SwitchX®-2 12 Port InfiniBand Switch System Hardware User Manual

P/N: MSX6005F-1BFS, MSX6005T-1BFS, MSX6012F-1BFS, MSX6012F-2BFS, MSX6012T-1BFS, MSX6012T-2BFS, MSX6005F-1BRS, MSX6005T-1BRS, MSX6012F-1BRS, MSX6012T-1BRS

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Revision History

Table 1 - Revision History Table

Date	Revision	Description
July 2013	1.0	Initial Draft

About this Manual

This manual describes the installation and basic use of the Mellanox MSX6012/6005 switch which is based on the SwitchX® -2 switch device.

Intended Audience

This manual is intended for users and system administrators responsible forwitch platforms.

The manual assumes familiarity with the InfiniBand® Architecture Specificationand with the Ethernet specification.

Related Documentation

Additional Documentation available from Mellanox:

Table 2 - Reference Documents and Web Sites

Document Name	Description
InfiniBand Architecture Specification, Volume 1, Release 1.2.1	The InfiniBand Architecture Specification that is provided by IBTA
SwitchX®-2 Switch Product Hardware Release Notes	For possible hardware issues see the switch support product page. This document can be found on the support web page for this product. This requires a customer support login. Look up the relevant SwitchX®-based switch system/series release note file.
Mellanox MLNX-OS® Software User Manual	This document contains information regarding configuring and managing Mellanox Technologies Switch Platforms.
MLNX-OS® Software Command Reference Guide	Command Reference Guide for ***MLNX-OS®*** listing all of the commands available through ***MLNX-OS®*** with explanations and examples.

All of these documents can be found on the Mellanox Website at www.mellanox.com. They are available either through the product pages www.mellanox.com ⇨ Products ⇨ InfiniBand/VPI Switch Systems or through the support page with a login and password.

Conventions

Throughout this manual, the name SX6012/6005 and the term switch are used to describe the 12-port 56Gb/s IB switch unless explicitly indicated otherwise.

The following icons are used throughout this document to indicate information that is important to the user.

This icon makes recommendations to the user.

This icon indicates information that is helpful to the user.

This icon indicates a situation that can potentially cause damage to hardware or software.

BEWARE! This icon indicates a situation that can potentially cause personal injury or damage to hardware or software.

Abbreviations

FDR — Fourteen Data Rate – Used to indicate a 4X port running at 56 Gb/s.

Mellanox Part Numbering Legend

Place	Field	Decoder
M		Mellanox Technologies
SX	System Type	SwitchX® switch Family
P	Data Transfer Protocol	6 = InfiniBand
R	Size of box	0 = 1U 1 = 1.5U 2 = 2U
FF	Management Capabilities	05 = 12 Ports externally managed 12 = 12 Ports internally managed 15 = 18 Ports externally managed 18 = 18 Ports internally managed 25 = 36 Ports externally managed 36 = 36 Ports internally managed
C	Data Rate	F = FDR, T = FDR10, Q = QDR, D = DDR
-	Separator	
P	# Power Supplies	1=1, 2=2....
M	Depth of the Unit	S = standard depth, B = short depth
Y	Air Flow direction	R= Connector side to Power side airflow F= Power Side side to Connector side airflow
R	Chip Generation	R – SwitchX S – SwitchX-2

1 Overview

Mellanox SX6012 and SX6005 switch systems provide the highest performing fabric solution in a 1U half-width form factor by delivering up to 1.3Tb/s of non-blocking bandwidth with 170ns port-to-port latency. These switches are the industry's most cost-effective building blocks for embedded systems and storage with the need for a low port density switch. Whether looking at price-to-performance or energy-to-performance, the Mellanox 12 port FDR switches offer superior performance, power and space reducing capital and operating expenses, providing the best return-on-investment.

The VPI switch running as an InfiniBand system switch is built with Mellanox's 6th generation switch device (SwitchX®-2 switch device), and provides up to 56Gb/s full bidirectional bandwidth per port. These stand alone switches are an ideal choice for smaller departmental or back-end clustering uses with high-performance needs, such as storage, data base and GPGPU clusters.

The switch comes pre-installed with all necessary firmware and is configured for standard operation within an InfiniBand fabric. This switch requires an InfiniBand compliant Subnet Manager running from one of the hosts or Fabric Management software running on the fabric. All that is required for normal operation is to follow the usual precautions for installation and to connect the switch to the adapter cards. Once an unmanaged switch is connected, the Subnet Management software automatically configures and begins utilizing the switch. Managed switches need initial configuration before they will start working.

It is recommended that the Mellanox OpenFabrics software package be installed on all nodes connected to the switch. The software package provides a subnet manager and network management tools as well as connectivity software for servers and storage, and is available on the Mellanox web site. See Section 5 on page 50 for more information.

Installation, hot-swapping components and hardware maintenance is covered in "Basic Operation" on page 16.

Figure 1: Internally Managed Switch SX6012

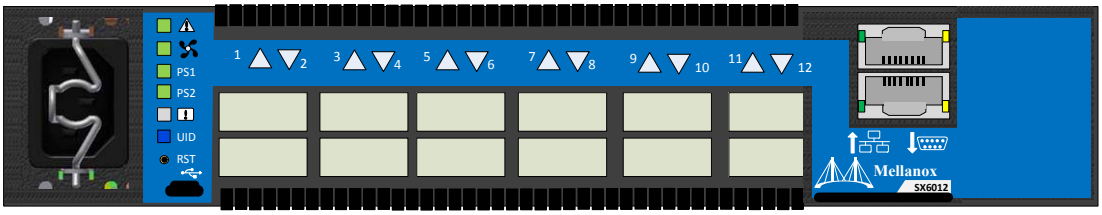


Figure 2: Externally Managed Switch SX6005

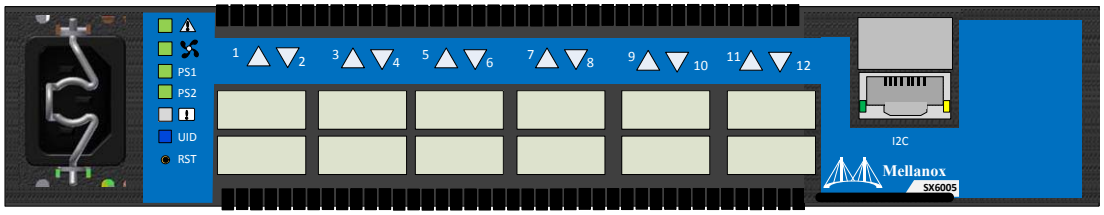
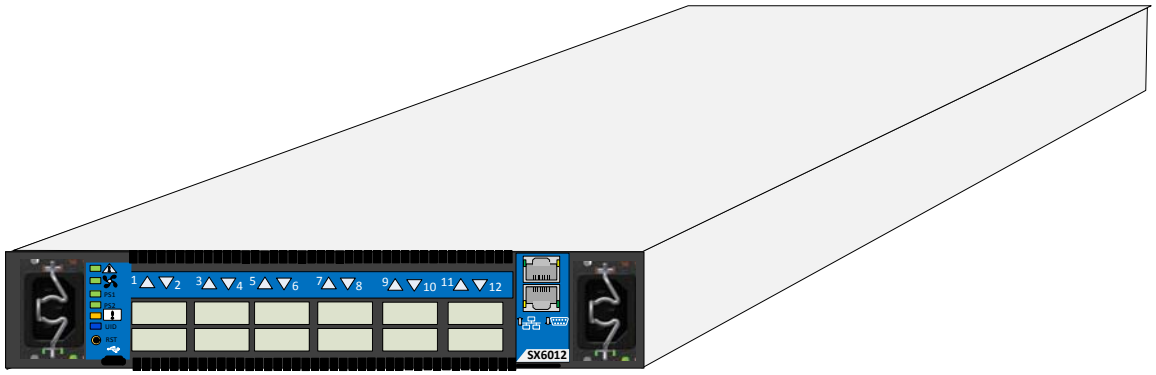


Figure 3: Connector Side View of the Switch



1.1 Features

The switch includes the following features:

Table 3 - General System Features

	Feature	Description
Hardware features	Network Interfaces	• 12 QSPF+ VPI interfaces • Interface type –InfiniBand or Ethernet* • InfiniBand speed: FDR (56Gb/s); FDR10/QDR (40Gb/s); DDR (20Gb/s); SDR (10Gb/s) • Ethernet* speed: 10/40/56 GbE
	Switch options	• InfiniBand – Inbox • Ethernet* • InfiniBand to Ethernet Gateway*
	Compliance	• Compliant with IBTA 1.21 and 1.3 • RoHS 6
	Advanced Features	• Congestion control** • Adaptive routing** • Port mirroring** • Forward Error Correction -(FEC) • Link Layer Retransmission -(LLR) • Multiple SWIDs **

* License required.

** This feature will be available to customers in the near future.

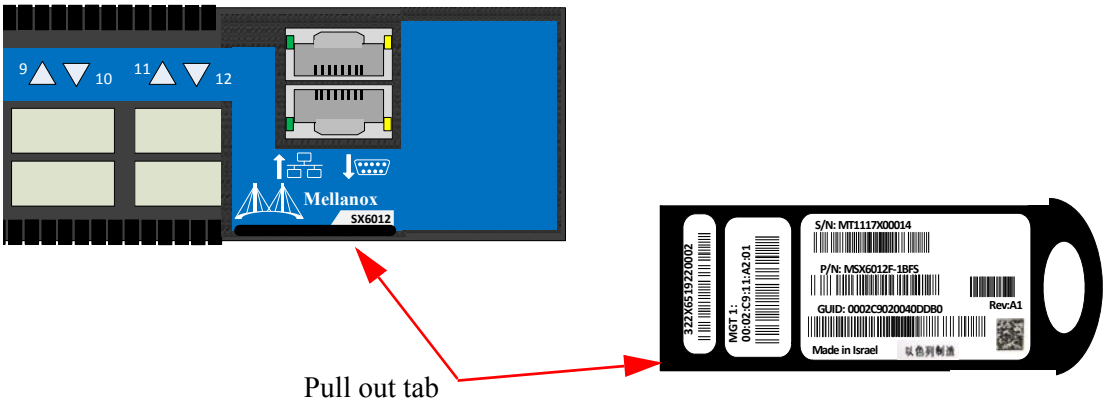
Table 4 - Management Software

	Feature	Description
Management Software (MLNX-OS®)	Software Management	• Dual software image • Software and firmware updates
	File management	• FTP • TFTP • SCP
	Logging	• Event history log • SysLog support
	Management Interface	• DHCP/Zeroconf • IPv6
	Chassis Management	• Monitoring environmental controls • Power management • Auto temperature control • High availability
	Network Management Interfaces	• SNMP v1,v2c,v3 • REST interfaces (XML Gateway)
	Security	• SSH • Telnet • RADIUS • TACACS+
	Date and Time	• NTP
	Cables & Transceivers	• Transceiver info
	Virtual Port Interconnect® (VPI)	• Ethernet • InfiniBand

1.2 Serial Number and Product Version Information

The serial number and GUID for the switch are found on the pull out tab below the CONSOLE connector. On managed switches only, the MAC for the Management PC is also placed on this tab.

Figure 4: Pull out tab



1.3 FDR Transmission Rate

Mellanox switch systems support FDR (fourteen data rate), an InfiniBand data rate, where each lane of a 4X port runs a bit rate of 14.0625 Gb/s with a 64b/66b encoding, resulting in an effective bandwidth of 56.25 Gb/s. The FDR physical layer is an IBTA specified physical layer using advanced block types, deskew mechanism and framing rules for supporting higher speeds and increased reliability.

The switches also supports FDR10, a non-standard InfiniBand data rate, where each lane of a 4X port runs a bit rate of 10.3125 Gb/s with a 64b/66b encoding, resulting in an effective bandwidth of 40 Gb/s.

FDR10 supports 20% more bandwidth over QDR using the same QSFP cables/connectors.

Both FDR and FDR10 support Forward Error Correction (FEC), as described in IEEE 802.3ap chapter 74.

FDR and FDR10 are only guaranteed to work with approved Mellanox Cables.

FDR10 is only guaranteed to work with approved Mellanox ConnectX®-3 adapters.

1.4 Internally Managed vs. Externally Managed

All internally managed switches can support IB fabric of up to 648 nodes. Internally managed switches need an initial configuration before they will start working.

The externally (unmanaged) managed switch system is designed as a low cost switch and as a result does not have any field replaceable units. This switch has no Ethernet or console interfaces. The only management interface is an I2C interface on the connector side.

Externally Managed (Unmanaged) switches are plug and play out of the box. Updating the firmware stack for the externally managed switches is done in-band only. You will need to confirm that your switch has the latest firmware. For externally managed switches, confirm that the latest FW revision is installed on this device. Use the CLI to get the currently installed revision and then go to Mellanox.com to check the revision of the latest version.

Externally managed switches can only run in an IB fabric. Externally managed switches cannot run Ethernet protocol.

The following table shows which switches come with a management CPU and which do not.

Table 5 - Switch Management

Family	Externally / Internally Managed	Management Connections
SX6005	Externally Managed (Unmanaged)	Plug and Play All firmware updates should be done in-band using Mellanox firmware management tools. I2C port access using MTUSB-1 device is required for firmware updates if in-band burning is not possible.
SX6012	Internally Managed	RS232 cable DB9 to RJ-45 included in the box to connect to host PC for initial configuration of the switch. After initial configuration, the switch can be managed through the Ethernet port using a remote connection.

2 Basic Operation

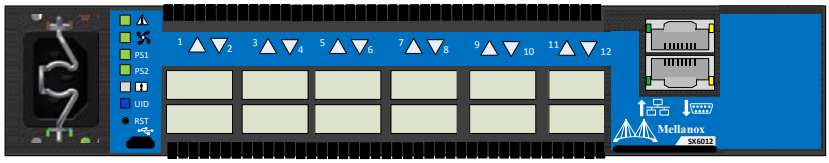
2.1 Switch Platform Hardware Overview

switchFigure 5 shows the connector side panel views of the internally managed switches. The figure shows port configurations for the switch systems.Managed systems have:

- 1 – Ethernet RJ-45 connector for management
- 1 – RJ-45 connector for connecting to a host PC
- 1 – USB connector.

