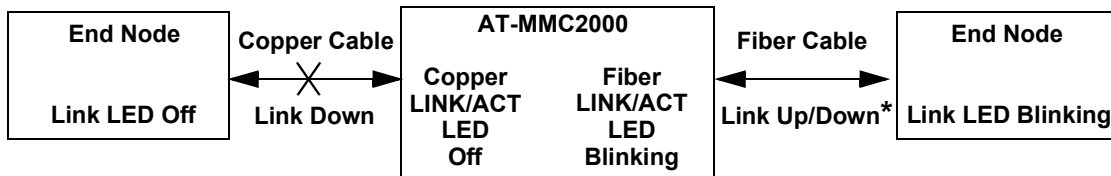


Figure 18. SML with Fiber Connection Down

Figure 19 shows media converter and end node LINK/ACT LED behavior with SML enabled with a copper connection down.



\*This behavior may cause problems with some switches. See Figure 12 on page 27 for more information.

Figure 19. SML with Copper Connection Down

**Media Converters in Pairs in SML Mode**

Following are example scenarios with media converters in pairs in the SML mode, connected back-to-back or in the bookend mode.

Figure 20 shows media converter and its LINK/ACT LED behavior in the SML mode under normal conditions.

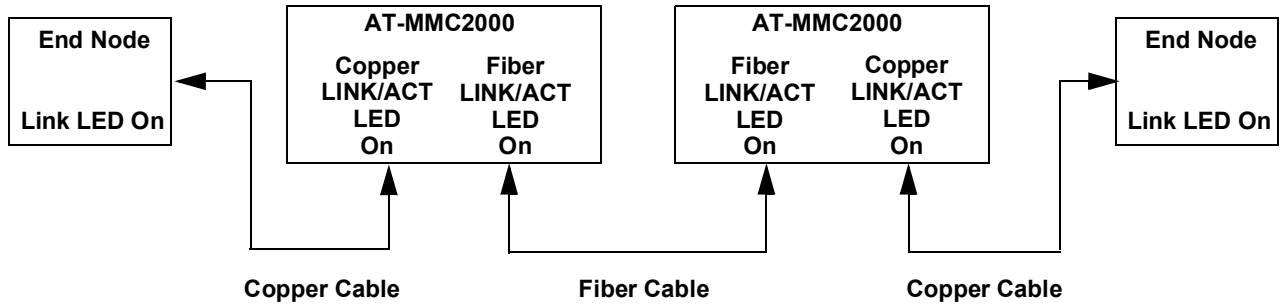


Figure 20. SML in Normal Condition with Two Media Converters

Figure 21 shows media converter and its LINK/ACT LED behavior in the SML mode with a copper connection down between a media converter and an end node.

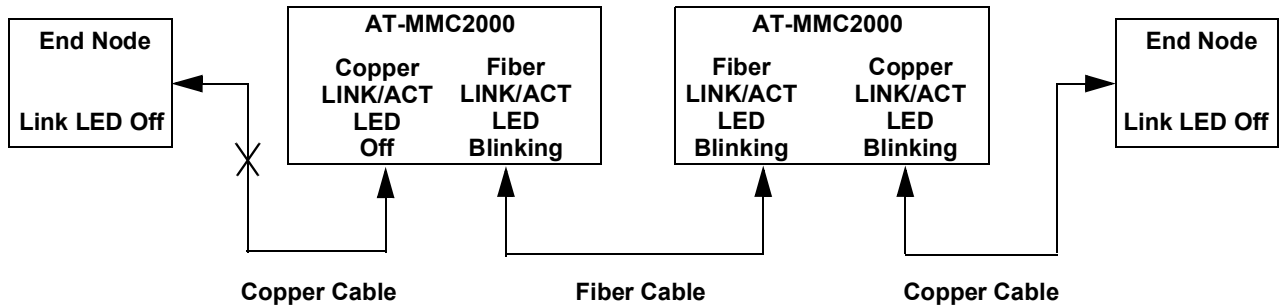


Figure 21. SML with Copper Connection to End Node Down

Figure 22 shows media converter and its LINK/ACT LED behavior in the SML mode with a fiber connection down between two media converters.

