

HARDWARE INSTALLATION GUIDE

EMS100G-32

32-PORT 100G IP NETWORK SWITCH

24/7 TECHNICAL SUPPORT AT 1.877.877.2269 OR VISIT BLACKBOX.COM

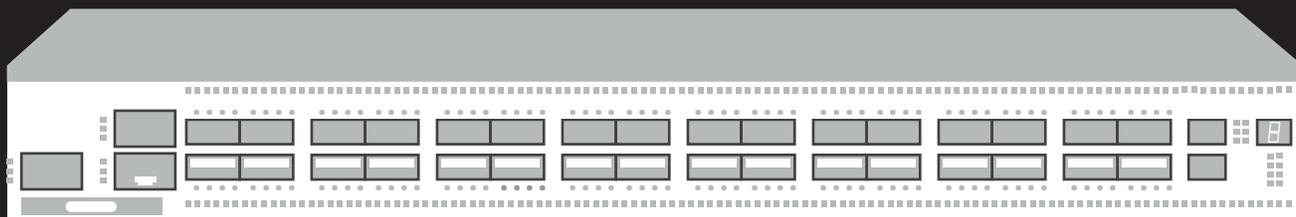


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SAFETY INSTRUCTIONS

This guide provides site preparation recommendations, step-by-step procedures for rack mounting and desk mounting, inserting optional modules, and connecting to a power source.

CAUTION: To avoid electrostatic discharge (ESD) damage, wear grounding wrist straps when handling this equipment.

WARNING: Only trained and qualified personnel can install this equipment. Read this guide before you install and power up this equipment. This equipment contains two power cords. Disconnect both power cords before servicing.

WARNING: This equipment contains optical transceivers, which comply with the limits of Class 1 laser radiation.



**CLASS 1
LASER PRODUCT**

WARNING: When no cable is connected, visible and invisible laser radiation may be emitted from the aperture of the optical transceiver ports. Avoid exposure to laser radiation. Do not stare into open apertures.

CHAPTER 1: SPECIFICATIONS

32-PORT 100G NETWORK SWITCH (EMS100G-32) SPECIFICATIONS	
APPROVALS	Environmental Compliances: Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A; RoHS EMI Certifications: Australia/New Zealand: AS/NZS CISPR 32: Class A; Canada: ICES-003, Issue-4, Class A; Europe: EN 55032: 2015+A1:2007 (CISPR 32); Class A; Japan: VCCI V3/2009 Class A; USA: FCC CFR 47 Part 15, Subpart B:2009, Class A Safety Certifications: UL/CSA, EN 60959-1, EN 60825-1, FDA Regulation 21 CFR 1040.10 and 1040.11
ENVIRONMENTAL	Operating Humidity: 10 to 90% (RH), noncondensing Operating Temperature: 32 to 113° F (0 to 45° C) Storage Humidity: 5 to 95% (RH), noncondensing Storage Temperature: -40 to +158° F (-40 to +70° C)
MANAGEMENT	Network Management: SMIv1, SNMPv1, Concise MIB Definitions, SNMP Traps, Bridges MIB, OSPFv2 MIB, Community-Based SNMPv2, IP MIB, IP Forwarding Table MIB, SMIv2, Textual Conventions for SMIv2; Security/Authentication: RADIUS, RADIUS and IPv6, Radius support for EAP, 802.1X with RADIUS, EAP, AES Cipher Algorithm in the SNMP User Base Security Model, SSHv2, Security Architecture for IPsec, IPsec Authentication Header, ESP Protocol, IPsec Security Policy DB MIB Type
PERFORMANCE	Switching Capacity: 6.4 Tbps; Forwarding capacity: Up to 4400 Mpps (Full Duplex); Packet buffer memory: 16MB; CPU memory: 8GB; MAC addresses: 136 K; ARP entries: 128K; IPv4 Unicast routes: 136 K; IPv6 Unicast routes: 68K; IPv4 Multicast routes: 68K; IPv6 Multicast routes: Not supported; Multicast Hosts: 8K; Layer 2 VLANs: 4K per port; Layer 3 VLANs: Standalone 1K/VLT 4K; MSTP: 64 instances; PVST+: 128 instances; LAG: 128 groups, 16 members per LAG group;; LAG load balancing: Based on layer 2, IPv4 or IPv6 headers;; Latency: Sub 500 ns; QOS data queues: 8; QOS control queues: 12; QOS: Default 1024 entries scalable to 2.5K; ACL Support: 3K
PHYSICAL	Connectors/Interfaces: (32) 100 Gbps Ethernet SFP ports, (2) 10GbE/1GbE/100MbE SFP+ uplink ports, (1) RJ-45 serial console management port, (1) 10/100/1000BT Ethernet port for management, (1) USB 2.0 Type A storage port, (1) micro USB Type B for console/management port access Dimensions: 1.75" H (1 RU) x 17.08" W x 18.11" D (4.4 x 43.4 x 46 cm) Mounting: Rackmounted Weight: 20.1 lb. (9.12 kg), including power modules
POWER	Input: 100–240 VAC, 50/60 Hz Max. Power Consumption: 605 W; Min. Power Consumption: 195 W; Power Supply Type: (2) hot-swappable redundant AC power Fans: (4) hot-swappable redundant fans
STANDARDS	LLDP, Bridging, STP, L2 Prioritization, VLAN Tagging, Double VLAN Tagging, GVRP, PFC, ETS, MSTP, RSTP, Network Access Control, Gigabit Ethernet (1000BASE-T) or breakout, Frame extensions for VLAN Tagging, Link Aggregation with LACP, MORE; ANSI/TIA-1057 LLDP-MED, Force10 PVST+. Jumbo MTU support 9.416 bytes



CHAPTER 2: OVERVIEW

2.1 INTRODUCTION

The EMS100G-32 is a one rack unit compact 10/25/40/50/100 GbE switch. The system includes 32 fixed quad form-factor pluggable 28 (QSFP28) optics for 40/100 GbE aggregation and 10/25/40/50 GbE top-of-rack (ToR) and end-of-row (EoR) applications. The EMS100G-32 system includes two hot-swap AC or DC power supply units (PSUs) and five hot-swap fan units.

2.2 FEATURES

- ◆ QSFP ports support 10/25/40/50/100 GbE
- ◆ Two 1000M/10G SFP+ ports
- ◆ One micro universal serial bus (MicroUSB-B) console port
- ◆ One 2.0 USB Type-A port for additional file storage
- ◆ One 10/100/1000BaseT Ethernet management port
- ◆ Rangeley central processing unit (CPU) system with 8GB DDR III RAM.
- ◆ Temperature monitoring
- ◆ Software-readable thermal monitor
- ◆ Real time clock (RTC) support
- ◆ Two hot-pluggable redundant power supplies
- ◆ Power management monitoring
- ◆ Five removable fans
- ◆ Standard 1U chassis

2.3 WHAT'S INCLUDED

Your package should include the following items. If anything is missing or damaged, contact Black Box Technical Support at 877-877-2269 or info@blackbox.com

- ◆ (1) EMS100G-32 Switch
- ◆ (1) RJ-45 to DB9 female cable
- ◆ (2) sets of rail kits, no tools required
- ◆ (2) PSUs
- ◆ (5) fan units
- ◆ (2) AC or DC country/region-specific power cords

2.4 ADDITIONAL ITEMS YOU MAY NEED

- ◆ Copper and fiber cables
- ◆ Screws for rack installation
- ◆ #1 and #2 Phillips screwdrivers
- ◆ Extra mounting brackets if installing in a four-post rack or cabinet



CHAPTER 2: OVERVIEW

2.5 HARDWARE DESCRIPTION

2.5.1 FRONT PANEL

Figure 2-1 shows the front panel of the switch. Table 2-1 describes its components.

