

AT-9000 Series

Gigabit Ethernet Switches

- AT-9000/12PoE
- AT-9000/28
- AT-9000/28PoE
- AT-9000/28SP
- AT-9000/52



Installation Guide

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This product meets the following standards.

U.S. Federal Communications Commission

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RFI Emissions: FCC Class A, EN55022 Class A, EN61000-3-2, EN61000-3-3, VCCI Class A, C-TICK, CE

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

EMC (Immunity): EN55024

Electrical Safety: EN60950-1 (TUV), UL 60950-1 (cULUS)



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” on the Allied Telesis website at <http://www.alliedtelesis.com/support>.

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Preface

This manual is the installation guide for the AT-9000 Gigabit Ethernet Switches. The switch models included in this series are:

- ❑ AT-9000/12POE
- ❑ AT-9000/28
- ❑ AT-9000/28POE
- ❑ AT-9000/28SP
- ❑ AT-9000/52

This preface contains the following sections:

- ❑ “Document Conventions” on page 12
- ❑ “Contacting Allied Telesis” on page 13

Document Conventions

This document uses the following conventions:

Note

Notes provide additional information.



Caution

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



Warning

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



Warning

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

Contacting Allied Telesis

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

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

For sales or corporate information, go to **www.alliedtelesis.com/purchase**.

Chapter 1

Overview

This chapter contains the following sections:

- ❑ “Switch Models and Features” on page 16
- ❑ “AT-9000 Series Gigabit Ethernet Switches” on page 19
- ❑ “10/100/1000Base-T Twisted-Pair Ports” on page 25
- ❑ “Power Over Ethernet” on page 28
- ❑ “SFP Slots” on page 32
- ❑ “Combo Ports” on page 34
- ❑ “Console Port” on page 36
- ❑ “LEDs” on page 37
- ❑ “ecoFriendly Button” on page 41
- ❑ “Power Supplies” on page 42
- ❑ “Power Connectors” on page 43

Switch Models and Features

AT-9000 Series Models

The AT-9000 series offers the following models:

- ❑ AT-9000/12POE
- ❑ AT-9000/28
- ❑ AT-9000/28POE
- ❑ AT-9000/28SP
- ❑ AT-9000/52

The AT-9000 series switches are environmentally friendly Gigabit Ethernet (GE) switches, equipped with 10/100/1000 Mbps twisted-pair copper ports, 100/1000 Mbps SFP slots, and LEDs. The Power over Ethernet (PoE) switches are capable of providing electrical power through the copper ports, excluding the copper side of the combo ports.

Figure 1 illustrates an example of an AT-9000 series switch.



Figure 1. AT-9000/28POE Switch

10/100/1000 Mbps Twisted-Pair Ports

Here are the basic features of the 10/100/1000 Mbps twisted-pair ports:

- ❑ 10Base-T, 100Base-TX, and 1000Base-T compliant
- ❑ IEEE 802.3u Autonegotiation compliant
- ❑ Auto-MDI/MDIX
- ❑ 100 meters (328 feet) maximum operating distance
- ❑ IEEE 802.3x flow control in 10/100Base-TX full-duplex mode
- ❑ IEEE 802.3x backpressure in 10/100Base-TX half-duplex mode
- ❑ IEEE 803.3z 1000Base-T flow control
- ❑ Support for jumbo frames up to 10KB
- ❑ RJ-45 connectors

Power over Ethernet

Here are the basic features of Power over Ethernet (PoE):

- ❑ PoE and PoE+ supported on the 10/100/1000Base-TX ports on the AT-9000/12POE and AT-9000/28POE switches
- ❑ Powered device classes 0 to 4
- ❑ Power budgets of 125 watts for the AT-9000/12POE switch and 370 watts for the AT-9000/28POE switch
- ❑ Port prioritization

SFP Slots

Here are the basic features of the SFP slots:

- ❑ Four slots per switch
- ❑ Support 100Mbps 100Base-FX or 1000Mbps 1000Base-SX/LX transceivers

Note

On the AT-9000/12POE, AT-9000/28, AT-9000/28POE, and AT-9000/28SP switches, the SFP slots and 10/100/1000Base-TX twisted-pair ports are paired together to form combo ports. For information, refer to “Combo Ports” on page 34.

Note

SFP transceivers must be purchased separately. For a list of supported transceivers, contact your Allied Telesis distributor or reseller.

Combo Ports

Here are the basic features of the combo ports:

- ❑ Supported on AT-9000/12POE, AT-9000/28, AT-9000/28POE, and AT-9000/28SP switches
- ❑ Four combo pairs of uplink ports
- ❑ Each pair consisting of one slot for an SFP transceiver and a redundant 10/100/1000 Base-T twisted-pair port

RS-232 Console Port

The RS-232 Console port uses the management cable supplied with the switch. Through the Console port, you can connect to the switch and use the CLI based AlliedWare Plus Version 2.xxxx Management Software user interface.

Port LEDs

Here are the port LEDs:

- Duplex mode and link/activity LEDs for the twisted-pair ports
- PoE status for the twisted-pair ports on AT-9000/12POE and AT-9000/28POE switches
- Link/activity LEDs for the SFP slots
- ecoFriendly button turns off the LEDs to conserve electricity

Note

For more detail on the above LEDs and other LEDs on the switches, refer to “LEDs” on page 37.

Installation Options

Here are the installation options:

- 19 inch equipment rack
- Desk or tabletop

MAC Address Table

Here are the basic features of the MAC address tables of the switches:

- Storage capacity of 16,000 MAC address entries
- Automatic learning and aging

Management Software and Interfaces

Here are the management software and management interfaces:

- AlliedWare Plus Management Software
- Command line interface
- Web browser interface

Management Methods

Here are the methods for managing the switches:

- Local management through the Console port
- Remote Telnet and Secure Shell management
- Remote HTTP and HTTPS web browser management
- SNMPv1, v2c, and v3

AT-9000 Series Gigabit Ethernet Switches

All of the AT-9000 Managed Layer 2 Gigabit Ethernet Switches include the following features:

- ❑ RS-232 Console port with RJ-45 connector
- ❑ Port status LEDs
- ❑ Low power mode ecoFriendly push-button
- ❑ Auto MDI/MDI-X on the twisted-pair ports
- ❑ IEEE 802.3i, 3u, and 3z compliant
- ❑ IEEE 802.3x flow control in full-duplex operation; back pressure in half-duplex operation and pause frame flow control in full-duplex mode
- ❑ MAC address table capacity of up to 16K addresses with automatic aging
- ❑ 16MB flash memory with 128MB RAM
- ❑ Temperature-controlled fan
- ❑ Compliant with European and China RoHS standards

AT-9000/12POE Switch

Features specific to the AT-9000/12POE switch include:

- ❑ 12 port Gigabit Switch with 8 10/100/1000Base-T RJ-45 ports fixed configuration and 4 SFP/RJ-45 ports
- ❑ PoE and PoE+ supported on the 10/100/1000Base-TX ports

Figure 2 on page 20 illustrates the front- and rear-panel features of the AT-9000/12POE switch.

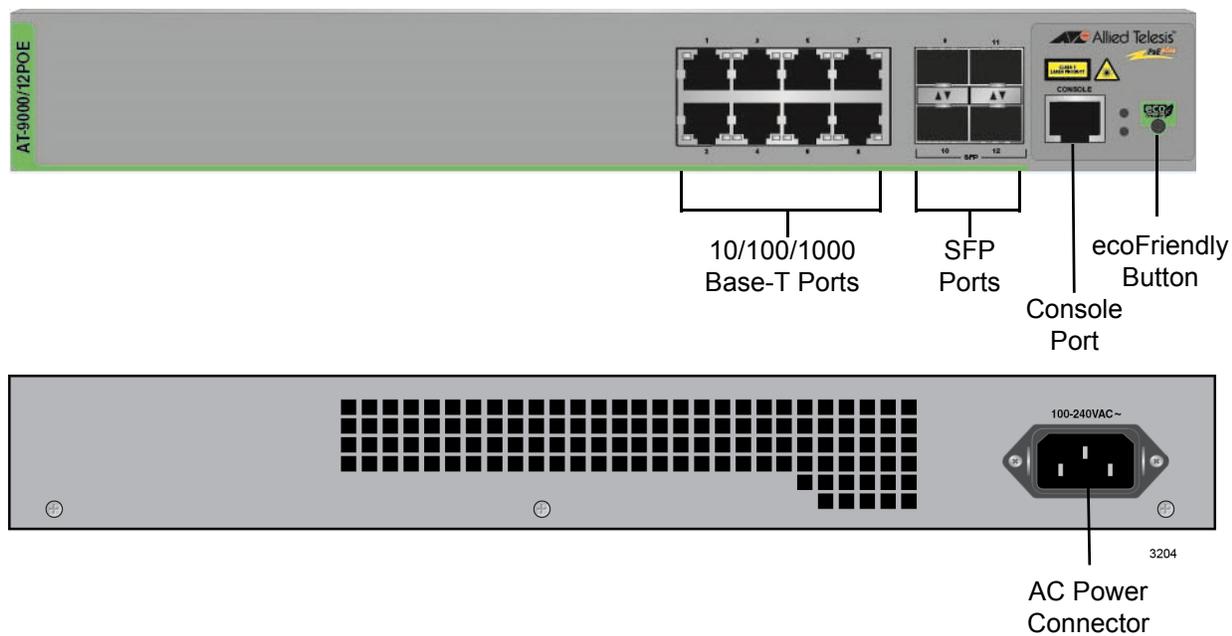


Figure 2. AT-9000/12POE Switch Front and Rear Panels

AT-9000/28 Switch

Features specific to the AT-9000/28 switch include:

- ❑ 28 port Gigabit Switch with 24 10/100/1000Base-T RJ-45 ports fixed configuration and 4 SFP/RJ-45 combo ports
- ❑ RJ-45 MODE LED selection button for status of collision, speed, duplex, or activity

Figure 3 illustrates the front- and rear-panel features of the AT-9000/28 switch.

