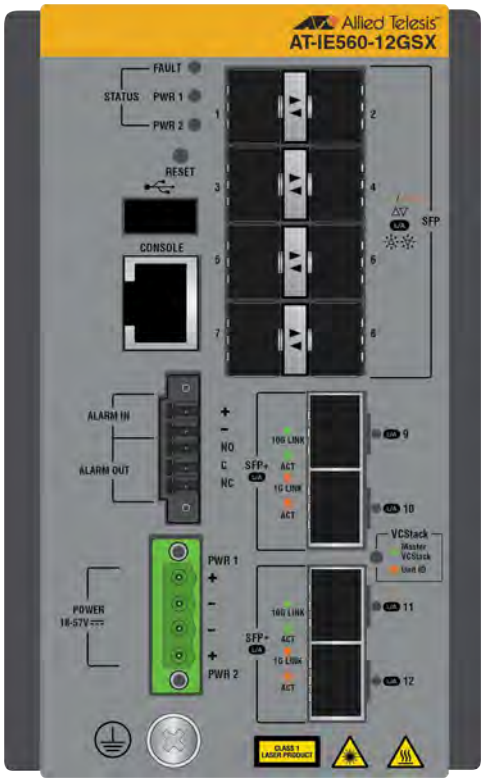
IE560 Series

Industrial Ethernet Layer 3 Switch

IE560-12GSX



Installation Guide

613-003351 Rev. A

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 (Pending), TEC (Pending), UL, UL-EU, VCCI, UKCA

Safety - Pending

AS/NZS 62368-1
Audio/video information and communication technology equipment: Part 1: Safety requirements (Australian/New Zealand Standards)

CAN/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.

EN/IEC 60950-22
Audio/video information and communication technology equipment installed in outdoor locations.
Part 22: Safety requirements.

Electromagnetic Immunity - Pending

EN 55035
Electromagnetic compatibility of multimedia equipment - Immunity requirements

EN/IEC 61000-6-2
Electromagnetic compatibility;
Part 6-2: Generic standards - Immunity standard for Industrial Environments

IEC CISPR 35
Electromagnetic compatibility of multimedia equipment - Immunity requirements

Electromagnetic Emissions - Pending

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

EN 55032
Electromagnetic compatibility of multimedia equipment - Emission requirements

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

ICES-Gen
General Requirements for Compliance of Interference-causing Equipment
(Canadian Standard)

ICES 003
Information Technology Equipment (Including Digital Apparatus)
Limits and Methods of Measurement
(Canadian Standard)

EN/IEC 61000-6-4
Electromagnetic compatibility;
Part 6-4: Generic Standards - Emission Standard for Industrial Environments.

IEC CISPR 32
Electromagnetic compatibility of Multimedia Equipment - Emission requirements

Other Approvals

EN 50121-4
Railway Applications - Electromagnetic Compatibility;
Part 4: Emissions and immunity of the signaling and telecommunications apparatus

EN 50121-5
Railway Applications - Electromagnetic Compatibility;
Part 5: Emissions and immunity of fixed power supply installations and apparatus

IEC 62236-4
Railway Applications - Electromagnetic Compatibility;
Part 4: Emissions and immunity of the signaling and telecommunications apparatus

IEC 62236-5
Railway Applications - Electromagnetic Compatibility;
Part 5: Emissions and immunity of fixed power supply installations and apparatus

IEC 61850-3
Communications networks and systems for power utility automation;
Part 3: General requirements

IEEE 1613
IEEE Standard Environmental and Testing Requirements for Communications Networking Devices in Electric Power Substations

Note
Refer to “Electromagnetic Compatibility Test Types” on page 202 in Appendix A, ”Technical Specifications” on page 193 for further information.

Allied Telesis Approved SFP Modules - Pending

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 “Electromagnetic Compatibility Test Types” on page 202 in Appendix A, “Technical Specifications” on page 193 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

Warning
Laser Safety, EN 60825 L7

Contents

Figures

Tables

Preface

This guide contains the hardware installation instructions for the IE560 Series of Industrial Ethernet Layer 3 Switches. The instructions explain how to install the series as standalone units or in a VCStack™ of multiple switches. The series currently consists of this switch model:

- IE560-12GSX Switch

Note
Refer to the Allied Telesis web site for a list of all models in the series.

The preface contains the following sections:

How to Use this Installation Guide

Installing a Standalone Switch

Here are the steps and procedures to installing the switch as a standalone unit:

Step 1. Review the Hardware Overview

- ❒ Chapter 1, “IE560 Series Overview” on page 23

Step 2. Install the Hardware

- ❒ Chapter 2, “Beginning the Installation” on page 55
- ❒ Chapter 3, “Installing the Switch” on page 69
- ❒ Chapter 4, “Cabling the SFP and SFP+ Ports” on page 89

Step 3. Power On and Verify the Switch

- ❒ Chapter 5, “Wiring the Ground, ALARM, and POWER Connectors” on page 97
- ❒ Chapter 6, “Powering On the Switch” on page 113
- ❒ Chapter 7, “Managing a Standalone Switch” on page 119
- ❒ Chapter 8, “Troubleshooting” on page 131

Installing a VCStack

Here are the steps and procedures to installing the switch in a VCStack:

Step 1. Review the Hardware and VCStack Overviews

- ❒ Chapter 1, “IE560 Series Overview” on page 23
- ❒ Chapter 9, “VCStack Overview” on page 139

Step 2. Install the Hardware

- ❒ Chapter 2, “Beginning the Installation” on page 55
- ❒ Chapter 3, “Installing the Switch” on page 69

Step 3. Configure the Switches for VCStack

- ❒ Chapter 10, “VCStack Commands Overview” on page 155
- ❒ Chapter 11, “Configuring the Master Switch” on page 161
- ❒ Chapter 12, “Configuring Member Switches” on page 175

Step 4. Cable the Stacking Ports

❒ Chapter 4, “Cabling the SFP and SFP+ Ports” on page 89

Note
After configuring the switches for VCStack, cable the stacking ports and test the stack. You should cable the networking ports only after verifying that the switches are operating as a stack.

Step 5. Power On and Verify the VCStack

Chapter 13, “Powering On and Verifying the Stack” on page 187

Step 6. Cable the Networking Ports

❒ Chapter 4, “Cabling the SFP and SFP+ Ports” on page 89

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.

Translated Safety Statements

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  Wichtig: Das ✍ zeigt an, dass Übersetzungen der Sicherheitserklärung in den PDF-**Translated Safety Statements** auf der Allied Telesis-Website unter **alliedtelesis.com/us/en/library/search** verfügbar sind.

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Section I

Hardware Overview and Installation

The chapters in this section contain hardware overview and installation instructions:

Note
Refer to “How to Use this Installation Guide” on page 16 before beginning the installation.

Chapter 1

IE560 Series Overview

This chapter describes the hardware features of the IE560 Series of Industrial Ethernet Layer 3 switches. The sections are listed here:

Hardware Components

The IE560 Series of Industrial Managed Layer 3 switches is designed to withstand harsh environmental conditions, such as power surges and extended temperature ranges, commonly experienced in power utility deployments.

IE560-12GSX Switch

Figure 1 illustrates the front panel of the IE560-12GSX Switch.

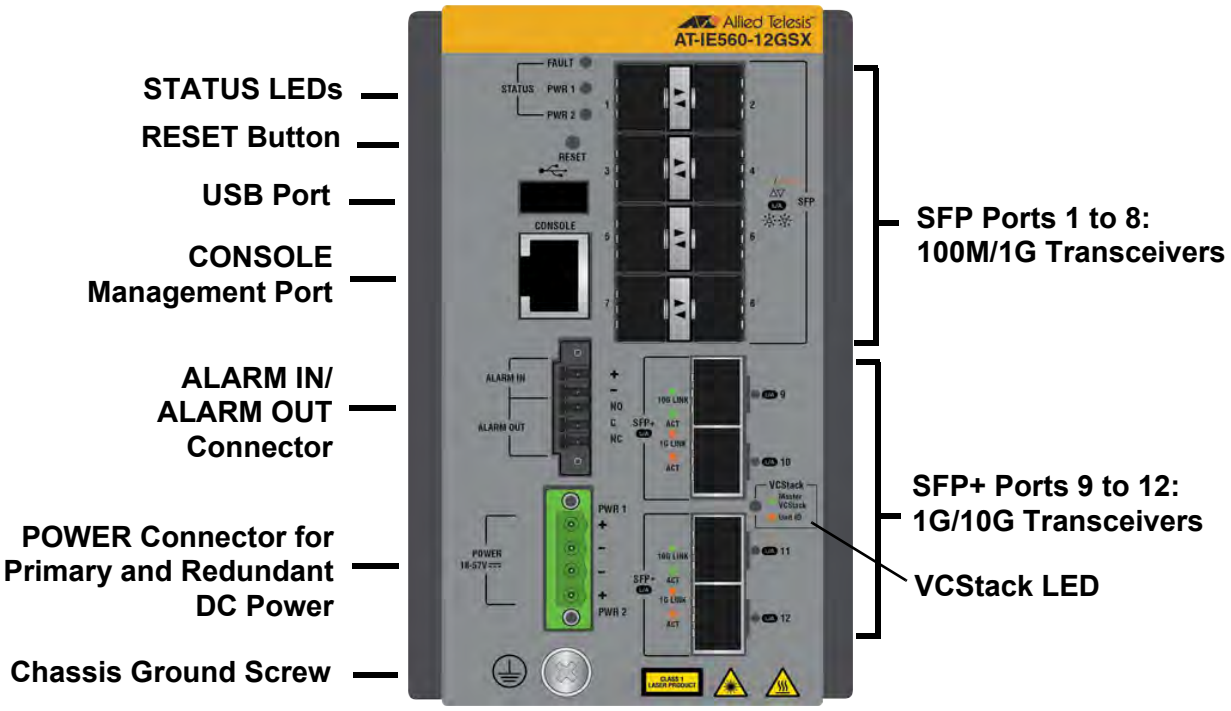


Figure 1. Front Panel of the IE560-12GSX Switch

Figure 2 illustrates the rear panel.

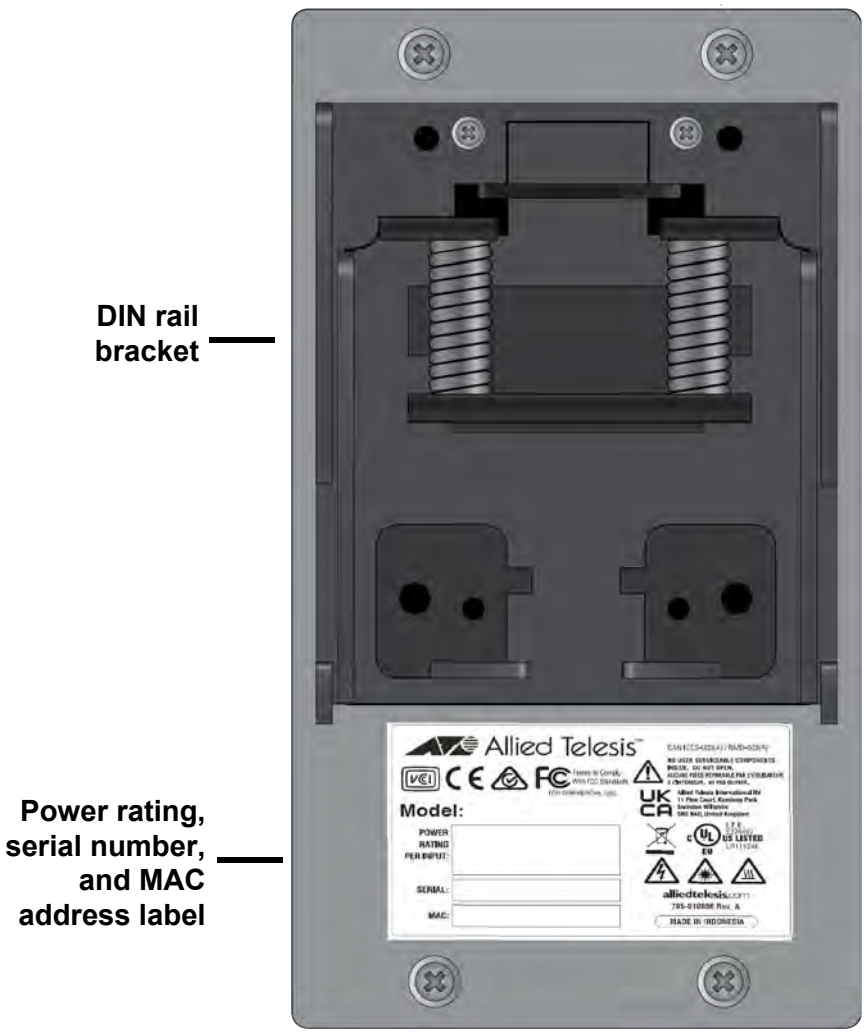


Figure 2. Rear Panel

Features

The following sections list the basic features of the IE560 Series.

SFP Ports

SFP ports 1 to 8 support these types of fiber optic transceivers:

- 100M, SFP 100Base-FX transceivers
- 100M, SFP single-port BiDi 100Base-FX transceivers
- 1G, SFP 1000Base-SX/LX transceivers
- 1G, SFP single-port BiDi 1000Base-LX transceivers
- 1G, SFP 1000Base-ZX transceivers

SFP+ Ports

SFP+ ports 9 to 12 support these types of fiber optic transceivers:

- 1G, SFP 1000Base-SX/LX transceivers
- 1G, SFP single-port BiDi 1000Base-LX transceivers
- 1G, SFP 1000Base-ZX transceivers
- 10G, SFP+ 10GBase-SR/LR/ER/ZR transceivers
- 10G, SFP+ single-port BiDi 10GBase transceivers

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

VCStack

The VCStack feature lets you manage multiple switches as a single unit and add redundancy to your network topology by distributing network functions across multiple devices. The IE560 Series supports stacks of up to four switches. For overview information, refer to "VCStack Overview" on page 139.

Protection Circuits

The IE560 Series has 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
- High temperature

Internal Alarm Monitoring

The IE560 Series has internal sensors that monitor the device's operations and alert you to possible problems, including:

- Main power source failure
- High temperature
- Dropped fiber optic port links

Alarm Connector

This connector supports these three alarm circuits for external sensors and alarm devices, alerting you to changes in the switch's installation environment or system operations:

- One ALARM IN circuit for an external sensor to monitor changes in the environmental conditions of the switch's installation site. Sensor device examples include temperature, humidity, and motion detection.
- Two ALARM OUT circuits for alert devices, such as LEDs or bells. The switch activates the devices to signal configurable operational alarm events, such as high temperature, ports without links, and power supply failures.

LEDs

The IE560 Series has the following LEDs:

- System fault LED
- Power supply STATUS LEDs
- L/A (link/activity) LEDs on the SFP and SFP+ ports

MAC Address Tables

Here are the basic features of the MAC address table:

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

Management Software

The IE560 Series supports the following management software and interfaces:

- AlliedWare Plus management software, version 5.5.5 or later
- Command line interface
- Web browser interface

Management Methods

The IE560 Series supports the following management options:

- Local management through the CONSOLE port
- Remote Telnet or secure shell (SSH) management
- Remote HTTP or HTTPS web browser management
- SNMPv1, v2c, and v3 for system monitoring

- ❒ NETCONF/RESCONF for network automation
- ❒ OpenFlow for network orchestration

Environment Installations

The product supports the following installation options:

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

Additional Features

Additional features include:

- ❒ RJ-45 style CONSOLE port for local management
- ❒ Slot for USB flash memory
- ❒ Reset button
- ❒ POWER connector for both primary and redundant power sources
- ❒ Extended environmental range
- ❒ IP30-compliant

SFP and SFP+ Ports

SFP and SFP+ transceivers allow you to connect the IE560 Series 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.

SFP Ports 1 to 8

Ports 1 to 8 support 100M (100Base-X) and 1G (1000Base-X) fiber optic, MSA-compliant SFP transceivers, listed here:

- 100M, SFP 100Base-FX transceivers
- 100M, SFP single-port BiDi 100Base-FX transceivers
- 1G, SFP 1000Base-SX/LX transceivers
- 1G, SFP single-port BiDi 1000Base-LX transceivers
- 1G, SFP 1000Base-ZX transceivers

SFP+ Ports 9 to 12

Ports 9 to 12 support 1G (1000Base-X) and 10G (10GBase-X) fiber optic, MSA-compliant SFP and SFP+ transceivers. Listed here are the types of supported transceivers:

- 1G, SFP 1000Base-SX/LX transceivers
- 1G, SFP single-port BiDi 1000Base-LX transceivers
- 1G, SFP 1000Base-ZX transceivers
- 10G, SFP+ 10GBase-SR/LR/ER/ZR transceivers
- 10G, SFP+ single-port BiDi 10GBase transceivers

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

Heat Protection Guidelines

To protect SFP and SFP+ transceivers from heat-related damage, you should select transceivers whose maximum operating temperatures exceed the anticipated maximum ambient temperature of the installation site. Table 1 on page 30 lists the recommended SFP and SFP+ maximum operating temperatures for various ambient site temperatures.

Table 1. SFP and 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, the fiber optic transceivers in a switch installed in a ventilated enclosure with >40 LFM and a maximum ambient operating temperature of 65°C (149° F) need to support a maximum operating temperature of 95°C (203°F). The recommended maximum ambient temperatures for switches with transceivers with low maximum operating temperatures may need to be reduced. 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:

STATUS FAULT, PWR 1 and PWR 2 LEDs

The STATUS FAULT, PWR 1, and PWR 2 LEDs are shown in Figure 3.

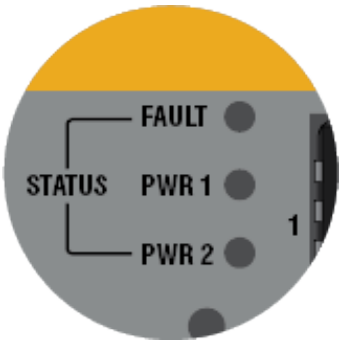


Figure 3. STATUS FAULT, PWR 1 and PWR 2 LEDs

The STATUS FAULT LED is defined in Table 2.

Table 2. STATUS FAULT LED

State	Description
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 ALARM FACILITY STATUS command in the User Exec or Privileged Exec mode of the AlliedWare Plus management software to view the active alarms. To create facility alarms that cause the FAULT LED to flash in response to alarm conditions, use the ALARM FACILITY commands in the Global Configuration mode. This example configures the switch to flash the FAULT LED if port 1 has no link to a network device: `alarm facility link-down port1.0.1 led` For more information, refer to the *Command Reference: IE560 Series Running AlliedWare Plus* on the Allied Telesis website.

Table 2. STATUS FAULT LED (Continued)

State	Description
Six flashes in two seconds	The switch is overheating and might shutdown.

The STATUS PWR 1 and PWR 2 LEDs are defined in Table 3.

Table 3. STATUS PWR 1 and PWR 2 LEDs

State	Description
Off	The switch is not receiving power on the PWR 1 or PWR 2 circuit, or the input power from the DC power supply is outside the normal operating range of the switch.
Solid Green	The switch is operating normally. The input power on the PWR 1 or PWR 2 circuit is within the normal operating range of the switch.
Solid Yellow	The input power on the PWR 1 or PWR 2 circuit is under the permitted minimum voltage.
Solid Red	The input power on the PWR 1 or PWR 2 circuit exceeds the permitted maximum voltage.

SFP Ports 1 to 8 LEDs

SFP ports 1 to 8 have one LED each. Refer to Figure 4.

Figure 4. LEDs for SFP Ports 1 to 8

The LEDs for the SFP ports are defined in Table 4.

Table 4. LEDs for SFP Ports 1 to 8

State	Description
Solid Green	The port has established a 1G link to a network device.
Flashing Green	The port is transmitting or receiving network packet traffic at 1G.
Solid Amber	The port has established a 100M link to a network device.
Flashing Amber	The port is transmitting or receiving network packet traffic at 100M.
Off	The port has not established a link to a network device or the port LEDs have been turned off with the ECOFRIENDLY LED command in the AlliedWare Plus management software.

SFP+ Ports 9 to 12 LEDs

SFP+ ports 9 to 12 have one L/A (Link/Activity) LED each. Refer to Figure 5.

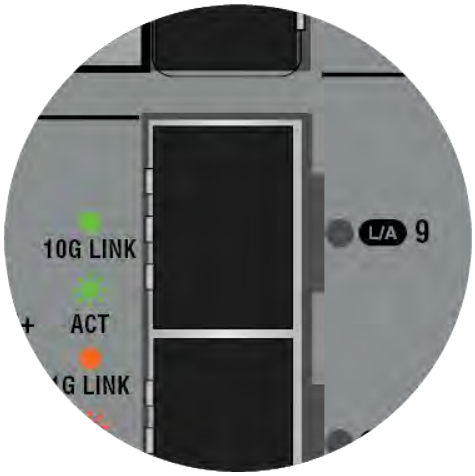


Figure 5. L/A LEDs for SFP+ Ports 9 to 12

The LED is defined in Table 5.

Table 5. L/A LEDs for SFP+ Ports 9 to 12

State	Description
Solid Green	The port has established a 10G link to a network device.
Flashing Green	The port is transmitting or receiving network packet traffic at 10G.
Solid Amber	The port has established a 1G link to a network device.
Flashing Amber	The port is transmitting or receiving network packet traffic at 1G.
Off	The port has not established a link to a network device or the port LEDs have been turned off with the ECOFRIENDLY LED command in the AlliedWare Plus management software.

VCStack LED

The VCStack LED displays the status of the VCStack feature. If VCStack is enabled, the LED signals the master or member status of the switch, and the ID number. Refer to Figure 6.

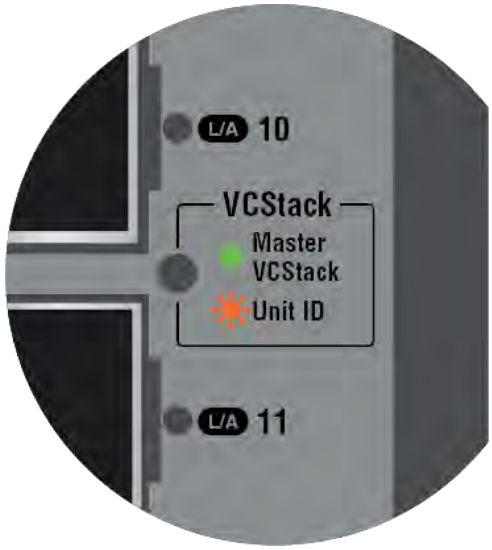


Figure 6. VCStack LED

The LED is defined in Table 6.

Table 6. VCStack LED

State	Description
Off	The VCStack feature is disabled. The switch is operating in the standalone mode.
Solid Green	The VCStack feature is enabled. The switch is operating as the master switch of the stack.
Flashing Amber	The VCStack feature is enabled. The switch is operating as a member of a stack. The switch blinks the LED equal to its VCStack ID number. For example, if its ID number is three, it blinks the LED three times, pauses, and repeats, continuously.

CONSOLE Port

The CONSOLE port, shown in Figure 7, is a serial RS-232 port for managing 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 the IP address of the switch and do not interfere with the network operations of the unit.

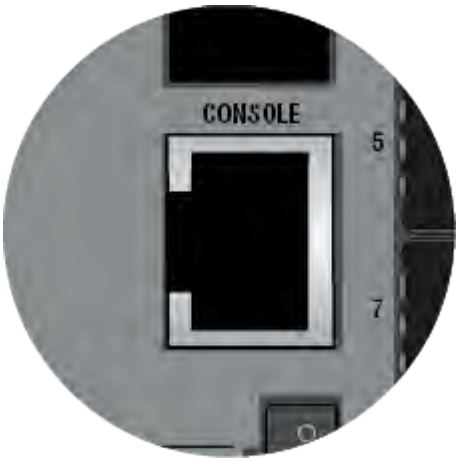


Figure 7. CONSOLE Port

Local management sessions require a management cable. 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 management cable from Allied Telesis. It has a USB-A male connector and an RJ-45 female connector. Refer to Figure 8.

Figure 8. 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 9. The VT-Kit3 management cable and software driver are sold separately.

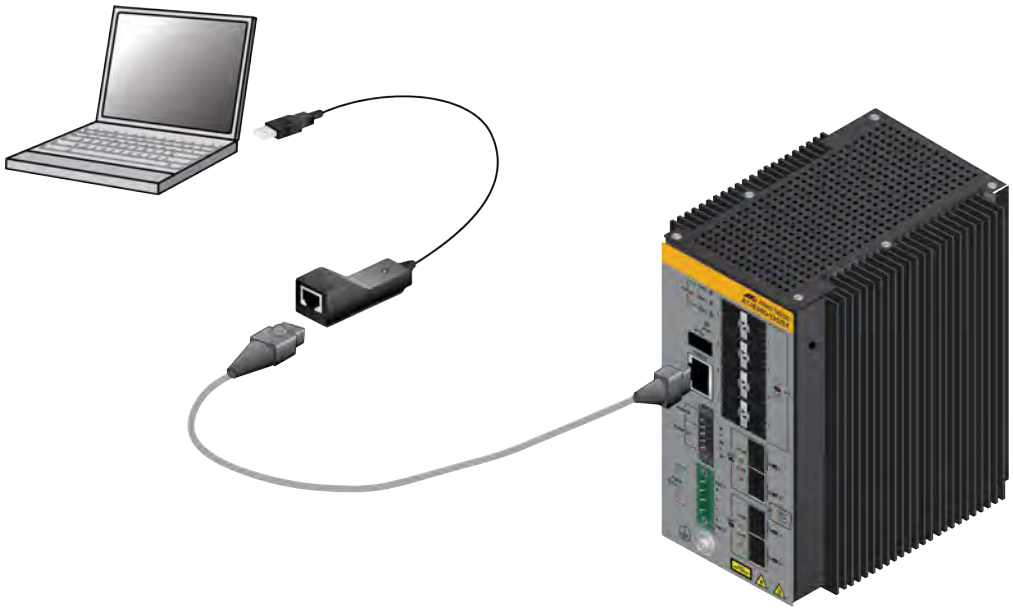


Figure 9. Local Management Session with the VT-Kit3 Management Cable

For workstations with a DB-9 female connector, refer to “CONSOLE Port Management Cable with DB-9 Female and RJ-45 Connectors” on page 212 for management cable specifications.