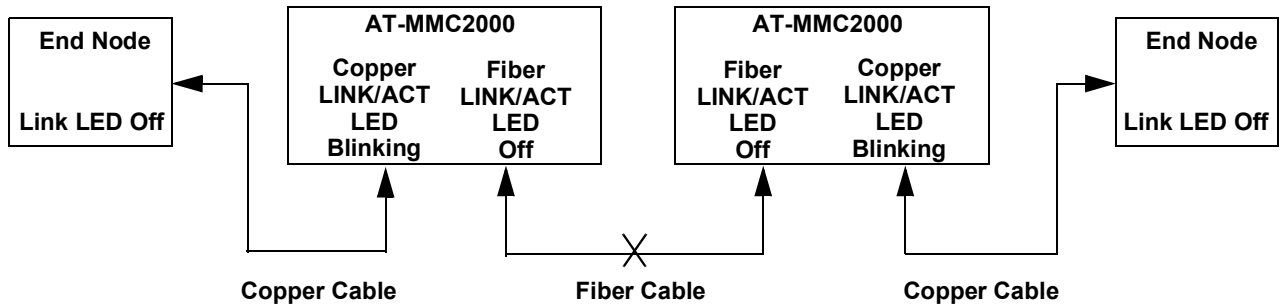


Figure 22. SML with Fiber Connection Between Media Converters Down

## Missing Link (ML)

The MMC2000/200 V3 series media converters offer the Missing Link (ML), which is intended for use when the V2 media converter is connected standalone between a fiber endpoint and copper endpoint.

**Note**

To find out whether your device is V2 or V3, see “Differences Between V2 and V3” on page 28.

### Standalone Media Converter in ML Mode

Following are example scenarios for the media converter in the ML mode, connected standalone between two end nodes.

**Note**

This section applies only to the MMC2000/200 V3 media converter. The MMC2000/200 V2 media converter does *not* have the ML mode.

Figure 23 shows media converter and its LINK/ACT LED behavior in the ML mode under normal conditions.

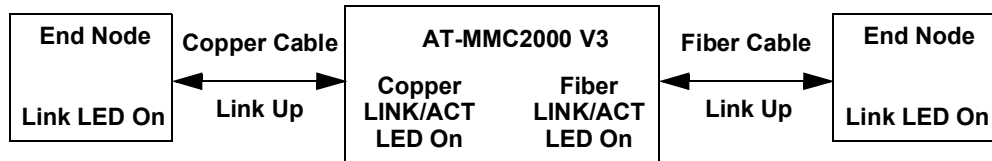


Figure 23. ML in Normal Condition

Figure 24 shows media converter and its LINK/ACT LED behavior in the ML mode when a fiber connection is down.

When a fiber connection to the media converter fails, the fiber LINK/ACT LED is turned off. The copper port LINK/ACT LED blinks slowly and the copper link goes down.

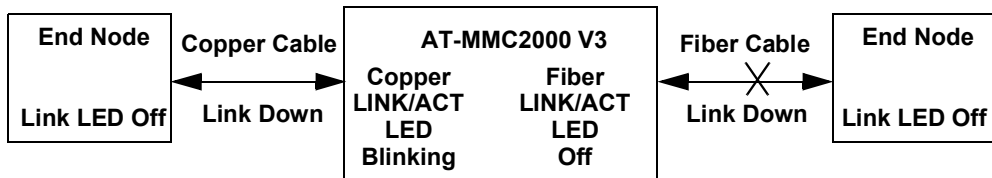


Figure 24. ML with Fiber Connection Down

Figure 25 shows media converter and its LINK/ACT LED behavior in the ML mode when a copper connection is down.

When a copper connection to the media converter fails, the copper LINK/ACT LED is turned off. The fiber port LINK/ACT LED blinks slowly and the fiber link goes down.

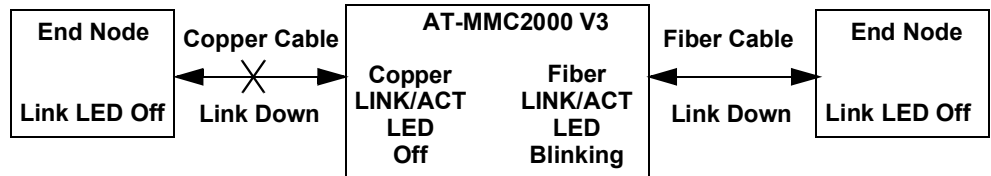


Figure 25. ML with Copper Connection Down

## **Reset the Media Converter**

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



## Chapter 2

# Installation

---

This chapter contains the following sections:

- “Reviewing Safety Precautions” on page 38
- “Selecting a Site for the Media Converter” on page 40
- “Planning the Installation” on page 41
- “Unpacking the Media Converter” on page 44
- “Installing the Media Converter” on page 47
- “Installing the SFP Transceiver” on page 48
- “Powering On and Cabling the Media Converter” on page 51

## Reviewing Safety Precautions

---

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

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### 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](http://www.alliedtelesis.com/support).

