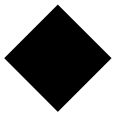


Fast Ethernet Media Converter

AT-PC232/POE



Installation Guide

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Electrical Safety and Emissions Standards

This product meets the following standards.

U.S. Federal Communications Commission

Declaration of Conformity

Manufacturer Name: Allied Telesis, Inc.

Declares that the product: **Residential Gateway**

Model Numbers: **AT-PC232/POE**

This product complies with FCC Part 15B, Class B Limits:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device must not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Radiated Energy

Note: This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with instructions, may cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on. The user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission rules.

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

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

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This Allied Telesis RoHS-compliant product conforms to the European Union Restriction of the Use of Certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment. Allied Telesis ensures RoHS conformance by requiring supplier Declarations of Conformity, monitoring incoming materials, and maintaining manufacturing process controls.

RFI Emissions	FCC Class B, EN55022 Class B, EN61000-3-2, EN61000-3-3, VCCI Class B, C-TICK, CE
Immunity	EN55024
Electrical Safety	EN60950 (TUV), UL 60950 (cUL _{US})



Laser Safety EN60825

Translated Safety Statements

Important: The  indicates that a translation of the safety statement is available in a PDF document titled “Translated Safety Statements” (613-000990) posted on the Allied Telesis website at www.alliedtelesis.com and on this product CD.

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Preface



This guide provides the hardware installation instructions for your AT-PC232/POE Media Converter. This preface contains the following sections:

- ❑ “Safety Symbols Used in this Document” on page 12
- ❑ “Where to Find Web-based Guides” on page 13
- ❑ “Contacting Allied Telesis” on page 14

Safety Symbols Used in this Document

This document uses the safety symbols defined in Table 1.

Table 1. Safety Symbols

Symbol	Meaning	Description
	Caution	Performing or omitting a specific action may result in equipment damage or loss of data.
	Warning	Performing or omitting a specific action may result in electrical shock.

Where to Find Web-based Guides

The installation and user guides for all Allied Telesis products are available in portable document format (PDF) on our web site at **www.alliedtelesis.com**. You can view the documents online or download them onto a local workstation or server.

Contacting Allied Telesis

This section provides Allied Telesis contact information for technical support as well as sales or corporate information.

Online Support

You can request technical support online by accessing the Allied Telesis Knowledge Base from the following web site:

www.alliedtelesis.com/support. You can use the Knowledge Base to submit questions to our technical support staff and review answers to previously asked questions.

Email and Telephone Support

For Technical Support via email or telephone, refer to the Allied Telesis web site: **www.alliedtelesis.com**. Select your country from the list displayed on the website. Then select the appropriate menu tab.

Returning Products

Products for return or repair must first be assigned a Return Materials Authorization (RMA) number. A product sent to Allied Telesis without a RMA number will be returned to the sender at the sender's expense.

To obtain an RMA number, contact the Allied Telesis Technical Support group at our web site: **www.alliedtelesis.com/support/rma**. Select your country from the list displayed on the website. Then select the appropriate menu tab.

For Sales or Corporate Information

You can contact Allied Telesis for sales or corporate information at our web site: **www.alliedtelesis.com**. Select your country from the list displayed on the website. Then select the appropriate menu tab.

Warranty

The AT-PC232/POE has a Five Year Warranty. Go to **www.alliedtelesis.com/warranty** for the specific terms and conditions of the warranty and for warranty registration.

Management Software Updates

New releases of management software for our managed products are available from the following Internet sites:

- Allied Telesis web site: **www.alliedtelesis.com**
- Allied Telesis FTP server: **ftp://ftp.alliedtelesis.com**

You must have FTP client software and log in to the server to access the Allied Telesis FTP server from your workstation's command prompt. The user name is "anonymous" and the password is your email address.

Chapter 1

Overview

The AT-PC232/POE Media Converter is designed to extend the distance of your network by converting 10 /100Base Ethernet data between copper and fiber network cables and to provide Power over Ethernet (PoE) power to a Powered Device (PD) connected to the copper port.

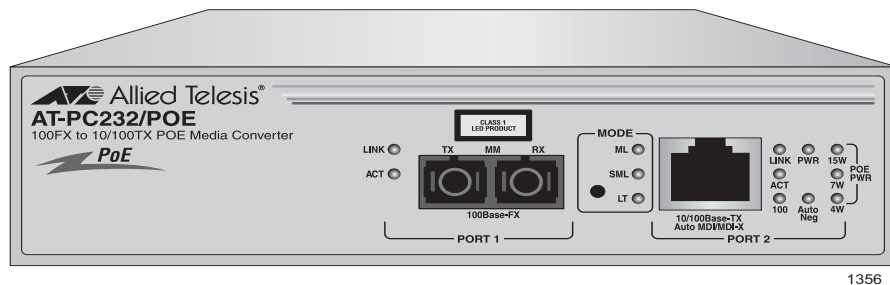
This chapter contains the following sections:

- “Introduction” on page 16
- “Key Features” on page 17
- “10/100Base-TX Twisted Pair Port” on page 18
- “100Base-FX Fiber Optic Port” on page 20
- “Operating Modes” on page 21
- “Power over Ethernet” on page 24
- “LEDs” on page 26
- “DIP Switches” on page 29
- “A Few Basics about Ethernet Switching” on page 30
- “Network Topologies” on page 31

Introduction

The AT-PC232/POE Media Converter is a 10/100Base-TX copper to 100Base-FX fiber media converter is designed for both standalone and wall mount use and does not require software configuration or management.

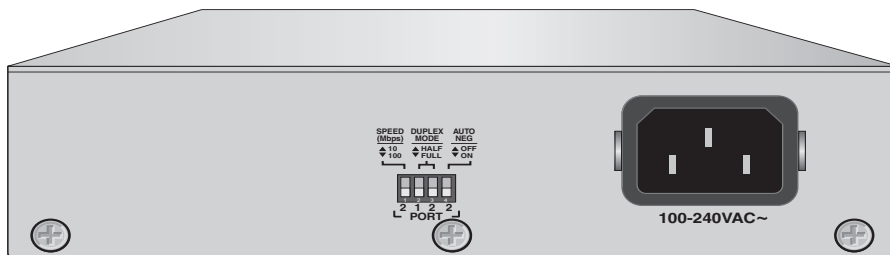
Figure 1 illustrates the front panel of the AT-PC232/POE Media Converter.



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Figure 1. AT-PC232/POE Front Panel

Figure 2 illustrates the back panel of the AT-PC232/POE Media Converter.



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Figure 2. AT-PC232/POE Back Panel

Key Features

The AT-PC232/POE Media Converter comes with the following features:

- One 10/100Base-TX twisted pair port with RJ-45 connector
- One 100Base-FX multi-mode fiber optic port with a duplex SC connector
- Supports half and full duplex operation
- Auto-MDI/MDI-X on the 10/100Base-TX port
- IEEE 802.3u compliant Auto-Negotiation
- IEEE 802.3af Power over Ethernet (PoE) compliant
- Supplies up to 15.4 W of PoE power on 10/100Base-TX twisted pair port
- Supports a maximum frame size of 1916 Bytes
- Transparent to IEEE802.1Q packets
- Supports MissingLink™ operating mode
- Supports Smart MissingLink operating mode
- LEDs for unit and port status
- Store and forward switching mode
- MAC address table capable of storing up to 1,000 MAC addresses
- Support of back-to-back and standalone topologies
- Supports installation on a desktop or wall-mounting
- Internal AC power supply
- AC receptacle power adapter with power cord retaining clip

10/100Base-TX Twisted Pair Port

The 10/100Base-TX twisted pair port is described below:

Type of Connector The 10/100Base-TX twisted pair port on AT-PC232/POE Media Converter features an 8-pin RJ-45 connector. The port uses four pins when operating at 10 or 100 Mbps. For the port pinout details, refer to Figure 17 , “RJ-45 Connector and Port Pin Layout” on page 54.

Port Speed The 10/100Base-TX twisted pair port can operate at 10 or 100 Mbps. The speed is set automatically through Auto-Negotiation or you can set the speed manually via the DIP switches located on the back of the unit. With Auto-Negotiation, the speed of the port is set automatically by the converter after it determines the speed of the end-node connected to the port. Auto-Negotiation is designed to ensure that the port on the converter and the end-node are operating at the same speed and that they are communicating at the highest possible common speed of the devices.

Duplex Mode Duplex mode refers to how an end-node receives and transmits data. If an end-node can receive or transmit data, but not both simultaneously, the end-node is operating in what is referred to as half-duplex mode. If an end-node can both receive and transmit data simultaneously, the end-node is said to be operating in full-duplex mode. Naturally, an end-node capable of operating in full-duplex can handle data much faster than an end-node that can only operate in half-duplex mode.

