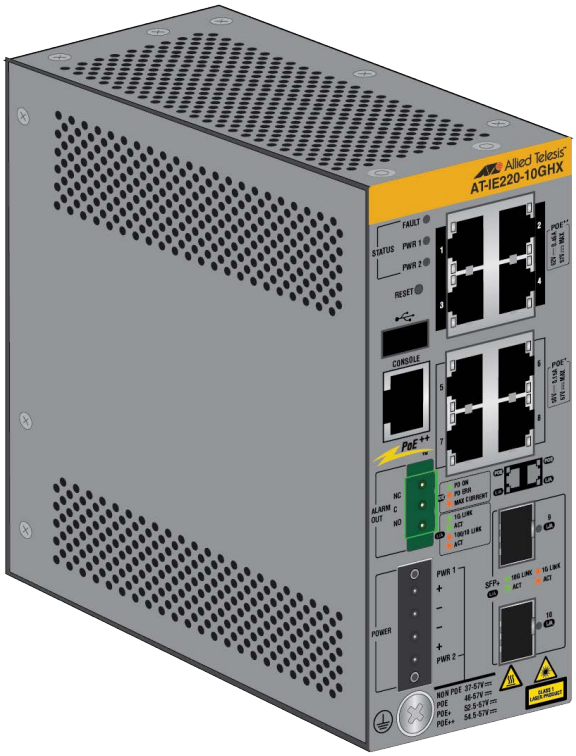
IE220 Series

Industrial Ethernet Layer 2+ Switches

IE220-6GHX
IE220-10GHX



Installation Guide

613-003093 Rev. C

Electrical Safety and Emissions Standards

This section contains the following:

US Federal Communications Commission

Radiated Energy

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

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

Industry Canada

Radiated Energy

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

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

VCCI Statement

この装置は、クラスA情報処理装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。VCCI-A

Grounding and Bonding Requirements

Electrical systems and communication cabling system that are required to be grounded must be connected to earth. Grounding and bonding provide reliable means to safely conduct voltages generated by lightning, line surges, or unintentional contact with high voltages lines or equipment to ground.

The users of the plant or those responsible for the installation shall institute the necessary measures (e.g., shielding, bonding, and grounding protection) to assure all components are on the ground fault path. Inappropriate grounding and bonding shall render all warranties null and void.

Regulatory Approvals

Compliance Marks

CE, FCC, ICES, RCM, UL, UL-EU, VCCI, UKCA

Safety

AS/NZS 62368.1
Audio/video, information and communication technology equipment Safety requirements
(Australian/New Zealand Standard)

CSA C22.2 NO. 62368-1
Audio/video, information and communication technology equipment - Part 1: Safety requirements
(Canadian Standards Association)

EN/IEC/UL 62368-1
Audio/video, information and communication technology equipment - Part 1: Safety requirements;
Information technology equipment - Safety - Part 22: Equipment to be installed outdoors (previously EN/IEC/UL 60950-22)

Electromagnetic Immunity

EN 55035
Electromagnetic compatibility of multimedia equipment — Immunity requirements

IEC CISPR 35
Electromagnetic compatibility of multimedia equipment - Immunity requirements

Electromagnetic Emissions

AS/NZS CISPR 32
Electromagnetic compatibility of multimedia equipment - Emission requirements
(Australian/New Zealand Standard)

FCC 47 CFR Part 15, subpart B
Unintentional Radiators
(US Code of Federal Regulation)

ICES 003 issue 6, class A

Information Technology Equipment (Including Digital Apparatus) - Limits and Methods of Measurement (Canadian Standard)

IEC CISPR 32

Electromagnetic compatibility of multimedia equipment - Emission requirements

EN 55032

Electromagnetic compatibility of multimedia equipment. Emission requirements

Other Approvals

NEMA TS2

Traffic Controller Assemblies with NTCIP Requirements (Pending)

UL 2043

UL Standard for Safety Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces

TEC

Standards for Routing, Switching, Safety, EMI/EMC (Pending)

Allied Telesis Approved SFP Modules

EN 60825-1

Safety of laser products - Part 1: Equipment classification and requirements

EN 60825-2

Safety of laser products - Part 2: Safety of optical fiber communication systems

EN/IEC/UL 62368-1

Safety of laser products - Part 2: Safety of optical fiber communication systems

FDA / CDRH REGISTRATION

Registration of Laser Products with the FDA (CDRH)
(US requirement)

Note
Refer to “EMC and Environmental Test Types” on page 124 in Appendix A, “Technical Specifications” on page 117 for further information.

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

Laser Safety EN 60825

Translated Safety Statements

Important: Safety statements with the ✍ symbol are translated into multiple languages in **Translated Safety Statements** at **alliedtelesis.com/library/search**.

Übersetzte Sicherheitshinweise

Wichtig: Sicherheitshinweise mit dem ✍-Symbol werden in **Translated Safety Statements** bei **alliedtelesis.com/library/search** in mehrere Sprachen übersetzt.

Declaraciones de seguridad traducidas

Importante: Las declaraciones de seguridad con el símbolo ✍ se traducen a varios idiomas en **Translated Safety Statements** en **alliedtelesis.com/library/search**.

Consignes de sécurité traduites

Important: Les déclarations de sécurité avec le symbole ✍ sont traduites en plusieurs langues en **Translated Safety Statements** sur **alliedtelesis.com/library/search**.

Dichiarazioni di sicurezza tradotte

Importante: Le dichiarazioni di sicurezza con il simbolo ✍ sono tradotte in più lingue in **Translated Safety Statements** su **alliedtelesis.com/library/search**.

Översatta säkerhetsförklaringar

Viktig: Säkerhetsföreskrifter med ✍-symbolen översätts till flera språk på **Translated Safety Statements** vid **alliedtelesis.com/library/search**.

Contents

Figures

Tables

Preface

This guide contains the hardware installation instructions for the IE220 Series of Industrial Ethernet Layer 2+ switches. The switch models are listed here:

- IE220-6GHX
- IE220-10GHX

The preface contains the following sections:

Safety Symbols Used in this Document

This document uses the following conventions.

Note
Notes provide additional information.

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

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

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

Warning
Warnings inform you of hot surfaces.

Contacting Allied Telesis

For assistance with this product, you may contact Allied Telesis technical support at the Support & Services section of the Allied Telesis web site at **www.alliedtelesis.com/support**. You can find links to 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, to check support tickets, to learn about Return Merchandise Authorizations (RMAs), and to 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 a 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.

Chapter 1
Overview

This chapter describes the hardware features of the IE220 Switches. The sections are listed here:

Hardware Components

The IE220 Switches are Industrial Managed Layer 2+ switches that are designed to withstand harsh environmental conditions, such as power surges and extended temperature ranges, commonly experienced in outdoor deployments. They feature four or eight copper ports, two SFP+ transceiver ports, an Alarm Out connector, a USB port, and a Console port for local management.

The IE220 Switches are listed here:

- “IE220-6GHX Switch”, next
- “IE220-10GHX Switch” on page 19

IE220-6GHX Switch

Figure 1 illustrates the front panel of the IE220-6GHX Switch.

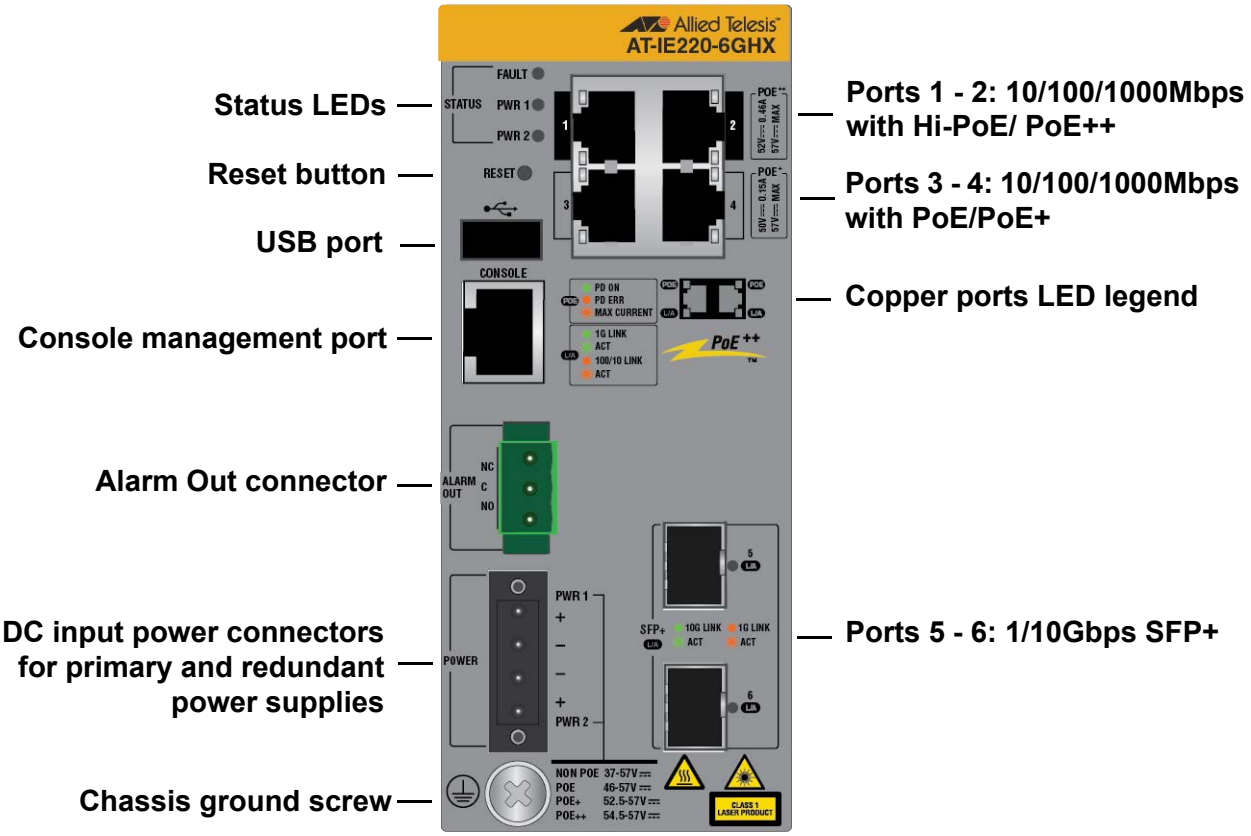


Figure 1. Front Panel of the IE220-6GHX Switch

IE220-10GHX Switch

Figure 2 illustrates the front panel of the IE220-10GHX Switch.

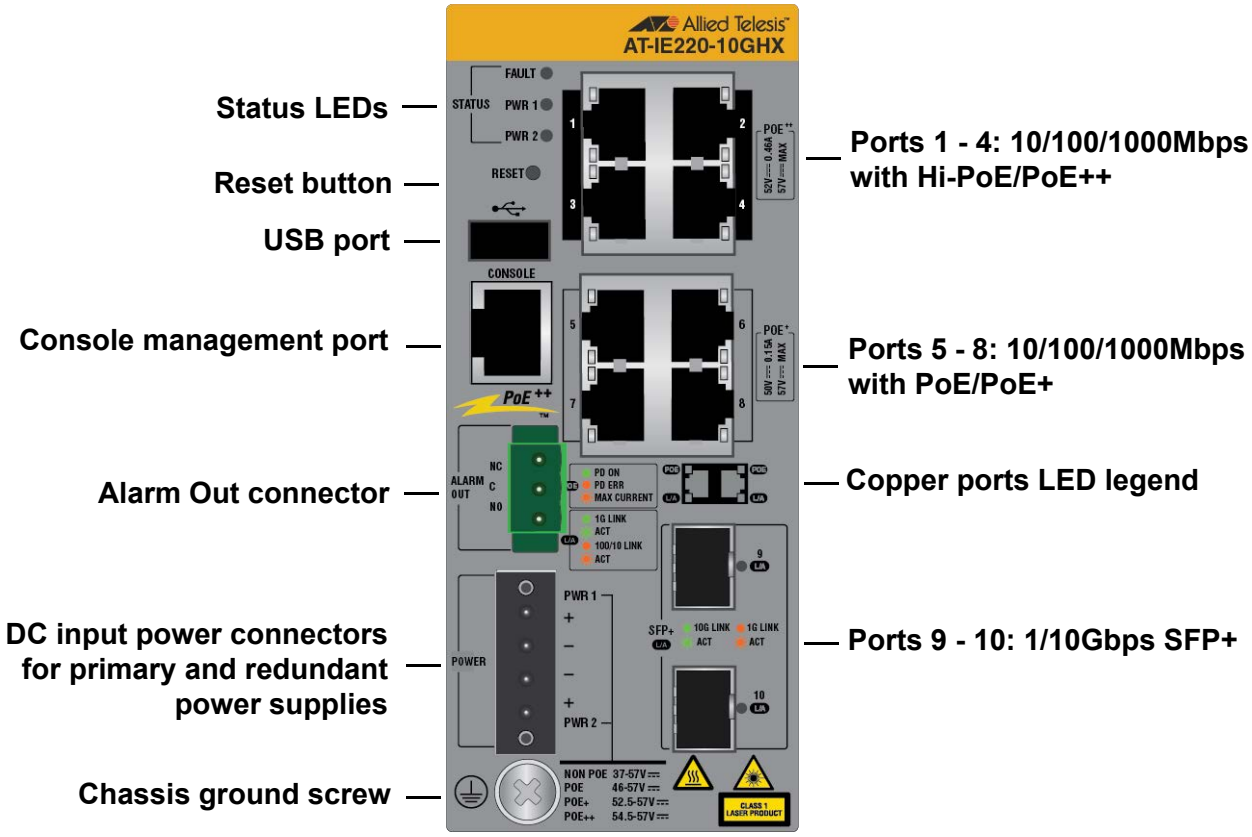


Figure 2. Front Panel of the IE220-10GHX Switch

Back Panel

Figure 3 illustrates the back panel.

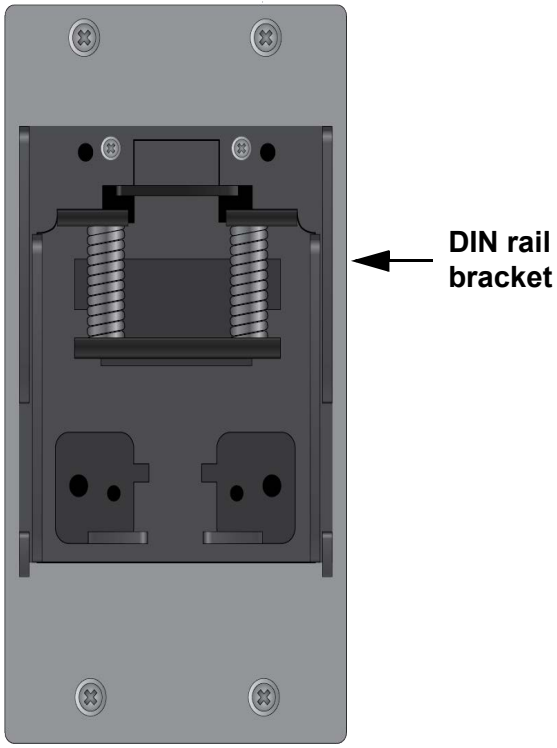


Figure 3. Back Panel

Features

Here are the basic features of the switches.

Copper Ports

Here are the basic features of the copper ports:

- ❒ 10/100/1000Mbps ports 1 to 4 on the IE220-6GHX Switch
- ❒ 10/100/1000Mbps ports 1 to 8 on the IE220-10GHX Switch
- ❒ IEEE 802.3i 10Base-T compliant
- ❒ IEEE 802.3u 100Base-TX compliant
- ❒ IEEE 802.3ab 1000Base-T compliant
- ❒ IEEE 802.3u Auto-Negotiation compliant
- ❒ IEEE 802.3x flow control in full-duplex mode
- ❒ IEEE 802.3x back pressure compliant
- ❒ Jumbo frames up to 12KB
- ❒ RJ-45 connectors

Power Over Ethernet (PoE)

The IE220 Switches are PoE Power Sourcing Equipment (PSE).

They support these PoE standards:

- ❒ PoE: IEEE 802.3af, IEEE 802.3at Type 1 (15.4W)
- ❒ PoE+: IEEE 802.3at Type 2 (30W)
- ❒ Hi-PoE: IEEE 802.3at Type 2 (60W)[1]
- ❒ PoE++: IEEE 802.3bt Type 3 (60W)
- ❒ PoE++: IEEE 802.3bt Type 4 (95W)

([1] Hi-PoE devices use all four pairs of twisted-pair strands in the copper cables.)

Additional PoE capabilities include:

- ❒ Support powered device classes 0 to 8.
- ❒ Dynamic PoE power budget allocation, according to powered device consumptions and/or PoE port priorities.
- ❒ Uninterrupted PoE during warm switch restarts.

The IE220-6GHX Switch has these PoE properties on its four 10/100/1000Mbps copper ports:

- ❒ Ports 1 to 2 support Hi-PoE/PoE++ devices
- ❒ Ports 3 to 4 support PoE/PoE+ devices
- ❒ Maximum PoE budget of 180W

The IE220-10GHX Switch has these PoE properties on its eight 10/100/1000Mbps copper ports:

- Ports 1 to 4 support Hi-PoE/PoE++ devices
- Ports 5 to 8 support PoE/PoE+ devices
- Maximum PoE budget of 240W

SFP+ Ports

The switches support the following types of fiber optic transceivers in the two SFP+ ports:

- 1Gbps, SFP 1000Base-SX/LX transceivers
- 1Gbps, SFP single-port BiDi 1000Base-LX transceivers
- 1Gbps, SFP 1000Base-ZX transceivers
- 10Gbps, SFP+ 10GBase-SR/LR fiber optic transceivers

Note
SFP and SFP+ transceivers are sold separately. For a list of supported transceivers, refer to the product's data sheet.

Protection Circuits

The switches have optimized protection circuits to guard against the following abnormal conditions:

- Reverse input voltage polarity
- Over- and under-voltage
- Over-current
- Peak-current and short-circuit
- Over-temperature

Alarm Monitoring

The alarm facility lets you monitor the switch's environment and respond to problems as they occur. Example of alarm events include:

- Main power supply failure
- Over-temperature
- Port link down
- Power requirements of all powered devices exceeding available power budget
- Powered devices exceeding individual port budgets

Alarm Connector

The switches have an Alarm Out connector for an external alert device, such as a buzzer or LED, to signal switch alarms.

LEDs

The switches have the following LEDs:

- System fault
- Status of the power supplies
- Link/activity on the SFP+ and copper ports
- PoE sourcing status on the copper ports

MAC Address Tables

Here are the basic features of the MAC address tables:

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

Management Software

The switches support the following management software and interfaces:

- AlliedWare Plus management software, version 5.5.3-01 or later
- Command line interface
- Web browser interface

Management Methods

You can manage the switches in the following ways:

- Local management through the Console port
- Remote Telnet or secure shell management
- Remote HTTP or HTTPS web browser management
- SNMPv1, v2c, and v3 for system monitoring
- NETCONF/RESTCONF for network automation[1]
- OpenFlow for network orchestration

Installation Options

The switches support the following installation options:

- DIN rail (compatible with DIN 35x7.5mm rail)
- Concrete or wooden wall
- Indoor or outdoor environment

Additional Features

Here are additional features:

- RJ-45 style Console port for local management
- Slot for USB flash memory
- Reset button
- Two DC power supply connectors for primary and redundant power sources
- Extended environmental range
- IP30-compliant

1. Contact Sales Representative for availability.

Copper Ports

This section describes the copper ports.

Connector Type

The copper ports have 8-pin RJ-45 connectors. The ports use four pins at 10 or 100Mbps and all eight pins at 1000Mbps. The pin assignments are listed in Table 28 on page 126 and Table 29 on page 126.

Speed

The ports can operate at 10, 100, or 1000Mbps. The switch can set the speeds automatically with Auto-Negotiation, the default setting, or you can set the speeds manually with the AlliedWare Plus operating system.

Note
Copper ports must be set to Auto-Negotiation to operate at 1000 Mbps.

Duplex Mode

The copper ports can operate in either half- or full-duplex mode at 10 or 100Mbps. Ports operating at 1000Mbps can only operate in full-duplex mode. The copper ports are IEEE 802.3u Auto-Negotiation compliant. The switch can set the duplex modes automatically or you can disable Auto-Negotiation and set the duplex modes manually.

Speed and duplex mode settings can be set independently of each other on the ports. For example, the speed of a port can be configured manually while its duplex mode is established through Auto-Negotiation.

Note
Switch ports connected to 10 or 100Mbps end nodes that do not support Auto-Negotiation should not use Auto-Negotiation to set their speed and duplex mode settings, because duplex mode mismatches might occur. You should disable Auto-Negotiation and set the speed and duplex mode settings manually with the AlliedWare Plus operating system.

Maximum Distance

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

Copper Cable Requirements

Minimum cable requirements for the copper ports are listed here:

- 10Mbps operations: Standard TIA/EIA 568-compliant Category 3, 100 ohm shielded or unshielded cabling, complying with IEEE 802.3i 10Base-T specifications.