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
### Caution

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

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### Note

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

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### Note


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

---



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### Warning


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

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### 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

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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 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 MMC2000/200 media converter ports support both half-duplex and full-duplex modes.
- The duplex mode is set with Auto-Negotiation.
- The two end nodes connected to the media converter ports can operate at different duplex modes.
- 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 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 MMC2000/200LX/*nn* model has a maximum operating distance of 20km.

---

**Note**

The parameter *nn* can be SC, ST, or LC.

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---

**Note**

For more details, see “Fiber-Optic Port Specifications” on page 60.

---

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

---

**Note**

For the AT-MMC2000/SP model, you must purchase the SFP transceiver separately. The maximum operating distance of the AT-MMC2000/SP media converter is dependent on the specific SFP module. For a list of supported transceivers, contact your Allied Telesis distributor or reseller.

---

- Table 7 contains the cable specifications for the twisted-pair port.

Table 7. Twisted-Pair Port Cabling Specifications

Speed	Type of Cable
10 Mbps	Standard TIA/EIA 568-B unshielded Category 3 cable, or better.
100 Mbps	Standard TIA/EIA 568-A/B unshielded Category 5e cable, or better.
1000 Mbps	

- For speed/duplex interactions between the copper port on the MMC2000/200 series media converter and the copper link partner, see Table 8 on page 43 for allowable speed/duplex combinations.

Table 8. Copper Connection Speed/Duplex Settings and Resulting Speed

<b>MMC2000/200 Copper Port Speed/Duplex Setting</b>	<b>Copper Link Partner Port Setting</b>			
	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
<p>*Although 1000Mbps connections require Auto Negotiation, some switches allow the option of only advertising 1000Mbps speed.</p> <p>Note: The fiber port always runs at 1000Mbps full duplex.</p>				

**Note**

For the fiber-optic port specifications, refer to “Fiber-Optic Port Specifications” on page 60.

## Unpacking the Media Converter

---

To unpack the media converter, perform the following procedure:

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

---

**Note**

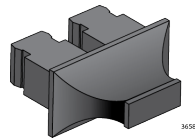
Store the packaging material in a safe location. You must use the original shipping material if you need to return the unit to Allied Telesis.

---

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 26 shows shipping container items for the MMC2000/200/SC series and MMC2000/200/LX/SC series media converters.



One power adapter



One fiber port dust cover  
(pre-installed)

Figure 26. MMC2000/200/SC Series and MMC2000/200/LX/SC Series Shipping Package Contents



- Figure 27 shows shipping container items for the MMC2000/200/ST series and AT-MMC200/LX/ST media converters.

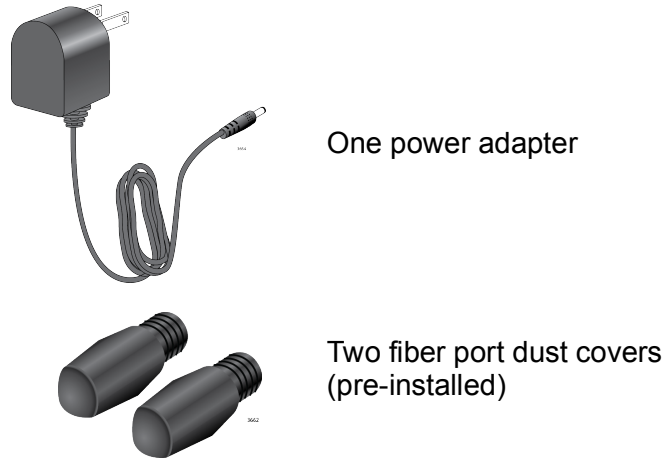


Figure 27. MMC2000/200/ST Series and AT-MMC200LX/ST Shipping Package Contents

- Figure 28 shows shipping container items for the MMC2000/200/LC series and AT-MMC2000/LX/LC media converters.