The CONSOLE port has these 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 start a management session on the switch from the CONSOLE port, refer to “Starting a Management Session” on page 120.

The pin assignments of the CONSOLE port are listed in Table 49 on page 211.

USB Port

The switch has a USB port for a USB storage device. Refer to Figure 10.

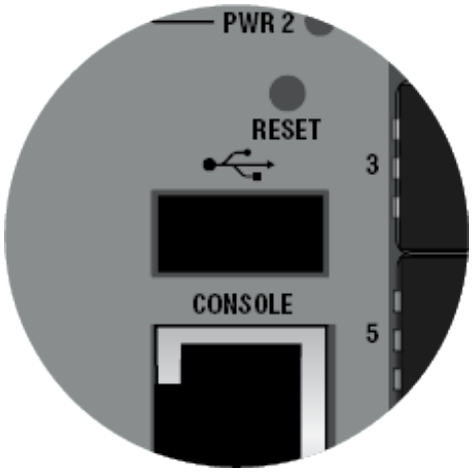


Figure 10. USB Port

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

The AlliedWare Plus management software has commands that allow you to specify the USB port as the source or destination of a management action. For example, you can copy the router's startup configuration file from its flash memory to a USB storage device and then copy it onto another switch. Table 7 lists examples of features and commands that support the USB port as the source or destination of a management function.

Table 7. Example Functions of the USB Port with a USB Storage Device

Function	AlliedWare Plus Command
File and Configuration Management	
Configure the switch using a configuration file on the USB storage device the next time it boots.	BOOT CONFIG-FILE

Table 7. Example Functions of the USB Port with a USB Storage Device

Function	AlliedWare Plus Command
Direct the switch to the USB storage device for the AlliedWare Plus management software the next time it boots.	BOOT SYSTEM
Copy files to or from the USB storage device, or create duplicate files on the storage device.	COPY
Save debug files on a USB storage device to diagnose or troubleshoot network issues.	COPY DEBUG MOVE DEBUG
Save the running-config file on a USB storage device. It contains the switch's current configuration, including commands that have not yet been saved in the startup-config file.	COPY RUNNING-CONFIG
Save the startup-config file on a USB storage device. The file contains the switch's currently saved configuration settings.	COPY STARTUP-CONFIG
Save autoboot.txt files on the USB storage device. The switch uses the files to restore a release file and/or configuration file to its file system.	CREATE AUTOBOOT
List the files on a USB storage device.	DIR
Generate system and debugging information for the switch and save it in a file on a USB storage device.	SHOW TECH-SUPPORT
Close all open files and stop all management actions on the USB storage device. You should always perform this command before removing a USB storage device from the drive, to prevent corrupting data files.	UNMOUNT

Table 7. Example Functions of the USB Port with a USB Storage Device

Function	AlliedWare Plus Command
Configure a trigger that the switch performs when a USB storage device is inserted or removed in the USB port.	TYPE USB
Save syslog messages in a file on the USB storage device.	LOG EXTERNAL
Copy the buffered log onto the USB storage device.	COPY BUFFERED-LOG
Copy the permanent log onto the USB storage device.	COPY PERMANENT-LOG

POWER Connector

The IE560 Series can be powered by one or two DC power supplies. A single DC power supply that meets the specifications in “Switch DC Power Requirements” on page 51 can fully power the switch. Adding a second power supply provides power redundancy, thereby protecting the device from power loss in the event a power supply fails or loses power.

The DC power supplies are connected to the PWR 1 and PWR 2 connections on the POWER connector. Refer to Figure 11.

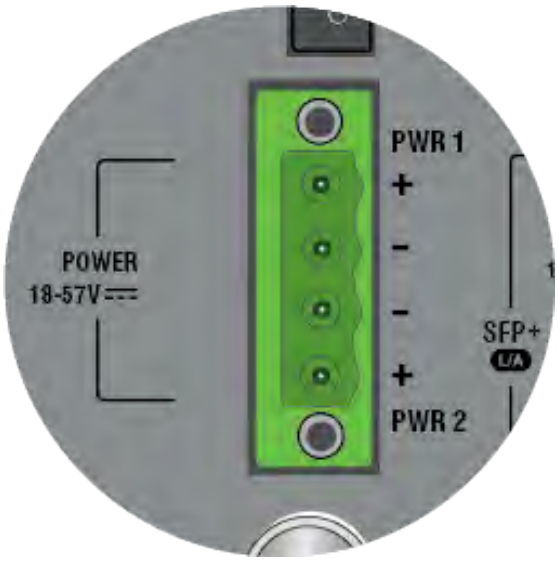


Figure 11. POWER Connector

The switch supports the following types of power sources:

- AC/DC rectifiers
- Un-interruptible power supplies

Note
The switch signals an alert event by flashing the FAULT LED on the front panel if it is connected to only one power source or if it is connected to two power supplies and one is powered off. The switch also enters an alert message in the SHOW SYSTEM ENVIRONMENT command. To deactivate the alert, refer to “FAULT LED” on page 132 in Chapter 8, “Troubleshooting” on page 131.

For more information, refer to “Power Supplies” on page 52 and “DC Power Specifications” on page 200.

ALARM IN / ALARM OUT Connector

The ALARM IN / ALARM OUT connector has three separate circuits for alerting you to changes at the installation site or operations of the switch. The circuits are explained in the following sections.

- “ALARM IN Circuit”, next
- “ALARM OUT Circuits” on page 45

ALARM IN Circuit

The ALARM IN circuit is for an external sensor. Refer to Figure 12. With an external sensor, the switch can monitor the status or condition of its physical location, such as its wiring room or cabinet. For instance, the switch can monitor the room for unauthorized access or for changes in the temperature or humidity. Here are examples of external sensors:

- Door
- Temperature
- Motion detector
- Light
- Humidity

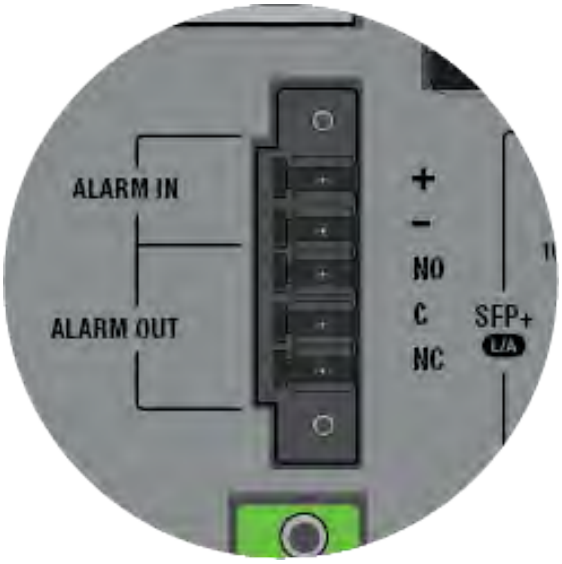


Figure 12. ALARM IN / ALARM OUT Connector

The two pins of the ALARM IN circuit are referred to as contact alarm 1 in the AlliedWare Plus management software. The switch places a 3.3VDC voltage on the circuit and monitors its status, which is either closed or open. A closed circuit is on, allowing voltage to flow through the circuit, while an open circuit is off, blocking the flow of voltage through the circuit.

The switch performs one or more of the following functions when the state of the external sensor changes to open or closed.

- Transmits an SNMP trap.
- Flashes the Fault LED.
- Activates the device on the ALARM OUT pins.

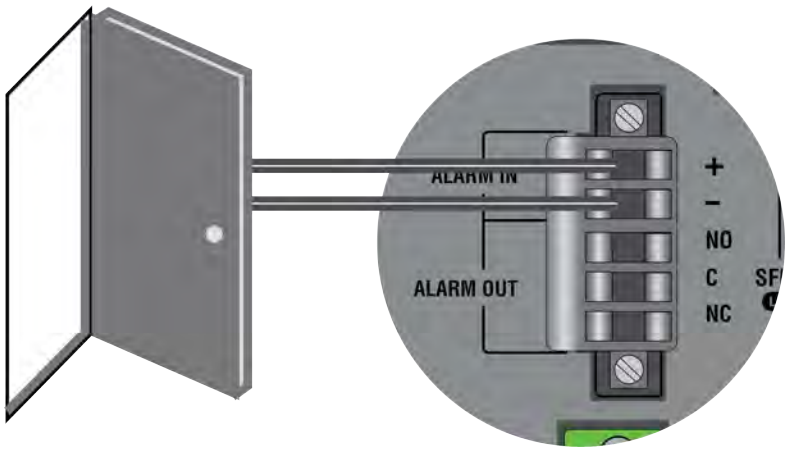
You use the ALARM FACILITY INPUT-ALARM command in the AlliedWare Plus management software to specify the state of the external sensor that signals an alarm. Alarms remain active until their causes are resolved. For instructions, refer to the *Command Reference: IE560 Series Running AlliedWare Plus* on the Allied Telesis website.

Here are the requirements for the external sensor on the ALARM IN circuit:

- It must be a dry contact.
- It must not place any current on the circuit.
- It must not use the voltage or current for its own operations.
- It must be able to handle a minimum of 3.3VDC and 320uA.

Caution
The external sensor might damage the ALARM IN circuit if it places a voltage on it. E118

The example in Figure 13 shows the ALARM IN circuit attached to a door sensor. The sensor is installed such that it is closed (on) when the door is closed and open (off) when the door is open.



Door Sensor:
Door closed - circuit closed
Door open - circuit open

ALARM IN circuit:
Alarm triggered when circuit changes to open.

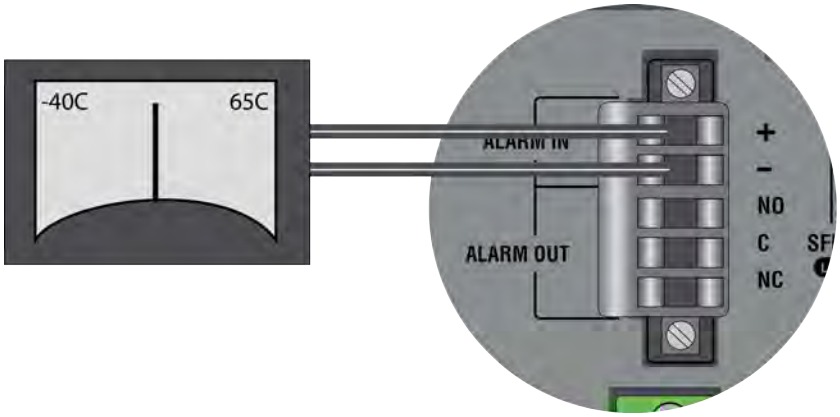
Figure 13. Example 1 of the ALARM IN Circuit

To have the switch generate an alarm when someone opens the door, you enter the following ALARM FACILITY INPUT-ALARM command. The command configures the switch to generate an alarm when the state of the sensor changes from closed to open.

```
awplus(config)# alarm facility input-alarm 1 alarm-
position open
```

The alarm remains active until the door is closed again.

In the example in Figure 14, the ALARM IN circuit is connected to a temperature sensor. The sensor is configured to be open (off) at temperatures of 30°C or below and closed (on) at temperatures above 30°C.



Temperature Sensor:
Temperature <30°C - circuit open
Temperature >30°C - circuit closed

ALARM IN circuit:
Alarm triggered when circuit changes to closed.

Figure 14. Example 2 of the ALARM IN Connector

To have the switch trigger an alarm when the temperature exceeds 30°C, you enter the following ALARM FACILITY INPUT-ALARM command:

```
awplus(config)# alarm facility input-alarm 1 alarm-
position close
```

The command configures the switch to signal an alarm when the sensor rises above 30°C. When the temperature falls below 30°C, and the temperature sensor opens again, the switch automatically cancels the alarm.

Note
External sensors are not available from Allied Telesis.

ALARM OUT Circuits

The ALARM IN / ALARM OUT connector has two ALARM OUT circuits for external alert devices. The switch uses the circuits to 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
- Bell

The pin signals on the ALARM OUT connector are listed here and identified in Figure 15:

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

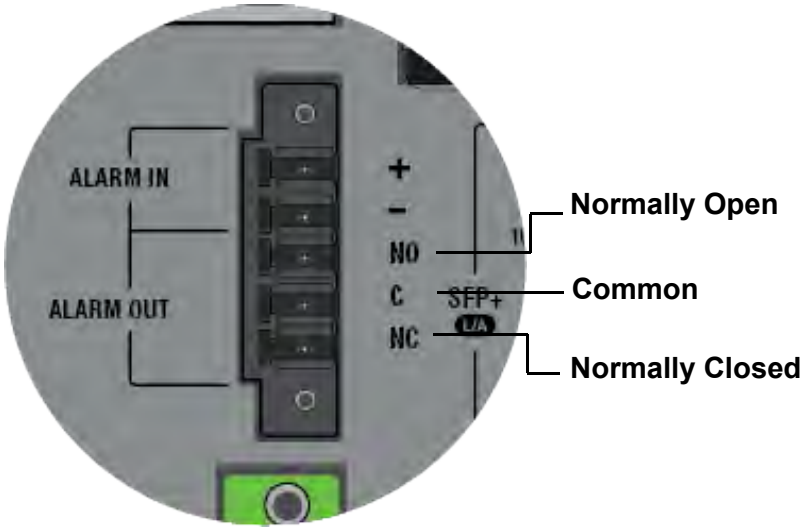


Figure 15. Pin Signals on the ALARM IN/ALARM OUT Connector

The circuits are relays with two states: open and closed. The switch automatically controls the circuits by opening or closing them after detecting alarm conditions or when alarm conditions are resolved. The switch turns off a circuit, blocking the flow of electricity, by opening it. The switch turns on the circuit, allowing the flow of electricity, by closing it.

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 choices:

- Normally Open and Common circuit: 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.

- Normally Closed and Common circuit: 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.

You may use both Normally Closed and Normally Open circuits, simultaneously.

Note
The state of the circuits when the switch is powered off is Normally Open.

The external alert devices must provide the power for the circuits and monitor them for their closed or open state. They must be isolated power supplies with output power specifications that equal or are less than 48Vdc, 1A, maximum.

Caution
The external alert devices must not exceed these specifications. The ALARM OUT connector can be damaged by devices that exceed the specifications. E119

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

You specify the alarm conditions that change the states of the ALARM OUT circuits with the ALARM FACILITY RELAY command in the AlliedWare Plus management software. Examples of alarm conditions are power supply failures, ports without links, and loop detections. For instructions, refer to the *Command Reference: IE560 Series Running AlliedWare Plus* on the Allied Telesis website.

An example of the feature is illustrated in Figure 16. 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 connector. Refer to Figure 16.

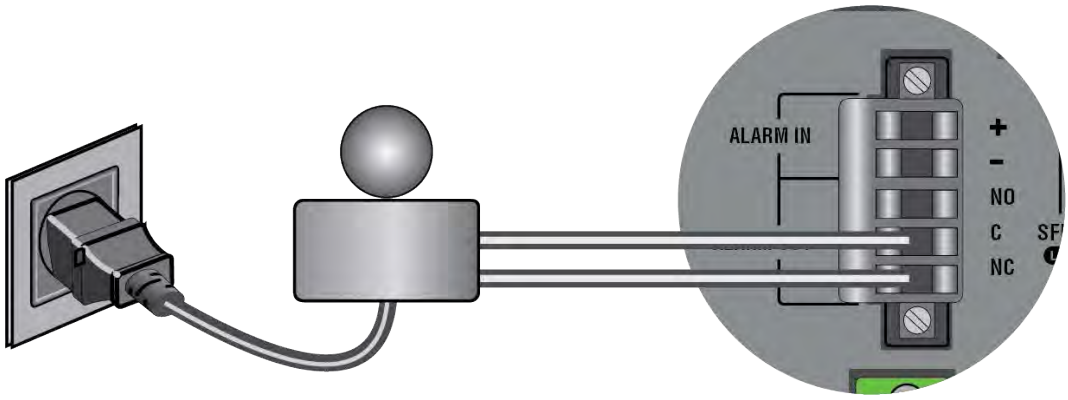


Figure 16. Example of the ALARM OUT Circuit with an LED Alert Device

Now assume you want the switch to change the circuit and activate the LED when any of the ports on the switch are not linked to network devices. Here is the ALARM FACILITY RELAY command:

```
awplus(config)# alarm facility link-down port1.0.1-
port1.0.8 relay
```

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

Note
Alarm devices are not available from Allied Telesis.

Reset Button

The Reset button resets the switch by restarting the AlliedWare Plus management software. Refer to Figure 17. 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.

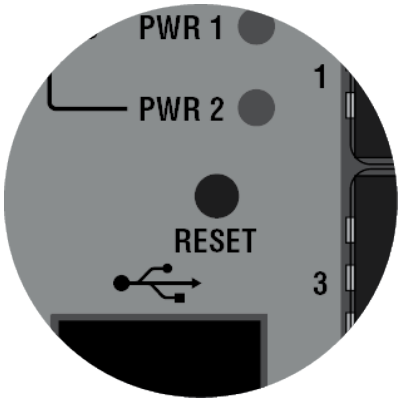


Figure 17. Reset Button

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 several 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. Refer to Figure 18. For instructions, refer to “Connecting the Ground Wire” on page 98.

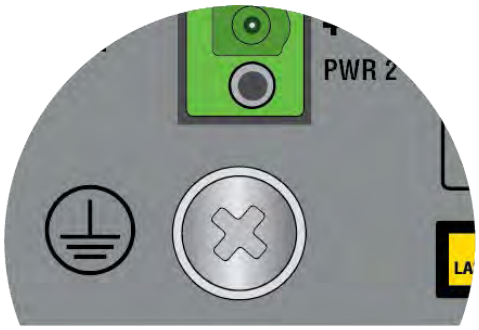


Figure 18. Ground Screw

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

DIN Rail Bracket

The switch comes with one DIN rail bracket pre-installed on the back panel. Refer to Figure 2 on page 25. The bracket is compatible with DIN 35 x 7.5mm rails. For instructions, refer to “Installing the Switch on a DIN Rail” on page 73.

Wall Brackets

The switch comes with two wall brackets in the accessory kit. Refer to Figure 19. Installing the device on a wall requires removing the DIN rail bracket from the rear panel and replacing it with the wall brackets. For instructions, refer to “Installing the Switch on an Indoor Wooden Wall” on page 76 or “Installing the Switch on an Indoor Concrete Wall” on page 82.

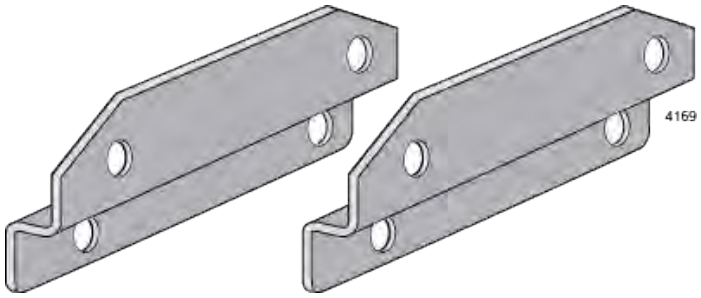


Figure 19. Wall Brackets

Switch DC Power Requirements

The maximum and recommended input DC voltage ranges for the IE560-12GSX Switch on its DC input are listed here

- Maximum range: 18Vdc to 57Vdc
- Recommended range: 24Vdc to 48Vdc

The DC input voltage guidelines are listed here:

- The DC input voltage must not exceed 57Vdc to avoid damaging the device.
- The DC input current has to be available continuously over the operating temperature range and required consumption.

Note
The range is absolute with no tolerance.

Caution
Use a UL-listed DC power supply that is suitable for the operating altitude of 3,000 m 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
The IE560-12GSX Switch can be powered by one or two power supplies. A single power supply that meets the requirements specified above can fully power the switch. A second power supply adds power redundancy.

Note
The FAULT LED will signal a fault condition if the switch is connected to only one power source. You can resolve this with the SYSTEM PSU command in the Global Configuration mode of the AlliedWare Plus management software. For instructions, refer to “FAULT LED” on page 132.

Power Supplies

You can power the IE560 Switch with the IE048-120 Power Supply from Allied Telesis. The power supply is an industrial product with an extended operating temperature for harsh environments, such as those found in industrial applications. The IE048-120 Power Supply is sold separately. Here are main features:

- 120W 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

Warning
The IE048-120 Power Supply and other non-compliant UL/EN/IEC 61010-1 and 61010-2-201 power supplies must be installed in fire protection enclosures when installed on walls of combustible material (e.g., wood). Additionally, the floor area directly below the power supplies should be non-combustible (e.g., metal or concrete) and free of combustible material (e.g., paper, plastic, or wood).
E156

Note
The switch will signal an alert event by flashing the FAULT LED on the front panel if it is connected to only one power source or if it connected to two power sources and one is powered off. The switch also enters an alert message in the SHOW SYSTEM ENVIRONMENT command. To deactivate the alert, refer to “FAULT LED” on page 132 in Chapter 8, “Troubleshooting” on page 131.

Note
The output power of the IE048-120 Power Supply is affected by the input voltage and ambient temperature. Refer to its data sheet for the derating curve.

Note
Power supplies from third-party manufacturers must meet the power requirements listed in “Switch DC Power Requirements” on page 51 and “DC Power Specifications” on page 200 to be compatible with the IE560-12GSX Switch.

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**.

Note
Safety precautions with the “L” prefix relate to hazards handling fiber optic transceivers, which may contain lasers. Safety precautions with the “E” prefix relate to general hazards, including to, but not limited to, temperature and electricity.

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
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. E159

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
Disconnect all DC power wires before servicing the unit. E160

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
The device requires a UL Listed Type 3X or higher enclosure when installed in outdoor environments. E144

Note
The standards for Type 3X and higher enclosures include protection from corrosion.

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.

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 electrical 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 wires, 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 higher enclosure when installed in outdoor environments. 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 or bottom 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 necessary 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.

Note
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 196. For heat dissipation, refer to Table 34 on page 200.
- 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 a 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.
- 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 8.

Table 8. Ground Resistivity Recommendations

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

- Outdoor installation requires adequate electromagnetic immunity due to the higher threat-level conditions. For guidelines, refer to “Installing the Switch in Outdoor Environments” on page 70.
- When installing the switch in environments vulnerable to shock, seismic movement, and/or high vibration, Allied Telesis recommends the following:
  - All fiber optic cables should be properly strain relieved to prevent cable tension from disconnecting fiber optic transceivers from switch ports during vibration.
  - If installing the device on a wall, apply threadlocking adhesive (e.g., Loctite) to the screws that attach the wall mount brackets to the switch and also to the screws that attach the wall mount brackets to the wall.
  - If installing the device on a DIN rail, secure it by installing DIN RAIL end clamps.

Unpacking the Switch

To unpack the switch, perform the following procedure:

1. Remove all the components from the shipping box. Refer to Figure 20.

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

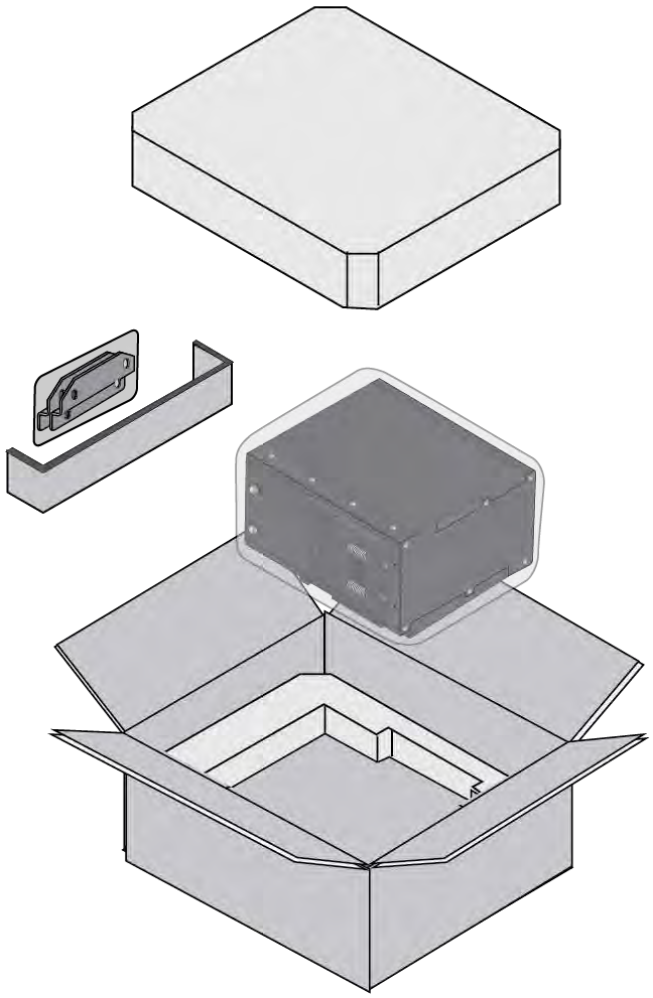


Figure 20. Removing the Switch from the Shipping Box

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 21 and Table 9 identify the pre-installed components.