- 100Mbps operations: Standard TIA/EIA 568-compliant Category 5, 100 ohm shielded or unshielded cabling, complying with IEEE 802.3u 100Base-TX specifications.
- 1Gbps operations: Standard TIA/EIA 568-compliant Category 5, 100 ohm, 4-pair shielded or unshielded cabling, complying with IEEE 802.3ab 1000Base-T specifications. Category 5e is recommended.

Note
Category 3 and 5 cables may be used for EN55035 immunity levels.

Note
Category 6 or 6a shielded or unshielded cable is required in high RF noise environments.

Automatic MDIX Detection

The 10/100/1000Mbps copper ports are IEEE 802.3ab compliant, with automatic MDIX detection at 10 or 100Mbps. (Automatic MDIX detection does not apply to 1000Mbps.) This feature automatically configures the ports to MDI or MDI-X depending on the wiring configurations of the end nodes.

Switch ports connected to network devices that do not support automatic MDIX detection default to MDIX.

You may disable automatic MDIX detection on the individual ports and configure the MDI/MDI-X settings manually.

Port Pinouts

Refer to Table 28 on page 126 for the pinouts of the copper ports at 10 or 100Mbps and to Table 29 on page 126 for the port pinouts at 1000Mbps.

Power over Ethernet

IE220 Switches support Power over Ethernet (PoE). They can function as Power Sourcing Equipment (PSE) for devices connected to their copper ports. With PoE, the switches can supply electrical power to network devices over the same copper cables that carry the network traffic.

Devices receiving their power over Ethernet cables are called powered devices. Examples include wireless access points, IP telephones, web cams, and even other Ethernet switches. PoE can simplify network installations and maintenance by letting you use the switches as central power sources for other network devices.

PoE Versions

The switches support the following PoE versions:

- ❒ PoE: IEEE 802.3af, IEEE 802.3at Type 1 (15.4W)
- ❒ PoE+: IEEE 802.3at Type 2 (30W)
- ❒ Hi-PoE: IEEE 802.3at Type 2 (60W)[1]
- ❒ PoE++: IEEE 802.3bt Type 3 (60W)
- ❒ PoE++: IEEE 802.3bt Type 4 (95W)

([1] Hi-PoE devices use all four pairs of twisted-pair strands in the copper cables.)

Table 1 lists the supported PoE versions and maximum powers on the switch ports.

Table 1. PoE Versions, Ports, and Maximum Power Levels

PoE Version	IE220-6GHX Copper Ports	IE220-10GHX Copper Ports	Maximum Power at Switch Port	Maximum Power at Powered Device
PoE	1 to 4	1 to 8	15.4W	12.95W
PoE+	1 to 4	1 to 8	30.0W	25.5W
Hi-PoE[a]	1 and 2	1 to 4	60.0W	51.0W
PoE++ (60W)	1 and 2	1 to 4	60.0W	51.0W
PoE++ (95W)	1 and 2	1 to 4	95.0W	71.0W

a. Hi-PoE devices use all four pairs of twisted-pair strands in the copper cables.

Powered Device Classes

Table 2 lists the nine classes of powered devices in the PoE standards. The classes are defined by the power requirements of the devices. The switches support all nine classes.

Table 2. PoE Device Classes

Class	Usage	Maximum Power Output at the Switch Port	Device Power Range
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
4	Optional	30.0W	12.95W to 25.9W
5	Optional	45W	40W
6	Optional	60W	51W
7	Optional	75W	62W
8	Optional	95W	71.3W

PoE Power Budget

PoE power budget is the maximum amount of DC power that the switch can supply to powered devices on its copper ports. The switches have the following maximum power budgets when powered by the IE048-480 Power Supply or an equivalent power supply from a third-party manufacturer:

- IE220-6GHX Switch: 180W
- IE220-10GHX Switch: 240W

Note
IE220 Switches powered by power supplies from third-party manufacturers that do not meet the requirements in “Switch DC Power Requirements” on page 44 and “DC Power Specifications” on page 123 may have lower PoE budgets.

The number of powered devices the switch can support at one time depends on the switch’s PoE budget, which is dependent on the power supply, and the wattage requirements of the powered devices. To determine whether the wattage requirements of the PoE devices you plan to connect to the switch exceed its budget, see their documentation for their power requirements and add the requirements together.

The switch can power all the devices simultaneously as long as the total is below its PoE power budget. If the total exceeds the available power budget, you should consider reducing the number of PoE devices so that all the devices receive power. Otherwise, the switch powers a subset of the devices, based on PoE port priorities.

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.

Power Delivery with Alternatives A and B

The PoE standards define two methods for delivering power over copper cables from power sources such as the IE220 Switches to powered devices. The methods, called Alternatives A and B, identify the wire strands that carry the electrical power over the Ethernet cables to the powered devices from the power source, which in this case is the switch sourcing PoE.

Copper pair cabling usually has eight strands. For 10Base-T and 100Base-TX devices, the wire strands connected to pins 1, 2, 3, and 6 carry the network traffic while the strands connected to pins 4, 5, 7, and 8 are unused. 1000Base-T devices use all eight strands to carry network traffic.

In Alternative A, power is delivered on strands 1, 2, 3, and 6, which are the same strands carrying 10/100Base-TX network traffic. In Alternative B, power is delivered on strands 4, 5, 7, and 8. These are the unused strands in 10/100Base-TX network traffic.

The IE220 Switches supply power to powered devices on the copper ports using PoE Alternatives A and B as described in Table 3.

Table 3. PoE Alternatives A and B for the Copper Ports

IE220-6GHX Copper Ports	IE220-10GHX Copper Ports	PoE Devices	PoE Alternatives
1 to 4	1 to 8	PoE and PoE+ devices Classes 0 to 4 (Types 1, 2, and 3 up to 30W at switch ports)	Alternative A (MDI-X)
1 and 2	1 to 4	Hi-PoE devices Classes 5 and 6 (Type 3 up to 60W at switch ports)	Alternative A (MDI-X) plus Alternative B (MDI-x, MDI)
1 and 2	1 to 4	PoE++ devices Classes 7 and 8 (Type 4 up to 75W/ 95W at switch ports)	Alternative A (MDI-X) plus Alternative B (MDI-x, MDI)

The switches support PoE powered devices that comply with the IEEE 802.3af, 802.3at, and 802.3bt standards. The standards require that powered devices support both Alternatives A and B.

Note
Legacy Powered Devices that are non-standard or were manufactured before the completion of the standards and support only one method might not be compatible with IE220 Switches.

PoE Port Priorities

If the power requirements of the powered devices exceed the switch's power budget, the switch will deny power to ports based on a system called PoE port priorities. You may use this feature to ensure that the switch gives preferential treatment to powered devices critical to the operations of your network 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 the Critical ports are receiving power. Ports that are connected to your most critical powered devices should be assigned to this level. If there is not enough power to support all the ports set to the Critical priority level, power is provided to the ports based on port number, in ascending order.

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

SFP+ Ports

IE220 Switches have two ports for 1000Base-X and 10GBase-X fiber optic, MSA-compliant SFP and SFP+ transceivers. Listed here are the types of supported transceivers:

- 1Gbps, SFP 1000Base-SX/LX transceivers
- 1Gbps, SFP single-port BiDi 1000Base-LX transceivers
- 1Gbps, SFP 1000Base-ZX transceivers
- 10Gbps, SFP+ 10GBase-SR/LR fiber optic transceivers

Note
SFP and SFP+ transceivers are sold separately. Refer to the product's data sheet for a list of supported transceivers.

The transceivers allow you to connect switches to other network devices over large distances, build high-speed backbone networks between network devices, or connect high-speed devices, such as servers, to your network.

To protect SFP+ transceivers from heat-related damage, you should select transceivers whose maximum operating temperatures exceed the anticipated maximum ambient temperature at the installation site. Table 4 lists the recommended SFP+ maximum operating temperatures for various ambient site temperatures.

Table 4. SFP+ Temperature Ratings Versus Maximum Installation Site Temperatures

SFP/SFP+ Temperature Rating	Maximum Ambient Installation Site Temperature[a]			
	Sealed Enclosure: >0 LFM[b]	Ventilated Enclosure: >40 LFM	Fan-based Enclosure: >150 LFM	Indoors, No Enclosure (Open Air) 0 LFM
105°C (221°F)[c]	55°C (131°F)	65°C (149°F)	75°C (167°F)	55°C (131°F)
95°C (203°F)	55°C (131°F)	65°C (149°F)	75°C (167°F)	55°C (131°F)
85°C (185°F)	55°C (131°F)	65°C (149°F)	70°C (158°F)	55°C (131°F)
70°C (158°F)	40°C (104°F)	50° C (149°F)	55°C (131°F)	40°C (104°F)

a. Ambient temperature and airflow are measured 25.4mm below the switch.
b. Linear Feet per Minute
c. 1G SFP transceivers only. Not supported on 10G SFP+ transceivers.

As an example, if the switch is installed in a ventilated enclosure with >40 LFM and a maximum ambient operating temperature of 65°C (149° F), the fiber optic transceivers should have a maximum operating temperature of 95°C (203°F). Transceivers with low maximum operating temperatures may reduce the recommended maximum ambient temperature of the switch. For example, the ambient installation site temperature for a switch in a sealed enclosure with 0 (zero) LFM and transceivers rated to 70°C (158°F) should not exceed 40°C (104°F).

LEDs

The following sections describe the LEDs on the switches:

Fault and Power LEDs

The Fault, PWR1, and PWR2 LEDs are defined in Table 5.

Table 5. Fault, PWR1, and PWR2 LEDs

LED	State	Description
Fault	Off	The switch is operating normally or powered off.
	Solid Amber	The switch is booting up.
	Five flashes followed by a pause	The switch is experiencing an alarm condition. Use the SHOW FACILITY-ALARM STATUS command to view active alarms. The ALARM FACILITY command in the Global Configuration mode is the command for programming the Fault LED to flash in response to an alarm condition. The following example of the command configures the switch to flash the Fault LED if port 1 does not have a link to a network device: `alarm facility link-down port1.0.1 led` For more information, refer to the *IE220 Series Industrial Ethernet Layer 2+ Switches Command Reference for AlliedWare Plus*
	Six flashes in two seconds	The switch is overheating and might shutdown.

Table 5. Fault, PWR1, and PWR2 LEDs (Continued)

LED	State	Description
PWR1	Off	The switch is not receiving power on the PWR 1 connector or the input power from the DC power supply is outside the normal operating range of the unit.
	Solid Green	The switch is receiving power on the PWR 1 connector and is operating normally.
PWR2	Off	The switch is not receiving power on the PWR 2 connector or the input power from the DC power supply is outside the normal operating range of the unit.
	Solid Green	The switch is receiving power on the PWR 2 connector and is operating normally.

Copper Port LEDs

The copper ports have two LEDs. Refer to Figure 4.

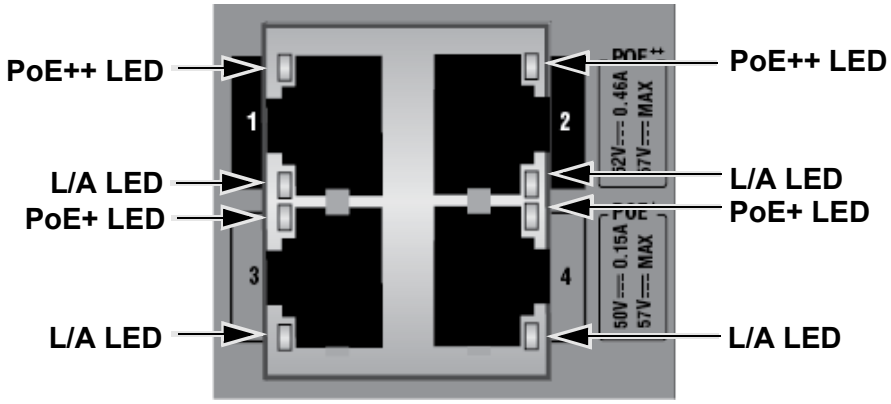


Figure 4. Copper Port LEDs

The copper port LEDs are described in Table 6.

Table 6. Copper Port LEDs

LED	State	Description
PoE+ or PoE++	Solid Green	The port is delivering power to a powered device.
	Solid Amber	The port is connected to a powered device but the switch has shutdown PoE on the port because of a fault condition.
	Flashing Amber	The port is connected to a powered device but the switch does not have sufficient unused power to allocate to it.
	Off	This LED state can result from the following conditions: - The port is connected to a non-PoE device. - The device is powered off. - The port is disabled in the management software. - PoE is disabled on the port.
L/A	Solid Green	The port has established a 1000Mbps link to a network device.
	Flashing Green	The port is transmitting or receiving data at 1000Mbps.
	Solid Amber	The port has established a 10 or 100Mbps link to a network device.
	Flashing Amber	The port is transmitting or receiving data at 10 or 100Mbps.
	Off	The port has not established a link with a network device.

SFP+ Port LEDs

Each SFP+ port has one LED. Refer to Table 7.

Table 7. SFP+ Port LED

State	Description
Solid Green	The port has established a 10Gbps link to a network device.
Flashing Green	The port is transmitting or receiving network packet traffic at 10Gbps.
Solid Amber	The port has established a 1Gbps link to a network device.
Flashing Amber	The port is transmitting or receiving network packet traffic at 1Gbps.
Off	The port has not established a link to a network device.

Console Port

The Console port is a serial RS-232 port. You use it to manage and configure the switch with the command line interface in the AlliedWare Plus management software. Management sessions conducted through the Console port are referred to as local management sessions because you have to be at the location of the switch. Local management sessions do not require an IP address and do not interfere with the network operations of the unit.

Local management sessions require a management cable. For workstations with a USB connector, Allied Telesis offers the VT-Kit3 management cable. The cable has a USB-A male connector and an RJ-45 female connector. Refer to Figure 5.

Figure 5. VT-Kit3 Management Cable

You connect the cable to a USB port on your workstation and to the Console port on the switch with a standard, straight-through Ethernet cable. Refer to Figure 6. The VT-Kit3 management cable and software driver are sold separately.

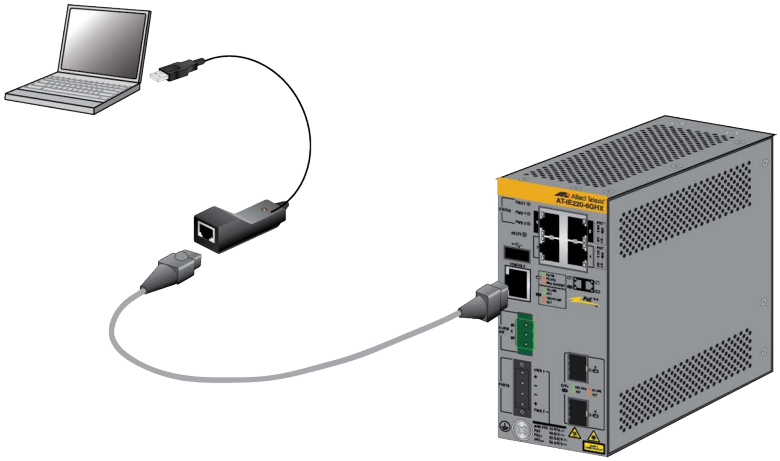


Figure 6. Management Workstation, VT-Kit3 Management Cable, and Switch

For workstations with a DB-9 female connector, refer to “Console Management Cable with DB-9 Female and RJ-45 Connectors” on page 129 for management cable specifications.

The Console port has the following settings:

- 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.

For instructions on how to use the Console port, refer to “Starting a Management Session” on page 103.

The pin assignments of the Console port are in Table 30 on page 128.

USB Port

The USB port is for a flash drive. It provides these management functions:

- Use Allied Telesis Autonomous Management Framework (AMF) to provide a centralized network backup location.
- Store backup copies of configuration files.
- Transfer configuration files between switches.
- Store or transfer log files.
- Store or transfer debug files (for example, the output of the SHOW TECH-SUPPORT command).
- Boot the AlliedWare Plus management software and master configuration file from flash drive.

Note
The port is compatible with USB v1.0 and v2.0 flash drives. Operating the switch with a flash drive is optional.

Caution
Do not leave a flash drive in the USB port when the ambient temperature exceeds 65°C. E136

Reset Button

The Reset button resets the switch. You might reset the switch if it is experiencing a problem. The reset button is recessed in the chassis. To press it, use a straightened paper-clip or similar object.

Caution
The switch does not forward network traffic during the reboot process. Some network traffic may be lost. E113

Note
The reboot process may take two to three minutes.

Note
Unsaved changes to the configuration settings of the switch are discarded when you reset the device.

Ground Screw

The ground screw is used to connect the chassis to the earth ground at the installation site. For instructions, refer to “Connecting the Ground Wire” on page 88.

Warning
The switch must be connected to an earth ground. Do not operate the device without an earth ground. E129

PWR 1 and PWR 2 DC Input Power Connectors

The PWR 1 and PWR 2 connectors are DC input connectors for the power wires from DC power supplies. You can power the unit with one or two power supplies. Powering the switch with two power supplies provide power redundancy. This protects the device from power loss in the event a power supply fails or loses power. The switches support the following types of power sources:

- AC/DC rectifiers
- Un-interruptible power supplies

For more information, refer to “Switch DC Power Requirements” on page 44 and “Power Supplies” on page 46.

Alarm Out Connector

The switch has a 3-pin Alarm Out connector on the front panel for an external alert device. The switch can alert you to alarm conditions if it detects a problem with its power or network operations. Alarm examples include power supply failures, ports without links, and high operating temperatures. Here are examples of alert devices:

- LEDs
- Buzzers

The pin signals on the connector are as follows:

- Normally Closed (NC)
- Common (C)
- Normally Open (NO)

The circuit is a dry relay with two states: open and closed. The switch automatically controls the circuit by opening or closing it after detecting an alarm condition or when an alarm condition is resolved. The switch turns off the circuit, blocking the flow of electricity, when it opens the circuit. The switch turns on the circuit, allowing the flow of electricity, when it closes the circuit.

The Normally Closed and Normally Open pins, with the Common pin, are separate circuits. You may use the circuit with the normal and alert states that best suit your alert device. Here are the two choices:

- Normally Closed and Common pins: The switch keeps the circuit closed (on) during normal operations and opens it (off) when it detects an alert. The switch closes the circuit again when alerts are resolved.
- Normally Open and Common pins: The switch keeps the circuit open (off) during normal operations and closes it (on) when it detects an alert. The switch opens the circuit again when alerts are resolved.

Note
You can use both the Normally Closed and Normal Open circuits, simultaneously.

The external alert device must provide the power for the circuit and monitor the circuit for its closed or open state. The power specifications of the circuit are 30Vdc, 0.5A and 48Vdc, 1A, maximum.

Caution
The external alert device must not exceed the above specifications. The Alarm Out connector can be damaged by devices that exceed the specifications. E119

Caution
The alert device must be an isolated power supply with an output that equals or is less than 30Vdc, 0.5A. E137

Caution
To reduce the risk of fire or electric shock, the alert device must be an IEC-60950-1 or IEC-62368-1 compliant limited power device. E138

You specify the alarm condition that changes the state of the Alarm Out circuit with the ALARM FACILITY RELAY command in the AlliedWare Plus software. Examples of alarm conditions are power supply failures, ports without links, and loop detections. For instructions, refer to the *IE220 Series Industrial Ethernet Layer 2+ Switches Command Reference for AlliedWare Plus*.

An example of the feature is illustrated in Figure 7. The alert device is an LED that operates as follows:

- The LED is off when the circuit is open (off).
- The LED is on when the circuit is closed (on).

If you want the LED to be off during normal operations (no alerts) and on during alerts, you wire it to the Normally Open and Common pins on the Alarm Out connector, as shown in Figure 5.

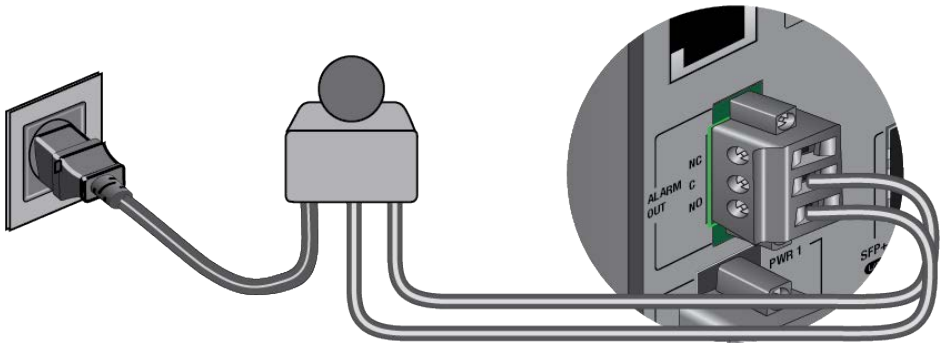


Figure 7. Example of the Alarm Out Port with an LED Alert Device

Now assume you want the switch to change the circuit and activate the LED when copper or SFP+ ports on the switch are not linked to network devices. Here are the ALARM FACILITY RELAY commands:

- IE220-6GHX Switch:

```
awplus(config)# alarm facility link-down
port1.0.1-port1.0.6 relay
```

- IE220-10GHX Switch

```
awplus(config)# alarm facility link-down
port1.0.1-port1.0.10 relay
```

If the switch detects that a copper or SFP+ port does not have a link, it changes the circuit from closed to open. In response, the alert device turns on the LED. When the switch detects that all ports have links, it closes the circuit, turning off the LED.

