



# FortiSwitch 80-POE

Rev A

User Guide

**FORTINET**<sup>®</sup>

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## **FortiSwitch 80-POE User Guide FS-80-POE**

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### **UL Warning**

- a) Elevated Operating Ambient Temperature- If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer's maximum rated ambient temperature (Tmra).
- b) Reduced Air Flow- Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- c) Mechanical Loading- mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- d) Circuit Overloading- Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of circuits might have on over current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- e) Reliable Earthing- Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).
- f) The Installation instructions clearly state that the ITE is to be connected only to POE networks without routing to the outside plant

### **FCC Warning**

This equipment has been tested and found to comply with the regulations for a Class B digital device, pursuant to Part 15 of the 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 user's guide, 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 or her own expense.

### **CE Mark Warning**

This is a Class B product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

### **VCCI Warning**

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取扱説明書に従って正しい取り扱いをして下さい。



# Table of Contents

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<b>1 Introduction</b> .....	<b>1</b>
1.1 Scope .....	1
1.2 Terminology in this user guide .....	1
1.3 Customer Service and Technical Support .....	1
1.4 Training .....	1
1.5 Fortinet Documentation .....	1
1.5.1 Fortinet Knowledge Base .....	2
1.5.2 Comments on Fortinet technical documentation .....	2
<b>2 Product Overview</b> .....	<b>3</b>
2.1 Power over Ethernet (POE) .....	3
2.2 Features .....	4
2.3 External components .....	4
2.3.1 Front panel .....	4
2.3.2 Rear panel .....	6
<b>3 Hardware installation</b> .....	<b>7</b>
<b>4 Switch Features</b> .....	<b>9</b>
4.1 Cable Diagnostics .....	9
4.2 POE Characteristics .....	9
4.3 QoS .....	10
4.4 Power Savings Feature .....	10
<b>5 Technical Specifications</b> .....	<b>11</b>



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# 1 Introduction

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## 1.1 Scope

This document describes how to install FortiSwitch 80-POE hardware, Revision A. The FortiSwitch 80-POE is an 8-Port Gigabit Ethernet Switch with 4 full power 802.3af power-over-Ethernet (POE) ports.

## 1.2 Terminology in this user guide

In this user guide, the term “Switch” (first letter upper case) refers to the FortiSwitch 80-POE. The term “switch” (first letter lower case) refers to a generic Ethernet switch.

## 1.3 Customer Service and Technical Support

Fortinet Technical Support provides services designed to make sure that your Fortinet products install quickly, configure easily, and operate reliably in your network.

To learn about the technical support services that Fortinet provides, visit the Fortinet Technical Support web site at <https://support.fortinet.com>.

You can dramatically improve the time that it takes to resolve your technical support ticket by providing your configuration file, a network diagram, and other specific information. For a list of required information, see the Fortinet Knowledge Center article [What does Fortinet Technical Support require in order to best assist the customer?](#)

## 1.4 Training

Fortinet Training Services provides classes that orient you quickly to your new equipment, and certifications to verify your knowledge level. Fortinet provides a variety of training programs to serve the needs of our customers and partners world-wide.

To learn about the training services that Fortinet provides, visit the Fortinet Training Services web site at <http://campus.training.fortinet.com>, or email them at [training@fortinet.com](mailto:training@fortinet.com).

## 1.5 Fortinet Documentation

The Fortinet Technical Documentation web site, <http://docs.fortinet.com>, provides the most up-to-date versions of Fortinet publications, as well as additional technical documentation such as technical notes.

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## 1.5.1 Fortinet Knowledge Base

The Fortinet Knowledge Base provides additional Fortinet technical documentation, such as troubleshooting and how-to-articles, examples, FAQs, technical notes, a glossary, and more. Visit the Fortinet Knowledge Base at <http://kb.fortinet.com>.

## 1.5.2 Comments on Fortinet technical documentation

Please send information about any errors or omissions in this or any Fortinet technical document to [techdoc@fortinet.com](mailto:techdoc@fortinet.com).