The twisted pair port is IEEE 802.3u-compliant and will Auto-Negotiate the duplex mode setting. It can be manually reconfigured to either full or half-duplex mode via the DIP switches located on the back of the unit when the Auto-Negotiate switch is in the OFF position.

Note

In order for a converter port to successfully Auto-Negotiate its duplex mode with an end-node, the link partner should also be using Auto-Negotiation. Otherwise, a duplex mode mismatch can occur. While configured for Auto-Negotiation, a converter port will default to half-duplex if it detects that its link partner is not using Auto-Negotiation. This will result in a mismatch if the end-node is operating at a fixed duplex mode of full-duplex.

Maximum Distance The 10/100Base-TX twisted pair port has a maximum operating distance of 100 meters (328 feet).

- Type of Cabling** For 10 Mbps, the port requires Category 3 or better 100 ohm shielded or unshielded twisted pair cabling. For 100 Mbps operation, the port requires Category 5 or Enhanced Category 5 (5E) 100 ohm shielded or unshielded twisted pair cabling.
- Auto MDI/MDI-X** The 10/100Base-TX twisted pair port on the AT-PC232/POE Media Converter is auto-MDI/MDI-X and IEEE 802.3ab-compatible. The port uses the auto-MDI/MDI-X feature to automatically configure itself as MDI or MDI-X when connected to an end-node. Consequently, you can use a straight-through twisted pair cable when connecting any network device to a port. The Auto MDI/MDI-X feature is always enabled even when the Auto-Negotiate feature is turned off and the speed and duplex mode on a port are set manually.
- Port Pinouts** For the pinouts of the port when it is operating at 10 or 100 Mbps in the MDI configuration, refer to Table 11, “MDI Pin Signals (10/100Base-TX)” page 54. For the pinouts of the port when it is operating in the MDI-X configuration, refer to Table 12, “MDI-X Pin Signals (10/100Base-TX)” page 55.

100Base-FX Fiber Optic Port

The AT-PC232/POE Media Converter features a single fiber optic port.

Type of Connector

The fiber optic port features a duplex SC connector.

Port Speed

The fiber optic port has a fixed operating speed of 100 Mbps. The end-node connected to the port must also be able to operate at 100 Mbps. This speed cannot be changed.

Duplex Mode

The fiber optic port can operate in either full-duplex or half-duplex mode. You can set the duplex mode manually using the DIP switches after turning Auto-Negotiation off or you can let the media converter set it automatically with Auto-Negotiation turned on.

Maximum Distance

The fiber optic port has a maximum operating distance of 2 Km (1.2 mi) in full duplex mode. The maximum operating distance of the port will be less if it is operating in half-duplex mode.

Type of Cable

The fiber optic port on the AT-PC232/POE Media Converter uses multi-mode fiber optic cable.

Optical Output Power

Refer to “100Base-FX Port 1 Specifications” on page 55.

Optical Receiver Sensitivity

Refer to “100Base-FX Port 1 Specifications” on page 55.

Operating Modes

The AT-PC232/POE Media Converter supports these operating modes:

- ❑ “Link Test Mode,” next
- ❑ “MissingLink Mode” on page 21
- ❑ “Smart MissingLink Mode” on page 22

Link Test Mode

Contrary to its name, the Link Test operating mode is not a diagnostic utility. Instead, it uses the Link LEDs to display the current states of the ports. A port’s Link LED will be on when the port has established a link to a network device and it will be off when the port does not have a link to a network device.

This operating mode is typically used when the network devices connected to the ports of the media converter cannot take advantage of the features of the MissingLink mode, or when you want to use the Link LEDs to troubleshoot a network problem. This operating mode is also useful after the installation of the media converter to verify whether or not the ports on the unit have established links to their network devices.

MissingLink Mode

The MissingLink_{TM} mode allows the two ports on the media converter to share their “link” status with each other. If one of the ports is unable to establish a link with its network device or loses the link, this operating mode disables the transmitter on the other port. This action notifies the network device connected to the port that there is a loss of the link on the other port. Without the MissingLink mode, a network device connected to a port would be unaware of a loss of a link on the companion port, because its link to the media converter would be unaffected. To explain it another way, the MissingLink mode will not allow a port to form a link with its network device unless the other port on the media converter can also establish a link with its device.

When the link is reestablished on a port, the MissingLink mode automatically reactivates the transmitter on the companion port so that the two network devices can again forward traffic to each other through the two ports of the media converter.

The value to this type of fault notification is that some network devices, such as managed Fast Ethernet switches, can respond to the loss of a link on a port by performing a specific action. For example, the network device might send a trap to a network management station, and so alert the network administrator of the problem. Or, if the device is running a spanning tree protocol, it might seek a redundant path to a disconnected node.

Here is an example of how the MissingLink mode works. Assume that the two ports on a media converter are connected to two Fast Ethernet

switches, one local and the other remote. Switch 1, the remote switch, is connected to port 1, the fiber optic port, on the media converter, while Switch 2, the local device, is connected to port 2, the twisted pair port. If the link to Switch 1 is lost, the line card disables the transmitter on port 2 to signal Switch 2 of the loss of the link to Switch 1. This notifies Switch 2 of the problem so it too, along with Switch 1, can take remedial action, such as activating a redundant path if it is running a spanning tree protocol, or sending an SNMP trap to a management workstation. Without the MissingLink mode, Switch 2 would be unaware of the problem because it would still have a valid link to the media converter.

In the example the initial loss occurred on port 1. But the operating mode operates the same when the initial loss of the link is on port 2. Here, the transmitter on port 1 is disabled to notify the node connected to that port of the loss of the link on port 2.

The states of the ports on the media converter running in this mode operate in tandem. Either both of the ports have a link or neither of the ports. This is reflected on the Link LEDs. If both ports can form links with their network devices, their Link LEDs will both be on. But if one or both ports cannot establish a link, then the Link LEDs will be off.

This operating mode is most useful when the network devices connected to the ports of the media converter can react to a loss of a link on a port, such as managed Fast Ethernet switches running SNMP or a spanning tree protocol. Conversely, the MissingLink mode will be of little value if the network devices of the media converter cannot react to a lost link. In the latter scenario, the Link Test mode would probably be a better operating mode for the media converter during normal network operations.

Furthermore, Allied Telesis does not recommend using the MissingLink mode when troubleshooting a network problem that may have its roots with a link problem. The MissingLink mode will not allow you to use the port's Link LEDs or the management software to diagnose the problem, since neither port will show a link. Rather, the Link Test and the Smart MissingLink modes are more useful when troubleshooting a link problem.

Smart MissingLink Mode

The Smart MissingLink mode is nearly identical to the MissingLink mode. It, too, enables the two ports on the media converter to share the link status of their connections. This mode is different in that it does not completely shut off the transmitter of a port when the companion port loses its link. Rather, this operating mode pulses the port's transmitter and flashes the port's Link LED once a second to signal that the port can still establish a link to its network device and that the loss of the link originated on the companion port on the media converter.

The advantage of this operating mode over the MissingLink mode is that you can use the Link LEDs on the media converter to troubleshoot a link failure with the ports. As an example, assume that the fiber optic port on a media converter lost its link to its network device. The mode would

respond by pulsing the transmitter on the twisted pair port and flashing the port's Link LED about once a second to signal that the failure originated on the fiber optic port. When the connection is reestablished on the fiber optic port, the twisted pair port would automatically resume normal operations to permit the two ports to forward traffic again.

The operating mode functions the same if the failure starts on the twisted pair port. Here, the mode pulses the transmitter on the fiber optic port.

As with the other operating modes, this mode does not interfere with the flow of network traffic through the ports of a media converter during normal network operations of a media converter. However, Allied Telesis recommends limiting its use to diagnosing link failures, particularly if the network devices connected to the ports are managed devices. The pulsing of the transmitter on a port and the constantly changing status of a link could prove problematic for some managed devices. For example, the device might send a constant stream of SNMP traps or, if the device is running a spanning tree protocol, the protocol might become confused as the status of the device's link to the media converter constantly changes.

Setting the Operating Mode

You set the operating mode on the media converter using the Mode select on the front panel of the unit. Setting the mode does not interfere with the network operations of the device. To set the operating mode, use a pointed object such as a pen to depress the Mode button.

Power over Ethernet

The twisted pair port on the AT-PC232/POE Media Converter features Power over Ethernet (PoE). PoE is a mechanism for supplying power to network devices over the same twisted pair cables used to carry network traffic. This feature can simplify network installation and maintenance by allowing you to use the switch as a central power source for other network devices.

A device that receives its power over an Ethernet cable is called a *powered device (PD)*. Examples of such devices can be wireless access points, IP telephones, web cams, and Ethernet switches.