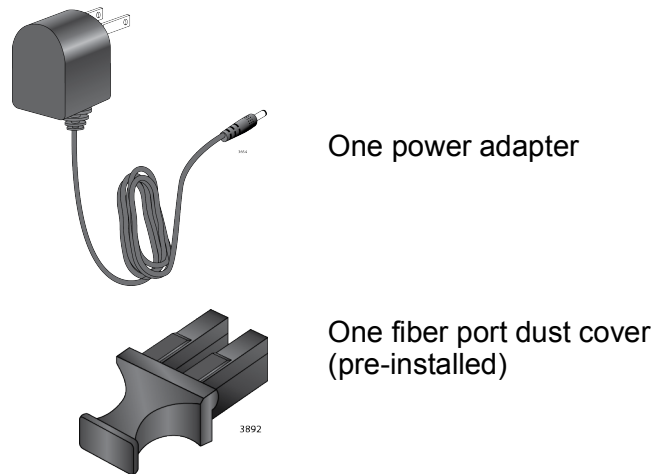
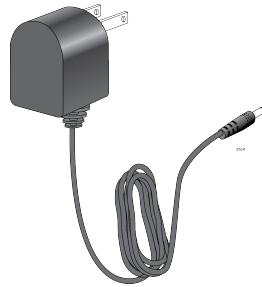


Figure 28. MMC2000/200/LC Series and AT-MMC2000/LX/LC Shipping Package Contents

- Figure 29 shows shipping container items for the AT-MMC2000/SP model.



One power adapter



One SFP slot dust cover  
(pre-installed)

Figure 29. AT-MMC2000/SP Shipping Package Contents

- Figure 30 shows shipping container items for the AT-MMC2000/T model.



One power adapter

Figure 30. AT-MMC2000/T Shipping Package Content

## Installing the Media Converter

---

You may install the media converter on a desktop or on a wall:

- To install the media converter on a desktop, see “Installing the Media Converter on a Desktop,” next.
- To install the media converter on a wall, see “AT-MMCWLMT Kit Installation” on page 63.

---

**Note**

To install the media converter on a wall, you must purchase the AT-MMCWLMT kit separately.

---

### Installing the Media Converter on a Desktop

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 48.
  - For all other models, go to “Powering On and Cabling the Media Converter” on page 51.

## 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 31.

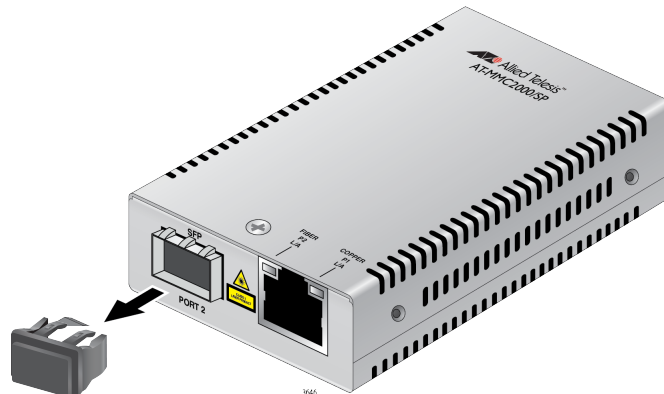


Figure 31. Removing the Dust Plug from an SFP Slot

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

- Slide the transceiver into the SFP slot until it clicks into place. See Figure 32.

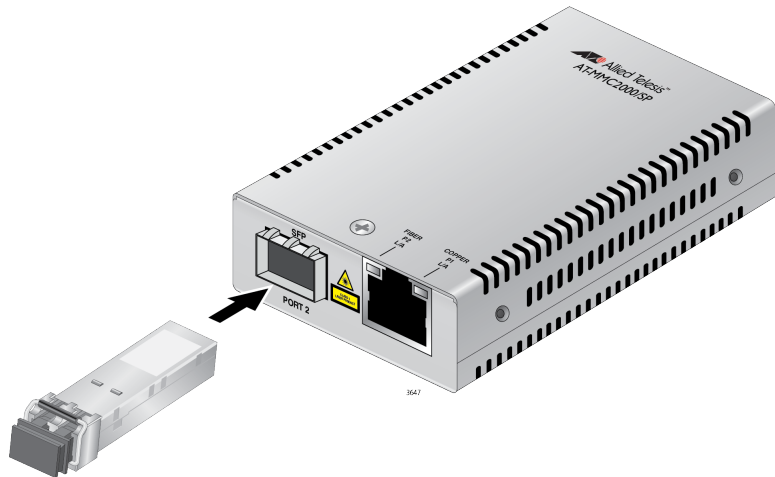


Figure 32. Inserting the SFP

- Verify that the handle on the transceiver is in the upright position, as shown in Figure 33. This secures the transceiver and prevents it from being dislodged from the slot.