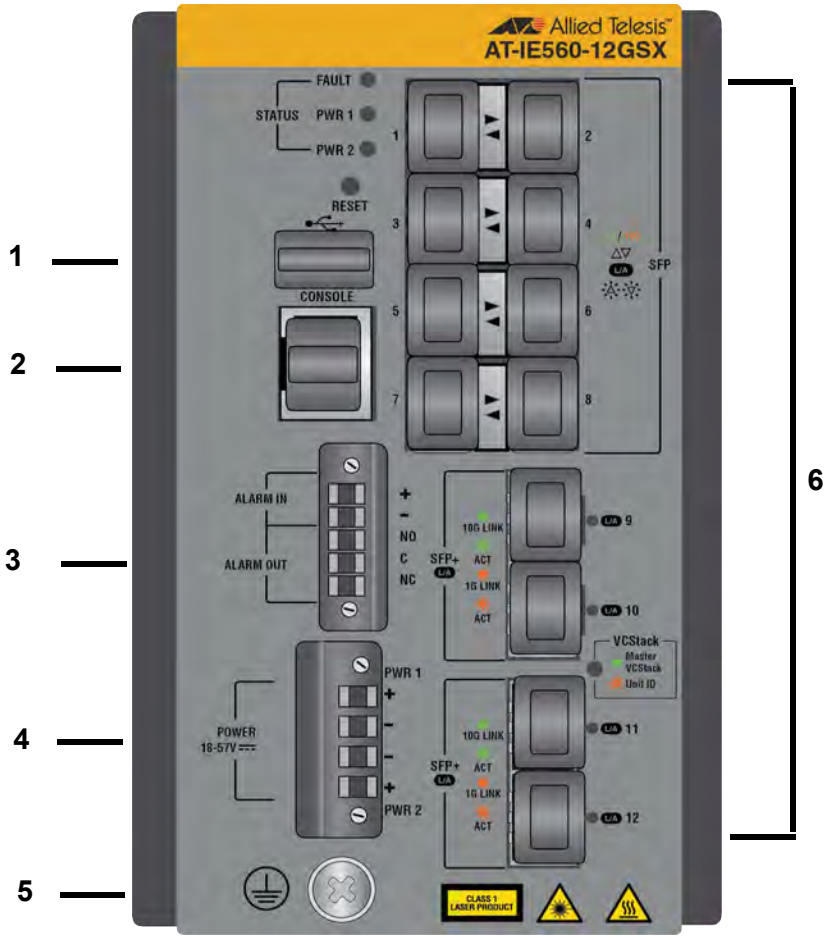


Figure 21. Pre-installed Components on the IE560-12GSX Switch

Table 9. Pre-installed Components on the IE560-12GSX Switch

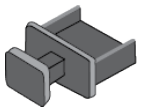
	Pre-installed Components	
1		One dust cover on the USB port
2		One dust cover on the CONSOLE port

Table 9. Pre-installed Components on the IE560-12GSX Switch

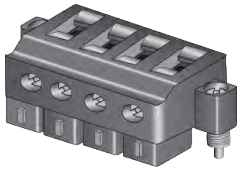
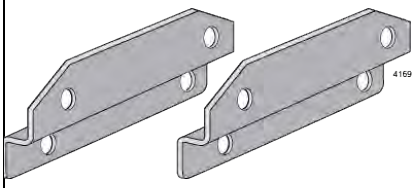
	Pre-installed Components	
3		One 5-pin plug on the ALARM IN/ALARM OUT connector
4		One 4-pin plug on the POWER connector
5		One M4x8 cross-head grounding screw
6		Twelve dust covers on the SFP and SFP+ ports 1 to 12
-		One DIN rail bracket on back panel

Table 10 lists the items in the accessory kit.

Table 10. Accessory Kit

Accessory Kit Components	
	Two wall brackets
	Five M4x8 cross-head screws (one spare screw)

Tools and Material

Table 11 lists the required tools and material for the installation:

Table 11. Tools and Material

Ground wire	❒ One solid ground wire (recommended #12 AWG or #14 AWG solid wire) ❒ One heat-shrink tube ❒ Ring-terminal lug
Power wires	❒ Two or four stranded power wires (recommended #14 AWG stranded wire. Do not use wire heavier than #12 AWG). ❒ One or two 2-wire connectors to connect the power wires to the AC/DC rectifiers or UPS units.
Alarm devices (optional)	❒ External sensor for the ALARM IN circuit and/or external alert devices for the ALARM OUT circuits. ❒ #24 to #18 AWG stranded wire properly rated for the installation site, maximum length of two meters
Outdoor installation	❒ Outdoor environment enclosure. Refer to “Installing the Switch in Outdoor Environments” on page 70 for minimum enclosure ratings.
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 diameter of the screw holes in the wall brackets is 4.5 mm (0.17 in.)).
Concrete wall installation	❒ Four wall anchors and screws
Tools	❒ #1 flat-head screwdriver ❒ Cross-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 the agency label on the rear panel, below the DIN rail bracket. Refer to Figure 22. You should record the numbers for your records before installing the device.

Figure 22. 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 in Outdoor Environments

The IE560 Series is suitable for outdoor environments when installed in enclosures rated for the environments. The minimum rated enclosures when the device is installed outdoors are:

- UL Listed North American Type 3X or higher enclosure
- UL Listed European Union Type 3X or higher enclosure

Note
The standards for Type 3X and higher enclosures include protection from corrosion.

Note
The switch can be installed vertically or horizontally in an enclosure.

Caution
Do not install the switch upside-down.

Requirements for Outdoor Installation

Here are the requirements:

- Follow the enclosure manufacturer's 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 196.
- The enclosure size and whether it is sealed or ventilated must be determined by considering several factors, which can include the following:
  - Total heat generated by the installed equipment
  - Enclosure material and paint color
  - Mounting method (wall, pole, ground, etc.)
  - Sun exposure

Caution
The smaller the enclosure, the higher the risk of the product overheating. The product's warranty may be voided if the device is installed in a deficient enclosure. Consult Allied Telesis when assistance is needed. E151

Immunity and Precautions

The IE560 Series is suitable for industrial applications specified in electromagnetic compatibility (EMC) standards. The standards specify the immunity test levels in relation to continuous and transient conducted and radiated disturbances. Tests within the standards 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.

Equipment connected to outdoor cables may be exposed to surges, which may damage components and circuits. The IE560 Series satisfies the surge immunity listed in the tables in “Electromagnetic Compatibility Test Types” on page 202.

The IE560 Series has a surge immunity up to 4 kV and complies with IEC 61000-4-5 Class 4. This is sufficient when interconnections are running as outdoor cables along with the power cables. If this condition is not satisfied, Allied Telesis strongly recommends installing primary surge protections, typically solid state or gas tube arrestors, at the point where the cables enter the building or outdoor cabinet.

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

Lightning Protection Requirements

Lightning strikes the ground and causes damage by following the paths of least impedance. 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 or CAT6a shielded twisted pair (STP) or shielded foil twisted pair (SFTP) cables to connect devices if a device (e.g. camera) is installed outdoors, or a network cable is routed outdoors.

- Avoid Ground Loops. STP or SFTP cabling must be grounded on one end only. Grounding both ends 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 may experience either complete system failures or intermittent problems that are hard to diagnose. Improper installation of electrical grounding components may make the components work ineffectively. Installing systems 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.

Warning
Allied Telesis does not recommend connecting PoE powered devices to the switch with STP cables if they have surge protection devices connected to earth ground. Surge events may interrupt switch operations. Resolving the events may require manually power cycling the switch.

Installing the Switch on a DIN Rail

The switch comes with a DIN rail bracket installed on the rear panel. The bracket is compatible with DIN 35 x 7.5mm rails. Refer to Figure 23.

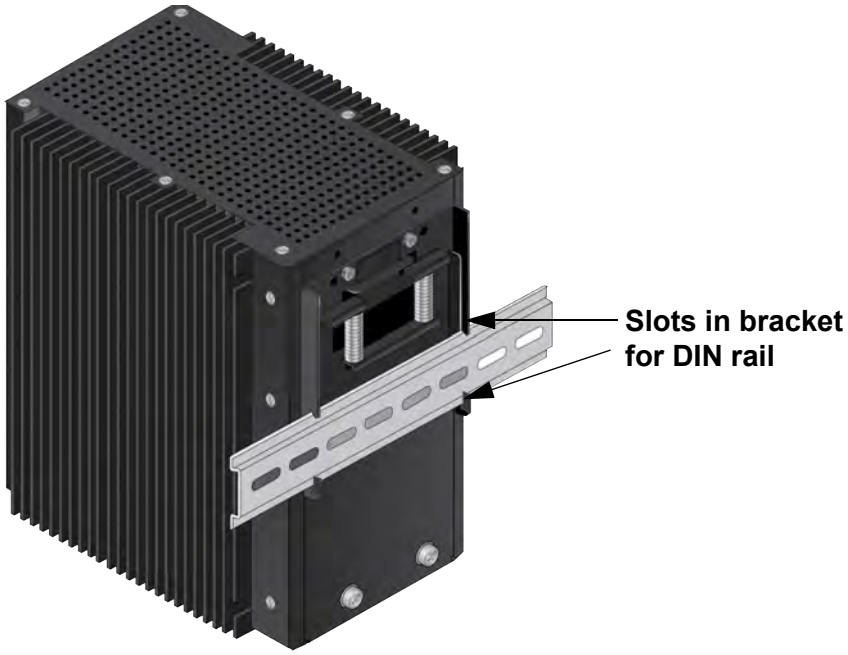


Figure 23. Switch on a DIN Rail

Note
The switch can be installed vertically or horizontally.

Caution
Do not install the switch upside-down.

Note
Depending on the installation site, it may be easier to wire the ports and connectors before installing the switch on the DIN rail. For instructions, begin with Chapter 4, “Cabling the SFP and SFP+ Ports” on page 89.

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

1. Hold the switch vertically with both hands, with the rear panel 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 24 on page 74.

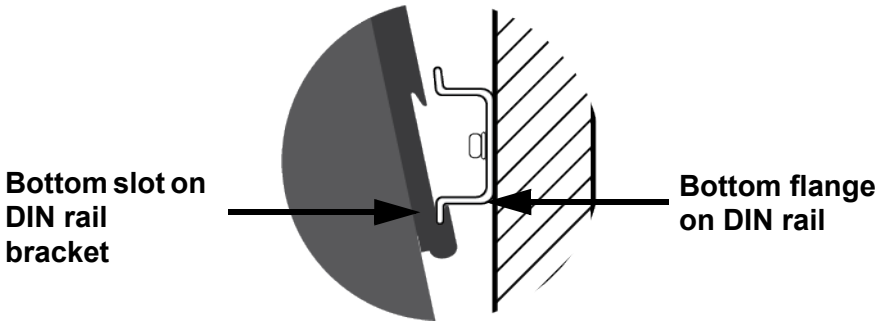


Figure 24. Installing the Switch on a DIN Rail - 1

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 25.

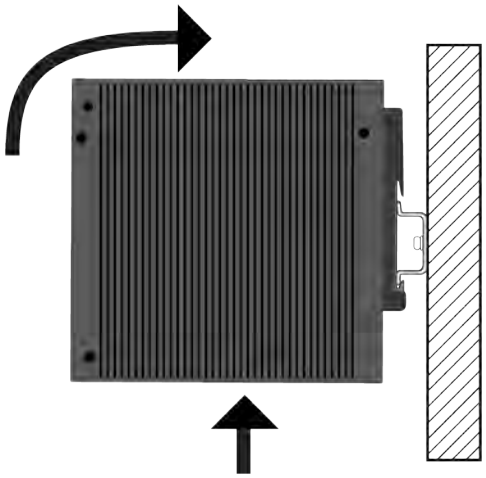


Figure 25. Installing the Switch on a DIN Rail - 2

4. 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 26.

Figure 26. Installing the Switch on a DIN Rail - 3

5. 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 of the switch. Refer to Figure 27.

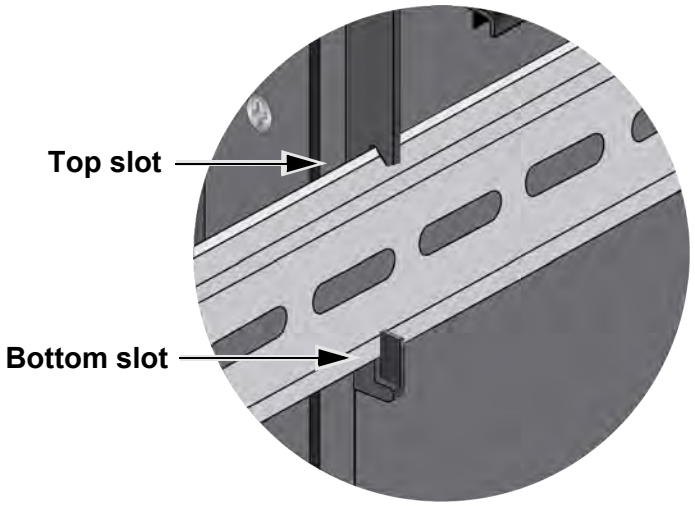


Figure 27. Verifying the DIN Rail Installation

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.

6. To install the switch as a standalone unit, go to Chapter 4, “Cabling the SFP and SFP+ Ports” on page 89. To install the unit in a VCStack, go to Chapter 9, “VCStack Overview” on page 139.

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 can be installed vertically or horizontally on a wall.

Caution
Do not install the switch upside-down.

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

Note
Depending on the installation site, it may be easier to wire the ports and connectors before installing the switch on the wall. For instructions, begin with Chapter 4, “Cabling the SFP and SFP+ Ports” on page 89.

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 28 on page 77.

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.

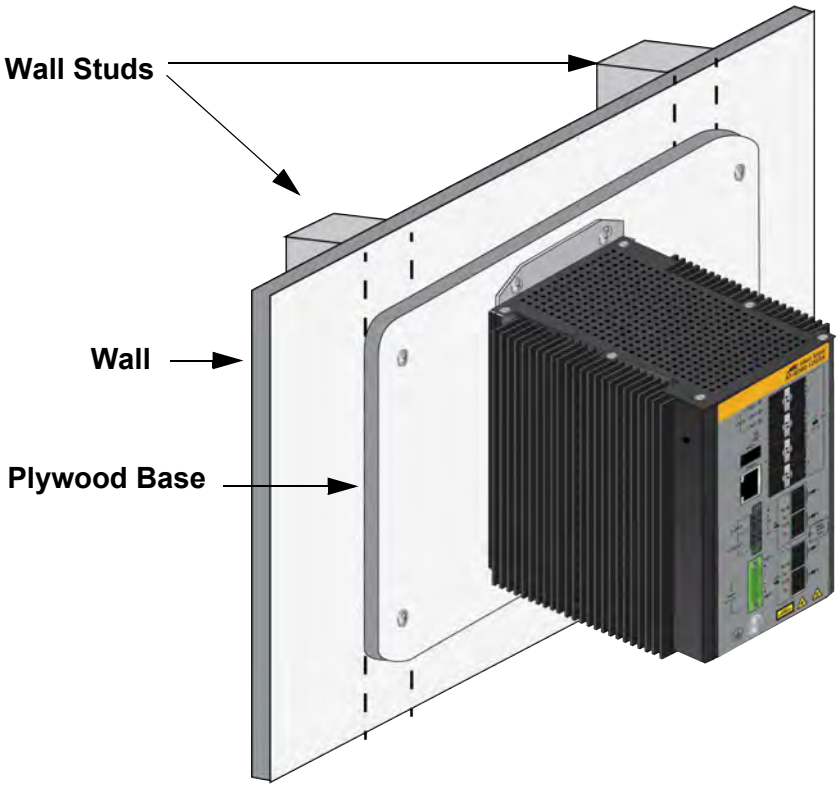


Figure 28. Switch on a Wall with a Plywood Base

You should install the plywood base to the wall first, and then install the switch on the base. Refer to Figure 29.

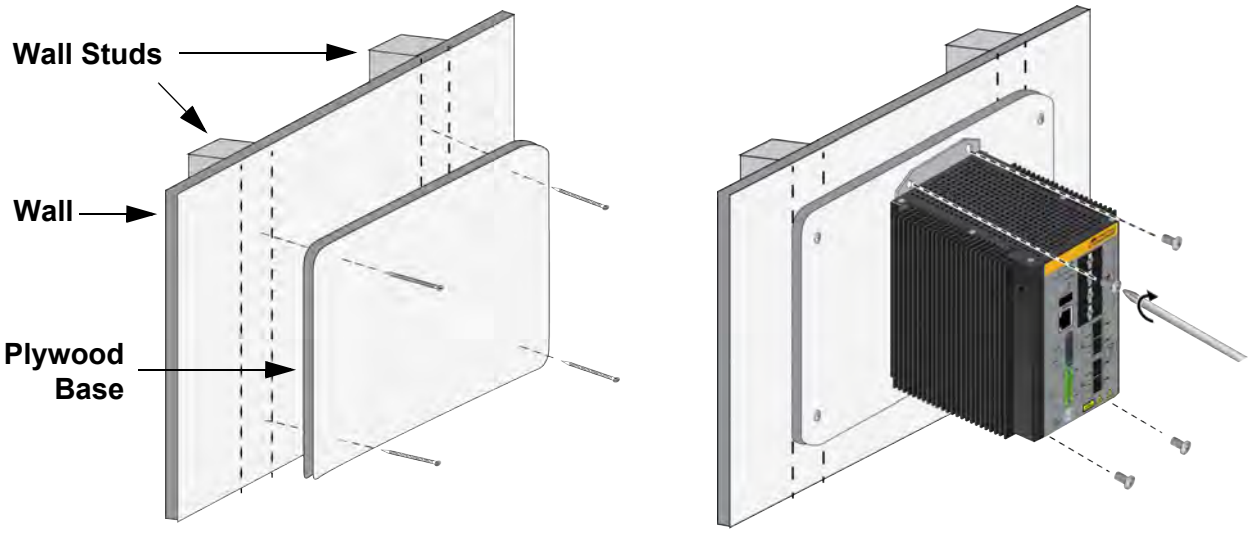


Figure 29. Steps to Installing the Switch on a Wall with a Plywood Base

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 screws and anchors for attaching the plywood base to the wall (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.).

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 60.

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 56 and “Reviewing Site Requirements” on page 60 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 cross-head screwdriver, remove the four screws holding the DIN rail bracket, and remove the bracket. Refer to Figure 30.

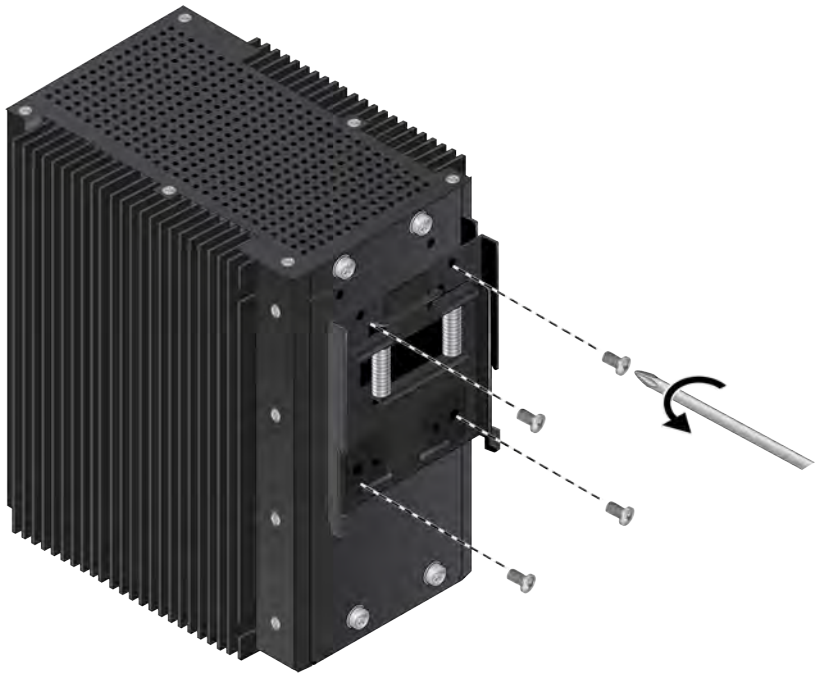


Figure 30. Removing the DIN Rail Bracket from the Switch

3. Reinstall the bracket screws. Tighten the screws to 18 in-lbs. Refer to Figure 31.

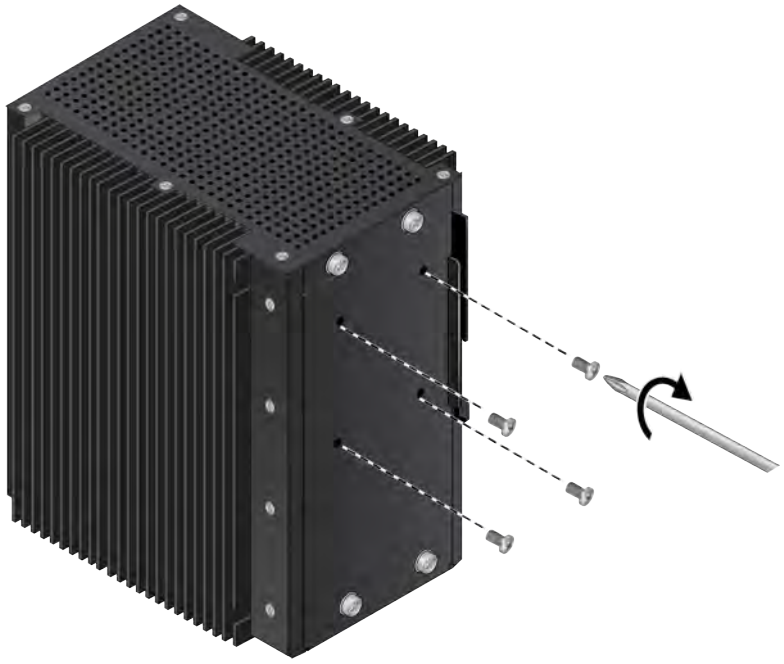


Figure 31. Reinstalling the DIN Rail Bracket Screws

4. Remove the four screws from the top and bottom of the rear panel of the switch. Refer to Figure 32.

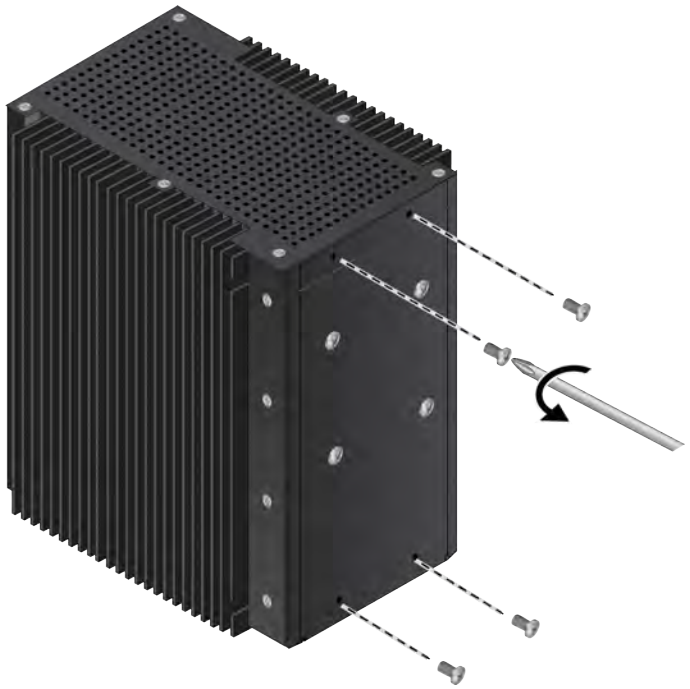


Figure 32. Removing the Four Screws from the Rear Panel

5. Install the two wall brackets to the top and bottom of the rear panel with the four screws removed in the previous step or the screws in the accessory kit. Tighten the screws to 18 in-lbs. Refer to Figure 33.

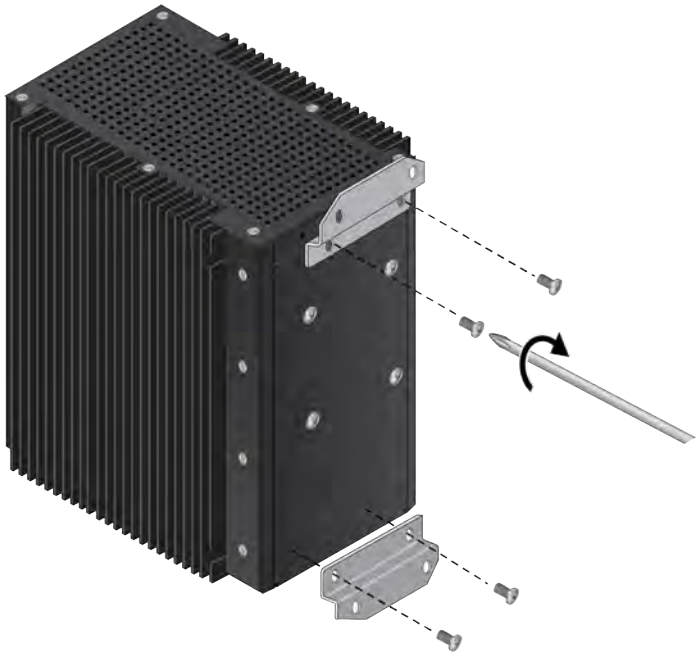


Figure 33. Installing the Wall Brackets on the Switch

6. 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 34.

   Observe these guidelines when positioning the switch on the wall:

   - ❒ 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 60 for further information.
   - ❒ Refer to the anchor datasheet from the manufacturer for the recommended torque value for the screws.