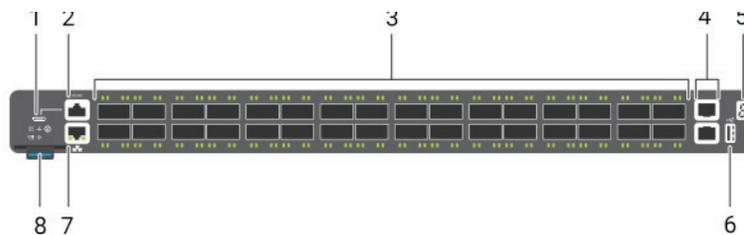


FIGURE 2-1. FRONT PANEL OF THE SWITCH

TABLE 2-1. FRONT PANEL COMPONENTS

NUMBER IN FIGURE 2-1	COMPONENT	DESCRIPTION
1	(1) Micro USB-B port	Connects to console
2	(1) RJ-45 port	Links to serial console
3	(32) 10/25/40/50/100 ports	SFP+ modules install here
4	(2) 1000M/10G SFP+ ports	SFP+ modules install here
5	Stack ID	Unique number between 1-6 used when stacking switches
6	USB Type A connector	Storage
7	(1) RJ-45 port	10/100/1000BASE-T Ethernet management port
8	Luggage tag	Contains MAC Address, Service tag or express service code and QR code to documentation.

TABLE 2-2. COMPATIBLE SFPS

PRODUCT CODE	DESCRIPTION
LSP421	SFP+ - 10-Gb, Extended Diagnostics, 850-nm Multimode Fiber, 300-m, LC
LSP422	SFP+, 10GBASE-R, 1310-nm single-mode, 10 km
Contact Black Box	100 GbE QSFP modules

CHAPTER 2: OVERVIEW

2.5.2 BACK PANEL

Figure 2-2 shows the back panel of the switch. Table 2-3 describes its components.

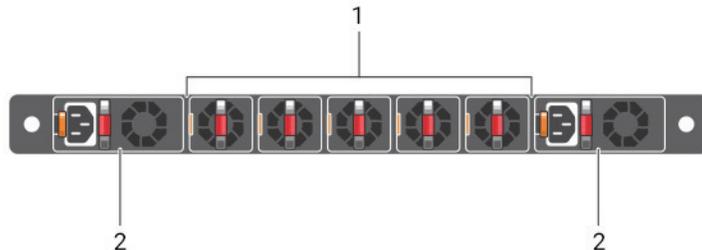


FIGURE 2-2. BACK PANEL OF THE SWITCH

TABLE 2-3. BACK PANEL COMPONENTS

NUMBER IN FIGURE 2-2	COMPONENT	DESCRIPTION
1	(5) fan modules	Provide proper ventilation
2	(2) power supply units	Provide redundant power

CHAPTER 2: OVERVIEW

2.5.3 LED INDICATORS

The EMS100G-32 includes LED displays on the I/O side of the switch. This section describes open networking installation environment (ONIE) LED behaviors. Some LED behaviors may change after you install your software.

The following EMS100G-32 switch LED behavior is seen during ONIE operations.

Figure 2-3 shows the LEDs on the switch. Table 2-4 describes their functions.

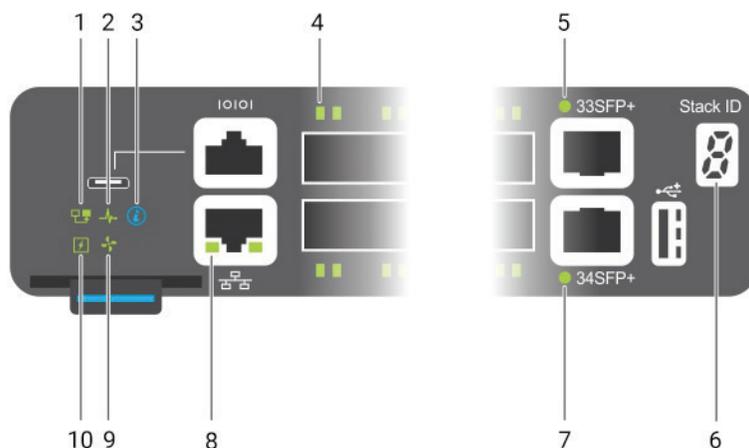


FIGURE 2-3. LEDS ON THE SWITCH

TABLE 2-4. LEDS ON THE SWITCH

NUMBER IN FIGURE 2-3	NAME OF LED	DESCRIPTION
1	Master LED	<ul style="list-style-type: none"> • Off—Switch is in Stacking Slave mode • Solid green—System is in Stacking Master or Standalone mode
2	System LED	<ul style="list-style-type: none"> • Off—No power • Solid green—Normal operation • Blinking green—POST is in process • Solid yellow—Critical system error • Blinking yellow—Non-critical system error, fan failure, or power supply failure
3	Locator LED	<ul style="list-style-type: none"> • Off—Locator function is disabled • Blinking blue—Locator function is enabled
4	RJ-45 Ethernet port LEDs	<ul style="list-style-type: none"> • Off—No link • Solid Green—Link on maximum speed, 1 Gbps • Solid amber—Link on lower speed, 10/100 Mbps • Flashing green —Port activity
5, 7	SFP+ LED	<ul style="list-style-type: none"> • Off—No power • Solid Green—Link is active • Flashing Green — Port activity
6	Stack ID	Stack unit number

CHAPTER 2: OVERVIEW**TABLE 2-4. LEDS ON THE SWITCH (CONTINUED)**

NUMBER IN FIGURE 2-3	NAME OF LED	DESCRIPTION
8	RJ-45 Management Ethernet Port Link LED	<ul style="list-style-type: none"> • Off - No Link or activity • Solid green - Link on 1 Gbps speed • Solid amber - Link on 10/100 Mbps speeds • Flashing green - Port activity
9	Fan LED	<ul style="list-style-type: none"> • Off – No power • Solid green – Fan powered and running at the expected RPM • Flashing amber – Fan failed or incompatible airflow direction, PSU or fan trays with differing airflows.
10	Power LED	<ul style="list-style-type: none"> • Off – No power • Solid green - Normal operation • Solid amber - Post in process • Blinking amber - Non-critical system error, PSU fan failure or power supply failure

TABLE 2-5. QSFP28 PORT LEDS

NUMBER IN FIGURE 2-3	NAME OF LED	DESCRIPTION
4	Link LED	<ul style="list-style-type: none"> • Off - No Link • Solid green - Port operating at maximum port speed • Solid amber - Port operating at lower speed
4	Activity LED	<ul style="list-style-type: none"> • Off – No link • Flashing green – approx. 30 ms, port operating at maximum port speed • Flashing amber – approx. 30 ms, port operating at maximum port speed

TABLE 2-6. QSFP28 PORT LEDS FOR 4X25 GBE OR 4X10 GBE MODE

NUMBER IN FIGURE 2-3	NAME OF LED	DESCRIPTION
4	Link LED	<ul style="list-style-type: none"> • Off - No Link • Solid green - Port link is 4x25 GbE • Solid amber - Port link is 4x10 GbE
4	Activity LED	<ul style="list-style-type: none"> • Off – No link • Flashing green – approx. 30 ms, port link is 4x25 GbE • Flashing amber – approx. 30 ms, port link ia 4x10 GbE



TABLE 2-7. QSFP28 PORT LEDS FOR 2X50 GBE MODE

NUMBER IN FIGURE 2-3	NAME OF LED	DESCRIPTION
4	Link LED	<ul style="list-style-type: none">• Off - No Link• Solid green - Port link is 2x50 GbE
4	Activity LED	<ul style="list-style-type: none">• Off – No link• Flashing amber – approx. 30 ms, port link is 2x50 GbE

TABLE 2-8. SFP+ PORT LEDS

NUMBER IN FIGURE 2-3	NAME OF LED	DESCRIPTION
4	Link LED	<ul style="list-style-type: none">• Off - No Link• Solid green - Link operating at maximum port speed• Solid amber - Link operating at lower speed
4	Activity LED	<ul style="list-style-type: none">• Off – No link• Flashing green – approx. 30 ms, port activity• Flashing amber – approx. 30 ms, port activity

CHAPTER 3: PREPARING THE SITE

The EMS100G-32 is suitable for installation as part of a common bond network (CBN).

You can install the switch in:

- ◆ Network telecommunications facilities
- ◆ Data centers
- ◆ Other locations where the National Electric Code (NEC) applies

NOTE: Install the EMS100G-32 switch into a rack or cabinet before installing any optional components.

3.1 SITE SELECTION

Install this equipment in restricted access areas.

A restricted access area is one in which service personnel can only gain access using a special tool, lock, key or other means of security. Also, access is controlled by the authority responsible for the location.