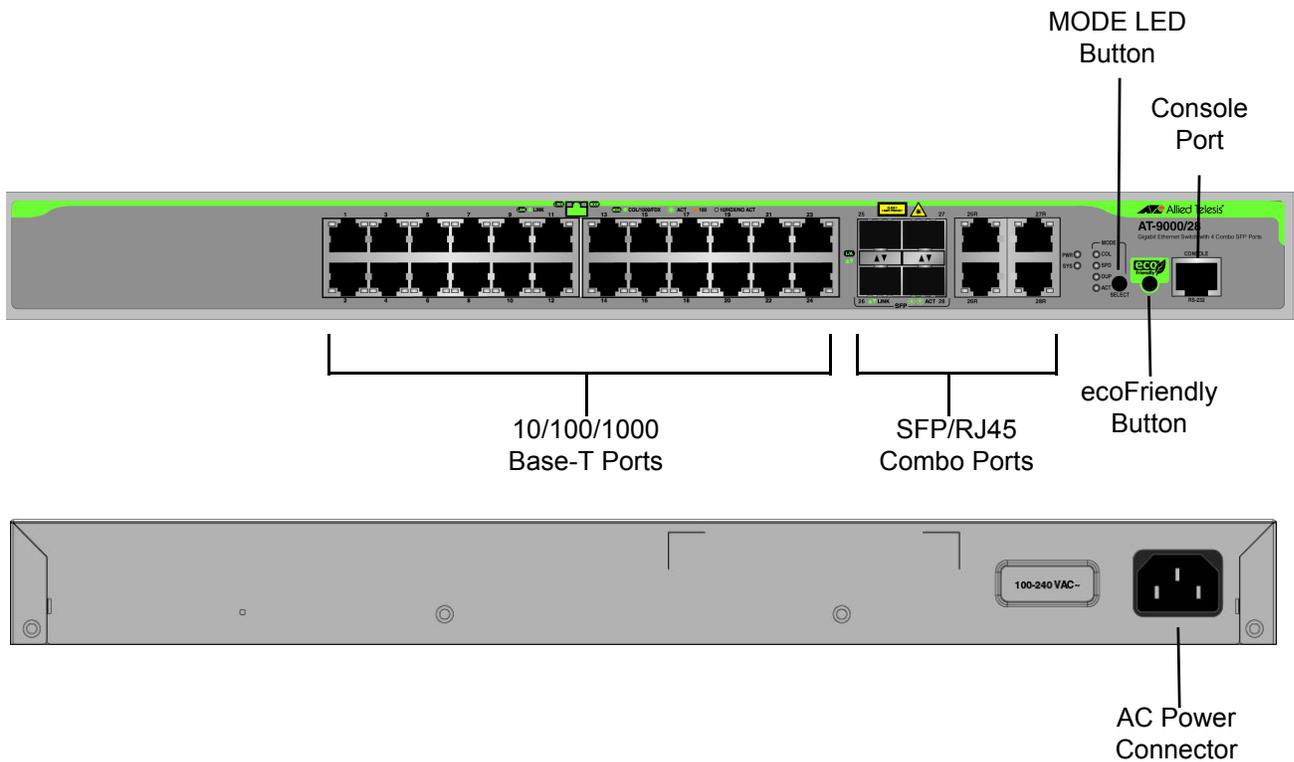


Figure 3. AT-9000/28 Switch Front and Rear Panels

AT-9000/28POE Switch

Features specific to the AT-9000/28POE switch include:

- ❑ 28 port Gigabit Switch with 24 10/100/1000Base-T RJ-45 ports fixed configuration and 4 SFP/RJ-45 combo ports
- ❑ PoE and PoE+ supported on the 10/100/1000Base-TX ports
- ❑ RJ-45 MODE LED selection button for status of PoE, speed, duplex or activity

Figure 4 illustrates the front- and rear-panel features of the AT-9000/28POE switch.

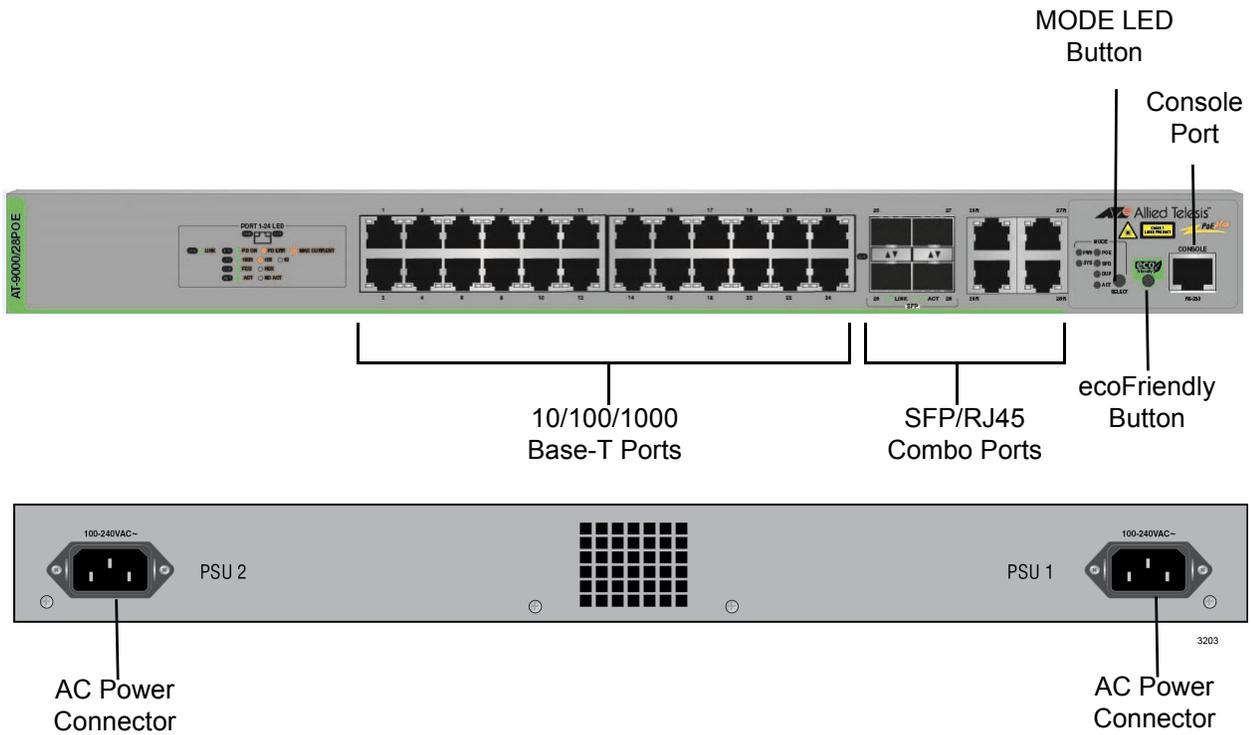


Figure 4. AT-9000/28POE Switch Front and Rear Panels

AT-9000/28SP Switch

Features specific to the AT-9000/28SP switch include:

- ❑ 28 port Gigabit Switch with 24 Gigabit Ethernet small form-factor pluggable (SFP) transceiver slots and 4 SFP/RJ-45 combo ports
- ❑ RJ-45 MODE LED selection button for status of collision, speed, duplex or activity

Figure 5 illustrates the front- and rear-panel features of the AT-9000/28SP switch.

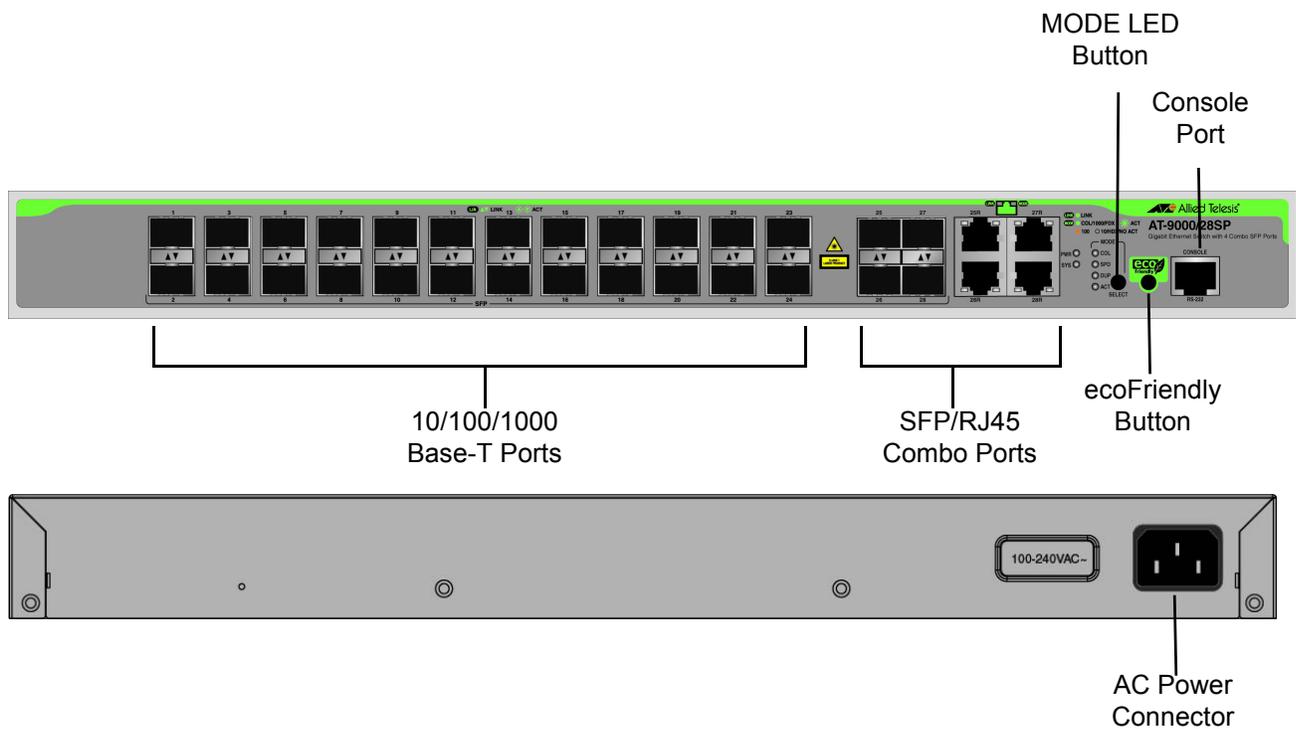


Figure 5. AT-9000/28SP Switch Front and Rear Panels

AT-9000/52 Switch

Features specific to the AT-9000/52 switch include:

- ❑ 52 port Gigabit Switch with 48 10/100/1000Base-T RJ-45 ports fixed configuration and 4 SFP slots
- ❑ RJ-45 MODE LED selection button for status of collision, speed, duplex or activity

Figure 6 illustrates the front- and rear-panel features of the AT-9000/52 switch.

