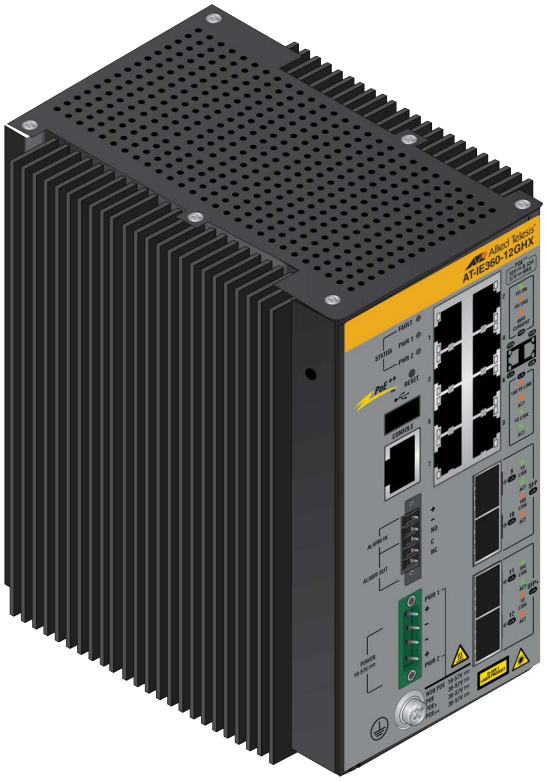
IE360 Series

Industrial Ethernet Layer 3 Switches

IE360-12GHX
IE360-12GTX



Installation Guide

613-003237 Rev. B

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

Safety

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

EN/IEC 60950-22
Information technology equipment Safety;
Part 22: Equipment to be installed outdoors

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
Information technology equipment
Safety: Part 22: Equipment to be installed outdoors

Electromagnetic Immunity

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

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 appartus

EN 50125-5
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 152 in Appendix A, ”Technical Specifications” on page 139 for further information.

Allied Telesis Approved SFP Modules

EN 60825-1
Safety of laser products;
Part 1: Equipment classification and requirements

EN 60825-2
Safety of laser products;
Part 2: Safety of optical fiber communication systems

EN/IEC/UL 62368-1
Safety of laser products;
Part 2: Safety of optical fiber communication systems

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

Note
Refer to “Electromagnetic Compatibility Test Types” on page 152 in Appendix A, “Technical Specifications” on page 139 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 IE360 Series of Industrial Ethernet Layer 3 Switches. The switch models in the series are listed here:

- IE360-12GHX
- IE360-12GTX

The preface contains the following sections:

Safety Symbols Used in this Document

This document uses the following conventions.

Note
Notes provide additional information.

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

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

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

Warning
Warnings inform you of hot surfaces.

Translated Safety Statements

Important: The ✍ indicates that translations of the safety statement are available in the PDF document **Translated Safety Statements** posted on the Allied Telesis website at **alliedtelesis.com/library/search**.

- Übersetzte Sicherheitserklärungen

  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.

- Declaraciones de seguridad traducidas

  Importante: El ✍ indica que las traducciones de la declaración de seguridad están disponibles en las **Translated Safety Statements** en PDF publicadas en el sitio web de Allied Telesis en **alliedtelesis.com/us/en/library/search**.

- Consignes de sécurité traduites

  Important: Le symbole ✍ indique que les traductions de la déclaration de sécurité sont disponibles dans le PDF **Translated Safety Statements** publiées sur le site Web de Allied Telesis à l'adresse **alliedtelesis.com/us/en/library/search**.

- Dichiarazioni di sicurezza tradotte

  Importante: ✍ indica che le traduzioni della dichiarazione di sicurezza sono disponibili nelle **Translated Safety Statements** in PDF pubblicate sul sito Web di Allied Telesis all'indirizzo **alliedtelesis.com/us/en/library/search**.

- Översatta säkerhetsförklaringar

  Viktig: ✍ anger att översättningar av säkerhetsförklaringen finns tillgängliga i PDF-dokumentet **Translated Safety Statements** som publicerats på Allied Telesis webbplats på **alliedtelesis.com/us/en/library/search**.

Chapter 1
Overview

This chapter describes the hardware features of the IE360 Switches. The sections are listed here:

Hardware Components

The IE360 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.

The switches in the IE360 Series are listed here:

- “IE360-12GHX PoE++ Switch”, next
- “IE360-12GTX Switch” on page 21

IE360-12GHX PoE++ Switch

Figure 1 illustrates the front panel of the IE360-12GHX PoE++ Switch.

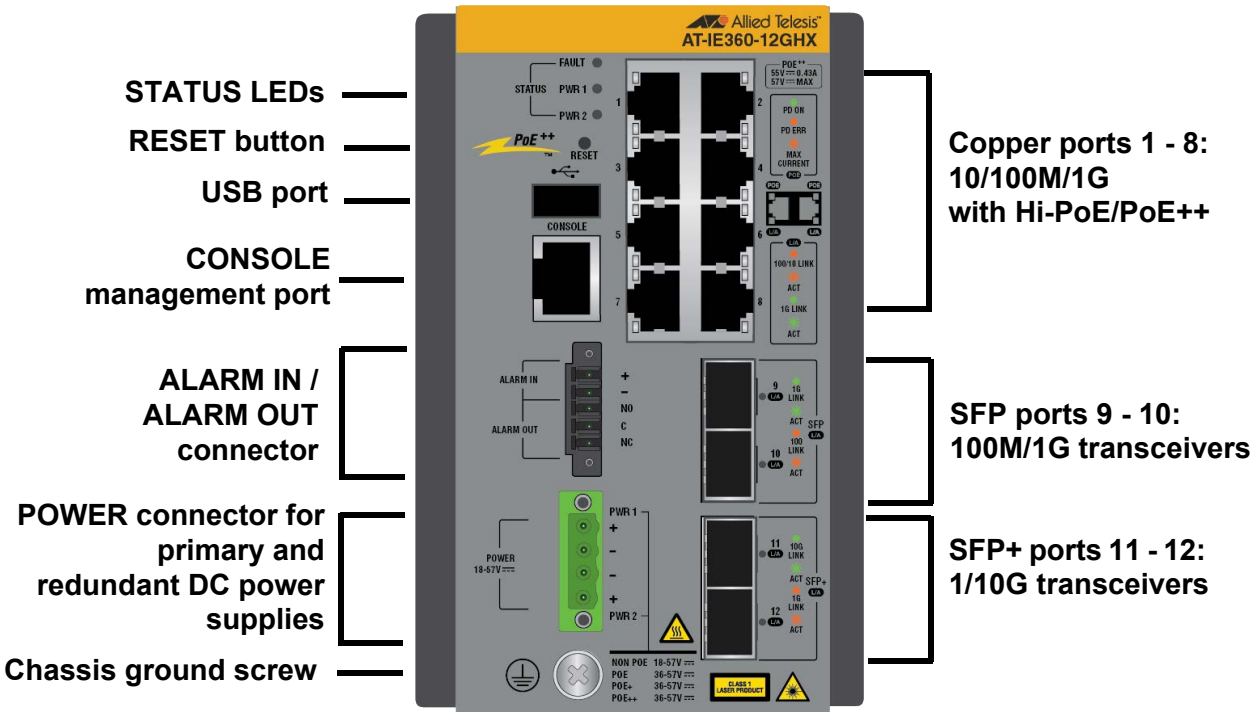


Figure 1. Front Panel of the IE360-12GHX PoE++ Switch

IE360-12GTX Switch

Figure 2 illustrates the front panel of the IE360-12GTX Switch.

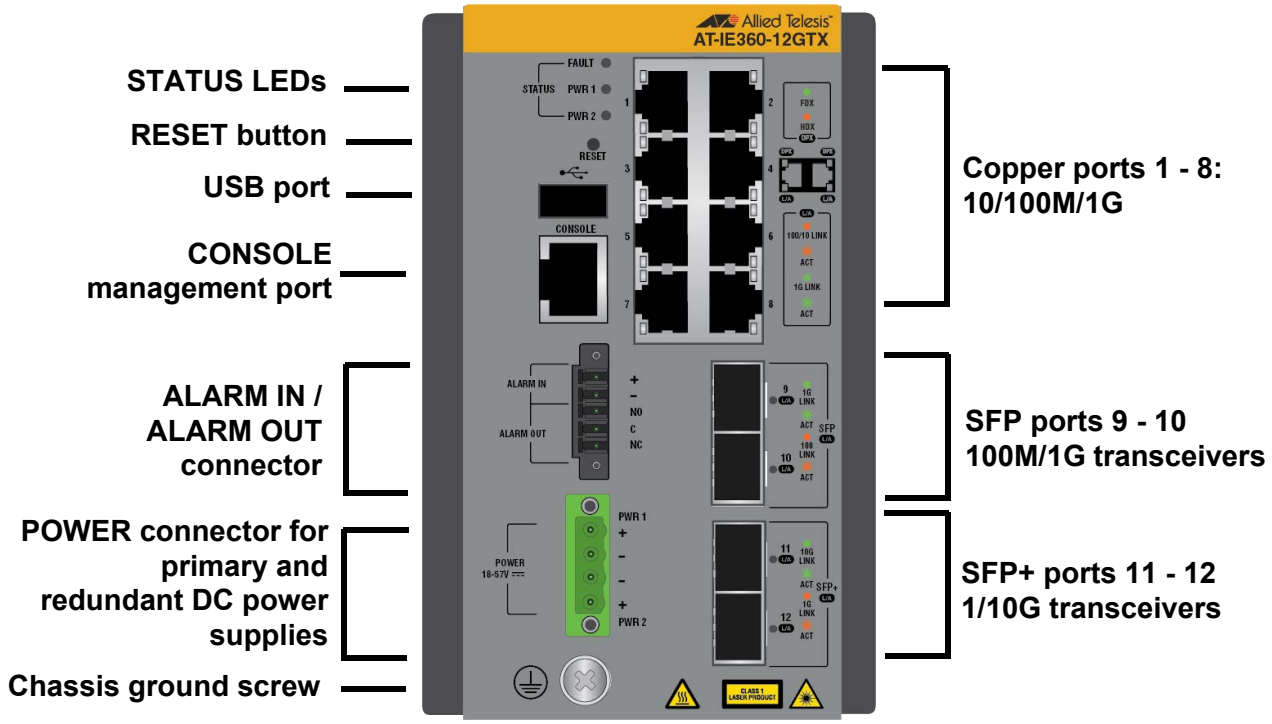


Figure 2. Front Panel of the IE360-12GTX Switch

Rear Panel

Figure 3 illustrates the rear panel.

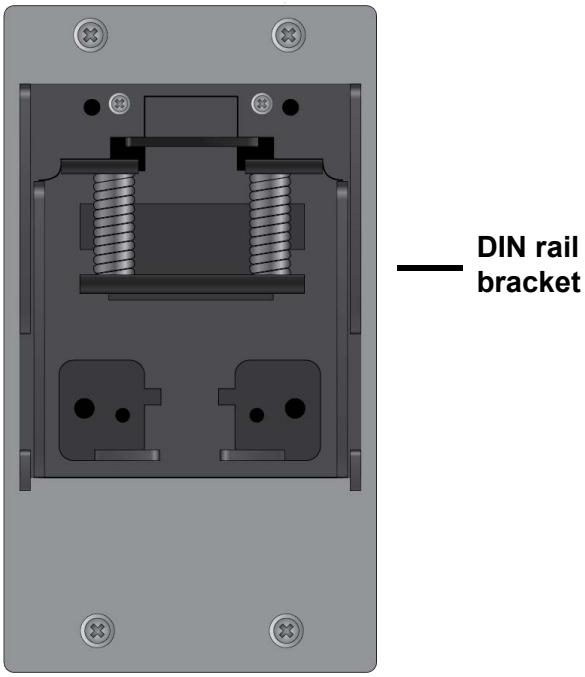


Figure 3. Rear Panel

Features

Here are the basic features of the switches.

Copper Ports

Here are the basic features of copper ports 1 to 8:

- 10/100M/1G supported on all ports
- IEEE 802.3i 10Base-T compliant
- IEEE 802.3u 100Base-TX compliant
- IEEE 802.3ab 1000Base-T compliant
- IEEE 802.3u Auto-Negotiation compliant
- IEEE 802.3x flow control in full-duplex mode
- IEEE 802.3x back pressure compliant
- Jumbo frames up to 12KB
- RJ-45 connectors

Power Over Ethernet (PoE)

The IE360-12GHX Switch is a Power Sourcing Equipment (PSE) that meets these PoE standards:

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

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

Additional PoE capabilities include:

- Maximum PoE budget of 360W.
- Support powered device classes 0 to 8.
- Dynamic PoE power budget allocation, according to powered device consumptions and/or PoE port priorities.
- Uninterrupted PoE delivery during warm switch restarts.

SFP Ports

The switches support the following types of fiber optic transceivers in SFP ports 9 and 10:

- 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

The switches support the following types of fiber optic transceivers in SFP+ ports 11 and 12:

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

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

Protection Circuits

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

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

Internal Alarm Monitoring

The switch has internal sensors that monitor the device's operations and alert you to possible problems. Examples of alarm events include:

- Main power source failure
- High temperature
- Dropped copper and fiber optic port links
- Total power requirements of all PoE++ devices exceeding the switch's available power budget (IE360-12GHX Switch only)
- Powered devices that exceed their individual port budgets (IE360-12GHX Switch only)

Alarm Connectors

This connector supports the following three alarm circuits for external sensors and alarm devices so that the switch can alert you to changes to its installation environment or system operations:

- One ALARM IN circuit for an external sensor to monitor changes in the environmental status of the switch. Sensor examples include temperature, humidity, and motion detection.

- Two ALARM OUT circuits for alert devices, such as LEDs or bells, activated by the switch to signal definable operational alarms. Examples include high temperature, ports without links, and power supply failures.

LEDs

The switches have the following LEDs:

- System fault LED
- Power supply STATUS LEDs
- L/A (link/activity) LEDs on the SFP, SFP+ and copper ports
- PoE LEDs on the copper ports (IE360-12GHX Switch)
- Duplex mode LEDs on the copper ports (IE360-12GTX Switch)

MAC Address Tables

Here are the basic features of the MAC address tables:

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

Management Methods

The switches support the following management software and interfaces:

- AlliedWare Plus management software, version 5.5.4 or later
- Command line interface
- Web browser interface

Management Methods

You can manage the switches, as follows:

- 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/RESTCONF for network automation
- OpenFlow for network orchestration

Environment Installations

The switches support the following installation options:

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

Additional Features

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

Copper Ports

This section describes the copper ports.

Connector Type

The copper ports have 8-pin RJ-45 connectors. The ports use four pins at 10M or 100M and all eight pins at 1G. The pin assignments are listed in Table 47 on page 161 and Table 48 on page 161.

Speeds

The ports can operate at 10M, 100M, or 1G. The switch can set the speeds automatically with Auto-Negotiation, the default setting, or you can set the speeds manually with the AlliedWare Plus management software.

Note
Copper ports must be set to Auto-Negotiation to operate at 1G.

Duplex Modes

The copper ports can operate in either half- or full-duplex mode at 10M or 100M. Ports operating at 1G can only operate in full-duplex mode. The copper ports are IEEE 802.3u Auto-Negotiation compliant. The switch can set the duplex modes automatically or you can disable Auto-Negotiation and set the duplex modes manually.

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

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

Maximum Distance

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

Copper Cable Requirements

Here are the minimum cable requirements for the Ethernet copper ports:

- Category 5 Unshielded Twisted Pair (UTP) or better is recommended for ITE immunity levels (i.e., EN 55035)
- Category 6 Shielded Twisted Pair (STP) and Shielded Foil Twisted Pair (SFTP) are recommended for high RF applications with higher immunity levels, such as industrial Ethernet, power utility stations, and rail yards.

Note
Shielded or unshielded Category 5 or better cable is required to meet EN55035 immunity levels.

Note
Shielded Category 6 or 6a cable is required to meet immunity levels in high RF noise environments, such as industrial Ethernet sites, electric power utility stations, electric power substations, and rail yards.

Automatic MDIX Detection

The copper ports are IEEE 802.3ab compliant, with automatic MDIX detection at 10M or 100M. (Automatic MDIX detection does not apply to 1G.) This feature automatically configures the ports to MDI or MDI-X depending on the wiring configurations of the end nodes.

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

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

Port Pinouts

Refer to Table 47 on page 161 for the pinouts of the copper ports at 10M or 100M, and Table 48 on page 161 for the port pinouts at 1G.

Power over Ethernet

The IE360-12GHX Switch supports Power over Ethernet (PoE) on copper ports 1 to 8. It functions as Power Sourcing Equipment (PSE) for devices by supplying electrical power over the same copper cables that carry the network traffic.

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

The copper ports on the IE360-12GHX Switch comply with the IEC 60512-99-002 standard, which defines the requirements for RJ45 connectors when copper connections are disconnected under electrical load conditions. This compliance ensures the level of contact resistance for RJ45 connectors servicing PoE++ 95W powered devices on the switch.

PoE Versions

The IE360-12GHX Switch supports the following PoE versions:

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

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

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

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

PoE Version	IE360-12GHX Copper Ports	Maximum Power at Switch Port	Maximum Power at Powered Device
PoE	1 to 8	15.4W	12.95W
PoE+	1 to 8	30.0W	25.5W
Hi-PoE[a]	1 to 8	60.0W	51.0W
PoE++ (60W)	1 to 8	60.0W	51.0W
PoE++ (95W)	1 to 8	95.0W	71.0W

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

Powered Device Classes

Table 2 lists the nine classes of powered devices in the PoE standards. The classes are defined by the power requirements of the devices. The IE360-12GHX Switch supports all nine classes.

Table 2. PoE Device Classes

Class	Usage	Maximum Power Output at the Switch Port	Device Power Range
0	Default	15.4W	0.44W to 12.95W
1	Optional	4.0W	0.44W to 3.84W
2	Optional	7.0W	3.84W to 6.49W
3	Optional	15.4W	6.49W to 12.95W
4	Optional	30.0W	12.95W to 25.9W
5	Optional	45W	40W
6	Optional	60W	51W
7	Optional	75W	62W
8	Optional	95W	71.3W

PoE Power Budget

PoE power budget is the maximum amount of DC power that the switch can supply to powered devices on its copper ports. The IE360-12GHX Switch has a maximum power budget of 360W when powered by the IE048-480 Power Supply or an equivalent power supply from a third-party manufacturer.

Note
The IE360-12GHX Switch may have a lower PoE budget if it is powered by a power supply that does not meet the requirements in “Switch DC Power Requirements” on page 55 and “DC Power Specifications” on page 150.

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

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

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

Power Delivery with Alternatives A and B

The PoE standards define two methods for delivering power over copper cables from power sources such as the IE360-12GHX Switch to powered devices. The methods, called Alternatives A and B, identify the wire strands that carry the electrical power over the Ethernet cables to the powered devices from the power source, which in this case is the switch sourcing PoE.