Ensure that the area where you install your EMS100G-32 switch meets the following safety requirements:

- ◆ Near an adequate power source. Connect the switch to the appropriate branch circuit protection as defined in your codes.
- ◆ Environmental temperature range i from 32 to 113° F (0 to 45° C).
- ◆ The switch operating ambient temperature range is from 50 to 95° F (10 to 35° F).
- ◆ Operating humidity is from 5 to 85 percent noncondensing.
- ◆ Storage humidity is from 5 to 95 percent noncondensing.
- ◆ In a dry, clean, well-ventilated and temperature controlled room away from heat sources such as hot air vents or direct sunlight.
- ◆ Away from sources of severe electromagnetic noise.
- ◆ Positioned in a rack or cabinet, or on a desktop with adequate space in the front, rear, and sides for proper ventilation and access.

3.2 CABINET PLACEMENT

Install the EMS100G-32 only in indoor cabinets designed for use in a controlled environment.

Do not install the S3048-ON in outside cabinets. For cabinet placement requirements, see Site Selection.

The cabinet must meet minimum size requirements. Airflow must be in accordance with the Electronic Industries Alliance (EIA) standard. Ensure that there is a minimum of 5 inches (12.7 cm) between the intake and exhaust vents and the cabinet wall.

3.3 RACKMOUNTING

When you prepare your equipment rack, ensure that the rack is grounded.

Ground the equipment rack to the same ground point the power service in your area uses. The ground path must be permanent.

3.4 SWITCH GROUND

Black Box recommends you ground your switch. Use the EMS100G-32 in a common bond network (CBN).

Connect the grounding cables as described in Install the Switch.

CHAPTER 3: PREPARING THE SITE

3.5 FANS AND AIRFLOW

The EMS100G-32 fans support normal airflow (from the I/O side to the PSU side).

Fans

Installation of the fans is done as part of the factory install based on stock keeping units (SKU) type. The EMS100G-32 supports the following configuration:

- ♦ AC PSU with fan airflow from the I/O to the PSU

NOTE: Use a single type of airflow fan in your switch. Do not mix reverse and normal airflows in a single EMS100G-32 chassis.

For proper ventilation, position the EMS100G-32 in an equipment rack or cabinet with a minimum of 5 inches (12.7 cm) of clearance around the exhaust vents.

3.6 POWER

To connect the chassis to the applicable power source, use the appropriate power cord with the EMS100G-32. An AC power cord is included with the switch.

When installing AC switches, follow the requirements of the National Electrical Code, ANSI/NFPA 70 where applicable.

The switch is powered-up as soon as the power cord is connected between the switch and the power source.

CAUTION: Always disconnect the power cable before you service the power supply slots.

CAUTION: Use the power supply cord as the main disconnect device on the AC switch. Make sure that the socket outlet is located/installed near the equipment and is easily accessible.

3.7 STORING COMPONENTS

If you do not install your EMS100G-32 and components immediately, properly store the switch and all optional components by following these guidelines:

- ♦ Storage location temperature must remain constant. The storage range is from -40 to +158° F (-40 to +70° C).
- ♦ Store on a dry surface or floor, away from direct sunlight, heat and air conditioning ducts.
- ♦ Store in a dust-free environment.

NOTE: ESD damage can occur when components are mishandled. Always wear an ESD-preventive wrist or heel ground strap when handling the switch and its accessories. After you remove the original packaging, place the switch and its components on an anti-static surface.

CHAPTER 4: NEBS COMPLIANCE

For your switch to be network equipment building system (NEBS) compliant, you must follow the instructions detailed in this section.

To be NEBS compliant, orient your switch in the rack so that the air inlet is from the front aisle and the air exhaust is to the rear aisle.

4.1 IMPORTANT INFORMATION

WARNING: The form-factor pluggable plus (SFP+), QSFP+, QSFP28, console, Ethernet management, and universal serial bus (USB) ports are suitable for connection to intrabuilding or unexposed wiring or cabling only. You must NOT metalically connect the ports to interfaces that connect to the outside plant (OSP) or its wiring. Use these interfaces as intrabuilding interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 6) and they require isolation from the exposed OSP cabling. Adding primary protectors is not sufficient protection to connect these interfaces metalically to OSP wiring.

WARNING: If you install and connect the EMS100G-32 switch to a commercial AC power source, you must connect the switch to an external special protection device (SPD).

To be NEBS compliant, you must follow these regulations:

- ◆ Locate your switch in a restricted access area where only trained personnel are allowed access.
- ◆ Install and connect your switch to the common bonding network (CBN).
- ◆ You can also install and connect your switch to the central office.
- ◆ Connect the battery returns of your switch as DC-I.
- ◆ Ground your switch using a copper ground connector.
- ◆ Clean and coat all bare grounding connection points on your switch with antioxidant
- ◆ Clean and coat all bare grounding connection points on your switch with an antioxidant solution before making connections.
- ◆ Bring all unplated surfaces on your switch to a bright finish and treat them with an antioxidant solution before making connections.
- ◆ Remove any nonconductive surfaces on your switch from the threads and connection points to ensure electrical continuity.
- ◆ Use the two-hole, Listed, compression-type lug with an AWG 14 gauge wire that uses 4-in./lb. to secure your switch to the frame.

NOTE: The switch can operate at -40.5 VDC to -60 VDC at a maximum current level of 15 A.

NOTE: The switch is Earthquake Z4-compliant when you attach the rails to the frame using threaded hardware.

4.2 NEBS-COMPLIANT GROUND INSTALLATION

Before you install the switch into a rack, install the ground (GND) lug assembly.

Your switch includes two installed M3 screws on the lower-left side of your chassis. Your switch also includes an assembled UL-certified GND lug with bracket, packaged separately. If any parts are missing, contact Black Box Technical Support at 877-877-2269 or info@blackbox.com

CHAPTER 4: NEBS COMPLIANCE

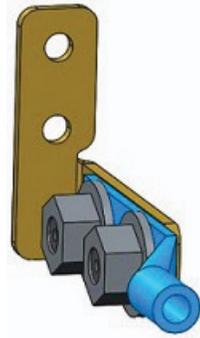


FIGURE 4-1. GND LUG ASSEMBLY

1. Remove the two installed M3 screws from the lower-left side of your chassis.
- NOTE: Keep these screws.
2. Remove the bracket assembly from the shipping bag.
 3. Clean the bracket and lug surfaces thoroughly and apply an anti-oxidant solution to the mating surfaces.
 4. Using the two removed screws, attach the GND lug bracket assembly to your chassis, as shown.
 5. Torque the M3 screws to $\pm 4-5$ in-lbs.

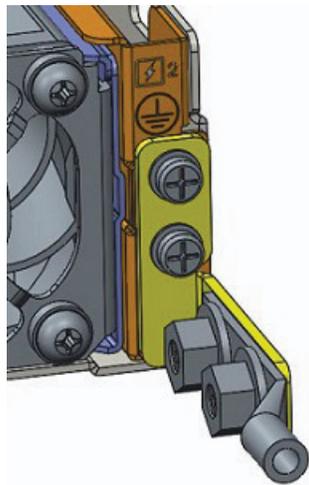


FIGURE 4-2. ATTACH THE GND LUG ASSEMBLY

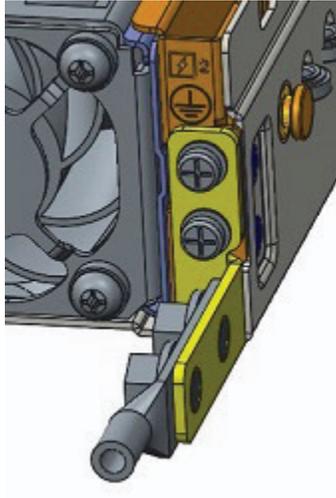


FIGURE 4-3. GND LUG ASSEMBLY ATTACHED

5. Install your chassis into your rack using the installation instructions in Chapter 5.
6. Attach the chassis ground using the ground cable instructions.

CHAPTER 5: INSTALLING THE SWITCH

NOTE: Before unpacking the switch, inspect the container and immediately report any evidence of damage.

NOTE: ESD damage can occur if components are mishandled. Always wear an ESD-preventive wrist or heel ground strap when handling the EMS100G-32 switch and its components. As with all electrical devices of this type, take all the necessary safety precautions to prevent injury when installing this system.

5.1 UNPACKING STEPS

1. Place the container on a clean, flat surface and cut all straps securing the container.
2. Open the container or remove the container top.
3. Carefully remove the switch from the container and place it on a secure and clean surface.
4. Remove all packing material.
5. Inspect the product and accessories for damage.