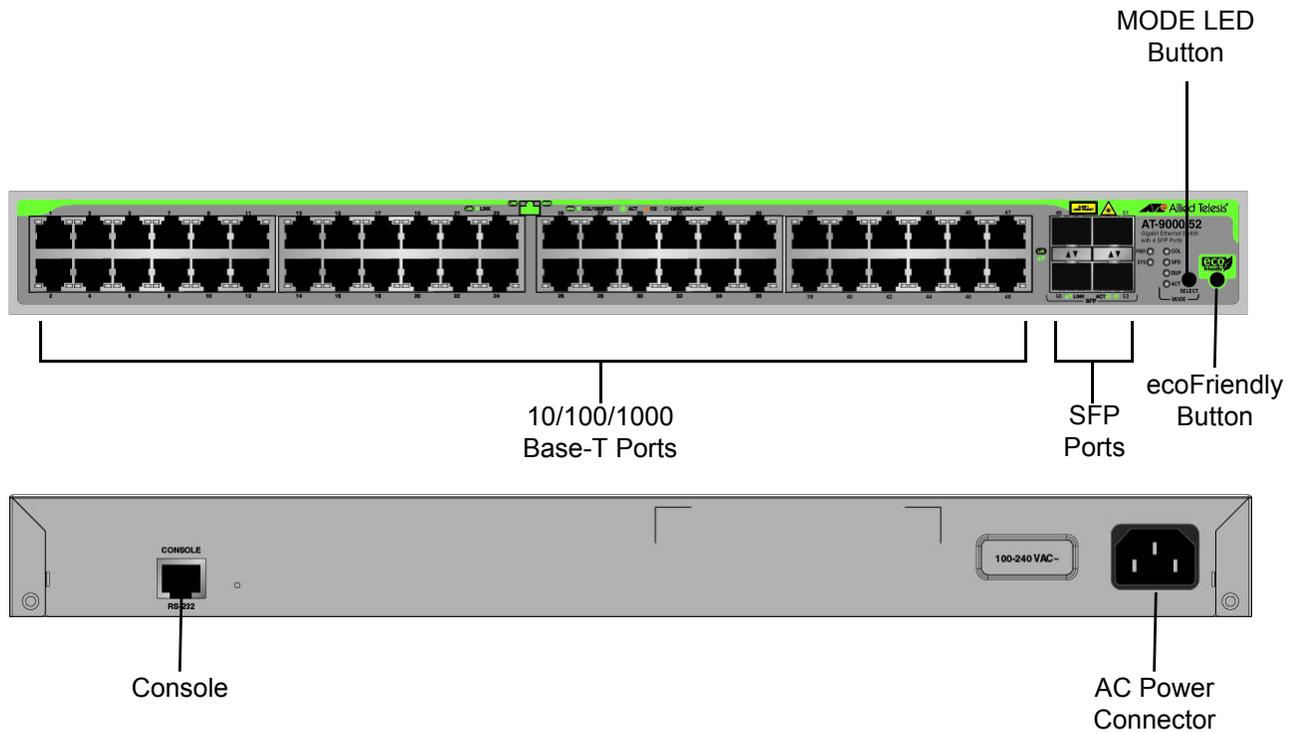


Figure 6. AT-9000/52 Switch Front and Rear Panels

10/100/1000Base-T Twisted-Pair Ports

A twisted-pair cable port is shown in Figure 7.

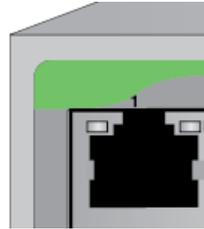


Figure 7. Twisted-Pair Cable Port

See Figure 19 on page 83 for the pin layout to a port and RJ-45 connector.

Speed The ports can operate at 10, 100, or 1000 Mbps. The speeds may be set manually using the management software or automatically with Autonegotiation (IEEE 802.3u), the default setting.

Note

The ports must be set to Autonegotiation to function at 1000 Mbps. They are not compatible with devices that are not IEEE 802.3u compliant.

Duplex Mode The twisted-pair ports can operate in either half- or full-duplex mode. The duplex modes, like port speeds, may be set manually using the management software or automatically with Autonegotiation (IEEE 802.3u), the default setting.

The speed and duplex mode settings of a port may be set independently of each other. For example, a port may be configured such that its speed is set manually while its duplex mode is established through Autonegotiation.

Note

A switch port connected to a host device that does not support Autonegotiation, and has a fixed duplex mode of full-duplex, should not set its duplex mode with Autonegotiation. A duplex-mode mismatch in which a switch port and a host device operate at different duplex modes may occur. The duplex modes of switch ports that are connected to host devices that do not support Autonegotiation should be set manually through the management software.

Wiring Configuration

The wiring configuration of a port operating at 10 or 100 Mbps can be MDI or MDI-X. The wiring configurations of a switch port and a host device connected with straight-through twisted-pair cabling must be opposite, such that one device is using MDI and the other MDI-X. For instance, a switch port has to be set to MDI-X if it is connected to a host device set to MDI.

You may set the wiring configurations of the ports manually or let the switch configure them automatically with auto-MDI/MDI-X (IEEE 802.3ab-compliant). This feature enables the switch to automatically negotiate with host devices to establish the proper settings.

The MDI and MDI-X settings do not apply when the ports are operating at 1000 Mbps.

Maximum Distance

The ports have a maximum operating distance of 100 meters (328 feet).

Power Over Ethernet

The 10/100/1000Base-T ports on the AT-9000/28, AT-9000/28SP, and AT-9000/52 switches do not support PoE.

The AT-9000/12POE and AT-9000/28POE switches are equipped with PoE+ copper ports for a 10/100/1000BASE-T twisted-pair cable.

Cable Requirements

The cable requirements of the ports are given in Table 1 on page 27.

Table 1. Twisted-Pair Cable for the 10/100/1000Base-T Ports

Cable Type	10Mbps			100Mbps			1000Mbps		
	Non-PoE	PoE	PoE+	Non-PoE	PoE	PoE+	Non-PoE	PoE	PoE+
Standard TIA/EIA 568-B-compliant Category 3 shielded or unshielded cabling with 100 ohm impedance and a frequency of 16 MHz.	Yes	No	No	Yes	No	No	No	No	No
Standard TIA/EIA 568-A-compliant Category 5 shielded or unshielded cabling with 100 ohm impedance and a frequency of 100 MHz.	Yes	Yes	No	Yes	Yes	No	Yes	No	No
Standard TIA/EIA 568-B-compliant Enhanced Category 5 (Cat 5e) shielded or unshielded cabling with 100 ohm impedance and a frequency of 100 MHz.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Standard TIA/EIA 568-B-compliant Category 6 or 6a shielded cabling.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Port Pinouts Refer to Table 15 on page 83, Table 17 on page 84, and Table 17 on page 84 for the port pinouts of the 10/100/1000Base-T twisted-pair ports.

Power Over Ethernet

The AT-9000/12POE and AT-9000/28POE switches feature Power over Ethernet (PoE) on the 10/100/1000Base-TX ports. PoE is used to supply power to host devices over the same twisted-pair cables that carry the network traffic.

The main advantage of PoE is that it makes it easier to install a network. The placement of host devices is often limited by whether there are power sources nearby. This often limits equipment placement or requires the added time and cost of having additional electrical sources installed. But with PoE, you can install PoE compatible devices wherever they are needed without being concerned whether there are power sources nearby.

A device that provides PoE to other host devices is called *power sourcing equipment* (PSE). The AT-9000/12POE and AT-9000/28POE switches act as PSE units by adding DC power to the network cable, thus functioning as a central power source for other host devices.

A device that receives its power from a PSE is called a *powered device* (PD). Examples include wireless access points, IP telephones, webcams, and even other Ethernet switches.

The switch automatically determines whether or not a device connected to a port is a powered device. Ports that are connected to network nodes that are not powered devices (that is, devices that receive their power from another power source) function as regular Ethernet ports, without PoE. The PoE feature remains activated on the ports, but no power is delivered to the devices.

PoE Standards

The AT-9000/12POE and AT-9000/28POE switches support these PoE standards:

- ❑ PoE (IEEE 802.3af): This standard provides up to 15.4 watts at the switch port to support powered devices that require up to 12.95 watts.
- ❑ PoE+ (IEEE 802.3at): This standard provides up to 30.0 watts at the switch port to support powered devices that require up to 25.5 watts.

Powered Device Classes

Powered devices are grouped into the five classes listed in Table 2. The classes are based on the amount of power the devices require. The switches support all five classes.

Table 2. IEEE Powered Device Classes

Class	Maximum Power Output from a Switch Port	PD Power Range
0	15.4W	0.44W to 12.95W
1	4.0W	0.44W to 3.84W
2	7.0W	3.84W to 6.49W
3	15.4W	6.49W to 12.95W
4	30.0W	12.95W to 25.5W

Power Budget

The AT-9000/12POE switch has a power budget of 125 watts. The AT-9000/28POE switch has a power budget of 370 watts. These are the maximum amounts of power the switches can provide at one time to the powered devices.