Copper pair cabling usually has eight strands. Devices that operate at 10M or 100M use the wire strands connected to pins 1, 2, 3, and 6 to carry the network traffic while the strands connected to pins 4, 5, 7, and 8 are unused. Devices that operate at 1G use all eight strands to carry network traffic.

In Alternative A, power is delivered on strands 1, 2, 3, and 6, which are the same strands that carry the network traffic at 10M and 100M. In Alternative B, power is delivered on strands 4, 5, 7, and 8,which are the unused strands at 10M and 100M.

The IE360-12GHX Switch supplies power to powered devices on its copper ports using both PoE Alternatives A and B, as described in Table 3.

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

IE360-12GHX Copper Ports	PoE Devices	PoE Alternatives
1 to 8	PoE and PoE+ devices Classes 0 to 4 (Types 1, 2, and 3 up to 30W at switch ports)	Alternative A (MDI-X)
1 to 8	Hi-PoE devices Classes 5 and 6 (Type 3 up to 60W at switch ports)	Alternative A (MDI-X) plus Alternative B (MDI-x, MDI)
1 to 8	PoE++ devices Classes 7 and 8 (Type 4 up to 75W/ 95W at switch ports)	Alternative A (MDI-X) plus Alternative B (MDI-x, MDI)

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

Note
Legacy Powered Devices that are non-standard or were manufactured before the completion of the standards and support only one method might not be compatible with the IE360-12GHX Switch.

PoE Port Priorities

If the power requirements of the powered devices exceed the switch's power budget, the switch will deny power to ports based on a system called PoE port priorities. You may use this feature to ensure that the switch gives preferential treatment to powered devices critical to the operations of your network should the demands of the devices exceed the available capacity.

There are three priority levels:

- Critical
- High
- Low

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

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

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

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

SFP and SFP+ Ports

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

Ports 9 and 10

Ports 9 and 10 support 100M (100Base-X) and 1G (1000Base-X) fiber optic, MSA-compliant SFP transceivers, as 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

Ports 11 and 12

Ports 11 and 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+ transceivers from heat-related damage, you should select transceivers whose maximum operating temperatures exceed the anticipated maximum ambient temperature of the installation site. Table 4 on page 33 lists the recommended SFP+ maximum operating temperatures for various ambient site temperatures.

Table 4. SFP/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 4.

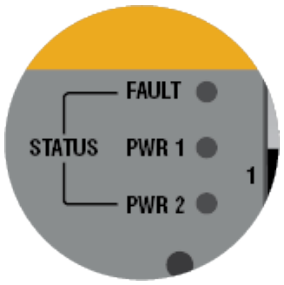


Figure 4. STATUS FAULT, PWR 1 and PWR 2 LEDs

The STATUS FAULT LED is defined in Table 5.

Table 5. 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 FACILITY-ALARM STATUS command to view active alarms. The ALARM FACILITY command in the Global Configuration mode is the command for programming the Fault LED to flash in response to an alarm condition. The following example of the command configures the switch to flash the Fault LED if port 1 does not have a link to a network device: `alarm facility link-down port1.0.1 led` For more information, refer to the *Command Reference: IE360 Series Running AlliedWare Plus* on the Allied Telesis web site.
Six flashes in two seconds	The switch is overheating and might shutdown.

The STATUS PWR 1 and PWR 2 LEDs are defined in Table 6.

Table 6. 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 unit.
Solid Green	The switch is operating normally. The input power on the PWR 1 or PWR 2 circuit is within the normal operating range.
Solid Yellow	The input power on the PWR 1 or PWR 2 circuit is under the minimum voltages, listed here: ❒ IE360-12GTX: 18Vdc ❒ IE360-12GHX: 36Vdc (low PoE++ voltage threshold)
Solid Red	The input power on the PWR 1 or PWR 2 circuit exceeds the permitted maximum voltage.

Copper Port LEDs

The copper ports on the IE360-12GHX Switch have two LEDs each. Refer to Figure 5.

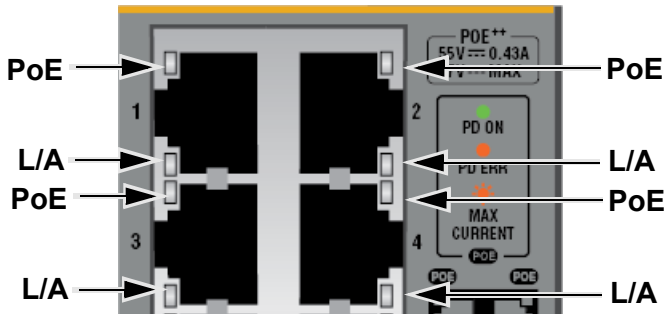


Figure 5. Copper Port LEDs on the IE360-12GHX Switch

The copper port LEDs are described in Table 7.

Table 7. Copper Port LEDs on the IE360-12GHX Switch

LED	State	Description
PoE	Solid Green	The port is delivering power to a PoE, PoE+, Hi-PoE, or PoE++ powered device.
	Solid Amber	The port is connected to a powered device but the switch has shutdown PoE on the port because of a fault condition.
	Flashing Amber	The port is connected to a powered device but the switch does not have sufficient unused power to allocate to it.
	Off	This LED state can result from the following conditions: - The port is connected to a non-PoE device. - The device is powered off. - The port is disabled in the management software. - PoE is disabled on the port.
L/A (Link/ Activity)	Solid Green	The port has established a 1G link to a network device.
	Flashing Green	The port is transmitting or receiving data at 1G.
	Solid Amber	The port has established a 10M or 100M link to a network device.
	Flashing Amber	The port is transmitting or receiving data at 10M or 100M.
	Off	The port has not established a link with a network device or the port LEDs have been turned off with the ECOFRIENDLY LED command in the AlliedWare Plus management software.

The copper ports on the IE360-12GTX Switch also have two LEDs each. Refer to Figure 6.

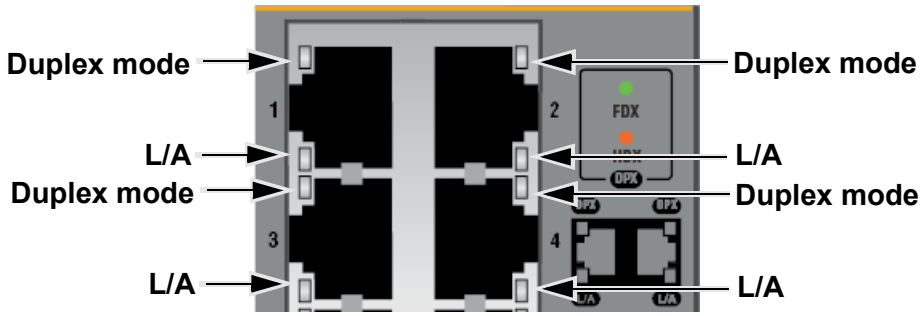


Figure 6. Copper Port LEDs on the IE360-12GTX Switch

The copper port LEDs on the IE360-12GTX Switch are described in Table 8 on page 37.

Table 8. Copper Port LEDs on the IE360-12GTX Switch

LED	State	Description
Duplex mode	Solid Green	The port is operating in full duplex mode.
	Solid Amber	The port is operating in half duplex mode.
	Off	This LED state can result from the following conditions: - The device is powered off. - The port is disabled in the management software.
L/A (Link/ Activity)	Solid Green	The port has established a 1G link to a network device.
	Flashing Green	The port is transmitting or receiving data at 1G.
	Solid Amber	The port has established a 10M or 100M link to a network device.
	Flashing Amber	The port is transmitting or receiving data at 10M or 100M.
	Off	The port has not established a link with 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 and 10 LEDs

SFP ports 9 and 10 have one LED each. Refer Figure 7 and Table 9.

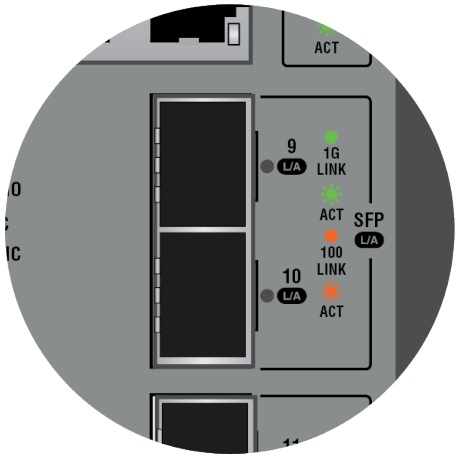


Figure 7. LEDs for SFP Ports 9 and 10

Table 9. LEDs for SFP Ports 9 and 10

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 11 and 12 LEDs

SFP+ ports 11 and 12 have one LED each. Refer to Figure 8 and Table 10.

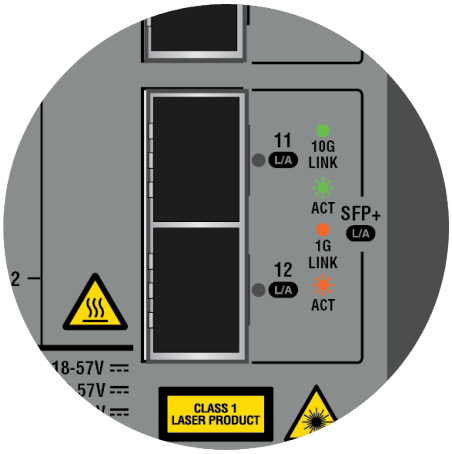


Figure 8. LEDs for SFP+ Ports 11 and 12

Table 10. LEDs for SFP+ Ports 11 and 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.

CONSOLE Port

The CONSOLE port, shown in Figure 9, 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 specifying the IP address of the switch and do not interfere with the network operations of the unit.

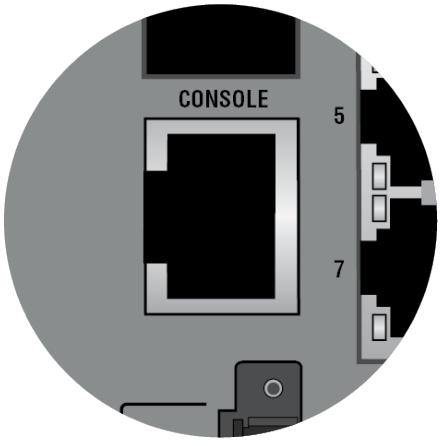


Figure 9. CONSOLE Port

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 10.

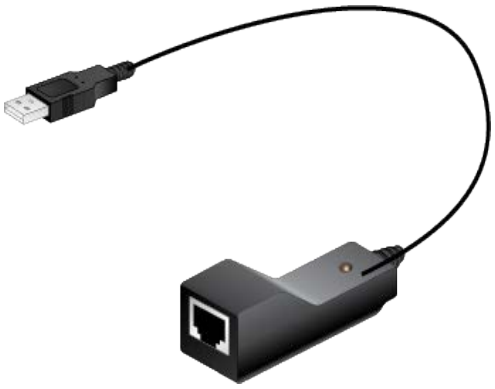


Figure 10. VT-Kit3 Management Cable

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 11. The VT-Kit3 management cable and software driver are sold separately.

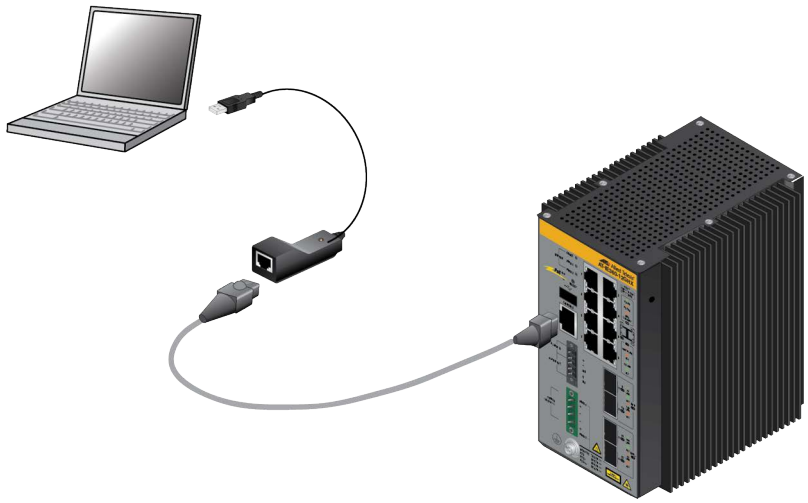


Figure 11. Local Management Session with the VT-Kit3 Management Cable

For workstations with a DB-9 female connector, refer to “CONSOLE Port Management Cable with DB-9 Female and RJ-45 Connectors” on page 164 for management cable specifications.

The CONSOLE port has the following settings:

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

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

For instructions on how to start a management session on the switch from the CONSOLE port, refer to “Starting a Management Session” on page 122.

The pin assignments of the CONSOLE port are listed in Table 49 on page 163.

USB Port

The switches have a USB port for a USB storage device. Refer to Figure 12.

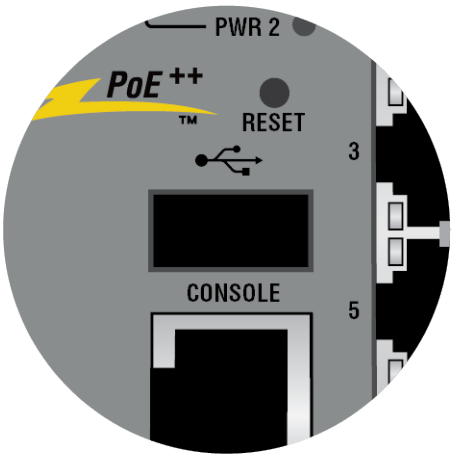


Figure 12. USB Port

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 operating system 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 11 lists examples of features and commands that support the USB port as the source or destination of a management function.

Table 11. Example Functions of the USB Port with a USB Storage Device

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

Table 11. Example Functions of the USB Port with a USB Storage Device

Function	AlliedWare Plus Command
Direct the router to the USB storage device for the AlliedWare Plus operating system 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 and troubleshoot network issues.	COPY DEBUG MOVE DEBUG
Save the running-config file on a USB storage device. It contains the router's current configuration, including unsaved commands in the startup-config file.	COPY RUNNING-CONFIG
Save the startup-config file on a USB storage device. The file contains the router's currently saved configuration settings.	COPY STARTUP-CONFIG
Save autoboot.txt files on the USB storage device. The router 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 storage device from the drive, to prevent corrupting data files.	UNMOUNT

Table 11. Example Functions of the USB Port with a USB Storage Device

Function	AlliedWare Plus Command
Configure a trigger that the router 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 IE360 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 55 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 13.

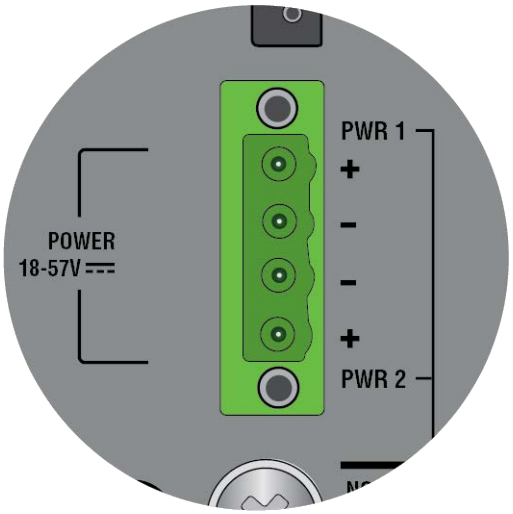


Figure 13. POWER Connector

The switches support 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 7, “Troubleshooting” on page 131.

For more information, refer to “Power Supplies” on page 57 and “DC Power Specifications” on page 150.

ALARM IN / ALARM OUT Connector

The ALARM IN / ALARM OUT connector has three separate circuits that the switch uses to alert you to changes at its installation site or to its operations. The circuits are explained in the following sections.

- “ALARM IN Circuit”, next
- “ALARM OUT Circuits” on page 49

ALARM IN Circuit

The ALARM IN circuit is for an external sensor. Refer to Figure 14. The switch uses an external sensor to 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

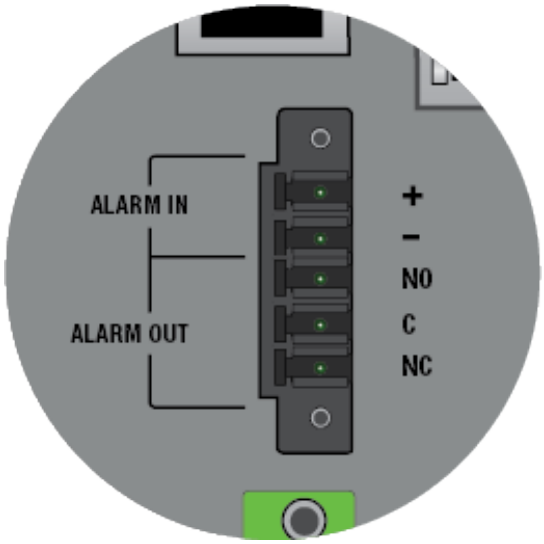


Figure 14. ALARM IN / ALARM OUT Connector

The two pins of the 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 can be either closed or open. A closed circuit is on, meaning that voltage can flow through the circuit, while an open circuit is off, preventing 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.

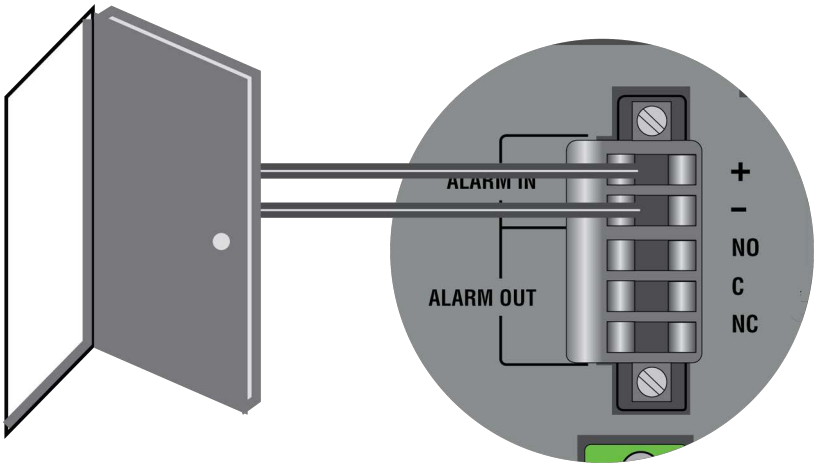
You use the ALARM FACILITY INPUT-ALARM command in the AlliedWare Plus management software to specify the state of the external sensor that signals an alarm. Alarms remain active until their causes are resolved. For instructions, refer to the *IE360 Series Command Reference for AlliedWare Plus*.