Note
Alarm devices are not available from Allied Telesis.

DIN Rail Bracket

The switch comes with one DIN rail bracket pre-installed on the back panel. The bracket is compatible with DIN 35 x 7.5mm rails.

Switch DC Power Requirements

IE220 Switches have the following power supply requirements:

- The DC input voltages have to be between 37Vdc and 57Vdc. This range is absolute with no tolerance.
- DC input voltage has to meet the requirements in Table 8 on page 45 to support PoE.
- DC input voltage must not exceed 57Vdc to avoid damaging the device.
- DC input current has to be available continuously over the operating temperature range and required consumption.

Warning
Use a UL-listed DC power supply with 48Vdc, 10A output. It should be suitable for the operating altitude and maximum ambient temperature of the physical location of the switch. Refer to the installation instructions from the manufacturer for installation and safety guidelines. E143

Note
IE220 Switches can be powered by one or two power supplies. A single power supply that meets the requirements in Table 8 on page 45 can fully power the switches. A second power supply adds power redundancy.

IE220 Switches can operate in the following modes:

- Non-PoE mode: All network devices connected to the ports on the switch do not require PoE sourcing.
- PoE mode: Some or all network devices connected to the ports on the switch require PoE sourcing, in accordance with std. IEEE 802.3at Type 1 “PoE.”
- PoE+ mode. Some or all network devices connected to the ports on the switch require PoE sourcing, in accordance with std. IEEE 802.3at Type 1 and/or Type 2 “PoE+.”
- PoE++ mode. Some or all network devices connected to ports that support PoE++ on the switch require PoE sourcing, in accordance with std. IEEE 802.3bt Type 3 4PPoE, and/or Type 3 PoE++.
- PoE++ mode. Some or all network devices connected to ports that support PoE++ on the switch require PoE sourcing, in accordance with std. IEEE 802.3bt Type 4 PoE++.

Table 8 describes the input voltage requirements. The listed voltage ranges are absolute with no tolerance.

Table 8. Input Voltage Requirements

Mode	Input Voltage Range	Recommended Input Voltage	Over-voltage Alarm
Non-PoE	37.0 to 57.0Vdc	48Vdc	≥ 57Vdc
PoE	46.0 to 57.0Vdc	48Vdc	
PoE+	52.0 to 57.0Vdc	54Vdc	
Hi-PoE	52.0 to 57.0Vdc	54Vdc	
PoE++	54.0 to 57.0Vdc	56Vdc	

Power Supplies

The IE048-480 Power Supply from Allied Telesis meets the power requirements of IE220 Switches. It is an industrial product with an extended operating temperature for harsh environments. The IE048-480 Power Supply is sold separately. Here are main features:

- 480W output power
- Wide input voltage range: 85 ~ 264Vac
- Wide operating temperature range: -25 ~ 70°C
- Electromagnetic immunity (EMI) suitable for industrial applications
- High efficiency: 94% @230Vac
- 150% peak current capability
- Active PFC: PF type. 0.93 @230Vac
- Protection circuits: peak-current, over-current, over-voltage, over-temperature
- Remote ON/OFF
- Output power confirmation relay (DC_OK)
- DIN rail mount

Caution

The output power of the IE048-480 Power Supply is affected by the input voltage and ambient temperature. Refer to the data sheet for the derating curve. E139

Note

Power supplies from third-party manufacturers must meet the power requirements in Table 8 on page 45 and “DC Power Specifications” on page 123 to be compatible with IE220 Switches.

Chapter 2

Beginning the Installation

The chapter contains the following sections:

Reviewing Safety Precautions

Please review the following safety precautions before beginning the installation procedures.

Note
Safety statements that have the ✍ symbol are translated into multiple languages in the *Translated Safety Statements* document at **www.alliedtelesis.com/support**.

Warning
Class 1 Laser product. ✍ L1

Warning
Laser Radiation.
Class 1M Laser product. ✍ L9

Warning
Do not stare into the laser beam. ✍ L2

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

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.
✍ E124

Warning
Do not work on equipment or cables during periods of lightning activity. ✍ E2

Note
An appropriate disconnect device must be provided as part of the building or enclosure installation.

Warning
Use a UL-listed DC power supply having 48Vdc, 10A output and being suitable for the maximum operating altitude of 3,000 m and the maximum ambient temperature of the switch's location. E143

Warning
This equipment must be earthed. The ground screw on the unit must be connected to a properly earthed bonding point. E120

Note
Ground resistance from the building primary bonding point to earth should be less than 5 ohms.

Caution
Air flow around the unit must not be restricted. E20

Note
All Countries: Install 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 overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern. E21

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

Caution
The unit does not contain serviceable components. Please return damaged units for servicing. E42

Warning
The temperature of an operational SFP or SFP+ transceiver can exceed 70° C (158° F). Exercise caution when handling transceivers with unprotected hands. E43

Caution
An Energy Hazard exists inside this equipment. Do not insert hands or tools into open chassis slots or plugs. E44

Warning
This equipment shall be installed in a Restricted Access location. E45

Warning
Install the switch in a UL-listed Type 3X or 4X enclosure when installing it in an outdoor environment. E144

Warning
An operational unit can be hot. Exercise caution when handling with unprotected hands. E145

Warning
Per NEC section 800.90, all exposed cables, service wires, or drops entering a building must have primary over-voltage protection if they are classified as exposed plants. E121

Note
The equipment meets EN61000-4-5 Class 3 on the DC inputs and Ethernet ports.

Note
Allied Telesis does not warrant against lightning or power surges damaging the device. Such damage will be the responsibility of the equipment owner.

Safety Precautions When Working with Electricity

Please review the following additional safety guidelines before beginning the installation procedure.

- ❒ Disconnect all power by turning off the circuit breakers before installing or removing the device or when working with the power supplies.
- ❒ Do not work alone if potential hazards exist.
- ❒ Never assume that the power is disconnected from a circuit; always check the circuit.
- ❒ Inspect the work area carefully for possible hazards, such as moist floors, ungrounded power extension cables, frayed power cord, or missing safety grounds.

If an electrical accident occurs, proceed as follows:

- ❒ Use caution; do not become a victim yourself.
- ❒ Turn off power to the system.
- ❒ If possible, send another person to get medical aid. Otherwise, access the condition of the victim and then call for help.
- ❒ Determine if the person needs rescue breathing or external cardiac compressions and take appropriate action.

Reviewing Site Requirements

Please observe the following requirements and guidelines when choosing a site for the switch:

Warning
You must install the switch in a UL Listed 3X or 4X enclosure when installing it in an outdoor environment. E144

- ❒ The switch must be installed in a Restricted Access location.
- ❒ The switch does not require an enclosure when installed in most indoor environments.
- ❒ You can install the switch on a concrete wall, wooden wall, or DIN 35x7.5mm rail.
- ❒ You should not install the switch on a wall that has metal studs. Metal studs might not be strong enough to safely support the device.
- ❒ You should not install the switch on sheetrock or similar material. Sheetrock might not be strong enough to safely support the device.
- ❒ The site should allow for easy access to the ports on the front of the device, so that you can easily connect and disconnect cables, and view the port LEDs.
- ❒ The DC power source should be located near the device and be easily accessible.
- ❒ The site should not expose the device to moisture or water.
- ❒ The site should be a dust-free environment.
- ❒ Do not place objects on top of the switch.
- ❒ Do not block the vent holes on the top, bottom, or sides of the switch.
- ❒ When installing the device in an enclosure, verify that the enclosure has adequate airflow so that the unit does not overheat.
- ❒ The site should allow for adequate airflow around all sides of the switch. The following minimum open spaces around the switch are recommended:
  - Two inches (5.08cm) under and above the switch.
  - Two inches (5.08cm) in front of the switch.
  - Two inches (5.08cm) on the left and right sides of the switch.
- ❒ Select an enclosure that is large enough for the switch, DC power supply, and all other included equipment.

- The enclosure size must be determined by considering multiple factors, including the outside ambient temperature, total heat generated by the installed equipment, sealed or unsealed enclosure type, enclosure material, paint color, mounting method (wall, pole, ground, etc.), and sun exposure. The smaller enclosure size you choose, the higher the risk of the product overheating.

  If the product overheats in an enclosure that was built without taking into account these factors, the warranty of the product might be voided. Consult Allied Telesis when assistance is needed.
- The enclosure BTU/hour rating must be higher than the total BTU/hour values of equipment installed in the enclosure, over the expected operating temperature range. For the operating temperature ratings, refer to “Environmental Specifications” on page 120. For heat dissipation, refer to Table 24 on page 123.
- The switch’s maximum operating temperature depends on its orientation on the wall and the type of enclosure. Allied Telesis recommends installing the device vertically for best possible ventilation and cooling.
- If you install the switch in an metal enclosure, be sure to review the manufacturer’s installation guide for rules and restrictions on site requirements, and to follow all guidelines and safety warnings.
- The switch and DC power source must be installed close to each other so that the DC power cables are kept as short as possible to minimize voltage loss.
- Before installing the DC power supply, be sure to review the manufacturer’s installation guide for rules and restrictions on site requirements, and to follow all guidelines and safety warnings.
- The site should include dedicated power circuits or power conditioners to supply reliable electrical power to the network devices.
- The switch and power supply must be properly connected to a protective earth ground.
- The switch and power supply must be individually grounded to the grounding conductor. Do not daisy-chain the ground wires.
- If you install the switch in a metal enclosure, the enclosure must be properly grounded to a protective earth ground following local electrical codes and the instructions in the manufacturer’s installation guide.
- Powered devices connected to the LAN ports on the switch must be grounded to the same grounding conductor at the service entrance as the switch.
- LAN ports should have additional lightning protections as specified in 802.3at and 802.3bt standards, Environment B Requirements, when connected to powered devices that are not grounded to the same grounding conductor at the service entrance as the switch.

- Electromagnetic interference might occur between switches and other devices when multiple switches are powered by a single DC power supply. This can be addressed by installing clamp-on ferrite beads on the DC power cables, between the DC power supply and switches.
- Recommendations for ground resistivity are given in Table 9.

Table 9. Ground Resistivity Recommendations

Level	Recommendation
Best Practice	<5 ohms
Acceptable	5 to 15 ohms
Marginal	15 to 25 ohms
Non-compliant	>25 ohms

- The copper cabling should not be exposed to sources of electrical noise, such as radio transmitters, broadband amplifiers, power lines, electric motors, and fluorescent lights.
- Allied Telesis recommends using CAT6 STP or UTP for LAN ports. These cables provide higher protection from radio frequency interference.
- Outdoor installation requires adequate electromagnetic immunity due to the higher thread-level conditions. For guidelines, refer to “Installing the Switch in an Outdoor Environment” on page 76.

Unpacking the Switch

To unpack the switch, perform the following procedure:

1. Remove all the components from the shipping box. Refer to Figure 8.

> **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.

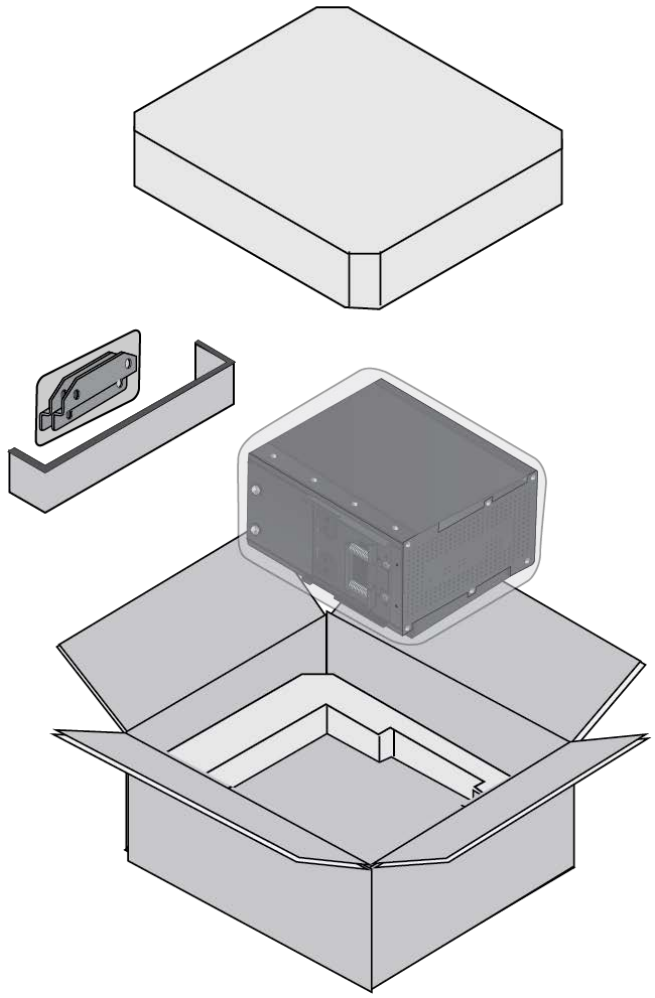


Figure 8. Removing the Switch from the Shipping Box

2. Remove the switch from the anti-static bag and place it on a level, secure surface.

3. Verify the contents of the shipping container. Figure 9 and Table 10 identify the pre-installed components.

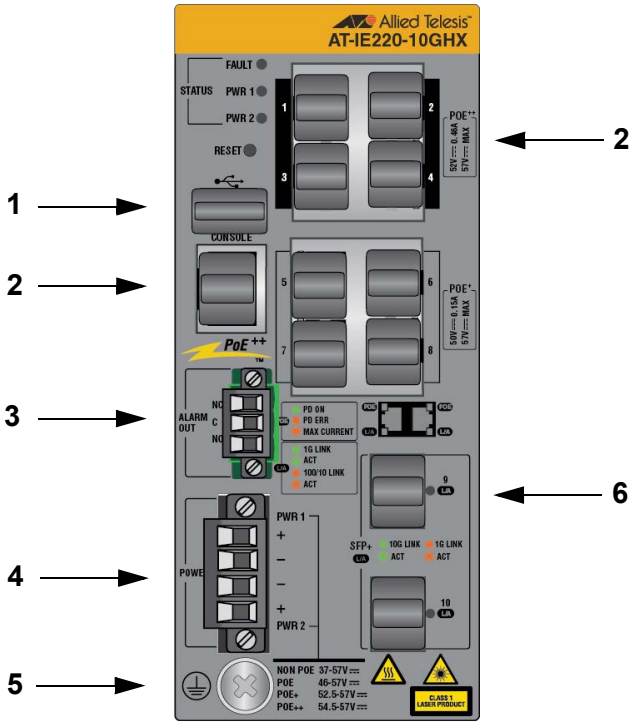


Figure 9. Pre-installed Components

Table 10. Pre-installed Components

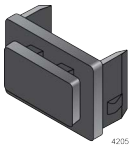
	Pre-installed Component		IE220-6GHX	IE220-10GHX
			Number of Components	
1		Dust cover on the USB port	1	1
2		Dust covers on the copper and Console ports	5	9
3		3-pin connector on the Alarm Out connector	1	1

Table 10. Pre-installed Components (Continued)

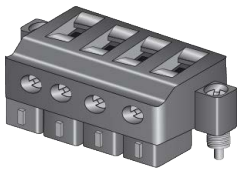
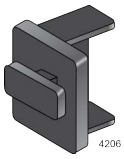
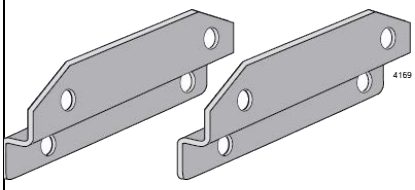
	Pre-installed Component		IE220-6GHX	IE220-10GHX
			Number of Components	
4		4-pin connector on the DC power PWR 1 and PWR 2 connectors	1	1
5		M4x8 Phillips-head grounding screw	1	1
6		Dust covers on the SFP+ ports	2	2
-		DIN rail bracket on back panel	1	1

Table 11 lists the items in the accessory kit.

Table 11. Accessory Kit

Shipping Component		IE220-6GHX	IE220-10GHX
		Number of Components	
	Wall brackets	2	2
	M4x8 Phillips-head screws (one spare screw)	5	5

Tools and Material

Table 12 lists the tools and material needed for the installation:

Table 12. Tools and Material

Ground wire	❒ One solid ground wire (recommended #16 AWG solid wire) ❒ One heat-shrink tube ❒ Ring-terminal lug
Power wires	❒ Two or four stranded power wires (recommended 18 AWG stranded wire. Do not use wire heavier than 16 AWG). ❒ One or two 2-wire connectors to connect the power wires to the AC/DC rectifiers or UPS units.
Alarm device	❒ External alert device for the Alarm Out (ALM OUT) connector ❒ 24 to 18 AWG stranded wire properly rated for the installation site, maximum length of two meters
DIN rail installation	❒ 35 x 7.5mm DIN rail ❒ Two DIN rail end clamps (optional)
Wooden wall installation	❒ Plywood base (optional) ❒ Four wall screws (The screw holes in the wall brackets have a diameter of 4.5 mm (0.17 in.)).
Concrete wall installation	❒ Four wall anchors and screws
Outdoor installation	❒ UL-listed Type 3X or 4X enclosure (Refer to “Installing the Switch in an Outdoor Environment” on page 76 for details.)
Tools	❒ #1 flat-head screwdriver ❒ Phillips-head screwdriver ❒ Wire insulator stripper ❒ Wire crimper tool ❒ Heating device for the heat-shrink tube ❒ Stud finder for identifying the middle of wall studs and hot electrical wiring (wooden wall installation) ❒ Drill with 1/4” carbide drill bit (concrete wall installation)

Recording the Serial Number and MAC Address

The serial number and MAC address of the switch are located on labels on the left side of the device, facing the front. Refer to Figure 10. If you need to record the numbers for your records, you may find it easier to do so before installing the device.

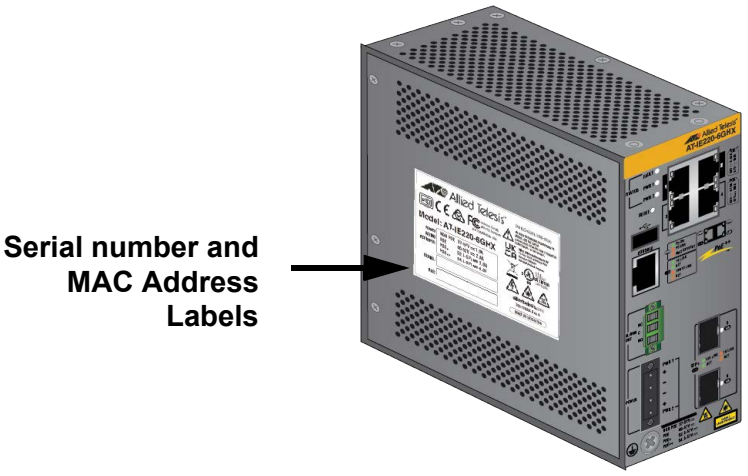


Figure 10. Serial Number and MAC Address Labels

Note
You can also view the serial number and MAC address of the switch with the SHOW SYSTEM SERIALNUMBER and SHOW SYSTEM MAC commands in the User Exec and Privileged EXEC modes of the AlliedWare Plus management software.

Chapter 3

Installing the Switch

The procedures in this chapter are listed here:

Installing the Switch on a DIN Rail

The switch comes with a DIN rail bracket pre-installed on the back panel. The bracket is compatible with DIN 35 x 7.5mm rails. Refer to Figure 11.

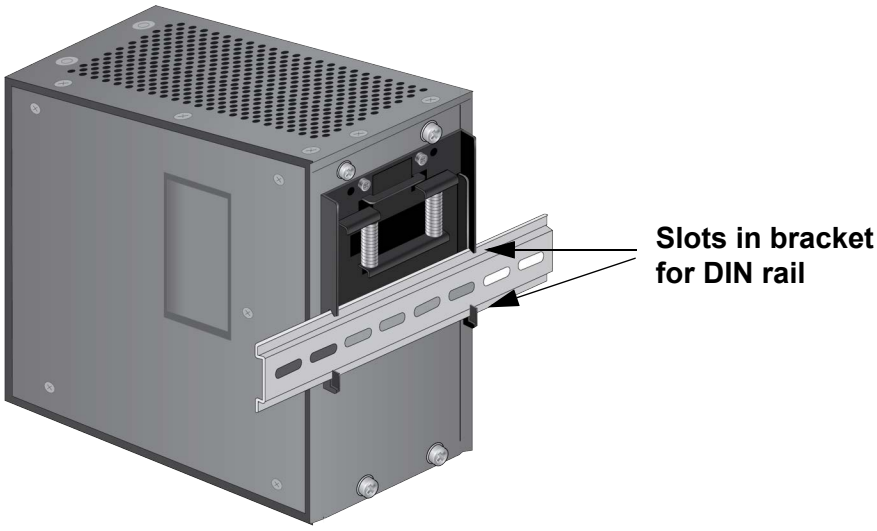


Figure 11. Switch on a DIN Rail

Figure 12 shows the correct orientation of the switch on a DIN rail. Do not install the switch horizontally or upside-down.