Externally managed switches only have a single I2C RJ-45 connector. All switches have various status LEDs for on site status information.

Figure 5: Switch System Connector Side Panels



2.2 Status LEDs

The System Status LEDs are located to the left of the connectors on the connector side panel.

2.2.1 System Status LEDs

Figure 6: Externally Managed System Status LEDS

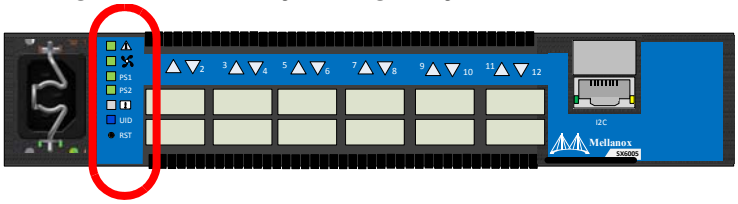


Table 6 - System Status LEDs

Symbol	Name	Description	Normal Conditions
	Switch Status LED	Shows the health of the switch	Solid green after 5 minutes
	Fan Status LED	Shows the health of the fans	Green
	Power supply #1	Shows the health of the right side power supply unit	Green
	Power supply #2	Shows the health of the left side power supply unit	Depends on switch
	Bad Port LED	lights up when a symbol error is detected	Off
	Unit Identifier LED	Lights up on command through the CLI	Off

Switch The system status LEDs should display as follows:

- when the switch is plugged in, within five minutes the switch status LED should light up green
- the FAN LED should light up green. If the FAN LED shows red, replace the switch.
- the PS1 LED for the plugged in PS unit should light up green
- the PS2 LED for the second PS unit should light up green only if a second PS unit is installed in the switch for redundancy and it is connected to a power source
  - if two PS units are installed and only one PS unit is connected to a power supply the PS2 LED will be red
  - if only one PS unit is installed in the switch, the PS2 LED will be off

As long as there is power to the switch (one PS unit is connected), and the switch is booted up and running, the switch status LED should be green.

If the status LED shows red after five minutes, unplug the switch and call your Mellanox representative for assistance.

If the switch shuts down due to over temperature, unplug the switch, wait 5 minutes and replug in the switch. For more information See page 53.

If the PS LEDs are not green, this indicates a problem with the power supplies. The switch is operational only if at least one of the PS LEDs is green.

2.2.2 Switch Status LED

Figure 7: Switch Status LED

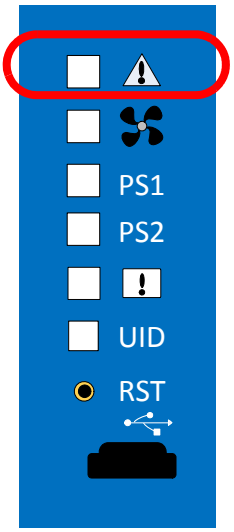


Table 7 - Switch Status LED Assignments

LED Configuration	STATUS/ System Health LED
Solid Green	OK – The system is up and running.
Flashing Green	The system is booting up. This assignment is valid on managed systems only.
Solid Yellow	To be implemented in a future SW release.
Solid Red	Major Error – Possible damage can result to the switch. Turn off immediately. e.g. bad firmware, can't boot, overheated. If the system is booting up, it can take up to 5 minutes for the status led to change to green.
Off	Off – The system has no power.

2.2.3 Fan Status LED

All fans must be operating while the power supply is plugged in.

If the switch shuts down due to over temperature, unplug the switch , wait 5 minutes and replug in the switch . For more information See page 53.

Figure 8: Fan Status LED Connector Side

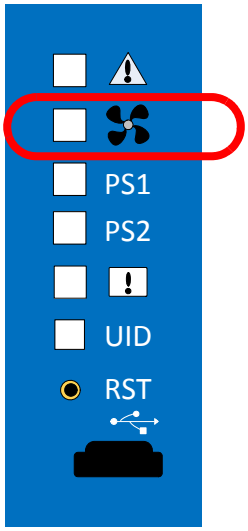


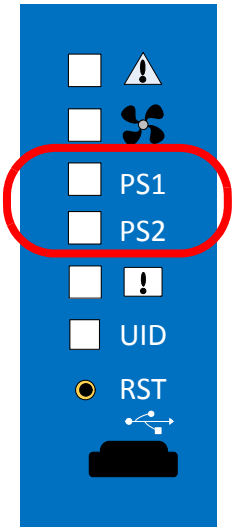
Table 8 shows the fan status LED assignment.

Table 8 - Fan Status LED Assignments

LED Configuration	FAN LED
Solid Green	OK – All fans are up and running.
Solid Red	Error – One or more fans is not operating properly. The system should be powered down and troubleshoot the fan module. For the SX6005 replace the switch.
Off	Off – The fan unit is not receiving any power. Check that the fan unit is properly and completely inserted.

2.2.4 Power Supply Status LEDs

Figure 9: Power Status LED Connector Side



This switch can come with two power supply units for redundancy.

The primary power supply (PS) unit is located on the left side and if there is a secondary PS unit it will be on the right side.

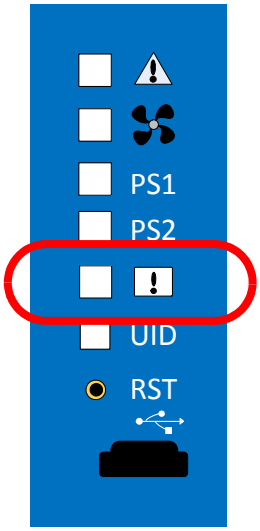
Table 9 shows the power supply unit status LED assignment.

Table 9 - PS Unit Status LED Assignments

LED Color	Status
Solid Green	OK – The Power supply is delivering the correct voltage – 12VDC.
Solid Red	Error – The PS unit is not operational.
Off	Off – There is no power to the system (neither PS unit is receiving power). If one PS unit is showing green and the second PS unit is unplugged it will show a red indication.

2.2.5 Bad Port LED

Figure 10: Bad Port LED



The Bad Port indicator is located on the left side of the connector side panel of the unit. Table 10 shows the bad port status LED assignment.

Table 10 - Bad Port LED Assignments

LED Configuration	Description
Off	OK – No symbol errors have been received in last few seconds.
Flashing Orange	Error – One or possibly more ports have just received a symbol error Possible causes are: • Bad cable • Bad connection • Bad connector

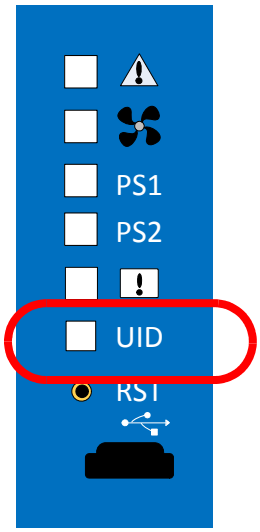
This LED lights up when one or more ports is receiving a symbol error. The LED immediately goes off until the next symbol error is received.

2.2.6 UID LED Switch Identifier[1]

The UID LED is a debug feature that lights a blue LED on the switch connector side panel for ease in finding a particular switch within a cluster.

1. This feature will be available in a coming software release.

Figure 11: Identifier LED



2.3 Port Connector LEDs

Figure 12: Port LEDs

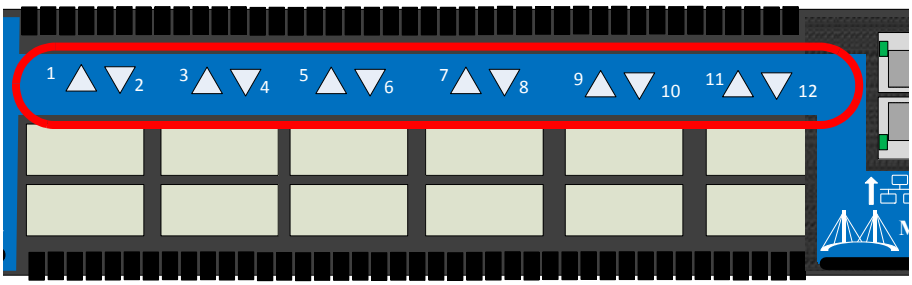


Table 11 - Port Connector Physical and Logical Link Assignments for Ethernet Mode

LED Configuration	LED Description
Off	Physical link is down / Default.
Solid Green	Physical link is up with no traffic.
Flashing Green	Physical link is up with traffic.
Flashing Orange	Physical errors.

Table 12 - Connector Physical and Logical Link Assignments for IB Mode

LED Status	LED Description
Off	No power to the port.
Solid Green	Logical link is up.
Flashing Green	Data activity flashing speed is proportional to data transfer speed.
Solid Orange	Physical link is up.
Flashing Orange	A problem with the physical link.

In IB mode, the LED indicator, corresponding to each data port, will light orange when the physical connection is established (that is, when the unit is powered on and a cable is plugged into the port with the other end of the connector plugged into a functioning port). When a logical connection is made the LED will change to green. When data is being transferred the light will blink green.

2.4 Air Flow

These switches can come with two air flow patterns. The two patterns are:

- Front side (connector side) inlet to rear side outlet
- Rear side inlet to front side outlet

The air flow is specified in the product model number. See “Mellanox Part Numbering Legend” on page 10.

2.5 QSFP Cable Power Budget Classification

All SwitchX®-2 QSFP switches are designed for fiber cables with a max power per module of 2W. Typical power per port is 1.5 W.

2.6 Interfaces

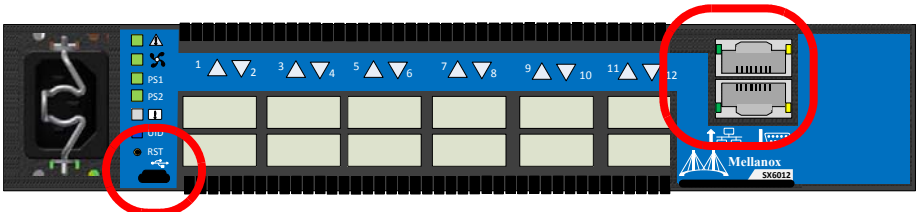
Management and Firmware Updating Interfaces

The following interfaces connect to the switch:

- 1 – 100M/1 Gb Ethernet connectors labeled 
- 1 – USB port that is labeled 
  This interface can be used to update software or firmware. This is only on the managed switch.
- 1 – connector that is labeled 
  Use this connector to connect to the host PC.

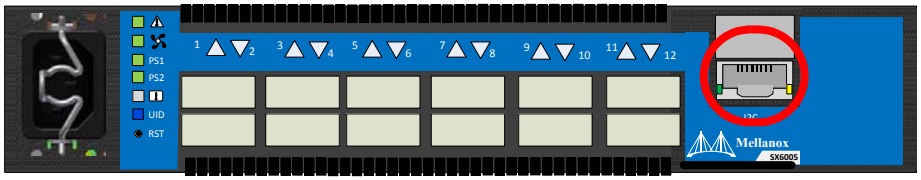
- 1 – reset button
- 1 – I2C banana connector on the rear side is for FAE use only.

Figure 13: Front Side Interfaces for the Internally Managed Switch



For Externally managed switches there is one I2C RJ-45 interface to connect to the SX6005.

Figure 14: Interface for Externally Managed Switches



2.6.1 RJ-45 Connector "CONSOLE" Internally Managed Switches only

The port labeled  is for a local host connection to the management module. This is used the first time the switch is connected. A harness is included in the package to connect to a DB9 connection on a host PC. Connecting to a local host PC and following the instructions in the Installation Guide, "Configuring the Switch for the First Time", must be done before any remote management is available. For the Socket pinout see "RJ-45 CONSOLE and I2C Interface" on page 61.

2.6.2 RJ-45 Ethernet Connector Internally Managed Switches Only

The Ethernet connection labeled  provides access for remote management. The switch can be connected to any Ethernet port. The Ethernet port on the connector side of the switch is mgmt0.

These connector(s) are not found in unmanaged (externally managed) switches.

Each Ethernet connector gets connected to Ethernet switches. These switches must be configured to 100M/1G auto-negotiation.

Use only FCC compliant Ethernet cables.

The externally managed switches are Plug and Play and all firmware updates should be done in-band. The I2C connection should only be used if the firmware image was corrupted to the point that the regular firmware tools cannot successfully reburn the correct image.

2.6.3 USB Connector Internally Managed Switches Only

There is a single mini USB connector. This connector can be used to install software and or firmware upgrades using a memory device that has a USB connector. This connector is USB 2.0 compliant.

The USB connector is not found on externally managed switches.

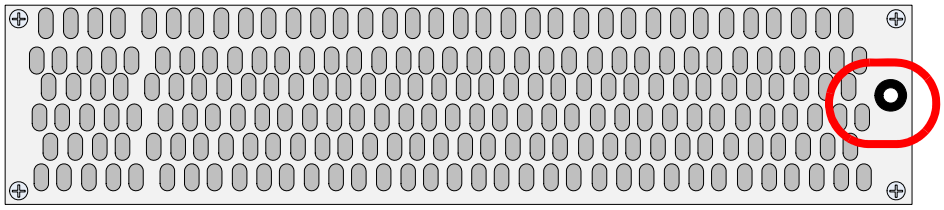
USB 1.0 is not supported.

Do NOT use excessive force when inserting or extracting the USB from the connector.

2.6.4 I2C Connector On Internally Managed Switches

There is an I2C connector on the far right of the rear side of the switch. **This interface is for Debug and Troubleshooting only.** This connector can be used to install firmware upgrades, should the firmware image be damaged and cannot be upgraded through a host PC or remotely. This interface is for support personnel and advanced users only.

Figure 15: Rear of Switch



2.6.5 I2C Connector On Externally Managed Switches Only

The I2C RJ-45 connection provides access to Flash and EEPROMs. This connection is for FAE use only.