There are several advantages that the PoE feature of the AT-PC232/POE Media Converter adds to the installation and maintenance of your network. First, because the media converter acts as the power source for the powered device, adding an uninterruptible power source (UPS) to the media converter increases the protection not just to the media converter itself from possible power source problems but also to the powered device connected to it. This can increase the reliability of your network by minimizing the impact to network operations from a power failure.

PoE can also simplify the installation of your network. A frequent issue in selecting a location for a network device is whether there is a power source nearby. This often limits equipment placement or requires the added cost and time of having additional electrical sources installed. With PoE, you can install PoE-compatible network equipment wherever they are needed without having to worry about whether they are near a power source.

The media converter can automatically determine whether or not a device connected to its port is a powered device. A powered device has a signature resistor or capacitor that the media converter can detect over the Ethernet cabling. If the resistor or capacitor is present, the media converter assumes that the device is a powered device.

The twisted pair port on the AT-PC232/POE Media Converter can supply up to 15.4 watts of power, while at the same time furnishing standard 10/100 Mbps Ethernet functionality. If the twisted pair port is connected to a network node that is not a powered device, it functions as a regular Ethernet port without PoE. The PoE feature remains enabled on the port but no power is delivered to the device.

Power Budgeting

The AT-PC232/POE Media Converter can provide a maximum of 15.4 W of power on its twisted pair port (Port 2), along with standard 10/100 Mbps Ethernet functionality.

The AT-PC232/POE Media Converter smart power management functionality supports all of the IEEE 802.3af powered device classes listed in Table 2.

Table 2. IEEE 802.3af Class vs. Power Levels

Class	Usage	Minimum Power Levels Output at the PSE	Maximum Power Levels Output at the PD
0	Default	15.4W	0.44W to 12.95W
1	Optional	4.0W	0.44W to 3.84W
2	Optional	7.0W	3.84W to 6.49W
3	Optional	15.4W	6.49W to 12.95W

If the twisted pair port is connected to a network node that is not a powered device (that is, a device that receives its power from another power source), the port functions as a regular Ethernet port, without PoE. The PoE feature remains enabled on the port but no power is delivered to the device.

Implementation

A standard Ethernet twisted pair cable contains four pairs of strands for a total of eight strands. 10/100 Mbps network traffic requires only four strands (1, 2, 3, and 6), leaving four strands in the cable unused (4, 5, 7, and 8).

The PoE standard, IEEE 802.3af, describes two alternative ways for delivering power to a powered device (PD) over twisted pair cabling. Alternative A uses the same strands that carry the network traffic. Alternative B uses the spare strands. The PoE implementation on the AT-PC232/POE Media Converter is Alternative A, where power is transmitted over strands 1, 2, 3, and 6.

PD's that comply with the IEEE 802.3af standard typically support both power delivery methods. So long as a PD is compliant with the standard, it should be able to receive its power from the media converter while using either a straight or cross-over cable. The PoE feature on the AT-PC232/POE Media Converter should also work with most legacy PD's as long as the device can be powered on pins 1, 2, 3, and 6.

LEDs

The LEDs on the AT-PC232/POE Media Converter, are shown in Figure 3 and are described in the following sections:

- “Power LED” on page 26
- “10/100Base-TX Twisted Pair Port LEDs” on page 27
- “100Base-FX Fiber Optic Port LEDs” on page 27
- “Operating Mode LEDs” on page 28
- “PoE PWR LEDs” on page 28

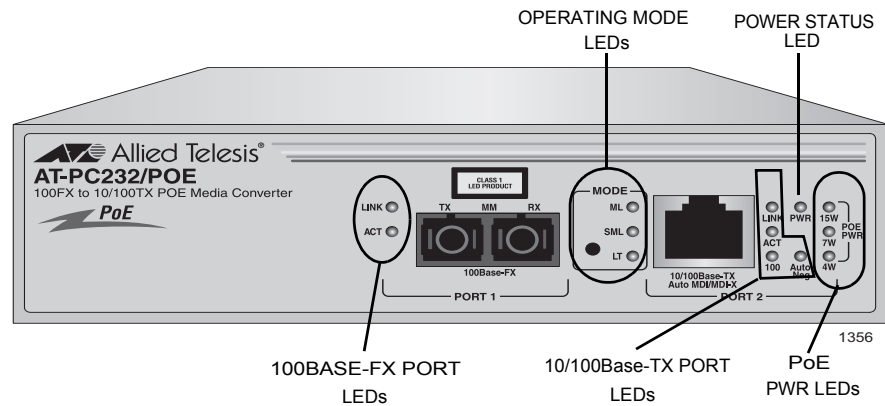


Figure 3. LEDs on the AT-PC232/POE Media Converter

Power LED The function of the PWR LED is defined in Table 3.

Table 3. System Status LED

LED	Color	Description
PWR	Green	Indicates that the unit power is ON.
	Off	Indicates that the converter power is OFF.

10/100Base-TX Twisted Pair Port LEDs

the LEDs for the 10/100Base-TX twisted pair port defined in Table 4, “Twisted Pair Port LEDs” page 27.

Table 4. Twisted Pair Port LEDs

LED	Color	Description
LINK	Green	A valid link has been established on the port.
	Blinking Green	Indicates that when the AT-PC232/POE Media Converter is in SML mode, the LINK on the 100BASE-FX port is lost.
	Off	A port has not established a link with an end node.
ACT	Blinking Green	Indicates that the port is transmitting and/or receiving data packets.
	Off	Indicates that there is no activity on the port.
100	Green	Indicates that the port is operating at 100 Mbps.
	OFF	*With the LINK LED either Green or Blinking Green: Indicates that the port is operating at 10 Mbps.
AUTO NEG	Green	Indicates that Auto-Negotiation is ON.
	Off	Indicates that Auto-Negotiation is OFF.

100Base-FX Fiber Optic Port LEDs

The two LEDs for the are defined in Table 5.

Table 5. Fiber Optic Port LEDs

LED	Color	Description
LINK	Green	Indicates a valid link has been established between the port and the end-node.
	Blinking Green	Indicates that when the AT-PC232/POE Media Converter is in SML mode, the LINK on the 100BASE-TX port is lost.
	Off	Indicates that there is no link between the port and the end-node.
ACT	Blinking Green	Indicates that the port is transmitting and/or receiving data packets.
	Off	Indicates that there is no activity on the port.

Operating Mode LEDs

The three LEDs listed under MODE on the front panel display the operating mode of the media converter. The LEDs are defined in Table 6 on page 28. Beside these LEDs is a button for setting the operating mode.

Table 6. Operating Mode LEDs

LED	Color	Description
ML	Green	MissingLink mode is enabled.
SML	Green	Smart MissingLink mode is enabled.
LT	Green	Link Test mode is enabled.

PoE PWR LEDs

If the end-node that is connected to the twisted pair port on the media converter is a Powered Device (PD), you can use the three PoE PWR LED's to determine its class ID, as defined in the IEEE802.3af PoE specification. The LEDs are described in Table 7 on page 28.

Table 7. PoE PWR LEDs

LED	Color	Description
4W	Green	Indicates that the PD device is Class 1..
7W	Green	Indicates that the PD device is Class 2..
15W	Green	Indicates that the PD device is Class 0 or 3..

DIP Switches

The DIP switches are used to manually configure the operating characteristics of the 10/100BASE-TX twisted-pair port (Port 2), such as port speed, duplex mode, and Auto-Negotiation and the duplex mode for the 100BASE-FX fiber port (Port 1). For the DIP switch setting, refer to Table 10 on page 44.

A Few Basics about Ethernet Switching

The AT-PC232/POE Media Converter interconnects network devices, such as workstations, printers, routers, and other Ethernet switches, so that they can communicate with each other by sending and receiving Ethernet frames.

MAC Address Table

The operation of the AT-PC232/POE Media Converter's MAC address table reduces the amount of unnecessary traffic by not forwarding packets with a destination address that has been learned on the same port.

Store and Forward

The AT-PC232/POE Media Converter supports store and forward switching at Fast Ethernet full-wire speed in 100 Mbps, half- or full-duplex mode. Packets entering each port are stored in buffers. Once the full packet is received, the media converter will forward or discard the packet, depending on its destination address and error status. This ensures the only error-free packets destined for another segment will be transferred across the media converter, reducing network load.

The AT-PC232/POE Media Converter will discard CRC errors, misaligned, runt, and under-oversized packets. When the packet has dribble bits at the end, the media converter will truncate to octet boundary and check for a good FCS before forwarding.

Network Topologies

Standalone Topology

A standalone topology uses only one AT-PC232/POE Media Converter between a switch and each end-node. Figure 4 illustrates an example of a standalone topology where several AT-PC232/POE Media Converters are used to interconnect a number of PoE network Power Devices, such as VoIP phones, AT-7400 Wireless Access Points, and a network camera.