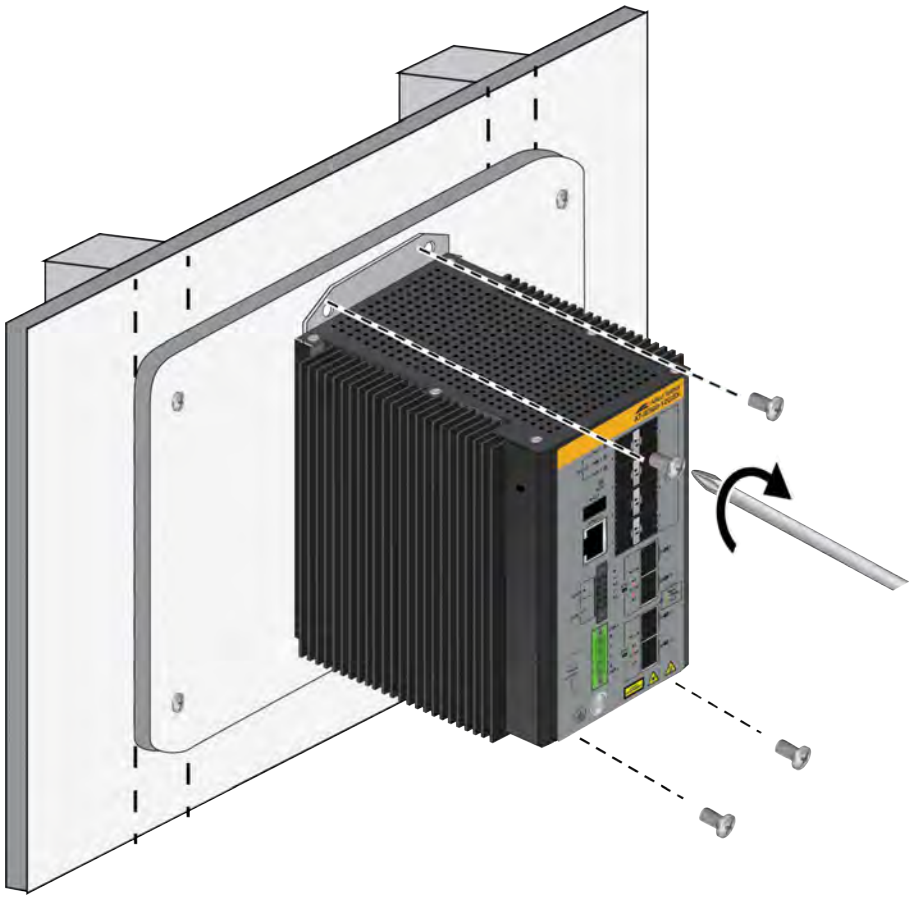


Figure 34. Attaching the Switch to the Plywood Base

7. To install the switch as a standalone unit, go to Chapter 4, “Cabling the SFP and SFP+ Ports” on page 89. To install the unit in a VCStack, go to Chapter 9, “VCStack Overview” on page 139.

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 can be installed vertically or horizontally on a wall.

Caution
Do not install the switch upside-down.

Note
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 60 for further information.

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

Note
Depending on the installation site, it may be easier to wire the ports and connectors before installing the switch on the DIN rail. For instructions, begin with Chapter 4, “Cabling the SFP and SFP+ Ports” on page 89.

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 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.).
- ❒ Cross-head screwdriver (not provided)
- ❒ Drill and 1/4” carbide drill bit (not provided)

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

1. Place the switch on a table.
2. With a cross-head screwdriver, remove the four screws holding the pre-installed DIN rail bracket, and remove the bracket. Refer to Figure 30 on page 79.
3. Reinstall the bracket screws. Tighten the screws to 18 in-lbs. Refer to Figure 31 on page 79.
4. Remove the four screws from the top and bottom of the rear panel. Refer to Figure 32 on page 80.
5. Install the two wall brackets to the rear panel of the switch with the four screws removed in the previous step or the screws in the accessory kit. Tighten the screws to 18 in-lbs. Refer to Figure 33 on page 80.
6. 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 top and bottom wall brackets. Refer to Figure 35 on page 84.

Figure 35. Marking the Bracket Hole Locations on a Concrete Wall

7. Place the switch on a table.
8. Use a drill and 1/4” carbide drill bit to pre-drill the four holes you marked in step 5. 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.
9. Insert four anchors (not provided) into the holes.
10. Have another person hold the switch at the selected wall location while you secure it with four screws (not provided). Refer to the anchor datasheet from the manufacturer for the recommended torque value for the screws. Refer to Figure 36 on page 85.

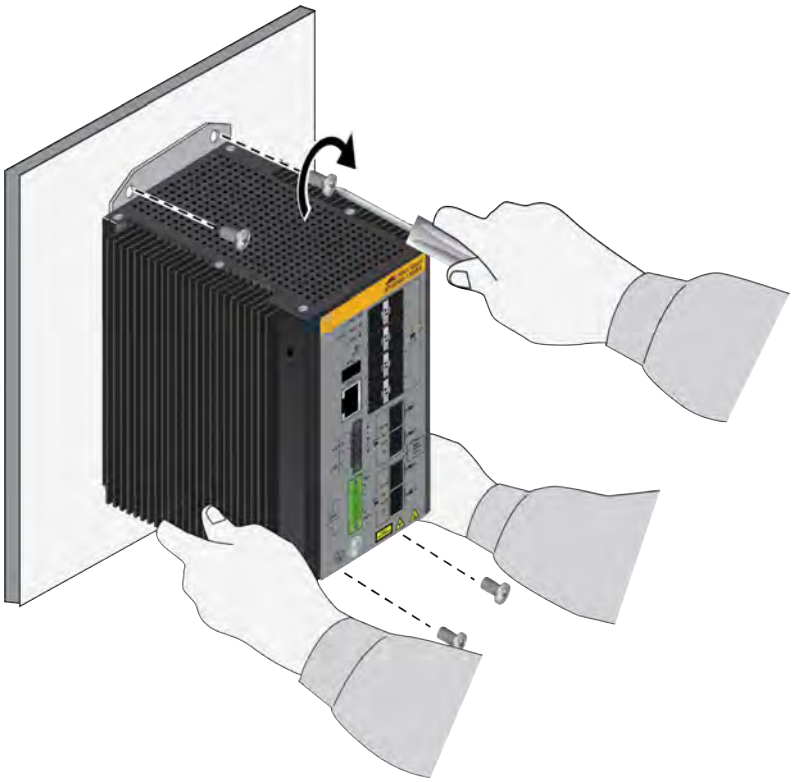


Figure 36. Installing the Switch on a Concrete Wall

11. To install the switch as a standalone unit, go to Chapter 4, “Cabling the SFP and SFP+ Ports” on page 89. To install the unit in a VCStack, go to Chapter 9, “VCStack Overview” on page 139.

Installing the Switch on a Floor, Table, or Desk

To install the switch on a floor, table, or desk, you must attach the wall brackets and place the switch with the faceplate facing upwards. Refer to Figure 37.

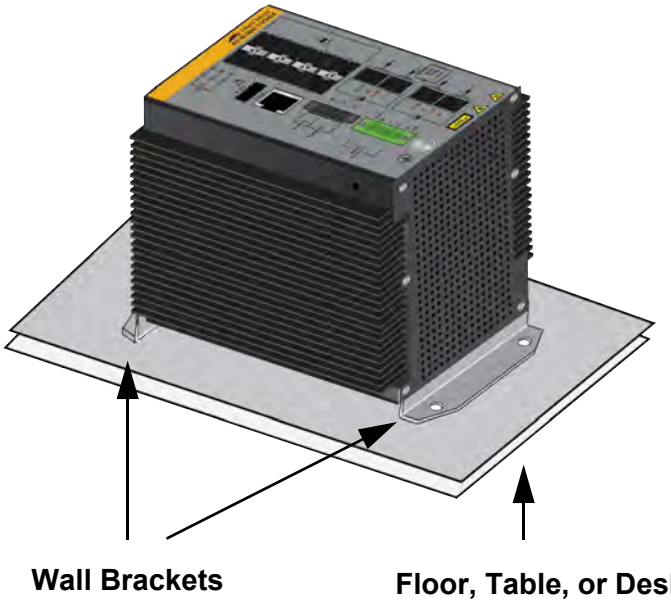


Figure 37. Installing the Switch on a Floor, Table, or Desk

Caution
Figure 37 is the only approved orientation for the switch when installed on a floor, table, or desk. Installing the switch without the wall brackets or in a different orientation might cause the device to overheat and fail.

Here are the necessary tools and material:

- Two wall brackets (included with the switch)
- Four bracket screws (included with the switch)
- Cross-head screwdriver (not provided)

To install the switch on a floor, table, or desk, perform the following procedure:

1. Place the switch on a table.

2. With a cross-head screwdriver, remove the four screws holding the pre-installed DIN rail bracket, and remove the bracket. Refer to Figure 30 on page 79.

3. Reinstall the bracket screws. Tighten the screws to 18 in-lbs. Refer to Figure 31 on page 79.

4. Remove the four screws from the top and bottom of the rear panel. Refer to Figure 32 on page 80.

5. Install the two wall brackets to the rear panel of the switch with the four screws removed in the previous step or the screws in the accessory kit. Tighten the screws to 18 in-lbs. Refer to Figure 33 on page 80.

6. Position the switch at the selected location on the floor, table, or desk.

7. To install the switch as a standalone unit, go to Chapter 4, “Cabling the SFP and SFP+ Ports” on page 89. To install the unit in a VCStack, go to Chapter 9, “VCStack Overview” on page 139.

Chapter 4

Cabling the SFP and SFP+ Ports

This chapter contains the following procedures:

SFP and SFP+ Guidelines

Please review the following guidelines before installing SFP and SFP+ transceivers:

- Ports 1 to 8 support 100M and 1G SFP transceivers.
- Ports 9 to 12 support 1G SFP and 10G SFP+ transceivers.
- SFP and 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 in the switch 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.
- Do not route cables or wires on the floor or other areas where they might pose a hazard.

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

Installing and Cabling SFP and SFP+ Transceivers

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

Note
The transceiver in the following illustrations has a duplex LC connector. Your transceivers may have different connectors.

Note
If you are installing a VCStack, Allied Telesis recommends configuring the switches for stacking before cabling the ports. For instructions, begin with Chapter 9, “VCStack Overview” on page 139

1. Remove the dust plug from the selected transceiver port. Refer to Figure 38.

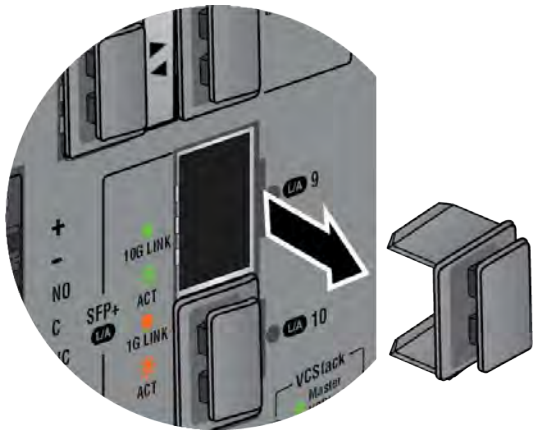


Figure 38. Removing the Dust Plug from a Transceiver Port

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

3. Position the transceiver as follows, and slide it into its port until it clicks into place:

   - For 100M/1G SFP transceivers in odd numbered ports 1 to 7, position the transceivers with the handles on the left. For SFP transceivers in even numbered ports, position the transceivers with the handles on the right. Refer to Figure 39 on page 92.

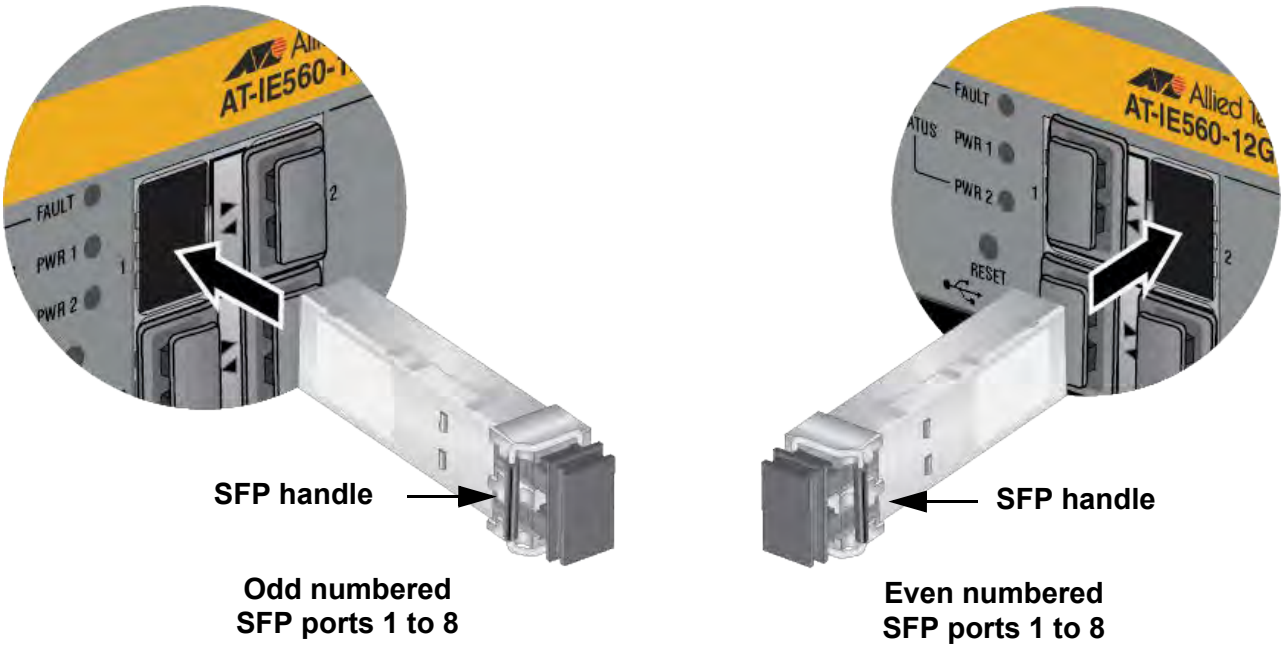


Figure 39. Installing SFP Transceivers in Ports 1 to 8

- For SFP+ transceivers for ports 9 to 12, position the transceivers with the handles on the left. Refer to Figure 40.

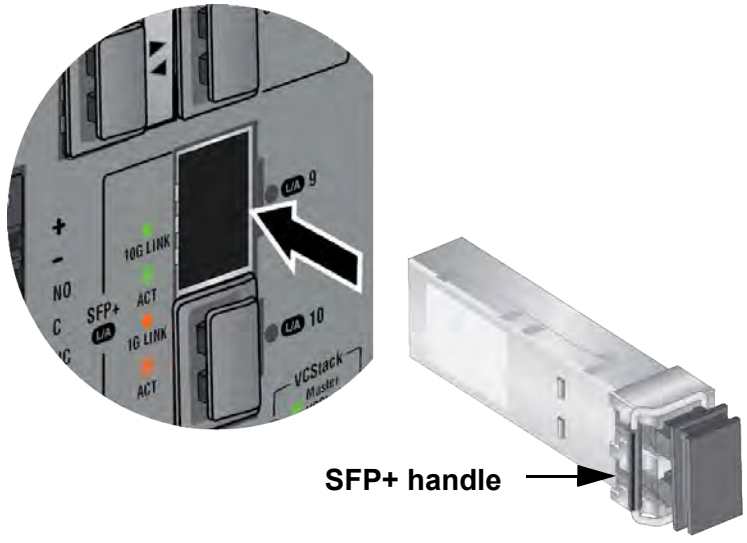


Figure 40. Installing SFP+ Transceivers in Ports 9 to 12

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 additional transceivers.

4. Remove the dust cover from the transceiver. Refer to Figure 41.

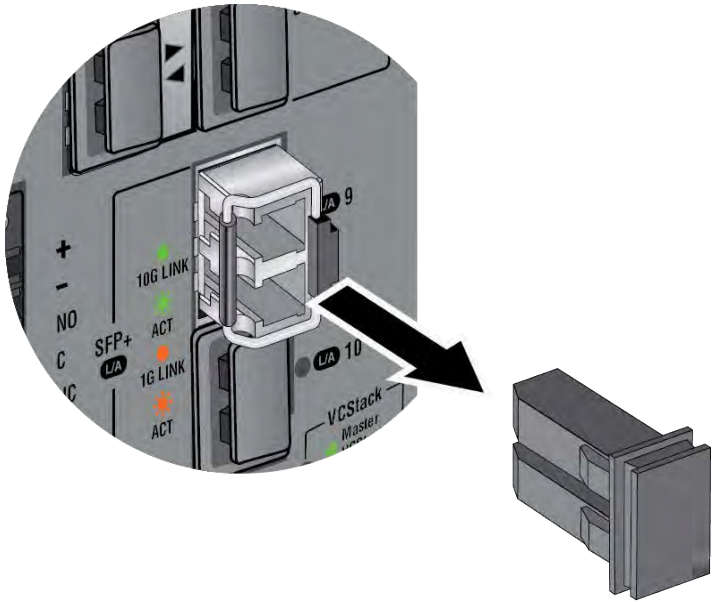


Figure 41. Removing the Dust Cover from a Transceiver

5. 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 42.

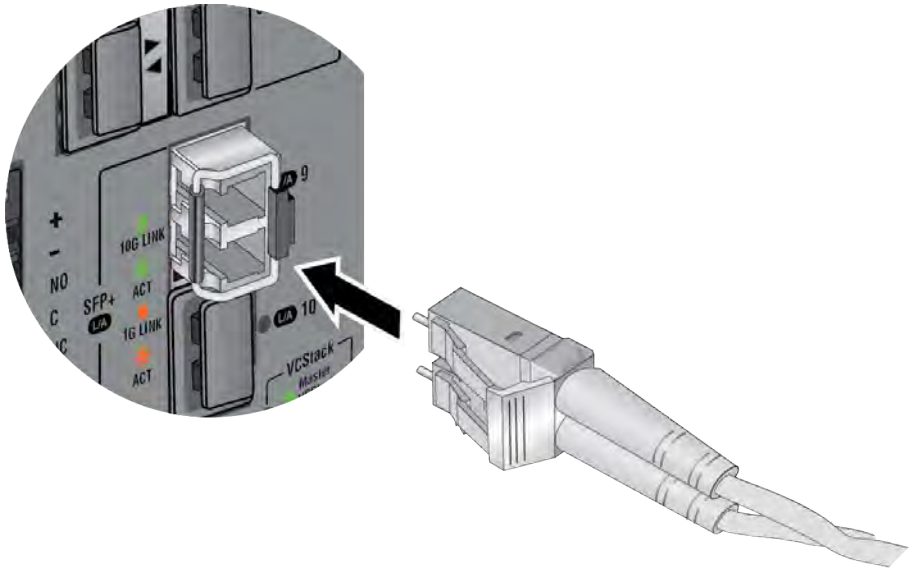


Figure 42. Connecting a Fiber Optic Cable to a Transceiver

6. Repeat this procedure to install and cable the remaining transceivers.

7. To install the switch as a standalone unit, go to Chapter 5, “Wiring the Ground, ALARM, and POWER Connectors” on page 97. To install the unit in a VCStack, go to Chapter 9, “VCStack Overview” on page 139.

Section II

Powering and Verifying a Standalone Switch

The chapters in this section are:

Chapter 5

Wiring the Ground, ALARM, and POWER Connectors

This chapter contains the following procedures:

Connecting the Ground Wire

Here are the guidelines for the ground wire:

- ❒ The wire should be minimum #14 AWG or #12 AWG solid wire. Do not use wire heavier than #12 AWG.
- ❒ 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.
- ❒ A terminal is required. 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

Warning
When installing this equipment, always connect the frame ground connection first and disconnect it last. E11

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 43.

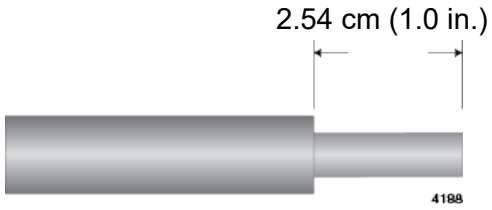


Figure 43. Stripping the Grounding Wire

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 44

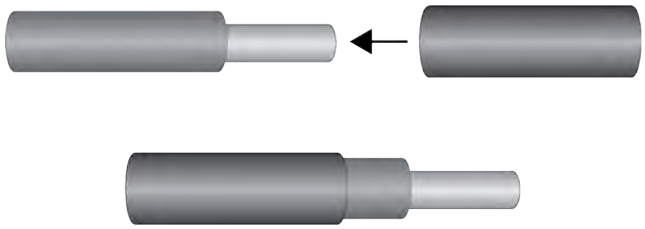


Figure 44. Sliding a Heat-shrink Tube Over the Grounding Wire

3. Slide the ring terminal lug over the stripped wire on the grounding wire. Refer to Figure 45.

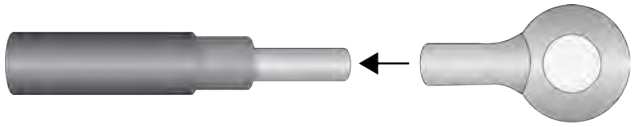


Figure 45. Sliding the Ring Terminal Lug on the Grounding Wire

4. Crimp the ring terminal lug with a wire crimping tool to secure it on the grounding wire. Refer to Figure 46.

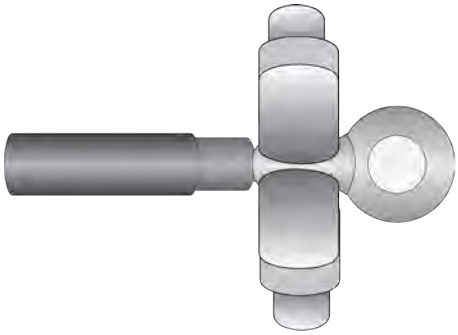


Figure 46. Crimping the Ring Terminal Lug

5. Slide the heat-shrink tube over the shaft of the ring terminal lug. Refer to Figure 47.

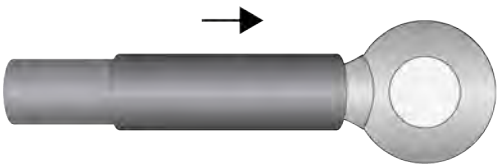


Figure 47. Sliding the Heat-Shrink Tube Over the Ring Terminal Lug

6. Heat the heat-shrink tube to secure it on the wire and ring terminal lug. Refer to Figure 48.

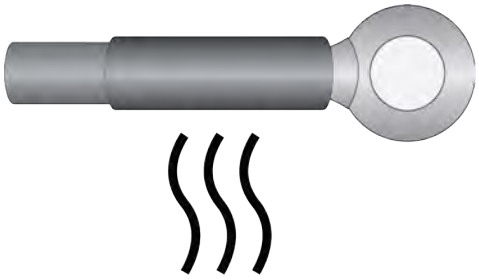


Figure 48. Heating the Heat-Shrink Tube

7. Remove the grounding screw from the switch with a #2 Phillips-head screwdriver. Refer to Figure 49.

Figure 49. Removing the Grounding Screw

8. Secure the grounding screw to the IE560 Switch with the grounding screw. Tighten screw to 6 in-lbs. Refer to Figure 50.

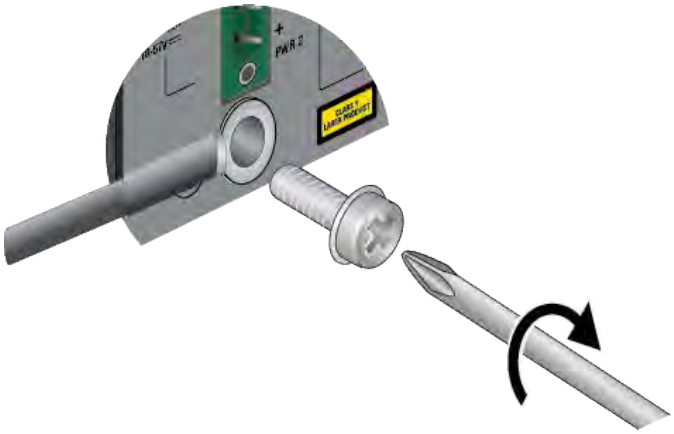


Figure 50. Attaching the Grounding Wire to the Switch

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 IN / ALARM OUT connector, go to “Wiring the ALARM IN / ALARM OUT Connector” on page 102.
    - Otherwise, go to “Wiring the POWER Connector” on page 108.

Wiring the ALARM IN / ALARM OUT Connector

For background information, refer to “ALARM IN Circuit” on page 42 and “ALARM OUT Circuits” on page 45. Here are general guidelines to the alarm connector:

- Use 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 switch provides the voltage for the ALARM IN circuit. Here are the requirements for the external sensor:

- It must be a dry contact.
- It must not place any voltage on the circuit.
- It must not use the voltage or current from the switch on the circuit for its own operations.
- It must be able to handle a minimum of 3.3VDC and 320uA.

Caution
The external sensor might damage the ALARM IN circuit if it places a voltage on it. E118

The external alert devices have to provide the necessary power for the ALARM OUT circuits. The power specifications of the circuits are:

- 48Vdc
- 1A, maximum.

Caution
The power from the external alert devices must not exceed the above specifications or the ALARM OUT circuits might be damaged. E123

Note
The ALARM OUT circuits can sync 1.0A at 48Vdc maximum. You must provide a series resistance to limit current, if necessary.

Before wiring the alarm circuits, familiarize yourself with the pin signals by examining the legend on the top panel. Refer to Figure 51.

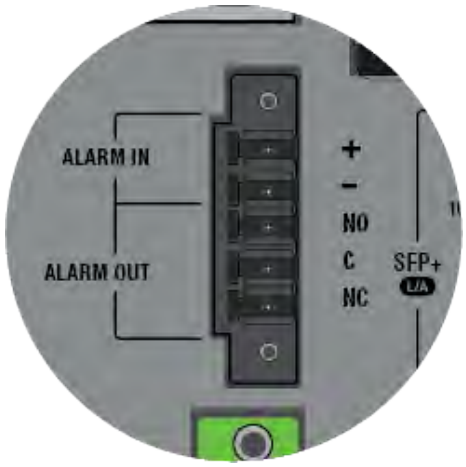


Figure 51. Polarity Legend on the ALARM IN / ALARM OUT Connector

To wire the alarm circuits, perform the following procedure:

1. Strip 6.5mm (0.25 in.) of insulation from the end of a wire with a wire insulator stripper. Use 24 to 18 AWG stranded wires properly rated for the installation site. Refer to Figure 52.