The externally managed switches are Plug and Play and all firmware updates should be done in-band.

This interface is for Debug and Troubleshooting only. This interface is for FAEs and advanced users only.

All firmware updates should be done in-band using Mellanox Firmware Management Tools.

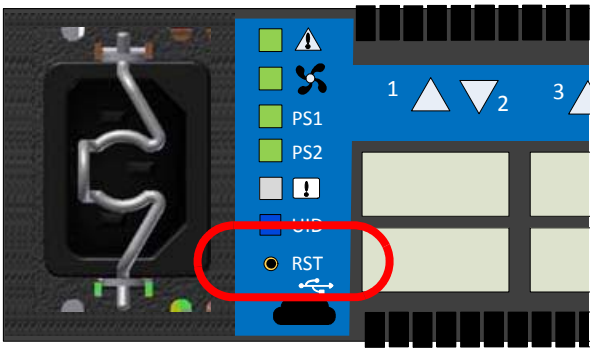
You will need to order an MTUSB-1 USB to I2C adapter to make use of the I2C interface. The I2C connection provides access to Flash and EEPROMs. This connection allows access to the switch for updating firmware.

2.6.6 Reset Button

On the connector side panel under the system LEDs is a reset button . This reset button requires a tool to be pressed.

DO NOT use a sharp pointed object such as needle or push pin for pressing the Reset button. Sharp objects can cause damage, use a flat object to push the reset button.

Figure 16: Reset Button



This button resets both the CPU of the switch device and the CPU of the management module. It thereby resets all of the ports by bringing them down and powering them up when the button is pushed. A quick push of this button performs this reset. When the button is held down for 15 seconds the switch is reset and the password is deleted. You will then be able to enter without a password and make a new password for the user *"admin"*.

In the externally managed switches the reset button resets the CPU of the switch device.

2.6.7 Port Connector Interfaces

The connector side of the switch has 12 QSFP ports. These are placed in two rows, 6 ports to a row. The ports are labelled as shown in Figure 17. The bottom row ports are flipped from the top row. See Figure 18 for bottom row - top row port orientation. See page 48 for more information regarding breakout (fanout) cables.

Figure 17: Port Numbering

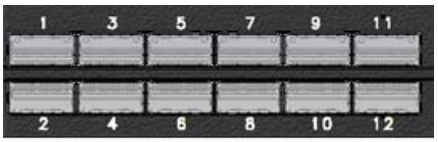
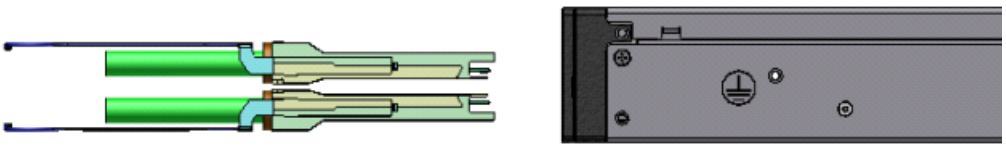


Figure 18: Top and Bottom QSFP Port Orientation



3 Installation

Installation and initialization of the switch platform are straightforward processes, requiring attention to the normal mechanical, power, and thermal precautions for rack-mounted equipment.

The externally managed switch platform does not require any programming or configuration to operate as a basic InfiniBand switch and includes all of the necessary functionality to operate with external standard InfiniBand Subnet Management software.

The managed switch platform requires initial configuration to operate as an InfiniBand device. All internally managed switches come with an internal PPC based management board. This board allows for internally managing the switch through a host PC or remotely through the Ethernet.

The switch platform can be rack mounted and is designed for installation in a standard 19” rack.The switch platform contains auto-sensing 100 - 240 VAC connections for all possible PS units.

The installer should use a rack capable of supporting the mechanical and environmental characteristics of a fully populated platform.

The rack mounting holes conform to the EIA-310 standard for 19-inch racks. Take precautions to guarantee proper ventilation in order to maintain good airflow at ambient temperature. Cable routing in particular should not impede the air flow through the switch .

3.1 Installation Safety Warnings

For Safety Warnings in French see “Avertissements de sécurité pour l'installation (French)” on page 64, for German “Installation – Sicherheitshinweise(German)” on page 69, for Spanish see “Advertencias de seguridad de instalación(Spanish)” on page 73 for Russian see “Предупреждения по технике безопасности при установке(Russian)” on page 78, for Romanian see “Avertismente privind siguranţa la instalare (Romanian)” on page 83, and for Chinese see page 88.

1. **Installation Instructions**

Read all installation instructions before connecting the equipment to the power source.

2. **Installation in Restricted Access Location**

This unit is intended for installation in a Restricted Access Location.

3. Over-temperature

This equipment should not be operated in an area with an ambient temperature exceeding the maximum recommended: 45°C (113°F). Moreover, to guarantee proper air flow, allow at least 8cm (3 inches) of clearance around the ventilation openings.

4. Stacking the Chassis

The chassis should not be stacked on any other equipment. If the chassis falls, it can cause bodily injury and equipment damage.

5. Double Pole/Neutral Fusing

This system has double pole/neutral fusing. Remove all power cords before opening the cover of this product or touching any internal parts.

6. Multiple Power Inlets

Risk of electric shock and energy hazard.

The PSUs are all independent.

Disconnect all power supplies to ensure a powered down state inside of the switch platform.

7. During Lightning - Electrical Hazard

During periods of lightning activity, do not work on the equipment or connect or disconnect cables.

8. Copper Cable Connecting/Disconnecting

Copper cables are heavy and not flexible, as such they should be carefully attached to or detached from the connectors. Refer to the cable manufacturer for special warnings/instructions.

9. Rack Mounting and Servicing

When this product is mounted or serviced in a rack, special precautions must be taken to ensure that the system remains stable. In general you should fill the rack with equipment starting from the bottom to the top.

10. Equipment Installation

This equipment should be installed, replaced, and/or serviced only by trained and qualified personnel.

11. Equipment Disposal

Disposal of this equipment should be in accordance to all national laws and regulations.

12. Local and National Electrical Codes

This equipment should be installed in compliance with local and national electrical codes.

13. Installation Codes

This device must be installed according to the latest version of the country national electrical codes. For North America, equipment must be installed in accordance to the applicable requirements in the US National Electrical Code and the Canadian Electrical Code.

14. Battery Replacement

Warning: Replace only with UL Recognized battery, certified for maximum abnormal charging current not less than 4mA

There is a risk of explosion should the battery be replaced with a battery of an incorrect type.

Dispose of used batteries according to the instructions.

15. UL Listed and CSA Certified Power Supply Cord

For North American power connection, select a power supply cord that is UL Listed and CSA Certified, 3 - conductor, [16 AWG], terminated with a molded plug rated at 125 V, [13 A], with a minimum length of 1.5m [six feet] but no longer than 4.5m.

For European connection, select a power supply cord that is internationally harmonized and marked “<HAR>”, 3 - conductor, minimum 1.0 mm^2 wire, rated at 300 V, with a PVC insulated jacket. The cord must have a molded plug rated at 250 V, 10 A.

16. High Leakage Current

Warning: High leakage current; Earth connection essential before connecting supply.

17. Add GND connection information

Before connecting this device to the power line, the protective earth terminal screws of this device must be connected to the protective earth in the building installation.

(GND Connection Information):

The building installation shall provide a means for a connection to protective earth; and the equipment shall be permanently connected to that by a service person.

A SERVICE PERSON shall check whether or not the socket - outlet from which the equipment is to be powered provides a connection to the building protective earth. If not, the SERVICE PERSON shall arrange for the installation of a PROTECTIVE EARTHING CONDUCTOR from the separate protective earthing terminal to the protective earth wire in the building. The equipment shall be installed in area where equipotential bonding exists ((such as a telecommunication centre or a dedicated computer room).

18. Interconnection Of Units

Cables for connecting to the unit RS232 and Ethernet Interfaces must be UL certified type DP-1 or DP-2. (Note- when residing in non LPS circuit)

Overcurrent Protection: A readily accessible Listed branch circuit overcurrent protective device rated 20 A must be incorporated in the building wiring.

19. Hazardous Radiation Exposure

Caution – Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.

CLASS 1 LASER PRODUCT and reference to the most recent laser standards IEC 60 825-1:1993 + A1:1997 + A2:2001 and EN 60825-1:1994+A1:1996+ A2:2001

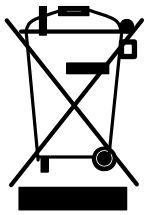
20. Proper Enclosure

A suitable electrical, mechanical and fire enclosure shall be provided by the end product manufacturer and or the end user.

21. Do Not Use the Switch as a Shelf or Work Space

Caution: Slide/rail mounted equipment is not to be used as a shelf or a work space. The rails are not intended for sliding the unit away from the rack. It is for permanent installation at final resting place only, not used for service and maintenance

22. WEEE Directive



According to the WEEE Directive 2002/96/EC, all waste electrical and electronic equipment (EEE) should be collected separately and not disposed of with regular household waste.
Dispose of this product and all of its parts in a responsible and environmentally friendly way.

23. Country of Norway Power Restrictions

This unit is intended for connection to a TN power system and an IT power system of Norway only.

3.1.1 Battery Replacement

Mellanox Technologies does not support battery replacement. Customer removal of the switch cover will void the warrantee. Only Remove the cover to comply with WEEE directives or to disassemble for environmentally approved disposal.

Customer removal of the switch cover will void the warrantee.

There is a danger of explosion if the battery is incorrectly replaced.
DO NOT replace the battery.
Dispose of used batteries according to manufacturer's instructions.

3.2 Package Contents

Before you install your new switch, unpack the system and check to make sure that all the parts have been sent, check this against the parts list below. Check the parts for visible damage that may have occurred during shipping.

The switch comes packed with the following items:

- 1 – switch
- 1 – set of rubber feet for the tabletop installation
- 1– power cable for each PS unit – Type C13-C14

- 1 – Harness DB9 to RJ-45 for connecting to the CONSOLE port for managed switches only
- Documentation – QSG
- 1 – China RoHS statement

If anything is damaged or missing, contact your customer representative immediately. For customer support go to:
www.mellanox.com =>Support => Customer Support Portal Login

No installation kit comes with this switch. The installation kit must be ordered separately. The order number is MSX60-DKIT.

3.3 Mechanical Installation

Tools and Customer Supplied Parts:

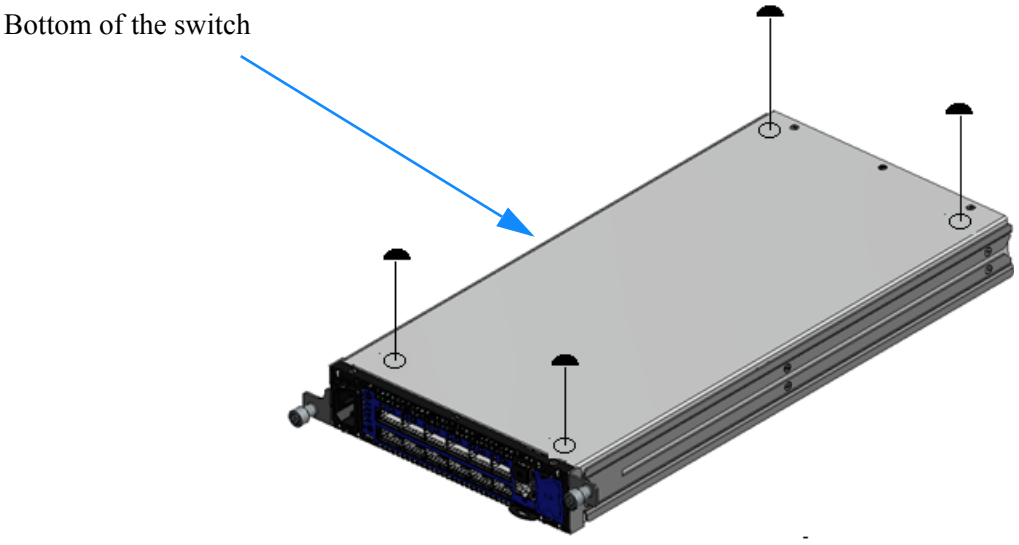
- Phillips Screwdrivers #1 and #2
- ESD strap
- ESD mat
- Grounding screw
- Grounding wire sufficient to reach a valid ground.

3.3.1 Table Top Installation

Included in the box is a bag with 4 rubber stick-on feet for table top installation.

1. Peel and stick the four rubber bumpers into the bottom of the switch. Place them in the round circles.

Figure 19: Placing the Bumpers



2. Place on a flat surface. Make sure the switch sits solid on the surface.

3. Connect the power cord.
4. Connect the data transfer cables.

3.3.2 Installation Procedure for a Side by Side Installation

No installation kit comes with this switch. The installation kit must be ordered separately. The order number is MSX60-DKIT.

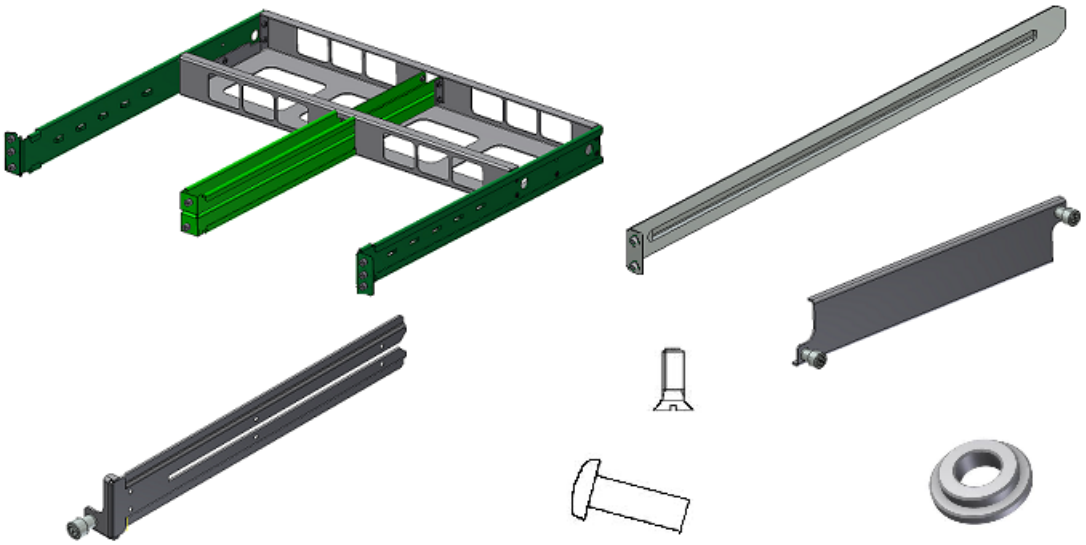
Installation kit parts for a side by side installation:

- 1 Two switch metal frame
- 2 frame rail slides
- 4 switch mounting rails - The kit contains enough rails to install 2 switches.
- 10 M-5 Pan head screws
- 24 flat head screws - The kit contains enough screws to install 2 switches.
- 1 blank cover
- 10 spacer bushing for frame installation
- 4 rubber stick-on feet
  Not used for side by side installation

The installation kits come with enough switch mounted rails and flat head screws to install two switches.