The AT-9000/28POE switch has two power supplies. Each power supply is responsible for providing 185 watts, or half, of the power budget. Both power supplies must be connected to AC power sources for the switch to provide the full 370 watts. The power budget is reduced to 185 watts if only one power supply is connected to a power source.

The power requirements of the PoE devices determine the maximum number of devices the switch can support at one time. So long as the total power requirements of the powered devices is less than the power budget of the switch, the switch can supply power to all of the devices. If the total power requirements exceed the power budget, the switch denies power to one or more ports using port prioritization.

To determine whether the power requirements of the PoE devices you plan to connect to the switch exceed its power budget, refer to the devices' documentation for their power requirements and add the requirements together. The switch should be able to power all of the devices simultaneously as long as the total is below its power budget. If the total exceeds the available power budget, consider reducing the number of PoE devices so that all of the devices receive power. Otherwise, the switch powers a subset of the devices, based on port prioritization.

The switch can handle different power requirements on different ports. This enables you to connect different classes of PoE equipment to the ports on the switch.

Port Prioritization

If the power requirements of the powered devices exceed the switch's power budget, the switch denies power to some ports based on a system called port prioritization. You may use port prioritization to ensure that powered devices critical to the operations of your network are given preferential treatment by the switch in the distribution of power, should the demands of the devices exceed the available capacity.

There are three priority levels:

- Critical
- High
- Low

Ports set to the Critical level, the highest priority level, are guaranteed power before any of the ports assigned to the other two priority levels. Ports assigned to the other priority levels receive power only if all Critical ports are receiving power. Ports that are connected to the most critical powered devices should be assigned to this level. If there is not enough power to support all ports set to the Critical priority level, power is provided to the ports based on the port number, in ascending order.

The High level is the second highest level. Ports set to this level receive power only if all ports set to the Critical level are already receiving power. If there is not enough power to support all ports set to the High priority level, power is provided to the ports based on the port number, in ascending order.

The lowest priority level is Low. This is the default setting. Ports set to this level only receive power if all ports assigned to the other two levels are already receiving power. As with the other levels, if there is not enough power to support all ports set to the Low priority level, power is provided to the ports based on the port number, in ascending order.

Power allocation is dynamic. Ports supplying power to powered devices may cease power transmission if the switch's power budget is at maximum usage and new powered devices, connected to ports with higher priorities, become active.

You can use port prioritization on dual power-supply PoE switches to protect your important networking devices from loss of power should one of the power supplies fail or lose power. By limiting the power requirements of the critical devices connected to a switch to less than 185 watts (the PoE power provided by a single power supply), a switch will have sufficient power to support the critical devices, even if it has only one functional power supply.

Wiring Implementation

The IEEE 802.3af standard defines two methods by which a PSE, such as the switch, can transmit DC power over twisted-pair cables to PDs. These methods, known as modes A and B, identify the wire strands the switch should use when sending DC power to a PD.

Twisted-pair cabling typically consists of eight strands. With 10Base-T and 100Base-TX devices, the strands connected to pins 1, 2, 3, and 6 on the RJ-45 connectors carry the network traffic, while strands connected to pins 4, 5, 7, and 8 are unused. With 1000Base-T devices, all eight strands are used to carry network data.

It takes four strands to deliver DC power to a PD. With Mode A, the power is delivered on pins 1, 2, 3, and 6. These are the same pins in 10Base-T and 100Base-TX devices that carry the network data. With Mode B, the power is provided over the spare strands.

The ports on the AT-9000/12POE and AT-9000/28POE switches deliver the power using pins 4, 5, 7, and 8, which corresponds to Mode B in the IEEE 802.3af standard.

Powered devices that comply with the IEEE 802.3af standard are required to support both power delivery methods. Legacy devices that do not comply with the standard will work with the switch if they are powered on pins 4, 5, 7, and 8.

SFP Slots

The AT-9000/12POE, AT-9000/28, AT-9000/28POE, and AT-9000/28SP switches have four slots for 100Mbps 100Base-FX or 1000Mbps 1000Base-SX/LX fiber optic transceivers. The transceivers can be used to connect the switches to other host devices over large distances, build a high-speed backbone network between host devices, or connect high-speed devices, such as servers, to your network.

The switches support a variety of short and long distance, 100 and 1000 Mbps fiber optic SFP modules. For a list of supported SFP modules, contact your Allied Telesis representative or visit our website.

On the AT-9000/28, AT-9000/28POE, and AT-9000/28SP switches, the four SFP slots are paired with the four 10/100/1000Base-T ports. The combo ports are listed in Table 3.

Table 3. Combo Ports

10/100/1000 Base-T Port	SFP Slot
25R	25
26R	26
27R	27
28R	28

The rules for using the combo ports are listed here:

- ❑ Only one port in a combo pair is active at a time.
- ❑ The twisted-pair port is the default active port.
- ❑ The SFP slot becomes active when an SFP transceiver establishes a link to another network node.
- ❑ The twisted-pair port of a combo pair remains deactivated so long as the SFP transceiver has a link to another host device.
- ❑ The switch automatically reactivates the twisted-pair port if the companion SFP module loses its network link.
- ❑ The twisted-pair port and SFP module of a combo port share the same settings, such as VLAN assignments, access control lists, and spanning tree.

- Port speed is an exception to the shared settings of the twisted-pair port and SFP slot of a combo port. If you disable Autonegotiation on the twisted-pair port (and set the speed and duplex mode manually), the switch will reactivate Autonegotiation when an SFP module establishes a link with an end node.

Combo Ports

The AT-9000/28, AT-9000/28POE, and AT-9000/28SP switches have four combo pairs of uplink ports, each consisting of one slot for an SFP transceiver and a redundant 10/100/1000 Base-T twisted-pair port. These combo ports are numbered 25 through 28 on the switches. The twisted-pair ports in each of the combo pairs are identified with the letter “R” for “Redundant” as part of their number on the front faceplate of the unit.

In each combo pair, only one port is active at a time. A link on an SFP transceiver takes precedence over a link on the corresponding redundant twisted-pair port. If an SFP transceiver is installed and has a link to an end node, the twisted-pair port in the pair is inactive. If the SFP slot is empty, or if an SFP module is inserted and does not have an active link, the 10/100/1000Base-T twisted-pair port of the pair will be active.

Note

When the RJ-45 port is inactive, it may have a link to its end node. However, the port will not pass traffic.

These guidelines apply when using these SFP slots and redundant RJ-45 ports:

- ❑ Only one port in a pair can be active at a time — either the SFP module or its corresponding twisted-pair port.
- ❑ The twisted-pair port is the active port when its SFP slot is empty, or when an SFP module is installed but has not established a link to an end node.
- ❑ A twisted-pair port automatically changes to the inactive mode when an SFP module in the corresponding slot establishes a link with an end node.
- ❑ A twisted-pair port automatically transitions back to the active status when the link is down on the corresponding SFP module.
- ❑ In nearly all cases, a twisted-pair port and an SFP module share the same configuration settings, such as port settings, VLAN assignments, access control lists, and spanning tree.

An exception to the shared settings is port speed. If you disable Autonegotiation on a twisted-pair port and set the speed and duplex mode manually, the speed reverts to Autonegotiation when an SFP module establishes a link with an end node.

Note

For a list of supported SFP transceivers for the AT-9000 Series Managed Layer 2 Gigabit Ethernet Switches, contact your Allied Telesis sales representative.

Console Port

The Console port is used to configure the features and parameter settings of the switch. This type of management uses serial RS-232 and is commonly referred to as local or out-of-band management because it is not conducted over your network. To perform local management, you must be at the location of the switch and use the management cable included with the switch.

To establish a local management session with the switch, connect a terminal or a personal computer with a terminal emulation program to the Console port, which has an RJ-45 style (8P8C) connector, using the provided management cable. The cable has RJ-45 RJ-style (8P8C) and DB-9 (D-sub 9-pin) connectors.

The Console port is set to the following specifications:

- Default baud rate: 9600 bps (range is 9600 to 115200 bps)
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

Note

These settings are for a DEC VT100 or ANSI terminal, or an equivalent terminal emulation program.

LEDs

Here are descriptions of the switch LEDs.

System LEDs

There are two system LEDs, the Power (PWR) LED and System (SYS) LED, as shown in Figure 8.

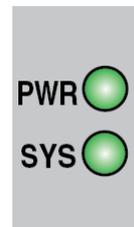


Figure 8. Power and System LEDs

The system LED states are described in Table 4.

Table 4. System LED States

LED	State	Description
Power	Green	System is powered up (power on)
	Off	System is not powered up (power off)
SYS	Green	System is operational

RJ-45 Port LEDs & MODE LED SELECT Button

The RJ-45 port LEDs are illustrated in Figure 9.

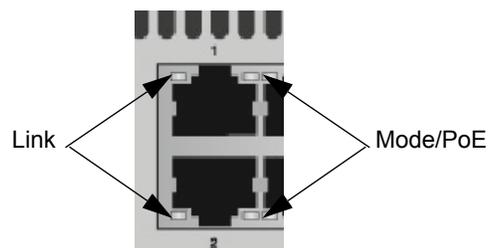


Figure 9. RJ-45 Port LEDs

On each port, the left LED indicates the Link status.

Depending on the switch, the right LED indicates the status as follows:

- AT-9000/12POE: PoE. The AT-9000/12POE does not have a MODE LED SELECT button.

- ❑ AT-9000/28, AT-9000/28SP, AT-9000/52: either collision, speed, duplex, or activity, depending on the selected mode.
- ❑ AT-9000/28POE: either PoE, speed, duplex, or activity, depending on the selected mode.

LINK LED

The RJ-45 LINK LED states are described in Table 5.

Table 5. RJ-45 LINK LED States

Switch Model	LED State	Description
All	Solid Green	A link is established on the port
	Off	No link is established on the port
AT-9000/12POE	Flashing Green	Port is transmitting or receiving data

PoE LED

On the AT-9000/12POE switch, the right LED indicates the PoE status as described in Table 6.