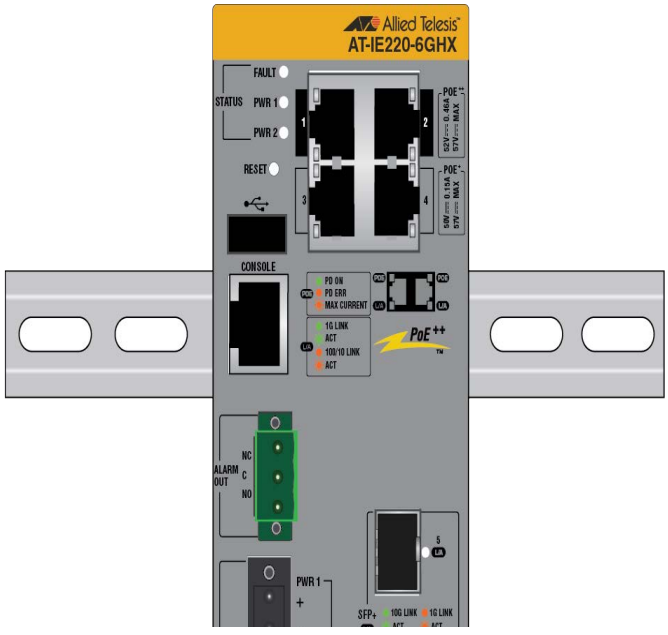


Figure 12. Orientation of the Switch on a DIN Rail

To install the switch on a DIN rail, perform the following procedure:

1. Hold the switch vertically with both hands, next to the DIN rail.
2. Hook the bottom flange on the DIN rail into the bottom slot on the DIN rail bracket on the switch. Refer to Figure 13.

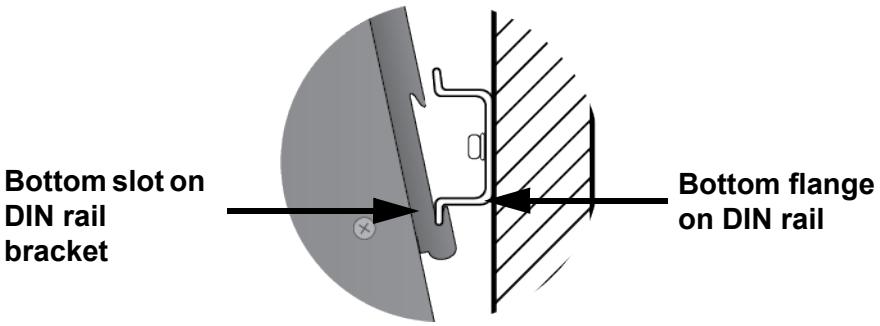


Figure 13. Installing the Switch on a DIN Rail - 1

3. Press upwards on the bottom panel of the switch to compress the springs on the DIN rail bracket, and pivot the switch until vertical. Refer to Figure 14.

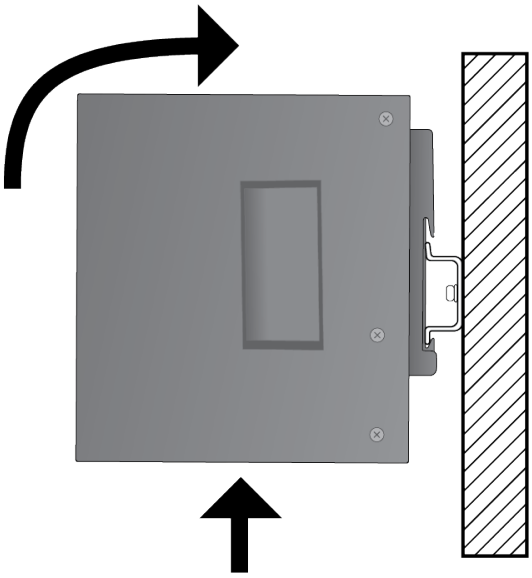


Figure 14. Installing the Switch on a DIN Rail - 2

1. Carefully lower the switch so that the top flange on the DIN rail slides into the top slot of the DIN rail bracket. Refer to Figure 15 on page 66.

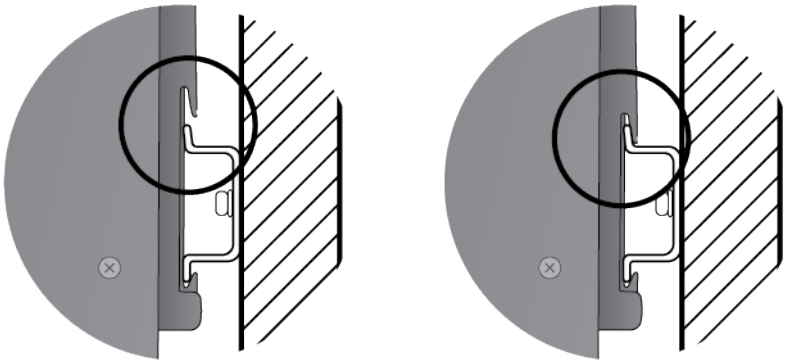


Figure 15. Installing the Switch on a DIN Rail - 3

2. Visually inspect the bracket to verify that the DIN rail is now fitted into the top and bottom slots of the bracket, on both the left and right sides. Refer to Figure 16.

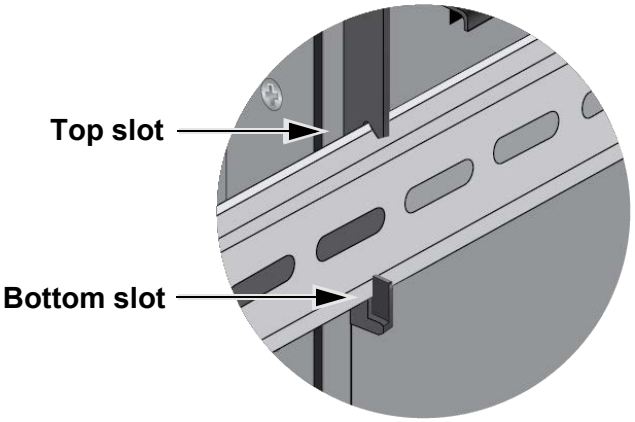


Figure 16. Verifying the DIN Rail Installation

Note
Allied Telesis recommends installing DIN rail end clamps to the sides of the switch to prevent damage or network traffic loss from vibration or shock. End clamps are not available from Allied Telesis.

3. Go to Chapter 4, “Cabling the Copper and SFP+ Ports” on page 79.

Installing the Switch on an Indoor Wooden Wall

This section contains the procedure for installing the switch on a wooden wall in a protected, indoor environment.

Note
The switch does not require an enclosure when installed in most indoor environments.

Warning
The device should be installed on the wall by a qualified building contractor. Serious injury to yourself or others or damage to the equipment may result if it is not properly fastened to the wall.
E105

Allied Telesis recommends using a plywood base when installing the switch on a wall with wooden studs. The base allows you to mount the device on two studs in the wall. (A plywood base is not required for a concrete wall.) Refer to Figure 17.

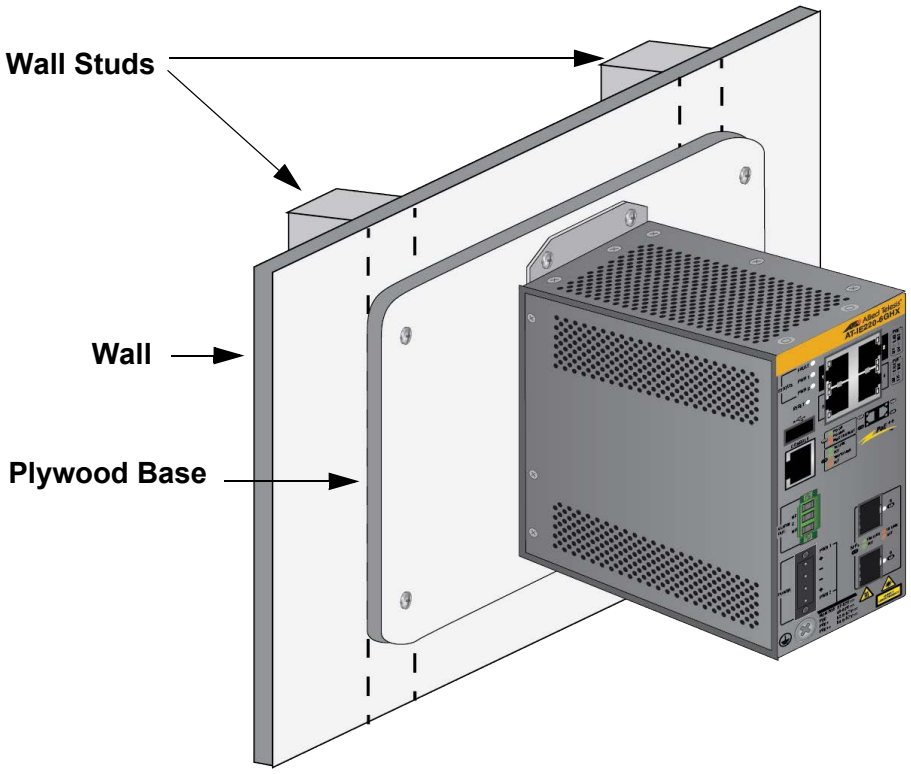


Figure 17. Switch on a Wall with a Plywood Base

The recommended minimum dimensions of the plywood base are listed here:

- Width: 58.4 centimeters (23 inches)
- Height: 28.0 centimeters (11 inches)
- Thickness: 2.6 centimeters (1 inch)

The dimensions assume the wall studs are 41 centimeters (16 inches) apart, the industry standard. You may need to adjust the width of the base if the distance between the studs in your wall is different than the standard.

You should install the plywood base to the wall first and then install the switch on the base. Refer to Figure 18.

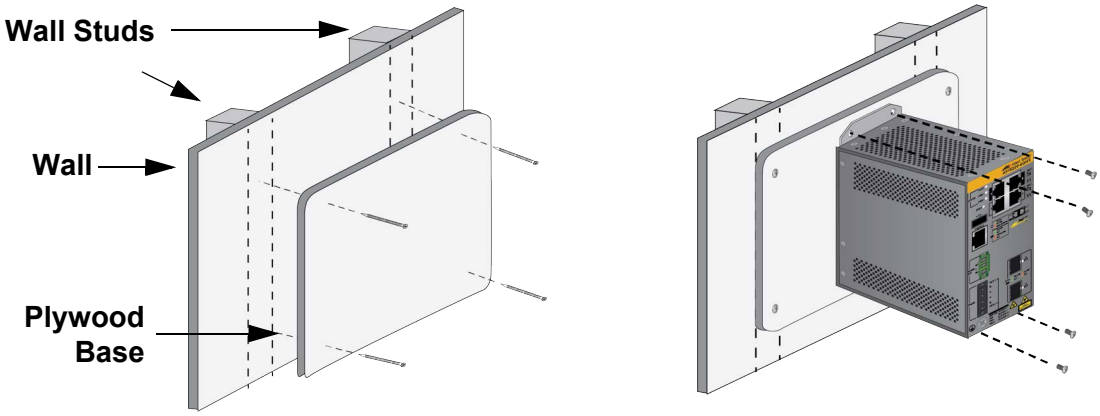


Figure 18. Steps to Installing the Switch on a Wall with a Plywood Base

Tools and Material

Here are the tools and material required for installing the switch on a wooden wall:

- Two wall brackets (included with the switch)
- Four bracket screws (included with the switch)
- Cross-head screwdriver (not provided)
- Stud finder capable of identifying the middle of wall studs and hot electrical wiring (not provided)
- Plywood base (not provided)
- Four wall screws for attaching the switch to the plywood base (not provided). The diameter of the screw holes in the wall brackets is 4.5 mm (0.17 in.).

- Four screws and anchors for attaching the plywood base to the wall (not provided)

Installing the Plywood Base

A plywood base is recommended when installing the switch on a wall that has wooden studs. Consult a qualified building contractor for installation instructions for the plywood base. The installation guidelines are listed here:

- You should use a stud finder to identify the middle of studs and hot electrical wiring in the wall.
- You should attach the base to two wall studs with a minimum of four screws.
- The selected wall location for the base should adhere to the recommendations in “Reviewing Site Requirements” on page 53.

Installing the Switch on the Plywood Base

This procedure assumes that the plywood base for the switch is installed on the wall. Please review “Reviewing Safety Precautions” on page 48 and “Reviewing Site Requirements” on page 53 before performing this procedure.

Warning
The device is heavy. Always ask for assistance before moving or lifting it to avoid injuring yourself or damaging the equipment.
E122

To install the switch on the plywood base, perform the following procedure:

1. Place the switch on a table.
2. With a Phillips-head screwdriver, remove the four screws holding the pre-installed DIN rail bracket, and remove the bracket. Refer to Figure 19 on page 70.

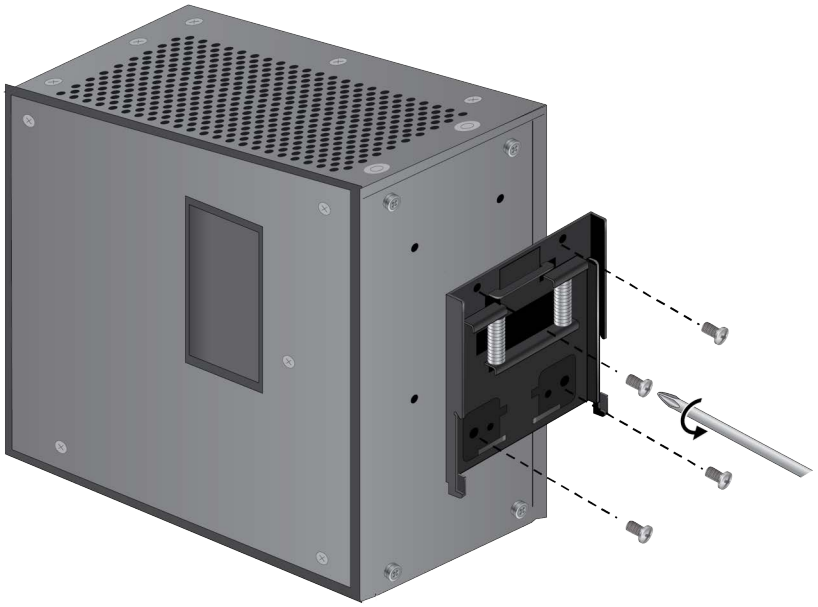


Figure 19. Removing the DIN Rail Bracket from the Switch

3. Remove the four screws from the top and bottom of the back panel. Refer to Figure 20.

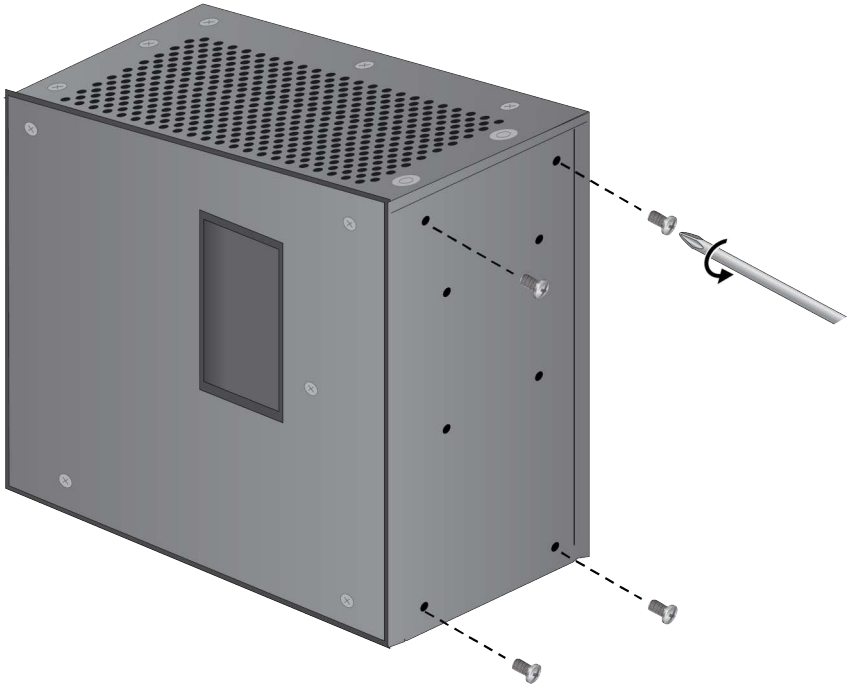


Figure 20. Removing the Four Screws from the Back Panel

4. Install the two wall brackets to the back panel of the switch with the four screws removed in the previous step or the screws in the accessory kit. Refer to Figure 21.

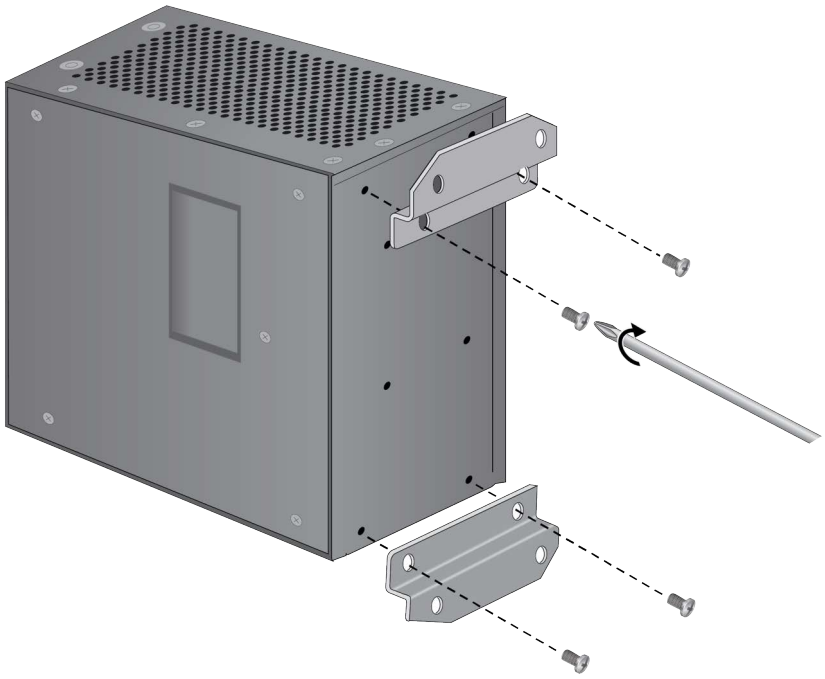


Figure 21. Installing the Wall Brackets on the Switch

5. Have another person hold the switch on the plywood base on the wall while you secure it with four screws (not provided). Refer to Figure 22 on page 72.

   Please follow these guidelines as you position the switch on the wall:

   - ❒ The switch must be oriented as shown in Figure 22. Do not install the switch horizontally or upside-down.
   - ❒ Be sure to leave sufficient space from other devices or walls to allow for adequate air circulation around all sides of the switch. Refer to “Reviewing Site Requirements” on page 53 for further information.

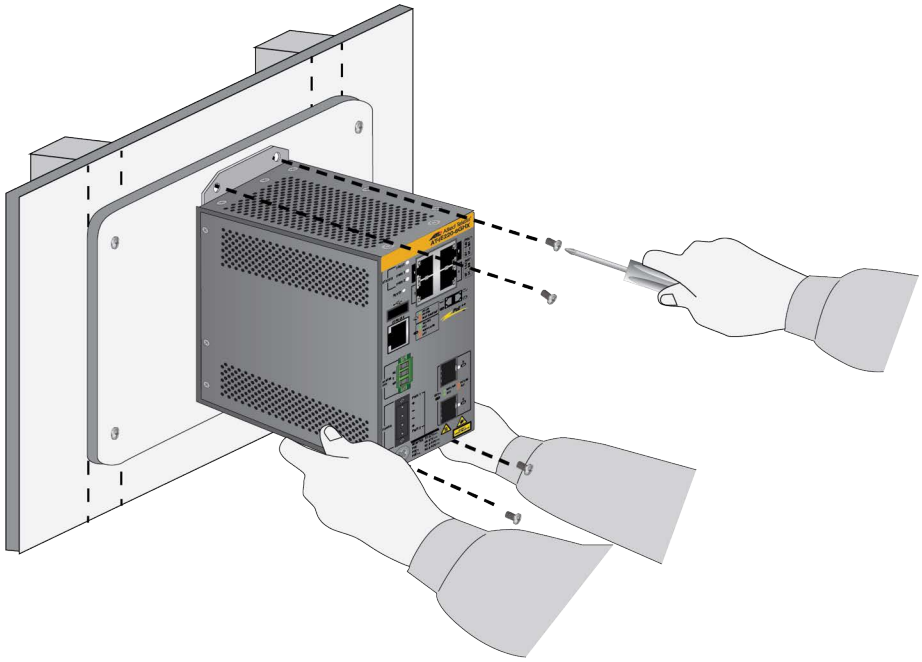


Figure 22. Attaching the Switch to the Plywood Base

6. Go to Chapter 4, “Cabling the Copper and SFP+ Ports” on page 79.

Installing the Switch on an Indoor Concrete Wall

This section contains the procedure for installing the switch on a concrete wall in a protected, indoor environment.