The 2 switch frame will fit into racks with from 21” (533mm) to 34” (864mm) between the vertical supports.

Figure 20: Installation Kit Parts for a Side by Side Installation



➢ ***Installing the switch slides on the switch***

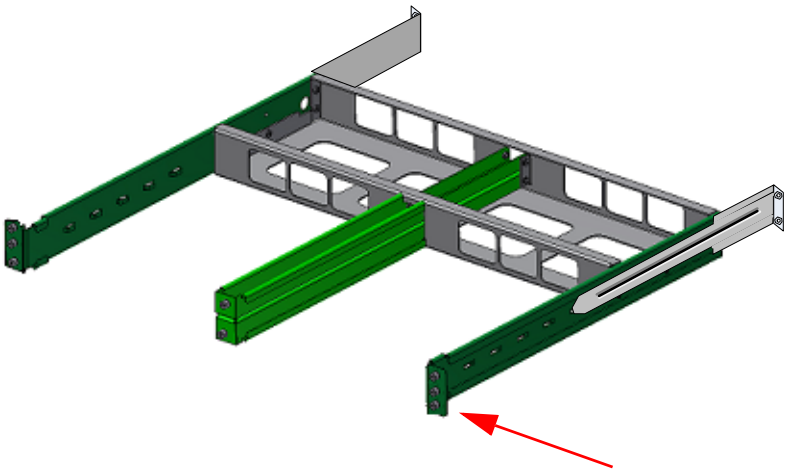
1. Place the ESD mat on the floor where you will be working and put on the ESD strap. Make sure the ESD strap is touching your skin and that the other end is connected to a verified ground.
2. Screw the two switch mounted rails to the switch using six flat head screws per rail.

Figure 21: Screw on the Switch Mounted Rails

- ***Install the two switch frame into the rack.***

1. Slide the Frame slides into the frame.

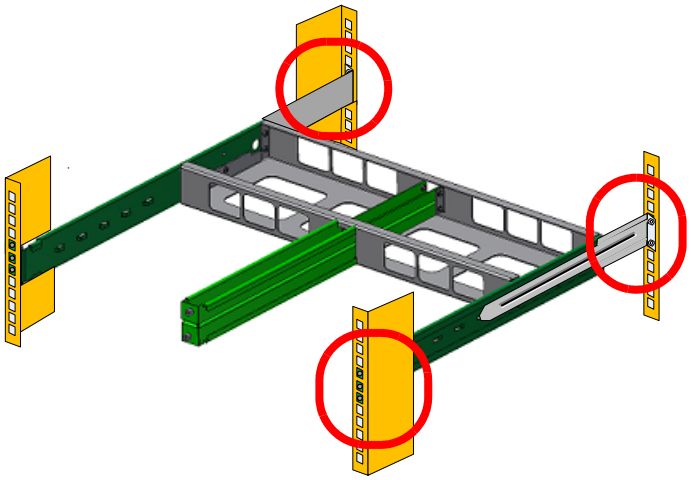
Figure 22: Two Switch Frame



Connector side of the rack.

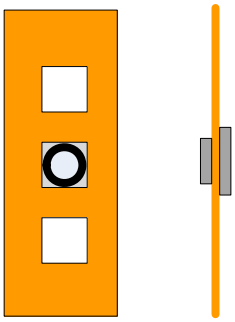
2. Place the frame in the rack. Both sides of the frame need to be on the inside of the rack.

Figure 23: Placement of Frame in the Rack



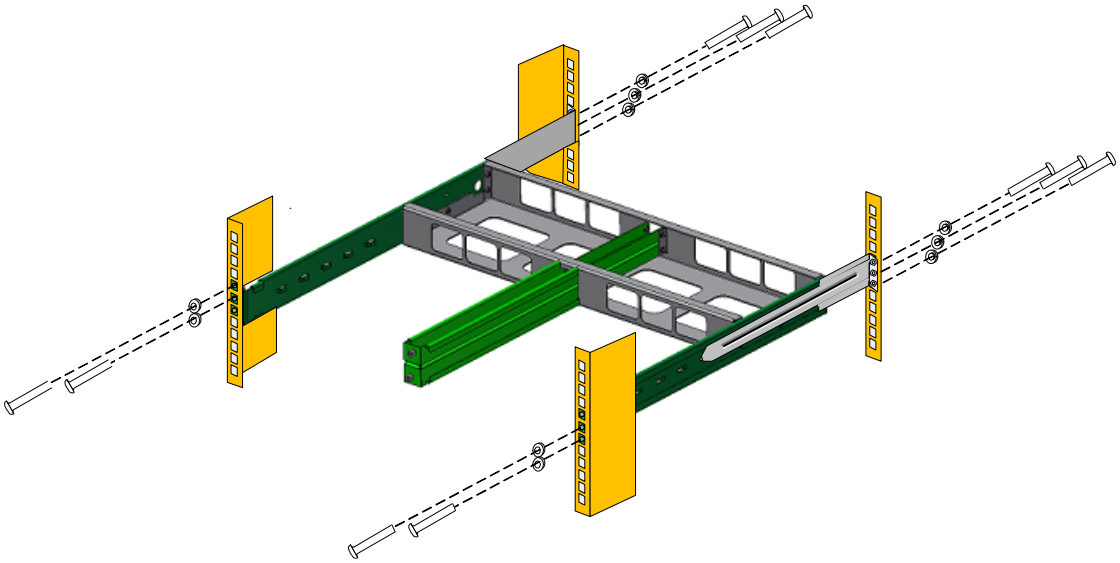
3. Take the 10 spacer bushings and use them to adapt the square openings in the vertical support.

Figure 24: Placing the Spacer in the Rack



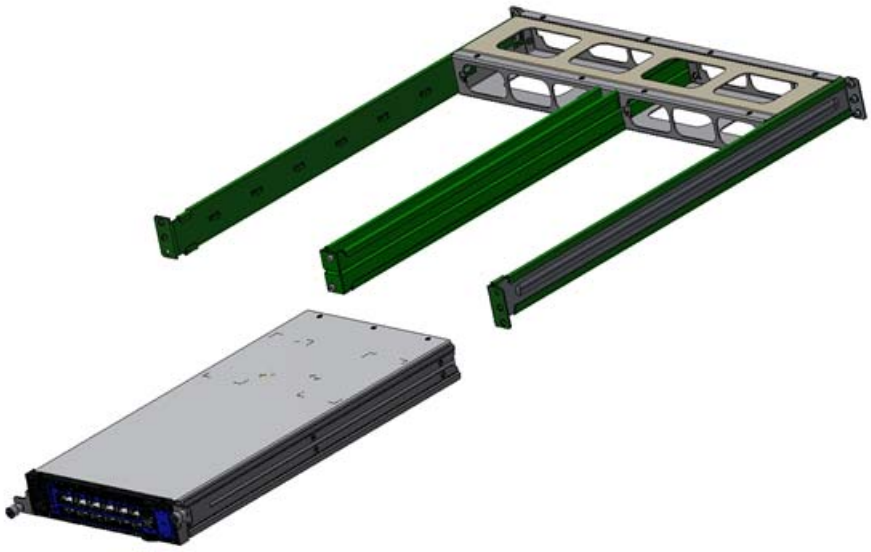
4. Use the 10 M5 pan head screws. Do not tighten the screws for the frame.

Figure 25: Using the Spacer Bushings



5. Slide the switch into the frame, and screw in the capture bolts into the frame.

Figure 26: Insert Switch into Frame



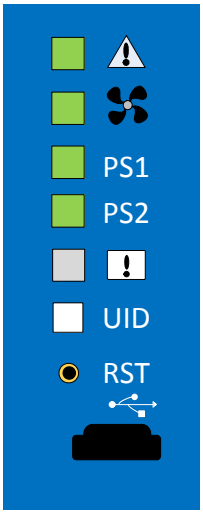
6. Tighten the capture nuts.
7. Install the blank panel into the frame opposite the switch, or install a second switch.
8. Tighten the capture nuts.
9. Tighten all ten screws to 9.2 Nm or 81.5 pound inches.
10. Ground the switch.
11. Plug in the power cables. Wait at least 2 seconds between inserting the first power supply cord and inserting the second power supply cord.

Wait at least 2 seconds between inserting the first power supply cord and inserting the second power supply cord.

Anytime the switch is powered down (by choice or by power failure) you must unplug the 2 PSUs before powering up the system.

12. You can start connecting all of the cables to the switch.

Figure 27: Status LEDs 5 Minutes After Power On



Warning: Any yellow or red status LEDs are cause for concern and must be dealt with immediately.
It can take up to 5 minutes to boot up, during which time the status LED may indicate red.

3.4 Grounding the Switch

Check to determine if your local or national electrical codes require an external ground to all IT components. If so, connect a ground wire to one of the casing screws and connect the other end to a valid ground. If you choose to not use the ground screw, make sure that the rack is properly grounded and that there is a valid ground connection between the chassis of the switch and the rack. Test the ground using an Ohm meter.

Some national and/or local codes may require IT components to be bonded and externally grounded (not including the power cord ground). You must follow all national and local codes when installing this equipment.

3.5 Power Connections and Initial Power On

The switch platform ships with one or two power supply units. Each supply has a separate AC receptacle. The input voltage is auto-adjusting for 100 - 240VAC, 50-60Hz power connections. The power cords should be standard 3-wire AC power cords including a safety ground and rated for 15A or higher.

Caution: The switch platform will automatically power on when AC power is applied. There is no power switch. Check all boards, power supplies, and fan tray modules for proper insertion before plugging in a power cable.

This unit is intended for installation in a Restricted Access Location. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.

Caution: After inserting a power cable and confirming the green system status LED light is on; make sure that the Fan Status indicator shows green.
If the fan status indicator is not green then unplug the power connection and call product support.

Caution: When turning off the switch, make sure ALL Connector LEDS are off to ensure a powered down status.

Figure 28: Two Power Inlets - Electric Caution Notifications

CAUTION

Risk of electric shock and energy hazard. The two PS units are independent.

Disconnect all power supplies to ensure a powered down state inside of the switch platform.

ACHTUNG

Gafahr des elektrischen Schocks. Entferrnen des Netzsteckers elnes Netzteils spannungsfrei. Um alle Einhieten spannungsfrei zu machen sind die Netzstecker aller Netzteile zu entfernen

ATTENTION

Risque de choc et de danger e'lectriques. Le de'branchment d'une seule alimentation stabilise'e ne de'branch uniquement qu'un module "Alimentation Stabilise'e". Pour isoler completement le module en cause, Il faut de'brancher toutes les alimentations stabilise'es.

This unit is intended for installation in a Restricted Access Location. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.

3.6 Externally Managed Switches

Externally managed switches, that is the SX6005 switches, do not have a management chip or management board within the switch. These switches do not get configured. On externally managed switches, the CONSOLE, Ethernet, and USB connectors are not found. Instead there is an I2C connector.

The externally managed switches are Plug and Play and all firmware updates should be done in-band. The I2C connection should only be used if the firmware image was corrupted to the point that the regular firmware tools cannot successfully reburn the correct image.

You will need to confirm that your switch has the latest firmware. For externally managed switches, confirm that the latest FW revision is installed on this device. Use the CLI to get the currently installed revision and then go to Mellanox.com to check the revision of the latest version.

For more information on how to get the current firmware version see Section 5.5.1, "Current Firmware Revision For Externally Managed Switches," on page 51.

3.7 Internally Managed Switch Configuration

3.7.1 Configuring the Switch for the First Time

The procedures described in this chapter assume that you have already installed and powered-on your switch according to the instructions in this document.

Internally managed switches, must be configured before they will work. Follow the procedures below to configure the switch.

➢ ***To configure the switch:***

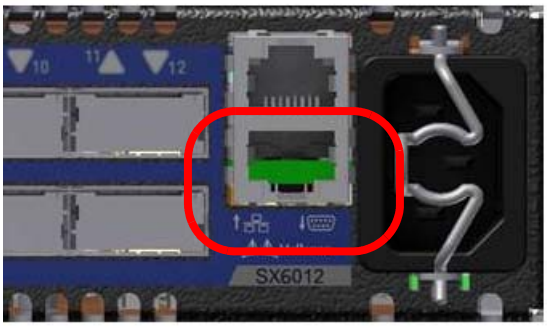
Externally managed switches do not get configured. The CONSOLE, Ethernet, and USB connectors are not found on externally managed switches. Instead there is an I2C connector.

1. Connect the host PC to the Console (RJ-45) port of the switch system using the supplied cable. The Console ports for systems are shown below as examples.

The port labelled  must be connected to a local host PC. This must be used the first time the switch is connected. This must be done before any remote management is available.

Hook up the supplied harness cable (HAR00028) from the connector labelled  to the DB9 connector of the local host PC.

Figure 29: Console Port



Connect the host PC to this port.

Make sure to connect to the Console RJ-45 port of the switch and not to the (Ethernet) MGT port.