Here are the requirements for the external sensor for 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 15 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.

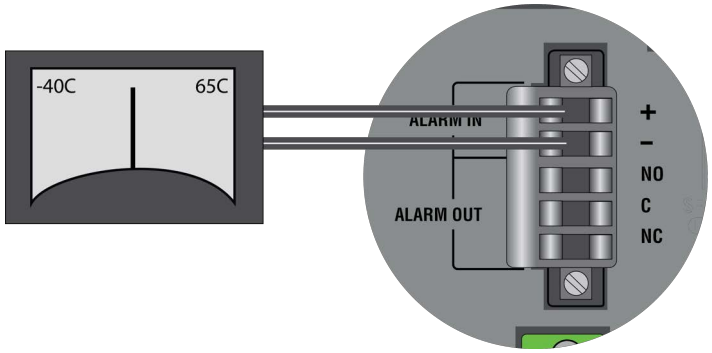
Figure 15. Example 1 of the ALARM IN Circuit

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 16 on page 48, 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 <30C - circuit open
Temperature >30C - circuit closed

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

Figure 16. 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 the alarm when the sensor closes 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. Refer to Figure 14 on page 46. The switch can use 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 17:

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

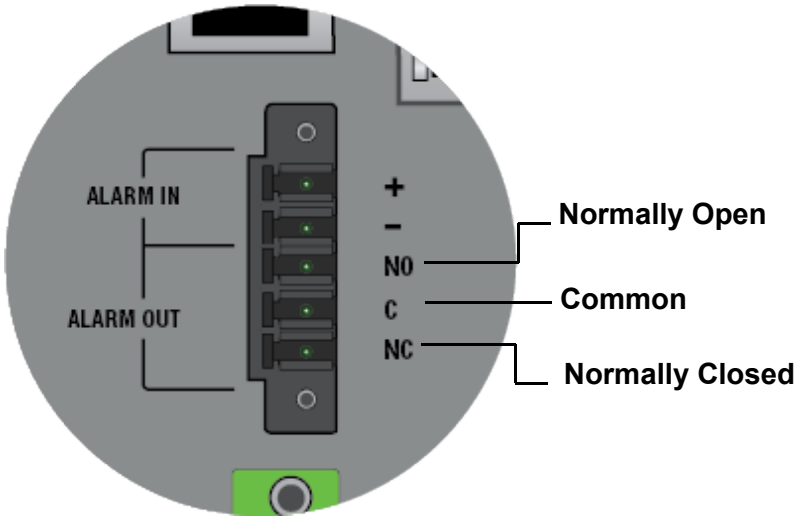


Figure 17. Pin Signals on the ALARM IN/ALARM OUT Connector

The circuits are a state 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 *IE360 Series Command Reference for AlliedWare Plus*.

An example of the feature is illustrated in Figure 18. 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, as shown in Figure 18 on page 51.

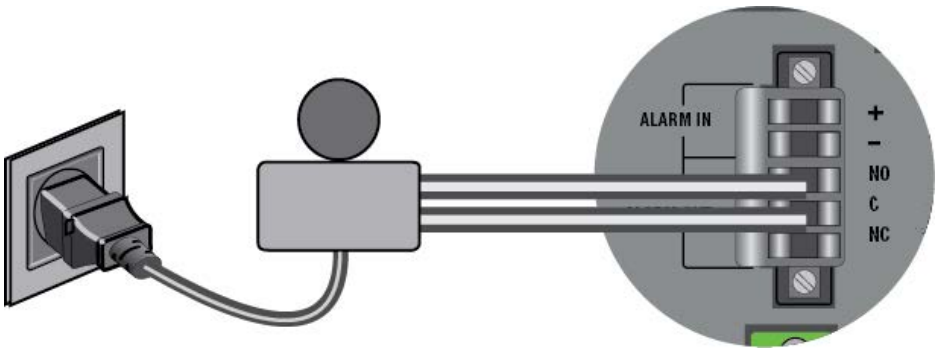


Figure 18. Example of the ALARM OUT Circuit with an LED Alert Device

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 closed to open. In response, the alert device turns on the LED. When the switch detects that all ports have links, it closes the circuit, turning off the LED.

Note
Alarm devices are not available from Allied Telesis.

RESET Button

The RESET button resets the switch by reinitializing the AlliedWare Plus management software. 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. Refer to Figure 19.

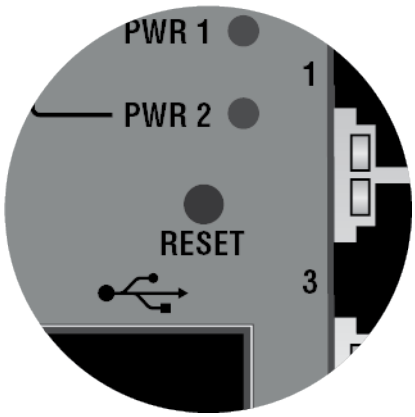


Figure 19. RESET Button

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 two to three minutes.

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

Ground Screw

The ground screw is used to connect the chassis to the earth ground at the installation site. Refer to Figure 20. For instructions, refer to “Connecting the Ground Wire” on page 102.

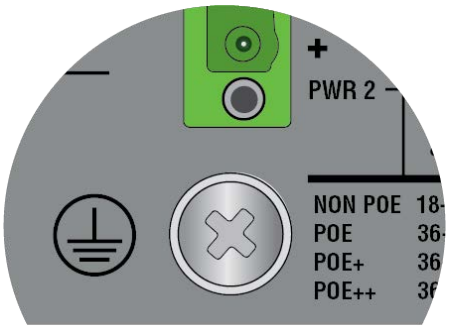


Figure 20. Ground Screw

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. The bracket is compatible with DIN 35 x 7.5mm rails. Refer to Figure 3 on page 21. For installation instructions, refer to “Installing the Switch on a DIN Rail” on page 79.

Wall Brackets

The switch comes with two wall brackets in the accessory kit. Refer to Figure 21. 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 82 or “Installing the Switch on an Indoor Concrete Wall” on page 88.

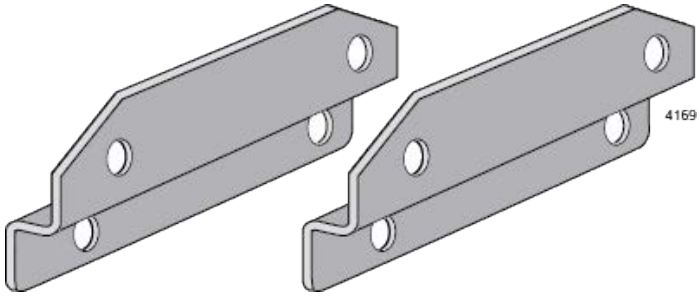


Figure 21. Wall Brackets

Switch DC Power Requirements

The PoE IE360-12GHX Switch can be powered by one or two DC power supplies. Adding a second power supply adds power redundancy. Here are power supply requirements for its DC input voltage:

- Between 36Vdc and 57Vdc when the copper ports are connected to PoE end devices.
- Between 18Vdc to 57Vdc when the copper ports are connected to non-PoE end devices.
- The recommended input voltage for both PoE and non-PoE configurations is 48Vdc 10A.

The non-PoE IE360-12GTX Switch can also be powered by one or two DC power supplies. As with the IE360-12GHX Switch, adding a second power supply provides power redundancy. Here are power supply requirements for its DC input voltage:

- Between 18Vdc and 57Vdc.
- The recommended input voltage is 24Vdc or 48Vdc,

The following input power guidelines apply to both switches:

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

Note
The ranges are 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 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 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 7, “Troubleshooting” on page 131.

The IE360-12GHX Switch can operate in the following modes:

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

Power Supplies

You can power IE360 Switches with the IE048-480 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 IE048-480 Power Supply is sold separately. Here are main features:

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

Warning
The IE048-480 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 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 7, “Troubleshooting” on page 131.

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

Note
Power supplies from third-party manufacturers must meet the power requirements in “Switch DC Power Requirements” on page 55 and “DC Power Specifications” on page 150 to be compatible with IE360 Switches.

Chapter 2

Beginning the Installation

The chapter contains the following sections:

Reviewing Safety Precautions

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

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

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 a outdoor environment. E144

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

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

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

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

Safety Precautions When Working with Electricity

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

- Disconnect all power by turning off the circuit breakers before installing or removing the device or when working with the power supplies.
- Do not work alone if potential hazards exist.
- Never assume that the power is disconnected from a circuit; always check the circuit.
- Inspect the work area carefully for possible hazards, such as moist floors, ungrounded power extension cables, frayed power 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 an 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 142. For heat dissipation, refer to Table 32 on page 150.
- 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.
- Powered devices connected to the LAN ports on the switch must be grounded to the same grounding conductor at the service entrance as the switch.

- LAN ports should have additional lightning protections as specified in the 802.3at and 802.3bt standards, Environment B Requirements, when connected to powered devices that are not grounded to the same grounding conductor at the service entrance as the switch.
- Electromagnetic interference might occur between switches and other devices when multiple switches are powered by a single DC power supply. This can be addressed by installing clamp-on ferrite beads on the DC power cables, between the DC power supply and switches.
- Recommendations for ground resistivity are given in Table 12.

Table 12. Ground Resistivity Recommendations

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

- The copper cabling should not be exposed to sources of electrical noise, such as radio transmitters, broadband amplifiers, power lines, electric motors, and fluorescent lights.
- Allied Telesis recommends using CAT6 or CAT6A shielded twisted pair (STP) cable or shielded foil twisted pair (SFTP) cable in industrial or heavy machinery environments, including:
  - Industrial Ethernet sites
  - Electric power utilities
  - Electric power substations
  - Rail yards
- Allied Telesis recommends using CAT5, CAT6, or CAT6A unshielded twisted pair (UTP), STP, or SFTP cables in ITE installations (i.e., EN55035 immunity).
- 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 76.
- Allied Telesis does not recommend using STP cables to connect PoE powered devices to the switch if they have surge protection devices connected to earth ground. Surge events may cause the switch to stop functioning, which may require you to manually power cycle the device.

- When installing the switch in environments vulnerable to shock, seismic movement, and/or high vibration, Allied Telesis recommends the following:
  - All cables connected to the switch should be properly strain relieved to prevent cable tension from damaging the interface connectors during vibration.
  - 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 22.

> **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.

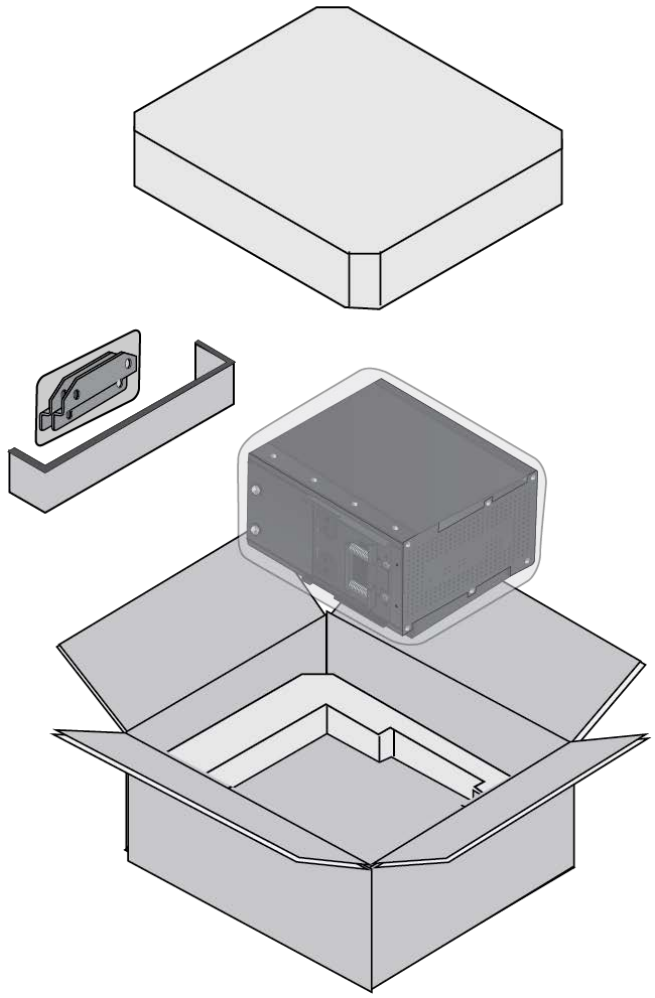


Figure 22. Removing the Switch from the Shipping Box

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 23 and Table 13 identify the pre-installed components.

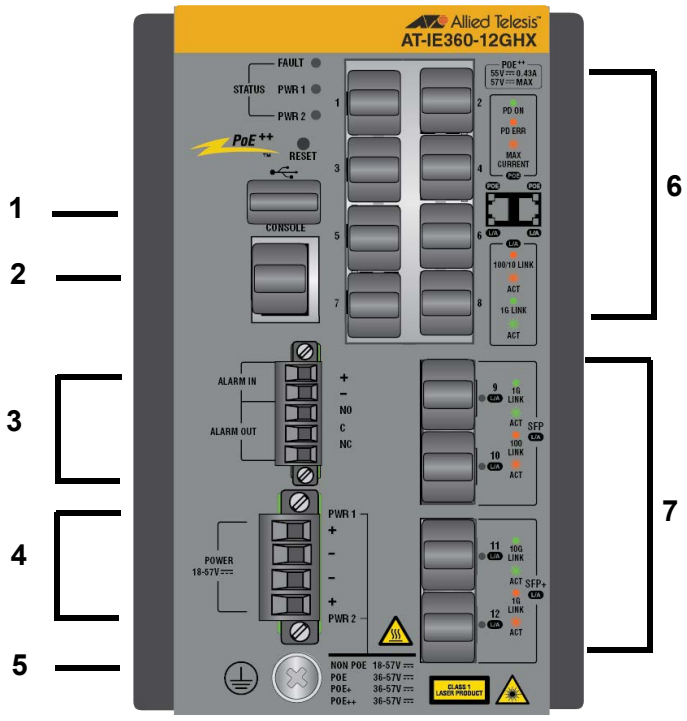


Figure 23. Pre-installed Components

Table 13. Pre-installed Components

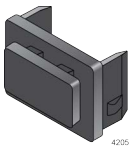
	Pre-installed Components	
1		One dust cover on the USB port
2		One dust cover on the CONSOLE port
3		One 5-pin plug on the ALARM IN/ALARM OUT connector

Table 13. Pre-installed Components (Continued)

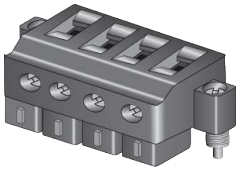
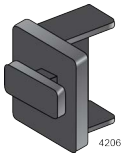
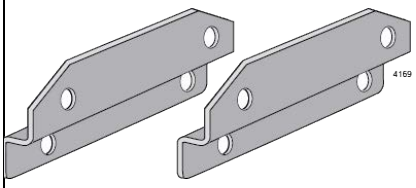
	Pre-installed Components	
4		One 4-pin plug on the POWER connector
5		One M4x8 cross-head grounding screw
6		Eight dust covers on the copper ports 1 to 8
7		Four dust covers on the SFP and SFP+ ports 9 to 12
-		One DIN rail bracket on back panel

Table 14 lists the items in the accessory kit.

Table 14. Accessory Kit

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

Tools and Material

Table 15 lists the required tools and material for the installation:

Table 15. 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 #12 AWG or #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 76 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 24. If you need to record the numbers for your records, you should do so before installing the device.

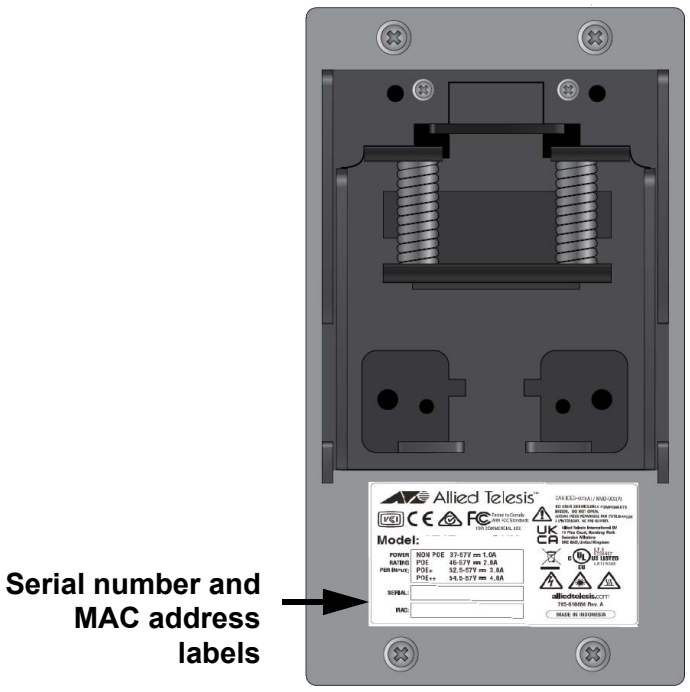


Figure 24. Serial Number and MAC Address Labels

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 IE360 Series is suitable for outdoor environments when installed in enclosures rated for the environments. The minimum rated enclosures when the switches are 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.

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 142.
- 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 IE360 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 can damage components and circuits. The IE360 Series satisfies the surge immunity listed in the tables in “Electromagnetic Compatibility Test Types” on page 152.

The IE360 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 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 can experience either complete system failures or intermittent problems that are hard to diagnose. Improper

installation of electrical grounding components can make the components work ineffectively. Installing a system with the proper grounding equipment and following proper installation guidelines can reduce potential downtime as well as costly repairs to system electronics.

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

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 25.

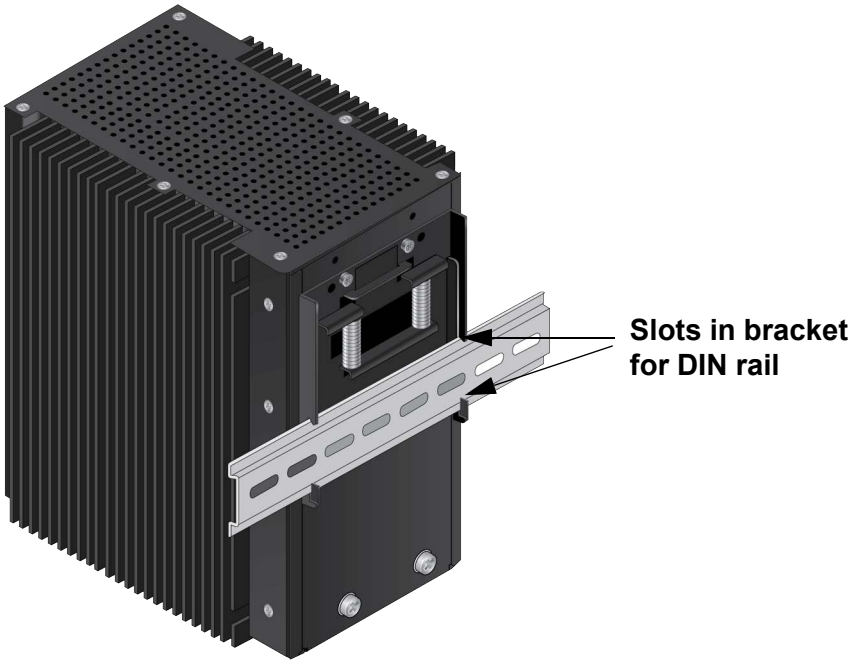


Figure 25. Switch on a DIN Rail

Figure 26 shows the correct orientation of the switch on a DIN rail.