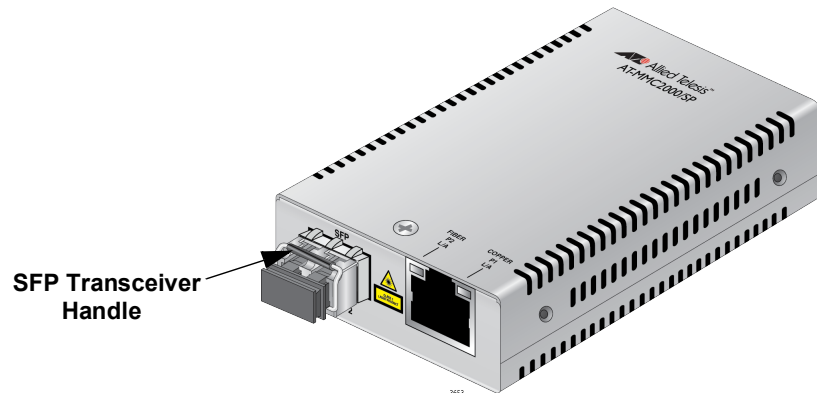


Figure 33. Positioning the SFP Handle in the Upright Position

---

**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 51.

## 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 34.



Figure 34. Connecting 12VDC Powered Unit

2. Plug the power adapter to a power outlet. Refer to “Power Specifications” on page 58 for power requirements.
3. Verify that the PWR LED is lit green. If the PWR LED is off, refer to “Troubleshooting” on page 53.
4. Verify that the SYS LED is lit green. If the SYS LED is off, refer to “Troubleshooting” on page 53.

The solid green SYS LED with heartbeat indicates that the media converter is operational. For the media converters except the AT-MMC2000/SP model, the slow blinking green SYS LED indicates that an error is present. For the AT-MMC2000/SP model, the slow blinking SYS LED means that no SFP module is installed or an error is present.

---

**Note**

For more information about LEDs, see Table 4 on page 25.

---

5. If the media converter has a fiber-optic connector, remove the dust cover from the fiber-optic connector and connect the cable to the fiber-optic port. For the AT-MMC2000/T model, skip to Step 7.
6. 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.

7. 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 8 on page 43 for allowable speed/duplex combinations.

---

**Note**

For the AT-MMC2000/T model, repeat this step for the other twisted-pair port.

---

8. 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](http://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.

For an AT-MMC2000/SP unit, no SFP module is installed, or 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.
- If the FORCE 100 F/D switch on the back panel is on, try the connection with the switch off.
- 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.

- 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

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

- “Physical Specifications”
- “Environmental Specifications”
- “Power Specifications” on page 58
- “RJ45 Connector and Port Pinouts” on page 58
- “Fiber-Optic Port Specifications” on page 60

## Physical Specifications

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Table 9. Physical Specifications

Dimensions W x D x H	5.6 cm x 10.2 cm x 2.2 cm (2.2 in x 4 in x 0.9 in)
Weight	170 g (6 oz)

## Environmental Specifications

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Table 10. 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 3,048 m (10,000 ft)

## Power Specifications

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

Table 11. Power Specifications

Input supply voltage	12 VDC
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## RJ45 Connector and Port Pinouts

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Figure 35 illustrates the pin layout for the RJ45 connector and port.

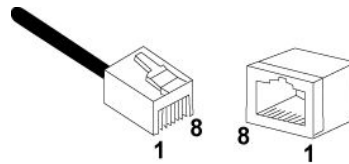


Figure 35. RJ45 Connector and Port Pin Layout

Table 12 lists the pin signals when a port is operating in the MDI configuration at 10 or 100 Mbps.

Table 12. MDI Pin Signals (10 or 100 Mbps)

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

Table 13 lists the pin signals when a port is operating in the MDI-X configuration at 10 or 100 Mbps.