Table 6. AT-9000/12POE RJ-45 PoE LED States

LED State	Description
Solid Green	PoE is enabled
Off	PoE is disabled
Solid Amber	PD error
Flashing Amber	Switch’s power budget is at maximum usage

MODE LED

The AT-9000/28, AT-9000/28SP, AT-9000/28POE, and AT-9000/52 switches are equipped with a MODE LED SELECT button.

You can choose the port status parameter (Collision or PoE depending on the model, Speed, Duplex, or Activity) by pushing the MODE LED SELECT button located next to the ecoFriendly button on the front panel. The status of this parameter will be displayed on each RJ-45 port MODE LED (shown in Figure 9 on page 37). The MODE function that is selected

is indicated on one of the LEDs next to the MODE LED SELECT button, as shown in Figure 10.

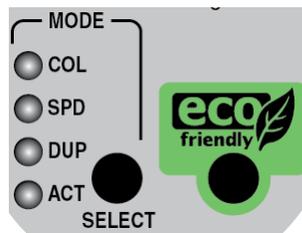


Figure 10. Front Panel MODE LED SELECT Button and LEDs

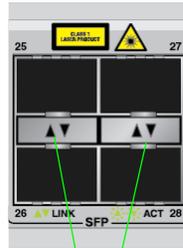
The RJ-45 Port MODE LED states are described in Table 7. Each port MODE is selected by the MODE SELECT button.

Table 7. RJ-45 Port LED MODE States

Switch Model	Port MODE	LED State	Description
AT-9000/28 AT-9000/28SP AT-9000/52	COL	Solid Green	Data collisions are occurring on the port
		Off	No data collisions are occurring on the port
AT-9000/28POE	POE	Solid Green	PoE is enabled
		Off	PoE is disabled
		Solid Amber	PD error
		Flashing Amber	Switch's power budget is at maximum usage
AT-9000/28 AT-9000/28POE AT-9000/28SP AT-9000/52	SPD	Solid Green	Link is established at 1000Mbps
		Solid Amber	Link is established at 100Mbps
		Off	Link is established at 10Mbps
	DUP	Solid Green	Full Duplex mode connection is established
		Off	Half Duplex mode connection is established
	ACT	Flashing Green	Port is transmitting and/or receiving data (default mode)
		Off	No activity is established

SFP LEDs Each SFP slot has one SFP LINK/ACT LED. An up-arrow LED corresponds to the upper SFP slot, and a down-arrow LED corresponds to the lower SFP slot.

The SFP LINK/ACT LEDs are illustrated in Figure 11, and their function is described in Table 8:



LINK/ACT LEDs

Figure 11. SFP LINK/ACT LEDs

Table 8. SFP LINK/ACT LED States

LED State	Description
Solid Green	Link is established on the port
Flashing Green	Port is transmitting and/or receiving data
Off	No link is established on the port

ecoFriendly Button

The ecoFriendly button enables the Low Power Mode (LPM) feature. This mode allows you to conserve power by turning off the port and MODE LEDs when they are not required. To toggle the LEDs on or off, press the ecoFriendly button, located on the front panel of the switch.

The LPM feature does not affect the network operations of the switch or the Power (PWR) and System (SYS) LEDs.

The front panel ecoFriendly button is illustrated in Figure 12.



Figure 12. Front Panel ecoFriendly Button

Power Supplies

The AT-9000/12POE, AT-9000/28, AT-9000/28SP, and AT-9000/52 switches have one AC power supply. The AT-9000/28POE switch has two AC power supplies. The supplies are not field-replaceable.

Excluding PoE operation, only one power supply is active at a time in the AT-9000/28POE switch. The second power supply operates in a redundant state and is automatically activated by the switch if the active power supply loses power or fails. The change-over is instantaneous, making it transparent to the network users. Power redundancy is available only when both AC connectors on the switch are connected to power sources.

For PoE, however, the power supplies operate in a load-sharing manner, with each power supply providing 185 watts, half the total PoE budget of the switch. The maximum 370 watts power budget of PoE is only available when both power supplies are connected to power sources.

Refer to “Technical Specifications” on page 79 for the input voltage range.



Warning

The power cord is used as a disconnection device. To de-energize equipment, disconnect the power cord. ⚡ E3



Warning

This unit might have more than one power cord. To reduce the risk of electric shock, disconnect all power cords before servicing the unit. ⚡ E30

Power Connectors

The AT-9000/12POE, AT-9000/28, AT-9000/28SP, and AT-9000/52 switches have one AC power supply socket on the back panel. The AT-9000/28POE switch has two AC power supply sockets.

AC switches are powered on or off by connecting or disconnecting the power cords.

Chapter 2

Beginning the Installation

This chapter contains the following sections:

- “Installation Procedures” on page 46
- “Reviewing Safety Precautions” on page 47
- “Selecting a Site” on page 51
- “Unpacking the Switch” on page 52

Installation Procedures

You may install the switch on a table or desktop, or in an equipment rack.

- ❑ To install the switch on a table or desktop, refer to “Installing the Switch on a Table or Desktop” on page 54.
- ❑ To install the switch in an equipment rack, refer to “Installing the Switch in a Rack” on page 55.

Reviewing Safety Precautions

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

Note

The  indicates that a translation of the safety statement is available in a PDF document titled “Translated Safety Statements” posted on the Allied Telesis website at <http://www.alliedtelesis.com/support>.

Note

Refer to the data sheet about an SFP module at www.alliedtelesis.com to determine whether it is a Class 1 LED or a Class 1 Laser product.



Warning

Class 1 Laser product.  L1



Warning

Do not stare into the laser beam.  L2



Warning

Class 1 LED product.  L3



Warning

To prevent electric shock, do not remove the cover. There are 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

Note

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 45° degrees C. ⚡ E7

Note

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

**Warning**

Only trained and qualified personnel are allowed to install or replace this equipment. *↪* E14

**Caution**

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 over-current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern. *↪* E21

**Warning**

Mounting of the equipment in the rack should be such that a hazardous condition is not created due to uneven mechanical loading. *↪* E25

**Warning**

This unit might have more than one power cord. To reduce the risk of electric shock, disconnect all power cords before servicing the unit. *↪* E30

Note

If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than the room ambient temperature. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer's maximum rated ambient temperature (T_{mra}). *↪* E35



Caution

Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised. *↪* E36



Warning

Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuits (for example, use of power strips). *↪* E37



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



Warning

This product may have multiple AC power cords installed. To de-energize this equipment, disconnect all power cords from the device. *↪* E41



Caution

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



Caution

When you remove an SFP module from this product, the case temperature of the SFP may exceed 70°C (158°F). Exercise caution when handling with unprotected hands.

Selecting a Site

Observe the following requirements when choosing a site for the switch:

- ❑ If you plan to install the switch in an equipment rack, check that the rack is safely secured and will not tip over. Devices in a rack should be installed starting at the bottom, with the heavier devices near the bottom of the rack.
- ❑ If you are installing the switch on a table, be sure the table is level and secure.
- ❑ The power outlet for the switch should be located near the unit and be easily accessible.
- ❑ The site should provide easy access to the ports on the front of the switch. This will make it easy for you to connect and disconnect cables, as well as view the switch's LEDs.
- ❑ To allow proper cooling of the switch, air flow around the unit and through its vents on the side should be unrestricted.
- ❑ Do not place objects on top of the switch.
- ❑ Do not expose the switch to moisture or water.
- ❑ Make sure that the site is a dust-free environment.
- ❑ Use dedicated power circuits or power conditioners to supply reliable electrical power to the host devices.
- ❑ The site should not be a wiring or utility box because the switch will overheat and fail from inadequate air flow.
- ❑ Twisted pair cabling should not be exposed to sources of electrical noise, such as radio transmitters, broadband amplifiers, power lines, electric motors, or fluorescent fixtures.

Unpacking the Switch

To unpack the switch, perform the following procedure:

1. Remove all 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 switch on a level, secure surface.
3. Make sure the following components are included in your switch package. If any item is missing or damaged, contact your Allied Telesis sales representative for assistance.
 - One AT-9000 Managed Layer 2 GE ecoSwitch
 - Mounting brackets:
 - AT-9000/12POE: two brackets - one long bracket and one short bracket
 - AT-9000/28, AT-9000/28POE, AT-9000/28SP, AT-9000/52: two brackets
 - Eight flathead Phillips rack-mount bracket screws
 - AC power cord:
 - AT-9000/12POE, AT-9000/28, AT-9000/28SP, AT-9000/52: one cord
 - AT-9000/28POE: two cords
 - Management cable for local management

Chapter 3

Installing the Switch on a Table or Rack

This chapter contains the following sections:

- “Installing the Switch on a Table or Desktop” on page 54
- “Installing the Switch in a Rack” on page 55

Installing the Switch on a Table or Desktop

You may install the switch on a table or desktop. Here are the guidelines for selecting a site:

- The table should be level and stable.
- The power outlet should be located near the switch and be easily accessible.
- The site should allow for easy access to the ports on the front of the switch, so that you can easily connect and disconnect cables, and view the port LEDs.
- The site should allow for adequate air flow around the unit and through the cooling vents on the front and rear panels. (The ventilation direction in units that have a cooling fan is from front to back, with the fans on the back panels drawing the air out of the units.)
- The site should not expose the switch to moisture or water.
- The site should be a dust-free environment.
- The site should include dedicated power circuits or power conditioners to supply reliable electrical power to the host devices.
- The rubber feet on the bottom of the switch should be left on for table or desktop installation.



Warning

Do not stack switches on top of one another on a table or desktop because that could present a personal safety hazard if you need to move or replace switches.

After placing the switch on the table or desktop, go to Chapter 4, “Cabling the Networking Ports” on page 59 to connect the network cables to the ports on the switch.

Installing the Switch in a Rack

Installation guidelines may be found in “Selecting a Site” on page 51.