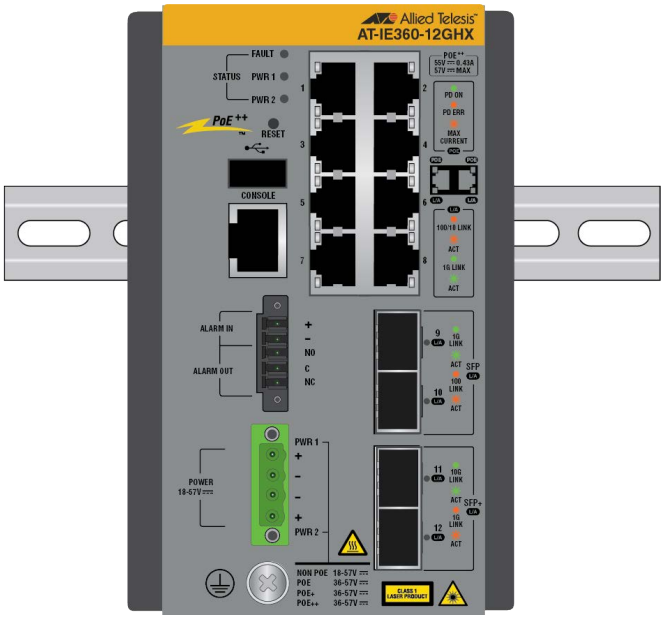


Figure 26. Orientation of the Switch on a DIN Rail

Caution
Do not install the switch horizontally or 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, refer to Chapter 4, “Cabling the Copper and SFP+ Ports” on page 93.

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 27.

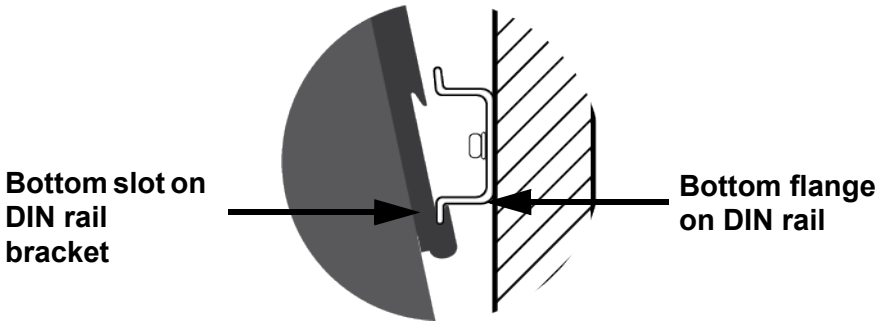


Figure 27. Installing the Switch on a DIN Rail - 1

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 28.

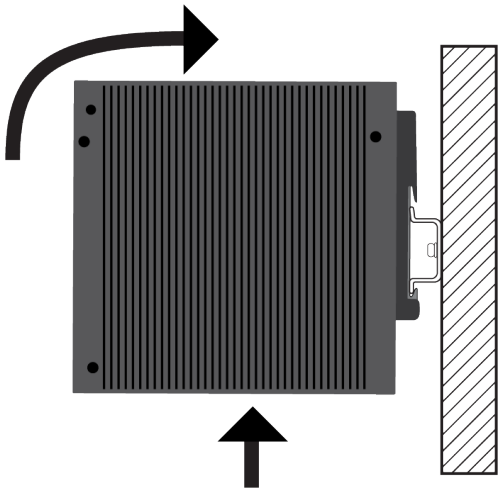


Figure 28. Installing the Switch on a DIN Rail - 2

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 29.

Figure 29. 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. Refer to Figure 30.

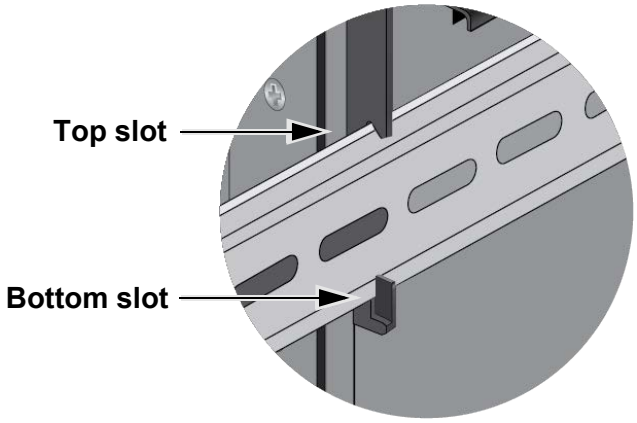


Figure 30. Verifying the DIN Rail Installation

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. Go to Chapter 4, “Cabling the Copper and SFP+ Ports” on page 93.

Installing the Switch on an Indoor Wooden Wall

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

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

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

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, refer to Chapter 4, “Cabling the Copper and SFP+ Ports” on page 93.

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 31 on page 83.

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.

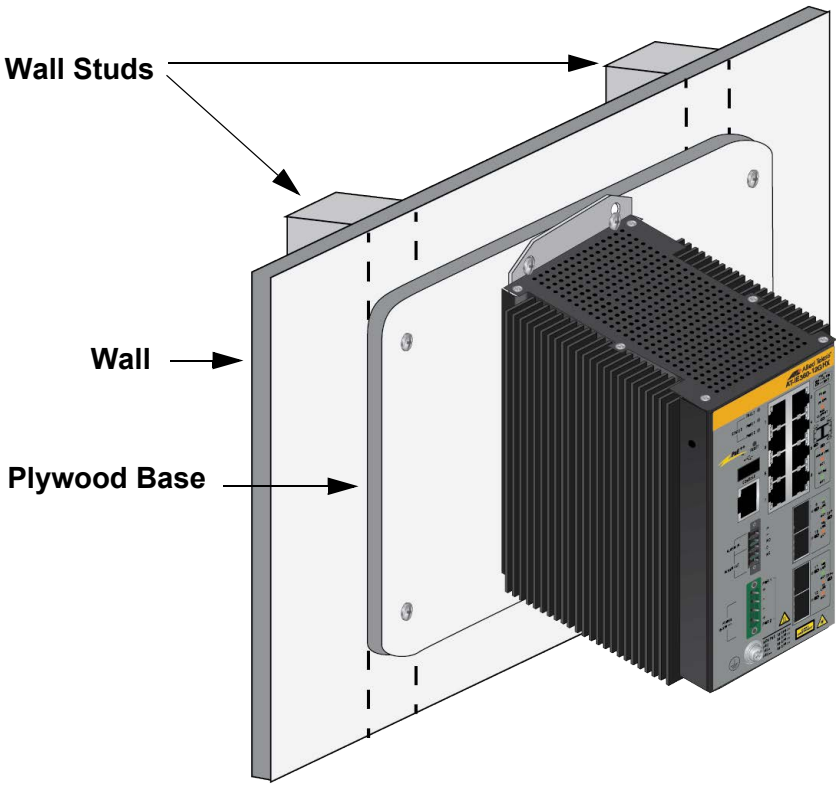


Figure 31. Switch on a Wall with a Plywood Base

You should install the plywood base to the wall first, and then install the switch on the base. Refer to Figure 32.

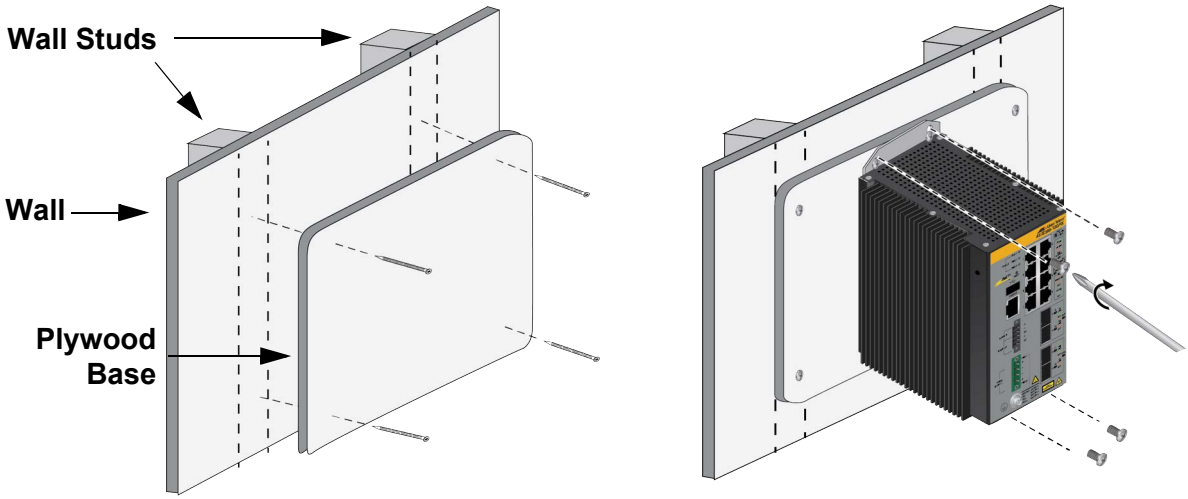


Figure 32. Steps to Installing the Switch on a Wall with a Plywood Base

Tools and Material

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

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

Installing the Plywood Base

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

- You should use a stud finder to identify the middle of studs and hot electrical wiring in the wall.
- You should attach the base to two wall studs with a minimum of four screws.
- The selected wall location for the base should adhere to the recommendations in “Reviewing Site Requirements” on page 64.

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 60 and “Reviewing Site Requirements” on page 64 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 pre-installed DIN rail bracket, and remove the bracket. Refer to Figure 33 on page 85.

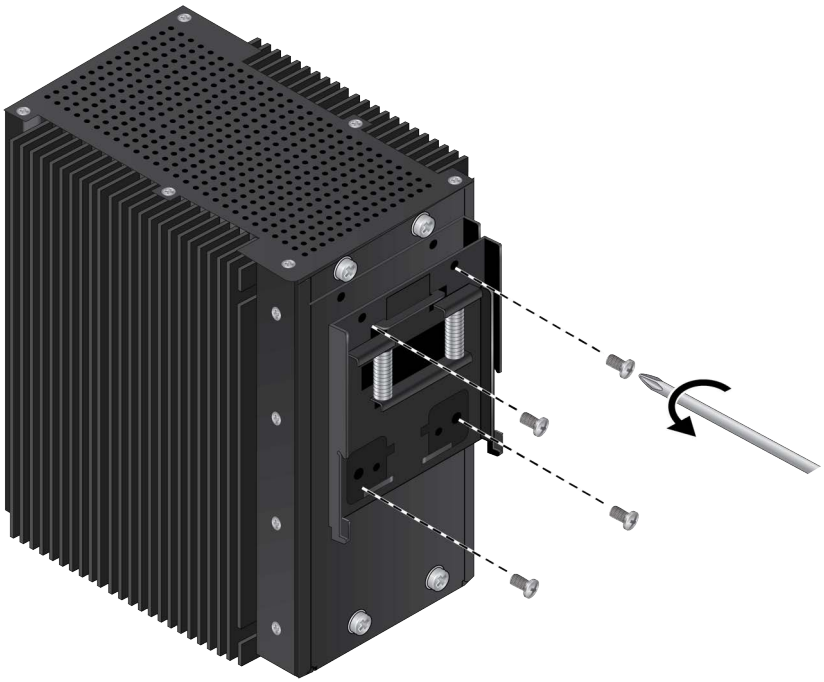


Figure 33. Removing the DIN Rail Bracket from the Switch

3. Reinstall the bracket screws. Tighten the screws to 18 in-lbs. Refer to Figure 34.

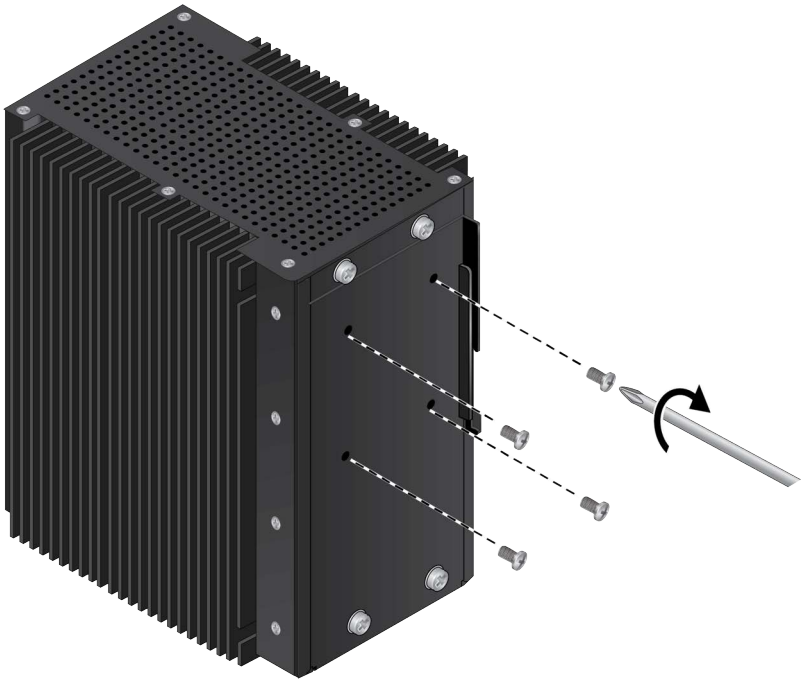


Figure 34. Reinstalling the DIN Rail Bracket Screws

4. Remove the four screws from the top and bottom of the rear panel of the switch. Refer to Figure 35.

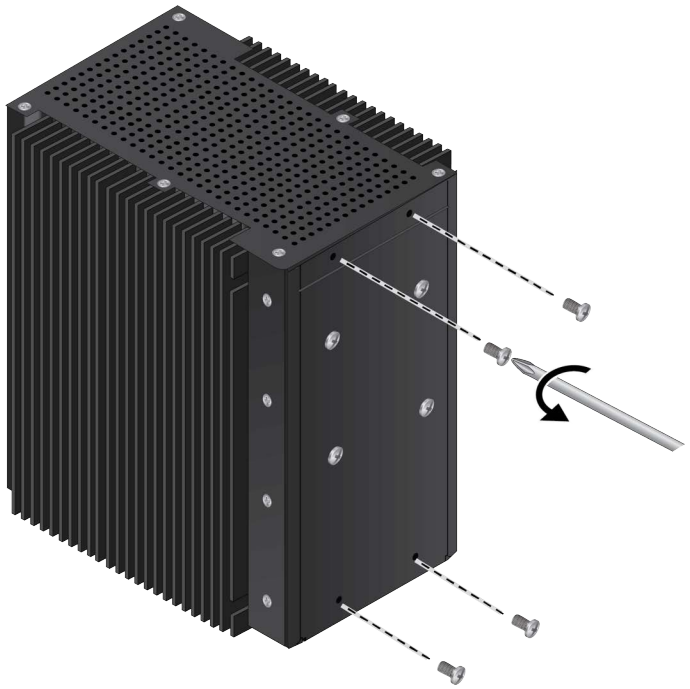


Figure 35. Removing the Four Screws from the Rear Panel

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 36.

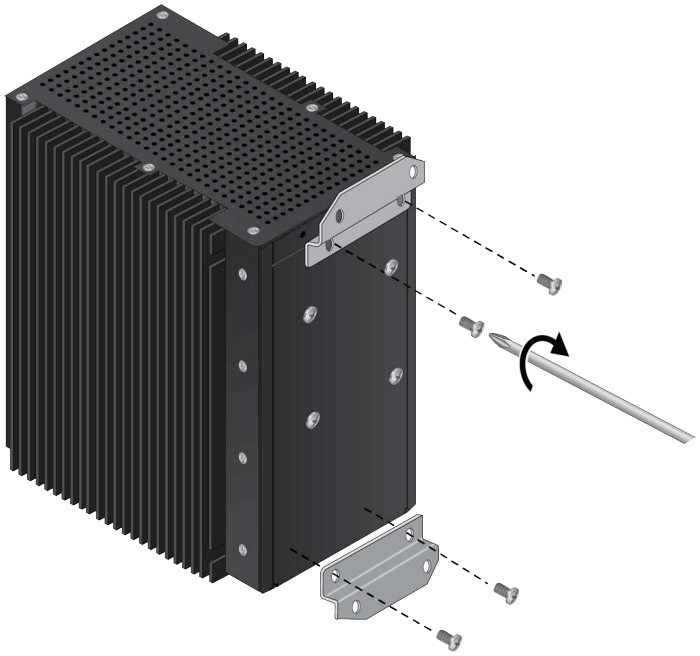


Figure 36. Installing the Wall Brackets on the Switch

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 37 on page 87.

   Observe these guidelines when positioning the switch on the wall:

   - ❒ The switch must be oriented as shown in Figure 37. Do not install the switch horizontally or upside-down.
   - ❒ Be sure to leave sufficient space from other devices or walls to allow for adequate air circulation around all sides of the switch. Refer to “Reviewing Site Requirements” on page 64 for further information.
   - ❒ Refer to the anchor datasheet from the manufacturer for the recommended torque value for the screws.