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## 2 Product Overview

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The FortiSwitch 80-POE is an 8-Port Gigabit Ethernet Switch with 4 full power 802.3af power-over-Ethernet (POE) ports. The FortiSwitch 80-POE offers 1000Mbps Gigabit Ethernet, 100Mbps and 10Mbps Ethernet switching connectivity with integrated POE on 4 of 8 Ethernet ports.

Port-1 to Port-4 are power over Ethernet ports. The FortiSwitch 80-POE will automatically detect the presence of IEEE 802.3af-compliant powered device (PD) on these ports. The Switch provides full 15.4 W for each POE port for a total of 61.6W of sustained supplied power.

The Switch can be used to power a WLAN access point, IP phone, video camera or other PD devices. The Switch will automatically detect the network appliance's requirements, and supply the required power current to each appliance.

The FortiSwitch 80-POE is a plug-and-play device that requires no configuration. It supports auto-MDI/MDI-X on all ports, and eliminates the need of crossover cables for connection to other switches or hubs.

Auto-negotiation on each port senses the link speed (either 10, 100 or 1000M) of a network device and intelligently adjusts the compatibility and optimal performance.

Fanless design extends the product life time of the Switch and also reduces the noise when operating.

FortiSwitch 80-POE also features diagnostic LEDs, which display the status and activity, allowing you to quickly detect and correct problems on the device.

The FortiSwitch 80-POE features many safety functions to prevent the unexpected overloading of the POE power. The Switch will cut off the power feed immediately when any error is detected, protecting both the POE device and the Switch from damage.

### 2.1 Power over Ethernet (POE)

Power over Ethernet (POE) integrates power and data onto one single cabling infrastructure, eliminating the need to have AC power available at all locations.

Power and data is integrated onto the same cable, supporting category 5/5e up to 100 Meters. The FortiSwitch 80-POE will provide power to POE compatible device, such as IP telephones, wireless LAN access points and IP security cameras.

POE is widely adopted in the market, saving up to 50% of overall installation costs by eliminating the need to install separate electrical wiring and power outlets.

## 2.2 Features

The FortiSwitch 80-POE provides the following features:

- 8-port 10/100/1000 Mbps Auto-negotiation Fast Ethernet RJ45 connections
- 4-port power over Ethernet (POE) supplied on port 1 to port 4
- Compliant with 802.3af specification
- Supports POE power up to 15.4W per POE port
- Supports POE power up to 61.6W for all POE ports
- Supports POE Powered Device (PD) classification
- Each port supports auto MDI/MDIX to eliminate cross-over cables or an up-link port
- Full/half duplex transfer mode for each port
- Wire speed reception and transmission
- Up to 1K unicast address entities per device, self-learning and table aging
- 96KBytes packet buffer
- Supports IEEE 802.3x flow control for full-duplex mode ports
- Supports Zack-pressure flow control for half-duplex mode ports

For more information, see “Technical Specifications” on page 11.

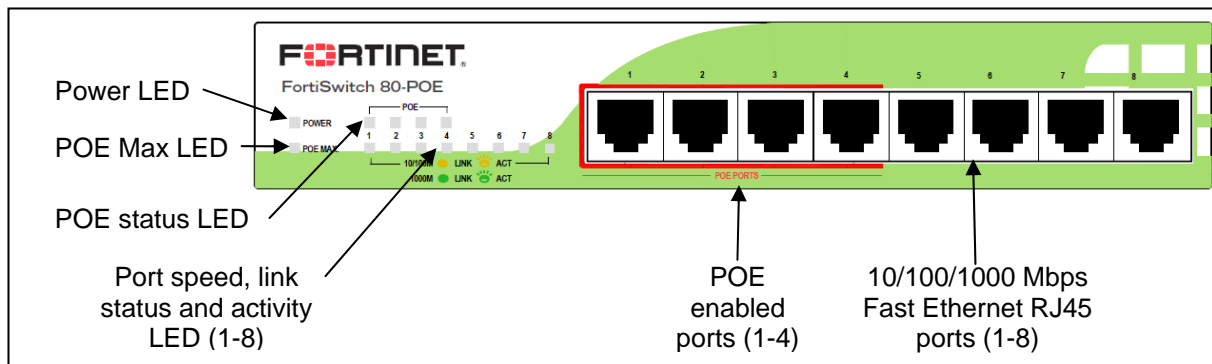
## 2.3 External components

This section describes the front panel, rear panel and the LED indicators on the FortiSwitch 80-POE.