Table 13. MDI-X Pin Signals (10 or 100 Mbps)

<b>Pin</b>	<b>Pair</b>	<b>Signal</b>
1	1	RX+
2	1	RX-
3	2	TX+
6	2	TX-

Table 14 lists the pin signals when a port is operating at 1000 Mbps.

Table 14. Pin Signals (1000 Mbps)

<b>Pin</b>	<b>Pair</b>	<b>Signal</b>
1	1	TX or RX+
2	1	TX or RX-
3	2	TX or RX+
4	3	TX or RX+
5	3	TX or RX-
6	2	TX or RX-
7	4	TX or RX+
8	4	TX or 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 15.

Table 15. 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 16 lists fiber-optic port specifications for the AT-MMC2000 media converters.

Table 16. AT-MMC2000 Fiber-Optic Port Specifications

Fiber Optic Diameter (microns)	Optical Wavelength (nm)	Launch Power (dBm) <sup>1</sup>		Receive Power (dBm)		Max. Distance
		Min.	Max.	Min.	Max.	
50/125	850	-9.5	-4	-17	-3	500 m (1,640 ft)
62.5/125	850	-9.5	-4	-17	-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 17. AT-MMC200 Fiber-Optic Port Specifications

Fiber Optic Diameter (microns)	Optical Wavelength (nm)	Launch Power (dBm) <sup>1</sup>		Receive Power (dBm)		Max. Distance
		Min.	Max.	Min.	Max.	
50/125	1310	-20	-14	-32	-3	2 km (6,562 ft)
62.5/125	1310	-20	-14	-32	-3	2 km (6,562 ft)

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

Table 18 lists fiber-optic port specifications for the AT-MMC2000LX media converters.

Table 18. AT-MMC2000LX Fiber-Optic Port Specifications

Fiber Type	Fiber Optic Diameter (microns)	Optical Wavelength (nm)	Launch Power (dBm) <sup>1</sup>		Receive Power (dBm)		Max. Distance
			Min.	Max.	Min.	Max.	
OS2	9/125	1310	-10	-1	-22	-3	20 km (65,617 ft)
OS1	9/125	1310	-10	-1	-22	-3	10 km (32,808 ft)

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

Table 19 lists fiber-optic port specifications for the AT-MMC200LX media converters.

Table 19. AT-MMC200LX Fiber-Optic Port Specifications

Fiber Type	Fiber Optic Diameter (microns)	Optical Wavelength (nm)	Launch Power (dBm) <sup>1</sup>		Receive Power (dBm)		Max. Distance
			Min.	Max.	Min.	Max.	
OS2	9/125	1310	-15	-5	-32	-3	20 km (65,617 ft)
OS1	9/125	1310	-15	-5	-32	-3	10 km (32,808 ft)

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



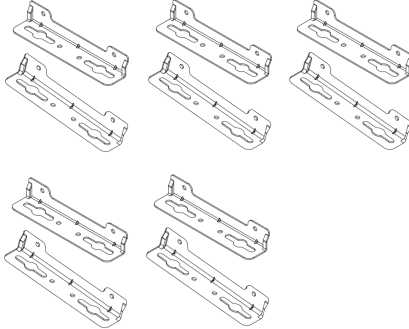


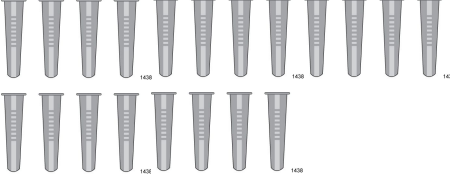
## Appendix B

# AT-MMCWLMT Kit Installation

Before installing an MMC media converter on a wall, you must have an AT-MMCWLMT Kit that is provided separately.

1. Verify that the AT-MMCWLMT Kit contains the items shown in Table 20.

Table 20 AT-MMCR WLMT Kit Contents

Description	Illustration
5 Sets of Wall Mounting Brackets	
20 Bracket Screws	
20 Self-Tapping Screws	
20 Plastic Anchors	

2. Select a wall location for the unit.
3. Place the unit on a table.

4. Orient the brackets against the sides of the unit, as shown in Figure 36, and secure them to the unit with the four of the brackets screws included.