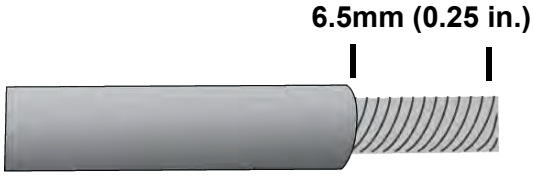


Figure 52. Stripping an Alarm Wire

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 53. This can prevent loose strands from touching other wires and causing an electrical short.

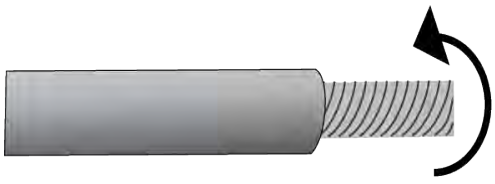


Figure 53. Wrapping the Wire Strands

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

3. Repeat steps 1 and 2 as needed to create the necessary number of wires for your installation.

4. Loosen the two captive screws securing the ALARM IN / ALARM OUT plug to the switch. Refer to Figure 54.

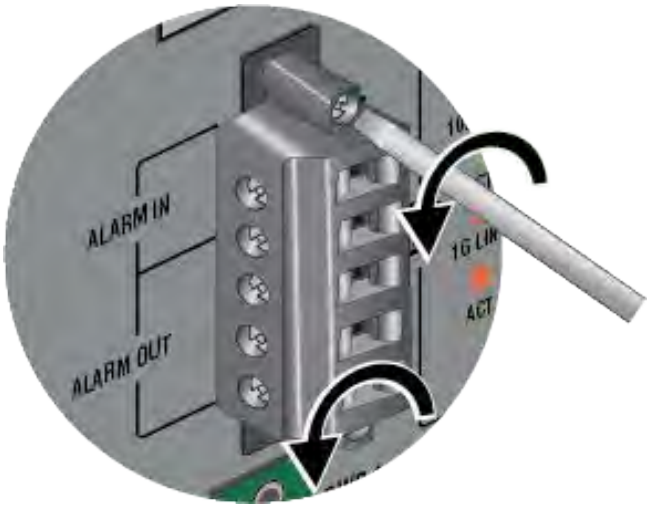


Figure 54. Loosening the Captive Screws on the ALARM IN / ALARM OUT Plug

5. Remove the ALARM IN / ALARM OUT plug. Refer to Figure 55.

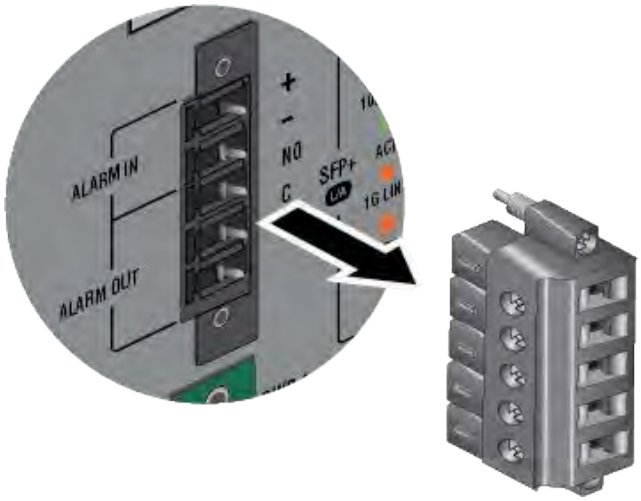


Figure 55. Removing the ALARM IN / ALARM OUT Plug

6. Use a #1 screwdriver to loosen the wire retaining screws that correspond to the connector pins of the selected ALARM IN and ALARM OUT circuits. Refer to Figure 56.

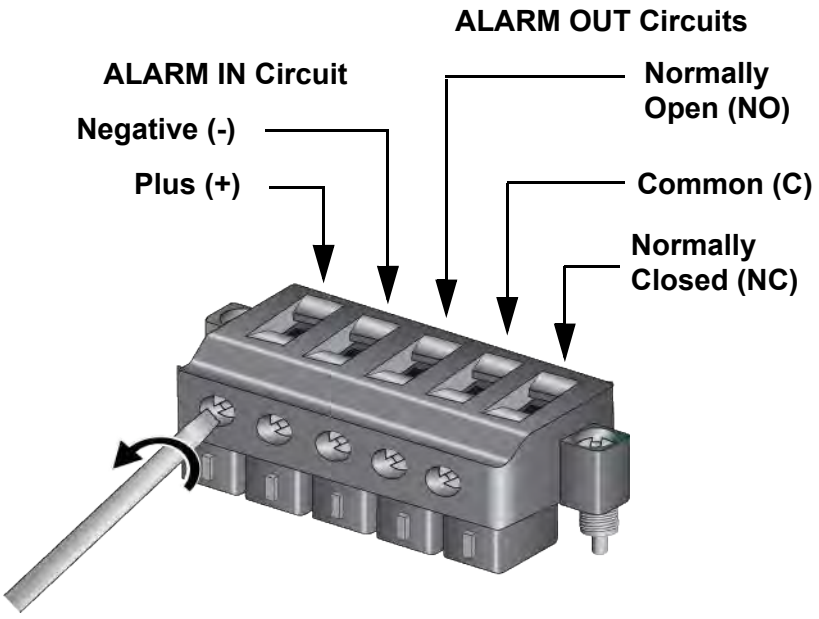


Figure 56. Loosening the Wire Retaining Screws on the ALARM IN / ALARM OUT Plug

7. Insert the lead wires into the pin connectors that correspond to the selected ALARM IN and ALARM OUT circuits, and tighten the retaining screws to secure them. Allied Telesis recommends tightening the screws to 2.0 in-lbs (0.23 Nm).

8. Verify that there are no exposed wires or loose wire strands. Refer to Figure 57.

Figure 57. Verifying the Wires on the ALARM IN / ALARM OUT Plug

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

9. Insert the ALARM IN / ALARM OUT plug into the connector on the switch. Refer to Figure 58.

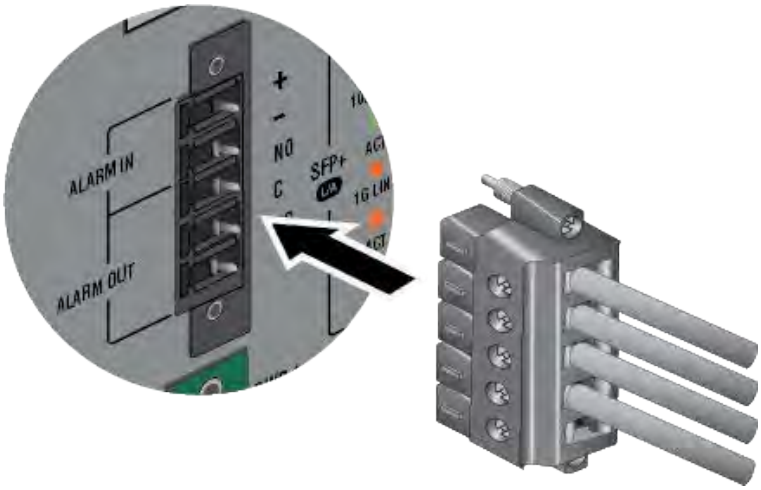


Figure 58. Inserting the ALARM IN / ALARM OUT Plug into the Connector

10. Tighten the two captive screws to secure the ALARM IN / ALARM OUT plug to the switch. Refer to Figure 59.

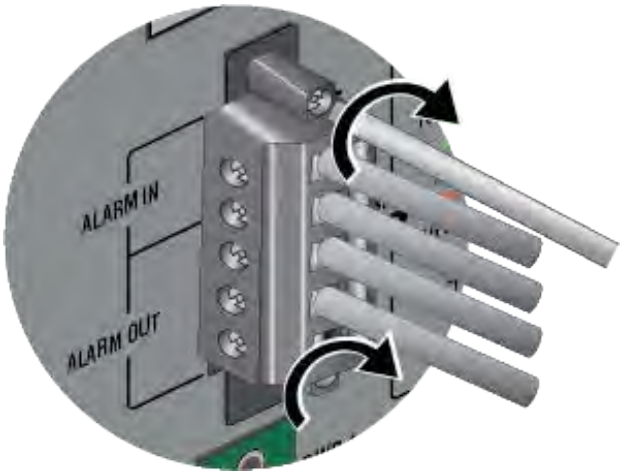


Figure 59. Securing the ALARM IN / ALARM OUT Plug to the Switch

11. Connect the other ends of the wires to external sensors or alarm devices. Refer to the documentation included with the devices for instructions.

12. Go to “Wiring the POWER Connector” on page 108.

Wiring the POWER Connector

You can power the switch with either one or two DC power sources. A single power source that meets the specifications in “Switch DC Power Requirements” on page 51 and “DC Power Specifications” on page 200 can fully power the switch. A second power source 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 60, 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 sources. If you are installing only one power supply, you may use either the PWR 1 or PWR 2 connectors.

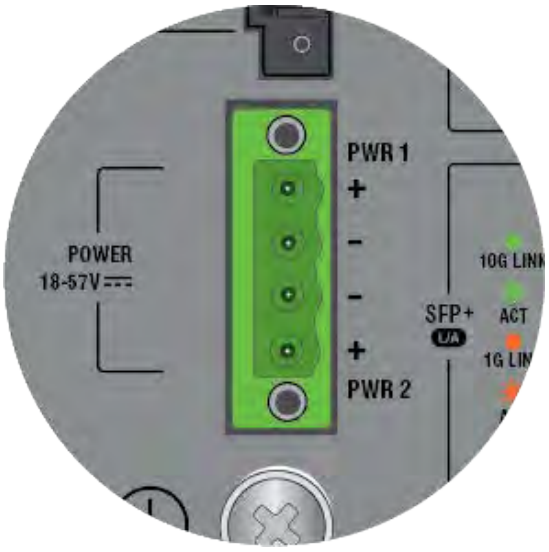


Figure 60. Pin Signals Legend on the POWER Connectors

Note
The FAULT LED will signal a fault condition if the switch is connected to only one power source. You can resolve this with the SYSTEM PSU command in the Global Configuration mode of the AlliedWare Plus management software. For instructions, refer to “FAULT LED” on page 132.

Here are the materials and tools needed to wire the POWER plug:

- ❒ #16 AWG, #14 AWG, or #12 AWG stranded wire. Do not use wire heavier than #12 AWG.
- ❒ 2-wire connectors to connect the power cables to the AC/DC rectifiers or UPS units.
- ❒ #1 flat-head screwdriver
- ❒ Wire insulation stripper

To wire the POWER plug, perform the following procedure:

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

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 61.

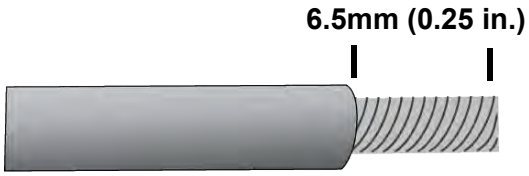


Figure 61. Stripping a Power Cable Wire

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 53 on page 103. This step can prevent loose strands from touching other wires, 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 POWER plug with a #1 flat-head screwdriver. Refer to Figure 62.

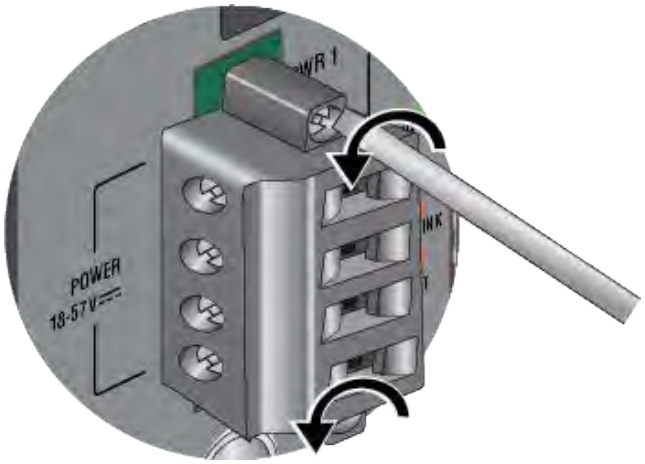


Figure 62. Loosening the Two Captive Screws on the POWER Plug

4. Remove the POWER plug from the front panel. Refer to Figure 63.

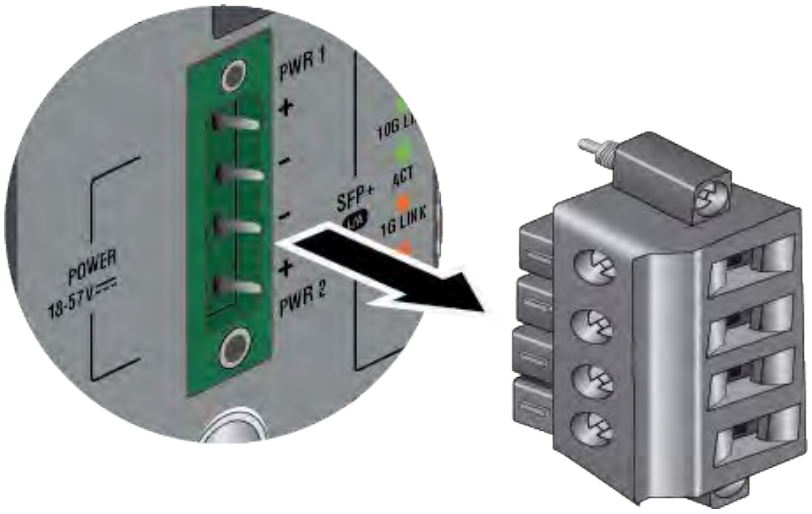


Figure 63. Removing the POWER Plug

5. Use a #1 screwdriver to loosen the wire retaining screws of the PWR 1 and PWR 2 pins. If you are powering the switch with only one DC power supply, you may use either the PWR 1 or PWR 2 pins. Refer to Figure 64.

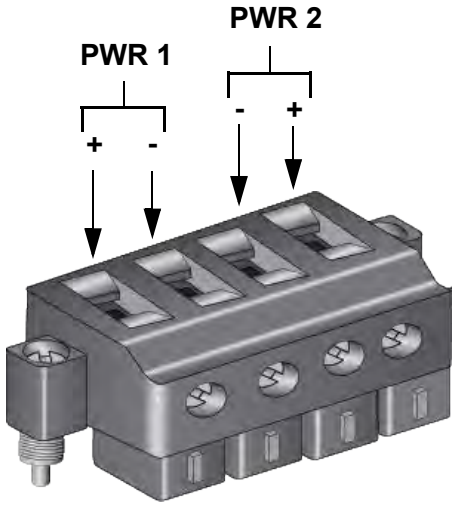


Figure 64. Loosening the Wire Retaining Screws on the POWER Plug

6. Insert the wires into the plug and tighten the retaining screws to secure them. The example in Figure 65 assumes the switch will be powered by a single DC power supply on the PWR 1 pins on the plug. Allied Telesis recommends tightening the screws to 5.0 in-lbs (0.55 Nm).

Figure 65. Inserting DC Wires into the POWER Plug

7. After attaching the wires, verify that there are no exposed wires or loose wire strands. Refer to Figure 66.

Figure 66. Verifying the DC Power 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 POWER plug, do one of the following:

9. Go to “Powering On the Switch” on page 114.

Chapter 6

Powering On the Switch

This chapter contains the following procedures:

Powering On the Switch

This section contains the procedure for powering on the switch.

Note
Refer to “Switch DC Power Requirements” on page 51 and “Power Supplies” on page 52 for the DC input power requirements of the switches.

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

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. 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 IE560 Series of Industrial Layer 3 Switches*.

The following procedure assumes you have already wired the POWER plug on the switch. For instructions, refer to “Wiring the POWER Connector” on page 108. For power supply requirements, refer to “Switch DC Power Requirements” on page 51 and “DC Power Specifications” on page 200.

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. Insert the POWER plug into the POWER connector on the front panel. Refer to Figure 67.

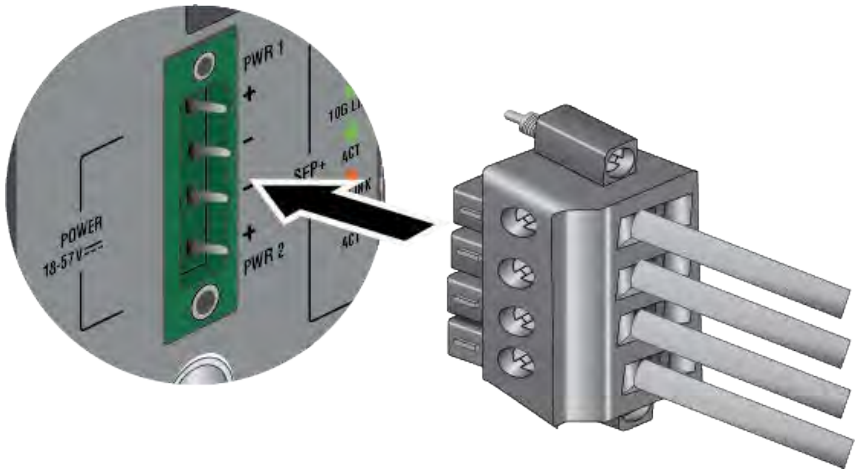


Figure 67. Inserting the POWER Plug into the POWER Connector

3. Tighten the two captive screws to secure the POWER plug to the switch. Allied Telesis recommends tightening the screws to 5.0 in-lbs (0.55 Nm). Refer to Figure 68.

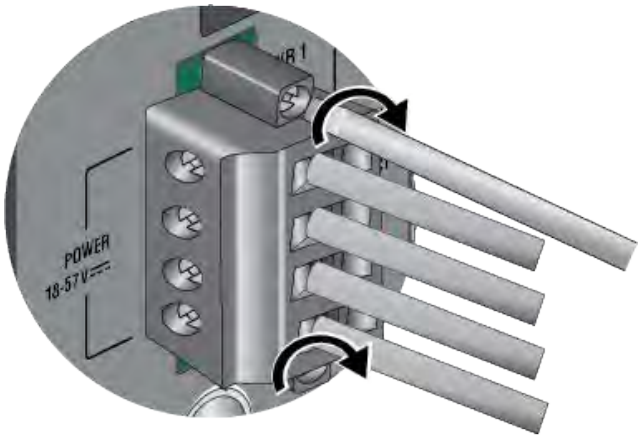


Figure 68. Tightening the Captive Screws to Secure the POWER Plug

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 several 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 120.

Verifying Switch Operations

Here are items to check to verify that the switch is operating properly. If there is a problem, refer to Chapter 8, “Troubleshooting” on page 131.

- The Fault LED should be off. Refer to “STATUS FAULT, PWR 1 and PWR 2 LEDs” on page 31. If there is a problem, refer to “FAULT LED” on page 132.
- One or both PWR 1 and PWR 2 LEDs should be solid green, depending on the number of power supplies connected to the unit. Refer to “STATUS FAULT, PWR 1 and PWR 2 LEDs” on page 31. If there is a problem, refer to “PWR 1 and PWR 2 LEDs” on page 134.
- The LEDs on SFP and SFP+ ports with transceivers connected to powered-on devices should be solid or flashing green or amber. Refer to “SFP Ports 1 to 8 LEDs” on page 33 and “SFP+ Ports 9 to 12 LEDs” on page 34. If there is a problem, refer to “SFP and SFP+ Ports” on page 135.
- The VCStack LED should be off, indicating that the switch is in the standalone mode. (The default setting for the VCStack feature is disabled.)

To confirm the operating mode of the switch and its ID number, go to “Starting a Management Session” on page 120.

Chapter 7

Managing a Standalone Switch

This chapter contains the following procedures:

Starting a Management Session

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

- ❒ “Locally from the CONSOLE Port,” next
- ❒ “Remotely with a DHCP or DHCPv6 Server” on page 122
- ❒ “Remotely with the Default IP Address” on page 123

Locally from 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” on page 211 and “CONSOLE Port Management Cable with DB-9 Female and RJ-45 Connectors” on page 212 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 8 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.
- ❒ The CONSOLE port does not support the web browser management interface.
- ❒ 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 its parameter settings.
- ❒ The configuration file contains only those parameters that are changed from their default 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 8 on page 36. The kit and driver are sold separately.
   - ❒ If your workstation has a DB-9 female connector, refer to “CONSOLE Port Management Cable with DB-9 Female and RJ-45 Connectors” on page 212 for the cable specifications.

2. Power on the switch and wait several minutes for it to start the AlliedWare Plus management software. For instructions, refer to “Wiring the POWER Connector” on page 108 and “Powering On the Switch” on page 114.

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 9600 to 115200 bps. The default is 9600 bps. For a list of supported speeds, refer to “RJ-45 Style Serial CONSOLE Port” on page 211)
   - 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 and password, listed here:

   - User name: manager
   - Password: friend

   Note
   User names and passwords are case sensitive.

   The switch starts the local management session and displays the User Exec mode prompt in the command line interface, shown here:

```
awplus>
```

6. Go to “Setting the Switch’s Operational Mode and ID Number” on page 125:

Remotely 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 (The switch automatically creates a configuration file the first time you save its parameter settings.)

Note
The default settings for the SSH and Telnet servers when the switch is powered on for the first time are enabled and disabled, respectively. However, the switch saves their settings in its first configuration file as SSH server disabled and Telnet server enabled. To continue using SSH in subsequent management sessions, you must enable the server with the SERVICE SSH command in the AlliedWare Plus management software.

To start the first management session with the switch on a network that has a DHCP or DHCPv6 server, 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 68. Refer to your DHCP server’s documentation for instructions.

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

3. Power on the switch and wait several minutes for it to initialize the AlliedWare Plus software and obtain its IPv4 or IPv6 address from the DHCP server. For instructions, refer to “Wiring the POWER Connector” on page 108 and “Powering On the Switch” on page 114.

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 and password, listed here:

   - ❒ User name: manager
   - ❒ Password: friend

   Note
   User names and passwords are case sensitive.

   The switch starts the management session. If you are using SSH and the command line interface, the switch displays the User Exec mode prompt, shown here:

```
awplus>
```

7. To continue using SSH in subsequent management sessions, enable the SSH server with the following commands:

```
awplus> enable
awplus# configure terminal
awplus>(config) service ssh
```

8. Go to “Setting the Switch’s Operational Mode and ID Number” on page 125.

Remotely with the Default IP Address

This section contains the procedure for starting the first management session remotely with the switch using its default IPv4 address. You might perform this procedure if your network does not have a DHCP or DHCPv6 server. 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 its configuration file the first time you save its parameter settings.)

Note
The default settings for the SSH and Telnet servers when the switch is powered on for the first time are enabled and disabled, respectively. However, the switch saves their settings in its first configuration file as SSH server disabled and Telnet server enabled. To continue using SSH in subsequent management sessions, you must enable its server with the SERVICE SSH command in the AlliedWare Plus management software.

To start the first management session using the default IP address, 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 for it to initialize the AlliedWare Plus management software. For instructions, refer to “Wiring the POWER Connector” on page 108 and “Powering On the Switch” on page 114.

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 and password, listed here:

   - User name: manager
   - Password: friend

   Note
   User names and passwords are case sensitive.

   The switch starts the management session. If you are using the command line interface, the switch displays the User Exec mode prompt, shown here:

```
awplus>
```

7. To continue using SSH in subsequent management sessions, enable the SSH server with the following commands:

```
awplus> enable
awplus# configure terminal
awplus>(config) service ssh
```

8. Go to “Setting the Switch’s Operational Mode and ID Number” on page 125.

Setting the Switch's Operational Mode and ID Number

The switch has two operational modes: standalone and VCStack. The switch can operate in only one mode at a time. You may determine the current mode of the switch by viewing the VCStack LED on the front panel or entering the SHOW STACK command in the User Exec mode of the command line interface. If the switch is in the VCStack mode, you must disable the mode to operate the switch in the standalone mode. You should also view the switch's ID number and, if necessary, set it to "1", the correct ID number for a standalone switch.

Caution
Disabling the VCStack feature requires resetting the switch. Some network traffic may be lost if the switch is connected to a live network. E89

To disable the VCStack feature or set the switch's ID number, perform the following procedure.

1. Start a CLI management session on the switch. For instructions, refer to "Starting a Management Session" on page 120.

2. At the User Exec mode prompt, enter the SHOW STACK command to display the operational mode of the switch and its ID number. Figure 69 is an example of the command.

```
awplus> show stack
Virtual Chassis Stacking summary information
ID    Pending ID   MAC address       Priority    Status    Role
1     -            eccd:6dd1:64a2    128         Ready     Active Master
Operational Status                   Stacking Hardware Disabled
Stack MAC address                    eccd:6dd1:64a2
awplus>
```

Figure 69. SHOW STACK Command

3. Examine the ID and Operational Status fields in the window and do one of the following:

   - If the ID is "1" and the Operational Status is "Stacking Hardware Disabled," the hardware installation is complete. The switch is now operating in the standalone mode, with the ID number 1. To begin managing the standalone switch, go to "Specifying Ports in the Command Line Interface for Standalone Switches" on page 129 or the *Command Reference: IE560 Series Running AlliedWare Plus* on the Allied Telesis website.

- If the status is “Standalone Unit,” the VCStack feature is active on the unit. (The “Standalone Unit” status here means the switch is operating as a stack of one switch.) You must disable feature to use the switch in the standalone mode. Continue with the next step.