Note
The switch does not require an enclosure when installed in most indoor environments.

Warning
The device is heavy. Always ask for assistance before moving or lifting it to avoid injuring yourself or damaging the equipment. E122

Warning
The device should be installed by a qualified building contractor. Serious injury to yourself or others or damage to the equipment may result if it is not properly fastened to the wall. E105

Here are the necessary tools and material for installing the switch on a concrete wall:

- Two wall brackets (included with the switch)
- Four bracket screws (included with the switch)
- Four wall screws (not provided)
- Cross-head screwdriver (not provided)
- Drill and 1/4” carbide drill bit (not provided)
- Four anchors and screws for attaching the switch to the wall (not provided). The diameter of the screw holes in the wall brackets is 4.5 mm (0.17 in.).

To install the switch on a concrete wall, perform the following procedure:

1. Place the switch in a table.
2. With a Phillips-head screwdriver, remove the four screws holding the pre-installed DIN rail bracket, and remove the bracket. Refer to Figure 19 on page 70.
3. Remove the four screws from the top and bottom of the back panel. Refer to Figure 20 on page 70.

4. Install the two wall brackets to the back panel of the switch with the four screws removed in the previous step or the screws in the accessory kit. Refer to Figure 21 on page 71.

5. Have a person hold the switch on the concrete wall at the selected location for the device while you use a pencil or pen to mark the wall with the locations of the four screw holes in the two wall brackets. Refer to Figure 23.

   Please follow these guidelines as you position the switch on the wall:

   - The switch must be oriented as shown in Figure 23. You may not install the switch horizontally or upside-down.
   - Be sure to leave sufficient space from other devices or walls to allow for adequate air circulation around the device and through the ventilation holes. Refer to “Reviewing Site Requirements” on page 53 for further information.

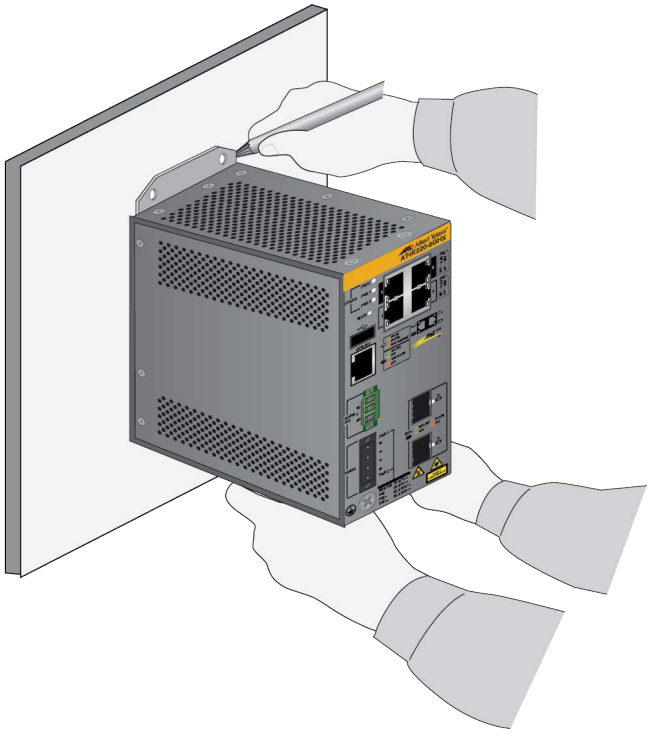


Figure 23. Marking the Locations of the Bracket Holes on a Concrete Wall

6. Place the switch on a table or desk.

7. Use a drill and 1/4” carbide drill bit to pre-drill the four holes you marked in step 3. Please review the following guidelines:
   - ❒ Prior to drilling, set the drill to hammer and rotation mode. The modes break up the concrete and clean out the hole.
   - ❒ Allied Telesis recommends cleaning out the holes with a brush or compressed air.
8. Insert four anchors (not provided) into the holes.
9. Have another person hold the switch at the selected wall location while you secure it with four screws (not provided). Refer to Figure 24.

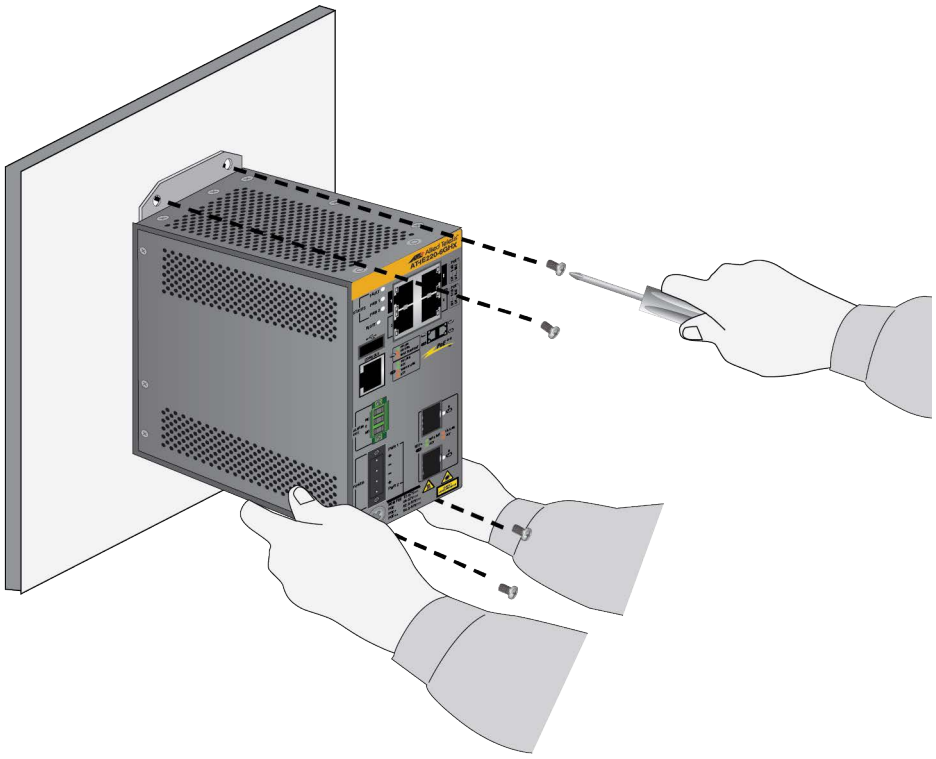


Figure 24. Installing the Switch on a Concrete Wall

10. Go to Chapter 4, “Cabling the Copper and SFP+ Ports” on page 79.

Installing the Switch in an Outdoor Environment

The switch can be installed in an outdoor environment. Before planning to install the switch outdoors, read the following requirements and precautions. You must meet all requirements to install the switch outdoors.

Requirements for Outdoor Installation

Here are the requirements:

Warning
Install the switch in a UL-listed Type 3X or 4X enclosure when installing the switch in an outdoor environment. E144

- Follow the enclosure manufacturers installation recommendations to maintain safety and protection from outdoor environment.
- Verify that the enclosure BTU/hour rating is higher than the total BTU/hour values of equipment installed in the enclosure over the expected operating temperature range. For the operating temperature ranges, see “Environmental Specifications” on page 120.
- The enclosure size should be determined by considering multiple factors, such as the outside ambient temperature, total heat generated from the installed equipment, sealed or unsealed enclosure type, enclosure material, paint color, mounting method (wall, pole, ground, etc.), and sun exposure. The smaller enclosure size you choose, the higher risk of the product overheating. If the product overheats in an enclosure that was built without taking into account these factors, the warranty of the product might be voided. Consult Allied Telesis when assistance is needed.

Immunity and Precautions

IE220 Switches are suitable for industrial applications, which require electromagnetic compatibility (EMC) standards, such as EN55032 and EN55035.

The generic standard EN55035 specifies the immunity test levels in relation to continuous and transient conducted and radiated disturbances. Tests within the standard include Electrostatic Discharges (ESD) and Electrical Fast Transients (EFT) surges, and power interruptions. These tests use the same detailed measurements and test methods used for the basic standard EN61000-4-x series.

The equipment connected to outdoor cables may be exposed to surges, which can damage components and circuits.

IE220 Switches satisfy the surge immunity defined by IEC 61000-4-5 test level 3 and the requirements for the installation class 3.

IE220 Switches have a surge immunity of up to 2 kV. This is sufficient when interconnection cables are partly outdoor cables and close to the grounding network. If this condition is not satisfied, Allied Telesis strongly recommends installing primary surge protections, which are usually provided by the use of solid state or gas tube arrestors located at the point where the cable enters the building or the outdoor cabinet.

Note
The requirements may not be sufficient to protect against damages in extreme environments, including close or direct lightning strikes.

Lightning Protection Requirements

Lightning strikes the ground and follows the paths of least impedance to cause damage. To provide an effective lighting protection system, you should implement the following fundamental measures:

- Surge protection devices must be installed at all service entrances to stop the intrusion of lightning from outside.
- Bonding must be accommodated to eliminate the opportunity for lightning to side-flash internally. The bonding resistance between any termination point and the related earthing rod should not exceed 0.01 ohms.
- Grounding electrode system must efficiently move the lightning to its final destination away from the structure and its contents.The resistance of the common grounding electrode should not exceed 5 ohms.
- Cable conductors route lightning current over and through the construction, without damage, toward the grounding electrode system.
- To avoid interference problems, use CAT6 Shielded Twisted Pair (STP) cables to connect devices if a device (e.g. camera) is installed outdoors, or a network cable is routed outdoors.
- Avoid Ground Loops. STP cabling must be grounded on one side only. Failure to do so can lead to Ground Loops, which can occur when networks have more than one ground point. Ground Loops cause voltage differences between connected networking components, which can result in current loops that can potentially damage connected equipment.
- Use appropriate grounding. Systems without appropriate grounding can experience either complete system failures or intermittent problems that are hard to diagnose. Improper installation of electrical grounding components can make the components work ineffectively. Installing a system with the proper grounding equipment and following proper installation guidelines can reduce potential downtime as well as costly repairs to system electronics.

Note
The users of the plant or those responsible for the installation should institute the necessary measures (e.g. shielding, bonding, and grounding protection) to ensure that the interference voltages caused by lighting strikes do not exceed the available immunity level.

Chapter 4

Cabling the Copper and SFP+ Ports

This chapter contains the following procedures:

Cabling the Copper Ports

Here are the guidelines to cabling the copper ports:

- The ports have 8-pin RJ45 connectors.
- The connectors on the cables should fit snugly into the ports, and the tabs should lock the connectors into place.
- The default speed setting for the ports is Auto-Negotiation. This setting is appropriate for ports connected to network devices that also support Auto-Negotiation.
- The default speed setting of Auto-Negotiation is not appropriate for ports connected to network devices that do not support Auto-Negotiation and have fixed speeds of 10 or 100 Mbps. For those switch ports, disable Auto-Negotiation and set the port's speed manually to match the speeds of the network devices.
- The 10/100/1000Base-T ports must be set to Auto-Negotiation, the default setting, to operate at 1000Mbps.
- The default duplex mode setting for the ports is Auto-Negotiation. This setting is appropriate for ports connected to network devices that also support Auto-Negotiation for duplex modes.
- The default duplex mode setting of Auto-Negotiation is not appropriate for ports connected to network devices that do not support Auto-Negotiation and have fixed duplex modes. Disable Auto-Negotiation on those ports and set their duplex modes manually to avoid the possibility of duplex mode mismatches. A switch port using Auto-Negotiation defaults to half-duplex if it detects that the end node is not using Auto-Negotiation. This can result in a mismatch if the end node is operating at the fixed duplex mode of full-duplex.
- The default wiring configuration of the ports is automatic MDIX detection, which configures the MDI/MDIX setting automatically. This setting is appropriate for switch ports that are connected to network devices that also support the feature.
- The default wiring configuration of automatic MDIX detection is not appropriate for ports that are connected to network devices that do not support the feature. On those ports, you should disable automatic MDIX detection and set the wiring configuration manually with the POLARITY command.

- The appropriate MDI/MDI-X setting for a switch port connected to a 10/100Base-T network device with a fixed wiring configuration depends on the setting of the network device and whether the switch and network device are connected with straight-through or crossover cable. If you are using straight-through copper cable, the wiring configurations of a port on the switch and a port on a network device must be opposite each other, such that one port uses MDI and the other MDI-X. For example, if a network 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 copper cable, the wiring configurations of a port on the switch and a port on a network device must be the same.
- Do not attach cables to ports of static or LACP port trunks until after configuring the switch trunks. This is to prevent the ports from forming network loops that can adversely affect network performance.
- PoE is enabled by default on the ports on the switches.
- Ethernet cables that are connected to outdoor equipment, such as CCTVs mounted on poles, might be subjected to surges from lightning or power cross events. Properly rated primary protection devices must be installed on the cables before connecting them to the switch.

Installing SFP+ Transceivers

Please review the following guidelines before installing SFP+ transceivers:

- SFP+ transceivers are hot-swappable. You may install them while the device is powered on.
- For a list of supported transceivers, refer to the product's data sheet.
- The operational specifications and fiber optic cable requirements of the transceivers are provided in documents included with the devices.
- You should install a transceiver before connecting its fiber optic cable.
- Fiber optic transceivers are dust sensitive. Always keep the plug in the optical bores when a fiber optic cable is not installed, or when you store the transceiver. When you do remove the plug, keep it for future use.
- Unnecessary removal and insertion of a transceiver can lead to premature failure.

Warning
A transceiver can be damaged by static electricity. Be sure to observe all standard electrostatic discharge (ESD) precautions, such as wearing an anti-static wrist strap, to avoid damaging the device. E86

The illustrations in the following procedure show a transceiver with a duplex LC connector. The connectors on your transceivers may be different.

To install SFP+ transceivers in the chassis, perform the following procedure:

1. Remove the dust plug from an SFP+ port. Figure 25 on page 83.

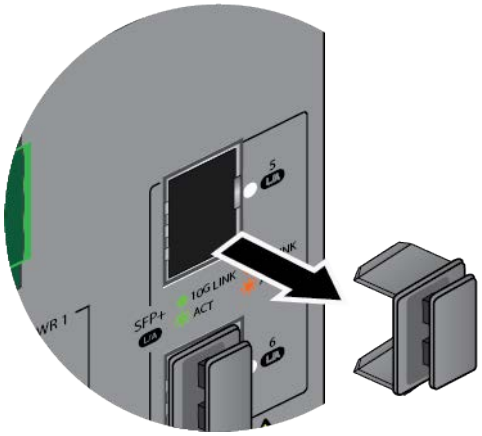


Figure 25. Removing the Dust Plug from an SFP+ Port

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

3. Position the transceiver with its handle on the right and slide it into the port until it clicks into place. Refer to Figure 26.

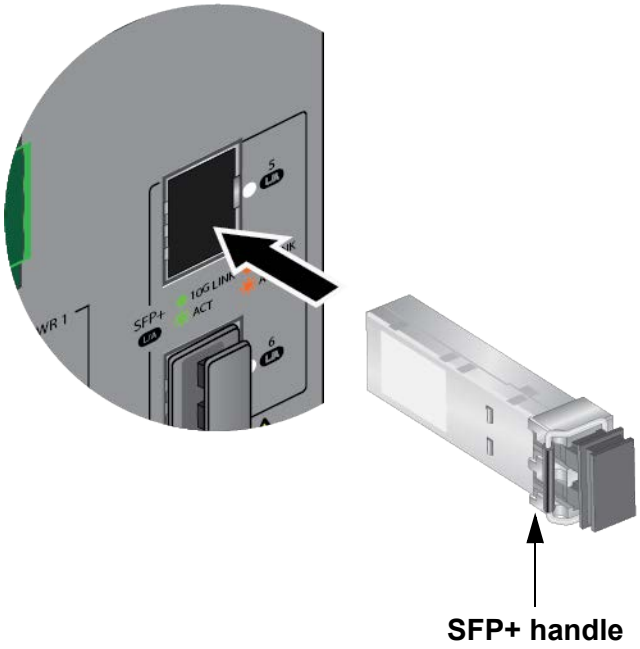


Figure 26. Installing an SFP+ Transceiver

Note
If you are ready to attach the fiber optic cable to the transceiver, continue with the next step. Otherwise, repeat steps 1 to 3 to install a second transceiver.

4. Remove the dust cover from the transceiver. Refer to Figure 27.

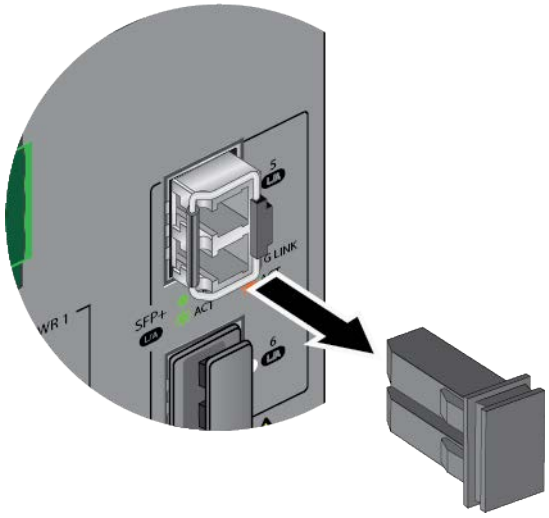


Figure 27. Removing the Dust Cover from an SFP+ Transceiver

5. Verify the handle on the transceiver is turned to the left. Refer to Figure 28.

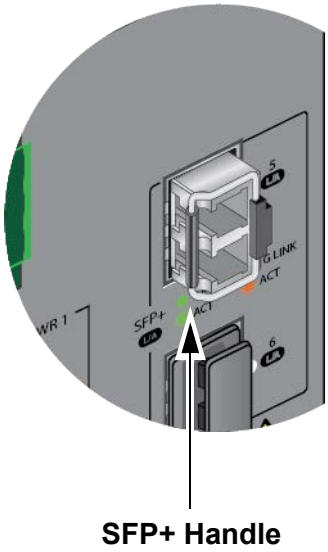


Figure 28. Verifying the Position of the SFP+ Handle

6. Connect the fiber optic cable to the transceiver. The connector on the cable should fit snugly into the port, and the tab should lock the connector into place. Refer to Figure 29 on page 85.

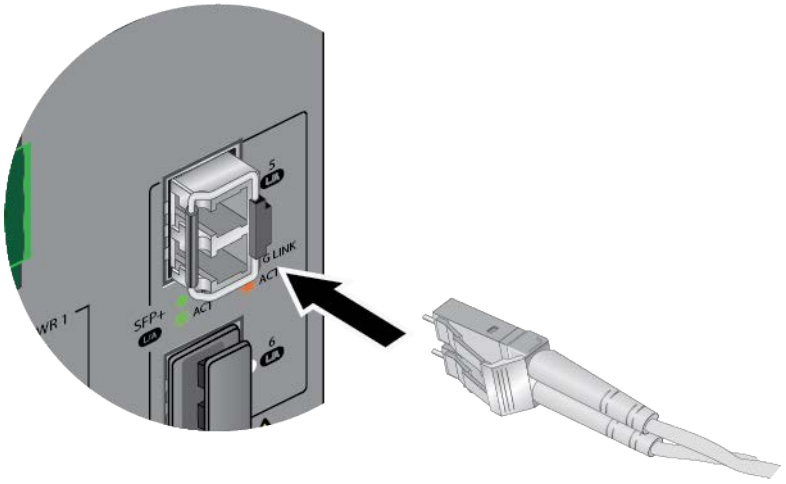


Figure 29. Connecting a Fiber Optic Cable to an SFP+ Transceiver

7. Repeat this procedure to install and cable the remaining transceivers.
8. Go to Chapter 5, “Powering On the Switch” on page 87.

Chapter 5

Powering On the Switch

This chapter contains the following procedures:

Connecting the Ground Wire

Here are the guidelines for the ground wire:

- ❒ The wire should be minimum #16 AWG solid wire.
- ❒ The wire length should be as short as possible.
- ❒ Continuity from the grounding screw to the earth ground must be less than 0.05 ohms.
- ❒ If a terminal is used, it should be double crimped.

Warning
This equipment must be earthed. The ground screw on the unit must be connected to a properly earthed bonding point. E120

To connect the grounding wire, perform the following procedure:

1. Strip 2.54cm (1.0 in.) of insulation from the end of the solid grounding wire with a wire insulator stripper. Refer to Figure 30.