No remote IP connection is available at this stage.

2. Configure a serial terminal program (for example, HyperTerminal, minicom, or Tera Term) on your host PC with the settings described in Table 13.

Table 13 - Serial Terminal Program Configuration

Parameter	Setting
Baud Rate	9600
Data bits	8
Stop bits	1
Parity	None
Flow Control	None

3. Login (from a serial terminal program) as *admin* and use *admin* as password. This starts the Mellanox configuration wizard.
4. Go through the Mellanox configuration wizard. Table 14 shows an example of a wizard session.

Table 14 - Configuration Wizard Session - DHCP (Sheet 1 of 2)Configuration (Example)

Wizard Session Display	Comments
Mellanox configuration wizard Do you want to use the wizard for initial configuration? yes	You must perform this configuration the first time you operate the switch or after resetting the switch. Type ‘y’ and then press <Enter>.
Step 1: Hostname? [switch]	If you wish to accept the default hostname, then press <Enter>. Otherwise, type a different hostname and press <Enter>.

Table 14 - Configuration Wizard Session - DHCP (Sheet 2 of 2)Configuration (Example)

Wizard Session Display	Comments
Step 2: Use DHCP on mgmt0 interface? [no] yes	Perform this step to obtain an IP address for the switch. (mgmt0 is the management port of the switch.) If you wish the DHCP server to assign the IP address, type 'yes' and press <Enter>. If you type 'no' (no DHCP), then you will be asked whether you wish to use the 'zeroconf' configuration or not. If you enter 'no' (no Zeroconf), then you need to enter a *static* IP, and the session will continue.
Step 3: Enable IPv6? [yes]	The management interface will be able to use IPv6 addresses.
Step 4: Enable IPv6 auto-config (SLAAC) on mgmt0 interface? [no]	This turns on auto-configuration of the IPv6 addresses. This is unsuitable for DHCPv6.
Step 5: Enable DHCPv6 on mgmt0 interface? [no]	To enable DHCPv6 on the MGMT0 interface.
Step 6: Admin password (Press <Enter> to leave unchanged)? <new_password> Step 6: Confirm admin password? <new_password>	To avoid illegal access to the machine, please type a password and then press <Enter>. Then confirm the password by re-entering it. Note that password characters are *not* printed.
You have entered the following information: <A summary of the configuration is now displayed.> To change an answer, enter the step number to return to or hit <enter> to save changes and exit. Choice: <Enter> Configuration changes saved.	The wizard displays a summary of your choices and then asks you to confirm the choices or to re-edit them. Either press <Enter> to save changes and exit, or enter the configuration step number that you wish to return to. Note: To re-run the configuration wizard run the command "configuration jump-start" in Config mode.

The table below shows an example of static IP configuration for mgmt0 interface.

.

Table 15 - Configuration Wizard Session - Static IP Configuration

Wizard Session Display - Static IP Configuration (Example)
Mellanox configuration wizard Do you want to use the wizard for initial configuration? yes Step 1: Hostname? [switch] Step 2: Use DHCP on mgmt0 interface? [yes] no Step 3: Use zeroconf on mgmt0 interface? [no] Step 4: Primary IP address? [for example 192.168.10.4] 10.10.10.10 Mask length may not be zero if address is not zero (interface eth0) Step 5: Netmask? [0.0.0.0] 255.255.255.0 Step 6: Default gateway? [for example 192.168.10.1] 10.10.10.255 Step 7: Primary DNS server? Step 8: Domain name? Step 9: Enable IPv6? [yes] Step 10: Enable IPv6 autoconfig (SLAAC) on mgmt0 interface? [no] Step 11: Admin password (Enter to leave unchanged)? To change an answer, enter the step number to return to. Otherwise hit <enter> to save changes and exit. Choice: Configuration changes saved. To return to the wizard from the CLI, enter the “configuration jump-start” command from configure mode. Launching CLI... switch>

The table below shows an example of a Zeroconf wizard session.

Table 16 - Configuration Wizard Session - Zeroconf Configuration

Wizard Session Display - IP Zeroconf Configuration (Example)
Mellanox configuration wizard Do you want to use the wizard for initial configuration? yes Step 1: Hostname? [switch] Step 2: Use DHCP on mgmt0 interface? [yes] no Step 3: Use zeroconf on mgmt0 interface? [no] yes Step 4: Default gateway? [For example:192.168.10.1] Step 5: Primary DNS server? Step 6: Domain name? Step 7: Enable IPv6? [yes] Step 8: Enable IPv6 autoconfig (SLAAC) on mgmt0 interface? [no] Step 9: Admin password (Enter to leave unchanged)? To change an answer, enter the step number to return to. Otherwise hit <enter> to save changes and exit. Choice: Configuration changes saved. To return to the wizard from the CLI, enter the “configuration jump-start” command from configure mode. Launching CLI... switch>

5. Before attempting a remote (for example, SSH) connection to the switch, check the mgmt0 interface configuration. Specifically, verify the existence of an IP address. To check the current mgmt0 configuration, enter the following commands:

```
switch > enable
switch # configure terminal
switch (config) # show interfaces mgmt0
```

The following is an example of the output:

```
Interface mgmt0 state
   Admin up:           yes
   Link up:            yes
   IP address:         192.168.10.43
   Netmask:            255.255.255.0
   Speed:              1000Mb/s (auto)
   Duplex:             full (auto)
   Interface type:     ethernet
   Interface source:   physical
   MTU:                1500
   HW address:         00:02:C9:11:2A:AE
   Comment:
```

```
RX bytes:         1343502058      TX bytes:         313920869
RX packets:        17589211       TX packets:       992717
RX mcast packets:  0              TX discards:     0
RX discards:       0              TX errors:       0
RX errors:         0              TX overruns:     0
RX overruns:       0              TX carrier:      0
RX frame:          0              TX collisions:   0
                                  TX queue len:    1000
```

Confirm that the latest SW revision is installed on this device. Use the CLI to get the currently installed revision and then go to Mellanox.com to check the revision of the latest version.

6. Run the command:

```
show version
```

7. Compare the results of this command with the latest version for your switch posted on the support page for your switch. This page will need a support login and password.

➢ ***Rerunning the Wizard***

8. If you want to rerun the wizard run the following commands:

```
switch > enable
switch# configure terminal
switch (config) # configuration jump-start
```

3.7.2 Starting a Remote Connection to the Switch

There are two ways to access the management CPU:

- Via the Ethernet connector for remote access:
  - SSH
  - Telnet
  - Web
  - SNMP
  - XML

For additional information on the MLNX-OS refer to MLNX-OS User Manual and MLNX-OS Command Reference Guide located on Mellanox support web.

➢ ***To Start an SSH Connection to the Switch perform the following steps:***

1. Set up an Ethernet connection between the switch and a local network machine (“the remote machine” henceforth) using a standard RJ-45 connector.
2. Connect to the remote machine (*rem_mach1* is used as an example).

3. Start a remote shell to the switch using the following command:
   <switch_IP_address> is the IP address of the switch.

```
rem_mach1 >  ssh -l <username> <switch ip address>
Mellanox MLNX-OS® Switch Management
Password:
Last login: March 13, 2013 from 192.168.10.1
Mellanox Switch
switch >
```

4. You can enter any supported command now.

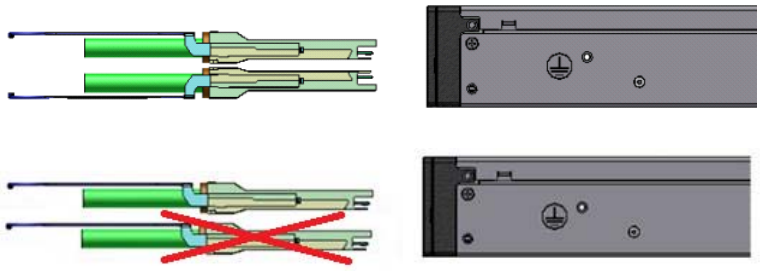
4 Cabling

4.1 Cable Installation

FDR and FDR10 are only guaranteed to work with approved Mellanox Cables. For a list of approved cables for these switches see http://www.mellanox.com/related-docs/user_manuals/Mellanox_approved_cables.pdf

All cables can be inserted or removed with the unit powered on. To insert a cable, press the connector into the port receptacle until the connector is firmly seated. The LED indicator, corresponding to each data port, will light when the physical connection is established (that is, when the unit is powered on and a cable is plugged into the port with the other end of the connector plugged into a functioning port). After plugging in a cable, lock the connector using the latching mechanism particular to the cable vendor. When a logical connection is made the LED will change to green for IB and orange for Eth. When data is being transferred the light will blink green.

Figure 30: Top and Bottom QSFP Cable Orientation



To remove, disengage the locks and slowly pull the connector away from the port receptacle. The LED indicator for that port will turn off when the cable is unseated.

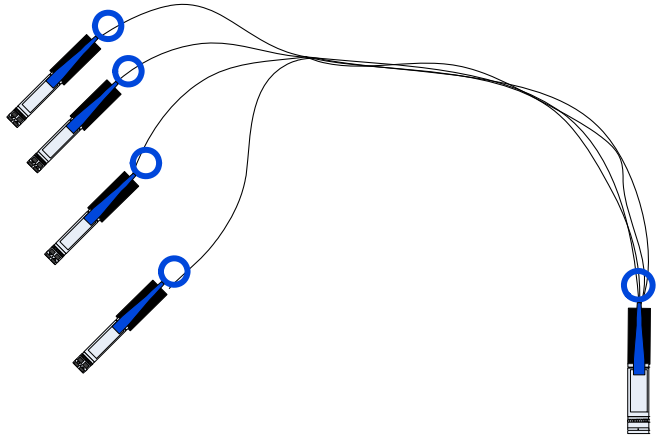
Care should be taken not to impede the air flow through the ventilation holes next to the connector ports. Cable lengths should be used which allow for routing horizontally around to the side of the switch before bending upward or downward in the rack.

4.2 Splitting the Data Stream Using Breakout (Fanout) Cables

Only internally managed switches support splitting of the data stream.

All 12 ports can be split from 1 X QSFP to 4 X SFP+ by using a QSFP 1X4 breakout cable to split one 40 GbE port into 4 lanes (4 SFP+ connectors 10 GbE each). All ports can also split into 2 10 GbE ports, using lanes 1 and 2 only. When a QSFP port is split into 2 10 GbE ports then only SFP+ connectors #1 and #2 are used. Connectors #3 and #4 are left unconnected.

Figure 31: Breakout or Fanout Cable



When using this feature you MUST go into the MLNX-OS® chassis management system and reconfigure the individual ports to split-4. See the MLNX-OS® Software Command Reference Guide for instructions on port configuration.

5 Switch Management

Managed switches come with a management chip and MLNX-OS software.

The MLNX-OS® switch management package can be downloaded from: http://support.mellanox.com/SupportWeb/software_products/fm_products/mlnx_os. For additional information on the MLNX-OS refer to MLNX-OS User Manual and MLNX-OS Command Reference Guide located on Mellanox support web.

5.1 InfiniBand Subnet Manager

The InfiniBand Subnet Manager (SM) is a centralized entity running in the switch. The SM applies network traffic related configurations such as QoS, routing, partitioning to the fabric devices. You can view and configure the Subnet Manager parameters via the CLI/WebUI. Each subnet needs one subnet manager to discover, activate and manage the subnet.

Each network requires a Subnet Manager to be running in either the switch itself (switch based) or on one of the nodes which is connected to the fabric (host based).

No more than two subnet managers are recommended for any single fabric.

The IB Subnet Manager running on the switch supports up to 648 nodes. If the fabric includes more than 648 nodes, you may need to purchase Mellanox's Unified Fabric Manager (UFM®) software package.

Each subnet needs one subnet manager to discover, activate and manage the subnet.

Each network requires a Subnet Manager to be running in either the switch itself (switch based) or on one of the nodes which is connected to the fabric (host based).

The subnet manager (OpenSM) assigns Local IDentifiers (LIDs) to each port connected to the fabric, and develops a routing table based on the assigned LIDs.

A typical installation using the OFED package will run the OpenSM subnet manager at system start up after the OpenIB drivers are loaded. This automatic OpenSM is resident in memory, and sweeps the fabric approximately every 5 seconds for new adapters to add to the subnet routing tables.

5.2 Fabric Inspector (Diagnostics)

Fabric Inspector is a plug & play licensed software within MLNX-OS® displaying and filtering all identified systems and nodes within the fabric.

Fabric Inspector includes a complete set of InfiniBand tools for fabric wide diagnostics to check node-node and node-switch connectivity and to verify routes within the fabric.

Advanced filtering allows creating filtering rules on a system wide basis, between nodes or port connections based on traffic patterns and user assigned system names (GUIDs).

5.3 Upgrading Software

Software and firmware updates are available from the Mellanox Support website. Check that your current revision is the same one that is on the Mellanox website. If not Upgrade your software. Copy the update to a known location on a Remote server within the user's LAN.

Use the CLI or the GUI in order to perform software upgrades. For further information please refer to the MLNX-OS Software User Manual section Upgrading MLNX-OS® Software.

Be sure to read and follow all of the instructions regarding the updating of the software on your switch system.

5.4 Updating Firmware Internally Managed Switch

Managed switches do not require Firmware updating. Firmware updating is done through the MLNX-OS management software. The switch comes standard with a management software module for switch management called Mellanox Operating System (MLNX-OS). MLNX-OS® is installed on all SwitchX®-2 based managed switch systems. MLNX-OS® includes a CLI, WebUI, SNMP, switch management software and IB management software (OpenSM).

The Ethernet ports for remote management connect to Ethernet switches. These switches must be configured to 100Mb/1 Gb auto-negotiation.

5.5 Updating Firmware Externally Managed Switch

All firmware updates should be done in-band. Go to the Mellanox Website and confirm that the firmware is the latest. If not, reburn the latest firmware from the download site. New firmware versions will be posted on the Mellanox firmware download page:
http://www.mellanox.com > Support > Download Firmware. Access to this page requires a login and password.