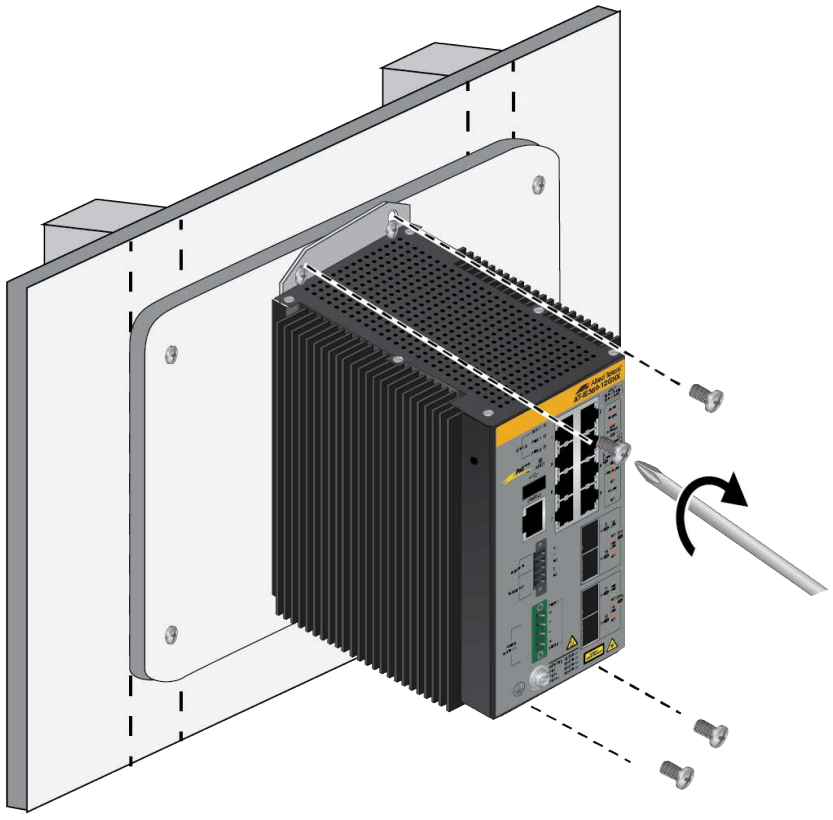


Figure 37. Attaching the Switch to the Plywood Base

7. Go to Chapter 4, “Cabling the Copper and SFP+ Ports” on page 93.

Installing the Switch on an Indoor Concrete Wall

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

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

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

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

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, refer to Chapter 4, “Cabling the Copper and SFP+ Ports” on page 93.

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 33 on page 85.

3. Reinstall the bracket screws. Refer to Figure 34 on page 85.

4. Remove the four screws from the top and bottom of the rear panel. Refer to Figure 35 on page 86.

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. Refer to Figure 36 on page 86.

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 wall brackets. Refer to Figure 38.

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

   - ❒ The switch must be oriented as shown in Figure 38. You may not install the switch horizontally or upside-down.
   - ❒ Be sure to leave sufficient space from other devices or walls to allow for adequate air circulation around the device and through the ventilation holes. Refer to “Reviewing Site Requirements” on page 64 for further information.

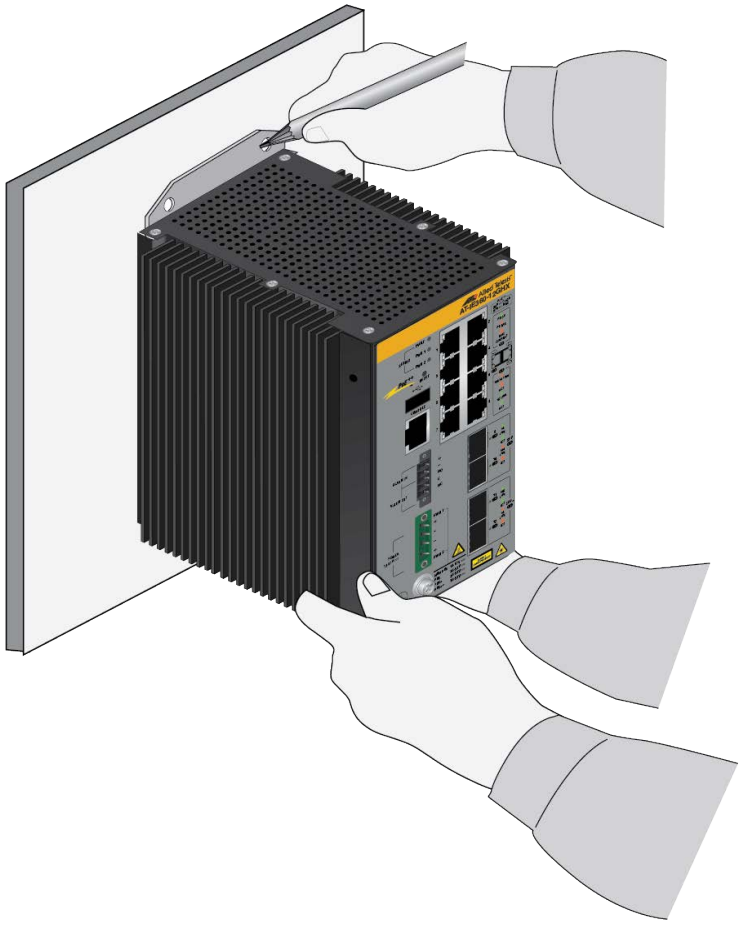


Figure 38. Marking the Locations of the Bracket Holes on a Concrete Wall

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 39.

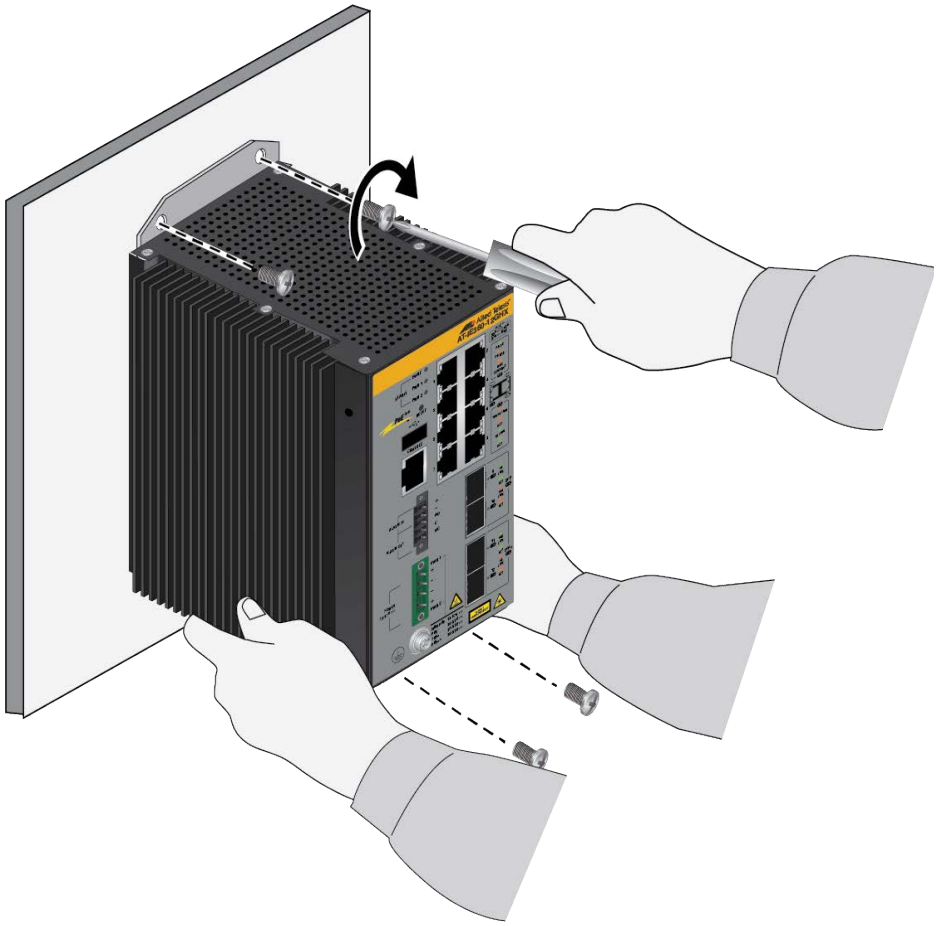


Figure 39. Installing the Switch on a Concrete Wall

11. Go to Chapter 4, “Cabling the Copper and SFP+ Ports” on page 93.

Chapter 4

Cabling the Copper and SFP+ Ports

This chapter contains the following procedures:

Cabling the Copper Ports

Here are the minimum cable requirements for the Ethernet copper ports:

- Category 5 Unshielded Twisted Pair (UTP) or better is recommended for ITE immunity levels (i.e., EN 55035)
- Category 6 Shielded Twisted Pair (STP) and Shielded Foil Twisted Pair (SFTP) are recommended for high RF applications with higher immunity levels, such as industrial Ethernet, power utility stations, and railyards.

Note
Shielded Category 6 or 6a cable is required to meet immunity levels in high RF noise environments, such as industrial Ethernet sites, electric power utility stations, electric power substations, and rail yards.

Here are the guidelines to cabling the copper ports:

- The ports have 8-pin RJ45 connectors. The connectors on the cables should fit snugly into the ports, and the tabs should lock the connectors into place.
- The default speed setting for the ports is Auto-Negotiation. This setting is appropriate for ports connected to network devices that also support Auto-Negotiation.
- The default speed setting of Auto-Negotiation is not appropriate for ports connected to network devices that do not support Auto-Negotiation and have fixed speeds of 10M or 100M. For switch ports connected to devices with fixed speeds, disable Auto-Negotiation and set the port's speed manually to match the speeds of the network devices.
- The copper ports must be set to Auto-Negotiation, the default setting, to operate at 1G.
- The default duplex mode setting for the ports is Auto-Negotiation. This setting is appropriate for ports connected to network devices that also support Auto-Negotiation for duplex modes.
- The default duplex mode setting of Auto-Negotiation is not appropriate for ports connected to network devices that do not support Auto-Negotiation and have fixed duplex modes. Disable Auto-Negotiation on those ports and set their duplex modes manually to avoid the possibility of duplex mode mismatches. A switch port using Auto-Negotiation defaults to half-duplex if it detects that the end node is not using Auto-Negotiation. This can result in a mismatch if the end node is operating at the fixed duplex mode of full-duplex.

- The default wiring configuration of the ports is automatic MDIX detection, which configures the MDI/MDIX setting automatically. This setting is appropriate for switch ports that are connected to network devices that also support the feature.
- The default wiring configuration of automatic MDIX detection is not appropriate for ports that are connected to network devices that do not support the feature. On those ports, you should disable automatic MDIX detection and set the wiring configuration manually with the POLARITY command.
- The appropriate MDI/MDI-X setting for a switch port connected to a 10M or 100M network device with a fixed wiring configuration depends on the setting of the network device and whether the switch and network device are connected with straight-through or crossover cable. If you are using straight-through copper cable, the wiring configurations of a port on the switch and a port on a network device must be opposite each other, such that one port uses MDI and the other MDI-X. For example, if a network device has a fixed wiring configuration of MDI, you must disable auto-MDI/MDI-X on the corresponding switch port and manually set it to MDI-X. If you are using crossover copper cable, the wiring configurations of a port on the switch and a port on a network device must be the same.
- Do not attach cables to ports of static or LACP port trunks until after configuring the switch trunks. This is to prevent the ports from forming network loops that can adversely affect network performance.
- PoE is enabled by default on the copper ports on the IE360-12GHX Switch.
- Ethernet cables that are connected to outdoor equipment, such as CCTVs mounted on poles, might be subjected to surges from lightning or power cross events. Properly rated primary protection devices must be installed on the cables before connecting them to the switch. Refer to “Installing the Switch in Outdoor Environments” on page 76.

SFP and SFP+ Guidelines

Please review the following guidelines before installing SFP+ transceivers:

- Ports 9 and 10 support 100M/1G SFP transceivers.
- Ports 11 and 12 support 1G SFP and 10G SFP+ transceivers.
- SFP+ transceivers are hot-swappable. You may install them while the device is powered on.
- For a list of supported transceivers, refer to the product's data sheet.
- The operational specifications and fiber optic cable requirements of the transceivers are provided in documents included with the devices.
- You should install a transceiver before connecting its fiber optic cable.
- Fiber optic transceivers are dust sensitive. Always keep the plug in the optical bores when a fiber optic cable is not installed, or when you store the transceiver. When you do remove the plug, keep it for future use.
- Unnecessary removal and insertion of a transceiver can lead to premature failure.

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

Installing SFP and SFP+ Transceivers

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

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

1. Remove the dust plug from the selected transceiver port. Figure 40 on page 97.

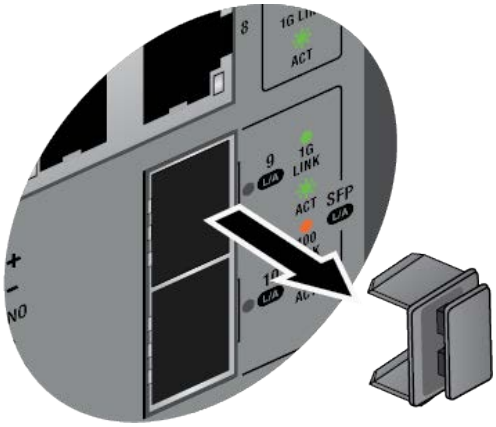


Figure 40. Removing the Dust Plug from a Transceiver Port

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

3. Position the transceiver with its handle on the left and slide it into the port until it clicks into place. Refer to Figure 41.

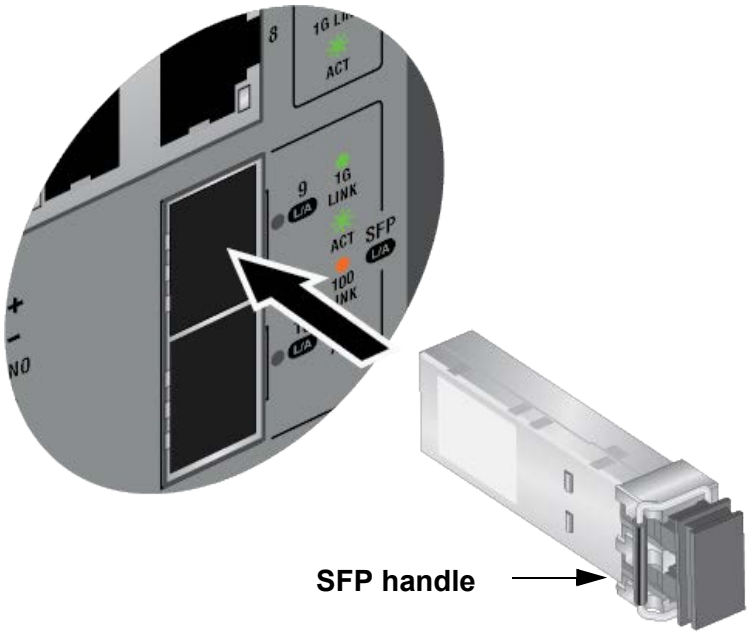


Figure 41. Installing a Transceiver

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

4. Remove the dust cover from the transceiver. Refer to Figure 42.

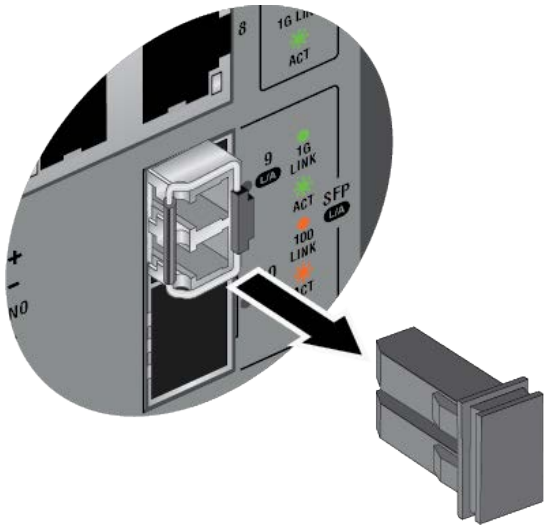


Figure 42. Removing the Dust Cover from a Transceiver

5. Verify the handle on the transceiver is turned to the right. Refer to Figure 43.

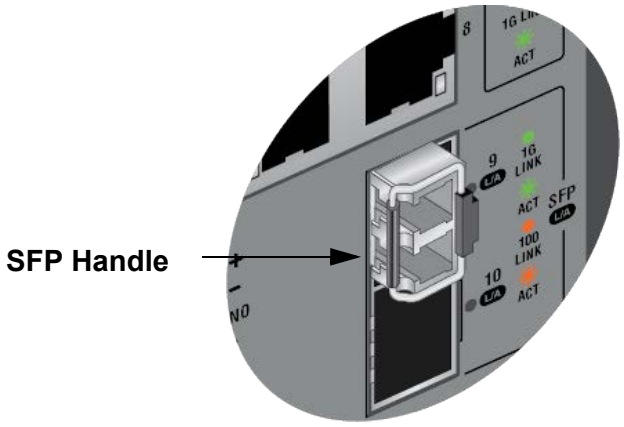


Figure 43. Verifying the Position of the Transceiver Handle

6. Connect the fiber optic cable to the transceiver. The connector on the cable should fit snugly into the port, and the tab should lock the connector into place. Refer to Figure 44 on page 99.

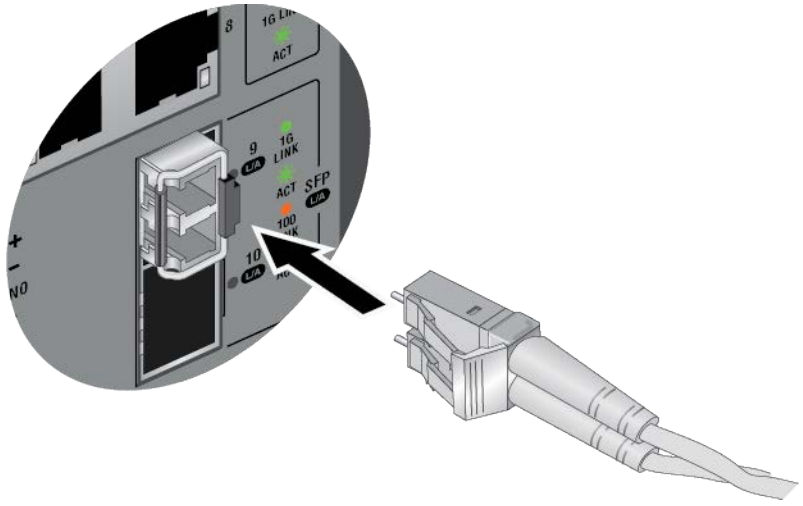


Figure 44. Connecting a Fiber Optic Cable to a Transceiver

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

8. Go to Chapter 5, “Powering On the Switch” on page 101.

Chapter 5

Powering On the Switch

This chapter contains the following procedures:

Connecting the Ground Wire

Here are the guidelines for the ground wire:

- The wire should be minimum #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 45.