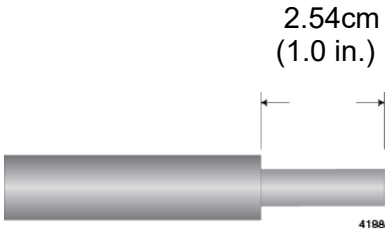


Figure 30. Stripping the Grounding Wire

Warning
Do not strip more than the recommended amount of wire. Stripping more than the recommended amount can create a safety hazard by leaving exposed wire on the terminal block after installation. E10

2. Slide a heat-shrink tube over the grounding wire. Refer to Figure 31

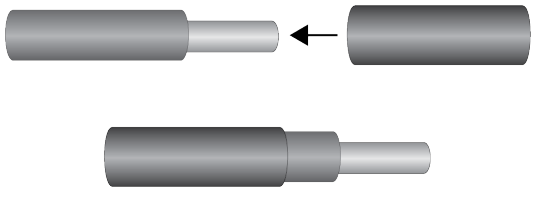


Figure 31. Sliding a Heat-shrink Tube Over the Grounding Wire

3. Slide the ring terminal lug over the stripped wire on the grounding wire. Refer to Figure 32.

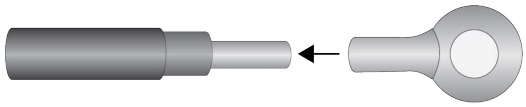


Figure 32. Sliding the Ring Terminal Lug on the Grounding Wire

4. Crimp the ring terminal lug with a wire crimping tool to secure it on the grounding wire. Refer to Figure 33.

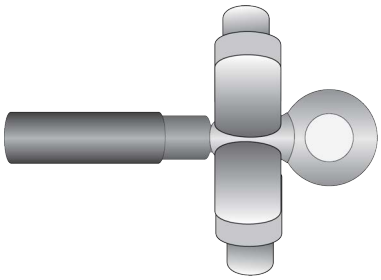


Figure 33. Crimping the Ring Terminal Lug

5. Slide the heat-shrink tube over the shaft of the ring terminal lug. Refer to Figure 34.

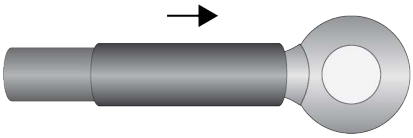


Figure 34. Sliding the Heat-Shrink Tube Over the Ring Terminal Lug

6. Heat the heat-shrink tube to secure it on the wire and ring terminal lug. Refer to Figure 35.

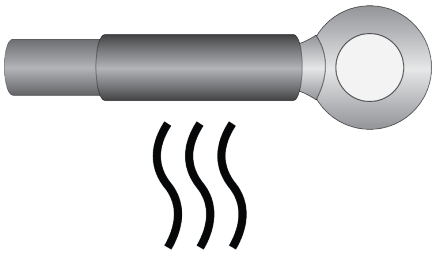


Figure 35. Heating the Heat-Shrink Tube

7. Remove the grounding screw from the switch with a #2 Phillips-head screwdriver. Refer to Figure 36.

Figure 36. Loosening the Grounding Screw

8. Secure the grounding screw to the IE220 Switch with the grounding screw. Refer to Figure 37.

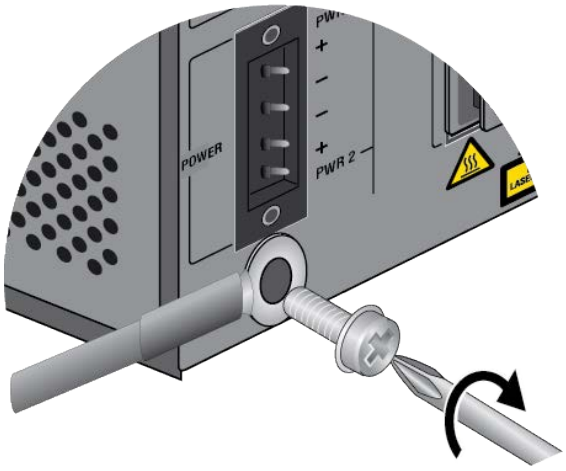


Figure 37. Attaching the Grounding Wire to the Switch

9. Connect the other end of the ground wire to a ground point at the installation site.

10. Do one of the following:

    - ❒ To wire the Alarm Out alarm connector, go to “Wiring the Alarm Out Connector” on page 91.
    - ❒ Otherwise, go to “Wiring the DC Input Plug for the Power Connector” on page 96.

Wiring the Alarm Out Connector

For background information, refer to “Alarm Out Connector” on page 41. Here are the guidelines:

- Use two 24 to 18 AWG stranded wires properly rated for the installation site.
- The maximum length of the wires is two meters.
- The alarm wires must be contained within the cabinet or building. Do not expose the wires to the outside environment.

The external alert device has to provide the necessary power for the Alarm Out circuit. The power specifications of the circuit are 30Vdc, 0.5A and 48Vdc, 1A, maximum.

Caution
The power from the external alert device must not exceed the above specifications. Otherwise, the Alarm Out connector circuit might be damaged. E123

Note
The Alarm Out connector can sync 0.5A at 30Vdc maximum.You must provide a series resistance to limit current, if necessary.

The Alarm Out connector has two circuits:

- Normally Closed (NC) and Common (C) circuit
- Normally Open (NO) and Common (C) circuit

Before wiring the alarm connector, familiarize yourself with the pin signals by examining the legend next to the connector. Refer to Figure 38 on page 92.

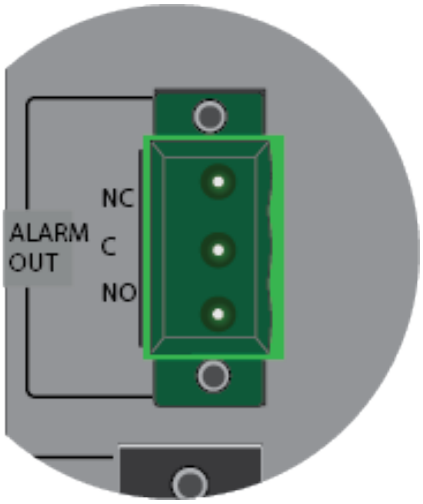


Figure 38. Pin Signals Legend for the Alarm Out Connector

To wire the Alarm Out connector, perform the following procedure:

1. Strip 6.5mm (0.25 in.) of insulation from the ends of two wires with a wire insulator stripper. Refer to Figure 39.

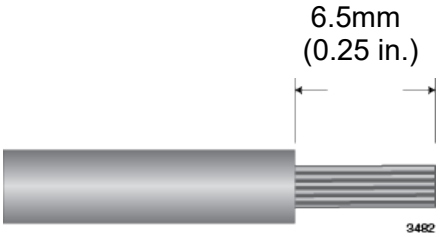


Figure 39. Stripping an Alarm Wire

Warning
Do not strip more than the recommended amount of wire. Stripping more than the recommended amount can create a safety hazard by leaving exposed wire on the terminal block after installation. E10

2. Tightly wrap the wire strands with your finger tips. Refer to Figure 40. This can prevent loose strands from touching other wires and causing an electrical short.

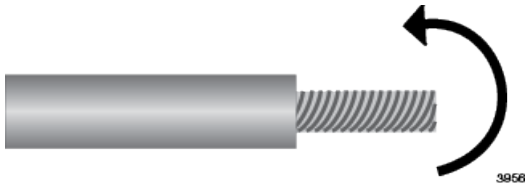


Figure 40. Wrapping the Wire Strands

Note
Allied Telesis recommends tinning the wires with solder for added protection against loose strands. This guide does not provide instructions on how to tin wires.

3. Loosen the two captive screws securing the Alarm Out plug to the switch. Refer to Figure 41.

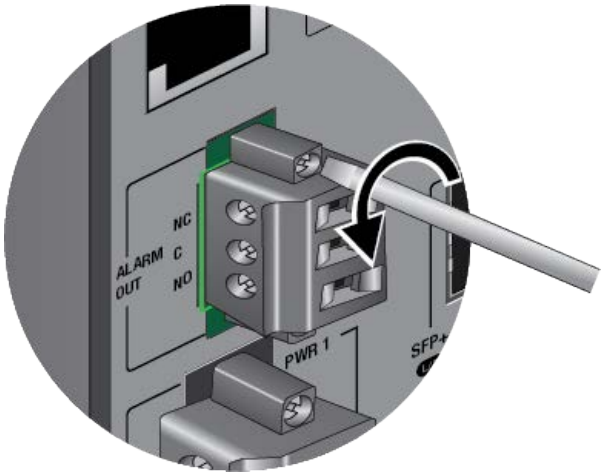


Figure 41. Loosening the Captive Screws on the Alarm Out Plug

4. Remove the Alarm Out plug. Refer to Figure 42.

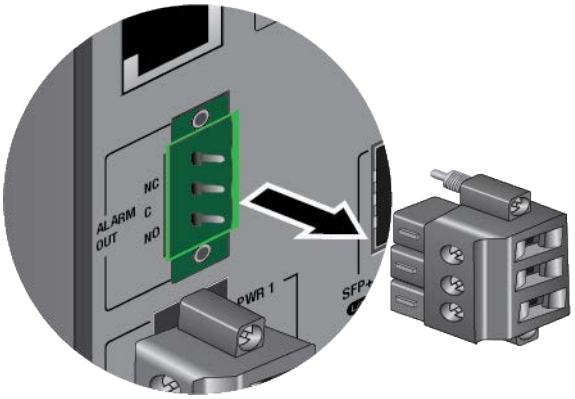


Figure 42. Removing the Alarm Out Plug

5. Use a #1 screwdriver to loosen the two wire retaining screws that correspond to the two pins of the selected Alarm Out circuit. Your choices are Normally Closed and Common, and Normally Open and Common. Refer to Figure 43 on page 94.

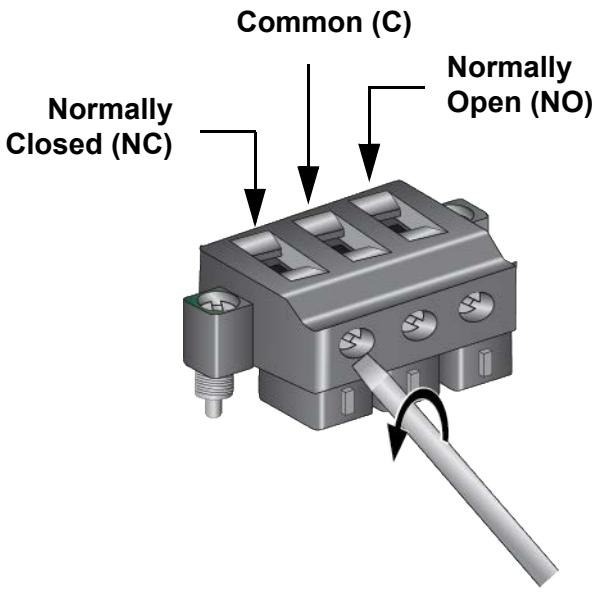


Figure 43. Loosening the Wire Retaining Screws on the Alarm Out Plug

6. Insert two wires into the pin connectors that correspond to the selected Alarm Out circuit. Tighten the retaining screws to secure them. Figure 44 shows wires being inserted into the Normally Closed and Common pin connectors. Allied Telesis recommends tightening the screws to 2.0 in-lbs (0.23 Nm).

Figure 44. Inserting the Wires into the Alarm Out Plug

7. Verify that there are no exposed wires or loose wire strands. Refer to Figure 53 on page 99.

Warning
Check to see if there are any exposed copper strands coming from the installed wires. When this installation is done correctly there should be no exposed copper wire strands extending from the terminal block. Any exposed wiring can conduct harmful levels of electricity to persons touching the wires. E12

8. Insert the Alarm Out plug into the Alarm Out connector. Refer to Figure 45.

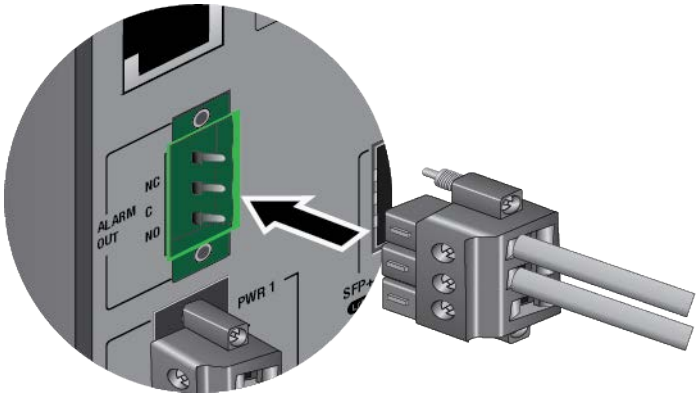


Figure 45. Inserting the Alarm Out Plug into the Alarm Out Connector

9. Tighten the two captive screws to secure the Alarm Out plug to the switch. Refer to Figure 46.

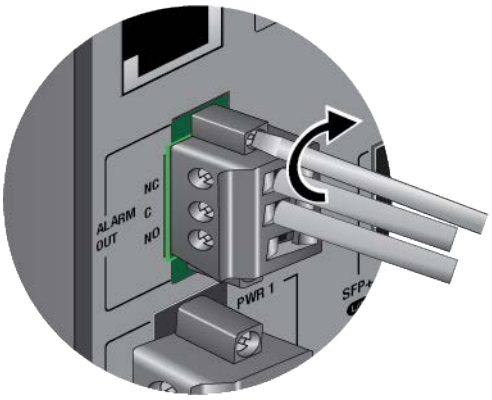


Figure 46. Securing the Alarm Connector to the Switch

10. Connect the other end of the wires to an alert device.

11. Go to “Wiring the DC Input Plug for the Power Connector” on page 96.

Wiring the DC Input Plug for the Power Connector

You can power the switch with one or two DC power supplies. A single power supply that meets the specifications in “Switch DC Power Requirements” on page 44 and “DC Power Specifications” on page 123 can fully power the switch and the powered devices connected to the ports, up to the maximum power budget. A second power supply adds power redundancy, which protects the switch against power supply failures.

The 4-pin Power connector on the front panel of the switch is the DC input connector. As shown in Figure 47, the connector has two sets of positive (+) and negative (-) pins, labeled PWR 1 and PWR 2, for the DC input power supply wires from two power supplies. If you are installing only one power supply, you may connect it to either set.

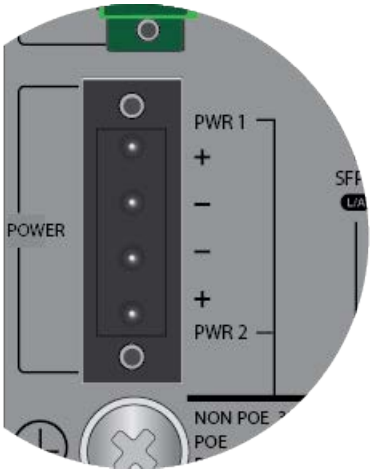


Figure 47. Pin Signals Legend for the POWER Connector

Here are the materials and tools needed to wire the DC power input plug on the POWER connector:

- ❒ 18 AWG stranded wires. Do not use wire heavier than 16 AWG.
- ❒ 2-wire connectors to connect the power cables to the AC/DC rectifiers or UPS units.
- ❒ #1 flat-head screwdriver
- ❒ Wire insulation stripper

Warning
You should connect the DC wires to the DC input plug first before connecting them to an external DC circuit or the DC power supplies. Never work with HOT wires. E146

To wire the DC input plug, perform the following procedure:

1. Strip 6.5mm (0.25 in.) of insulation from the ends of the stranded power wires with a wire insulator stripper. Refer to Figure 48.

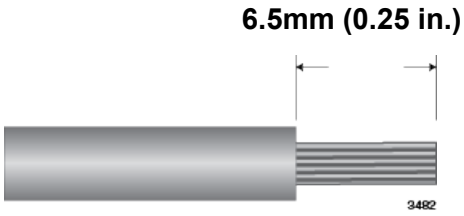


Figure 48. Stripping a Power Cable Wire

Warning
Do not strip more than the recommended amount of wire. Stripping more than the recommended amount can create a safety hazard by leaving exposed wire on the terminal block after installation. E10

2. Tightly wrap the wire strands with your finger tips. Refer to Figure 40 on page 92. This step can prevent loose strands from touching other wires and causing an electrical short.

Note
Allied Telesis recommends tinning the wires with solder as added protection against loose strands. This guide does not provide instructions on how to tin wires.

3. Loosen the two captive screws on the DC input plug. Refer to Figure 49.

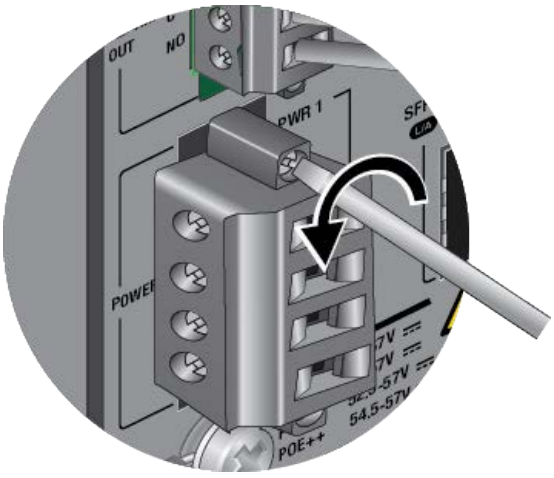


Figure 49. Loosening the Two Captive Screws on the DC input Plug

4. Remove the DC input plug from the front panel. Refer to Figure 50.

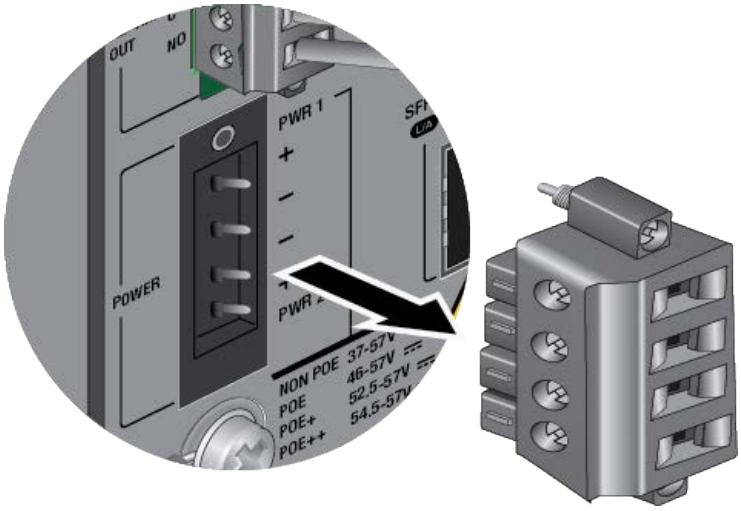


Figure 50. Removing the DC Input Plug

5. Use a #2 screwdriver to loosen the wire retaining screws of the pins corresponding to the selected DC input circuits. If you are powering the switch with only one DC power supply, you may use either PWR1 or PWR 2 pins. Refer to Figure 51.

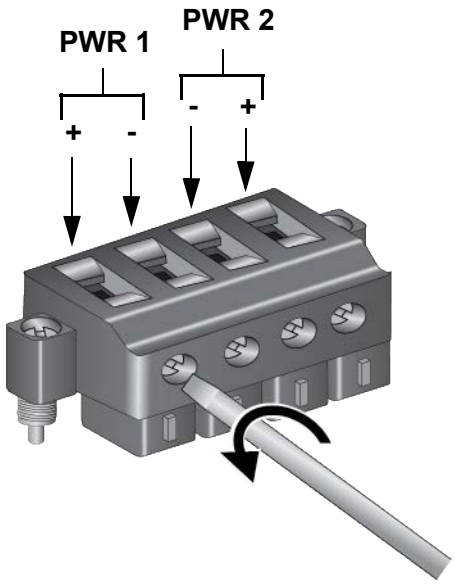


Figure 51. Loosening the Wire Retaining Screws on the DC Input Plug

6. Insert the wires into the plug and tighten the retaining screws to secure them. The example in Figure 52 on page 99 assumes the switch will be powered by a single power supply on the PWR 1 input circuit on the plug. Allied Telesis recommends tightening the screws to 5.0 in-lbs (0.55 Nm).

Figure 52. Inserting Wires into the DC Input Plug

7. After attaching the wires, verify that there are no exposed wires or loose wire strands. Refer to Figure 53.

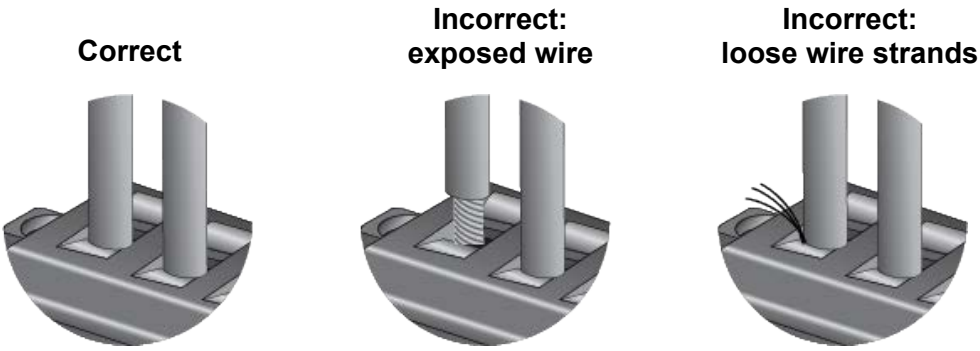


Figure 53. Verifying the Wire Installation

Warning
Check to see if there are any exposed copper strands coming from the installed wires. When this installation is done correctly there should be no exposed copper wire strands extending from the terminal block. Any exposed wiring can conduct harmful levels of electricity to persons touching the wires. E12

8. After cabling the DC power input plug, go to “Powering On the Switch” on page 100.

Powering On the Switch

This section contains the procedure for powering on the switch.