4. Move to the Global Configuration mode by entering the ENABLE and CONFIGURE TERMINAL commands. Refer to Figure 70.

```
awplus> enable
awplus# configure terminal
Enter configuration commands, one per line. End with CNTL/Z
awplus#
```

Figure 70. Moving to the Global Configuration Mode

5. To disable the VCStack mode, enter the NO STACK ENABLE command in this format:

```
no stack id enable
```

The ID parameter is the current ID number of the switch, displayed in the SHOW STACK command. For example, if the ID number of the switch is 1, the default value, enter the command as follows:

```
awplus(config)# no stack 1 enable
```

The confirmation prompt in Figure 71 is displayed.

```
Warning; This will disable the stacking hardware on member-1.
Are you sure you want to continue? (y/n):
```

Figure 71. Confirmation Prompt for the NO STACK ENABLE Command

6. Type Y to disable VCStack on the switch or N to cancel the procedure.

The switch displays the message in Figure 72.

```
awplus(config)#18:04:12 awplus VCS[2119]: Deactivating
Stacking Ports on stack member 1.
```

Figure 72. Disabling VCStack

7. Press the Return key to re-display the Global Configuration mode prompt.

Note
If the ID number of the switch is 2 or higher, go to the next step to set it to “1”, the correct number for standalone switches. If the ID number is already “1”, go to step 9.

8. In the Global Configuration mode, enter the STACK RENUMBER command to change the switch's ID number to "1". The command's format is shown here:

```
stack current_id renumber new_id
```

   For example, if the switch's current ID number is "2", you enter this command to change it to "1":

```
awplus(config)# stack 2 renumber 1
```

> **Note**
> The following steps save your configuration changes and reboot the switch.

9. In the Global Configuration mode, enter the EXIT command to return to the Privileged Exec mode. Refer to Figure 73.

```
awplus(config)# exit
awplus#
```

Figure 73. Returning to the Privileged Exec Mode

10. Enter the WRITE command to save your changes in the configuration file. The switch displays the confirmation prompt in Figure 74.

```
awplus# write
Building configuration ...
[OK]
awplus#
```

Figure 74. Saving the Changes with the WRITE Command

> **Note**
> If this is the first management session, the switch automatically creates the Default.cfg configuration file to store your changes. The file contains only those parameters that are changed from their default settings.

11. Enter the REBOOT command to reboot the switch.

12. At the confirmation prompt, type "Y" for yes.

13. Wait several minutes for the switch to restart the AlliedWare Plus management software.

14. Start a new CLI management session.

15. Enter the SHOW STACK command again in the User Exec mode.

16. Go to step 3. If the switch's ID number is 1 and VCStack is disabled, the hardware installation for a standalone switch is complete. Go to "Specifying Ports in the Command Line Interface for Standalone Switches" on page 129 or the *Command Reference: IE560 Series Running AlliedWare Plus* on the Allied Telesis website. If VCStack is not disabled or the ID number is 2 or higher, repeat this procedure.

Specifying Ports in the Command Line Interface for Standalone Switches

The individual ports on the switch are specified in the command line interface with the PORT parameter. The format of the parameter for a standalone IE560 Series is shown in Figure 75.

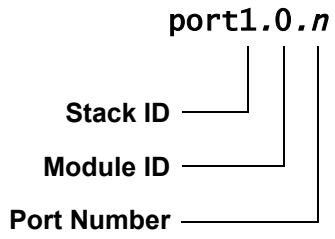


Figure 75. PORT Parameter in the Command Line Interface for a Standalone switch

The three parts of the PORT parameter are described in Table 12.

Table 12. PORT Parameter Format for a Standalone IE560-12GSX Switch

Number	Description
Stack ID	Designates the switch's ID number. The correct value is "1" for standalone switches.
Module ID	Designates the module number of a port. This value is always 0 (zero) for the IE560 Series because it does not support modules.
Port Number	Designates a port number.

Here is an example of the PORT parameter on a standalone switch. It uses the INTERFACE command to enter the Port Interface mode for ports 4 and 6 on the switch:

```
awplus> enable
awplus# configure terminal
awplus(config)# interface port1.0.4,port1.0.6
```

For instructions on the command line interface, refer to the *Command Reference: IE560 Series Running AlliedWare Plus*.

Chapter 8
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**.

FAULT LED

Problem: The FAULT LED is solid amber.

Solutions: This indicates that the switch is starting up the AlliedWare Plus management software. The switch performs the process whenever it is powered on or reset. The device may take several minutes to complete the process, at which point the FAULT LED turns off, unless there is a fault condition or the unit is overheating.

Problem: The FAULT LED is flashing five times followed by a pause.

Solution: The switch is experiencing an alarm condition. Use the SHOW ALARM FACILITY STATUS command in the User Exec or Privileged Exec mode to view the active alarms. To create facility alarms that cause the FAULT LED to flash in response to alarm conditions, use the ALARM FACILITY commands in the Global Configuration mode. The following example configures the switch to flash the FAULT LED if port 1 does not have a link to a network device:

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

The switch also signals an alert event for the power sources if either of the following conditions is true:

- The switch is connected to only one power source, or
- The switch is connected to two power supplies and one is powered off or has failed.

To deactivate an alert associated with a power source, enter the SYSTEM PSU command in the Global Configuration mode. Here is the command format for the IE560 Series:

```
system psu psu <1-2> unused
```

The <1-2> variable corresponds to the PWR 1 and PWR 2 connectors on the front panel, respectively. For example, to disable the alarm if the PWR 2 connector is not connected to a power supply, you enter:

```
awplus# configure terminal
awplus(config)# system psu psu 2 unused
```

To reactivate a power supply alert, enter the NO SYSTEM PSU command, in this format:

```
no system psu psu <1-2> unused
```

This example reactivates the alert for the PWR 2 connector:

```
awplus# configure terminal
awplus(config)# no system psu psu 2 unused
```

For more information, refer to the *Command Reference: IE560 Series Running AlliedWare Plus* on the Allied Telesis website.

Problem: The FAULT LED is flashing six times in two seconds.

Solution: The switch is overheating and might shutdown. Review the information in “Reviewing Site Requirements” on page 60 to verify that the ventilation and cooling at the installation site is adequate for the device,

PWR 1 and PWR 2 LEDs

Problem: A 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 51 and "DC Power Specifications" on page 200.
- ❒ Verify that the POWER plug is fully inserted into the POWER connector on the front panel of the switch.
- ❒ Verify that the POWER plug is correctly wired. Refer to "Wiring the POWER Connector" on page 108.
- ❒ Verify that the DC wires are correctly and securely connected to the POWER 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 ALARM IN/ALARM OUT connector.
- ❒ Try using a different DC power supply.
- ❒ Try replacing the DC power wires.
- ❒ Try testing the DC power source by connecting it 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 200.

Note
For further information, refer to "Wiring the POWER Connector" on page 108.

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 51 and "DC Power Specifications" on page 200.
- ❒ 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.

SFP and SFP+ Ports

Problem: A transceiver in an SFP or SFP+ port on the switch is connected to a network device but the port's L/A 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 transceiver is connected to the correct fiber optic cable.
- ❒ Check that the transceiver is fully inserted in the SFP or 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 transceiver using a different cable. If the transceiver 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).

Section III

Building a VCStack

The chapters in this section provide an overview of the VCStack feature, as well as the procedures on how to configure switches for a stack:

Chapter 9

VCStack Overview

The sections in this chapter are listed here:

Note
For more information on VCStack, refer to the *Command Reference: IE560 Series Switches Running AlliedWare Plus* from **www.alliedtelesis.com**.

Overview

The Virtual Chassis Stacking (VCStack) feature lets you build a virtual stack of up to four IE560 Series switches that function as a single networking unit. VCStack has the following benefits:

- Simplifies management - You can manage the devices of the stack as a single unit, rather than individually. Your local and remote management sessions automatically give you management access to all the devices.
- Reduces IP addresses - A stack requires only one IP address for remote management access, reducing the number of IP addresses you have to assign to network devices. The one address gives you management access to all the units.
- Adds feature flexibility and resiliency - A stack gives you more flexibility in the available configurations of features. For instance, you can create port aggregators of ports from different switches in the stack, rather than from only one switch. If you distribute the ports of an aggregator across two or more switches in a stack, you increase its resiliency because the aggregator will continue to function, though at a reduced bandwidth, if one of the switches stops functioning.
- Reduces protocol requirements - Creating a stack might eliminate your need to configure some protocols, such as the Virtual Router Redundancy Protocol or Spanning Tree Protocol.

Stacking Guidelines

Here are general stacking guidelines:

- A stack can have a maximum of four IE560 Series switches.
- Stacking requires the latest version of the AlliedWare Plus management software. Instructions later in this guide explain how to view the version number of the operating software on the switch.
- The VCStack feature comes standard with the AlliedWare Plus operating software. No additional software or license is required.
- The default setting for the VCStack feature on the IE560 Series is disabled. Enabling it requires rebooting switches. Instructions later in this guide explain how to enable the feature and reboot the unit.
- The VCStack feature supports optional feature licenses. When ordering a feature license, you need to order the same number of licenses as there are switches in the stack, and install the licenses on each switch. You can install licenses while the switches are operating in standalone mode or as a stack. Refer to the product's data sheet for a list of optional feature licenses.

Stack Trunk Guidelines

The switches of a stack are connected together with a physical network link called a stack trunk. Here are the trunk guidelines for the IE560 Series:

- Trunk ports must consist of 10G SFP+ transceivers in ports 9 to 12.
- The 10G SFP+ transceivers for the trunk must be from Allied Telesis. Transceivers from other network equipment providers might not operate properly as a trunk. For a list of supported transceivers, refer to the product's datasheet on the Allied Telesis web site.
- The more links in the trunk, the greater its bandwidth and resiliency.
- 1G SFP transceivers cannot be used as trunk ports.
- 100M/1G SFP ports 1 to 8 cannot be used as trunk ports.
- A stack can have only one trunk, but a trunk can have more than one port per switch.
- The trunk must have the same number of ports on all the switches in the stack.
- Managing and troubleshooting a trunk will be easier if you use the same ports for the trunk on all the switches of the stack and if the ports are sequential (for example, 9, 10, and 11). However, this is not a requirement.
- You designate trunk ports with the STACKPORT command in the AlliedWare Plus operating system.
- There are no default trunk ports.
- Once a port is designated as a trunk port, you cannot view or change its parameter settings.
- A stack of IE560 Series cannot contain other stacking products, such as x600 or x610 Switches.

Trunk Examples

Figure 76 to Figure 78 on page 145 contain examples of trunks for stacks of two, three, and four switches, respectively.

Note
The first examples in the figures show a linear trunk, with only one link between each switch in the stack. That configuration is not recommended because it does not provide link redundancy.

Figure 76. Trunk Examples for Stacks of Two IE560-12GSX Switches

Figure 77. Trunk Examples for Stacks of Three Switches

Figure 78. Trunk Examples for Stacks of Four Switches

Unsupported Trunks

Trunk links must be direct connections between ports 9 to 12 on the switches. A trunk cannot contain intermediate network devices, such as media converters, routers, or other Ethernet switches, in a trunk. Figure 79 is an example of an unsupported trunk because it contains media converters.

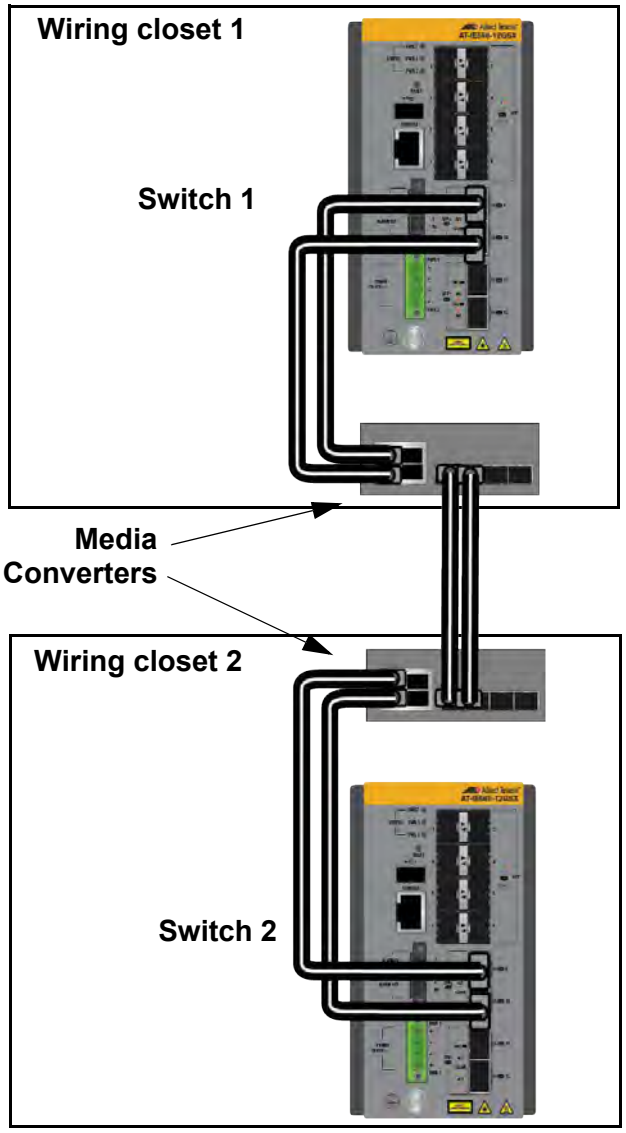


Figure 79. Unsupported Trunk with Intermediate Network Devices

A trunk must have the same number of ports and connections on each switch. The trunk in Figure 80 is unsupported because the first switch has only one connection to each of the other two switches, while the second and third switches are connected with two links.

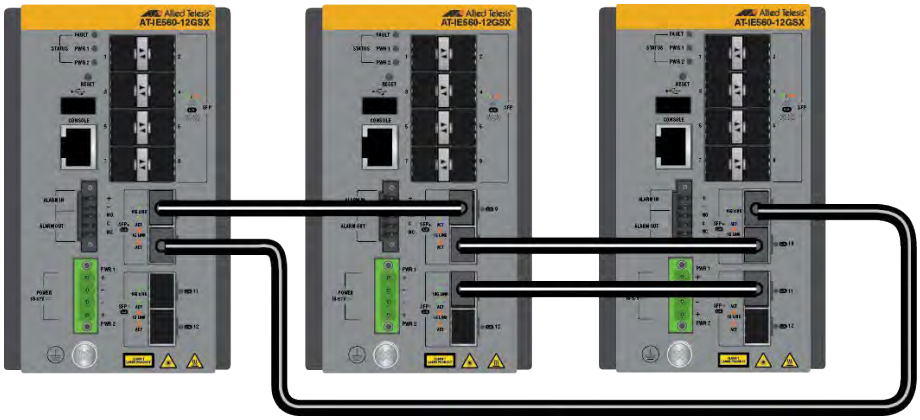


Figure 80. Unsupported Trunk with Different Number of Links Per Switch

You cannot use ports 1 to 8 for a stack trunk. The trunk in Figure 81 is invalid because it is using ports 1 and 3.

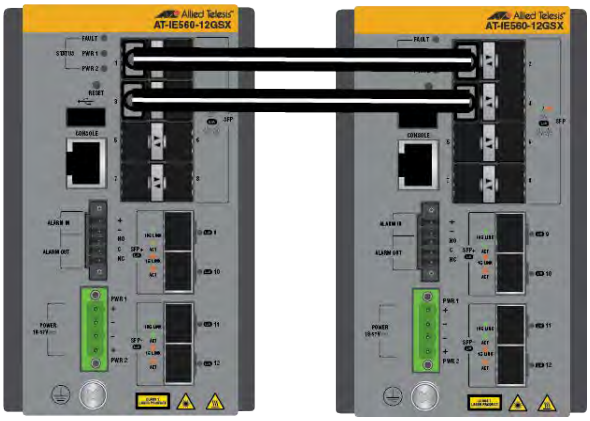


Figure 81. Unsupported Trunk with Switch Ports 1 to 8

Master and Member Switches

A stack has a master switch. A stack can have only one master switch at a time. Its main functions are listed here:

- Coordinate and monitor stack operations.
- Verify that the switches are using the same version of management software. It automatically downloads its management software over the stacking cables to switches with different software versions.
- Verify that the switches have different ID numbers. It automatically assigns new ID numbers to resolve situations where two or more switches have the same ID number.
- Verify that the stacking transceivers that connect the switches together are cabled correctly.

The other switches are called member switches. There can be up to three member switches in addition to the master switch. A member switch can automatically transition to the master role if the current master switch is removed from the stack or powered off. This ensures continued operations of the stack even if the master switch stops operating.

Selection of the Master Switch

The switches select the master switch during the initialization process they perform whenever they are powered on or reset. The selection of the master switch is based on the following parameters:

- Stack priority numbers
- MAC addresses

The stack priority number is an adjustable value of 0 to 255. The lower the number, the higher the priority. Typically, the switch with the lowest priority number (highest priority) becomes the master switch of a stack. The default priority value is 128.

If the switches have the same priority values, the selection of the master switch is based on their MAC addresses. As with the priority value, the lower the MAC address, the higher the priority. The switch with the lowest MAC address becomes the master switch.

If, during the initial power on of the stack, you power on the switches simultaneously without adjusting the priority values, they select the master switch by comparing their MAC addresses. If the switches are powered on one at a time, the master switch is the first switch to be powered on.

After the stack is established and operating, you may, if you choose, change the priority settings on the individual units and so control which switch will be the master switch after subsequent power cycles and resets.

Switch ID Numbers

Each switch in a stack must be assigned a unique ID number in the range of 1 to 4. The default is 1. You use the ID numbers to identify the individual switches and ports when configuring the devices with the commands in the management software.

The switches of the stack store their parameter settings in a configuration file. All switches contain copies of this file. The switches are identified in the configuration file by their ID numbers. When the stack is reset or power cycled, the ID numbers in the configuration file identify the devices to which the parameter settings belong.

The switches have a Stack ID LED on the front panel between ports 10 and 11. Refer to Figure 6 on page 35. The LED on the master switch is steady green. The LED on member switches is amber. Member switches blink the LED to indicate their ID numbers. For instance, a member switch with the ID 3 will blink the LED three times, pause two seconds, and repeat. Refer to Table 6 on page 35.

Caution
You should not change the ID numbers of the switches after configuring their parameter settings. Otherwise, the parameter settings might be applied to the wrong devices when you reset or power cycle the stack. E79

Note
The switches do not use their ID numbers to select the master switch. The selection of the master switch is based on the priority numbers and MAC addresses, as explained in “Selection of the Master Switch” on page 148.

Optional Feature Licenses

The IE560 Series comes with the AlliedWare Plus™ operating system and a base set of features that are available as soon as you install the devices. Additional features and capabilities might be included with the operating system, but they can only be used after they are unlocked with optional feature licenses from Allied Telesis. Contact your authorized reseller or distributor for a list of optional features licenses for this product.

Here are the guidelines to feature licenses for a stack of switches in the IE560 Series:

- The VCStack feature is part of the base features of the switch. It does not require an optional feature license.
- You can install feature licenses while the switches are operating as standalone devices or in a stack.
- When ordering feature licenses for the switches of a stack, you must order one license for each switch.
- Switches can form a stack even if they have different feature licenses. However, the additional features will only be available on those switches with the licenses. The stack generates a warning message when reset or powered on, if it detects that the switches have different optional feature licenses.

Planning the Stack

Here are factors to consider when planning a stack of IE560 Series switches:

- A stack can have a maximum four switches.
- The trunk ports must be ports 9 to 12. You cannot use ports 1 to 8 as trunk ports.
- You must use 10G transceivers for the trunk ports. Do not use 1G transceivers for the trunk.
- All the switches must have the same version of the AlliedWare Plus management software.
- Each switch must be assigned a unique stack ID number of 1 to 4. The default is 1. Refer to “Switch ID Numbers” on page 149.
- The switches must have a priority number, used to select the master switch. The default is 1. Allied Telesis recommends making the priority number the same as the stack ID number on a switch. For example, a switch with the ID number 2 would be assigned the priority number 2.

Stacking Worksheet

The worksheet in Table 13 can assist you in configuring and maintaining a stack.

Table 13. Stacking Worksheet

Switch	Location	ID	Priority	Firmware Version Number[1]	10G Trunk Ports 9 to12
Master		1	1		
Member		2	2		
Member		3	3		
Member		4	4		

1. AlliedWare Plus version number.

The table columns are described in Table 14.

Table 14. Stacking Worksheet Columns

Column	Description
Location	Use this column to record the physical locations of the devices, such as their buildings and equipment rooms. The information can be useful in locating the switches of the stack if they are in different locations.

Table 14. Stacking Worksheet Columns (Continued)

Column	Description
ID	Use this column to record the unique ID numbers of the stack switches. The range is 1 to 4. You use the numbers to identify the switches when configuring the devices with the management software. Allied Telesis recommends assigning the ID 1, the default value, to the master switch. You should decide ahead of time, before beginning the configuration procedures, the ID assignments of the switches.
Priority	Use this column to record the priority values of the switches. When the switches of a stack are reset or powered on, they perform an initialization process that involves, in part, choosing the master switch. The selection is based on their priority numbers and MAC addresses. The former is an adjustable parameter with a range of 0 to 255 and a default value of 128. The lower the value, the higher the priority. Thus, the switch with the lowest value becomes the stack master. If switches have the same priority number, the master is selected based on their MAC addresses. Again, as with priority numbers, the lower the MAC address, the higher the priority. For further information, refer to “Selection of the Master Switch” on page 148. Allied Telesis recommends setting each switch’s priority value to match its ID value. This is to ensure that the switch you have chosen to be the master unit will be selected to perform that role. Additionally, it will make it possible for you to know the order in which the switches assume the master role if the primary master should fail or be powered off.
Firmware Version Number	Use this column to record the version numbers of the AlliedWare Plus management software on the switches. The switches might not be able to form the stack if they have different versions. The configuration instructions explain how to view the version numbers. If they have different versions, you should update them to the most recent release prior to building the stack.

Table 14. Stacking Worksheet Columns (Continued)

Column	Description
10G Trunk Ports 9 to 12	Use this column to record the trunk ports. You should choose the trunk ports before beginning the configuration procedures. Allied Telesis recommends using the same ports as trunk ports on all the switches of the stack. Although this is not mandatory, it can make managing and troubleshooting the stack easier. Refer to “Stack Trunk Guidelines” on page 142.

Table 15 is an example of a completed worksheet for the stack of three switches from the second configuration in Figure 77 on page 144.

Table 15. Example of a Completed Stacking Worksheet

Switch	Location	ID	Priority	Firmware Version Number	10G Trunk Ports 9 to12
Master	Bldg 2 rm 104	1	1	*n.n.n*	9, 10
Member	Bldg 3 rm 215	2	2	*n.n.n*	9, 10
Member	Bldg 4 rm 106	3	3	*n.n.n*	9, 10
Member		4	4		

Chapter 10

VCStack Commands Overview

This chapter briefly describes the basic commands to configuring the master and member switches for stacking. For further instructions, refer to the following documents on the Allied Telesis website:

- *Software Reference for the IE560 Switch, AlliedWare Plus Operating System*
- *Virtual Chassis Stacking (VCStack): Feature Overview and Configuration Guide*

After reviewing the commands, go to Chapter 11, “Configuring the Master Switch” on page 161 to begin the configuration process.

Here are the stacking commands:

STACK ENABLE Command

This command is used to activate the VCStack feature on the switch. The default setting for the VCStack feature is disabled. The command is located in the Global Configuration mode of the AlliedWare Plus management software. Activating the VCStack feature requires resetting the switch. You must perform this command before designating the ports of the stack trunk with the STACKPORT command. Here is the command:

```
awplus(config)# stack enable
```

STACKPORT Command

You use this command to designate the ports of the stack trunk. The command has to be performed after you have enabled the stacking feature with the STACK ENABLE command. Additionally, it has to be performed from the Interface mode of the selected ports. In this example, ports 1 to 4 on the module in slot 4 on the master switch with ID 1 are designated as ports of the stack trunk:

```
awplus(config)# interface port1.4.1-1.4.4
awplus(config-if)# stackport
```

In this example, ports 1 and 2 on the modules in slots 3 and 4 on the member switch with ID 2 are designated as members of the stack trunk:

```
awplus(config)# interface port2.3.1-2.3.2,port2.4.1-
2.4.2
awplus(config-if)# stackport
```

STACK PRIORITY Command

This command is used to assign priority numbers to the switches in a stack. They use the numbers to select the master switch of the stack. The lower the number the higher the priority. The unit with the lowest number becomes the master. If they have the same priority value, then they use their MAC addresses to determine the master. As with priority numbers, the lower the MAC address, the higher the priority. A switch can have only one priority number.

Allied Telesis recommends making a switch's priority and ID numbers the same. This is not required, but it can make managing and troubleshooting a stack simpler and easier.

The command is located in the Global Configuration mode. Here is its format:

`stack` *switch_ID* `priority` *priority_number*

The variables are defined here:

- *switch_ID* - This is the ID number of the switch. The range is 1 to 4. You can specify only one ID number.
- *priority_number* - This is the new priority number for the switch. You can specify only one number. The range is 0 to 255. The default is 128.

This example assigns the priority 1 to the switch with ID 1:

```
awplus(config)# stack 1 priority 1
```

This example assigns the priority 2 to the switch with ID 2:

```
awplus(config)# stack 2 priority 2
```

STACK RENUMBER Command

You use this command to assign unique ID numbers to the switches in a stack. The AlliedWare Plus management software uses the ID numbers to identify the individual switches in the stack. The range is 1 to 4. The default is 1. The master switch will use the default value. You will use this command in the following procedures to set the ID numbers of the member switches. Here is the command format.

`stack` *current_switch_ID* `renumber` *new_switch_ID*

The variables are defined here:

- *current_switch_ID* - This is the current ID number of the switch. You can specify only one ID number. The default is 1.
- *new_switch_ID* - This is the new ID number for the switch. You can specify only one number. The range is 1 to 4.