**Caution**

The chassis may be heavy and awkward to lift. Allied Telesis recommends that you get assistance when mounting the chassis in an equipment rack. ⚡ E28

To install the switch in a standard 19-inch rack, perform the following procedure.

Note

Step 1, Step 2, and Step 3 are optional. These steps describe removing the snap-on plastic feet from the bottom of a switch. The feet can be left on.

1. Place the unit upside down on a level, secure surface.
2. Using a flat-head screwdriver, remove the snap-on plastic feet from the bottom of the switch, as shown in Figure 13.

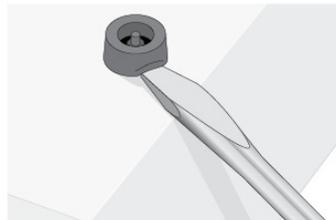


Figure 13. Removing the Feet

3. Turn the switch over.
4. Attach a mounting bracket to one side of the switch using four of the screws that come with the switch. Figure 14 on page 56 and Figure 15 on page 56 illustrate the four possible bracket positions.

Note

For the AT-9000/12POE, Allied Telesis recommends installing the short bracket on the right side and the long bracket on the left side, as you face the front of the unit.



Figure 14. Attaching Brackets for Rack Mounting

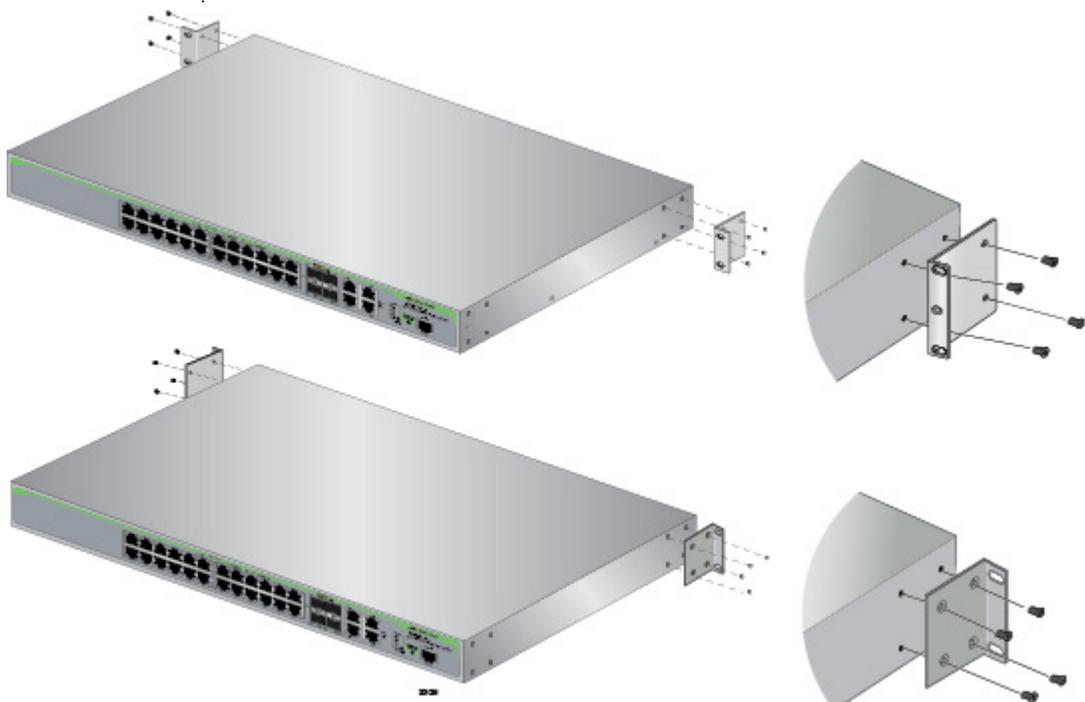


Figure 15. Attaching Brackets for Rack Mounting (Continued)

5. Install the second mounting bracket on the other side of the switch using the four remaining screws.

6. Mount the switch in the 19-inch rack using standard screws (not provided), as shown in Figure 16.

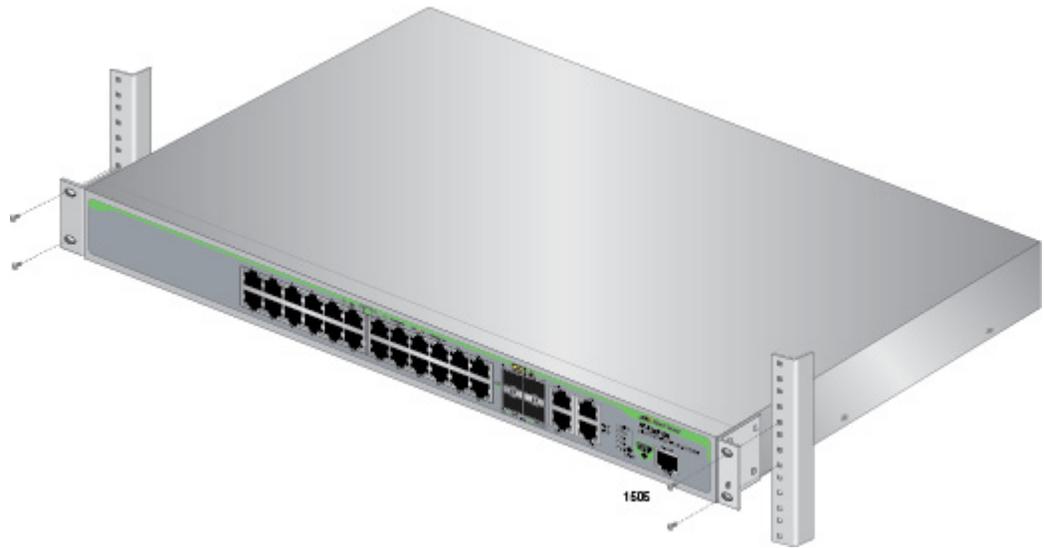


Figure 16. Mounting the Switch in a Rack

Chapter 4

Cabling the Networking Ports

Observe the following guidelines when connecting a twisted-pair cable to a port on the switch:

- ❑ The cable specifications for the 10/100/1000Base-T twisted pair ports are listed in Table 1 on page 27.
- ❑ The connector on the cable should fit snugly into the port on the switch. The tab on the connector should lock the connector into place.
- ❑ The appropriate MDI/MDI-X setting for a switch port connected to a 10/100Base-TX host device with a fixed wiring configuration depends on the setting of the host device and whether the switch and host device are connected with straight-through or crossover cable. If you are using straight-through twisted pair cable, the wiring configurations of a port on the switch and a port on a host device must be opposite each other, such that one port uses MDI and the other MDI-X. For example, if a host device has a fixed wiring configuration of MDI, you must disable auto-MDI/MDI-X on the corresponding switch port and manually set it to MDI-X. If you are using crossover twisted pair cable, the wiring configurations of a port on the switch and a port on a host device must be the same.

- ❑ The default speed setting for the ports is Autonegotiation. This setting is appropriate for ports connected to host devices that also support Autonegotiation.
- ❑ The default speed setting of Autonegotiation is not appropriate for ports connected to 10/100Base-TX host devices that do not support Autonegotiation and have fixed speeds. For those switch ports, you should disable Autonegotiation and set the port's speed manually to match the speeds of the host devices.
- ❑ The 10/100/1000Base-T ports must be set to Autonegotiation, the default setting, to operate at 1000Mbps.
- ❑ The default duplex mode setting for the ports is Autonegotiation. This setting is appropriate for ports connected to host devices that also support Autonegotiation for duplex modes.
- ❑ The default duplex mode setting of Autonegotiation is not appropriate for ports connected to host devices that do not support Autonegotiation and have a fixed duplex mode. You should disable Autonegotiation on those ports and set their duplex modes manually to avoid the possibility of duplex mode mismatches. A switch port using Autonegotiation defaults to half-duplex if it detects that the end node is not using Autonegotiation, which can result in a mismatch if the end node is operating at a fixed duplex mode of full-duplex.
- ❑ If the switch will have a static or an LACP port trunk, create the trunk first using the switch's management software before connecting the cables of the trunk. Otherwise, a network loop will result, which can adversely affect network performance.
- ❑ If your network topology contains a loop in which two or more host devices can communicate with each other over more than one network path, do not connect the network cables forming the loop until after you have activated a spanning tree protocol on the switch. Data loops can adversely affect network performance. For background information on the different types of spanning tree protocols supported by the switch, refer to the *AT-9000 Series Web User Guide*.

Chapter 5

Powering On the Switch

This chapter contains the following sections:

- ❑ “Applying AC Power” on page 62
- ❑ “Starting a Local Management Session” on page 64
- ❑ “Management Methods” on page 66
- ❑ “Adding a Management IP Address” on page 69

Applying AC Power

Consider the following items as you power on the switch:

- ❑ All of the models have one power supply, except for the AT-9000/28POE switch, which has two power supplies with separate connectors.
- ❑ The AT-9000/28POE switch supports 370 watts of PoE only when both internal power supplies are connected to power sources. The switch has a PoE budget of 185 watts if just one power supply is functional. For background information, refer to “Power Supplies” on page 42.
- ❑ Refer to “Power Specifications” on page 81 for the power specifications of the switches.

Note

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

To apply AC power to the switch, perform the following procedure:

1. Plug the power cord into the AC power connector on the back panel of the unit (see Figure 17).



Warning

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

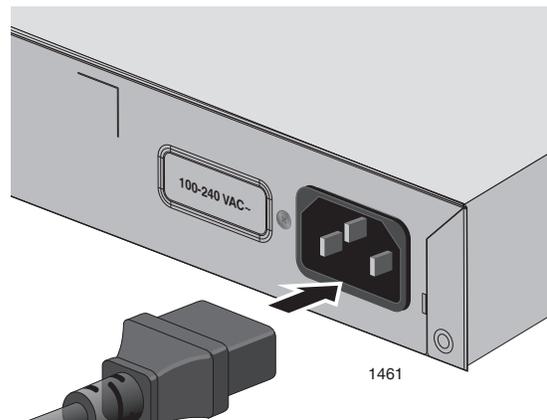


Figure 17. Connecting the AC Power Cord

2. Connect the other end of the power cord to an appropriate AC power outlet. For power specifications for the switch, refer to “Power Specifications” on page 81.
3. When power is applied, the switch begins to load the Management Software. The loading process takes less than a minute to complete.