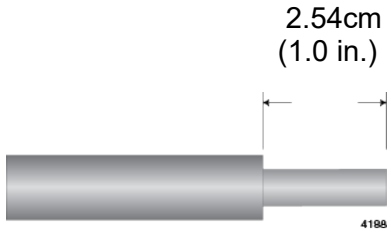


Figure 45. Stripping the Grounding Wire

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 46

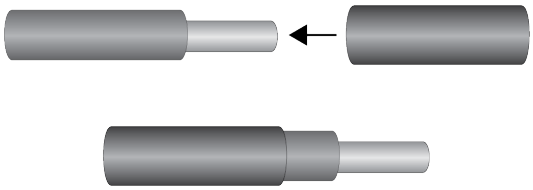


Figure 46. Sliding a Heat-shrink Tube Over the Grounding Wire

3. Slide the ring terminal lug over the stripped wire on the grounding wire. Refer to Figure 47.

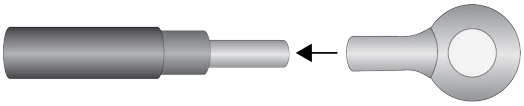


Figure 47. Sliding the Ring Terminal Lug on the Grounding Wire

4. Crimp the ring terminal lug with a wire crimping tool to secure it on the grounding wire. Refer to Figure 48.

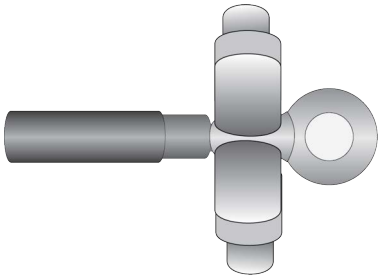


Figure 48. Crimping the Ring Terminal Lug

5. Slide the heat-shrink tube over the shaft of the ring terminal lug. Refer to Figure 49.

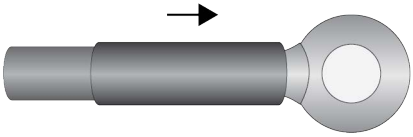


Figure 49. Sliding the Heat-Shrink Tube Over the Ring Terminal Lug

6. Heat the heat-shrink tube to secure it on the wire and ring terminal lug. Refer to Figure 50.

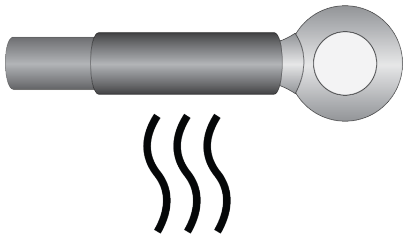


Figure 50. Heating the Heat-Shrink Tube

7. Remove the grounding screw from the switch with a #2 Phillips-head screwdriver. Refer to Figure 51.

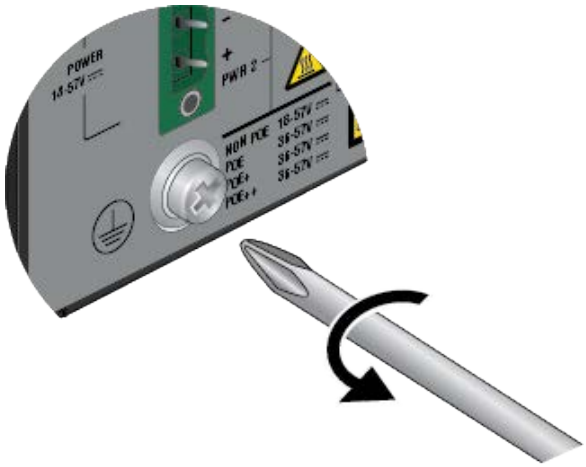


Figure 51. Removing the Grounding Screw

8. Secure the grounding screw to the IE360 Switch with the grounding screw. Tighten screw to 6 in-lbs. Refer to Figure 52 on page 104.

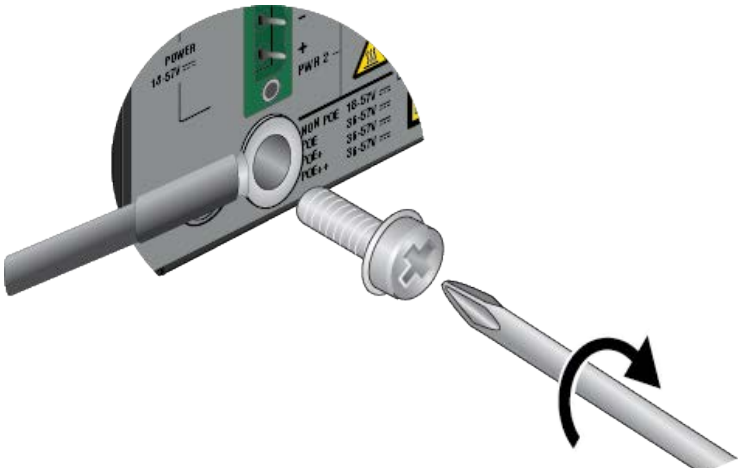


Figure 52. Attaching the Grounding Wire to the Switch

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 106.
    - ❒ Otherwise, go to “Wiring the POWER Connector” on page 111.

Wiring the ALARM IN / ALARM OUT Connector

For background information, refer to “ALARM IN Circuit” on page 46 and “ALARM OUT Circuits” on page 49. 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 an 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. Otherwise, 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 53.

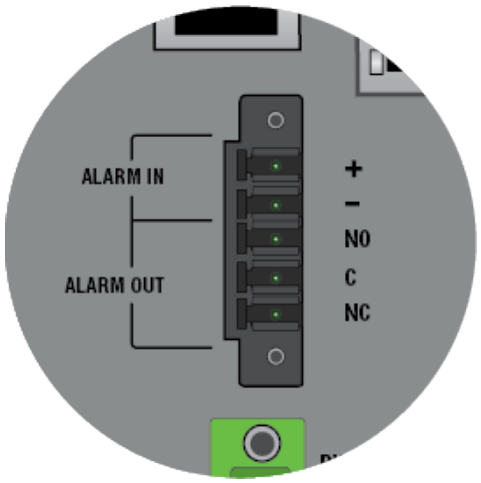


Figure 53. Polarity Legend on the ALARM IN / ALARM OUT Connector

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 54.

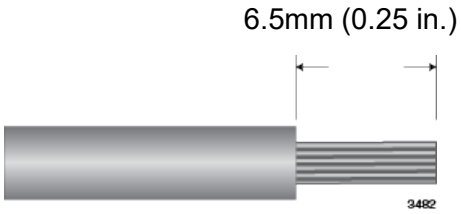


Figure 54. Stripping an Alarm Wire

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

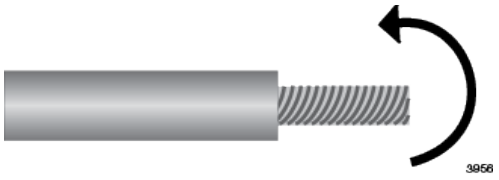


Figure 55. Wrapping the Wire Strands

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 56.

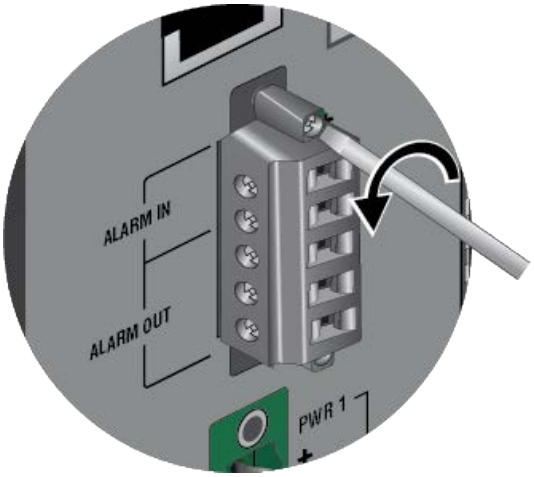


Figure 56. Loosening the Captive Screws on the ALARM IN / ALARM OUT Plug

5. Remove the ALARM IN / ALARM OUT plug. Refer to Figure 57.

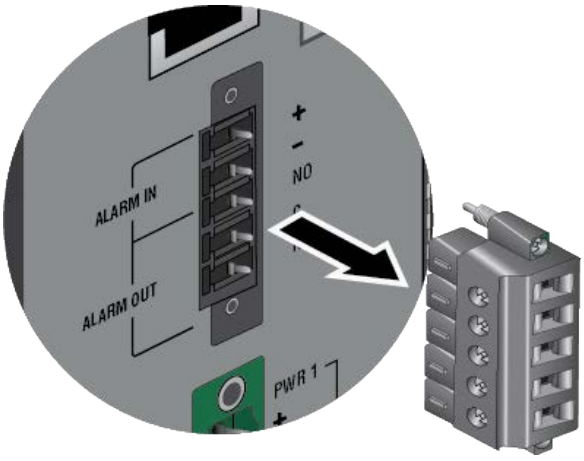


Figure 57. Removing the ALARM IN / ALARM OUT Plug

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 58.

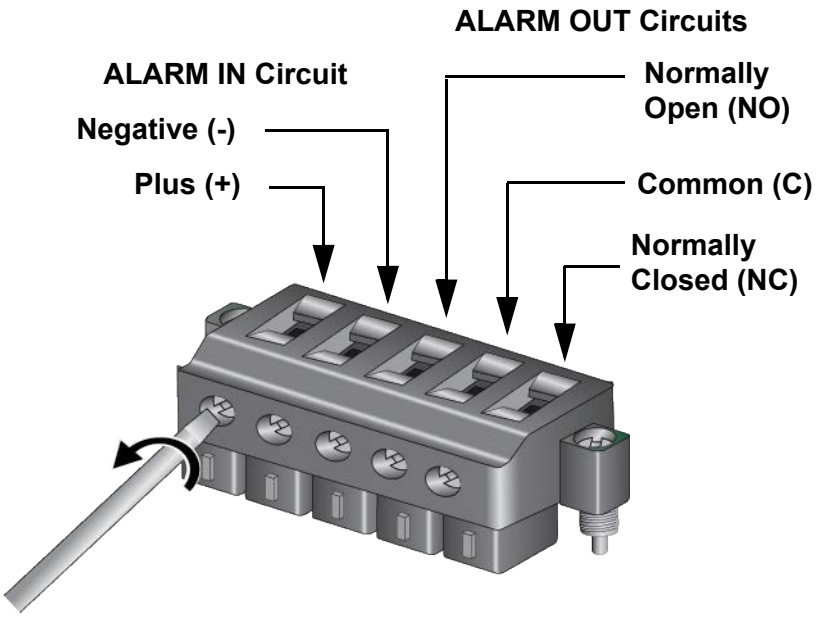


Figure 58. Loosening the Wire Retaining Screws on the ALARM IN / ALARM OUT Plug

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 59.

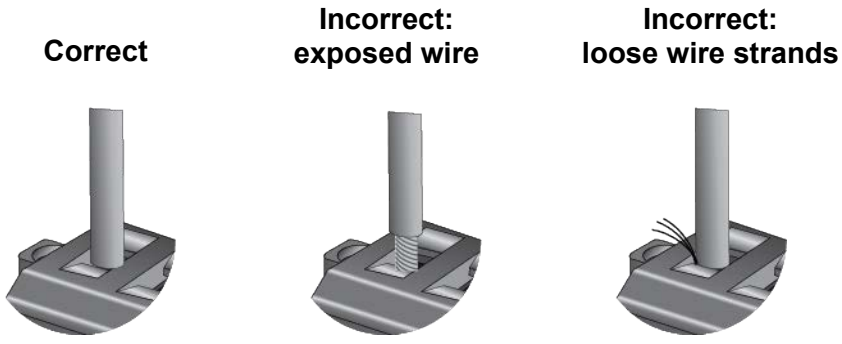


Figure 59. Verifying the Wires on the ALARM IN / ALARM OUT Plug

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 60.

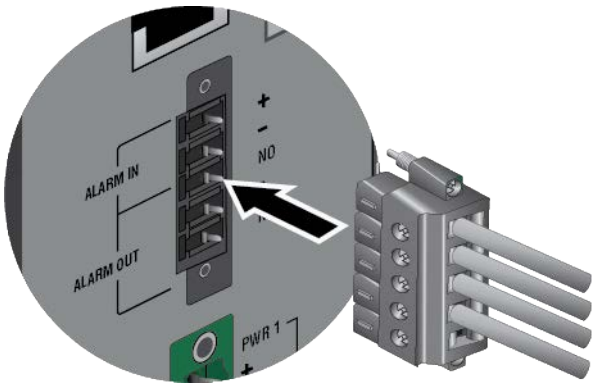


Figure 60. Inserting the ALARM IN / ALARM OUT Plug into the Connector

10. Tighten the two captive screws to secure the ALARM IN / ALARM OUT plug to the switch. Refer to Figure 61.

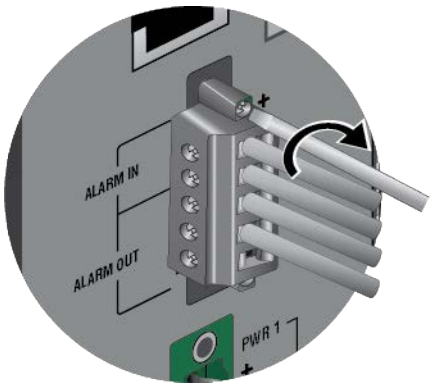


Figure 61. Securing the ALARM IN / ALARM OUT Plug to the Switch

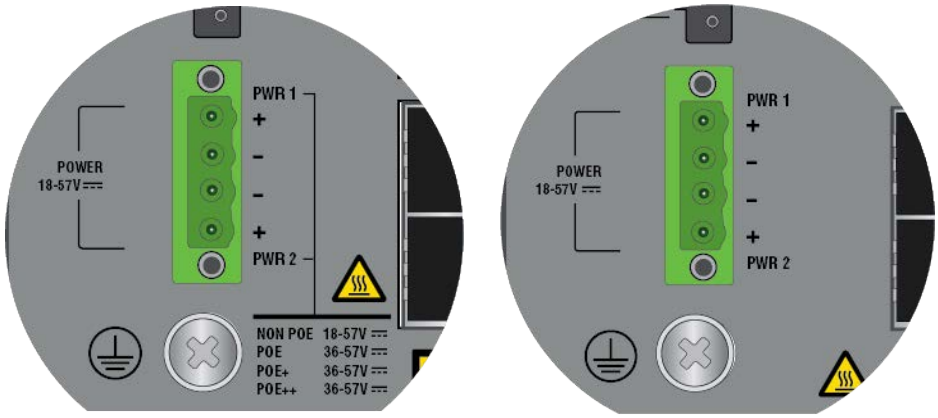
11. Connect the other ends of the wires to external sensors or alarm devices. Refer to the documentation included with the devices for instructions.

12. Go to “Wiring the POWER Connector” on page 111.

Wiring the POWER Connector

You can power the switches with either one or two DC power sources. A single power source that meets the specifications in “Switch DC Power Requirements” on page 55 and “DC Power Specifications” on page 150 can fully power the switches. In the case of the IE360-12GHX Switch, a single power source that meets the specifications also provides power for the powered devices on its ports, up to the maximum power budget. A second power source adds power redundancy, which protects the switches against power supply failures.

The 4-pin POWER connectors on the front panels of the switches are the DC input connectors. As shown in Figure 62, the connectors have 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.



IE360-12GHX Switch **IE360-12GTX Switch**

Figure 62. Pin Signals Legend on the POWER Connectors

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 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 7, “Troubleshooting” on page 131.

Here are the materials and tools required for wiring the POWER plug on the POWER connector:

- ❒ #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

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

To wire the POWER plug, perform the following procedure:

1. Strip 6.5mm (0.25 in.) of insulation from the ends of the stranded power wires with a wire insulator stripper. Refer to Figure 63.

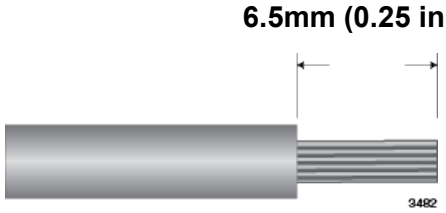


Figure 63. Stripping a Power Cable Wire

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 55 on page 107. This step can prevent loose strands from touching other wires and causing an electrical short.

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

3. Loosen the two captive screws on the POWER plug with a #1 flat-head screwdriver. Refer to Figure 64.

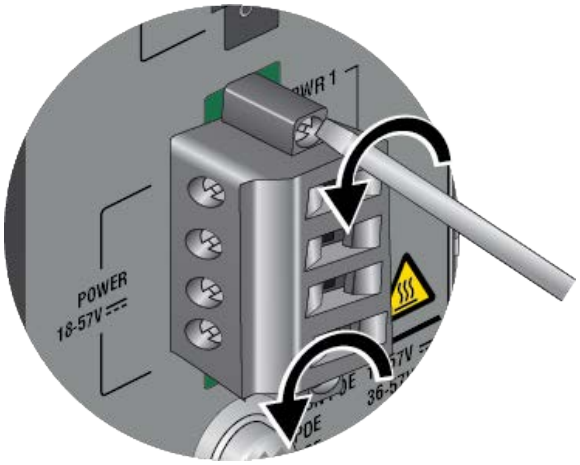


Figure 64. Loosening the Two Captive Screws on the POWER Plug

4. Remove the POWER plug from the front panel. Refer to Figure 65.

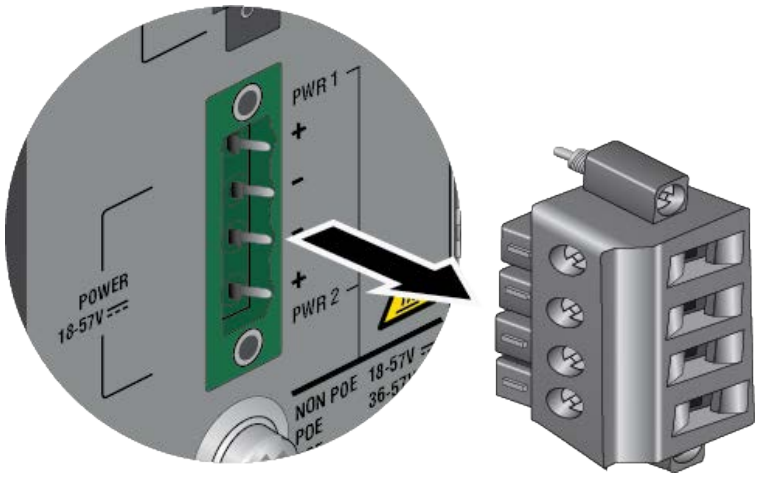


Figure 65. Removing the POWER Plug

5. Use a #2 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 66.

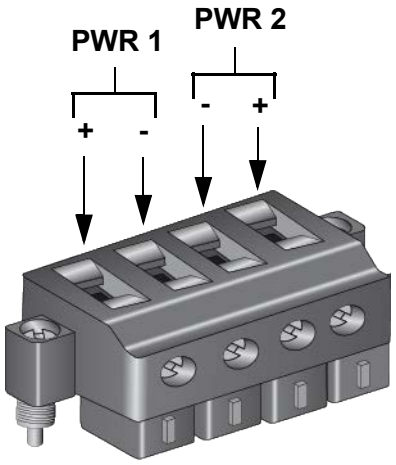


Figure 66. Loosening the Wire Retaining Screws on the POWER Plug

6. Insert the wires into the plug and tighten the retaining screws to secure them. The example in Figure 67 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 67. 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 68.