### 2.3.1 Front panel

Figure 1 shows the front panel of the FortiSwitch 80-POE. The LED indicators are described Table 1.

**Figure 1 FortiSwitch 80-POE front panel**



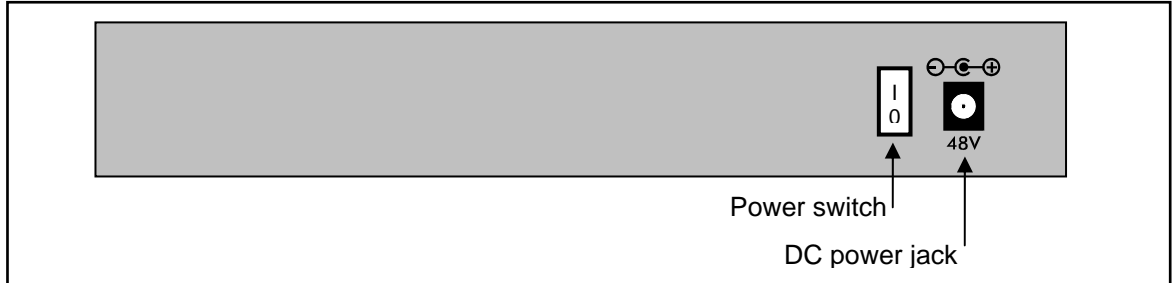
**Table 1 FortiSwitch 80-POE LED indicators**

<b>LED</b>	<b>Purpose</b>	<b>State</b>	<b>Meaning</b>
POWER	Indicates power supply status	green	Switch is connected to a working power source.
		off	Switch is not connected to a working power source
POE MAX	Indicates whether total sustained power output exceeds specifications	off	FortiSwitch 80-POE is operating within acceptable limits (less than 61.6W of sustained supplied power)
		red	A POE MAX condition has occurred. The total sustained supplied power output of the FortiSwitch 80-POE is greater than 61.6W. For more information, see the Priority feature in "POE Characteristics" on page 9.
		blinking red for 2 minutes	A POE MAX condition has been alleviated. The power to one or more PD has been disconnected, thereby lowering the sustained supplied power output of the FortiSwitch 80-POE to less than 61.6W.
POE (1-4)	Indicates whether a Powered Device (PD) is connected to corresponding port 1-4	off	There is no PD connected to the port.
		green	The FortiSwitch 80-POE is supplying power to a PD connected to the POE port.
		red	The power feed to a PD failed, possibly because: <ol style="list-style-type: none"> <li>1. There is a POE total power budget shortage. The sustained power supplied to the PD connected to the POE port exceeds 15.4W.</li> <li>2. Over current: The current exceeds the classification of the PD connected to the POE port.</li> <li>3. The PD is causing a short circuit.</li> </ol>
Port speed, link status and activity (1-8)	Indicates the link speed and activity on the corresponding ports	amber	The port is active and running at a link speed of 10Mbps or 100Mbps.
		blinking amber	The port is active and passing traffic at 10Mbps or 100Mbps.
		green	The port is active and running at a link speed of 1000Mbps.
		blinking green	The port is active and passing traffic at 1000Mbps.

## 2.3.2 Rear panel

Figure 2 shows the rear panel of the FortiSwitch 80-POE. The components are described in Table 2.

**Figure 2 FS-80 POE Rear panel**



**Table 2 FS-80 POE Rear panel components**

Component	Description
DC power jack	Power for the FS-80 POE Switch is supplied through an external DC power adapter (supplied). Refer to “Technical Specifications” on page 11 for information about the DC power input voltage.
Power switch	Used to turn the FS-80 POE Switch on and off. A power switch is required in some regulatory domains for Green Energy power savings initiative.