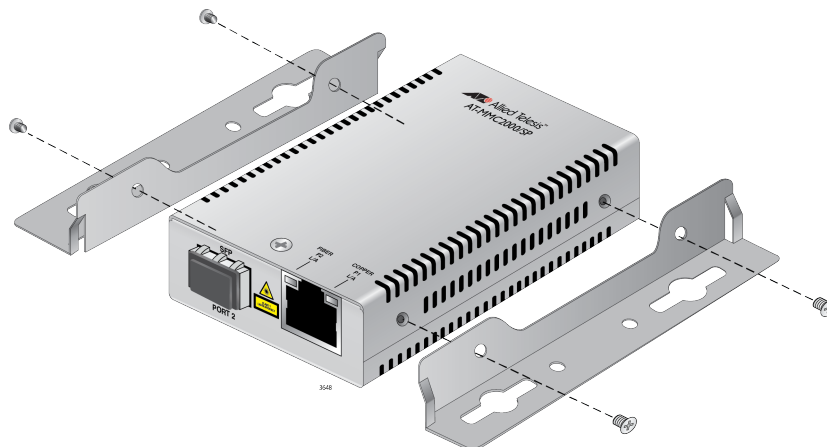


Figure 36. Attaching the Brackets to the Media Converter

5. Print out the template in Figure 37.

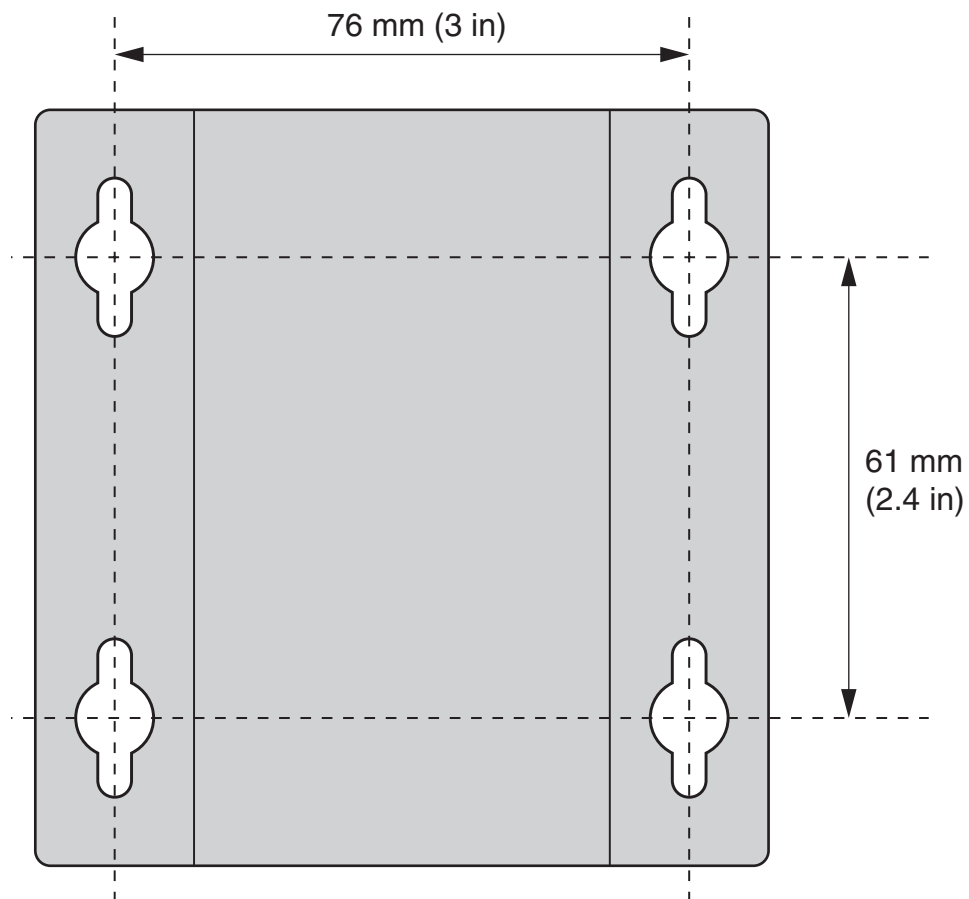


Figure 37. Wall-mount Template

6. Use scotch tape to attach the template on the wall.
7. Pre-drill four 3/16" (5mm) holes at the locations on the templates as shown in Figure 38.