An AT-8516F switch is connected to multiple AT-PC232/POE Media Converters via their 100Base-FX ports. The AT-PC232/POE Media Converters are capable of providing a connection of up to 2 kilometers (1.24 miles) from the switch over the fiber cable. The 10/100Base-TX twisted pair ports of the media converters deliver PoE power to the twisted pair ports on the different PoE Power Devices as shown in Figure 4

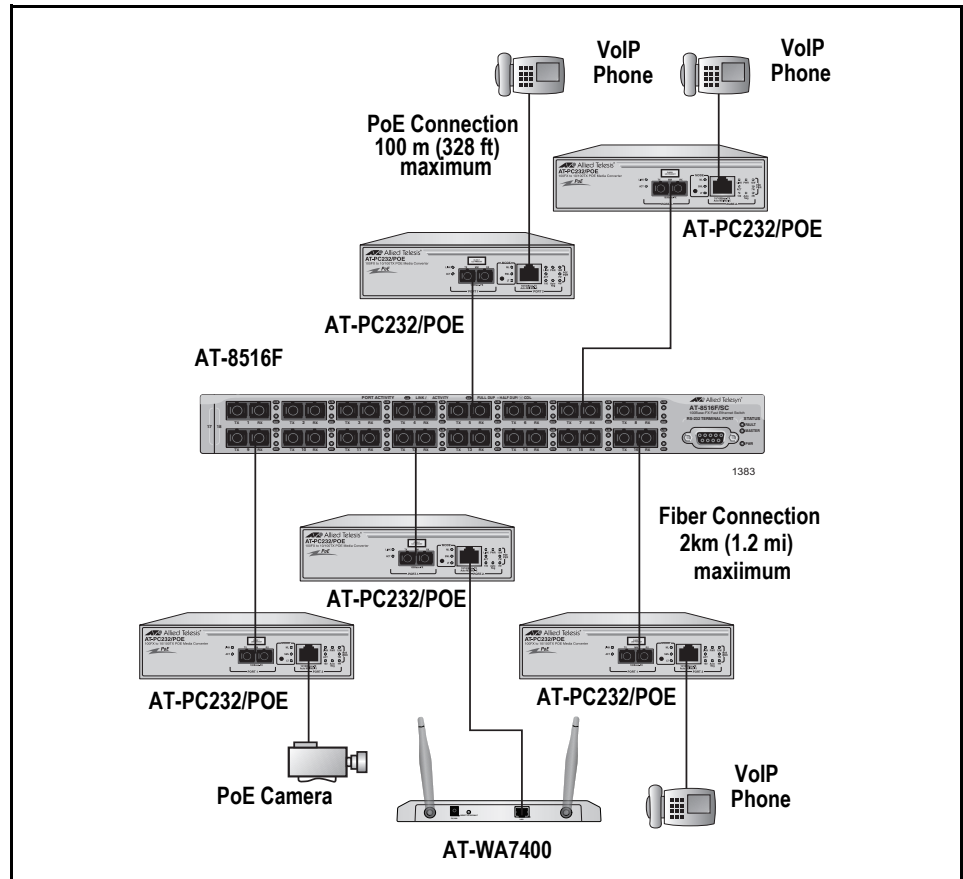


Figure 4. Standalone Topology

Back-to-Back Topology

In some network configurations you may want to interconnect two AT-PC232/POE Media Converters in what is referred to as a back-to-back topology. In this topology, the AT-PC232/POE Media Converters not only extend the distance of your network but also converts the fiber optic cable from twisted pair to fiber optic and back again. Figure 5 illustrates one AT-9424T switch at campus 1 and one AT-WA7400 Wireless Access Point on campus 2. The switch and access point are interconnected by two AT-PC232/POE Media Converters which provide a connection of up to 2 kilometers (1.24 miles). The 10/100Base-TX twisted pair ports on the AT-PC232/POE Media Converters are connected to the SC ports on the switches, while the 100Base-FX ports on the two AT-PC232/POE Media Converters are directly connected to each other.

Note

When using two AT-PC232/POE Media Converters back-to-back, you must set both AT-PC232/POE Media Converters to the same mode. For example, the first AT-PC232/POE Media Converter is set to Smart MissingLink mode, so the second media converter must also be set to Smart MissingLink mode.

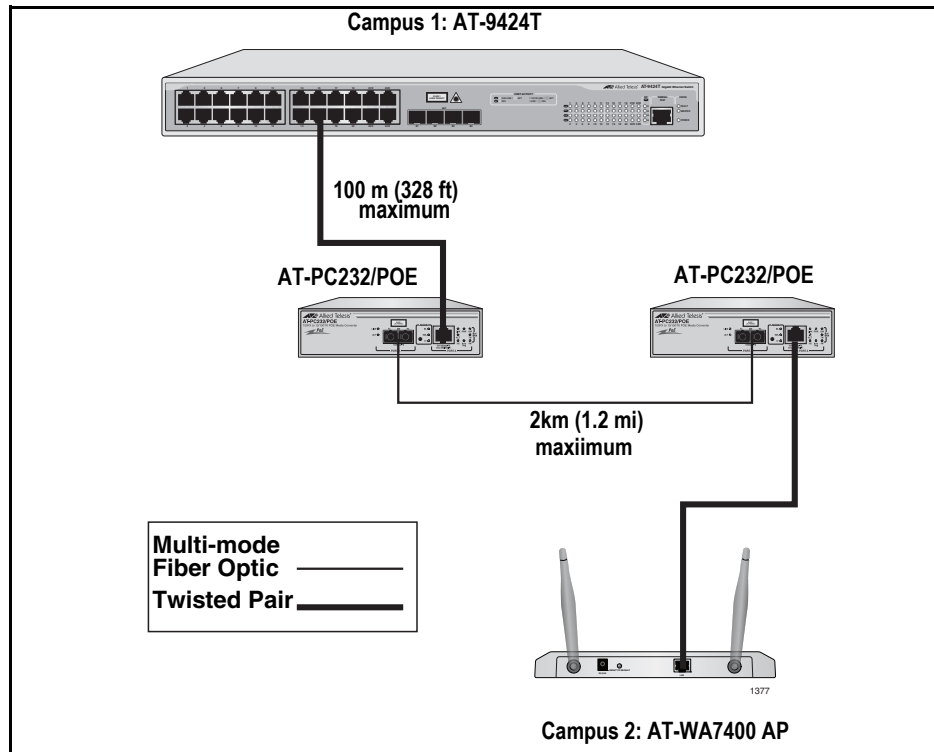


Figure 5. Back-to-Back Topology

Chapter 2

Installation

This chapter explains how to install the AT-PC232/POE Media Converter and contains the following sections:

- “Verifying the Package Contents” on page 34
- “Planning the Installation” on page 35
- “Desktop Installation” on page 39
- “Wall-Mount Installation” on page 40
- “Cabling the Ports” on page 41
- “Configuring the DIP Switches” on page 44
- “Installing the Power Cord Retaining Clip” on page 45
- “Applying AC Power” on page 46
- “Verifying the Installation” on page 48

Verifying the Package Contents

Make sure the following items are included in your package. If any item is missing or damaged, contact your Allied Telesis sales representative for assistance.

- One AT-PC232/POE Media Converter
- One AC power cord
- One AC power cord retaining clip
- Four rubber protective feet
- Two anchors
- Two screws
- One documentation CD

Planning the Installation

Observe the following guidelines when planning the installation of your AT-PC232/POE Media Converter:

- The end-node connected to the 100Base-FX port must be compatible.
- The 10/100Base-TX twisted pair port may be set to match the speed and mode of the connected device or allowed to Auto-Negotiate.
- The end-node connected to a port on the AT-PC232/POE Media Converter can be any other ethernet network device, such as an adapter card, repeater, router, access point, or a switch.
- The twisted pair cabling must be kept away from sources of electrical noise, such as radios, transmitters, power lines, broadband amplifiers, electrical motor, and fluorescent fixtures.

Table 8 lists the twisted pair port cabling specifications.

Table 8. Twisted Pair Cabling and Distance Specifications

Speed	Type of Cable	Maximum Operating Distance
10 Mbps	Standard TIA.EIA 568-B-compliant Category 3 or better shielded or unshielded twisted cabling with 100 ohm impedance and a frequency of 16 MHz.	100 m (328 ft)
100 Mbps	Standard TIA.EIA 568-B-compliant Category 5 or Standard TIA.EIA 568-B-compliant Category 5 (Cat 5e) shielded or unshielded twisted cabling with 100 ohm impedance and a frequency of 100 MHz.	100 m (328 ft)

Table 9 lists the fiber optic port cabling specifications.