Note
The switch can update its release or configuration file from a USB flash drive during the initial power up of the unit. This is called the Autoboot feature. Using the Autoboot feature is optional. It is only available during the initial power up of the unit. To use the feature, insert a USB flash drive with the appropriate files into the USB port on the switch before powering on the unit. For more information, refer to the *Software Reference for the IE220 Switches*.

Warning
An operational unit can be hot. Exercise caution when touching it with unprotected hands. E145

The following procedure assumes you have already wired the DC input plug for the Power connector. For instructions, refer to “Wiring the DC Input Plug for the Power Connector” on page 96. For power supply requirements, refer to “Switch DC Power Requirements” on page 44 and “DC Power Specifications” on page 123.

To power on the chassis, perform the following procedure:

1. Verify that the DC power supply or DC circuit is powered off. If there are two DC power supplies, verify that both units or circuits are powered off.

2. Connect the DC input plug to the Power connector on the front panel. Refer to Figure 54.

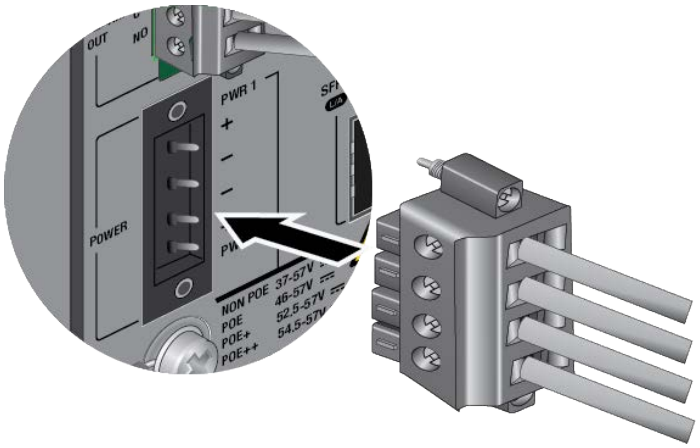


Figure 54. Connecting the DC Input Plug to the Power Connector

3. Tighten the two captive screws to secure the DC input plug to the switch. Refer to Figure 55.

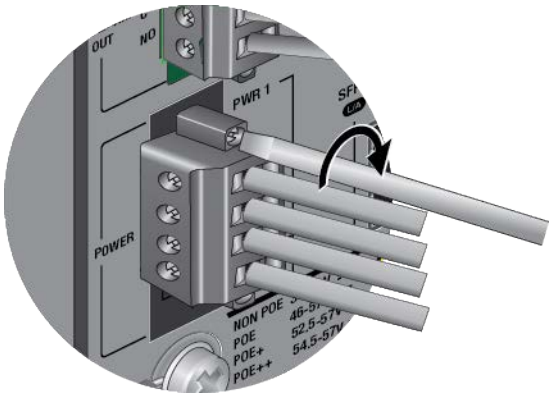


Figure 55. Tightening the Captive Screws to Secure the DC Input Plug to the Power Connector

4. Connect the other end of the power wires to external DC circuits or the DC power supply. Refer to the documentation included with the unit for instructions.

5. Power on the external DC circuits and/or DC power supplies.

> **Note**
> The switch does not have an On/Off switch.

6. Wait two to three minutes for the switch to start the AlliedWare Plus management software and load the default configuration.

   You can monitor the console messages as the device starts the management software by connecting a terminal or computer with a terminal emulator program to the Console port on the front panel. The parameter settings for the Console port are found in “Starting a Management Session” on page 103.

Verifying Switch Operations

Here are items to check to verify that the switch is operating normally. If there is a problem, refer to Chapter 6, “Troubleshooting” on page 111 for suggestions on how to resolve it.

- ❒ The Fault LED should be off.
- ❒ One or both PWR 1 and PWR 2 LEDs should be solid green, depending on the number of power supplies connected to the unit.
- ❒ The Link LEDs on copper ports connected to active network devices should be solid or flashing green or amber. Refer to Table 6 on page 34.

- ❒ The PoE LEDs on copper ports connected to active powered devices should be solid green. Refer to Table 6 on page 34.
- ❒ The LEDs on SFP+ ports with transceivers connected to active network devices should be solid or flashing green or amber. Refer to Table 7 on page 35.

After verifying the operations of the switch, go to “Starting a Management Session” on page 103.

Starting a Management Session

The following sections contain the procedures for starting the first management session on the switch:

- “Through the Console Port,” next
- “With a DHCP or DHCPv6 Server” on page 104
- “Without a DHCP or DHCPv6 Server” on page 106

Through the Console Port

This section explains how to start a local management session with the command line interface through the Console port. Here are the guidelines:

- Local management sessions require a terminal, computer, or laptop with an RS-232 serial port or USB port, and a terminal emulator, such as PuTTy.
- Local management sessions also require a management cable. If your computer has an RS-232 port, refer to “RJ-45 Style Serial Console Port Pinouts” on page 138 for the cable wiring specifications.
- If your computer has a USB port, you will need a USB-to-Serial converter that is compatible with its operating system. An example is the VT-Kit3 converter from Allied Telesis. Refer to Figure 5 on page 36.
- Local management sessions do not interfere with the network operations of the switch.
- The switch does not need an IP address for local management sessions.
- The web browser interface is not available through the Console port.
- The switch comes from the factory without a configuration file for storing its parameter settings. It automatically creates a file the first time you save the parameter settings.

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

1. Connect your workstation to the Console port on the switch:
   - If your workstation has a USB connector, use a USB-to-Serial converter, such as the VT-Kit3 from Allied Telesis. Refer to Figure 5 on page 36. The kit and driver are sold separately.
   - If your workstation has a DB-9 female connector, refer to “Console Management Cable with DB-9 Female and RJ-45 Connectors” on page 129 for the cable specifications.
2. Power on the switch and wait several minutes as it initializes the AlliedWare Plus management software.

3. Configure your VT-100 terminal or terminal emulation program as follows:

   - ❒ Baud rate: 9600 bps (The baud rate of the Console port is adjustable from 1200 to 115200 bps. The 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 the name and password of the manager account.

5. Enter the default user name “manager” and password “friend” (without the quotes).

   Note
   User names and passwords are case sensitive.

   The switch starts the local management session and displays the following prompt:

```
awplus>
```

   The prompt is the User Exec mode in the command line interface.

6. Go to “Verifying PoE” on page 107.

With a DHCP or DHCPv6 Server

This section contains the procedure for starting the first management session with the switch on a network that has a DHCP or DHCPv6 server. Review the following factory default settings for the switch when powered on for the first time:

- ❒ DHCP and DHCPv6 clients: enabled
- ❒ SSH server: enabled
- ❒ Telnet server: disabled
- ❒ Web server: enabled
- ❒ Switch ports: enabled
- ❒ VLAN membership: port-based VLAN1
- ❒ Configuration file: none

Note
The switch comes from the factory without a configuration file. It automatically creates the file the first time you save its parameter settings.

To start the first management session, perform the following procedure:

1. Enter the MAC address of the switch into your DHCP or DHCPv6 server so that the server assigns an address to the switch when you power it on. The MAC address label is shown in “Recording the Serial Number and MAC Address” on page 61. Refer to your DHCP server’s documentation for instructions.

2. Connect a single Ethernet port on the switch to your existing network.

3. Power on the switch and wait several minutes as it initializes the AlliedWare Plus software and obtains its IPv4 or IPv6 address from the DHCP server.

4. On your management workstation, enter the switch’s assigned IP address into an SSH utility or the URL field of your web browser on your workstation.

5. Press Enter. You are prompted for the name and password of the manager account.

6. Enter the default user name “manager” and password “friend” (without the quotes).

   Note
   User names and passwords are case sensitive.

   The switch starts the local management session and displays the following prompt:

```
awplus>
```

   The prompt is the User Exec mode of the command line interface.

7. Go to “Verifying PoE” on page 107.

Without a DHCP or DHCPv6 Server

This section contains the procedure for starting the first management session with the switch using its default IPv4 address. Review the following factory default settings for the switch when powered on for the first time:

- Default IP address (no DHCP server): 169.254.42.42 (255.255.0.0)
- SSH server: enabled
- Telnet server: disabled
- Web server: enabled
- Switch ports: enabled
- VLAN membership: port-based VLAN1
- Configuration file: none (The switch automatically creates a configuration file the first time you save its parameter settings.)

To start the first management session, perform the following procedure:

1. Change the IP address of your workstation to 169.254.42.*n*/16 (255.255.0.0), where *n* is any number from 1 to 254, but not 42.
2. Connect the Ethernet port on your workstation to any Ethernet port on the switch.
3. Power on the switch and wait several minutes as it initializes the AlliedWare Plus management software.
4. Enter the IP address 169.254.42.42, the switch's default IP address, in an SSH application or the URL field of the web browser on your workstation.
5. Press Enter. You are prompted for the name and password of the manager account.
6. Enter the default user name "manager" and password "friend", without the quote marks.

   Note
   User names and passwords are case sensitive.

   The switch starts the local management session and displays the following prompt:

```
awplus>
```

   The prompt is the User Exec mode of the command line interface.

7. Go to "Verifying PoE" on page 107.

Verifying PoE

This section contains procedures for verifying and, if necessary, configuring the PoE budgets on IE220 Switches. The procedures are listed here:

- “Verifying the PoE Budget,” next
- “Configuring the Power Budget” on page 108

Verifying the PoE Budget

The PoE budget is the maximum wattage the switch has available for powered devices on its copper ports. The switches have the following maximum power budgets when powered by the IE048-480 Power Supply or an equivalent power supply:

- IE220-6GHX Switch: 180W
- IE220-10GHX Switch: 240W

Note
IE220 Switches powered by power supplies that do not meet the requirements in “Switch DC Power Requirements” on page 44 and “DC Power Specifications” on page 123 might have lower PoE budgets.

The following procedure verifies the switch’s PoE budget. It assumes you have already started a management session on the switch, as explained in “Starting a Management Session” on page 103. To confirm the PoE budget, perform the following procedure:

1. Enter the ENABLE command at the User Exec mode to move to the Privileged Exec mode, as shown here:

```
awplus> enable
awplus#
```

2. Enter the SHOW POWER-INLINE command at the Privileged Exec mode prompt, as shown here:

```
awplus# show power-inline
```

3. Examine the Power Allocated field in the command output as follows:
   - If the power budget is correct, go to “Configuring the Power Budget” on page 108.
   - If the power budget is incorrect, either the power supply does not meet the specifications in “Switch DC Power Requirements” on page 44 and “DC Power Specifications” on page 123 or it has a problem. If the latter, refer to Chapter 6, “Troubleshooting” on page 111 for troubleshooting suggestions.

Configuring the Power Budget

The following procedure explains how to verify and, if necessary, adjust the PoE power budget of the switch. This value is the maximum wattage the switch is expecting from the power supply for the powered devices on its ports.

Because the switch consumes part of the input power itself, the PoE power budget must be less than the maximum power sourced from the DC power supply. The basic rule is as follows:

Pa = Pi - Pc

Where:

Pa = Available power for PoE sourcing on the copper ports on the switch.

Pi = Maximum input power from the external DC power supply to the switch.

Pc = Maximum power consumed by the switch.

If the PoE power budget is above the available input power, the switch may experience problems. For instance, it may attempt to distribute more power than it actually has available from the power supply or display the PoE Status LEDs incorrectly.

To verify and adjust the PoE power budget, perform the following procedure:

1. In the Privileged Exec mode, enter the SHOW POWER-INLINE command:

```
awplus# show power-inline
```

2. Compare the Nominal Power and Power Allocated fields in the command output. The Nominal Power field is the PoE power budget of the switch. It is the wattage the switch is expecting from the power supply for PoE devices. The Power Allocated is the actual wattage the switch is receiving from the power supply. The default values for the PoE power budgets are:

   - IE220-6GHX Switch: 180W
   - IE220-10GHX Switch: 240W

3. Do one of the following:

   - If the values in the Nominal Power and Power Allocated fields are the same, no further steps are required. Refer to the *IE220 Series Industrial Ethernet Layer 2+ Switches Command Reference for AlliedWare Plus* for management instructions.
   - If the values are different, continue with the next step:

4. Enter the CONFIGURE TERMINAL command to move to the Global Configuration mode:

```
awplus# configure terminal
awplus(config)#
```

5. In the Global Configuration mode. enter the POWER INLINE WATTAGE MAX command to change the nominal value. The command format is shown here:

```
power inline wattage max max
```

   The *max* variable sets the PoE power budget. This example reduces the PoE power budget to 120W:

```
awplus(config)# power inline wattage max 120
```

   The PoE power budget of the switch is now set. The value is displayed in the Power Allocated field of the SHOW POWER-INLINE command.

   For management instructions, refer to the *IE220 Series Industrial Ethernet Layer 2+ Switches Command Reference for AlliedWare Plus*.

Chapter 6

Troubleshooting

This chapter contains suggestions on how to troubleshoot problems with the switch. The sections in the chapter are listed here:

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

PWR 1 and PWR 2 LEDs

Problem: The DC power supply is connected to the switch, but the corresponding PWR 1 or PWR 2 LED on the front panel is off.

Solutions: The unit is not receiving power from the power supply or the power is outside the operating range of the switch. Try the following:

- ❒ Verify that the DC power source is powered on and operating normally.
- ❒ Review the DC power source's documentation to verify that it is compatible with the switch. Refer to "Switch DC Power Requirements" on page 44 and "DC Power Specifications" on page 123.
- ❒ Verify that the PWR 1 -PWR 2 connector is fully inserted into the slot in the front panel of the switch.
- ❒ Verify that the DC wires are correctly and securely connected to the PWR 1 -PWR 2 connector on the switch and to the DC power supply.
- ❒ Verify that the DC power wires from the power supply are not connected to the ALM OUT connector.
- ❒ Try using a different DC power supply.
- ❒ Try replacing the DC power wires.
- ❒ Try connecting the DC power source to a different device.
- ❒ Test the output voltage from the power source to verify that it is within the operating range of the switch. Refer to "DC Power Specifications" on page 123.

Problem: The DC power supply is supplying only partial power to the switch.

- ❒ Verify that the power supply meets the requirements in "Switch DC Power Requirements" on page 44 and "DC Power Specifications" on page 123.
- ❒ Verify that the power supply is not overheating. If necessary, increase ventilation around the power supply.
- ❒ The power supply might be failing. Replace the power supply.

Copper Ports

Problem: The switch is powered on and forwarding traffic, but all the port LEDs are off.

Solutions: The port LEDs may have been turned off with the ECOFRIENDLY LED command in the AlliedWare Plus management software. To turn on the LEDs, establish a management session with the unit and issue the NO ECOFRIENDLY LED command in the Global Configuration mode. The default setting for the LEDs is on.

Problem: A copper port on the switch is connected to a network device but the port's LINK/ACT LED is off.

Solutions: The port is unable to establish a link to a network device. Try the following:

- ❒ Verify that the port is connected to the correct copper cable.
- ❒ Verify that the network device connected to the copper port is powered on and is operating properly.
- ❒ Verify that the cable is securely connected to the ports on the switch and network device.
- ❒ Try connecting another network device to the port with a different cable. If the port establishes a link, the problem is with the cable or the other network device.
- ❒ Verify that the cable does not exceed 100 meters (328 feet).
- ❒ Verify that you are using the appropriate category of copper cable. Refer to "Copper Cable Requirements" on page 24.
- ❒ Use the switch's management software to verify that the port is enabled.
- ❒ If the remote network device is a managed device, use its management firmware to verify that its port is enabled.

Note
A 1000Base connection might require five to ten seconds to establish a link.

Problem: Network performance between a copper port on the switch and a network device is slow.

Solution: There might be a duplex mode mismatch between the port and the network device. This can occur when a copper port using Auto-Negotiation is connected to a remote device that has a fixed speed of 10 or 100 Mbps and a fixed duplex mode of full duplex. If this is the cause of the problem, adjust the duplex mode of the port on the network device or

switch so that both ports are using the same duplex mode. For the switch, use the management software to determine the duplex mode settings of the ports.

Power Over Ethernet

Problem: The switch is not providing power or only partial power to powered devices on the copper ports.

Solutions: Try the following:

- Check the port's PoE LED. If the LED is solid amber, the switch shutdown PoE on the port because of a fault condition. If the LED is flashing amber, the switch does not have sufficient unused power to allocate to the powered device.
- If the device is a PoE++ device, verify that it is connected to a port that supports PoE++ devices. PoE++ devices are supported on ports 1 and 2 on the IE220-6GHX Switch and ports 1 to 4 on the IE220-10GHX Switch.
- Review the powered device's documentation to confirm that it is compliant with one of the PoE standards in "PoE Versions" on page 26 and that its power requirements do not exceed those listed in Table 1 on page 26. Legacy devices that are non-standard or were manufactured before the completion of the standards might not be compatible with IE220 Switches.
- Start a local or remote management session on the switch and enter the SHOW POWER-INLINE command. Subtract the Actual Power Consumption value from the Power Allocated value to determine the amount of unused power. The switch cannot support the powered device if this value is less than the device's power requirements.
- Verify that you are using the appropriate category of copper cable by referring to "Copper Cable Requirements" on page 24.
- Try replacing the copper cable.
- Use the AlliedWare Plus management software on the switch to determine whether PoE is enabled on the port. The default setting is enabled.
- Use the SHOW POWER-INLINE command to determine whether the PoE power setting for the port was reduced to a value below the power requirements of the device.
- Try connecting the device to a different port on the switch.
- Verify that the switch is not overheating. If the device is installed in an enclosure, verify that the enclosure provides adequate ventilation.

SFP+ Ports

Problem: A SFP+ port on the switch is connected to a network device but the port's LINK/ACT LED is off.

Solutions: The fiber optic port on the transceiver cannot establish a link to the network device. Try the following:

- ❒ Verify that the remote network device is operating properly.
- ❒ Verify that the fiber optic cable is securely connected to the port on the SFP+ module and to the port on the remote network device.
- ❒ Verify that the port is connected to the correct fiber optic cable.
- ❒ Check that the SFP+ transceiver is fully inserted in the SFP+ port in the switch.
- ❒ Verify that the operating specifications of the fiber optic ports on the transceiver and remote network device are compatible.
- ❒ Verify that the correct type of fiber optic cabling is being used.
- ❒ Try connecting another network device to the fiber optic port using a different cable. If the port can establish a link, the problem is with the cable or the other network device.
- ❒ Use the switch's management software to verify that the port is enabled.
- ❒ If the remote network device is a managed device, use its management firmware to verify that its port is enabled.
- ❒ If the problem is with two BiDi (bi-directional) transceivers, refer to their data sheets to verify that their transmission and reception frequencies are opposite each other. For instance, a BiDi transceiver that transmits and receives at 1310nm and 1550nm, respectively, has to be connected to a transceiver that transmits and receives at 1550nm and 1310nm, respectively. Two BiDi transceivers that transmit and receive at the same frequencies will not establish a link.
- ❒ Test the attenuation of both directions on the fiber optic cable with a fiber optic tester to determine whether the optical signal is too weak (sensitivity) or too strong (maximum input power).

Appendix A
Technical Specifications

This appendix contains the following sections:

Physical Specifications

Dimensions

Table 13. Product Dimensions (H x W x D)

IE220 Switches[1]	155.4 x 65.0 x 137.0 x mm (6.12 x 2.56 x 5.39 x in)

1. Enclosure only. Refer to “Device Dimensions” on page 131.

Weights

Table 14. Product Weights

IE220-6GHX Switch	With DIN rail bracket	1.57 kg (3.46 lbs)
	With wall brackets	1.45 kg (3.20 lbs)
IE220-10GHX Switch	With DIN rail bracket	1.60 kg (3.53 lbs)
	With wall brackets	1.49 kg (3.28 lbs)

Ventilation

Table 15. Ventilation Requirements for Cabinet Installation

Minimum Open Space Below Switch	5.08 cm (2.0 in)
Minimum Open Space Above Switch	5.08 cm (2.0 in)
Minimum Open Space in Front of Switch	5.08 cm (2.0 in)
Minimum Open Space On Sides of Switch	5.08 cm (2.0 in)

Cabinet (Enclosure) Dimensions

Table 16. Minimum Cabinet (Enclosure) Dimensions

Minimum Cabinet Dimensions (W x H x D)	50.8 x 50.8 x 30.5 cm (20.0 x 20.0 x 12.0 in)

Note

The enclosure size should be determined by considering multiple factors. This includes the outside ambient temperature, total heat generated from the installed equipment, sealed or unsealed enclosure type, enclosure material, paint color, mounting method (wall, pole, ground, etc.), and sun load. The smaller enclosure size you choose, the higher risk of overheating the product faces.