5.2 RACK OR CABINET HARDWARE INSTALLATION

You may either place the switch on a rack shelf or mount the switch directly into a 19" wide, EIA-310- E-compliant rack—four-post, two-post, or threaded methods. The rack system is provided for 1U front-rack and two-post installations.

The rack system includes two separately packaged rail assemblies and two rails that are shipped attached to the sides of the switch.

CAUTION: Your system is not NEBS Earthquake Z4-compliant if you use the 1U tool-less square-hole or two-post installation methods.

WARNING: This is a condensed reference. Read the safety instructions in your Safety, Environmental, and Regulatory information booklet before you begin.

NOTE: The illustrations in this document are not intended to represent a specific switch.

NOTE: Do not use the mounted rails as a shelf or a workplace.

5.2.1 RACKMOUNT SAFETY CONSIDERATIONS

- Rack loading—Overloading or uneven loading of racks may result in shelf or rack failure, causing damage to the equipment and possible personal injury. Stabilize racks in a permanent location before loading begins. Mount the components beginning at the bottom of the rack, then work to the top. Do not exceed your rack's load rating.
- Power considerations—Connect only to the power source specified on the unit. When multiple electrical components are installed in a rack, ensure that the total component power ratings do not exceed the circuit capabilities. Overloaded power sources and extension cords present fire and shock hazards.
- Elevated ambient temperature—If installed in a closed rack assembly, the operating temperature of the rack environment may be greater than the room ambient temperature. Use care not to exceed the 113° F (45° C) maximum ambient temperature of the switch.
- Reduced air flow—Install the equipment in the rack so that the amount of airflow required for safe operation of the equipment is not compromised.
- Reliable earthing—Maintain reliable earthing of rack-mounted equipment. Pay particular attention to the supply connections other than the direct connections to the branch circuit, for example: use of power strips.
- Do not mount the equipment with the rear panel facing in the downward position.

CHAPTER 5: INSTALLING THE SWITCH

5.2.2 RAILS SYSTEM INSTALLATION

The rackmounting system is provided to easily configure your rack for installation of your EMS100G-32 switch.

You can install the rail system using the 1U tool-less method or one of three 1U tooled methods—two-post flush mount, two-post center mount or four-post threaded.

1. With the rail flange ears facing outward, place one rail between the left and right vertical posts.

Align and seat the rear flange rail pegs in the rear vertical post flange. The illustration and its extractions show how the pegs appear in both the square and non-threaded round holes.

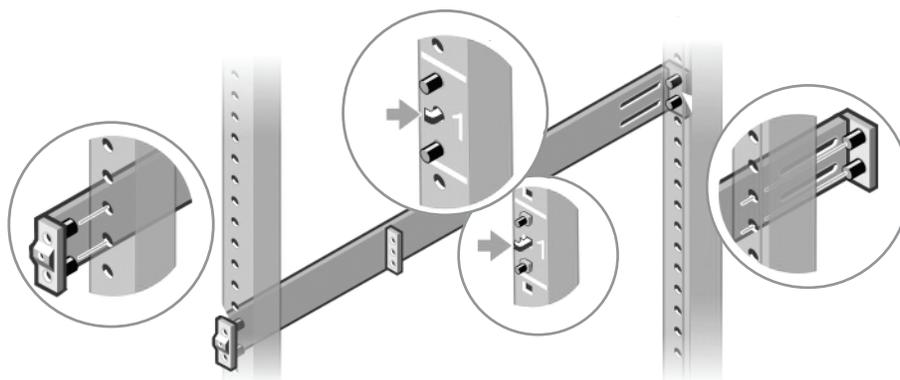


FIGURE 5-1. 1U TOOL-LESS CONFIGURATION

2. Align and seat the front flange pegs in the holes on the front side of the vertical post.

3. Repeat this procedure for the second rail.

4. To remove each rail, pull on the latch release button on each flange ear and unseat each rail.

CHAPTER 5: INSTALLING THE SWITCH

TWO-POST FLUSH MOUNT INSTALLATION

CAUTION: Your system is not NEBS Earthquake Z4-compliant if you use this installation method.

1. For this configuration, remove the castings from the front side of each rail assembly, item 1.

Use a Torx screwdriver to remove the two screws from each front flange ear on the switch side of the rail and remove each casting. Retain the castings for future rack requirements. It is not necessary to remove the rear flange castings.

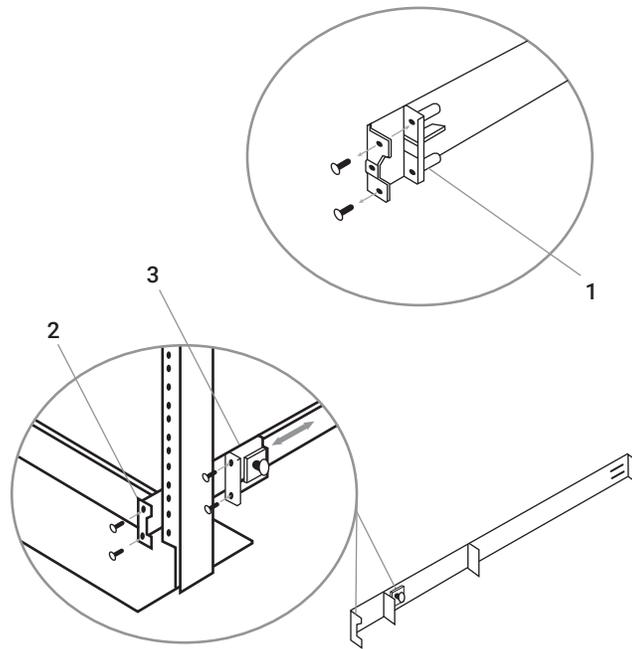


FIGURE 5-2. TWO-POST FLUSH-MOUNT CONFIGURATION

2. Attach one rail to the front post flange with two user-supplied screws, item 2.

3. Slide the plunger bracket forward against the vertical post and secure the plunger bracket to the post flange with two user-supplied screws, item 3.

4. Repeat this procedure for the second rail.

CHAPTER 5: INSTALLING THE SWITCH

TWO-POST CENTER MOUNT INSTALLATION

CAUTION: Your system is not NEBS Earthquake Z4-compliant if you use this installation method.

1. Slide the plunger bracket rearward until it clicks into place and secure the bracket to the front post flange with two user-supplied screws, item 1.

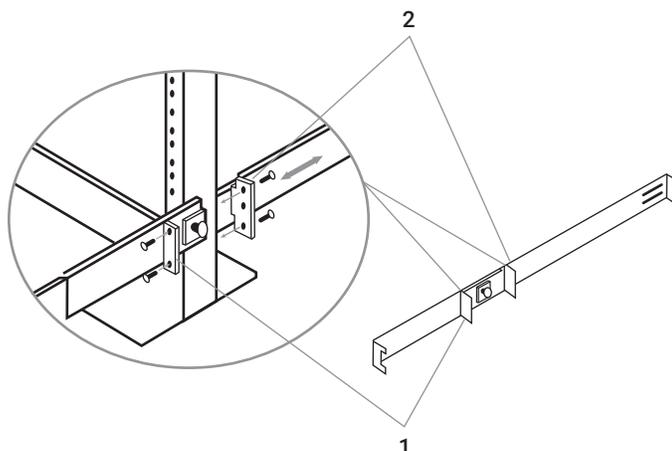


FIGURE 5-3. TWO-POST CENTER-MOUNT CONFIGURATION

2. Slide the back bracket towards the post. Secure it to the post flange with two user-supplied screws, to item 2.
3. Repeat this procedure for the second rail.

CHAPTER 5: INSTALLING THE SWITCH

FOUR-POST THREADED INSTALLATION

CAUTION: To be NEBS Earthquake Z4-compliant, you must remove the tool-less latch castings described in Step 1.

1. For this configuration, remove the flange ear castings from each end of the rail assemblies.

To remove the two screws from each flange ear and remove each casting, use a Torx driver, item 1. Retain the castings for future rack requirements.