Table 9. Fiber Optic Cabling and Distance Specifications

Speed	Cable Type	Maximum Operating Distance
100 Mbps	50/125 μm or 62.5/125 μm (core cladding) multimode fiber optic cable	2 km (1.24 mi.)

Selecting a Site


When selecting a site for your AT-PC232/POE Media Converter, observe the following guidelines:

- Select a site that is dust-free and moisture-free.
- The site should allow for easy access to the fiber optic and twisted pair cables and to the power cord.
- If the media converter will be installed on a table, the table should be level and secure.
- Do not place objects on top of the media converter.
- Air flow around the unit and through its vents should be unrestricted.
- The power outlet for the device should be located near the unit and be easy to access.
- Use a dedicated power circuit or power conditioner to supply reliable power to the unit.

Reviewing the Safety Guidelines

Please review the following safety guidelines before you begin to install the AT-PC232/POE Media Converter.

Note

The  indicates that a translation of the safety statement is available in a PDF document titled “Translated Safety Statements” (613-000990) posted on the Allied Telesis website at www.alliedtelesis.com. This document is also included with the documentation CD that is shipped with the product.



Warning: Class 1 Laser product.  L1




Warning: Do not stare into the laser beam.  L2



Warning: Class 1 LED product.  L3



Warning: The fiber optic ports contain a Class 1 laser device. When the ports are disconnected, always cover them with the provided plug. Exposed ports may cause skin or eye damage  L4



Caution: Using controls, making adjustments to performance, or performing procedures other than those specified herein may result in hazardous radiation exposure.

The protection provided by the equipment may be impaired if the equipment is used in a manner not specified by Allied Telesis, Inc.

Do not remove the cover from the unit or change any of the internal cables or wiring. Only an authorized Allied Telesis service technician should make repairs to this device.

The TX and RX multiplexing ports contain embedded Class 3B lasers operating in Class 1 compliance. Do not make any modifications to the unit that would override the safeguards that maintain the Class 1 compliance.

The laser light used by the multiplexing ports and SFP modules is invisible. Standard safety precautions (e.g. avoid looking directly into a fiber optic port) should always be observed when installing or maintaining this product. *⌚* L5



Warning: To prevent electric shock, do not remove the cover. No user-serviceable parts inside. This unit contains hazardous voltages and should only be opened by a trained and qualified technician. To avoid the possibility of electric shock, disconnect electric power to the product before connecting or disconnecting the LAN cables. *⌚* E1



Warning: Do not work on equipment or cables during periods of lightning activity. *⌚* E2



Warning: Power cord is used as a disconnection device. To de-energize equipment, disconnect the power cord. *⌚* E3



Warning: Class I Equipment. This equipment must be earthed. The power plug must be connected to a properly wired earth ground socket outlet. An improperly wired socket outlet could place hazardous voltages on accessible metal parts. *⌚* E4

Pluggable Equipment. The socket outlet shall be installed near the equipment and shall be easily accessible. *⌚* E5



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

Warning: Operating Temperature. This product is designed for a maximum ambient temperature of 40° degrees C. *↪* E7

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

Circuit Overloading: Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern. *↪* E21



Warning: Do not look directly at the fiber optic cable ends or inspect the cable ends with an optical lens. *↪* E29



Warning: To reduce the risk of electric shock, the PoE ports on this product must not connect to cabling that is routed outside the building where this device is located. *↪* E40



Caution: The unit does not contain serviceable components. Please return damaged units for servicing.

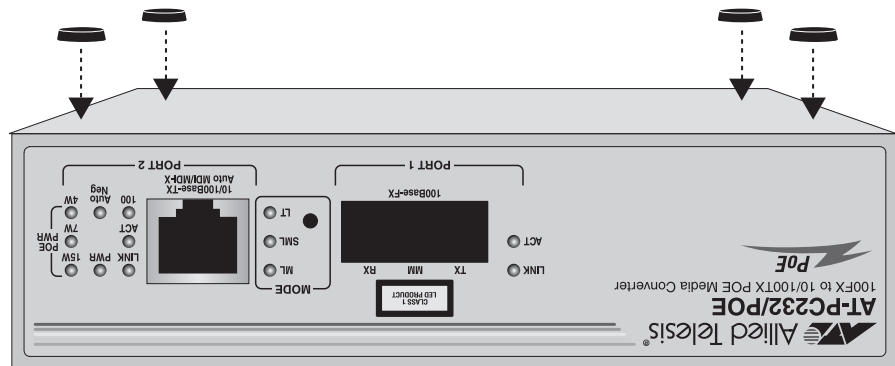


Caution: The AT-PC232/POE Ethernet port is only intended for installation in Environment A as defined in IEEE 802.3af. All interconnected equipment must be contained in the same building including the interconnected equipment's associated LAN connections.

Desktop Installation

Install the AT-PC232/POE Media Converter on a desktop, perform the following procedure:

1. Remove the converter from its shipping container and store the packaging material in a safe location.
2. Turn the converter over and place it on a secure surface.
3. Attach the four rubber feet included with the unit to the corners of the bottom of the media converter, as shown in Figure 6.



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Figure 6. Attaching Rubber Feet

Do not apply power at this time. Proceed to “Wall-Mount Installation” on page 40.

Wall-Mount Installation

The AT-PC232/POE Media Converter can be mounted vertically on a wall using the keyholes on the bottom of the switch. Two plastic anchors and screws necessary to mount the switch on a wall are provided in the accessory kit.

To wall-mount the switch, perform the following procedure:

1. If attached, remove the rubber feet, data cables, and power cord from the switch.
2. Select a wall location for the switch.
3. Install two plastic anchors and two screws into the wall so that they are level with each other and spaced 64 mm (2.52 in) apart.
4. Position the switch onto the wall screws, as illustrated in Figure 7.

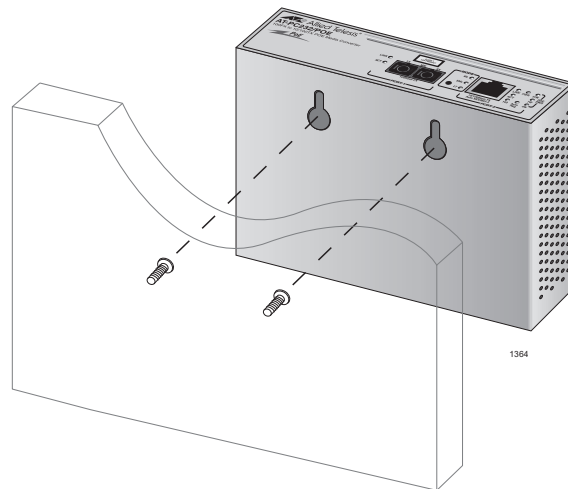


Figure 7. Positioning the Switch onto the Wall Screws

Cabling the Ports

Perform the following procedures to connect the network cables on the AT-PC232/POE Media Converter.

Cabling the Fiber Optic Ports

To connect to the fiber optic port (Port 1) on the AT-PC232/POE Media Converter, perform the following procedure.

1. Remove the dust cover from the fiber optic port, as shown in Figure 8 on page 41.

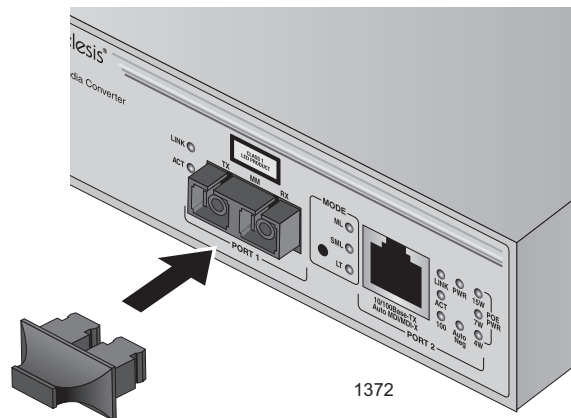


Figure 8. Removing the Dust Cover from the Fiber Optic Port

2. Connect the fiber optic cable to the port, as shown in Figure 9 on page 41.

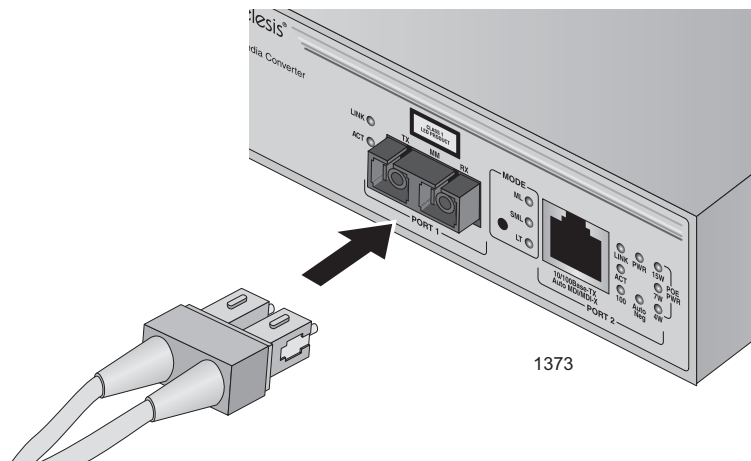


Figure 9. Connecting to the Fiber Optic Ports

When attaching a fiber optic cable, observe the following guidelines:

- Be sure that the cable connector firmly locks into place in the port.