You will need the Mellanox Firmware Tools package to update firmware for this switch. It can also be downloaded from:
http://www.mellanox.com > Support > InfiniBand Software and Drivers.

You will also need to download and unzip the firmware binary image. This is provided in the Mellanox Web site at: http://www.mellanox.com > Support > Download Firmware and go to the SwitchX®-2 Switch systems. Click in the Table for the firmware image that you need.

In order to get information regarding the externally managed switch you need to download the Mellanox MFT tools from the Mellanox website
www.mellanox.com > Products >Software > Firmware tools

Select and download the release that matches your system. Follow the instructions in the User Manual http://www.mellanox.com/pdf/MFT/MFT_user_manual.pdf to get the tools.

5.5.1 Current Firmware Revision For Externally Managed Switches

➢ ***In order to obtain the Firmware version of the externally managed switch:***

1. Run the following command from a host:

```
flint -d lid-[number] -qq
```

2. Compare the results of this command with the latest version for your switch posted on the www.mellanox.com > Support > Firmware Downloads > SwitchX®/SwitchX®-2 Switch System page.
3. If the current version is not the latest version, follow the directions in the MFT User manual to burn the new firmware inband.
4. I2C Connector

The I2C connection provides access to Flash and EEPROMs. This connection is for FAE use only.

The externally managed switches are Plug and Play and all firmware updates should be done in-band.

This interface is for Debug and Troubleshooting only. This interface is for FAEs and advanced users only.

5.5.2 How to Get Mellanox Firmware Tools (MFT)

Mellanox Firmware Tools (MFT) and documentation are available for download via http://www.mellanox.com > Downloads > Firmware & Documents.

The MFT kit includes:

- mlxburn
- flint
- spark
- debug utilities

See “Related Documentation” on page 8.

6 Troubleshooting

As soon as a switch is plugged in make sure that the green power LEDs on the PS units are on.

Issue 1. Switch Status (health) LED:

If this LED is **red** unplug the switch and call your Mellanox representative.

If this LED is **off**:

1. Check that the there is adequate ventilation. Are the fan LEDs showing that the fans are all up and running?
2. Make sure that there is nothing blocking the front or rear of the switch and that the fan modules and ventilation holes are not blocked (especially dust over the holes).
3. If you find dust blocking the holes it is recommended to clean the fan unit and remove the dust from the front and rear panels of the switch using a vacuum cleaner.

Issue 2. Power supply unit:

If the LED on the PS unit is not lit or is red, check that the power cable is plugged into a working outlet.

1. Check that the power cable has a voltage within the range of 100 - 240 volts AC.
2. Remove and reinstall the power cable.

Issue 3. The green power LED for the fans does not come on:

1. Check that at least one Power LED is green.

Do not run the switch if the System Status LED for the Fans is Red!

Issue 4. The link LED for the connector does not come on:

1. Check that both ends of the cable are connected.
2. Check that the locks on the ends are secured.
3. Make sure that the latest firmware version is installed on all of the HCA cards and the switch.
4. If media adapters are used, check that the all connections are good, tight, and secure.

Issue 5. The activity LED does not come on:

When running IB check that the Subnet Manager has been started.

Issue 6. The switch is off:

1. Unplug the switch.
2. Wait 5 minutes.
3. Plug in the switch.
4. If the switch does not come on, check the power supplies.
5. If the switch comes on, Use the MLNX-OS® management CLI to determine the cause of the Shutdown.
6. Check the temperature.
7. Check the Fan status.

Issue 7. The switch is not working and unresponsive:

1. Reset the switch.

If resetting the switch does not work:

1. Unplug the switch.
2. Wait 5 minutes.
3. Plug in the switch.
4. If the switch comes on, use the MLNX-OS® management CLI to determine the cause of the shutdown.

Appendix A: Specification

Table 17 - SX6012/6005 Specification Data

Physical				
Size	Size: (short)	1.73” (1U) H x 7.9” W x 15.7” D 44mm X 200mm X398.8mm		
Mounting / Weight	Mounting:	19” Rack mount	1PSU 2PSUs	2.98 kg 3.2 kg
SerDes Speeds / Connector Types	SerDes Speeds:	10, 20, 40, or 56 Gb/s per port	Connector Types:	QSFP+
Air Flow/ Heat dissipation	Air Flow:	55 CFM	Heat dissipation: Maximum	573 BTUs/hr
Power and Environmental				
Input Voltage	Input Voltage:	100 - 240 VAC 50-60Hz		
Power numbers	Power Consumption:	PS unit fan is at 80%	Typ: 56Gb/s Passive cables: Active Cables: Optical Cables	 119 W 142 W 145W
	Max: 56Gb/s Passive cables: Active Cables: Optical Cables	 136 W 163 W 168W		
Cable power / Temperature	QSFP	MAX 2.0W TYP: 1.5W	Temperature: Operating Non-operating	 0° to 45° Celsius -40° to 70° Celsius
Shock and Vibration/ Humidity	Shock and Vibration:	ETSI EN 300 019-2-2: 1999-09	Humidity: Operating	 5% - 90% non-condensing

Protocol Support				
Speed protocol \ QoS / Management	IB:	Auto-Negotiation of (56Gb/s, 40Gb/s, 10Gb/s)	Management: SX6012 SX6005	 PPC460 Externally Managed
Data Rate	Data Rate:	56Gb/s IB 40GbE for Ethernet		
Regulatory Compliance				
Safety \ EMC (Emissions)	Safety:	US/Canada: cTUVus EU: IEC60950 International: CB Russia: GOST-R Argentina: S-mark DoC	EMC (Emissions):	USA: FCC, Class A Canada: ICES, Class A EU: EN55022, Class A EU: EN55024, Class A EU: EN61000-3-2, Class A EU: EN61000-3-3, Class A Japan: VCCI, Class A Australia / New-Zealand: AS/NZS CISPR 22 class A
Environmental / Acoustic	Environmental:	EU: IEC 60068-2-64: Random Vibration EU: IEC 60068-2-29: Shocks, Type I / II EU: IEC 60068-2-32: Fall Test	Acoustic:	ISO 7779 71dB(A) ETS 300 753
Scalability and Performance				
Switching Performance / Capacity	Switching Performance:	Simultaneous wire-speed any port to any port	Switching Capacity:	1.344Tb/s

A.1 Approved Cables

For a list of all approved cables see:

http://www.mellanox.com/related-docs/user_manuals/Mellanox_approved_cables.pdf

A.2 EMC Certifications

The list of approved certifications per switch in different regions of the world is located on the Mellanox Website at:

http://www.mellanox.com/related-docs/user_manuals/Regulatory_and_Compliance_Guide.pdf

EMC statements are also in the Regulatory and Compliance Guide.

A.3 China CCC Warning Statement

在维修的时候一定要断开所有电源 (English translation"disconnect all power sources before service")

For non tropical use:

安全说明和标记	汉文	"仅适用于非热带气候条件下安全使用。"
	藏文	《[illegible]》
	蒙古文	"[illegible]"
	壮文	Dan hab yungh youq gij dienheiq diuzgen mbouj dwg diegndat haenx ancienz sawjyungh.
	维文	غەيرى ئىسسىق بەلباغ ھاۋا كىلىماتى شارائىتىدىلا بىخەتەر ئىشلەتكىلى بولىدۇ

For altitude 2000 meter and below:

安全说明和标记	汉文	仅适用于海拔2000m以下地区安全使用。
	藏文	《2000m [illegible]》
	蒙古文	"[illegible]"
	壮文	Dan hab yungh youq gij digih haijbaz 2000m doxroengz haenx ancienz sawjyungh.
	维文	دېڭىز يۈزىدىن 2000 مېتر تۆۋەن رايونلاردىلا بىخەتەر ئىشلەتكىلى بولىدۇ

Warning for Class A:

声 明

此为 A 级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

English translation of above statement

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

* Will be available in Q4 2013.

Appendix B: Thermal Threshold Definitions

There are three thermal threshold definitions for the SwitchX® switch device which impact the overall switch system operation state: Warning, Critical and Emergency.

1. Warning – 100C

On managed systems only: When the SwitchX® device crosses the 100C threshold, a Warning Threshold message will be issued by the MLNX-OS management SW, indicating to system administration that the switch has crossed the Warning threshold.

Note that this temperature threshold does not require nor lead to any action by hardware (such as switch shutdown).

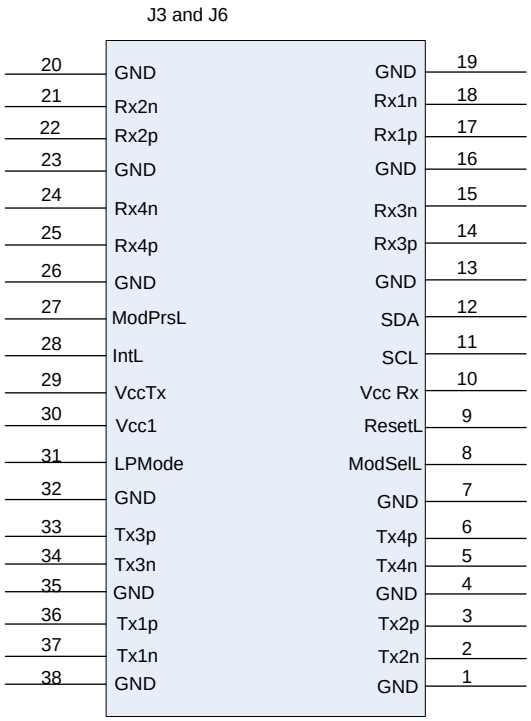
2. Critical – 120C

When the SwitchX® device crosses this temperature, the firmware will automatically shut down the device.

3. Emergency – 130C

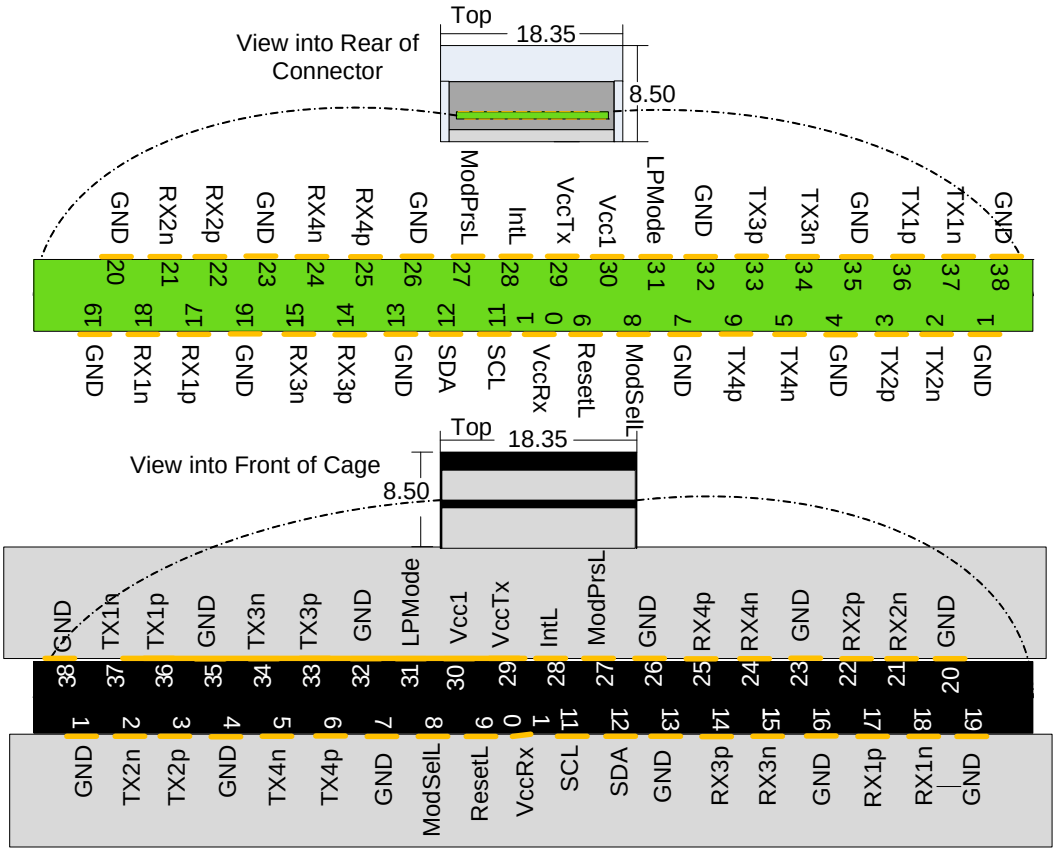
In case the firmware fails to shut down the SwitchX® device upon crossing the Critical threshold, the SwitchX® device will auto-shutdown upon crossing the Emergency (130C) threshold.

Appendix C: QSFP Interface



Connector Pin Number	Connector Pin Name	Signal Description
1	GND	Ground
2	Tx2n	Transmitter Inverted Data Input
3	Tx2p	Transmitter Non-Inverted Data Input
4	GND	Ground
5	Tx4n	Transmitter Inverted Data Input
6	Tx4p	Transmitter Non-Inverted Data Input
7	GND	Ground
8	ModSelL	Module Select
9	ResetL	Module Reset
10	Vcc Rx	+3.3 V Power supply receiver
11	SCL	2-wire serial interface clock
12	SDA	2-wire serial interface data
13	GND	Ground
14	Rx3p	Receiver Non-Inverted Data Output
15	Rx3n	Receiver Inverted Data Output
16	GND	Ground
17	Rx1p	Receiver Non-Inverted Data Output
18	Rx1n	Receiver Inverted Data Output
19	GND	Ground
20	GND	Ground
21	Rx2n	Receiver Inverted Data Output 3
22	Rx2p	Receiver Non-Inverted Data Output 3
23	GND	Ground
24	Rx4n	Receiver Inverted Data Output 3
25	Rx4p	Receiver Non-Inverted Data Output 3
26	GND	Ground
27	ModPrsL	Module Present
28	IntL	Interrupt
29	Vcc Tx	+3.3 V Power supply transmitter
30	Vcc 1	+3.3 V Power Supply
31	LPMode	Low Power Mode
32	GND	Ground
33	Tx3p	Transmitter Non-Inverted Data Input
34	Tx3n	Transmitter Inverted Data Input
35	GND	Ground
36	Tx1p	Transmitter Non-Inverted Data Input
37	Tx1n	Transmitter Inverted Data Input
38	GND	Ground

Figure 32: QSFP Connector Male and Female Views



Appendix D: RJ-45 CONSOLE and I2C Interface

The RJ-45 CONSOLE and I2C interface uses the EIA 568A standard wiring color coding.