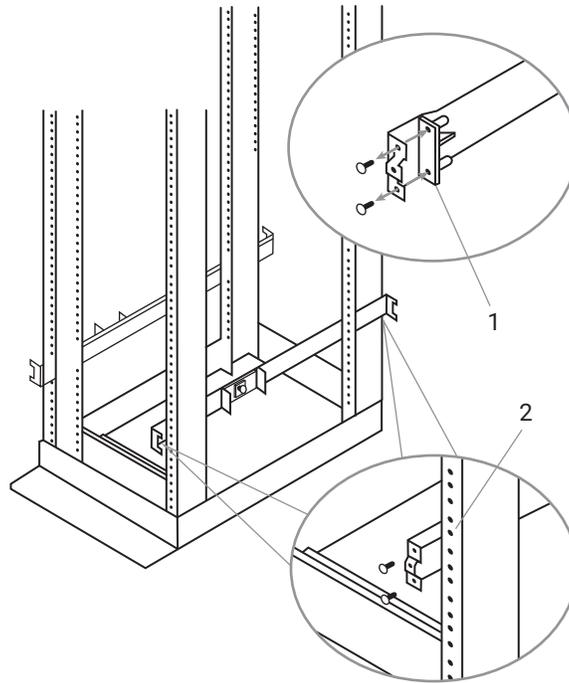


FIGURE 5-4. FOUR-POST THREADED CONFIGURATION

2. For each rail, attach the front and rear flanges to the post flanges with two user-supplied screws at each end, item 2.

CHAPTER 5: INSTALLING THE SWITCH

5.3 SWITCH INSTALLATION

You can mount the switch in the 1U front-rack or 1U flush or center two-post configurations. Following is an example of a front-rack configuration.

For the 1U flush or center two-post configurations, slide the switch into the rails in the same manner as the four-post configurations.

1U FRONT-RACK INSTALLATION

Configure the rails that are attached to the switch.

1. Attach the inner chassis members switch rails to the EMS100G-32 switch. Item 3 shows the detail for the front standoff with the locking tab.

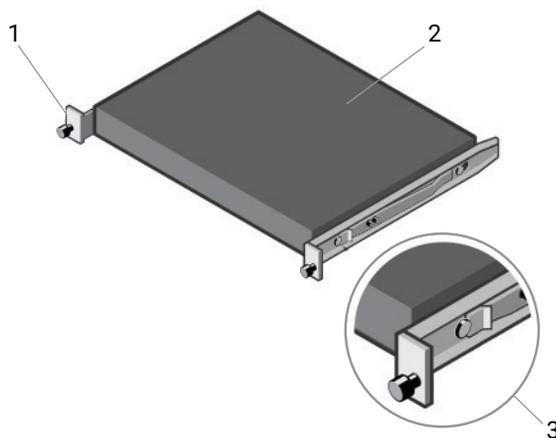


FIGURE 5-5. SWITCH RAILS ATTACHMENT

2. After you have installed both switch rails, line them up on the previously mounted rails and slide the switch in until it is flush with front of rack.

About three inches before you fully insert your switch, the rail locking feature engages to keep the switch from inadvertently sliding out of the rack and falling.

CHAPTER 5: INSTALLING THE SWITCH

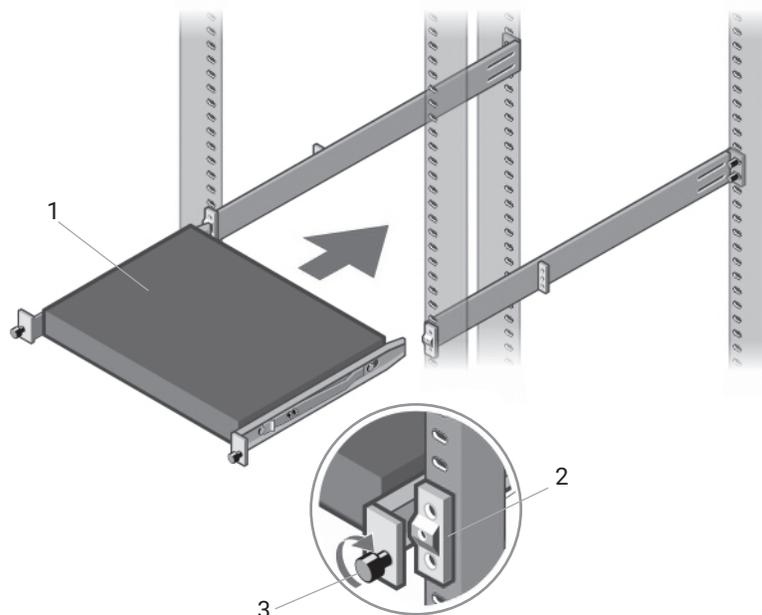


FIGURE 5-6. FRONT RACK INSTALLATION

NOTE: Do not use the mounted rails as a shelf or a workplace.

5.4 GROUND CABLE

Depending on the type of system, to attach a ground cable to the chassis, you need one of the included M3 or M4 screws.

The system ships with one of the following two configurations:

- ♦ One threaded hole using an included M3 screw.
- ♦ Two threaded holes using one of the two included M4 screws.

In both configurations, the ground cable is not included. To properly ground the chassis, Black Box recommends a one- or two-hole lug, M3 or M4 hole size. The system hole lugs must be a UL-recognized, crimp-type lug.

CAUTION: Grounding conductors must be made of copper. Do not use aluminum conductors.

NOTE: Coat the one-hole lug with an anti-oxidant compound before crimping. Also, bring any unplated mating surfaces to a shiny finish and coat with an anti-oxidant before mating. Plated mating surfaces must be clean and free from contamination.

NOTE: The rack installation ears are not suitable for grounding.

To connect the ground cable to the system, follow these steps.

1. Remove the ground cable from the shipping bag and cut it to the desired length. The cable length must facilitate proper operation of the fault interrupt circuits. Use the shortest cable route allowable.
2. To attach the ground cable, use one of the following:
 - ♦ Using one threaded M3 hole, attached the ground cable to the lug using an M3 screw with a captive internal tooth lock washer, as shown. Torque the screw to $\pm 4-5$ in-lbs.
 - ♦ Using one of the two M4 threaded holes, attach the ground cable to the lug. Use an M4 screw with a captive internal tooth lock washer, as shown. Torque the screw to $\pm 5-6$ in-lbs.
3. Attach the other end of the ground cable to a suitable ground point such as the rack or cabinet. The rack installation ears are not a suitable grounding point.

CHAPTER 5: INSTALLING THE SWITCH

5.5 OPTICS INSTALLATION

The EMS100G-32 has two SFP+ optical ports.

The following SFP+ modules are compatible with the switch.

TABLE 5-1. COMPATIBLE SFPS

PRODUCT CODE	DESCRIPTION
LSP421	SFP+ - 10-Gb, Extended Diagnostics, 850-nm Multimode Fiber, 300-m, LC
LSP422	SFP+, 10GBASE-R, 1310-nm single-mode, 10 km
LSP431	SFP+, 10-Gb, Extended Operating Temperature & Diagnostics, 850-nm Multimode Fiber, 300-m

CAUTION: ESD damage can occur if components are mishandled. Always wear an ESD-preventive wrist or heel ground strap when handling the EMS100G-32 and its components.

WARNING: When working with optical fibers, follow all warning labels and always wear eye protection. Never look directly into the end of a terminated or unterminated fiber or connector as it may cause eye damage!

1. Position the optic so it is in the correct position. The optic has a key that prevents it from being inserted incorrectly.
2. Insert the optic into the port until it gently snaps into place.

NOTE: When you cable the ports, be sure not to interfere with the airflow from the small vent holes above and below the ports.

5.6 OPTICS REMOVAL

Remove an optic by pushing the tab on the optic and sliding the optic from the port.

CAUTION: When removing optics with direct attach cables (DACs) from the port, pull the release tab firmly and steadily. Before pulling the release tab, you may need to gently push the optic into the port to ensure it is seated properly. Do not jerk or tug repeatedly on the tab.



CHAPTER 5: INSTALLING THE SWITCH

5.7 PORT CONNECTIVITY

Black Box recommends you distribute port groups across all four port pipes.

The EMS100G-32 switch has four port pipes, also known as packet processing pipelines. For the best buffer resource usage, distribute the functional port groups, such as downlinks, uplinks, interchassis links, LAGs, and ECMP, across all four port pipes—0, 1, 2, and 3. If that is not possible, distribute the port groups across port pipes 0 and 2 or port pipes 1 and 3. For example, create a two-port LAG using port 21 from port pipe 0 and port 5 from port pipe 2, as shown.

TABLE 5-2. PORT AND PIPE DISTRIBUTION

PORT	PORT PIPE
21–24 and 29–32	0—red
1–4, 9–12, and 33	1—orange
5–8, 13–16, and 34	2—green
17–20 and 25–28	3—blue

The connectivity between the front panel ports and the port pipes is shown.