- Verify that you are using the appropriate type of fiber optic cabling.
- Verify that the operating specifications of the converter's fiber optic port are compatible with the fiber optic port on the remote end-node.
- The fiber optic port has two SC connectors, as shown in Figure 10 on page 42. Each connects to a separate fiber strand. One is for receiving data and the other is for transmitting data. When connecting a fiber optic cable to the port, be sure that the receiver fiber connector is connected to the transmitter connector on the remote end-node, and the transmitter fiber connector is connected to the receiver connector on the remote node.

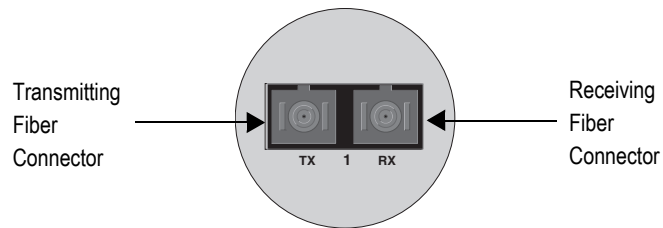


Figure 10. SC Ports

3. Connect the other end of the optical cable to the link partner.

Connecting to the Copper Port

To connect a twisted pair cable to Port 2 on the AT-PC232/POE Media Converter, perform the following procedure:

1. Connect a twisted pair cable with an RJ-45 connector to the 10/100Base-TX port, as shown in Figure 11.

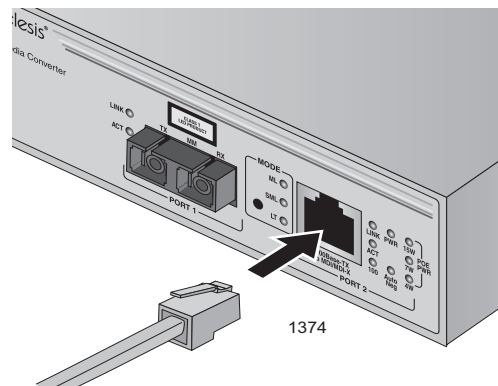


Figure 11. Connecting to the RJ-45 Copper Ports

When connecting a twisted pair cable to an RJ-45 twisted pair port, observe the following guidelines:

- An RJ-45 connector should fit snugly into the port on the converter. The tab on the connector should lock the connector into place.

- You can use a straight-through or crossover twisted pair cable to connect any type of network device to a port on the converter.
2. Connect the other end of the RJ-45 cable to the link partner.

Configuring the DIP Switches

Configure the DIP switches using the information in Table 10.

Table 10. DIP Switch Settings

DIP Switch	Port	Function	Position	Description
1	2	SPEED (Mbps)	UP	The twisted pair port operates at 10 Mbps..
			DOWN	The fiber port operates at 100 Mbps
2	1	DUPLEX	UP	The fiber port operates in half-duplex mode.
			DOWN	The fiber port operates in full-duplex mode.
3	2	DUPLEX	UP	The twisted pair port operates in half-duplex mode.
			DOWN	The twisted pair port operates in full-duplex mode.
4	2	AUTO NEG	UP	Auto-negotiation on both ports is OFF..
			DOWN	Auto-negotiation on both ports is ON

When setting the DIP switches, consider the following:

- DIP switch 4 controls Auto-Negotiation on both ports. When Auto-Negotiation is enabled, the duplex mode on the fiber optic port and the speed and duplex mode on the twisted pair port are set automatically by the media converter. When Auto-Negotiation is disabled, you can use the other DIP switches to manually configure these settings.
- If you enable Auto-Negotiation, be sure that the end-nodes are also configured for Auto-Negotiation.

Installing the Power Cord Retaining Clip

Perform the following procedure to install the power cord retaining clip on the AT-PC232/POE Media Converter:

1. Locate the power cord retaining clip, shown in Figure 12 in the shipping kit that comes with the media converter.

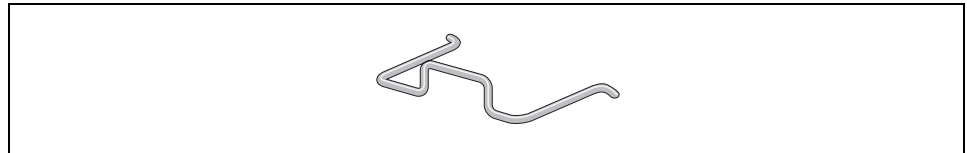


Figure 12. Power Cord Retaining Clip

2. Install the clip on the AC power connector on the back panel of the switch. With the “u” of the clip facing down, press the sides of the clip toward the center and insert the short ends into the holes in the retaining bracket, as shown in Figure 13.

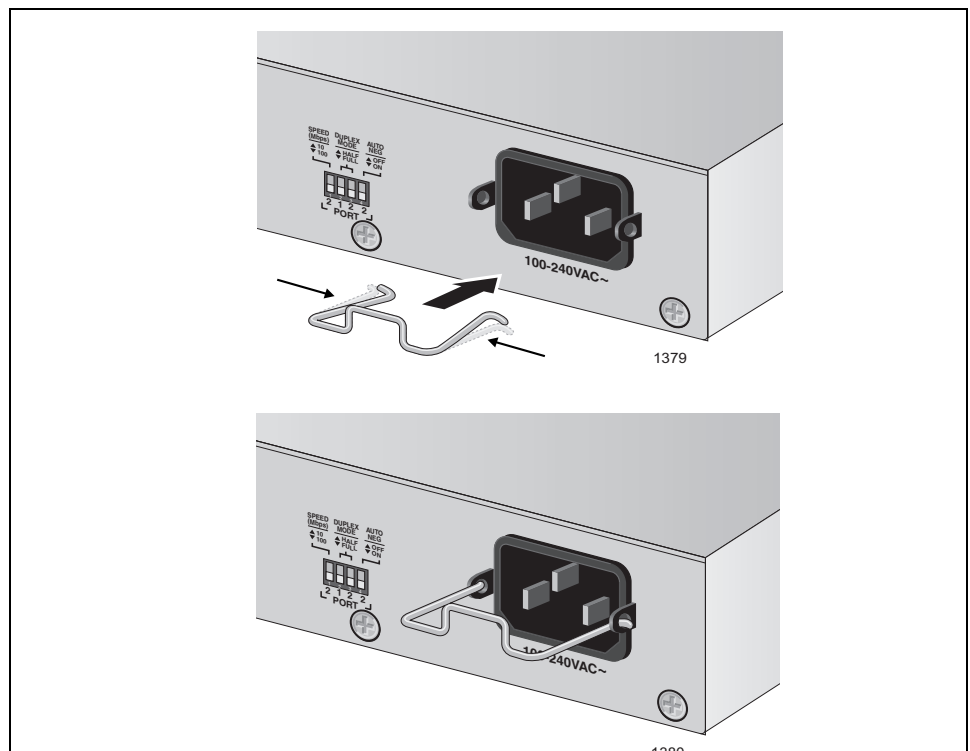


Figure 13. Inserting the Retaining Clip into the Retaining Bracket

Applying AC Power

To apply AC power to the AT-PC232/POE Media Converter, perform the following procedure:

1. Position the power cord retaining clip in the up position, shown in Figure 14.

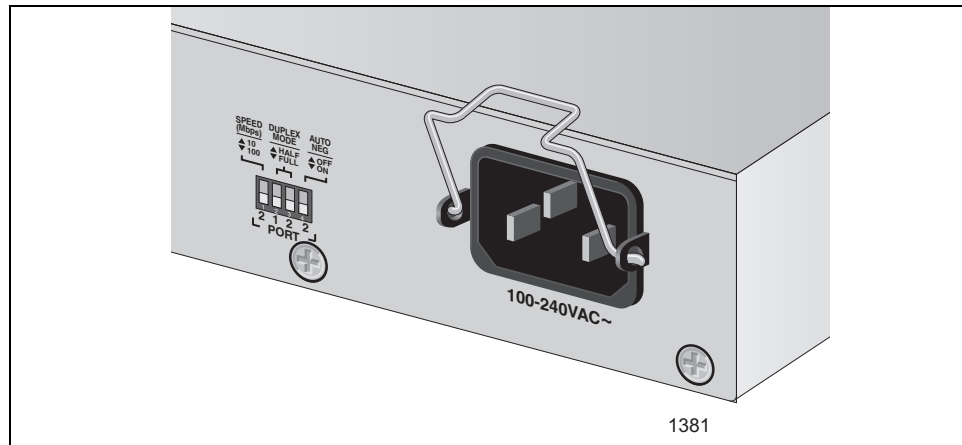


Figure 14. Power Cord Retaining Clip in the Up Position

2. Plug the power cord into the AC power connector on the back panel of the unit shown in Figure 15.



Warning: Power cord is used as a disconnection device. To de-energize equipment, disconnect the power cord. E3