The switch is now ready for network operations.

No further installation steps are required if the default parameter settings of the switch, listed in the *AT-9000 Series Management Command Line Interface User’s Guide*, are adequate for your network. If you want to manage the switch, refer to “Starting a Local Management Session” on page 64.

Starting a Local Management Session

The procedure in this section explains how to start a local (out-of-band) management session using the RJ-45 terminal port on the switch. You can use a local management session to configure the switch's operating parameters, and view performance and error statistics.

To start a local management session, perform the following procedure:

1. Connect the RJ-45 end of the management cable, included with the shipping package, to the Console port. The Console port is located on the front panel of the AT-9000/12POE, AT-9000/28, AT-9000/28POE, and AT-9000/28SP switches, as shown in Figure 18, and on the rear panel of the AT-9000/52 switch.

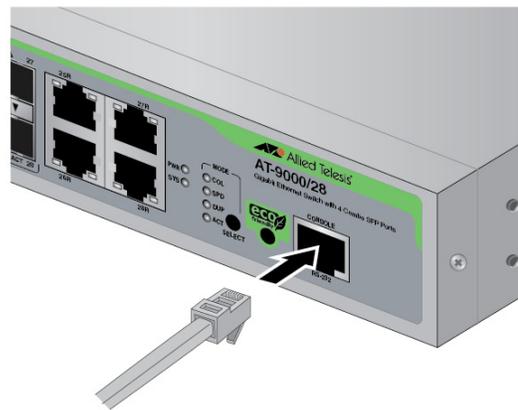


Figure 18. Connecting Management Cable to Switch RJ-45 Console Port

2. Connect the other end of the cable to an RS-232 port on a terminal or a personal computer with a terminal emulation program.
3. Configure the terminal or terminal emulation program as follows:
 - Baud rate: Default is 9600 bps
 - Data bits: 8
 - Parity: None
 - Stop bits: 1
 - Flow control: None

Note

The port settings are for a DEC VT100 or ANSI terminal, or an equivalent terminal emulator program.

4. Press Enter.

You are prompted for a user name and password.

5. To configure the switch settings, enter “manager” as the user name. The default password for manager access is “friend.” User names and passwords are case sensitive.
6. The local management session starts, and the command line interface prompt is displayed.

For information about the command line interface, refer to the *AT-9000 Series Management Command Line Interface User's Guide*.

Management Methods

You may use the following methods and tools to manage AT-9000 series switches:

- Local management
- Telnet client
- Secure Shell (SSH) client
- HTTP non-secure and HTTPs secure web browser
- SNMPv1, v2c, v3

Local Management

Local management uses the Console port on the switch. It is commonly referred to as out-of-band management because the management sessions are not conducted over your network. Listed here are the requirements for local management:

- A terminal or computer with a terminal emulator program.
- The management cable included with the switch.

This management method uses the command line interface (CLI), which gives you access to all of the features and parameters on the switch. For instructions on how to start a local management session, refer to “Starting a Local Management Session” on page 64.

Telnet Management

The switch has a Telnet server. You may use the server to manage the unit over your network with the Telnet application protocol. Commonly referred to as in-band management because it is conducted over the network, this management method has these requirements:

- Your management workstation must have a Telnet client.
- The Telnet server on the switch has to be activated. This is the server’s default setting.
- The switch must have an IP address. For instructions on how to assign the address, refer to the *AT-9000 Series Management Command Line Interface User’s Guide*.

Telnet management uses the command line interface, giving you access to all of the features and parameter settings on the switch. For instructions on how to start a Telnet management session on the switch, refer to the *AT-9000 Series Management Command Line Interface User’s Guide*.

Telnet management sessions are not secure and are vulnerable to snooping because the packets exchanged between the switch and your workstation are sent in plain text. The security of the switch may be jeopardized if an intruder captures the packet containing your user name and password. For secure remote management, use the SSH protocol.

Secure Shell Management

Secure Shell (SSH) management is similar to Telnet management in that you may use it, together with the command line interface, to manage all of the features and functions of the switch, from a workstation on your network. The difference is that this management method encrypts the packets exchanged by your computer and the switch to protect your management sessions.

Here are the requirements for SSH management:

- Your management workstation must have an SSH client.
- The SSH server on the switch must be activated. The server's default setting is disabled.
- You must create an encryption key on the switch.
- The switch must have an IP address.

For instructions on how to configure the switch for SSH management, refer to the *AT-9000 Series Management Command Line Interface User's Guide*.

Web Browser Management

Yet another way to remotely manage the switch is with a web browser. A special web browser interface, featuring both non-secure (HTTP) and secure (HTTPS) operation, lets you monitor and configure many of the switch's features from a series of windows. The interface, however, may only be used to configure a subset of the features. To configure the features the web browser interface does not support, use the command line interface from another management method.

Here are the requirements for non-secure HTTP web browser management:

- Your management workstation must have a web browser.
- The web browser server on the switch is disabled by default and must be activated.
- The switch must have an IP address.

Refer to the *AT-9000 Series Management Command Line Interface User's Guide* for instructions on how to configure the switch for secure HTTPS web browser management.

SNMP Refer to the *AT-9000 Series Management Command Line Interface User's Guide* for instructions on how to configure the switch for SNMP management. The switch does not have any default SNMP community strings.

Adding a Management IP Address

You must assign the switch a management IP address to access the web user interface and to remotely manage the switch during a remote Telnet connection. Here are the requirements:

- ❑ The switch can have one management IPv4 address and one management IPv6 address.
- ❑ A management IP address must be assigned to a VLAN on the switch. It can be any VLAN, including the Default VLAN.
- ❑ The host devices (for example, Syslog servers, TFTP servers) must be members of the same subnet as a management IP address or have access to it through routers or other Layer 3 devices.
- ❑ The switch must also have a default gateway if the host devices are not members of the same subnet as the management IP address. The default gateway specifies the IP address of a router interface that represents the first hop to the subnets or networks of the host devices.
- ❑ A default gateway address, if needed, must be a member of the same subnet as a management IP address.
- ❑ The switch can have one IPv4 default gateway and one IPv6 gateway.

The `IP ADDRESS` command in the VLAN Interface mode command adds a management IPv4 address to the switch. Table 9 on page 70 shows an example in which the command assigns a management IPv4 address of 149.82.112.72 and a subnet mask of 255.255.255.0 to the Default VLAN, which has the VID 1. The switch is also assigned the default gateway, 149.82.112.18:

Table 9. Example of Adding a Management Address

awplus> enable	Move to the Privileged Exec mode.
awplus# configure terminal	Move to the Global Configuration mode.
awplus(config)# interface vlan1	Use the INTERFACE VLAN command to move to the VLAN Interface mode of the Default VLAN.
awplus(config-if)# ip address 149.82.112.72/24	Assign the management IPv4 address to the switch using the IP ADDRESS command. The mask is a decimal number that represents the number of bits, from left to right, that constitute the network portion of the address. For example, the decimal masks 16 and 24 are equivalent to masks 255.255.0.0 and 255.255.255.0, respectively.
awplus(config-if)# ip route 0.0.0.0/0 149.82.112.18	Assign the default gateway to the switch using the IP ROUTE command.
awplus(config)# exit	Return to the Privileged Exec mode.
awplus# show ip route	Verify the new management IPv4 address and default gateway with the SHOW IP ROUTE command.

Chapter 6

Troubleshooting

This chapter contains information about how to troubleshoot the switch in the event a problem occurs.

Note

If you are unable to resolve a problem after following the instructions in this chapter, contact Allied Telesis Technical Support for assistance. Refer to “Contacting Allied Telesis” on page 13 for contact information.

This chapter contains the following sections:

- ❑ “Power LED Is Off” on page 72
- ❑ “Twisted-Pair Port Link LED Is Off” on page 73
- ❑ “Cannot Establish a Local (Out-of-Band) Management Session” on page 74
- ❑ “All Port LEDs Are Off” on page 75
- ❑ “Power Over Ethernet” on page 76
- ❑ “Fiber Optic Transceivers” on page 77
- ❑ “Slow Performance Between Switch and Host Device” on page 78

Power LED Is Off

Check the PWR LED on the front of the switch. If the LED is off, indicating that the unit is not receiving power, do the following:

- Make sure the power cord is securely connected to the power source and to the AC connector on the back panel of the switch.
- Verify that the power outlet has power by connecting another device to it.
- Try connecting the unit to another power source.
- Try using a different power cord.
- Check that the voltage from the power source is within the required levels for your region.

Twisted-Pair Port Link LED Is Off

When a twisted-pair port on the switch is connected to a properly operating end node, the Link LED for the port should be on. If a Link LED is off, do the following:

- ❑ Verify that the switch is not set to the power-saving mode by pressing the ecoFriendly push-button on the front panel. Refer to “AT-9000 Series Gigabit Ethernet Switches” on page 19 for the ecoFriendly push-button location.
- ❑ Verify that the end node connected to the port is powered on and is operating properly.
- ❑ Check that the twisted-pair cable is securely connected to the port on the switch and to the port on the end node.
- ❑ Make sure that the twisted-pair cable does not exceed 100m (328 ft.).
- ❑ Verify that you are using the appropriate category of twisted-pair cable. For information, refer to Table 1 on page 27.
- ❑ Determine if a crossover cable is required. Because the twisted-pair ports feature auto MDI/MDI-X, you should be able to use a straight-through cable, regardless of the type of device you connect to a port. However, if you disable Autonegotiation on a port and set a port’s speed and duplex mode manually, the port defaults to MDI-X. Disabling Autonegotiation may require manually configuring a port’s MDI/MDI-X setting or using a crossover cable.
- ❑ Make sure that the operating parameters of the port on the switch (speed, duplex, or Autonegotiation) are compatible with the end node to which the port is connected.
- ❑ If a switch port is using Autonegotiation (the default setting) to set its speed and duplex mode settings, the end node connected to the port should also be using Autonegotiation to prevent a duplex mode mismatch. This can occur because a switch port that is using Autonegotiation will default to the half-duplex mode if it detects that the end node is not using Autonegotiation. If the end node is operating at a fixed duplex mode of full-duplex, the result will be a mismatch of settings on the two devices, with the switch port using half-duplex and the end node using full-duplex. To avoid this problem, you should disable Autonegotiation on a switch port and set the port’s speed and duplex mode manually if the end node has a fixed duplex mode of full-duplex.