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# 3 Hardware installation

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This chapter provides unpacking and installation instructions for the FortiSwitch 80-POE.

Installation of the FortiSwitch 80-POE can be completed in four simple steps:

- Unpack the Switch
- Locate and install the Switch
- Connect the network cables to the Switch
- Power on the Switch

## 1. Unpack the Switch

The FortiSwitch 80-POE is packaged in a single shipping carton.

Open the shipping carton and verify it contains the following items.

Item	Quantity
FortiSwitch 80-POE	1
90W AC-DC power adapter, with DC power cord	1
Country-specific AC power cord	1
Quick Installation Guide (QSG)	1
Rubber feet for shock cushioning	4
User's Guide	1
Warranty Card	1

If any item is damaged or missing from the shipping carton or damaged, please contact your local reseller for replacement.

## 2. Locate and install the Switch

Ensure the surface on which the FortiSwitch 80-POE will be installed can support at least 1.5 Kg, and that the Switch is located within 1.82 meters (6 feet) of a power outlet. Make sure that there is adequate room for heat dissipation and ventilation around the Switch. Do not place heavy objects on the Switch.

Connect the DC cord on the AC-DC power adapter to the DC power jack on the rear panel of the Switch and verify the connection is secure. Do not connect the AC cord yet.

## 3. Connect the network cable to the Switch

The FortiSwitch 80-POE has eight Ethernet ports. Port 1 to port 4 are POE enabled ports. These ports can be used to connect 802.3af compatible Powered Devices (PD), as well as non-PD devices to the Switch.

The Switch supports 10Mbps Ethernet or 100Mbps Fast Ethernet or 1000Mbps Gigabit Ethernet in half or full duplex mode, using two pair of Category 5e cables.

**Note:** The RJ45 ports on the Switch are Auto-MDI type ports. The Switch will auto-transform to MDI-II or MDI-X. This enables you to connect your device to the Switch using either standard RJ-45 cables or crossover RJ45 cables without any additional configuration.

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Connect a PD to the first available POE PORT (1 through 4). Once power is applied to the Switch, the POE PORT is automatically activated when an 802.3af compatible PD is connected. For more information, see "POE Characteristics" on page 9.

You can connect a non-PD device to any of ports 1 through 8.

If you connect a non-PD device to one of the POE PORTS (1-4), or if you connect a PD device that is incompatible with the POE specifications of the Switch, the Switch will not source power to the device. This enables you to freely and safely mix POE-compatible PDs as well as non-POE-compatible devices on the FortiSwitch 80-POE.

#### **4. Power up the Switch**

The FortiSwitch 80-POE goes through a power up diagnostic process when AC power is applied. For more information, see to "Cable Diagnostics" on page 9.

Connect the country-specific AC power cord to an AC power outlet.

Move the power switch to the on (I) position to activate the Switch.

Once diagnostics are complete, the FortiSwitch 80-POE is ready to carry traffic.

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# 4 Switch Features

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This section provides information about specific features of the FortiSwitch 80-POE.

## 4.1 Cable Diagnostics

The FortiSwitch 80-POE runs diagnostics on all ports when power is applied to the Switch. Diagnostic results are indicated by the LEDs on the front panel of the Switch approximately 1 second after completion of the diagnostics.

The quality of cables will impact the diagnosis results. For a 1000Mbps Gigabit Ethernet connection, Twisted pair Cat 5, Cat 5e or better type cables must be used. If incorrect Ethernet cables or bad quality cables are used, a 1000Mbps Gigabit Ethernet connection could be automatically lowered to 10/100Mbps.

The cable diagnostic results are indicated as follows:

Port LED color	Description
Solid green	A Gigabit Ethernet connection is detected on the port, and the cable is good.
Solid Amber	There is no connection on the port, a bad cable has been detected or the port is running at 10/100Mbps.

## 4.2 POE Characteristics

The FortiSwitch 80-POE includes features that guarantee the safety and stability of the POE power supply.

**POE Power Budget:** The maximum POE source capability of the switch is set at 61.6 Watts. This results in a maximum power sourcing capability for each POE port of 15.4Watts.