Note
Changing the ID number requires resetting the switch. The switch does not implement the new ID assignment until it is reset.

This example changes the switch's ID from the default ID 1 to 2:

```
awplus(config)# stack 1 renumber 2
```

This example changes the switch's ID from the default ID 1 to 3:

```
awplus(config)# stack 1 renumber 3
```

SWITCH PROVISION Command

To ensure that the first power-on of the stack is successful, Allied Telesis recommends configuring the units such that the units know about each other prior to forming the stack. This involves using the SWITCH PROVISION command to add the member switches as provisional units on the master, and the master switch as a provisional unit on the member switches. Here is the format of the command:

```
switch switch_ID provision ie560
```

This example adds a provisioned switch to the current switch and assigns it the ID 2:

```
awplus(config)# switch 2 provision ie560
```

This example adds a provisioned switch to the current switch and assigns it the ID 1. You use this command to add the master switch as a provisioned switch on a member switch:

```
awplus(config)# switch 1 provision ie560
```

Chapter 11

Configuring the Master Switch

This chapter contains the following sections:

Starting a Local Management Session

This section explains how to start a local management session using the CONSOLE port and the command line interface. Here are the guidelines:

- Local management sessions require a terminal, computer, or laptop with a USB port or an RS-232 serial port, and a terminal emulator, such as PuTTy.
- Local management sessions also require a management cable. 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 8 on page 36 and Figure 9 on page 37.
- If your computer has an RS-232 port, refer to “RJ-45 Style Serial CONSOLE Port” on page 211 and “CONSOLE Port Management Cable with DB-9 Female and RJ-45 Connectors” on page 212 for the cable wiring specifications.
- Local management sessions do not interfere with the network operations of the switch.
- The switch does not need an IP address for local management.
- The CONSOLE port does not support the web browser management interface.
- 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 its parameter settings.
- The configuration file contains those parameters that are changed from their default settings. It does not contain parameters at their default values.

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. The kit and driver are sold separately.
   - If your workstation has a DB-9 female connector, refer to “CONSOLE Port Management Cable with DB-9 Female and RJ-45 Connectors” on page 212 for the cable specifications.
2. Power on the switch and wait several minutes for it to start the AlliedWare Plus management software. For instructions, refer to “Wiring the POWER Connector” on page 108 and “Powering On the Switch” on page 114.

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 9600 to 115200 bps. The default is 9600 bps. For a list of supported speeds, refer to “RJ-45 Style Serial CONSOLE Port” on page 211.)
   - ❒ 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 and password. Here are the default values:

   - ❒ User name: manager
   - ❒ Password: friend

   Note
   User names and passwords are case sensitive.

6. If this is the first log on to the switch, the switch prompts you to change the logon password. Enter a new password. The password can be up to 32 characters from the following four categories:

   - ❒ Uppercase letters: A to Z.
   - ❒ Lowercase letters: a to z
   - ❒ Digits: 0 to 9
   - ❒ Special symbols: all printable ACSII characters not included in the previous categories. The question mark (?) is excluded. It cannot be used in of a password.

   If the system requests a privilege level, enter 15, the highest level that provides full access.

   Note
   To change passwords or add users to the system, use the USERNAME command in the Global Configuration mode.

The local management session starts when the User Exec mode prompt, shown in Figure 82. is displayed.

```
awplus>
```

Figure 82. User Exec Mode Prompt

Note
The User Exec mode is the first level in the command mode interface. For complete information on the modes and commands, refer to the *Software Reference for IE560 Series, AlliedWare Plus Operating System* from **www.alliedtelesis.com**.

7. Do one of the following:

   - To begin configuring the master switch, start by going to “General Steps for the Master Switch” on page 165.
   - If you have already configured the master switch, go to Chapter 12, “Configuring Member Switches” on page 175.

General Steps for the Master Switch

The procedure for configuring the master switch is divided into two parts. Here are the general steps to “Configuring the Master Switch - Part I” on page 166.

Note
The procedures require reseting the switch. Some network traffic will be lost if the unit is already connected to an active network.

1. Start a local management session on the switch.
2. Verify the hardware status with the SHOW SYSTEM ENVIRONMENT command in the Privilege Exec mode.
3. Display the firmware version number of the AlliedWare Plus management software with the SHOW VERSION command.
4. Enable the VCStack feature with the STACK ENABLE command in the Global Configuration mode.
5. Assign the master switch the priority 1 with the STACK PRIORITY command in the Global Configuration mode. This is to ensure that it acts as the master switch when the stack is powered on.
6. Add the member switches as provisioned units to the master switch, with the SWITCH PROVISION command. This step ensures that the master switch will know about the member switches during the first power-on of the stack.
7. Save the changes with the WRITE command in the Privilege Exec mode.
8. Reboot the switch with the REBOOT command.

Here are the general steps to “Configuring the Master Switch - Part II” on page 169:

1. Start a new local management session.
2. Designate the ports of the stack trunk on the master and provisioned member switches with the STACKPORT command in the port Interface mode.
3. Save the changes with the WRITE command.
4. Reboot the switch with the REBOOT command.
5. Verify the changes with the SHOW STACK and SHOW RUNNING-CONFIG commands.

Configuring the Master Switch - Part I

This section contains the steps to Part I of configuring the master switch for stacking. In this procedure, you do the following:

- Verify the hardware status with the SHOW SYSTEM ENVIRONMENT command.
- Display the firmware version number with the SHOW VERSION command.
- Enable VCStack with the STACK ENABLE command.
- Assign the master switch the priority 1 with the STACK PRIORITY command in the Global Configuration mode.
- Add the member switches as provisioned switches with the SWITCH PROVISION command.
- Save the configuration and reboot the switch with the WRITE and REBOOT commands.

Allied Telesis recommends filling out the worksheet in “Stacking Worksheet” on page 152 before performing this procedure.

To configure the master switch, perform the procedure in Table 16.

Table 16. Configuring the Master Switch - Part I

Step	Description and Command
Steps 1 to 4 power on the switch, start a local management session, and verify the hardware operations of the unit.	
1	Power on the master switch and wait several minutes for it to start theAlliedWare Plus management software. Refer to Chapter 6, “Powering On the Switch” on page 113.
2	Start a local management session. Refer to “Starting a Local Management Session” on page 162.
3	Move to the Privileged Exec mode with the ENABLE command. `awplus> enable`
4	Verify that the switch hardware is operating correctly with the SHOW SYSTEM ENVIRONMENT command. The status of all components should be OK. `awplus# show system environment`
Step 5 displays the version number of the AlliedWare Plus management software on the switch. After viewing the version numbers on all the switches, you will compare them to confirm they all have the same version. Switches with different versions will have to be updated.	

Table 16. Configuring the Master Switch - Part I (Continued)

Step	Description and Command
5	Entering the SHOW VERSION command to display the version number of the AlliedWare Plus management software on the switch. Write down the version number in the worksheet in “Stacking Worksheet” on page 152 for the master switch. `awplus# show version`
Steps 6 to 8 activate VCStack and assign the switch the priority 1 so that it becomes the master switch when the stack is powered on.	

6	Move to the Global Configuration mode with the CONFIGURE TERMINAL command.
	
	`awplus# configure terminal`
	`Enter configuration commands, one per line. End with CNTL/Z.`

7	Activate VCStack on the switch with the STACK ENABLE command.
	
	`awplus(config)# stack enable`
	`% Automatically enabling ‘stack virtual-mac’ to minimize disruption form failovers.`
	`% Please check that the new MAC 0000.cd37.0431 is unique within the network.`
	`% Save the config and restart the system for this change to take effect.`

8	Assign priority 1 to the switch with the STACK PRIORITY command so that it becomes the master switch when the stack is powered-on.
	
	`awplus(config)# stack 1 priority 1`
	`% Warning: Stacking is currently disabled.`

Step 9 adds the member switches as provisioned switches to the master switch. You need to add one provisioned switch for each member switch to be in the stack.	

9	Add the member switches as provisioned switches to the master switch, with the SWITCH PROVISION command. Assign them unique IDs in the range of 2 to 4. In this example, the stack will have three member switches.
	
	`awplus(config)# switch 2 provision ie560`
	`awplus(config)# switch 3 provision ie560`
	`awplus(config)# switch 4 provision ie560`

Steps 10 to 15 save your changes and reboot the switch.	
10	Return to the Privileged Exec mode. `awplus(config)# exit`

Table 16. Configuring the Master Switch - Part I (Continued)

Step	Description and Command

11	Enter the WRITE command to save your change. If this is the first management session, the switch adds the configuration file DEFAULT.CFG to flash memory.
	
	`awplus# write`
	`Building configuration...`
	`[OK]`

12	Restart the switch with the REBOOT command.
	
	`awplus# reboot`
	`reboot system? (y/n):`
	`awplus#`

13	Type “Y” for yes.
14	Wait several minutes for the switch to start the AlliedWare Plus management software.
15	Go to “Configuring the Master Switch - Part II” on page 169.

Configuring the Master Switch - Part II

The procedure in Table 17 designates the ports of the stack trunk on the master switch and the provisioned member switches.

Table 17. Configuring the Master Switch - Part II

Step	Description and Command
1	Start a new local management session. Refer to “Starting a Local Management Session” on page 162.
2	Move to the Privileged Exec mode with the ENABLE command. `awplus> enable`

3	Move to the Global Configuration mode with the CONFIGURE TERMINAL command.
	
	`awplus# configure terminal`
	`Enter configuration commands, one per line. End with CNTL/Z.`

Steps 4 to 6 designate the stack ports on the master switch with the STACKPORT command.	
4	Enter the port Interface modes of the ports that will be the stack trunk on the master switch. In this example, the trunk ports will be ports 9 and 10: `awplus(config)# interface port1.0.9-1.0.10`

5	Designate the ports as trunk ports with the STACKPORT command.
	
	`awplus(config-if)# stackport`
	`% Save the config and restart the system for this change to take effect.`

6	Return to the Global Configuration mode. `awplus(config-if)# exit`
Steps 7 and 8 use the STACKPORT command in the port interface modes to designate the stack ports in the provisioned member switches on the master switch.	
7	Enter the port interface modes of the ports in the provisioned member switches that will be the port trunks. This examples assumes there will be three member switches (ID number 2 to 4) and the trunk ports will be 9 and 10: `awplus(config)# interface port2.0.9-2.0.10,port3.0.9-3.0.10, port4.0.9-4.0.10`

8	Designate the ports as trunk ports with the STACKPORT command.
	
	`awplus(config-if)# stackport`
	`% Save the config and restart the system for this change to take effect.`

Table 17. Configuring the Master Switch - Part II (Continued)

Step	Description and Command
Steps 9 to 15 save your changes and reboot the switch.	
9	Return to the Global Configuration mode. `awplus(config-if)# exit`
10	Return to the Privileged Exec mode. `awplus(config)# exit`

11	Enter the WRITE command to save your change.
	`awplus# write`
	`Building configuration...`
	`[OK]`

12	Restart the switch with the REBOOT command.
	`awplus# reboot`
	`reboot system? (y/n):`
	`awplus#`

13	Type “Y” for yes.
14	Wait several minutes for the switch to start the AlliedWare Plus management software.
15	Go to “Verifying the Master Switch” on page 171.

Verifying the Master Switch

Perform the steps in Table 18 to confirm the configuration of the master switch.

Table 18. Verifying the Master Switch

Step	Description and Command
1	Start a new local management session.
2	Move to the Privileged Exec mode with the ENABLE command. `awplus> enable`

3	Enter the SHOW STACK command. Here is an example for a stack of four switches:
	`awplus# show stack`
	`Virtual Chassis Stacking summary information`
	`ID Pending ID MAC address Priority Status Role`
	`1 - e01a.ba56.c208 1 Ready Active Master`
	`2 - - - - Provisioned`
	`3 - - - - Provisioned`
	`4 - - - - Provisioned`
	`Operational Status Standalone unit`
	`Stack MAC address 0000.ab56.d4a8 (Virtual MAC)`

4	Verify the display for the following: - The table should have one entry for the master switch (ID 1). - The table should have one entry for each provisioned member switch (IDs 2 to 4). If the table is missing a member switch, repeat the SWITCH PROVISION command in “Configuring the Master Switch - Part I” on page 166. - The master switch should have the priority 1. If the priority number is incorrect, repeat the STACK PRIORITY command in “Configuring the Master Switch - Part I” on page 166. - The Operational Status should be Standalone Unit, indicating that stacking is enabled and that the unit is operating as a stack of one switch. If the status is Stacking Hardware Disabled, the stacking feature is disabled and needs to be enabled. Repeat the STACK ENABLE command in “Configuring the Master Switch - Part I” on page 166. - Remember to perform the WRITE command to save your configuration changes.

Table 18. Verifying the Master Switch (Continued)

Step	Description and Command

5	Enter the SHOW RUNNING-CONFIG command to verify the following:
	- Check the running configuration for SWITCH PROVISION commands. There should be one command for each switch. The commands should designate IE560 Switches. Here are examples:
	`switch 1 provision IE560`
	`switch 2 provision IE560`
	`switch 3 provision IE560`
	`switch 4 provision IE560`
	- Check the running configuration for STACKPORT commands. The commands should designate the trunk ports for each switch. Here are examples:
	`.`
	`interface port1.0.9-1.0.10`
	`stackport`
	`.`
	`interface port2.0.9-2.0.10`
	`stackport`
	`.`
	`interface port3.0.9-3.0.10`
	`stackport`
	`.`
	`interface port4.0.9-4.0.10`
	`stackport`

6	Go to “What to Do Next” on page 173.

What to Do Next

After configuring the master switch, do the following:

1. Power off the switch.
2. Configure the member switches, as explained in Chapter 12, “Configuring Member Switches” on page 175.
3. After configuring the master and member switches, verify that all the units are powered off.
4. Cable the ports of the stack trunk. Refer to Chapter 4, “Cabling the SFP and SFP+ Ports” on page 89.
5. Power on the switches of the stack. Refer to “Powering On the Switch” on page 114.
6. Verify that the switches successfully formed the stack. Refer to “Verifying the Stack” on page 189.
7. Cable the networking ports. Refer to Chapter 4, “Cabling the SFP and SFP+ Ports” on page 89.

Chapter 12

Configuring Member Switches

This chapter contains the following sections:

General Steps for Member Switches

The procedure for configuring member switches has two parts:

- ❒ “Configuring Member Switches - Part I” on page 178
- ❒ “Configuring a Member Switch - Part II” on page 181

Note
The procedures require resetting member switches twice. Network traffic will be lost if the switches are already connected to an active network.

Here are the general steps to Part I:

1. Start a local management session on a member switch.
2. Verify the hardware with the SHOW SYSTEM ENVIRONMENT command in the Privilege Exec mode.
3. Enable the VCStack feature with the STACK ENABLE command in the Global Configuration mode.
4. Assign the member switch a unique ID number in the range of 2 to 4 with the STACK RENUMBER command in the Global Configuration mode.
5. If the stack will have three or four switches, use the SWITCH PROVISION command to add the other member switches as provisioned switches to the member switch.
6. Save your changes with the WRITE command in the Privilege Exec mode.
7. Restart the switch with the REBOOT command.

Here are the general steps to “Configuring a Member Switch - Part II” on page 181:

1. Start a new local management session.
2. Change the switch’s priority number to match its ID number with the STACK PRIORITY command in the Global Configuration mode.
3. Designate the ports of the stack trunk on the member switch and provisioned switches with the STACKPORT command in the port Interface mode.
4. Save your changes with the WRITE command in the Privilege Exec mode.

5. Restart the switch with the REBOOT command.
6. Start a new local management session.
7. Verify the changes with the SHOW STACK and SHOW RUNNING-CONFIG commands.

Configuring Member Switches - Part I

The instructions for configuring member switches are divided into two parts. In Part I, you do the following:

- Display the hardware status with the SHOW SYSTEM ENVIRONMENT command.
- Display the firmware version number with the SHOW VERSION command.
- Enable VCStack with the STACK ENABLE command.
- Set the switch ID number with the STACK RENUMBER command.
- Add the other member switches as provisioned members with the SWITCH PROVISION command.
- Save the configuration and reboot the switch with the WRITE and REBOOT commands.

Allied Telesis recommends filling out the worksheet in “Stacking Worksheet” on page 152 before performing the procedures. To configure a member switch, begin by performing the procedure in Table 19.

Table 19. Configuring a Member Switch - Part I

Step	Description and Command
1	Power on the member switch and wait several minutes for it to start the AlliedWare Plus management software. Refer to Chapter 6, “Powering On the Switch” on page 113.
2	Start a local management session. Refer to “Starting a Local Management Session” on page 162.
3	Enter the ENABLE command to move from the User Exec mode to the Privileged Exec mode. `awplus> enable`
4	Verify the status of the switch hardware with the SHOW SYSTEM ENVIRONMENT command. All components should have an OK status. `awplus# show system environment`
5	Enter the SHOW VERSION command to display the version number of the AlliedWare Plus management software on the switch. Write down the version number in the worksheet in “Stacking Worksheet” on page 152. After viewing the version numbers on all the switches, you should compare them to confirm they all have the same version. Switches with different versions will need to be updated. `awplus# show version`

Table 19. Configuring a Member Switch - Part I (Continued)

Step	Description and Command

6	Move to the Global Configuration mode with the CONFIGURE TERMINAL command.
	
	`awplus# configure terminal`
	`Enter configuration commands, one per line. End with CNTL/Z.`

7	Activate VCStack on the member switch with the STACK ENABLE command.
	
	`awplus(config)# stack enable`
	`% Automatically enabling 'stack virtual-mac' to minimize disruption form failovers.`
	`% Please check that the new MAC 0000.cd37.0431 is unique within the network.`
	`% Save the config and restart the system for this change to take effect.`

8	Assign a unique ID number in the range of 2 to 4 to the member switch with the STACK RENUMBER command. This example assigns the ID number 2 to the switch.
	
	`awplus(config)# stack 1 renumber 2`
	`% Warning: Stacking is currently disabled.`
	`% Warning: the new ID will not become effective until the stack-member reboots.`
	`% Warning: the boot configuration may now be invalid.`

9	If the stack will have other member switches, add them as provisioned switches with the SWITCH PROVISION command. Assign them their unique IDs in the range of 2 to 4. This example adds two provisioned IE560 Switches with the IDs 3 and 4:
	
	`awplus(config)# switch 3 provision IE560`
	`awplus(config)# switch 4 provision IE560`

10	Return to the Privileged Exec mode. `awplus(config)# exit`

11	Enter the WRITE command to save your changes. If this is the first management session, the switch adds the configuration file DEFAULT.CFG to flash memory for storing your configuration changes.
	
	`awplus# write`
	`Building configuration...`
	`[OK]`

12	Restart the switch with the REBOOT command.
	
	`awplus# reboot`
	`reboot system? (y/n):`
	`awplus#`

13	Type "Y" for yes.

Table 19. Configuring a Member Switch - Part I (Continued)

Step	Description and Command
14	Wait several minutes for the switch to start the AlliedWare Plus management software.
15	Check the Stack ID LED on the front panel, between ports 9 and 10. It should be steady green, indicating that VCStack is enabled on the switch. Once you have configured and cabled all the switches in the stack, this LED will change to amber on member switches. If the LED is off, do the following: - VCStack is still disabled. Repeat the STACK ENABLE command, also in the Global Configuration mode. - Remember to save your changes with the WRITE command.

Configuring a Member Switch - Part II

This section contains the second part to configuring member switches. The steps show how to configure the following parameters:

- Set the priority number of the member switch to match its ID number with the STACK PRIORITY command.
- Designate the ports of the stack trunk with the STACKPORT command. Refer to “Stack Trunk Guidelines” on page 142.

Perform the Part II procedure in Table 20 to configure a member switch.

Table 20. Configuring a Member Switch - Part II

Step	Description and Command
1	Start a new local management session on the member switch. Refer to “Starting a Local Management Session” on page 162.
2	Enter the ENABLE command to move from the User Exec mode to the Privileged Exec mode. `awplus> enable`

3	Move to the Global Configuration mode with the CONFIGURE TERMINAL command.
	
	`awplus# configure terminal`
	`Enter configuration commands, one per line. End with CNTL/Z.`

4	Change the switch’s priority to match its ID number with the STACK PRIORITY command. This example sets priority to 2 on a member switch with the ID 2: `awplus(config)# stack 2 priority 2`

5	Enter the port Interface modes of the ports to be the stack trunk on the member switch and provisioned switches, with the INTERFACE command. This example assumes ports 9 and 10 will be the stack trunk in a stack with three member switches.
	
	`awplus(config)# interface port2.0.9-2.0.10,port3.0.9-3.0.10,`
	`port4.0.9-4.0.10`

6	Designate the ports as the stack trunk with the STACKPORT command.
	
	`awplus(config-if)# stackport`
	`% Save the config and restart the system for this change to take effect.`

7	Return to the Global Configuration mode. `awplus(config-if)# exit`

Table 20. Configuring a Member Switch - Part II (Continued)

Step	Description and Command
8	Return to the Privileged Exec mode. `awplus(config)# exit`

9	Save your changes with the WRITE command.
	
	`awplus# write`
	`Building configuration...`
	`[OK]`

10	Restart the switch.
	
	`awplus# reboot`
	`reboot system? (y/n):`

11	Type “Y” for yes.
12	Wait several minutes for the switch to start the AlliedWare Plus management software.
13	Go to “Verifying Member Switches,” next.

Verifying Member Switches

Perform the steps in Table 21 to confirm the configuration of a member switch.

Table 21. Verifying Member Switches

Step	Description and Command
1	Start a local management session. Refer to “Starting a Local Management Session” on page 162.
2	Move to the Privileged Exec mode. `awplus> enable`

3	Enter the SHOW STACK command. The example here is for a member switch with the ID 2, in a stack of four switches:
	`awplus# show stack`
	`Virtual Chassis Stacking summary information`
	`ID Pending ID MAC address Priority Status Role`
	`1 - - - - Provisioned`
	`2 - e01a.ba56.c112 2 Ready Active Master`
	`3 - - - - Provisioned`
	`4 - - - - Provisioned`
	`Operational Status Standalone unit`
	`Stack MAC address 0000.ab56.478c (Virtual MAC)`

4	Verify the display for the following: - The table should have from two to four entries, depending on the number of switches to be in the stack. - The entry with the Ready status and Active Master role is the switch you are currently managing. Its role will change to member after the stack is functioning. - Switch ID 1 will be for the master switch. - The other entries are for the member switches. There should be one entry for each member switch that will be in the stack. To add more entries, perform the SWITCH PROVISION command in “Configuring Member Switches - Part I” on page 178. - The switch’s priority should match its ID number. If it does not, perform the STACK PRIORITY command in “Configuring a Member Switch - Part II” on page 181. - The Operational Status should be Standalone Unit. This indicates that stacking is enabled and the unit is operating as a stack of one switch. If the status is Stacking Hardware Disabled, the stacking feature is disabled. Perform the STACK ENABLE in “Configuring Member Switches - Part I” on page 178. - Remember to save your changes with the WRITE command.

Table 21. Verifying Member Switches (Continued)

Step	Description and Command

5	Enter the SHOW RUNNING-CONFIG command and verify the following:
	- Check the running configuration for SWITCH PROVISION commands. There should be one command for each switch. The commands should designate IE560 Switches. Here is an example of a stack of four switches:
	`switch 1 provision IE560`
	`switch 2 provision IE560`
	`switch 3 provision IE560`
	`switch 4 provision IE560`
	- Check the running configuration for STACKPORT commands. There should be one command for each switch. The commands should designate the trunk ports of the switches. In this example, the switches are using ports 9 and 10 for the stack trunk:
	`.`
	`interface port1.0.9-1.0.10`
	`stackport`
	`.`
	`interface port2.0.9-2.0.10`
	`stackport`
	`.`
	`interface port3.0.9-3.0.10`
	`stackport`
	`.`
	`interface port4.0.9-4.0.10`
	`stackport`

6	Go to “What to Do Next” on page 185.

What to Do Next

After configuring a member switch, do the following:

1. Power off the switch.
2. Repeat the procedures in this chapter to configure the remaining member switches.
3. If you have not already configured the master switch, start by performing “Configuring the Master Switch - Part I” on page 166.
4. After configuring the master and member switches, verify that all the units are powered off.
5. Cable the stacking ports on the master and member switches. Refer to Chapter 4, “Cabling the SFP and SFP+ Ports” on page 89.
6. Power on the switches of the stack. Refer to “Powering on the Stack” on page 188.
7. Perform “Verifying the Stack” on page 189 to verify that the switches have successfully formed the stack.
8. Cable the networking ports, as explained in Chapter 4, “Cabling the SFP and SFP+ Ports” on page 89.

Chapter 13

Powering On and Verifying the Stack

This chapter contains the following procedures:

Powering on the Stack

After configuring the master and member switches for stacking and cabling the trunk ports, you are ready to power on the stack for the first time. (If you want to monitor the power-on sequence, connect a terminal or PC with a terminal emulator program to the CONSOLE port on any of the switches).

To power on the stack for the first time, perform the following procedure:

1. Verify that all switches are powered off.
2. If you have not yet cabled the trunk ports, do so now. Refer to Chapter 4, “Cabling the SFP and SFP+ Ports” on page 89.
3. Power on all the switches at the same time.

   Refer to “DC Power Specifications” on page 200 for the power specifications of the switches.
4. Wait several minutes for the switches to form the stack.
5. Go to “Verifying the Stack” on page 189.

Verifying the Stack

To verify the stack, perform the following procedure:

1. Start a local management session on any of the switches in the stack. Refer to “Starting a Local Management Session” on page 162.