Cannot Establish a Local (Out-of-Band) Management Session

If you are unable to establish a local (out-of-band) management session with the switch through the terminal port on the front panel, do the following:

- ❑ Check that the RJ-45 connector of the serial management cable is securely connected to the Console port on the switch, and the DB-9 connector is connected to the RS-232 port on the terminal or personal computer.
- ❑ Check that the operating parameters on the terminal or the terminal emulation program have been set correctly. The settings for the RJ-45 serial terminal port are located in “Starting a Local Management Session” on page 64.

All Port LEDs Are Off

If all of the port LEDs are off, even though the ports are connected to active host devices, the switch may be operating in the low-power mode. To toggle on the LEDs, press the ecoFriendly button on the front panel of the switch.

Power Over Ethernet

This section applies only to the AT-9000/12POE and AT-9000/28POE switches.

Each RJ-45 port switch has two LEDs. The left LED provides port link and activity status, and the right LED provides PoE status information. The PoE LED is solid green when PoE is enabled. The PoE LED of a port that is not delivering power will be steady amber or off. If a powered device is not receiving power from a port on the switch, try the following:

- ❑ If all of the LINK/ACT LEDs on the switch are off, try pressing the ecoFriendly button on the switch front panel to turn on the LEDs.
- ❑ Review the power device's (PD) documentation to confirm that it supports Mode B of the IEEE 802.3at standard. Mode B is one of two modes that define the connector pins that deliver the power from the port on the switch to the PD. In Mode B, the power is carried on pins 4, 5, 7, and 8 on the RJ-45 port. In Mode A, the power is carried on pins 1, 2, 3, and 6 on the RJ-45 port, the same pins that carry the network traffic. The AT-9000/12POE and AT-9000/28POE switches do not support Mode A. Most powered devices are designed to accept power by either mode, but some legacy devices may only support one mode. This can be verified by reviewing the device's documentation or data sheet. Legacy devices that only support Mode A will not work with these switches.
- ❑ Check that the device's power requirements do not exceed 30 W. This can be verified by reviewing the device's documentation or data sheet.
- ❑ Verify that you are using the appropriate category of twisted-pair cable by referring to Table 1 on page 27.
- ❑ Try replacing the twisted-pair cable.
- ❑ Use the SHOW POE INTERFACE command in the management software to determine whether PoE is enabled on the port. The default setting for PoE is enabled.
- ❑ Use the SHOW POE INTERFACE command to determine whether the PoE power setting for the port has been reduced to a value below the power requirements of the device.
- ❑ Try connecting the PD to a port on a different switch.

Fiber Optic Transceivers

This section applies only to the AT-9000/12POE, AT-9000/28, AT-9000/28POE, and AT-9000/28SP switches.

The SFP LINK/ACT LEDs on the SFP ports are solid or flashing green when the fiber optic transceivers have links to end nodes. If a transceiver is cabled to an end node, but the LINK/ACT LED is off, try the following:

- ❑ If all of the SFP LINK/ACT LEDs on the switch are off, try pressing the ecoFriendly button on the switch front panel to turn on the LEDs.
- ❑ Check that the fiber optic transceiver is firmly inserted into the slot.
- ❑ Check that both ends of the fiber optic cable are securely connected to the ports on the transceiver and end node.
- ❑ Verify that the end node is powered on and operating properly.
- ❑ Review the operating specifications of the fiber optic transceiver and end node to verify that the devices have the same speed and duplex mode.
- ❑ Check that the operating specifications, including wavelength and maximum operating distance, of the transceiver are compatible with the fiber optic port on the end node.
- ❑ Make sure that you are using the appropriate type of fiber optic cable and that the cable length does not exceed the allowed maximum distance. The cable specifications for the transceivers are provided in the installation instructions that ship with the modules.
- ❑ Use a fiber optic tester to test the whether the optical signal is too weak (that is, sensitivity) or too strong (that is, maximum input power). The operating specifications of the fiber optic transceivers are shipped with the units.
- ❑ Try replacing the fiber optic cable.
- ❑ Check the two strands of the fiber optic cable to be sure that the receive fiber connector is connected to the transmit connector on the remote end node, and that the transmit fiber connector is connected to the receive connector on the end node.

Slow Performance Between Switch and Host Device

If network performance between a twisted-pair port on the switch and a host device is slow, there might be a duplex mode mismatch between the port and the host device. This occurs when a twisted-pair port using Autonegotiation 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 host device or switch so that both ports are using the same duplex mode.

Appendix A

Technical Specifications

This appendix contains the following sections:

- "Physical Specifications" on page 79
- "Environmental Specifications" on page 81
- "Power Specifications" on page 81
- "Safety and Electromagnetic Emissions Certifications" on page 82
- "Quality and Reliability" on page 82
- "Compliance Standards" on page 82
- "10/100/1000Base-T Twisted-Pair Port Connectors" on page 83
- "Console Port Pinouts" on page 84

All specifications listed below are identical for all AT-9000 series switches, except for the Physical Specifications and Power Specifications.

Physical Specifications

Dimensions (W x D x H)

Table 10. Product Dimensions

AT-9000/12POE	33 cm x 20.3 cm x 4.4 cm (13 in. x 8 in. x 1.73 in.)
AT-9000/28 AT-9000/28SP AT-9000/52	44 cm x 25.6 cm x 4.4 cm (17.33 in. x 10.08 in. x 1.73 in.)
AT-9000/28POE	44 cm x 32.1 cm x 4.4 cm (17.33 in. x 12.66 in. x 1.73 in.)

Weights

Table 11. Product Weights

AT-9000/12POE	2.40 kg (5.3 lb.)
AT-9000/28	3.62kg (8.00 lb.)
AT-9000/28SP	3.95 kg (8.70 lb.)
AT-9000/28POE	5.22 kg (11.5 lb.)
AT-9000/52	4.06 kg (8.85 lb.)

Ventilation Requirements

Recommended minimum ventilation on all sides: 10 cm (4.0 in.)

Environmental Specifications

Table 12. Environmental Specifications

Operating Temperature	0° C to 45° C (32° F to 113° F)
Storage Temperature	-25° C to 70° C (-13° F to 158° F)
Operating Humidity	5% to 90% non-condensing
Storage Humidity	5% to 95% non-condensing
Operating Altitude Range	Up to 2,000 m (6,562 ft.)
Acoustic Noise	75.7 dB

Power Specifications

AC Power Consumption

Table 13. AC Power Consumption

AT-9000/12POE	160 watts maximum
AT-9000/28	33 watts maximum
AT-9000/28SP	44 watts maximum
AT-9000/28POE	241 watts per input maximum
AT-9000/52	53 watts maximum

AC Input Electrical Ratings

Table 14. AC Input Electrical Ratings

AT-9000/12POE	100 - 240 VAC, 3A
AT-9000/28 AT-9000/28SP AT-9000/52	100 - 240 VAC, 1A
AT-9000/28POE	100 - 240 VAC, 3A per power input

Frequency

50/60 Hz

Safety and Electromagnetic Emissions Certifications

EMI

FCC Class A, CISPR 22 Class A, EN55022 Class A, C-TICK

Immunity

EN55024, EN61000-3-2, EN61000-3-3

Safety

UL 60950-1 (C_{ULUS}), EN60950-1 (TUV)

Quality and Reliability

MTBF – 340,000 hours

Compliance Standards

IEEE 802.3 – 10Base-T

IEEE 802.3u – 100Base-TX with Autonegotiation

IEEE 802.3ab – 1000Base-TX Gigabit Ethernet

IEEE 802.3x – Flow Control, Symmetric and Asymmetric

10/100/1000Base-T Twisted-Pair Port Connectors

This section lists the pin signals for the 10/100/1000Base-T twisted-pair ports. Figure 19 illustrates the pin layout to an RJ-45 connector and port.

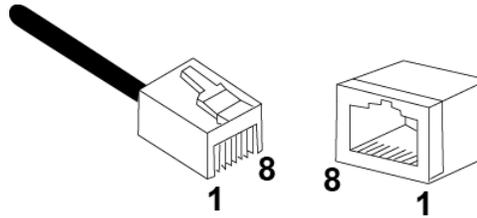


Figure 19. RJ-45 Connector and Port Pin Layout

Table 15 lists the RJ-45 pin signals when a twisted-pair port is operating in the MDI configuration.

Table 15. MDI Pin Signals (10Base-T or 100Base-TX)

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

Table 16 lists the RJ-45 port pin signals when a twisted-pair port is operating in the MDI-X configuration.

Table 16. MDI-X Pin Signals (10Base-T or 100Base-TX)

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

Table 17 lists the RJ-45 connector pins and their signals when a 1000Base-T port is operating at 1000 Mbps.

Table 17. RJ-45 1000Base-T Connector Pinouts¹

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

1. Bi-directional data on each pair.

Console Port Pinouts

Table 18 lists the pin signals on the RJ-45 style serial terminal port.

Table 18. Console Port Pinouts

Pin	Signal
4	Ground
3	Transmit Data
6	Receive Data
7	No Connection
5	Ground
2	No Connection
8	No Connection
1	No Connection