If the product overheats in an enclosure that was built without taking into account these factors, the warranty of the product might be voided. Consult Allied Telesis when assistance is needed.

Environmental Specifications

Note
The switch does not require an enclosure when installed in most indoor environments.

Warning
You must use a UL Listed 3X or 4X enclosure when installing the device in an outdoor environment. E144

Vertical Wall Installations

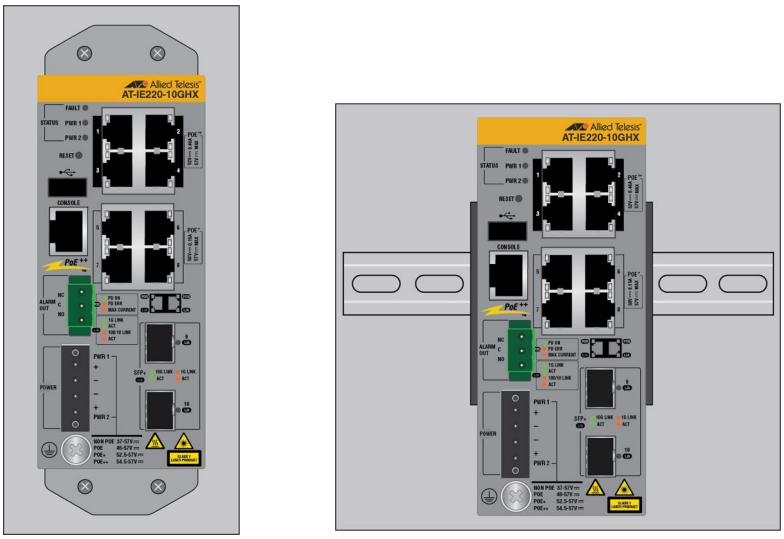


Figure 56. Vertical Wall Installations

Table 17. Operating Temperature Ratings - Vertical Installation - Top Up

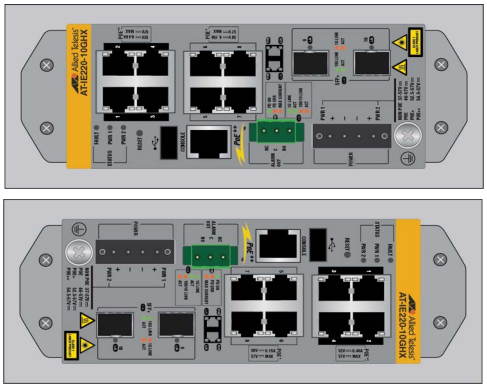
Model	PoE Load	Sealed Enclosure: 0 LFM[1,2]	Ventilated Enclosure: 40 LFM	Fan-based Enclosure: 150 LFM
IE220-6GHX	<180W	-40°C to 55°C (-40° F to 131° F)	-40°C to 65°C (-40°F to 149°F)	-40°C to 75°C (-40°F to 167°F)
IE220-10GHX	≤180W	-40°C to 55°C (-40° F to 131° F)	-40°C to 65°C (-40°F to 149°F)	-40°C to 75°C (-40°F to 167°F)
IE220-10GHX	>180W	-40°C to 50°C (-40° F to 122° F)	-40°C to 60°C (-40°F to 140°F)	-40°C to 65°C (-40°F to 149°F)

1. Linear Feet per Minute. Ambient temperature and airflow are measured 25.4mm below the switch.
2. Also applies to Indoor, No Enclosure: 0 LFM.

Note
All LFM values are the minimum baseline values for the specified minimum size enclosures. Refer to “Requirements for Outdoor Installation” on page 76. Product performance may vary depending on enclosure size and whether other heat generating devices are present in the enclosure.

Caution
The operating temperature ranges are absolute maximums at maximum PoE load. Do not operate the switch at maximum temperature and PoE load for extended periods of time as this may reduce long term reliability. E140

Horizontal Wall Installations



Wall brackets

Figure 57. Horizontal Wall Installations

Table 18. Operating Temperature Ratings - Horizontal Wall Installations

Model	PoE Load	Sealed Enclosure: 0 LFM[1,2]	Ventilated Enclosure: 40 LFM	Fan-based Enclosure: 150 LFM
IE220-6GHX	<180W	-40°C to 45°C (-40° F to 113° F)	-40°C to 55°C (-40°F to 131°F)	-40°C to 65°C (-40°F to 149°F)
IE220-10GHX	≤180W	-40°C to 45°C (-40° F to 113° F)	-40°C to 55°C (-40°F to 131°F)	-40°C to 65°C (-40°F to 149°F)
IE220-10GHX	>180W	-40°C to 40°C (-40° F to 104° F)	-40°C to 50°C (-40°F to 122°F)	-40°C to 55°C (-40°F to 131°F)

1. Linear Feet per Minute. Ambient temperature and airflow are measured 25.4mm below the switch.
2. Also applies to Indoor, No Enclosure: 0 LFM.

Floor and Ceiling Installations

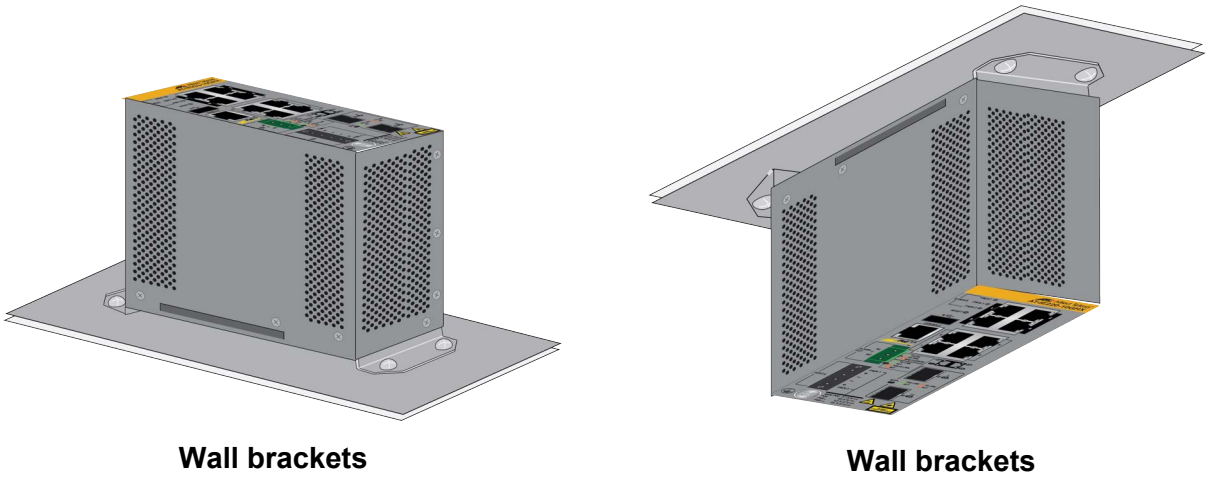


Figure 58. Floor and Ceiling Installations

Table 19. Operating Temperature Ratings - Floor and Ceiling Installations

Model	PoE Load	Sealed Enclosure: 0 LFM[1,2]	Ventilated Enclosure: 40 LFM	Fan-based Enclosure: 150 LFM
IE220-6GHX	<180W	-40°C to 50°C (-40° F to 122° F)	-40°C to 60°C (-40°F to 140°F)	-40°C to 70°C (-40°F to 158°F)
IE220-10GHX	≤180W	-40°C to 50°C (-40° F to 122° F)	-40°C to 60°C (-40°F to 140°F)	-40°C to 70°C (-40°F to 158°F)
IE220-10GHX	>180W	-40°C to 45°C (-40° F to 113° F)	-40°C to 55°C (-40°F to 131°F)	-40°C to 60°C (-40°F to 140°F)

1. Linear Feet per Minute. Ambient temperature and airflow are measured 25.4mm below the switch.
2. Also applies to Indoor, No Enclosure: 0 LFM.

Additional Environmental Specifications

Table 20. Environmental Specifications

Storage Temperature	-40° C to 85° C (-40° F to 185° F)
Operating Humidity	5% to 95% noncondensing
Storage Humidity	5% to 95% noncondensing
Maximum Operating Altitude	3,000 m (9,843 ft)

Table 21. Ingress Protection

IE220 Switch	IP30

DC Power Specifications

Table 22. DC Input Voltage Specifications

Switch	Non-PoE	PoE	PoE+	Hi-PoE	PoE++
IE220-6GHX IE220-10GHX	37-57Vdc	46-57Vdc	52-57Vdc	52-57Vdc	54-57Vdc

Table 23. Maximum Power Consumptions

Switch	No PoE Load	Full PoE Load
IE220-6GHX	17.4W	204W
IE220-10GHX	18.5W	266W

Table 24. Heat Dissipations

Switch	No PoE Load	Full PoE Load
IE220-6GHX	59.5 BTU/hr	80.3 BTU/hr
IE220-10GHX	63.3 BTU/hr	87.7 BTU/hr

Note
The cooling requirements for the switches are smaller than the power draws because most of the load is dissipated at the PoE powered devices and along the cabling. Use these BTU ratings for facility capacity planning.

Table 25. ALM OUT Power Ratings

ALARM OUT	30Vdc maximum	0.5A maximum
	48Vdc maximum	1.0A maximum

Note
For ALARM OUT wiring specifications, see “Wiring the Alarm Out Connector” on page 91.

EMC and Environmental Test Types

The IE220 Switches passed the tests in Table 26 and Table 27 on page 125.

Table 26. Electromagnetic Compatibility Test Types

Test Type	Test Standard	Test Severity Level
Electromagnetic Immunity	EN 55035	
Harmonic Emission	EN/IEC 61000-3-2[1]	
Flicker Emission	EN/IEC 61000-3-3[1]	
Electrostatic Discharge (ESD)	EN/IEC 61000-4-2	Contact discharge: 4kV (level 2) Air discharge: 8kV (level 3)
Radiated Susceptibility (RS)	EN/IEC 61000-4-3	Radiated Immunity: 3V/m (level 2) @80~1000MHz @1.8GHz, 2.6GHz, 3.5GHz,5.0GHz
Electrical Fast Transient (EFT)	EN/IEC 61000-4-4	Signal ports: 0.5kV (level 1) DC input power ports: 1kV (level 2)
Lighting/Surge immunity (Surge)	EN/IEC 61000-4-5	Signal ports: line-to-earth 2kV (level 3) line-to-line - DC input power ports: line-to-earth 1kV (level 2) line-to-line 1kV (level 3)
Conducted immunity (CS)	EN/IEC 61000-4-6	Signal ports: 3Vrms (level 2) @0.15~80MHz 3Vrms to 1Vrms (level 2 to 1) @0.1~30MHz 1Vrms (level 1) @30~80MHz DC input power ports: 3Vrms (level 2) @0.15~80MHz 3Vrms to 1Vrms (level 2 to 1) @0.1~30MHz 1Vrms (level 1) @30~80MHz
Power Frequency Magnetic Field	EN/IEC 61000-4-8	1A/m (level 3)
AC voltage dips and interruption	EN/IEC 61000-4-11[1]	ΔU 30% for 500ms ΔU 60% for 200ms ΔU 95% for 5s ΔU 95% for 10ms
DC voltage dips and interruption	EN/IEC 61000-4-29	ΔU 0% for 10ms ΔU 0% for 30ms, 100ms, 300ms, 1s ΔU 40% & 70% for 10ms, 30ms ΔU 40% & 70% for 100ms, 300ms, 1s ΔU 100% & 120% for 100ms to 10s

Table 26. Electromagnetic Compatibility Test Types (Continued)

Test Type	Test Standard	Test Severity Level
Electromagnetic Emissions	AS/NZS CISPR 32	Class A
	CISPR 32	Class A
	EN 55032	Class A
	FCC 47 CFR Part 15, subpart B	Class A
	ICES-003	Class A
	VCCI	Class A

1. Applicable when the IE220 Switch is powered by an AC/DC power supply unit (e.g., IE048 Industrial Power Supply).

Table 27. Environmental and Endurance Test Type (Pending)

Test Type	Test Standard	Test Severity Level[1]
Connector unmating endurance	EN/IEC 60512-99-002	
Test A: Cold	EN/IEC 60068-2-1	
Test B: Dry heat	EN/IEC 60068-2-2	
Test Z/AD: Composite temperature/humidity cyclic test	EN/IEC 60068-2-38	
Test Cab: Damp heat, steady state	EN/IEC 60068-2-78	
Test Db: Damp heat, cyclic (12 h + 12 h cycle)	EN/IEC 60068-2-30	
Test Fc: Vibration	EN/IEC 60068-2-6	
Test Ea: Shock	EN/IEC 60068-2-27	
Test Ec: Rough handling shocks (freefall)	EN/IEC 60068-2-31	

1. For final test results, contact Allied Telesis.

RJ-45 Copper Port Pinouts

Figure 59 identifies pin 1 on the RJ-45 copper ports.

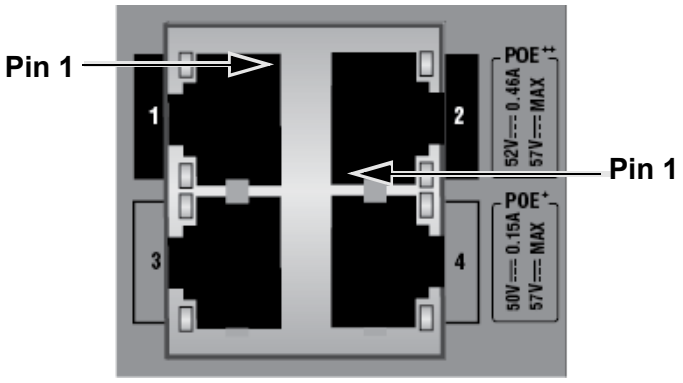


Figure 59. RJ-45 Port Pin Layout (Front View)

Table 28 lists the pin signals for ports operating at 10 or 100Mbps.

Table 28. Pin Signals for 10 and 100Mbps

Pin	MDI Signal	MDI-X Signal
1	TX+	RX+
2	TX-	RX-
3	RX+	TX+
4	Not used	Not used
5	Not used	Not used
6	RX-	TX-
7	Not used	Not used
8	Not used	Not used

Table 29 lists the pin signals for a port when it operating at 1000Mbps.

Table 29. Pin Signals for 1000Mbps

Pinout	Pair
1	Pair 1 +
2	Pair 1 -

Table 29. Pin Signals for 1000Mbps (Continued)

3	Pair 2 +
4	Pair 3 +
5	Pair 3 -
6	Pair 2 -
7	Pair 4 +
8	Pair 4 -

RJ-45 Style Serial Console Port Pinouts

Figure 60 identifies pin 1 on the RJ-45 connector on the Console port.

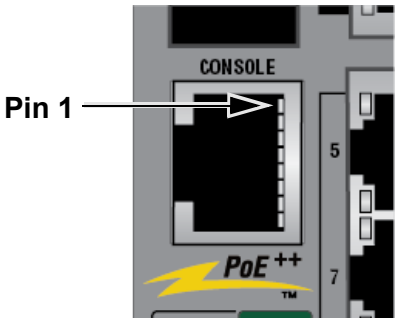


Figure 60. Console Port Pin Layout (Front View)

Table 30 lists the pin signals for the RJ-45 style serial Console port.

Table 30. RJ-45 Style Console Port Pin Signals

Pin	Signal
1	Open
2	Looped to pin 7
3	Transmit Data
4	Ground
5	Ground
6	Receive Data
7	Looped to pin 2
8	Open

Console Management Cable with DB-9 Female and RJ-45 Connectors

Figure 61 and Table 31 show the pin-outs for a Console port management cable with DB-9 female and RJ-45 connectors.

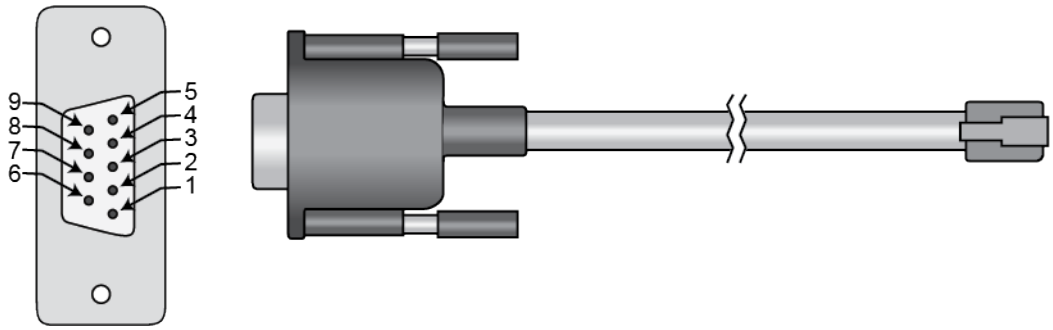


Figure 61. Console Port Management Cable with DB-9 Female and RJ-45 Connectors

Table 31. Pin-outs of Console Port Management Cable with DB-9 Female and RJ-45 Connectors

DB-9 Female Connector Pins	RJ-45 Connector Pins
1	4
2	3
3	6
4	7
5	5
6	2
7	8
8	1
9	NC

PWR 1 and PWR 2 DC Input Connectors

Table 32. PWR 1 and PWR 2 DC Input Connector Pin Signals

Pin	Signal
+	48/54 Vdc
-	Vdc Return

Device Dimensions

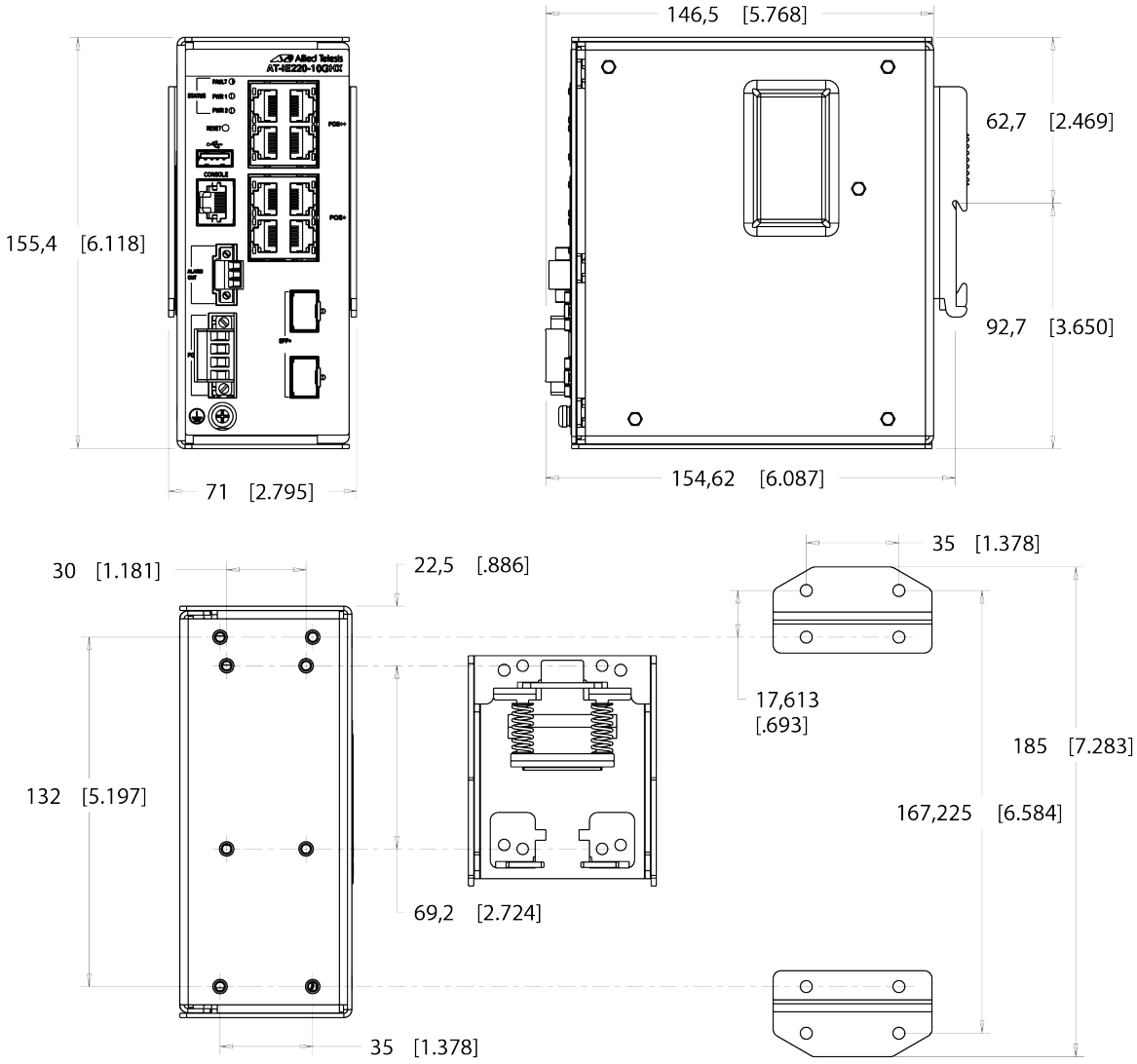


Figure 62. IE220 Series Dimensions