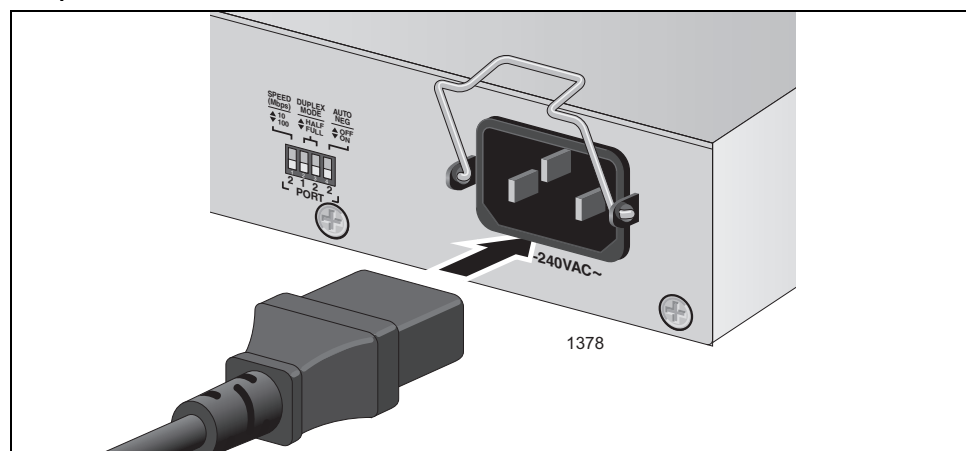


Figure 15. Connecting the AC Power Cord

3. Lower the power cord retaining clip to secure the cord to the AT-PC232/POE Media Converter, as shown in Figure 16.

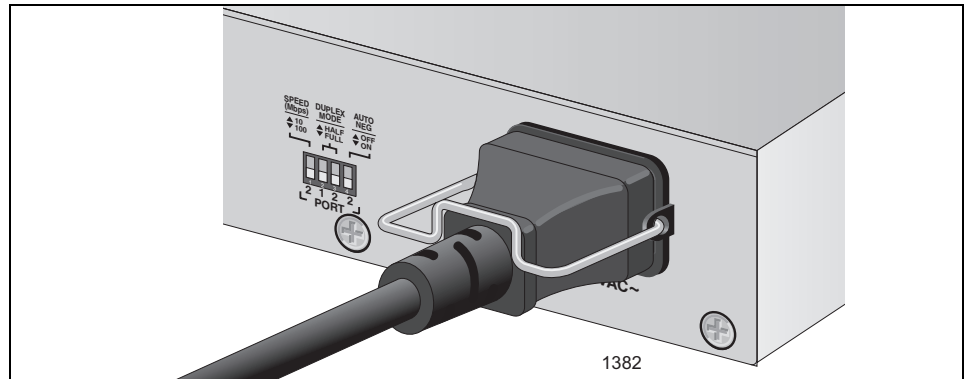


Figure 16. Securing the Power Cord with the Retaining Clip

4. Connect the other end of the power cord to an appropriate AC power outlet. For the power specifications of the media converter, refer to “Electrical Rating” on page 53.

The AT-PC232/POE Media Converter is now ready for network operations.

Verifying the Installation

This procedure is used to verify the installation of the media converter. It determines whether or not the fiber optic and twisted pair ports can establish links to their network devices. This procedure assumes the following:

- ❑ The media converter is powered on.
- ❑ The network cables are connected to the ports on the media converter and to the local and remote end-nodes.
- ❑ The local and remote network devices are powered on.

To verify the installation of the media converter, perform the following procedure:

1. Place the media converter in the Link Test operating mode by pressing the Mode selector button until the LT LED is on.
2. Observe the Link LEDs of the twisted pair and fiber optic ports on the media converter.
 - ❑ If the Link LEDs for both of the ports are on, the ports have established links with their network devices, which may already be forwarding network traffic to each other through the media converter. You can either leave the unit in the Link Test mode during normal operations or, by pressing the Mode selector button again, change it to the MissingLink or Smart MissingLink mode. The MissingLink mode is active when the ML LED is on and the Smart MissingLink mode is active when the SML LED is on.
 - ❑ If the Link LED for a port is off, the port is unable to establish a link to its network device. For suggestions on how to resolve the problem, go to Chapter 3, Troubleshooting on page 47.

Chapter 3

Troubleshooting

Here are suggestions on how to troubleshoot the twisted pair port and the fiber optic port on the AT-PC232/POE Media Converter.

Problem 1: The two ports are connected to network devices, but the Link LEDs for the ports are off.

Solution: The first step to resolving a link problem between the ports on the media converter and the network devices is to set the operating mode of the unit to the Smart MissingLink mode or the Link Test mode. These modes allow you to use the Link LEDs to identify which port is unable to establish a link to its network device. The operating mode is set with the Mode selector button.

After setting the unit to the Smart MissingLink or Link Test mode, observe the Link LEDs again. If the Link LED for the twisted pair port is off, go to Problem 2. If the Link LED for the fiber optic port is off, go to Problem 3.

Problem 2: The Link LED for the fiber optic port is on or blinking, but the Link LED for twisted pair port is off.

Solution: The twisted pair port has not established a link with its network device. Try the following:

- ❑ Verify that the network device connected to the twisted pair port is powered on and operating properly.
- ❑ Verify that the twisted pair cable is securely connected to the port on the media converter and to the port on the remote network device.
- ❑ Try connecting another network device 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 network device.

Problem 3: The Link LED of the twisted pair port is on or blinking, but the Link LED of the fiber optic port is off.

Solution: The fiber optic port is unable to establish a link to its network device. Try the following:

- ❑ Verify that the network device 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 and to the port on the remote network device.

- ❑ Verify that the operating specifications of the fiber optic port on the remote network device are compatible with the port on the media converter. For port specifications, refer to “100Base-FX Port Specifications” on page 55.
- ❑ Verify that the correct type of fiber optic cabling is being used. For specifications, refer to “Fiber Optic Cabling and Distance Specifications” on page 35 or “100Base-FX Port 1 Specifications” on page 55.
- ❑ Try connecting another network device to the fiber optic port using a different cable. If the twisted pair port is able to establish a link, then the problem is with the cable or the other network device.
- ❑ If the remote network device 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 (i.e., sensitivity) or too strong (i.e., maximum input power). The specifications of the fiber optic ports on the media converter can be found in “100Base-FX Port 1 Specifications” on page 55.

Problem 4: The Link LEDs for the two ports are on but the network devices are unable to forward traffic to each other through the media converter.

Solution: Try the following:

- ❑ If the network devices are managed devices, use their management firmware to determine whether they are configured and operating properly.
- ❑ If one of the network devices is a switch using a spanning tree protocol, use its management firmware to determine the status of the switch port connected to the media converter. The port may have been placed in the blocking mode by the switch if it is part of a redundant path.

Problem 5: Two network devices are forwarding traffic through the media converter, but performance is slow.

Solution: Try the following:

- ❑ There might be a duplex mode mismatch between the twisted pair port and the network device connected to the port. A duplex mode mismatch 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, you must adjust the duplex mode of the port on the network device or the twisted pair port on the media converter so that both ports are using the same duplex mode.

- ❑ The two network devices are operating in different duplex modes. The media converter performs best when its two network devices and its two ports all use the same duplex mode.
- ❑ There could be an intermittent problem with one of the network devices connected to the media converter or with a cable. To determine whether this might be the problem, set the unit to the Link Test mode and observe the Link LEDs of the ports. If one of the Link LEDs periodically blinks, it could mean that the link is intermittent. See Problem 6 for suggestions on how to resolve this issue.

Problem 6: The media converter is operating in the Link Test mode and the Link LED of a port is blinking.

Solution: This could indicate that the link between the port and the network device is intermittent. There might be a problem with the cable or the network device connected to the port. Try connecting another network device with a different cable to the same port on the media converter. If the Link LED remains steady on, then the problem is indeed with the original cable or the network device.

Problem 7: The media converter is operating in the Smart MissingLink mode and the Link LEDs for both ports are blinking.