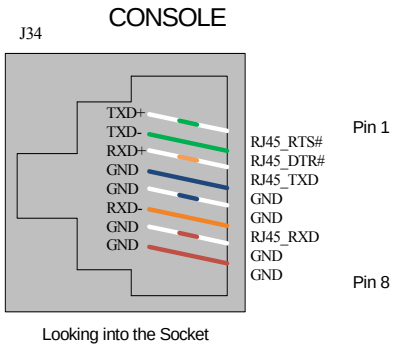


Table 18 - RJ-45 CONSOLE Pinout

Connection	Signal	Pin#	Color
TXD+	RJ-45_RTS#	1	G/W
TXD-	RJ-45_DTR#	2	G
RXD+	RJ-45_TXD	3	O/W
GND	GND	4	Bl
GND	GND	5	Bl/W
RXD-	RJ-45_RXD	6	O
GND	GND	7	Br/W
GND	GND	8	Br

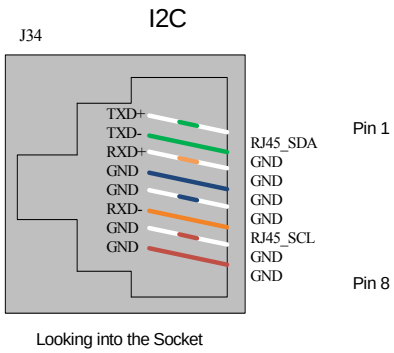


Table 19 - RJ-45 I2C Pinout

Connection	Signal	Pin#	Color
TXD+	RJ-45_SDA	1	G/W
TXD-	GND	2	G
RXD+	GND	3	O/W
GND	GND	4	Bl
GND	GND	5	Bl/W
RXD-	RJ-45_SCL	6	O
GND	GND	7	Br/W
GND	GND	8	Br

Appendix E: Accessory and Replacement Parts

Table 20 - OPNs for Replacement Parts

Part Description	OPN
I2C DB9 or RJ-45 to USB Adapter	MTUSB-1
Harness RS232 2M cable – DB9 to RJ-45 (for managed switches only)	HAR000028
Power cord Type C13-C14	ACC000500
Side by side installation kit	MSX60-DKIT

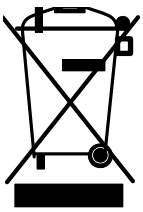
Appendix F: Disassembly of the Switch from the Rack

F.1 Disassembly Procedure

➢ ***To disassemble the switch from the rack:***

1. Unplug and remove all connectors.
2. Unplug the power cord.
3. Remove the ground wire.
4. Remove the switch by unscrewing the thumb nuts and slide the switch out of the frame.
5. Slide the switch from the rack.
6. Remove the 10 screws holding the frame.
7. Remove the frame from the rack.

F.2 Disposal



According to the WEEE Directive 2002/96/EC, all waste electrical and electronic equipment (EEE) should be collected separately and not disposed of with regular household waste.

Dispose of this product and all of its parts in a responsible and environmentally friendly way.

Follow the instructions found in the Mellanox Web site at mellanox.com for proper instructions to disassemble and dispose of the Switch according to the WEEE directive.

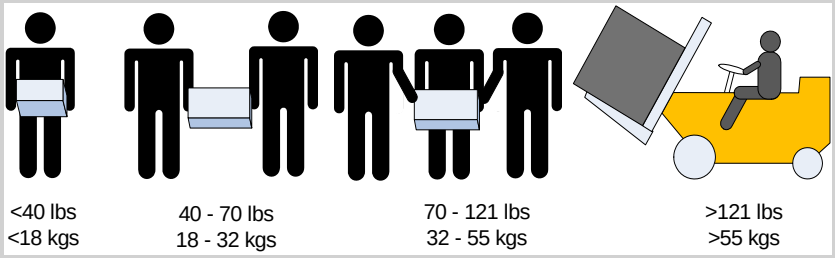
Appendix G: Avertissements de sécurité pour l'installation (French)

1. Instructions d'installation

Veuillez lire la totalité des instructions d'installation avant de relier l'équipement au secteur.

2. Blessures à cause du poids

Prévoyez assez de personnel pour soulever ce produit en toute sécurité.



3. Équipement lourd

Cet équipement est très lourd et doit être déplacé avec un système de levage mécanique pour éviter les blessures.

4. Installation dans un emplacement à accès limité

Cette unité doit être installée dans un emplacement à accès limité.

5. Danger d'électrocution

Danger d'électrocution !
Lorsque le module de ventilation est retiré, les broches d'alimentation sont exposées dans l'emplacement du module.
NE PAS insérer d'outils ou la main dans l'emplacement du module.

6. Surchauffe

Cet équipement ne doit pas être en service dans un local dont la température dépasse le maximum recommandé de 45°C (113°F). En outre et pour garantir une circulation d'air correcte, laisser un espace d'au moins 8 cm (3") autour des orifices de ventilation.

7. Châssis empilé sur d'autres équipements

Le châssis ne doit pas être empilé sur d'autres équipements. S'il tombe, il peut endommager l'équipement ou entraîner des blessures.

8. Connexion de l'alimentation redondante : danger d'électrocution

Ce produit est équipé d'une alimentation redondante ou d'un cache si elle est absente. Dans ce dernier cas, ne pas faire fonctionner le produit si le cache est retiré ou mal fixé.

9. Fusibles phase/neutre

Ce système dispose de fusibles phase/neutre. Débranchez tous les cordons d'alimentation avant d'ouvrir le capot ou de toucher tout élément à l'intérieur.

10. Plusieurs prises d'alimentation

Risque et danger d'électrocution.

Les alimentations sont toutes indépendantes.

Pour s'assurer que le commutateur est bien hors tension, débranchez toutes les alimentations.

11. En cas d'orage, danger d'électrocution

Pendant un orage, ne pas travailler sur l'équipement ni brancher ou débrancher des câbles.

12. Connexion et déconnexion du câble InfiniBand en cuivre

Les câbles InfiniBand en cuivre sont lourds et peu flexibles. Par conséquent, il faut procéder avec soin pour les brancher ou les débrancher des connecteurs. Consulter le fabricant du câble pour obtenir des instructions ou des avertissements spécifiques.

13. Montage en rack et maintenance

Lors du montage ou de la maintenance de ce produit dans un rack, il faut faire spécialement attention pour s'assurer que l'ensemble reste stable. En règle générale, le rack doit être rempli en commençant par le bas.

14. Installation de l'équipement

Cet équipement ne doit être installé, remplacé et maintenu que par un personnel formé et qualifié.

15. Mise au rebut de l'équipement

La mise au rebut de cet équipement doit se faire conformément à toutes les lois et réglementations nationales.

16. Codes électriques locaux et nationaux

Cet équipement doit être installé conformément aux codes électriques locaux et nationaux.

17. Codes d'installation

Cet appareil doit être installé conformément à la version la plus récente des codes électrique nationaux. En Amérique du Nord, l'équipement doit être installé en respectant les exigences de l'US National Electrical Code et du Code canadien de l'électricité.

18. Remplacement de la batterie

Avertissement : ne remplacer qu'avec une batterie UL, certifiée pour accepter un courant de charge anormal maximal supérieur ou égal à 4 mA.

Si la batterie n'est pas remplacée par un type correct, il y a un risque d'explosion.

Les batteries usagées doivent être mises au rebut conformément aux instructions.

19. Cordon d'alimentation UL Listed et certifié CSA

Pour le branchement électrique en Amérique du Nord, utiliser un cordon d'alimentation UL Listed et CSA Certified, à 3 conducteurs [calibre 16 AWG], avec une prise moulée 125 V [13 A], faisant au moins 1,5 m de long [six pieds] et au plus 4,5 m.

Pour le branchement électrique en Europe, utiliser un cordon d'alimentation au format international harmonisé (marqué <HAR>), à 3 conducteurs d'au moins 1 mm2 de section, 300 V, avec une gaine isolante en PVC. Le cordon doit avoir une prise moulée 250 V 10 A.

20. Courant de fuite élevé

Avertissement : courant de fuite élevé, une connexion à la terre est indispensable avant de brancher l'alimentation.

21. Information d'ajout de branchement à la terre (GND)

Avant de relier cet appareil au secteur, ses vis des bornes de la terre de protection doivent être reliées à la terre de l'installation électrique de l'immeuble. (Informations de branchement à la terre) :

L'installation électrique doit fournir une connexion à la terre, et un technicien de maintenance doit y relier l'équipement de façon permanente.

UN TECHNICIEN DE MAINTENANCE doit vérifier si la prise à laquelle sera branché l'équipement fournit une connexion à la terre. Si ce n'est pas le cas, le TECHNICIEN DE MAINTENANCE doit arranger l'installation d'un CONDUCTEUR DE MISE A LA TERRE, allant de la borne de mise à la terre jusqu'au conducteur de terre de l'immeuble. Cet équipement doit être installé dans une zone disposant de liaisons équipotentielles (comme un centre de télécommunications ou une salle informatique dédiée).

22. Codes d'installation

Cet appareil doit être installé conformément à la version la plus récente des codes électrique nationaux. En Amérique du Nord, l'équipement doit être installé en respectant les exigences de l'US National Electrical Code et du Code canadien de l'électricité.

23. Interconnexion des unités

Les câbles de connexion aux interfaces RS232 et Ethernet de l'appareil doivent être certifié UL de type DP-1 ou DP-2. (Note : en cas d'installation sur un circuit dont la puissance n'est pas limitée)

Protection contre les surintensités : le câblage de l'immeuble doit intégrer un dispositif certifié de protection contre les surintensités, calibré à 20 A et aisément accessible.

24. Exposition à des rayonnements dangereux

Attention : l'utilisation de commandes, l'ajustement ou la conduite de procédures autres que celles indiquées ici pourraient conduire à une exposition dangereuse à des rayonnements.

Pour les produits disposant de ports optiques

PRODUIT LASER DE CLASSE 1 et référence aux plus récentes normes relatives aux lasers : IEC 60 825-1:1993 + A1:1997 + A2:2001 et EN 60825-1:1994+A1:1996+ A2:2001

Pour les produits disposant de ports optiques

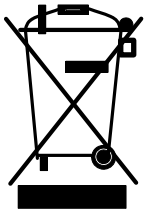
25. Armoire de protection appropriée

Une enceinte appropriée aux niveaux électrique, mécanique et incendie doit être fournie par le constructeur du produit fini ou par l'utilisateur.

26. Ne pas utiliser comme étagère ou plan de travail

Attention : un équipement coulissant ou monté sur rail ne doit pas servir d'étagère ni de plan de travail. Les rails ne sont pas destinés à faire coulisser l'unité hors du rack. Ils sont destinés à une installation permanente à l'emplacement final, pas pour l'entretien ni la maintenance.

27. Directive DEEE



Selon la Directive 2002/96/CE (DEEE), tous les déchets d'équipements électriques et électroniques (EEE) doivent être collectés séparément et ne pas être mis au rebut avec les déchets ménagers habituels.

Ce produit et toutes ses pièces doivent être mis au rebut d'une manière responsable, respectant l'environnement.

28. Restrictions concernant l'alimentation pour la Norvège

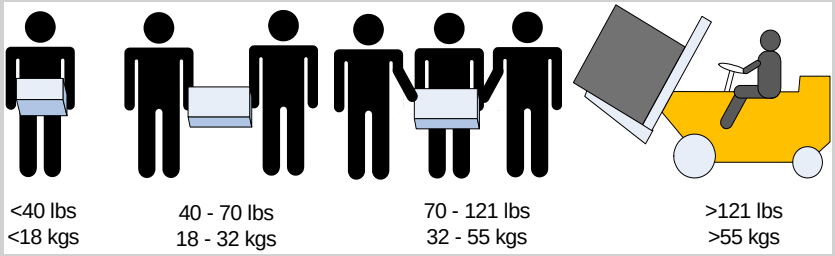
Appendix H: Installation – Sicherheitshinweise(German)

1. Installationsanleitungen

Lesen Sie alle Installationsanleitungen, bevor Sie das Gerät an die Stromversorgung anschließen.

2. Verletzungsgefahr wegen des Gewichts

Um das Produkt sicher anzuheben, genügend Personen einsetzen.



3. Schweres Gerät

Dieses Gerät ist sehr schwer und muss mit einem mechanischen Hebegerät verschoben werden, um Verletzungen zu vermeiden.

4. Installation an Bereich mit eingeschränktem Zugang

Diese Gerät ist für die Installation in einem Bereich mit beschränktem Zugang vorgesehen.

5. Stromschlagrisiko

Stromschlagrisiko!
Bei abgenommenem Ventilatormodul sind die Stromkontakte in der Modulvertiefung zugänglich.
Es dürfen KEINE Werkzeuge oder Körperteile in die Vertiefung des Ventilatormoduls gelangen.

6. Übertemperatur

Dieses Gerät sollte nicht in einem Bereich mit einer Umgebungstemperatur über der maximal empfohlenen Temperatur von 45°C (113°F) betrieben werden. Es ist ein Luftstrom von 200 LFM bei maximaler Umgebungstemperatur erforderlich. Außerdem sollten mindestens 8 cm (3 in.) Freiraum um die Belüftungsöffnungen sein, um einen einwandfreien Luftstrom zu gewährleisten.

7. Stapeln des Chassis

Das Chassis sollte nicht auf andere Geräte gestapelt werden. Wenn das Chassis herunterfällt, kann es zu Verletzungen und Beschädigungen an Geräten führen.