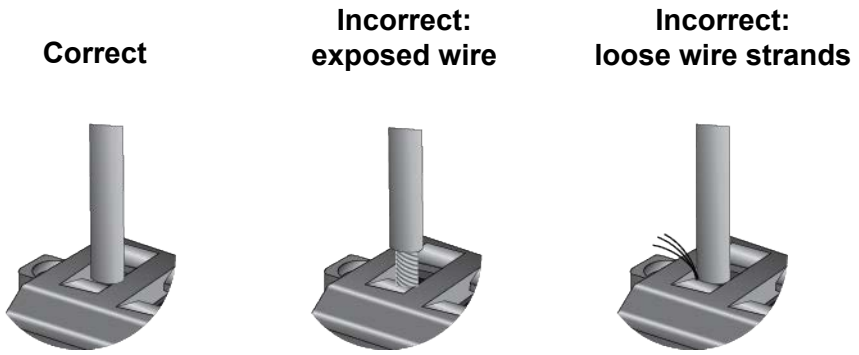


Figure 68. Verifying the DC Power Wire Installation

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, go to “Powering On the Switch” on page 116.

Powering On the Switch

This section contains the procedure for powering on the switch.

Note
Refer to “Switch DC Power Requirements” on page 55 and “Power Supplies” on page 57 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. Using the Autoboot feature is optional. It is only available during the initial power up of the unit. To use the feature, insert a USB flash drive with the appropriate files into the USB port on the switch before powering on the unit. For more information, refer to the *IE360 Series Command Reference for AlliedWare Plus*.

The following procedure assumes you have already wired the POWER plug on the switch. For instructions, refer to “Wiring the POWER Connector” on page 111. For power supply requirements, refer to “Switch DC Power Requirements” on page 55 and “DC Power Specifications” on page 150.

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 69 on page 117.

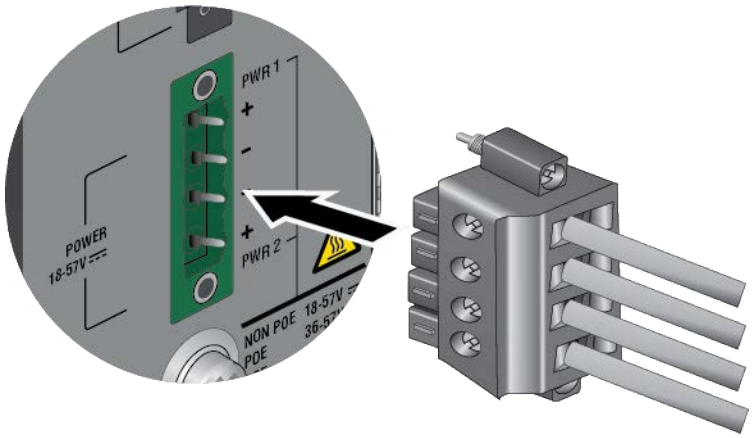


Figure 69. Inserting the POWER Plug into the POWER Connector

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 70.

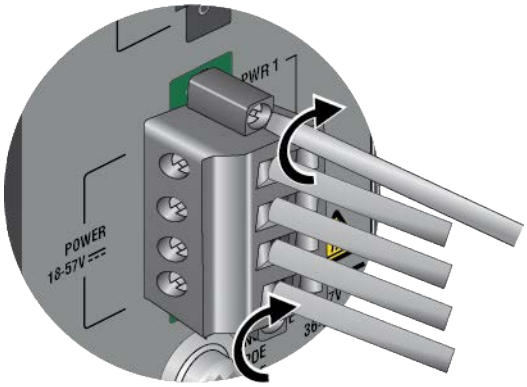


Figure 70. Tightening the Captive Screws to Secure the POWER Plug

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 122.

Verifying Switch Operations

Here are items to check to verify that the switch is operating normally. If there is a problem, refer to Chapter 7, “Troubleshooting” on page 131.

- The Fault LED should be off. Refer to “STATUS FAULT, PWR 1 and PWR 2 LEDs” on page 34.
- 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 34.
- The L/A (Link/Activity) LEDs on copper ports that are connected to powered-on devices should be solid or flashing green or amber. Refer to “Copper Port LEDs” on page 35.
- The PoE++ LEDs on copper ports on the IE360-12GHX Switch should be solid green when connected to powered devices. Refer to “Copper Port LEDs” on page 35.
- 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 9 and 10 LEDs” on page 38 and “SFP+ Ports 11 and 12 LEDs” on page 39.

After verifying the operations of the switch, go to Chapter 6, “Managing the Switch” on page 121.

Chapter 6

Managing the Switch

This chapter contains the following procedures:

Starting a Management Session

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

- ❒ “Locally from the CONSOLE Port,” next
- ❒ “Remotely with a DHCP or DHCPv6 Server” on page 124
- ❒ “Remotely with the Default IPv4 Address” on page 125

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 163 and “CONSOLE Port Management Cable with DB-9 Female and RJ-45 Connectors” on page 164 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 10 on page 40.
- ❒ Local management sessions do not interfere with the network operations of the switch.
- ❒ The switch does not need an IP address for local management sessions.
- ❒ The web browser interface is not available through the CONSOLE port.
- ❒ The switch comes from the factory without a configuration file for storing its parameter settings. It automatically creates a file the first time you save its parameter settings.

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

1. Connect your workstation to the CONSOLE port on the switch:

   - ❒ If your workstation has a USB connector, use a USB-to-Serial converter, such as the VT-Kit3 from Allied Telesis. Refer to Figure 10 on page 40. 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 164 for the cable specifications.

2. Power on the switch and wait several minutes for it to start the AlliedWare Plus management software.

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

   - Baud rate: 9600 bps (The baud rate of the CONSOLE port is adjustable from 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 163)
   - Data bits: 8
   - Parity: None
   - Stop bits: 1
   - Flow control: None

   Note
   The CONSOLE 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 following prompt:

```
awplus>
```

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

6. If you have the IE360-12GHX Switch, Go to “Verifying PoE” on page 127.

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, unless you change their setting manually. To continue using SSH in subsequent management sessions, you need to 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 73. 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.

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 following prompt:

```
awplus>
```

   This is the prompt for the User Exec mode.

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. If you are installing the IE360-12GHX Switch, go to “Verifying PoE” on page 127.

Remotely with the Default IPv4 Address

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

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

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 need to 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 Chapter 5, “Powering On the Switch” on page 101.

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 SSH and the command line interface, the switch displays the User Exec mode, 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. If you are installing the IE360-12GHX Switch, go to “Verifying PoE” on page 127.

Verifying PoE

This section contains the following procedures for verifying and, if necessary, configuring the PoE budget on the IE360-12GHX Switch:

- ❒ “Verifying the PoE Budget,” next
- ❒ “Configuring the Power Budget” on page 128

Verifying the PoE Budget

The PoE budget is the maximum wattage the switch has available for powered devices on its copper ports. The IE360-12GHX Switch has a maximum power budget of 360W when powered by power sources that meet the requirements in “Switch DC Power Requirements” on page 55 and “DC Power Specifications” on page 150.

Note
The switch might have a lower PoE budget when powered by power sources that do not meet the specified requirements.

The following procedure verifies the switch’s PoE budget. It assumes you have already started a management session on the switch, For instructions, refer to “Starting a Management Session” on page 122. To confirm the PoE budget, perform the following procedure:

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

```
awplus> enable
awplus#
```

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

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

3. Examine the Power Allocated field in the command output as follows:
   - ❒ If the power budget is correct, go to “Configuring the Power Budget” on page 128.
   - ❒ If the power budget is incorrect, either the power supply does not meet the specifications in “Switch DC Power Requirements” on page 55 and “DC Power Specifications” on page 150 or it has a problem. Refer to Chapter 7, “Troubleshooting” on page 131 for troubleshooting suggestions.

Configuring the Power Budget

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

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

Pa = Pi - Pc

Where:

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

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

Pc = Maximum power consumed by the switch.

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

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

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

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

2. Compare the Nominal Power and Power Allocated fields in the command output:
   - ❒ The Nominal Power field is the PoE power budget of the switch. It is the wattage the switch is expecting from the power supply for PoE devices.
   - ❒ The Power Allocated is the actual wattage the switch is receiving from the power supply. The default value is 360W.
3. Do one of the following:
   - ❒ If the values in the Nominal Power and Power Allocated fields are the same, no further steps are required. Refer to the *IE360 Series Command Reference for AlliedWare Plus* for management instructions.
   - ❒ If the values are different, continue with the next step:

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

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

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

```
power inline wattage max max
```

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

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

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

   For management instructions, refer to the *IE360 Series Command Reference for AlliedWare Plus*.

Specifying Ports in the Command Line Interface

The individual ports on the switch are specified in the command line interface with the PORT parameter. The format of the parameter for the IE360 Series is shown in Figure 71.

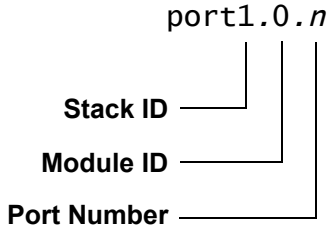


Figure 71. PORT Parameter in the Command Line Interface

The three parts of the PORT parameter are described in Table 16.

Table 16. PORT Parameter Format for the IE360 Series

Number	Description
Stack ID	Designates the switch's ID number in a stack. This value is always 1 (one) for the IE360 Switch because it does not support stacks.
Module ID	Designates the module number of a port. This value is always 0 (zero) for the IE360 Switch because it does not support modules.
Port Number	Designates a port number.

This example of the PORT parameter 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 *IE360 Series of Industrial Ethernet Layer 3 Switches Command Reference for AlliedWare Plus*.

Chapter 7
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 process is performed whenever the switch 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 alarm 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 activate or deactivate alarms, use the ALARM FACILITY commands in the Global Configuration mode. The following example configures the switch to flash the FAULT LED if port 1 loses its link to a network device:

```
awplus# configure terminal
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.

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 IE360 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 *IE360 Series Command Reference for 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 64 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 55 and "DC Power Specifications" on page 150.
- ❒ 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 111.
- ❒ 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 150.

Note
For further information, refer to "Wiring the POWER Connector" on page 111.

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 55 and "DC Power Specifications" on page 150.
- ❒ Verify that the power supply is not overheating. If necessary, increase ventilation around the power supply.
- ❒ The power supply might be failing. Replace the power supply.

Copper Ports

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

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

```
awplus> enable
awplus# configure terminal
awplus(config)# no ecofriendly led
```

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

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

- ❒ Verify that the port is connected to the correct copper cable.
- ❒ Verify that the network device connected to the copper port is powered on and operating properly.
- ❒ Verify that the cable is securely connected to the ports on the switch and network device.
- ❒ Try connecting another network device to the port with a different cable. If the port establishes a link, the problem is with the cable or the other network device.
- ❒ Verify that the cable does not exceed 100 meters (328 feet).
- ❒ Verify that you are using the appropriate category of copper cable. Refer to "Copper Cable Requirements" on page 27.
- ❒ 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.
- ❒ Use the SHOW SPANNING-TREE command in the User Exec or Privileged Exec mode to determine if the switch blocked the port because spanning tree detected a network loop. The default setting for RSTP on the switch is enabled on all ports. This example displays the spanning tree status of LAN port 2:

  ```
  awplus> enable
  awplus# show spanning-tree interface port1.0.2
  ```

- ❒ Review the documentation of the network device to determine the

MDI/MDIX wire setting on its copper port. The ports on the switch and network device must be set to different wire settings, with one device set to MDI and the other to MDIX. If the network device uses a fixed MDI/MDIX wire setting, it may be necessary to set the setting on the switch's port manually.

The MDI/MDIX setting is controlled with the POLARITY command in the Interface Configuration mode. The default setting is auto-detection. If the port on the network device has a fixed setting, try manually setting the switch port to the opposite setting. For example, if the network device on LAN port 2 of the switch has a fixed setting of MDIX at 100M, you would enter these commands to set the switch's port to MDI:

```
awplus> enable
awplus# configure terminal
awplus(config)# interface port1.0.2
awplus(config-if)# speed 100
awplus(config-if)# polarity mdi
```

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

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

Solution: There might be a duplex mode mismatch between the port and the network device. This can occur when a copper port using Auto-Negotiation is connected to a remote device that has a fixed speed of 10M or 100M and a fixed duplex mode of full duplex. If this is the cause of the problem, adjust the duplex mode of the port on the network device or switch so that both ports are using the same duplex mode. For the switch, use the management software to determine the duplex mode settings of the ports.

Power Over Ethernet

Problem: The IE360-12GHX Switch is not providing power or only partial power to powered devices on the copper ports.

Solutions: Try the following:

- ❒ Check the port's PoE++ LED. If the LED is solid amber, the switch shutdown PoE on the port because of a fault condition. If the LED is flashing amber, the switch does not have sufficient unused power to allocate to the powered device.
- ❒ Review the powered device's documentation to confirm that it is compliant with one of the PoE++ standards in "PoE Versions" on page 28 and that its power requirements do not exceed those listed in Table 1 on page 28. Legacy devices that are non-standard or were manufactured before the completion of the standards might not be compatible with the switch.
- ❒ Perform the procedures in "Verifying PoE" on page 127 to check and, if necessary, adjust the switch's power budget.
- ❒ Verify that you are using the appropriate category of copper cable. Refer to "Copper Cable Requirements" on page 27.
- ❒ Try replacing the copper cable.
- ❒ Use the AlliedWare Plus management software on the switch to determine whether PoE is enabled on the port. The default setting is enabled.
- ❒ Use the SHOW POWER-INLINE command to determine whether the PoE power setting for the port was reduced to a value below the power requirements of the device.
- ❒ Try connecting the device to a different port on the switch.
- ❒ Verify that the switch is not overheating. If the device is installed in an enclosure, verify that the enclosure provides adequate ventilation.

SFP 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).

Appendix A
Technical Specifications

This appendix contains the following sections:

Physical Specifications

Dimensions

Table 17. Product Dimensions (H x W x D)

IE360 Switches[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 18. Product Weights

IE360-12GHX Switch	With DIN rail bracket	2.216 kg (4.88 lbs)
	With wall brackets	2.106 kg (4.64 lbs)
IE360-12GTX Switch	With DIN rail bracket	2.11 kg (4.64 lbs)
	With wall brackets	2.06 kg (4.54 lbs)

Ventilation

Table 19. Ventilation Requirements for Cabinet Installation

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

Cabinet (Enclosure) Dimensions

Table 20. Minimum Cabinet (Enclosure) Dimensions

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

Note
The enclosure (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 switches do 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 switches are 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 21. 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 22. Ingress Protection

IE360 Switch	IP30

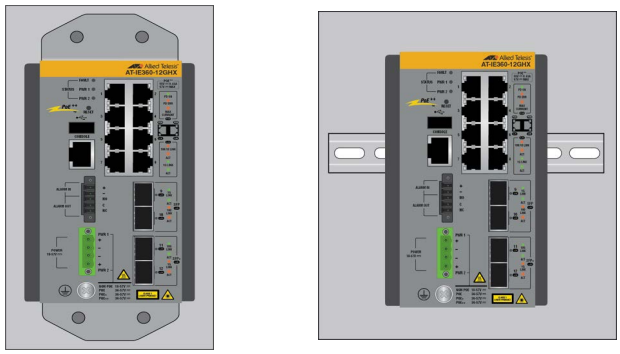
Operating Temperature Ranges

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

- "Vertical Wall Installations," next
- “Horizontal Wall Installations” on page 144
- “Floor or Ceiling Installations” on page 144

Vertical Wall Installations

Table 23 contains the operating temperature ranges for the switches when installed vertically on a wall.



Wall brackets **DIN rail**

Figure 72. Vertical Wall Installations

Table 23. Operating Temperature Ratings at 48Vdc Input Power - Vertical Installation - Top Up

Switch	Sealed Enclosure: 0 LFM[1,2]	Ventilated Enclosure: 40 LFM	Fan-based Enclosure: 150 LFM
IE360-12GHX	-40°C to 60°C (-40° F to 140° F)	-40°C to 69°C (-40°F to 156°F)	-40°C to 75°C (-40°F to 167°F)
IE360-12GTX	-40°C to 75°C (-40° F to 167° F)	-40°C to 75°C (-40°F to 167°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 76. Product performance may vary depending on enclosure size and whether other heat generating devices are present in the enclosure.

Caution

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

Horizontal Wall Installations

Table 24 contains the operating temperature ranges for the switches when installed horizontally on a wall.

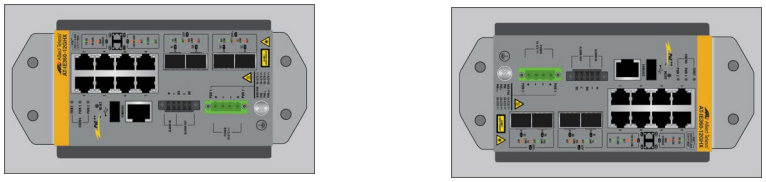


Figure 73. Horizontal Wall Installations

Table 24. Operating Temperature Ratings at 48Vdc Input Power - Horizontal Installation

Switch	Sealed Enclosure: 0 LFM[1,2]	Ventilated Enclosure: 40 LFM	Fan-based Enclosure: 150 LFM
IE360-12GHX	-40°C to 60°C (-40° F to 140° F)	-40°C to 69°C (-40°F to 156°F)	-40°C to 75°C (-40°F to 167°F)
IE360-12GTX	-40°C to 75°C (-40° F to 167° F)	-40°C to 75°C (-40°F to 167°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 or Ceiling Installations

Table 25 on page 145 contains the operating temperature ranges for the switches when installed on a floor or ceiling.

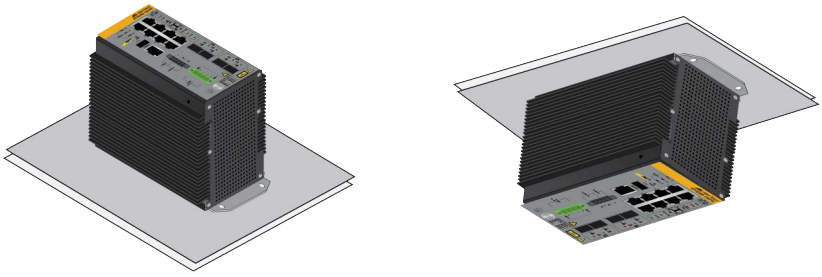


Figure 74. Floor and Ceiling Installations

Table 25. Operating Temperature Ratings at 48Vdc Input Power - Floor or Ceiling Installation

Switch	Sealed Enclosure: 0 LFM[1,2]	Ventilated Enclosure: 40 LFM	Fan-based Enclosure: 150 LFM
IE360-12GHX	-40°C to 60°C (-40° F to 140° F)	-40°C to 69°C (-40°F to 156°F)	-40°C to 75°C (-40°F to 167°F)
IE360-12GTX	-40°C to 75°C (-40° F to 167° F)	-40°C to 75°C (-40°F to 167°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.

Maximum Operating Temperatures for the IE360-12GHX Switch

The following sections contain the maximum operating temperatures for the IE360-12GHX Switch. As show in the graphs and tables, the temperatures vary depending on the following factors:

- Type of enclosure
- PoE load
- DC input power

The sections are listed here:

- “Sealed Enclosure” on page 147
- “Ventilated Enclosure” on page 148
- “Fan-based Ventilated Enclosure” on page 149

Note
The following graphics and tables apply to all four installation orientations for the switch.

Sealed Enclosure

Figure 75 and Table 26 provide the maximum operating temperatures for the IE360-12GHX Switch in a sealed enclosure.

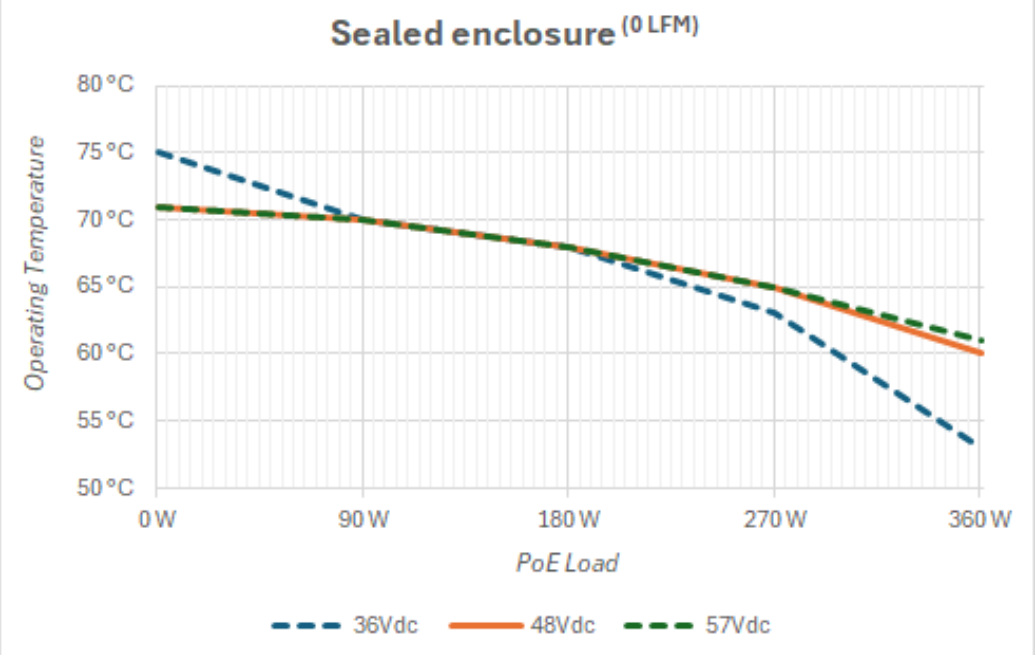


Figure 75. Maximum Operating Temperatures for the IE360-12GHX Switch in a Sealed Enclosure

Table 26. Maximum Operating Temperatures for the IE360-12GHX Switch in a Sealed Enclosure

PoE Load	Switch Input Power		
	36Vdc	48Vdc	57Vdc
0 W	75°C	71°C	71°C
90 W	70°C	70°C	70°C
180 W	68°C	68°C	68°C
270 W	63°C	65°C	65°C
360 W	53°C	60°C	61°C

Ventilated Enclosure

Figure 76 and Table 27 provide the maximum operating temperatures for the IE360-12GHX Switch in a ventilated enclosure, without a fan.

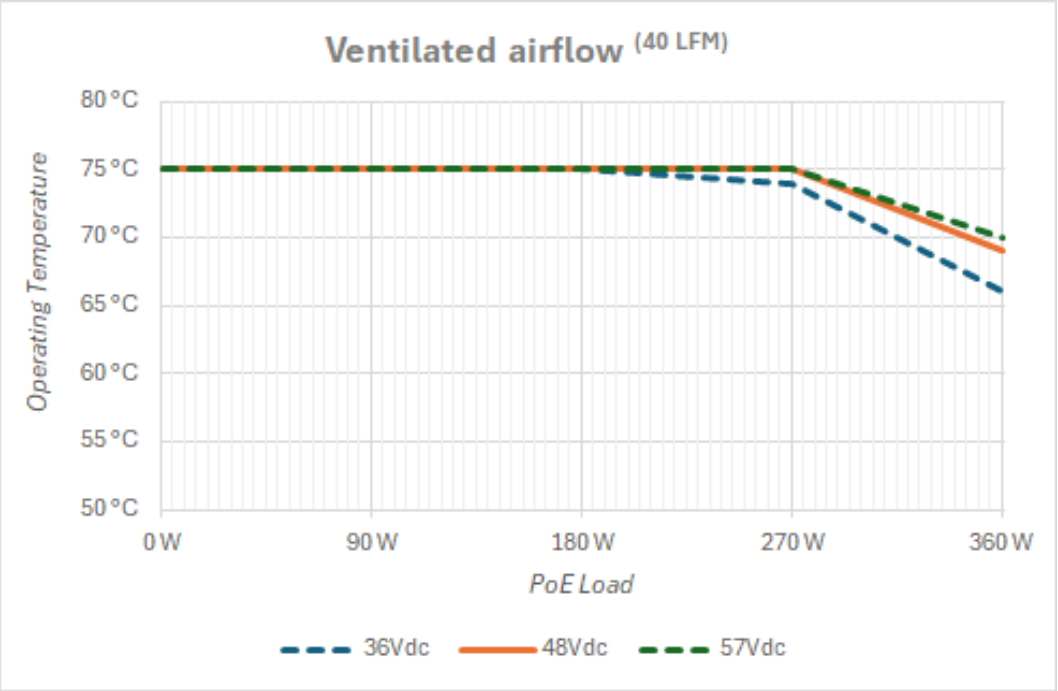


Figure 76. Maximum Operating Temperatures for the IE360-12GHX Switch in a Ventilated Enclosure (No Fan)

Table 27. Maximum Operating Temperatures for the IE360-12GHX Switch in a Ventilated Enclosure (No Fan)

PoE Load	Switch Input Power		
	36Vdc	48Vdc	57Vdc
0 W	75°C	75°C	75°C
90 W	75°C	75°C	75°C
180 W	75°C	75°C	75°C
270 W	74°C	75°C	75°C
360 W	66°C	69°C	70°C

Fan-based Ventilated Enclosure

Figure 77 and Table 28 provide the maximum operating temperature for the IE360-12GHX Switch in a fan-based ventilated enclosure.

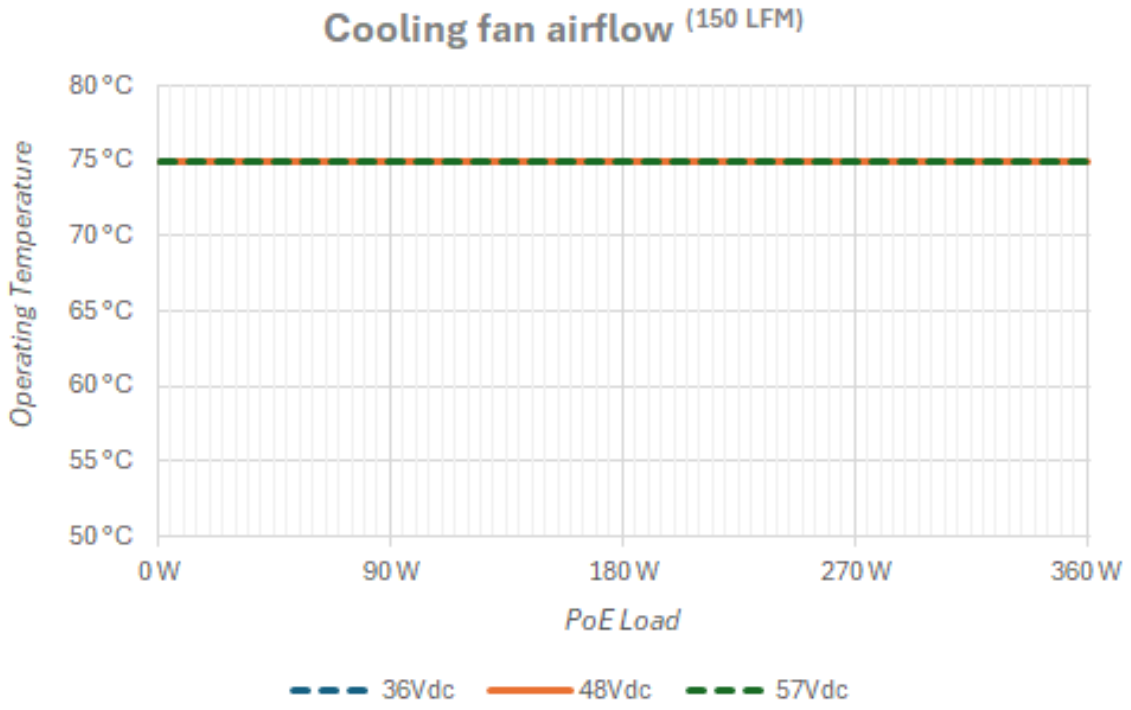


Figure 77. Maximum Operating Temperatures for the IE360-12GHX Switch in a Fan-based Ventilated Enclosure

Table 28. Maximum Operating Temperatures for the IE360-12GHX Switch in a Fan-based Ventilated Enclosure

PoE Load	Switch Input Power		
	36Vdc	48Vdc	57Vdc
0 W	75°C	75°C	75°C
90 W	75°C	75°C	75°C
180 W	75°C	75°C	75°C
270 W	75°C	75°C	75°C
360 W	75°C	75°C	75°C

DC Power Specifications

Table 29. DC Input Voltage Specifications

Switch	Non-PoE	PoE
IE360-12GHX	18-57Vdc	36-57Vdc
IE360-12GTX		N/A

Table 30. DC Input Inrush Current - IEC 61850-3

Switch	At Power On	Duration
IE360-12GHX	2A	2msec
IE360-12GTX		

Table 31. Maximum Power Consumptions

Switch	No PoE Load	Full PoE Load
IE360-12GHX	29.9W	406.5W
IE360-12GTX	25.0W	N/A

Table 32. Heat Dissipations

Switch	No PoE Load	Full PoE Load
IE360-12GHX	102.0 BTU/hr	158.7 BTU/hr
IE360-12GTX	85.3 BTU/hr	N/A

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

Table 33. ALARM IN Power Ratings

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

Table 34. 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 106.

Table 35. System Fuses

DC Input PWR 1	15A Very-Quick-Acting Speed Code = FF
DC Input PWR 2	15A Very-Quick-Acting Speed Code = FF
ALARM IN	250mA Very-Quick-Acting Speed Code = FF
ALARM OUT	1.25A Time-Lag Speed Code = T
LAN ports	1.5A Very-Quick-Acting Speed Code = FF

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.

Note
LAN ports require Category 6 or 6A shielded twisted pair (STP) or shielded foil twisted pair (SFTP) cable.

Electromagnetic Interference (EMI)

Table 36. 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 37. 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 2). LAN Ports +/-0.5kV (Level 1). DC Input Ports	B
EN/IEC 61000-4-5	Surge Immunity (1.2/50us)	+/-0.5kV shielded (Level 1), LAN Ports +/-0.5kV line-to-earth (Level 1), DC Input Ports	B
EN/IEC 61000-4-5	Surge Immunity (10/700us)	+/-1kV line-to-earth (Level 2), LAN Ports	B
EN/IEC 61000-4-6	Conducted Disturbances Immunity (CDI)	3Vrms (Level 2), 0.15-10 MHz, LAN Ports 3Vrms to 1Vrms (Level 2 to 1), 10-30 MHz, LAN Ports 1Vrms (Level 1), 30-80 MHz, LAN Ports 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 38. 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 3). LAN Ports +/-1kV (Level 2). DC Input Ports	B
EN/IEC 61000-4-5	Surge Immunity (1.2/50us)	+/-1kV line-to-earth (Level 3) LAN Ports +/-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, LAN Ports 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	30 A/m (Level 4), 50 & 60 Hz, Continuous	A

Table 39. EMS Test Type: Railway Applications - Signaling and Telecommunications Apparatus (EN 50121-4 & 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 4). LAN Ports +/- 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) LAN Ports +/-1kV line-to-line (Level 3) LAN Ports +/-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, LAN Ports 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 X), 0 Hz, Continuous	A

Table 40. EMS Test Type: Railway Applications - Fixed Power Supply Apparatus (EN 50121-5 & 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 4). LAN Ports +/- 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) LAN Ports +/-1kV line-to-line (Level 3) LAN Ports +/-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, LAN Ports 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 X), 0 Hz, Continuous	A
EN/IEC 61000-4-18	Damped Oscillatory Wave Immunity	+/-2.5kV line-to-earth (Level 3) LAN Ports +/-1kV line-to-line (Level 3) LAN Ports +/-2.5kV line-to-earth (Level 3) DC Input Ports +/-1kV line-to-line (Level 3) DC Input Ports	B

Table 41. 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 X). LAN Ports +/-4kV (Level 4). DC Input Ports +/-4kV (Level 4). Earth Port	1
EN/IEC 61000-4-5	Surge Immunity (1.2/50us)	+/-4kV line-to-earth (Level 4) LAN Ports +/-2kV line-to-line (Level 3) LAN Ports +/-2kV line-to-earth (Level 3) DC Input Ports +/-1kV line-to-line (Level 3) DC Input Ports Additional Test Levels Applied: +/-6kV line-to-earth (Level X) LAN Ports +/-6kV shielded (Level X) LAN Ports	1
EN/IEC 61000-4-5	Surge Immunity (10/700us)[1]	+/-4kV line-to-earth (Level 4) LAN Ports +/-2kV line-to-line (Level 4) LAN Ports	1
EN/IEC 61000-4-6	Conducted Disturbances Immunity (CDI)	10Vrms (Level 3), 0.15-80 MHz, LAN Ports 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) LAN Ports +/-1kV line-to-line (Level 3) LAN Ports +/-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

1. Not required but recommended for ports intended to be connected to remote equipment.

Table 42. EMS Test Type: Electric Power Apparatus (IEEE 1613)

Test	Description	Test Levels	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 X). LAN Ports +/-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) LAN Ports +/-2.5kV line-to-line (Level 3) LAN Ports +/-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, LAN Ports 2kV, DC Input Ports	N/A

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
LAN ports require Category 6 or 6A shielded twisted pair (STP) or shielded foil twisted pair (SFTP) cable.

Note
All cables connected to the switch in environments vulnerable to seismic and/or high vibration shock should be properly strain relieved to prevent cable tension from damaging the interface connectors during vibration.

Table 43. Environmental Test Type: Generic Industrial Environment

Test	Description	Test Level
EN/IEC 60512-99-002	Connector Unmating Endurance	95W PoE
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 44. Environmental Test Type: Railway Applications - Signaling and Telecommunications Apparatus (EN 50125-3, 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 45. Environmental Test Type: Railway Applications - Fixed Power Supply Apparatus (EN 50125-2, 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 46. 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
IEC 60255-21-2	Bump, Non-Operational	10g, 16ms DIN-Rail mount 20g, 16 ms Wall mount	2
IEC 60255-21-3	Seismic, Single Axis Sine	2g x-axis, 1g y-axis, 1-35 Hz	2

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

RJ-45 Copper Port Pinouts

Figure 78 identifies pin 1 on the RJ-45 copper ports.

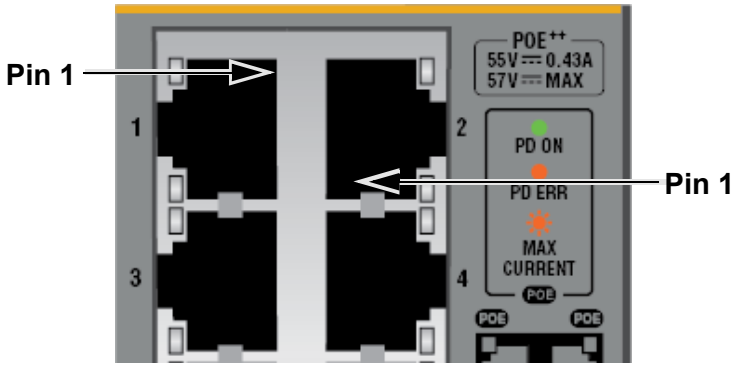


Figure 78. RJ-45 Port Pin Layout (Front View)

Table 47 lists the pin signals for ports operating at 10M or 100M.

Table 47. Pin Signals for 10M and 100M

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

Table 48 lists the pin signals for a port when it operating at 1G.

Table 48. Pin Signals for 1G

Pinout	Pair
1	Pair 1 +
2	Pair 1 -

Table 48. Pin Signals for 1G (Continued)

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

RJ-45 Style Serial CONSOLE Port

Figure 79 identifies pin 1 on the RJ-45 connector on the CONSOLE port.

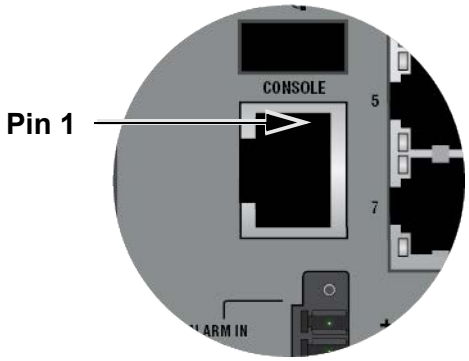


Figure 79. CONSOLE Port Pin Layout (Front View)

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

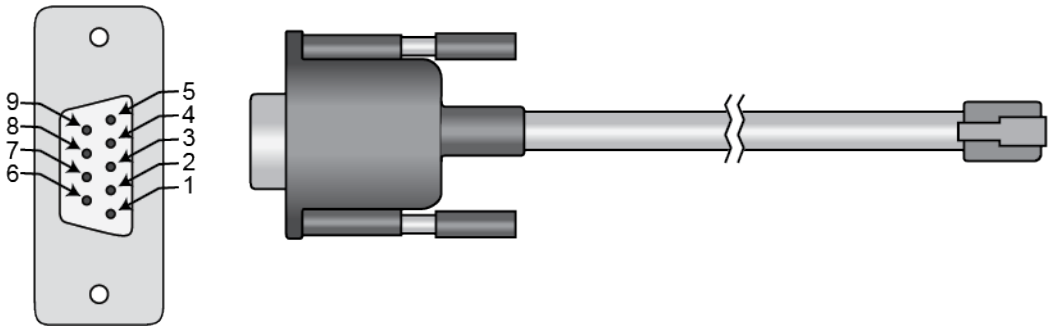


Figure 80. CONSOLE Port Management Cable with DB-9 Female and RJ-45 Connectors

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

PWR 1 and PWR 2 DC Input Connectors

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

Pin	Signal
+	48/54 Vdc
-	Vdc Return

Device Dimensions