2. From the User Exec mode, enter the SHOW STACK command:

   ```
   awplus> show stack
   ```

   An example of the command for a stack of four switches is shown in Figure 83.

```
awplus> show stack
Virtual Chassis Stacking summary information
ID    Pending ID     MAC address       Priority   Status   Role
1     -              e01a:ea20:8011    1          Ready    Active Master
2     -              e01a:ea20:ee45    2          Ready    Member
3     -              e01a:ea20:8a98    3          Ready    Member
4     -              e01a:ea20:1b67    4          Ready    Member
Operational Status                     Normal operations
Stack MAC address                      0015:774f:ed30
```

Figure 83. SHOW STACK Command

   Review the following items:

   - The command should list all the switches. If the list is incomplete, refer to “Troubleshooting a VCStack” on page 190.
   - The Operational Status field should be “Normal operations” to indicate that all the trunk ports are operating normally.
   - If the Operational Status field is displaying “Not all stack ports are up,” one or more trunk ports are not being used or cannot establish links with their counterparts. For more information, refer to “Troubleshooting a VCStack” on page 190.

3. Go to Chapter 4, “Cabling the SFP and SFP+ Ports” on page 89, to cable the networking ports and complete the installation.

Troubleshooting a VCStack

> **Note**
> For additional troubleshooting suggestions, refer to Chapter 8, “Troubleshooting” on page 131.

Problem: The Switch ID LED between ports 9 and 10 is off.

Solutions: This indicates that VCStack is disabled on the switch.

- To configure a master switch, refer to “General Steps for the Master Switch” on page 165.
- To configure a member switch, refer to “General Steps for Member Switches” on page 176.

Problem: The SHOW STACK command is not displaying all the switches in the stack.

Solutions: The switches are unable to form the stack. Try the following:

- The switches might have an earlier version of the management software that does not support VCStack, or they might have different versions. You can view the version number with the SHOW VERSION command.
- Review the information in “Stack Trunk Guidelines” on page 142 to verify that the trunk complies with all rules and restrictions.
- If the trunk is using fiber optic transceivers, verify that they are fully and securely inserted into the ports.
- Verify that the transceivers are from Allied Telesis.
- Verify that the fiber optic cables are securely connected to the ports on the transceivers.
- Display the running configuration with the SHOW RUNNING-CONFIG command to confirm the ports of the stack trunk. They are identified by the STACKPORT command. In this example from a running configuration, ports 9 to 10 are the stack trunk:

  ```
  interface port2.0.9-2.0.10
   stackport
  ```

- If necessary, repeat the STACKPORT command. For information, refer to “STACKPORT Command” on page 157. Afterwards, save your changes and reboot the switch.

Problem: A port removed from a stack trunk with the NO STACKPORT command is not forwarding regular Ethernet traffic.

- Display the running configuration with the SHOW RUNNING-CONFIG command to verify that the port is no longer part of the stack trunk.
- You have to reboot the switch whenever you add or remove ports from stack trunks with the STACKPORT or NO STACKPORT command. Be sure to save the change to the configuration file with the WRITE command before rebooting the unit.

Appendix A
Technical Specifications

This appendix contains the following sections:

Physical Specifications

Dimensions

Table 22. Product Dimensions (H x W x D)

IE560-12GSX Switch[1]	153.0 x 91.0 x 158.3 x mm (6.02 x 3.58 x 6.23 x in)

1. Enclosure only.

Weights

Table 23. Product Weights

IE560-12GSX Switch	With DIN rail bracket	2.290 kg (5.05 lbs)
	With wall brackets	2.170 kg (4.78 lbs)

Ventilation

Table 24. Ventilation Requirements for Cabinet Installations

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)

Enclosure (Cabinet) Dimensions

Table 25. Minimum Enclosure (Cabinet) Dimensions

Minimum Enclosure (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 (cabinet) 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
The device requires a UL Listed Type 3X or higher enclosure when installed in outdoor environments. E144

Note
The standards for Type 3X and higher enclosures include protection from corrosion.

Warning
This device requires a listed Type IP55 or better enclosure when installed in environments exposed to dust, such as railways or construction sites. Refer to IEC 50125-2 Annex A.5 Dust.

Note
The switch is rated to operate in the temperature range of -40°C to 75°C (-40° F to 167° F). The temperature range may be affected by the enclosure type and mounting orientation.

Table 26. 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)
Air Pollution	Pollution Degree 3 Insulation Class 3 Basic

Table 27. Ingress Protection

IE560-12GSX Switch	IP30

Operating Temperature Ranges

The following sections provide the operating temperature ranges for the switches in these installation orientations:

- "Vertical Wall Installations" next
- “Horizontal Wall Installations” on page 198
- “Floor, Table, Desk or Ceiling Installation” on page 199

Vertical Wall Installations

Wall brackets **DIN rail**

Figure 84. Vertical Wall Installations

Table 28. Operating Temperatures at 48Vdc - Vertical Wall Installation - Top Up

Switch	Sealed Enclosure: 0 LFM[1,2]	Ventilated Enclosure: 40 LFM	Fan-based Enclosure: 150 LFM
IE560-12GSX	-40°C to 60°C (-40° F to 140° F)	-40°C to 70°C (-40°F to 158°F)	-40°C to 75°C (-40°F to 167°F)

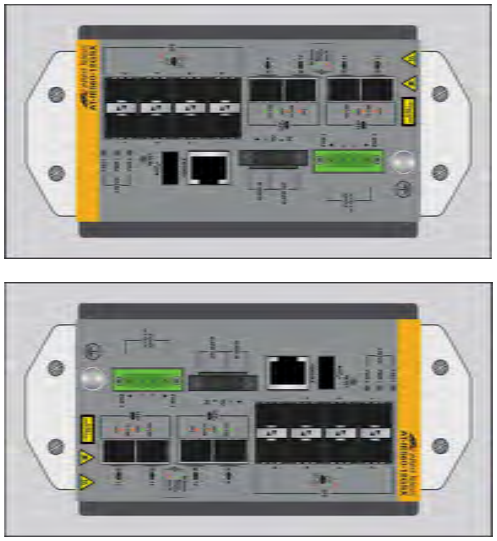
1. Linear Feet per Minute. Ambient temperature and airflow are measured 25.4mm below the switch.
2. Also applies to Indoor, No Enclosure: 0 LFM.

Note
All LFM values are the minimum baseline values for the specified minimum size enclosures. Refer to “Requirements for Outdoor Installation” on page 70. 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. Do not operate the switch at maximum temperature for extended periods of time as this may reduce long term reliability.

Horizontal Wall Installations



Wall brackets

Figure 85. Horizontal Wall Installations

Table 29. Operating Temperatures at 48Vdc - Horizontal Wall Installation

Switch	Sealed Enclosure: 0 LFM[1,2]	Ventilated Enclosure: 40 LFM	Fan-based Enclosure: 150 LFM
IE560-12GSX	-40°C to 60°C (-40° F to 140° F)	-40°C to 70°C (-40°F to 158°F)	-40°C to 75°C (-40°F to 167°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, Table, Desk or Ceiling Installation

Floor, Table, or Desk Installation with Wall Brackets

Ceiling Installation with Wall Brackets

Figure 86. Floor, Table, Desk or Ceiling Installation

Table 30. Operating Temperatures at 48Vdc - Floor, Table, Desk, or Ceiling Installation

Switch	Sealed Enclosure: 0 LFM[1,2]	Ventilated Enclosure: 40 LFM	Fan-based Enclosure: 150 LFM
IE560-12GSX	-40°C to 60°C (-40° F to 140° F)	-40°C to 70°C (-40°F to 158°F)	-40°C to 75°C (-40°F to 167°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.

DC Power Specifications

Table 31. DC Input Voltage Specification

Switch	DC Input Voltage
IE560-12GSX	18-57Vdc

Table 32. DC Input Inrush Current - IEC 61850-3

Switch	At Power On	Duration
IE560-12GSX	2A	2msec

Table 33. Maximum Power Consumption

Switch	Maximum Power Consumption
IE560-12GSX	30.0W

Table 34. Heat Dissipation

Switch	Heat Dissipation
IE560-12GSX	102.4 BTU/hr

Table 35. ALARM IN Power Ratings

Minimum Output Power	3.3VDC, 320uA
Withstand Voltage for Optocoupler	5Vdc

Table 36. ALARM OUT Power Ratings

Maximum Input Power	48VDC, 1.0A
Withstand Voltage for Open Contact	57Vdc

Note
For ALARM IN and ALARM OUT wiring specifications, see “Wiring the ALARM IN / ALARM OUT Connector” on page 102.

Table 37. System Fuses

DC Input PWR 1	5A Very-Quick-Acting Speed Code = FF
DC Input PWR 2	5A Very-Quick-Acting Speed Code = FF
ALARM IN	250mA Very-Quick-Acting Speed Code = FF
ALARM OUT	1.25A Time-Lag Speed Code = T

Note
System fuses are not field-replaceable.

Electromagnetic Compatibility Test Types

Note
Outdoor installations shall require a listed Type 3X or better enclosure.

Note
Installations that are exposed to dust as defined in EN 50125-2, EN 50125-3, IEC 62498-2, and IEC 62498-3 shall be installed in enclosures rated IP55 or better.

Electromagnetic Interference (EMI)

Table 38. Electromagnetic Interference (EMI)

Standard	Class
AS/NZS CISPR 32	A
CISPR 32	A
EN 55032	A
FCC 47 CFR Part 15, subpart B	A
ICES-03	A
VCCI	A
ICES-GEN	A
EN/IEC 61000-6-4	A
EN 50121-4, IEC 62236-4	A
EN 50121-5, IEC 62236-5	A
IEC 61850-3	A

Electromagnetic Susceptibility (EMS)

Table 39. EMS Test Type: Multimedia Equipment (CISPR 35, EN 55035)

Test	Description	Test Level	Class
EN/IEC 61000-4-2	Electrostatic Discharge (ESD)	+/- 4kV Contact (Level 2) +/- 8kV Air (Level 3)	B
EN/IEC 61000-4-3	Radiated Radio Frequency Immunity (RFI)	3V/m (Level 2), 80% 1kHz AM, 80-1000 MHz 3V/m (Level 2), 80% 1kHz AM, 1800, 2600, 3500, & 5000 MHz spot Frequencies	A
EN/IEC 61000-4-4	Electrical Fast Transient/ Burst Immunity (EFT)	+/-0.5kV (Level 1). DC Input ports	B
EN/IEC 61000-4-5	Surge Immunity (1.2/50us)	+/-0.5kV line-to-earth (Level 1), DC Input Ports	B
EN/IEC 61000-4-6	Conducted Disturbances Immunity (CDI)	3Vrms (Level 2), 0.15-10 MHz, DC Input Ports 3Vrms to 1Vrms (Level 2 to 1), 10 to 30 MHz, DC Input Ports 1Vrms (Level 1), 30 to 80 MHz, DC Input Ports	A
EN/IEC 61000-4-8	Power Frequency Magnetic Field Immunity	1 A/m (Level 1), 50 Hz or 60 Hz, Continuous	A

Table 40. EMS Test Type: Industrial Environment (EN/IEC 61000-6-2)

Test	Description	Test Level	Performance
EN/IEC 61000-4-2	Electrostatic Discharge (ESD)	+/- 4kV Contact (Level 2) +/- 8kV Air (Level 3)	B
EN/IEC 61000-4-3	Radiated Radio Frequency Immunity (RFI)	10V/m (Level 3), 80% 1kHz AM, 80-1000 MHz	A
EN/IEC 61000-4-4	Electrical Fast Transient/ Burst Immunity (EFT)	+/-1kV (Level 2). DC Input ports	B
EN/IEC 61000-4-5	Surge Immunity (1.2/50us)	+/-1kV line-to-earth (Level 2) DC Input Ports +/-0.5kV line-to-line (Level 1) DC Input Ports	B
EN/IEC 61000-4-6	Conducted Disturbances Immunity (CDI)	10Vrms (Level 3), 0.15-80 MHz, DC Input Ports 10Vrms (Level 3), 0.15-80 MHz, Earth Ports	A
EN/IEC 61000-4-8	Power Frequency Magnetic Field Immunity	30 A/m (Level 4), 50 & 60 Hz, Continuous	A

Table 41. EMS Test Type: Railway Applications - Signaling and Telecommunications Apparatus (EN 50121-4 and IEC 62236-4)

Test	Description	Test Level	Class
EN/IEC 61000-4-2	Electrostatic Discharge (ESD)	+/- 6kV Contact (Level 3) +/- 8kV Air (Level 3)	B
EN/IEC 61000-4-3	Radiated Radio Frequency Immunity (RFI)	10V/m (Level 3), 80% 1kHz AM, 80-800 MHz 20V/m (Level X), 80% 1kHz AM, 80-1000 MHz 10V/m (Level 3), 80% 1kHz AM, 1400-2000 MHz 5V/m (Level X), 80% 1kHz AM, 2000-2700 MHz 3V/m (Level 2), 80% 1kHz AM, 5100-6000 MHz	A
EN/IEC 61000-4-4	Electrical Fast Transient/ Burst Immunity (EFT)	+/- 2kV (Level 3). DC Input ports +/- 1kV (Level 2). Earth Port	B
EN/IEC 61000-4-5	Surge Immunity (1.2/50us)	+/-2kV line-to-earth (Level 3) DC Input Ports +/-1kV line-to-line (Level 3) DC Input Ports	B
EN/IEC 61000-4-6	Conducted Disturbances Immunity (CDI)	10Vrms (Level 3), 0.15-80 MHz, DC Input Ports 10Vrms (Level 3), 0.15-80 MHz, Earth Port	A
EN/IEC 61000-4-8	Power Frequency Magnetic Field Immunity	100 A/m (Level 5), 16.7 Hz, Continuous 100 A/m (Level 5), 50 Hz, Continuous 300 A/m (Level 4), 0 Hz, Continuous	A

Table 42. EMS Test Type: Railway Applications - Fixed Power Supply Apparatus (EN 50121-5 and IEC 62236-5)

Test	Description	Test Level	Class
EN/IEC 61000-4-2	Electrostatic Discharge (ESD)	+/- 6kV Contact (Level 3) +/- 8kV Air (Level 3)	B
EN/IEC 61000-4-3	Radiated Radio Frequency Immunity (RFI)	10V/m (Level 3), 80% 1kHz AM, 80-800 MHz 20V/m (Level X), 80% 1kHz AM, 800-1000 MHz 10V/m (Level 3), 80% 1kHz AM, 1400-2000 MHz 5V/m (Level X), 80% 1kHz AM, 2000-2700 MHz 3V/m (Level 2), 80% 1kHz AM, 5100-6000 MHz	A
EN/IEC 61000-4-4	Electrical Fast Transient/ Burst Immunity (EFT)	+/- 2kV (level 3). DC Input Ports +/- 1kV (level 2). Earth Port	B
EN/IEC 61000-4-5	Surge Immunity (1.2/50us)	+/-2kV line-to-earth (Level 3) DC Input Ports +/-1kV line-to-line (Level 3) DC Input Ports	B
EN/IEC 61000-4-6	Conducted Disturbances Immunity (CDI)	10Vrms (Level 3), 0.15-80 MHz, DC Input Ports 10Vrms (Level 3), 0.15-80 MHz, Earth Ports	A
EN/IEC 61000-4-8	Power Frequency Magnetic Field Immunity	100 A/m (Level 5), 16.7 Hz, Continuous 100 A/m (Level 5), 50 Hz, Continuous 300 A/m (Level 4), 0 Hz, Continuous	A
EN/IEC 61000-4-18	Damped Oscillatory Wave Immunity	+/-2.5kV line-to-earth (Level 3) DC Input Ports +/-1kV line-to-line (Level 3) DC Input Ports	B

Table 43. EMS Test Type: Power Utility Automation (IEC 61850-3)

Test	Description	Test Level	Performance
EN/IEC 61000-4-2	Electrostatic Discharge (ESD)	+/- 6kV Contact (Level 3) +/- 8kV Air (Level 3)	1
EN/IEC 61000-4-3	Radiated Radio Frequency Immunity (RFI)	10V/m (Level 3), 80% 1kHz AM, 80-3000 MHz	2
EN/IEC 61000-4-4	Electrical Fast Transient/ Burst Immunity (EFT)	+/-4kV (Level 4). DC Input ports +/-4kV (Level 4). DC earth port	1
EN/IEC 61000-4-5	Surge Immunity (1.2/50us)	+/-2kV line-to-earth (Level 3) DC Input Ports +/-1kV line-to-line (Level 3) DC Input Ports	1
EN/IEC 61000-4-6	Conducted Disturbances Immunity (CDI)	10Vrms (Level 3), 0.15-80 MHz, DC Input Ports 10Vrms (Level 3), 0.15-80 MHz, Earth Ports	2
EN/IEC 61000-4-8	Power Frequency Magnetic Field Immunity	3 A/m (Level 2), 50 & 60 Hz, Continuous 100 A/m (Level 5), 50 & 60 Hz, Continuous 1000 A/m (Level 5), 50 & 60 Hz, 1 sec	2
EN/IEC 61000-4-16	Conducted Common Mode Disturbances Immunity	30Vrms (Level 4), Continuous, DC Input Ports 300Vrms (Level 4), 1 sec, DC Input Ports	2
EN/IEC 61000-4-17	Ripple On DC Power Supply	%U 10%, 10 minutes, %U 15%, 10 minutes	1
EN/IEC 61000-4-18	Damped Oscillatory Wave Immunity	+/-2.5kV line-to-earth (Level 3) DC Input Ports +/-1kV line-to-line (Level 3) DC Input Ports	1
EN/IEC 61000-4-29	Voltage Dips Immunity	ΔU 30% for 0.1 sec, DC Input Ports ΔU 60% for 0.1 sec, DC Input Ports Requires primary and redundant power supplies connected to PWR1 and PWR2.	1
EN/IEC 61000-4-29	Voltage Interruptions Immunity	ΔU 100% for 0.05 sec, DC Input Ports Requires primary and redundant power supplies connected to PWR1 and PWR2.	1

Note

The IE560 Series is classified as Class 1 in immunity tests and network environments where packet loss might occur. Allied Telesis lists all immunity tests and relevant Class levels so that customers can implement protective measures to prevent packet loss in affected network environments.

Table 44. EMS Test Type: Electric Power Apparatus (IEEE 1613)

Test	Description	Test Level	Class
IEEE 1613 Clause 8	Electrostatic Discharge (ESD)	+/-8kV (Level 4) Contact +/-15kV (Level 4), Air	1
IEEE1613 Clause 7	Radiated Radio Frequency Immunity (RFI)	20V/m (Level X), 80% 1kHz AM, 80-1000 MHz 20V/m (Level X), 80% 1kHz AM, 80, 160, 450, 900 MHz spot Frequencies 3V/m (Level 2), 80% 1kHz AM, 1800, 2600, 3500, & 5000 MHz spot Frequencies 20V/m (Level X), 80-1000 HMz (keying 20V/m (Level X), 200 Hz Pulse (50% duty cycle)	2
IEEE 1613 Clause 6	Electrical Fast Transient/ Burst Immunity (EFT)	+/-4kV (Level 4). DC Input ports +/-4kV (Level 4). Earth port	1
IEEE 1613 Clause 6	Damped Oscillatory Wave Immunity	+/-2.5kV line-to-earth (Level 3) DC Input Ports +/-2.5kV line-to-line (Level 3) DC Input Ports	1
IEEE 1613 Clause 5	Dielectric Strength	2kV, DC Input Ports	N/A

Note

The IE560 Series is classified as Class 1 in immunity tests and network environments where packet loss might occur. Allied Telesis lists all immunity tests and relevant Class levels so that customers can implement protective measures to prevent packet loss in affected network environments.

Environmental Test Types

Note
Outdoor installations shall require a listed Type 3X or better enclosure.

Note
The standards for Type 3X and higher enclosures include protection from corrosion.

Note
Installations that are exposed to dust, as defined in EN 50125-2, EN 50125-3, IEC 62498-2, and IEC 62498-3, shall be installed in enclosures rated IP55 or better.

Note
All fiber optic cables connected to the switch in environments vulnerable to seismic and/or high vibration should be properly strain relieved to prevent cable tension from disconnecting fiber optic transceivers from switch ports during vibration.

Table 45. Environmental Test Type: Generic Industrial Environment

Test	Description	Test Level
IEC 60068-2-6	Vibration, Operational	2g, 10-500 Hz
IEC 60068-2-6	Vibration, Non-Operational	2g, 10-500 Hz
IEC 60068-2-27	Shock, Operational	20g, 11ms, half sine
IEC 60068-2-27	Shock, Non-Operational	65g, 11ms, half sine
TS3.24.15	Rough Handling Shocks, Non-Operational	100mm drop & topple

Table 46. Environmental Test Type: Railway Applications - Signaling and Telecommunications Apparatus (EN 50125-3 and IEC 62498-3)

Test	Description	Test Level
IEC 50125-3 Section 4.13.1	Vibration, Outside the track (from 1m to 3m from the rail)	2.3 m/s^2, 5-2000 Hz
IEC 50125-3 Section 4.13.2	Shocks, In a box upon post, outside the track (from 1m to 3m from the rail)	20 in m/s^2, 11 ms, mean and peak

Table 47. Environmental Test Type: Railway Applications - Fixed Power Supply Apparatus (EN 50125-2 and IEC 62498-2)

Test	Description	Test Level
IEC 50125-3 Section 4.13.1	Vibration, Outside the track (from 1m to 3m from the rail)	2.3 m/s^2, 5-2000 Hz
IEC 50125-3 Section 4.13.2	Shocks, In a box upon post, outside the track (from 1m to 3m from the rail)	20 in m/s^2, 11 ms, mean and peak

Table 48. Environmental Test Type: Power utility Automation (IEC 61850-3)

Test	Description	Test Level	Class
IEC 60068-2-1	Cold Operational, Test Ad	-40°C, 16 hours	2
IEC 60068-2-1	Cold Storage, Test Ab	-40°C, 16 hours	2
IEC 60068-2-2	Dry Heat Operational, Test Bd	75°C, 16 hours	2
IEC 60068-2-2	Dry Heat Storage, Test Bb	85°C, 16 hours	2
IEC 60068-2-14	Change of Temperature, Test Nb	-40°C to 75°C, Ramp 1°C/min, Dwell 3 hours, 5 cycles	2
IEC 60068-2-30	Damp Heat Cyclic, Test Db	25°C to 55°C, 97% RH at 25°C, 93% RH at 55°C (12 h + 12 h cycle)	2
IEC 60068-2-78	Damp Heat Steady State, Test Cab	40°C, 93% RH, 10 days	2
IEC 60255-21-1	Vibration Response	1g, 10-150 Hz	2
IEC 60255-21-1	Vibration Endurance	2g, 10-500 Hz	2
IEC 60255-21-2	Shock Response	10g, 11ms, half sine	2
IEC 60255-21-2	Shock Withstand, Non-Operational	30g, 11ms, half sine	2

Table 48. Environmental Test Type: Power utility Automation (IEC 61850-3) (Continued)

Test	Description	Test Level	Class
IEC 60255-21-2	Bump, Non-Operational	20g, 16 ms	2
IEC 60255-21-3	Seismic, Single Axis Sine	2g x-axis, 1g y-axis, 1-35 Hz	1

Environmental Test Type: NEMA TS2 Traffic Control - Pending
Test: NEMA TS-2
Description: Traffic Control Assemblies
Test Level: Environmental

RJ-45 Style Serial CONSOLE Port

Figure 87 identifies pin 1 on the RJ-45 connector on the CONSOLE port.

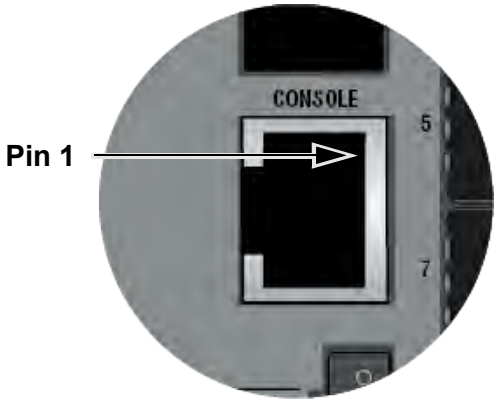


Figure 87. CONSOLE Port Pin Layout (Front View)

Table 49 lists the pin signals for the RJ-45 style serial CONSOLE port.

Table 49. 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

The port supports the following speeds: 9600, 14400, 28800, 38400, 57600, and 115200 bps. The default is 9600 bps.

CONSOLE Port Management Cable with DB-9 Female and RJ-45 Connectors

Figure 88 and Table 50 show the pin-outs for a CONSOLE port management cable with DB-9 female and RJ-45 connectors.

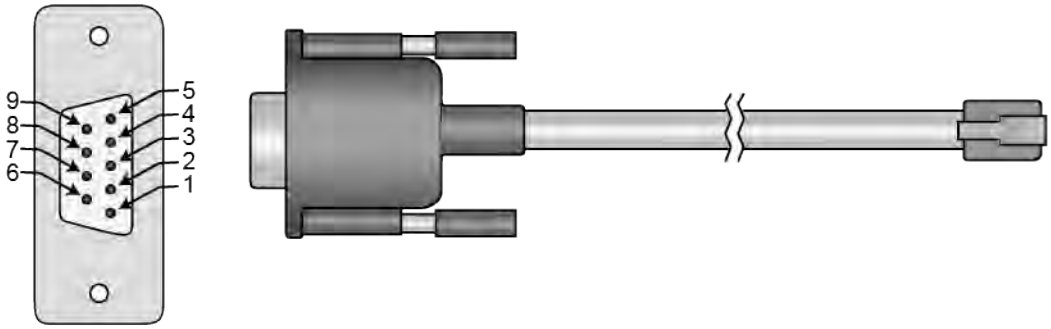


Figure 88. CONSOLE Port Management Cable with DB-9 Female and RJ-45 Connectors

Table 50. 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

POWER PWR 1 and PWR 2 DC Input Connectors

Table 51. POWER PWR 1 and PWR 2 DC Input Connector Pin Signals

Pin	Signal
+	24/48 Vdc
-	Vdc Return

Device Dimensions