**Priority:** The FortiSwitch 80-POE has a pre-defined POE port priority to prevent an unexpected overloading situation. Lower port numbers have higher priority for power feeds. For example, Port 1 has higher priority than Port 2, Port 2 has higher priority than Port 3, Port 3 has higher priority than Port 4. If the sustained power output of the FortiSwitch 80-POE is greater than 61.6W (i.e. a MAX POE condition occurs), the power supply of the higher port numbers is cut off first in an attempt to bring the sustained power output below the MAX POE level.

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## 4.3 QoS

The FortiSwitch 80-POE supports 4 levels of transmission queue that guarantees important traffic will always be transmitted first. The Switch checks the priority tags of the packets and maps them into corresponding queue levels. Following are the mapping rules:

### DSCP tags

1. DSCP value 0-15 map to Queue 0 (Lowest priority queue)
2. DSCP value 16-31 map to Queue 1
3. DSCP value 32-47 map to Queue 2
4. DSCP value 48-63 map to Queue 3 (Highest priority queue)

### 802.1p tags:

1. Priority value 1 and 2 map to Queue 0 (Lowest priority queue)
2. No 802.1 p tag or priority value 3 map to Queue 1
3. Priority value 4 and 5 map to Queue 2
4. Priority value 6 and 7 map to Queue 3 (Highest priority queue)

**Note:** If a packet has both DSCP and 802.1 p tags, the DSCP tag will have mapping priority.

## 4.4 Power Savings Feature

The FortiSwitch 80-POE monitors the status of the link on each port and automatically activates a power saving function based on the following:

**Power saving by link status:** Drastically saves power when the switch port link is down. For example, when a port has no device connected, or a device connected to the port is powered off.

**Power Saving by Cable Length:** Detects the length of the RJ-45 cables used to connect the device to the port and adjusts power usage accordingly without affecting performance. For example, when the Switch detects an RJ-45 cable less than 10m in length connected to a port, the Switch reduces the power output instead of using full power.

# 5 Technical Specifications

<b>General</b>	
Standards	IEEE 802.3 10BASE-T Ethernet IEEE 802.3u 100BASE-TX Fast Ethernet IEEE 802.3x Full Duplex Flow Control IEEE 802.3af Power over Ethernet (ports 1-4) IEEE 802.3ab 1000BASE-T
Protocol	CSMA/CD
General Features	Supports up to 4K MAC address Jumbo frame up to 9,720 bytes 4 strict queues support CoS & DSCP Function Queue Weight 1 : 2 : 4 : 8 Cable Diagnostics
Network Cables	10BASE-T: 2-pair UTP Cat. 3, 4, 5; up to 100m 100BASE-TX: 2-pair UTP Cat. 5; up to 100m
Number of Ports	4 × 10/100/1000 Mbps Auto-MDIX RJ45 ports with POE enabled (port 1 to port 4) 4 × 10/100/1000 Mbps Auto-MDIX RJ45 ports (port 5 to port 8)
POE Power on RJ-45	Power+: ping 3 & ping 6 Power-: ping 1 & ping 2
<b>Physical and Environmental</b>	
DC inputs	48VDC/1.875A
POE Power budget	61.6 watts (15.4watts average for all ports)
Temperature	Operating: 0° ~ 40° C, Storage: -10° ~ 70° C
Humidity	Operating: 10% ~ 90%, Storage: 5% ~ 90%
Dimensions	190 x 120 x 38 mm
EMI:	FCC Class B, CE Mark Class B, VCCI Class B, C-Tick
Safety:	cUL, UL, LVD, CB
<b>Performance</b>	
Packet Buffer:	100K bytes per device
MAC Address Table:	4K entries per device
Packet Filtering/Forwarding Rate:	10 Mbps Ethernet: 14,880/pps 100 Mbps Fast Ethernet: 148,800/pps 1000 Mbps Gigabit Ethernet: 1,488,000/pps
MAC Address Learning:	Automatic update
Transmits Method:	Store-and-forward

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