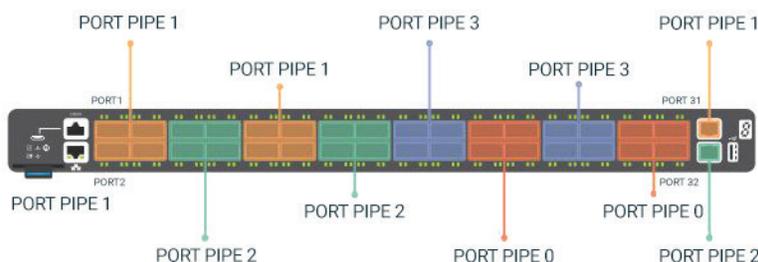


FIGURE 5-7. PORT PIPES

5.8 POWERING UP THE SWITCH

Supply power to the switch after it is mounted in a rack or cabinet.

Black Box recommends reinspecting your switch before powering up. Verify the following:

- The equipment is properly secured to the rack and properly grounded, recommended.
- The equipment rack is properly mounted and grounded, recommended.
- The ambient temperature around the unit, which may be higher than the room temperature, is within the limits specified for the switch. For more information, see Chapter 1, Specifications.
- There is sufficient airflow around the unit.
- The input circuits are correctly sized for the loads and that you use sufficient overcurrent protection devices.
- All protective covers are in place.

NOTE: A US AC or DC power cable is included for powering up an AC or DC power supply. You must order all other power cables separately.

NOTE: ESD damage can occur if components are mishandled. Always wear an ESD-preventive wrist or heel ground strap when handling the switch and its components.

CHAPTER 6: POWER SUPPLIES

The switch ships with two AC power supplies. The power supplies have two air-flow directions, normal and reverse. Normal is from the I/O-side to the PSU-side. Reverse is from the PSU-side to the I/O-side.

Two PSUs are required for full redundancy, but the system can operate with a single PSU.

The PSUs are field replaceable. When running with full redundancy—two power supplies installed and running, you can remove and replace one PSU without disrupting traffic.

CAUTION: To prevent electrical shock, ensure that the switch is grounded properly. If you do not ground your equipment correctly, excessive emissions may result. Use a qualified electrician to ensure that the power cables meet your local electrical requirements.

NOTE: ESD damage can occur if components are mishandled. Always wear an ESD-preventive wrist or heel ground strap when handling the EMS100G-32 and its components.

6.1 COMPONENTS

The following power supply is available for the EMS100G-32 switch:

- ♦ AC power supply with integrated fan

Power supply 1 (PSU1) is on the left side of the chassis; power supply 2 (PSU2) is on the right side of the chassis.

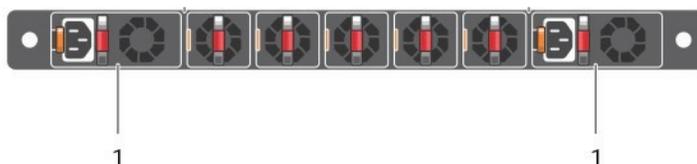


FIGURE 6-1. EMS100G-32 SWITCH PSUS

PSU 1 and 2

The PSUs have an integrated fan that you cannot replace individually. If the fan integrated in a PSU fails, you must replace the entire PSU. You can replace the fan trays individually. For fan tray replacement procedures, see Fans.

WARNING: Prevent exposure and contact with hazardous voltages. Do not attempt to operate this switch with the safety cover removed.

CAUTION: Remove the power cable from the PSU prior to removing the PSU. Also, do not connect the power cable before you insert the PSU in the chassis.

NOTE: To comply with the GR-1089 Lightning Criteria for Equipment Interfacing with AC Power Ports, use an external surge protection device (SPD) at the AC input of the router.

CHAPTER 6: POWER SUPPLIES

6.2 AC POWER SUPPLY INSTALLATION

NOTE: The PSU slides into the slot smoothly. Do not force a PSU into a slot as this action may damage the PSU or the switch chassis.

NOTE: Make sure that you correctly install the PSU. When you install the PSU correctly, the power connector is on the right side of the PSU.

1. Remove the PSU slot cover from the switch using a small #1 Phillips screwdriver.
2. Remove the PSU from the electro-static bag.
3. Insert the PSU into the switch PSU slot. Insert the PSU exposed PCB edge connector first. The PSU slot is keyed so that the PSU can only be fully inserted in one orientation.

When you install the PSU correctly, it snaps into place and is flush with the back of the switch.

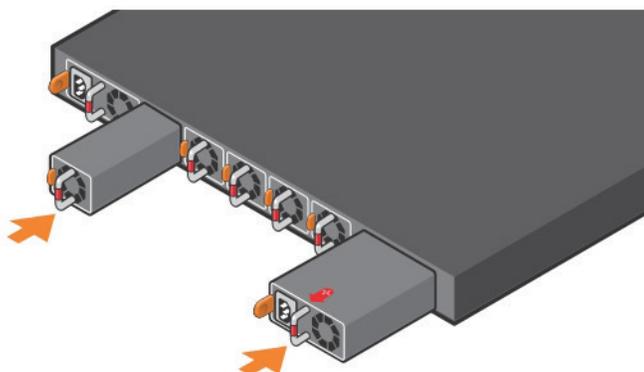


FIGURE 6-2. PSU INSTALLATION

NOTE: In the figure above, the power supply is on the right side and the fan unit is on the left.

4. Plug in the appropriate AC three-prong power cord from the switch PSU to the external power source.
5. Repeat steps 1 through 4 above using the second PSU slot on the switch.

NOTE: The switch powers up when you connect the cables between the power supply and the power source.

CHAPTER 6: POWER SUPPLIES

6.3 AC POWER SUPPLY REPLACEMENT

CAUTION: Disconnect the power cord before removing the power supplies. Also, disconnect all power cords before servicing.

NOTE: The PSU slides into the slot smoothly. Do not force a PSU into a slot as this action may damage the PSU or the switch chassis.

NOTE: If a PSU fails, you must replace the entire unit. There are no field serviceable components in the PSU. To request a hardware replacement, contact Black Box Technical Support at 877-877-2269 or info@blackbox.com

1. Disconnect the power cable from the PSU.
2. Use the grab handle to slide the PSU out of the power supply bay.
3. Use the grab handle on the replacement PSU to slide it into the power supply bay.
4. Attach the power cord to the replacement PSU.

NOTE: The switch powers up when you connect the cables between the power supply and the power source.



CHAPTER 7: FANS

The switch comes from the factory with two PSUs and five fan modules installed in the chassis. The fan modules and the power supplies, which have integrated fans, are hot-swappable.

In addition to the power supply modules, you can order and install fan modules separately.

The switch supports normal airflow direction. Do not mix airflow types in a chassis; you can use only a single airflow direction in a chassis. If the airflow directions are mismatched, the switch issues an alarm. You must correct the mismatched airflow direction.

- ♦ Normal—airflow is from the I/O panel to the PSU.

All fans and PSUs in a configuration must be in the same airflow direction.

Environmental factors can decrease the amount of time required between fan replacements. Check the environmental factors regularly. An increase in temperature and/or particulate matter in the air might affect performance; for example, new equipment installation.

CAUTION: Check the fans at six-month intervals and replace them as necessary. Regularly monitor the speeds of the fans to accurately determine replacement intervals.

7.1 COMPONENTS

The following are the EMS100G-32 fan components.

- EMS100G-32 Fan module

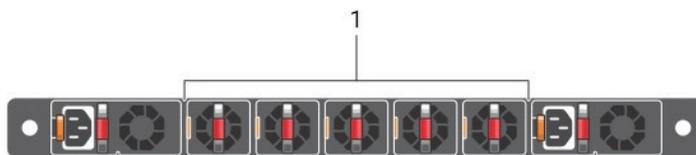


FIGURE 7-1. FAN MODULES

7.2 FAN MODULE INSTALLATION

The fan modules in the switch are field replaceable.

Module slot 1 is on the left side of the chassis, module slot 2 is in the middle of the chassis, and module slot 5 is on the right side of the chassis.

CAUTION: DO NOT mix airflow directions. All fans must use the same airflow direction—reverse or normal. If you mix the airflow direction, the switch detects the discrepancy and issues an alarm. You must correct the mixed airflow direction.