Solution: This could have several possible causes. This can occur when a port is connected to another media converter that also supports the Smart MissingLink mode, forming a chain of media converters. Media converters that support the Smart MissingLink mode will pass the loss of a link on a port to all the media converters in the chain. This can result in situations where the Link LEDs on both ports of a media converter are blinking, indicating that the source of the problem has its origins in another media converter in the chain. To identify the source of the problem, set the operating mode on all the media converters in the chain to Link Test and then examine the Link LEDs of the ports. The Link LED of the port that cannot establish a link to its network device will be off.

Another possible cause is that a port is only able to form an intermittent link with its network device, perhaps because of a problem with the cable or the network device. To identify which port is having the problem, use the Link Test mode.

Note

If you need further assistance, please contact Allied Telesis Technical Support. Refer to “Contacting Allied Telesis” on page 14.

Appendix A

Technical Specifications

Physical

Dimensions:	W x D x H 15.5 cm x 13.1 cm x 4.0 cm (6.10 in x 5.16 in x 1.58 in)
Weight:	.748 Kg (1.65 lb.)

Temperature

Operating Temperature:	0° C to 40° C (32° F to 104° F)
Storage Temperature:	-25° C to 70° C (-13° F to 158° F)
Operating Humidity:	5% to 90% noncondensing
Storage Humidity:	5% to 95% noncondensing
Maximum Operating Altitude:	3,048 m (10,000 ft)
Maximum Non-Operating Altitude:	4,000 m (13,100 ft)

Electrical Rating

AC Input Supply Requirements:	100-240 VAC, 1.0 A maximum, 50/60 Hz
AC Input Power:	25 Watts maximum
Power-over-Ethernet @ 10/100Base-TX Port:	15.4 Watts Maximum

Agency Certifications

RFI Emissions	FCC Class B, EN55022 Class B, C-TICK, CE
Immunity	EN55024
Electrical Safety	EN60950 (TUV), UL 60950 (CUL-US)
Standard	IEEE 802.3, IEEE 802.3u
RoHS	RoHS/China RoHS compliant
MTBF	580,000 Hrs

10/100Base-TX Port Pinouts

Figure 17 illustrates the pin layout to an RJ-45 connector and port.

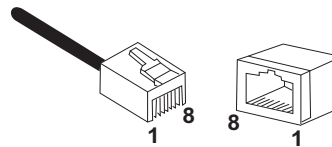


Figure 1. RJ-45 Connector and Port Pin Layout

Table 11 lists the RJ-45 pin signals when the twisted pair port is operating in the MDI configuration at 10 or 100 Mbps.

Table 1. MDI Pin Signals (10/100Base-TX)

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

Table 12 lists the RJ-45 port pin signals when a twisted pair port is operating in the MDI-X configuration at 10 or 100 Mbps.

Table 2. MDI-X Pin Signals (10/100Base-TX)

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

100Base-FX Port Specifications

Table 13 lists the operating specifications for fiber port (Port 1) .

Table 3. 100Base-FX Port 1 Specifications

Property	Value
General	
Maximum Distance	2 km
Fiber Optic Cable	50/125 μm or 62.5/125 μm (core cladding) multimode fiber optic cable
Transmitter Characteristics	
Wavelength	1310 nm
Output Power	Min: -22.5 dBm Typical: -20.3 dBm Max: -14 dBm
Receiver Characteristics	
Wavelength	1310 nm
Input Power	Min: -31.8 dBm Typical: -34.5 dBm Max (Saturation): -14 dBm
Max Power / Link Budget	9.3 dB (62.5/125 μm cabling) 12.8 dB (50/125 μm cabling)
Fiber Optic Typical Loss Factor	1.00 dB (62.5/125 μm cabling) 1.00 dB (50/125 μm cabling)
Connector Type	Duplex SC

Appendix B

Cleaning Fiber Optic Connectors

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 18 shows the ferrule in an SC connector.

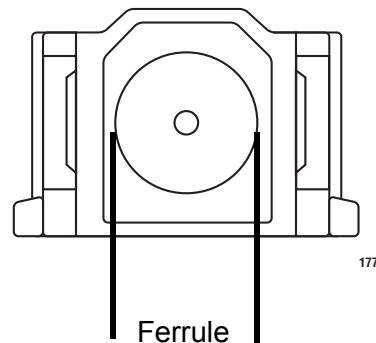


Figure 18. Ferrule in an SC Connector Plug

Figure 19 shows part of the end face of an unclean and clean ferrule.

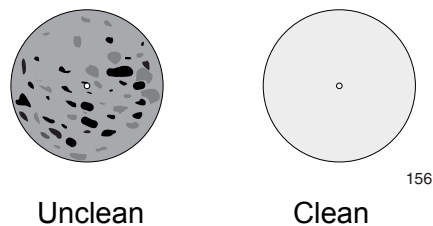


Figure 19. Unclean and Clean Ferrule

This appendix provides the following procedures

- ❑ “Using a Cartridge-Type Cleaner” on page 58
- ❑ “Using a Swab” on page 60

Using a Cartridge-Type Cleaner

Fiber optic cartridge cleaners are available from many vendors and are typically called “cartridge cleaners,” as shown in Figure 20.

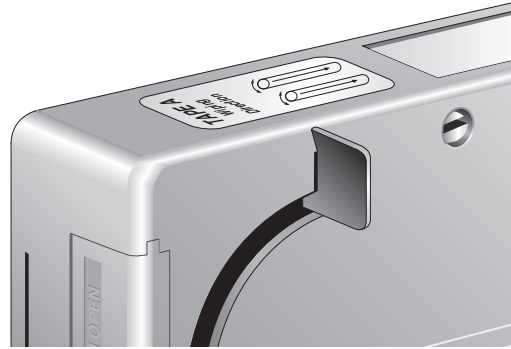


Figure 20. Cartridge Cleaner

Note

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



Warning: Do not stare into the laser beam. ⚠ L2

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 21 on page 59.

2. Place the ferrule tip on the exposed cleaning surface and rub the ferrule in a downward direction, as shown in Figure 21.

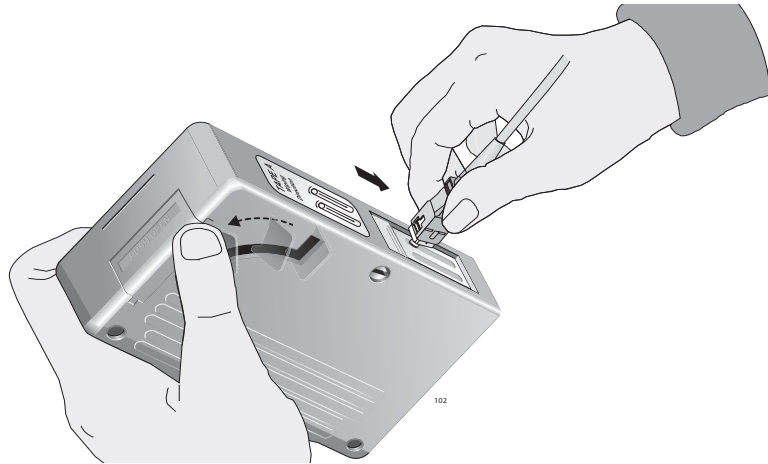


Figure 21. Rubbing the Ferrule Tip on the Cleaning Surface

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 2 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.

4. If desired, repeat steps 3 and 4.
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.

Using a Swab

Specially treated swabs (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, are available from many vendors, as shown in Figure 22. Stick cleaners are available in both 2.5 mm and 1.25 mm sizes for use on SC and MU connectors respectively.

Note

NEVER use a household cotton swab and/or alcohol to clean a fiber optic connector. This may leave a residue on the ferrule tip.

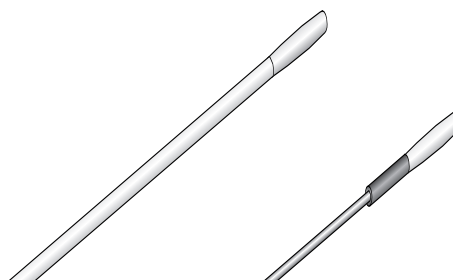


Figure 22. Lint-Free and Alcohol-Free Swabs

Note

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



Warning: Do not stare into the laser beam. ⚠ L2

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

1. Insert the swab into the adapter as shown in Figure 23 and rub the ferrule tip with the swab.

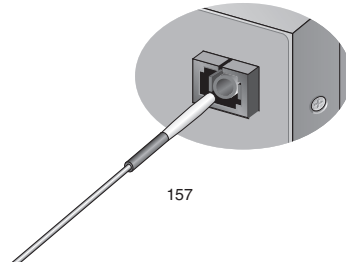


Figure 23. Cleaning a Recessed Ferrule

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.

Note

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