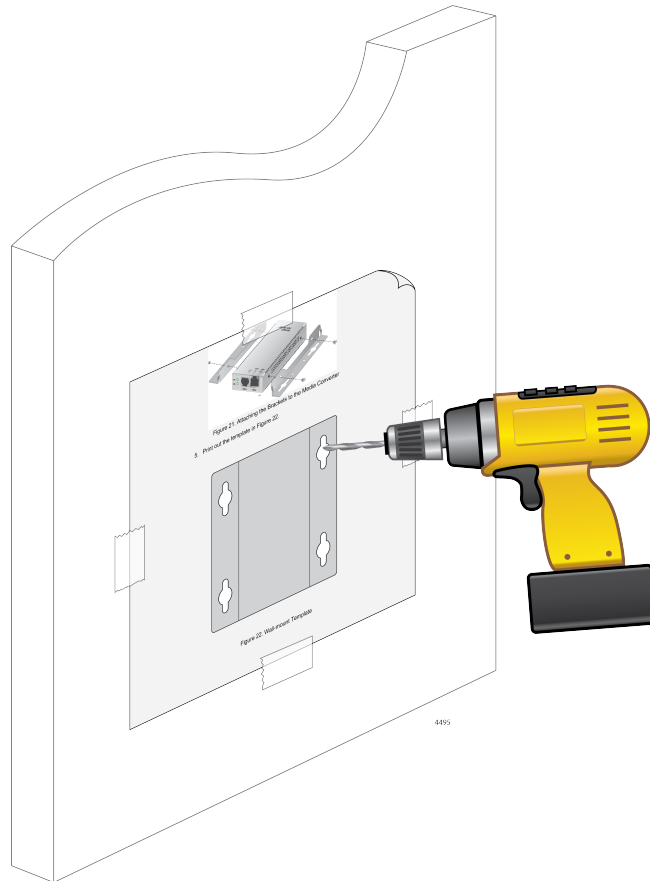


Figure 38. Placing the Template on the Wall

8. Remove the template from the wall.
9. Install four plastic anchors included with AT-MMCWLMT Kit into the wall, at the holes you drilled in the previous step.
10. Secure the media converter unit to the wall using four wall-mounting screws. See Figure 39 on page 66.

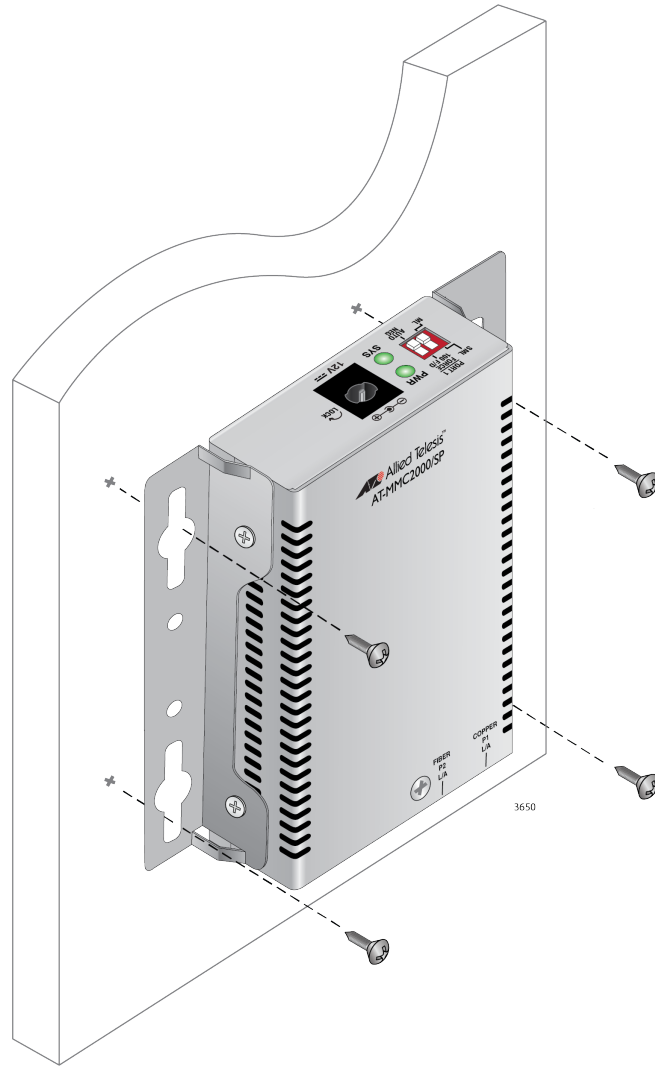


Figure 39. Securing the Media Converter to the Wall