1. Take the fan module out of the shipping box.
2. Slide the module into the bay.

CHAPTER 7: FANS

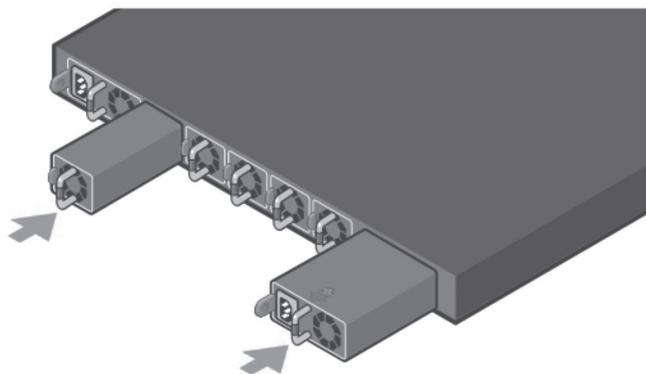


FIGURE 7-2. PSU AND FAN INSTALLATION

NOTE: In the figure above, the power supply is on the right side and the fan unit is on the left.

7.3 FAN MODULE REPLACEMENT

CAUTION: Complete steps 1 and 2 within one minute or the switch powers down.

1. Slide the fan module out of the bay.
2. Slide the replacement module into the bay.

7.4 FAN AIR FILTER REPLACEMENT

Environmental factors can decrease the amount of time required between air filter replacements. Check the environmental factors regularly. An increase in temperature and/or particulate matter in the air might affect performance.

CAUTION: Check the fan air filters at six-month intervals and replace them as necessary. To accurately determine air filter replacement intervals, regularly monitor the speeds of the cooling fans. An increase in overall fan speed may indicate a clogged filter.

You must replace the fan air filters with new filters; you cannot clean and reuse the old fan air filters. Replacement filter media must meet the requirements found in GR-63-CORE.

- ♦ Minimum dust arrestance of 65%, per ASHRAE Standard 52.1-1992. OR•
- ♦ Minimum Efficiency Rating Value (MERV) of 2, per ANSI/ASHRAE Standard 52.2-2007. CAUTION: For Network Equipment Building Systems (NEBS) compliance, use NEBS approved filters.

Use fan air filters with reverse blue-banded air flow systems—PSUs and fans. You can replace the air filters individually on each fan within the system without powering down a PSU module or disrupting traffic.

The fan air filter media slides into the frame from the top. No tools are required.

1. Determine which filters to replace.
2. Unlatch and remove the first module that needs the filter replaced.
3. Slide the existing filter upwards to remove it from the module.
4. Replace the filter with a new filter of the same size.
5. Repeat for the remaining modules that need the filter replaced.

CHAPTER 7: FANS

7.5 AFTER INSTALLING THE SWITCH

After you have securely installed and powered on the switch, to configure your switch, see your ONIE-compatible operating system documentation.



CHAPTER 8: MANAGEMENT PORTS

The switch provides several ports for management and storage.

8.1 RS-232 CONSOLE PORT ACCESS

The RS-232 console port is on the I/O-side of the switch chassis, as shown.

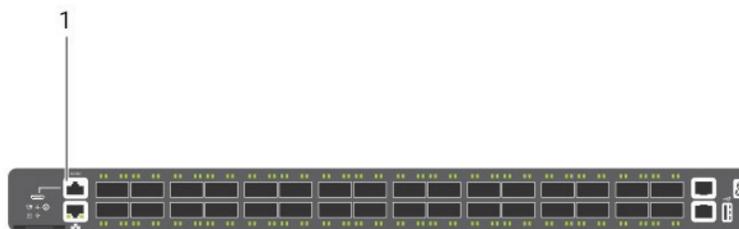


FIGURE 8-1. SWITCH RS-232 CONSOLE PORTS

1. RS-232 Console Port, top

NOTE: Before starting this procedure, make sure that your PC has a 9-pin serial port and that you have a terminal emulation program already installed and running on the PC.

NOTE: If your PC's serial port cannot accept a female DB9 connector, acquire a DB9 male-to-male adapter.

1. Install the provided RJ-45 connector side of the provided cable into the switch console port.
2. Install the DB9 female side of the provided copper cable into your PC's serial port or into other data terminal equipment (DTE) server hardware that you intend to use.
3. Keep the default terminal settings on the console as follows:
 - ◆ 115200 baud rate
 - ◆ No parity
 - ◆ 8 data bits
 - ◆ 1 stop bit
 - ◆ No flow control

8.2 MICRO USB-B CONSOLE PORT ACCESS

The Micro USB-B console port is on the I/O side of the switch.

The terminal settings are the same for the serial console port and the RS-232/RJ-45 console port:

- ◆ 115200 baud rate
- ◆ No parity
- ◆ 8 data bits
- ◆ 1 stop bit
- ◆ No flow control

When you connect the Micro USB-B port, it becomes the primary connection and, while connected, all messages are sent to the Micro USB-B port.

CHAPTER 8: MANAGEMENT PORTS

NOTE: Before starting this procedure, be sure you have a terminal emulation program already installed on your PC. You will need to install the appropriate drivers to support the USB-B port. For assistance, contact Black Box Technical Support at 877-877-2269 or info@blackbox.com to download the drivers.

To access the Micro USB-B console port, follow these steps.

1. Power on the PC.
2. Connect the USB-A end of cable into an available USB port on the PC.
3. Connect the Micro USB-B end of cable into the USB-B console port on the switch.
4. Power on the switch.
5. Install the necessary USB device drivers.

To download the drivers, contact Black Box Technical Support at 877-877-2269 or info@blackbox.com

6. Open your terminal software emulation program to access the switch.
7. Confirm the terminal settings on your terminal software emulation program are as follows:
 - ◆ 115200 baud rate
 - ◆ No parity
 - ◆ 8 data bits
 - ◆ 1 stop bit
 - ◆ No flow control

8.3 USB STORAGE

The USB storage supports the FAT file system. The USB storage does not automatically mount. To use USB storage, you must first mount the device.

1. Create a mount directory for the USB.

```
ONIE:/ # mkdir /mnt/usb
```

2. View the fixed disks using the fdisk command.

```
ONIE:/mnt # fdisk -l
```

For internal storage:

```
Disk /dev/sda: 15.8 GB, 15829303296 bytes
255 heads, 63 sectors/track, 1924 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
```

```
Device Boot   Start   End   Blocks      Id System
/dev/sda1     1     1925  15458303+  ee   EFI GPT
```

CHAPTER 8: MANAGEMENT PORTS

For USB storage:

```
Disk /dev/sdb: 30.9 GB, 30942946304 bytes
64 heads, 32 sectors/track, 29509 cylinders
Units = cylinders of 2048 * 512 = 1048576 bytes
Device Boot  Start  End    Blocks      Id System
```

3. Mount the device `/dev/sdb` to the `/mnt/usb` directory.

```
ONIE:/ # mount -t vfat /dev/sdb /mnt/usb
```

NOTE: The following message displays if the `/mnt/usb` directory is missing:

```
mount: mounting /dev/sdb on /mnt/usb failed: No such file or directory.
```

NOTE: The following message displays if the USB device is not seen:

```
mount: mounting /dev/sdb on /mnt/usb failed: No such device or address.
```

4. Add a device to the file systems table, `fstab`, and mount the file systems—recommended.

```
ONIE:/ # vi /etc/fstab
```

```
# FSTAB entry for the ONIE-BOOT partition mounted on /boot
LABEL=ONIE-BOOT    /mnt/onie-boot    ext4    defaults,rw,errors=remount-ro    0 1
/dev/sdb           /mnt/usb          vfat    defaults                          0 1
ONIE:/ # mount -a
```

8.4 BEFORE YOU INSTALL AN OS

After powering on the switch, it goes through a power-on self-test (POST).

POST runs every time the switch is initialized and checks the hardware components to determine if the switch is fully operational before booting. After POST, the switch uses the Grub bootloader.

To select which entry is highlighted, use the up and down arrow keys. Press Enter to select an OS or enter `e` to edit the commands before booting. Enter `c` for a command line. The highlighted entry executes automatically in the operating system.



CHAPTER 8: MANAGEMENT PORTS

8.4.1 EXAMPLE OF THE GRUB BOOTLOADER

```
GNU GRUB version 2.02~beta2+e4a1fe391
+-----+
|*ONIE: Install OS      |
| ONIE: Rescue         |
| ONIE: Uninstall OS   |
| ONIE: Update ONIE    |
| ONIE: Embed ONIE     |
| ONIE: Diag ONIE      |
+-----+
```

Your switch comes with ONIE installed.

8.4.2 EXAMPLE OF ONIE

```
ONIE: Install OS
      For downloading and installing an OS from a URL
      Starts ONIE with ONIE Discovery Service
      (factory default boot)
ONIE: Rescue
      Starts ONIE without ONIE Discovery Service Useful for running Diagnostics manuall
ONIE: Uninstall OS Restore to factory defaults erases any installed OS
ONIE: Update ONIE For downloading and updating ONIE from a URL
ONIE: Embed ONIE For downloading and updating ONIE from a URL and erases any installed O
ONIE: Diag ONIE Run Diagnostic package for EMS100G-32
Run Black Box Networking Diagnostic package for <platform>
```

During the initial setup, the switch boots to ONIE Install. ONIE Install boots with ONIE Discovery to the console (ONIE:).

8.4.3 ONIE SERVICE DISCOVERY

ONIE attempts to locate the installer through several discovery methods, as shown. To download and run an installer, the ONIE Service Discovery feature uses the first successful method found.

1. Passed from the boot loader.
2. Search locally attached storage devices for one of the ONIE default installer filenames; for example, USB.
3. Exact URLs from DHCPv4.
4. Inexact URLs based on DHCPv4 responses.
5. Query to IPv6 link-local neighbors using HTTP for an installer.
6. TFTP waterfall—from DHCPv4 option 66

CHAPTER 8: MANAGEMENT PORTS

Examples of the ONIE ifconfig eth0 Commands

If none of the ONIE Service Discovery methods are successful, you can disable this using the `onie-discovery-stop` command.

You can install an operating system manually from HTTP, FTP, or TFTP using the `onie-nos-install <URL>` command.

NOTE: If you have a recovery USB plugged into your switch, you must remove it before installing the DIAG-OS using the `onie-nos-install` command.

The ONIE Install environment uses DHCP to assign an IP address to the management interface, eth0. If that fails, it uses the default IP address 192.168.3.10/255.255.255.0.

To display the IP address, use the `ifconfig eth0` command, as shown.

```
ONIE:/ # ifconfig eth0
eth0 Link encap:Ethernet HWaddr 90:B1:1C:F4:9C:76
    inet addr:10.11.53.33 Bcast:10.255.255.255 Mask:255.0.0.0
    inet6 addr: fe80::92b1:1cff:fef4:9c76/64 Scope:Link
    UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
    RX packets:18 errors:0 dropped:0 overruns:0 frame:0
    TX packets:24 errors:0 dropped:0 overruns:0 carrier:0 collisions:0 txqueuelen:1000
    RX bytes:1152 (1.1 KiB) TX bytes:6864 (6.7 KiB)
    Interrupt:21 Memory:ff300000-ff320000
```

To assign an IP address to the management interface, eth0, and verify network connectivity, use the `ifconfig eth0 <ip address>` command, as shown.

```
ONIE:/ # ifconfig eth0 10.11.53.33/16
Verify the network connection with ping.
ONIE:/ # ping 10.11.8.12
PING 10.11.8.12 (10.11.8.12): 56 data bytes
64 bytes from 10.11.8.12: seq=0 ttl=62 time=1.357 ms
64 bytes from 10.11.8.12: seq=1 ttl=62 time=0.577 ms^C
```



CHAPTER 9: TROUBLESHOOTING

9.1 CONTACTING BLACK BOX

If you determine that your switch is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box Technical Support at 877-877-2269 or info@blackbox.com.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- ♦ the nature and duration of the problem.
- ♦ when the problem occurs.
- ♦ the components involved in the problem.
- ♦ any particular application that, when used, appears to create the problem or make it worse.

9.2 SHIPPING AND PACKAGING

If you need to transport or ship your switch:

- ♦ Package it carefully. We recommend that you use the original container.
- ♦ If you are returning the unit, make sure you include everything you received with it. Before you ship for return or repair, contact Black Box to get a Return Authorization (RA) number.

APPENDIX A: REGULATORY INFORMATION

A.1 USA FEDERAL COMMUNICATIONS COMMISSION STATEMENT

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designated 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. If it is not installed and used in accordance to the instructions, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to take whatever measures necessary to correct the interference at their own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Dell Networking is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications in the equipment. Unauthorized changes or modification could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



APPENDIX A: REGULATORY INFORMATION

A.2 NOM STATEMENT

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá de lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquear la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico debe ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

APPENDIX A: REGULATORY INFORMATION

A.3 EUROPEAN UNION EMC DIRECTIVE CONFORMANCE STATEMENT

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Black Box can not accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of this product, including the fitting of non-Black Box option cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22/ European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

WARNING: This is a Class A product. In a domestic environment, this device may cause radio interference, in which case, you may be required to take adequate measures.

A.4 JAPAN VCCI COMPLIANCE FOR CLASS A EQUIPMENT

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスA情報技術装置です。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。

This is Class A product based on the standard of the Voluntary Control Council For Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

WARNING: Use the AC power cords with Black Box equipment only.

本製品に同梱いたしております電源コードセットは、本製品専用です。本電源コードセットは、本製品以外の製品ならびに他の用途でご使用いただくことは出来ません。製品本体には同梱された電源コードセットを使用し、他製品の電源コードセットを使用しないで下さい。

APPENDIX A: REGULATORY INFORMATION

A.5 KOREAN CERTIFICATION OF COMPLIANCE

A급 기기 (업무용 방송통신기자재)	이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
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A.6 SAFETY CERTIFICATIONS AND COMPLIANCE AGENCY CERTIFICATIONS

- ◆ CUS UL 60950-1, 2nd Edition – Meets or exceeds Hi Pot and Ground Continuity testing per UL 60950-1.
- ◆ CSA 60950-1-03, 2nd Edition
- ◆ EN 60950-1, 2nd Edition
- ◆ EN 60825-1, 1st Edition
- ◆ EN 60825-1 Safety of Laser Products—Part 1: Equipment Classification Requirements and User's Guide
- ◆ EN 60825-2 Safety of Laser Products—Part 2: Safety of Optical Fibre Communication Systems
- ◆ FDA Regulation 21CFR 1040.10 and 1040.11
- ◆ IEC 60950-1, 2nd Ed, including all National Deviations and Group Differences

A.7 ELECTROMAGNETIC COMPATIBILITY

A.7.1 EMISSIONS

- ◆ International: CISPR 22: 2006, Class A
- ◆ Australia/New Zealand: AS/NZS CISPR 22:2009, Class A
- ◆ Canada: ICES-003, Issue-4, Class A
- ◆ Europe: EN55022 2006 (CISPR 22: 2006), Class A
- ◆ Japan: VCCI V-3/2011.04 Class A
- ◆ USA: FCC CFR47 Part 15, Subpart B, Class A

APPENDIX A: REGULATORY INFORMATION

A.7.2 IMMUNITY

- ◆ EN 300 386 v1.5.1:2010 EMC for Network Equipment
- ◆ EN55022 2006, Class A
- ◆ EN 55024 1998 + A1: 2001 + A2: 2003
- ◆ EN 61000-3-2 Harmonic Current Emissions
- ◆ EN 61000-3-3 Voltage Fluctuations and Flicker
- ◆ EN 61000-4-2 ESD
- ◆ EN 61000-4-3 Radiated Immunity
- ◆ EN 61000-4-4 EFT
- ◆ EN 61000-4-5 Surge
- ◆ EN 61000-4-6 Low Frequency Conducted Immunity

A.8 PRODUCT RECYCLING AND DISPOSAL (WEEE)

You must recycle or discard this system according to applicable local and national regulations. Black Box encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed.

Waste Electrical and Electronic Equipment (WEEE) Directive for Recovery, Recycle and Reuse of IT and Telecommunications Products

Black Box switches are labeled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.



APPENDIX B: DISCLAIMER/TRADEMARKS

B.1 DISCLAIMER

Black Box Corporation shall not be liable for damages of any kind, including, but not limited to, punitive, consequential or cost of cover damages, resulting from any errors in the product information or specifications set forth in this document and Black Box Corporation may revise this document at any time without notice.

B.2 TRADEMARKS USED IN THIS MANUAL

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