8. Redundanter Stromversorgungsanschluss - Elektrische Gefahr

9. Zweipolig/Neutrale Sicherung

Achtung:
Zweipolige bzw. Neutralleiter-Sicherung im Netzteil. Netzstecker ziehen, um sicherzustellen, daß keine Spannung am Gerät anliegt. Entfernen Sie alle Netzkabel vor dem Öffnen der Abdeckung dieses Produkts oder dem Berühren der Innenteile.

10. Mehrere Stromeingänge

Risiko eines Stromschlags und Stomgefahr.
Alle Stromversorgungseinheiten sind unabhängig.
Trennen Sie alle Stomversorgungen, um einen abgeschalteten Zustand im Inneren der Switch-Plattform sicherzustellen.

11. Bei Gewitter - Elektrische Gefahr

Arbeiten Sie während eines Gewitters und Blitzschlag nicht am Gerät, schließen Sie keine Kabel an oder ab.

12. Anschließen/Trennen von InfiniBand-Kupferkabel

InfiniBand-Kupferkabel sind schwer und nicht flexible. Deshalb müssen sie vorsichtig an die Anschlüsse angebracht bzw. davon getrennt werden. Lesen Sie die speziellen Warnungen und Anleitungen des Kabelherstellers.

13. Rack-Montage und Wartung

Wenn dieses Produkt in einem Rack montiert oder gewartet wird, sind besondere Vorsichtsmaßnahmen zu ergreifen, um die Stabilität des Systems zu gewährleisten. Im Allgemeinen sollten Sie das Gestell von unten nach oben mit Geräten füllen.

14. Geräteinstallation

Diese Gerät sollte nur von geschultem und qualifiziertem Personal installiert, ausgetauscht oder gewartet werden.

15. Geräteentsorgung

Die Entsorgung dieses Geräts sollte unter Beachtung aller nationalen Gesetze Bestimmungen erfolgen.

16. Regionale und nationale elektrische Bestimmungen

Dieses Gerät sollte unter Beachtung der regionalen und nationalen elektrischen Bestimmungen installiert werden.

17. Installationscodes

Dieses Gerät muss entsprechend der aktuellsten Version des National Electrical Code installiert weden. In Nodamerika muss das Gerät gemäß den geltenden Anforderungen des US National Electrical Code und des Canadian Electrical Code installiert werden.

18. Akkuaustausch

Warnung: Nur durch von UL anerkannten Akkus ersetzen, die für maximalen anormalen Ladestrom von nicht weniger als 4mA zertifiziert sind.

Es besteht Explosiionsgefahr, wenn der Akku durch einen Akku eines falschen Typs ersetzt wird.

Akkus gemäß den Anweisungen entsorgen.

19. UL- und CSA-zertifiziertes Netzkabel

Für Nordamerika Stromanschluss, wählen Sie ein Netzkabel, das UL-und CSA Certified

3 - Leiter, [18 AWG], mit einem angespritztem Stecker bewertet bei 125 V, [15], mit einer Mindestlänge von 1,5 m [Six Feet] aber nicht mehr als 4,5 m.

Für die europäischen Zusammenhang, wählen Sie ein Netzkabel, das international harmonisiert und der Aufschrift "<HAR>",

3 - Leiter, mindestens 0,75 mm2 Draht, bewertet mit 300 V, mit einem PVC-Mantel isoliert. Das Kabel muss eine angespritztem Stecker bewertet bei 250 V, 10 A. "

20. Hoher Ableitstrom

WARNUNG: Hohe Ableitstrom; Earth Verbindung, bevor Sie die Verbindung von wesentlicher Bedeutung werden.

21. Infomationen zum Erdungsanschluss

Bevor Sie dieses Gerät an das Stromnetz, die Schutzerde Terminal Schrauben dieses Gerät muss an den Schutzleiter in der Gebäudeinstallation.

22. Installationscodes

Dieses Gerät muss installiert sein, entsprechend auf die neueste Version des Landes National Electrical Code. Für Nordamerika, müssen in Übereinstimmung mit den geltenden Vorschriften in der US-amerikanischen National Electrical Code und dem Canadian Electrical Code.

23. Verbindung der Geräte untereinander

Kabel für den Anschluss an das Gerät RS232-und Ethernet-Schnittstellen müssen UL zertifiziert Typ DP-1 oder DP-2. (Hinweis-, wenn nicht mit Wohnsitz in LPS-Schaltung)

Überstromschutz: Eine leicht zugängliche Auflistung Abzweigleitung Überstrom-Schutzeinrichtung 20 A bewertet werden müssen in dem Gebäude Verkabelung.

24. Gefährliche Strahlung

Achtung – Nutzung von Steuerungen oder Einstellungen oder Ausführung von Prozeduren, die hier nicht spezifiziert sind, kann zu gefährlichem Strahlenkontakt führen..

Klasse 1 Laserprodukt und Referenzen zu den aktuellsten Lasterstandards :
ICE 60 825-1:1993 + A1:1997 + A2:2001 und EN 60825-1:1994+A1:1996+ A2:2001

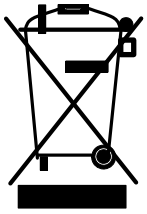
25. Geeignetes Gehäuse

Geeigneter elekrischer, mechanischer und Feuerschutz sind vom Hersteller des Endprodukts oder dem Endbenutzer bereitzustellen.

26. Switch nicht als Regal oder Arbeitsplatz nutzen

Achtung: Auf Schieber/Schienen montiertes Gerät ist nicht als Regal oder Arbeitsbereich zu nutzen. Die Schienen sind nicht dafür bestimmt, die Einheit aus dem Gestell weg zu ziehen. Sie sind nur für die permanente Installation an einem endgültigen Standort gedacht, nicht für Instandhaltung und Wartung.

27. WEEE-Direktive



Gemäß WEEE Directive 2002/96/EC müssen alle elektrischen und elektronischen Abfallgeräte (EEE) separat gesammelt und nichit mit normalem Haushaltsmüll ensorgt werden.
Dieses Produkt und alle seine Teile in verantwortungsvoller und umweltfreundlicher Art und Weise entsorgen.

28. Netzbeschränkungen für das Land Norwegen

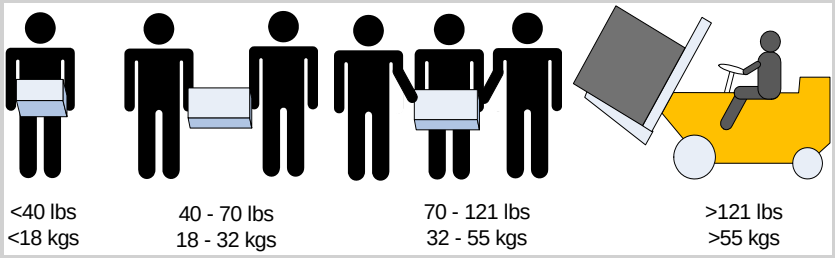
Appendix I: Advertencias de seguridad de instalación(Spanish)

1. Instrucciones de instalación

Antes de conectar el equipo a la fuente de alimentación, leer todas las instrucciones de instalación.

2. Lesión corporal a causa de peso

.Recurra a suficientes personas para levantar este producto sin



3. Equipos pesados

Dado que el equipo es muy pesado, se debe mover únicamente mediante un elevador mecánico, para evitar lesiones.

4. Instalación en lugares con acceso restringido

Esta unidad ha sido ideada para instalar en lugares de acceso restringido.

5. Riesgo de descarga eléctrica

¡Riesgo de descarga eléctrica!

Con el módulo del ventilador quitado, se obtiene acceso a las clavijas de alimentación desde dentro de la cavidad del módulo.

NO introducir herramientas ni partes del cuerpo en la cavidad del módulo del ventilador.

6. Sobretemperatura

No se debe utilizar el equipo en un área con una temperatura ambiente superior a la máxima recomendada: 45°C. Además, para garantizar una circulación de aire adecuada, se debe dejar como mínimo un espacio de 8 cm (3 pulgadas) alrededor de las aberturas de ventilación.

7. Apilamiento del chasis

Los chasis no se deben apilar sobre otros equipos. La caída del chasis podría causar lesiones corporales, así como daños al equipo.

8. Conexión redundante de fuente de alimentación: peligro de descarga

Este producto incluye una fuente de alimentación redundante o, en su lugar, una vacía. Si se dispone de una fuente de alimentación vacía, no utilizar el producto si su tapa está quitada o no está bien cerrada.

9. Fusible neutro o de polo doble

Dos fusibles, uno en el polo y otro en el neutro. Quitar los cables de corriente antes de abrir la tapa de este producto o tocar cualquier componente interno.

10. Tomas de alimentación múltiples

Riesgo de descarga eléctrica y peligro de corriente.

Todas las fuentes de alimentación son independientes.

Desconecte todas las fuentes de alimentación, para asegurar que no haya corriente alguna dentro de la plataforma de conmutación.

11. Al haber rayos: peligro de descarga

No utilizar el equipo ni conectar o desconectar cables durante períodos de actividad de rayos.

12. Cable de conexión y desconexión InfiniBand de cobre

Dado que los cables de cobre InfiniBand son pesados y no son flexibles, su conexión a los conectores y su desconexión se deben efectuar con mucho cuidado. Para ver advertencias o instrucciones especiales, consultar al fabricante del cable.

13. Montaje y mantenimiento del bastidor

Al instalar o realizar el mantenimiento de este aparato en un bastidor, es preciso adoptar precauciones especiales para garantizar que el sistema se mantenga estable. En general, en un bastidor, los equipos se deben instalar comenzando desde abajo hacia arriba.

14. Instalación del equipo

La instalación, el reemplazo y el mantenimiento de este equipo estarán a cargo únicamente de personal capacitado y competente.

15. Eliminación del equipo

La eliminación definitiva de este equipo se debe efectuar conforme a todas las leyes y reglamentaciones nacionales.

16. Códigos eléctricos locales y nacionales

Este equipo se debe instalar conforme a los códigos eléctricos locales y nacionales.

17. Códigos de instalación

Este dispositivo se debe instalar conforme a la versión más reciente de los códigos eléctricos nacionales del país en cuestión. En América del Norte, el equipo se debe instalar de acuerdo con las disposiciones vigentes del Código Eléctrico Nacional de los EE.UU. y del Código Eléctrico de Canadá.

18. Cambio de batería

II y a danger d’explosion s’il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d’un type équivalent recommandé par le constructeur.

Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

19. Cable de alimentación homologado por UL y con certificación CSA

En conexiones de América del Norte, seleccionar un cable de alimentación homologado por UL y con certificación CSA de tres conductores, [16 AWG], terminado en un enchufe moldeado con capuchón de 125 voltios nominal, [13 A], con una longitud mínima de 1,5 metros, pero no más de 4,5 metros.

En conexiones europeas, seleccionar un cable de alimentación armonizado internacionalmente y marcado "<HAR>", de tres conductores, hilo de 1,0 mm2 como mínimo, 300 voltios nominal, con cobertura protectora aislante de PVC. El cable debe tener un enchufe moldeado con capuchón de 250 voltios nominal, 10 A.

20. Alta corriente de fuga

21. Agregar información de conexión a tierra (GND)

Antes de conectar el dispositivo a la línea de alimentación, los tornillos del terminal de la puesta a tierra de protección del dispositivo se deben conectar a la puesta a tierra de protección de la instalación del edificio.

(Información de conexión a tierra):

La instalación del edificio deberá prover un medio para la conexión con la puesta a tierra de protección y un técnico de servicio deberá conectar permanentemente el equipo a dicho medio de conexión.

Un TÉCNICO DE SERVICIO comprobará si la toma eléctrica de la que se suministrará corriente al equipo provee una conexión con la puesta a tierra de protección del edificio. De no ser así, el TÉCNICO DE SERVICIO se encargará de instalar un CONDUCTOR DE CONEXIÓN A TIERRA DE PROTECCIÓN, del terminal de puesta a tierra de protección separado al conductor de tierra de protección del edificio. El equipo se instalará en un área donde haya conexión equipotencial, como por ejemplo, un centro de telecomunicaciones o una sala de computadoras dedicada.

22. Códigos de instalación

Este dispositivo se debe instalar conforme a la versión más reciente de los códigos eléctricos nacionales del país en cuestión. En América del Norte, el equipo se debe instalar de acuerdo con las disposiciones vigentes del Código Eléctrico Nacional de los EE.UU. y del Código Eléctrico de Canadá.

23. Interconexión de unidades

Los cables para la conexión con las interfaces RS232 y Ethernet de la unidad deben estar homologados por UL tipo DP-1 o DP-2. (Nota: cuando residen en circuito no de tipo LPS)

Protección contra sobrecargas: Al cableado del edificio se debe incorporar un dispositivo de protección contra sobrecargas de circuito derivado, de fácil acceso, con una corriente nominal de 20 A.

24. Exposición a radiación peligrosa

Precaución: el uso de controles o ajustes o la realización de procedimientos distintos de los que aquí se especifican podrían causar exposición a niveles de radiación peligrosos.

PRODUCTO LÁSER DE CLASE 1 y referencia a las normas de láser más recientes: IEC 60825-1:2007/03 y EN 60825-1:2007

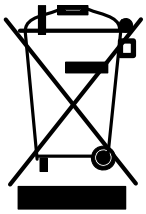
25. Recinto adecuado

El fabricante del producto final o el usuario final deberán suministrar un confinamiento adecuado para componentes eléctricos y mecánicos y contra incendio.

26. No utilizar el conmutador como estante ni como espacio de trabajo

Cuidado: Equipos montados en deslizadores o rieles no se deben utilizar como estantes ni como espacio de trabajo. La finalidad de los rieles no es deslizar la unidad hacia afuera del bastidor. Sirven solo para la instalación permanente en el lugar de destino final, no para fines de servicio o mantenimiento

27. Directiva WEEE



Conforme a la Directiva 2002/96/CE sobre RAEE, todos los residuos de equipos eléctricos y electrónicos (EEE) se deben recolectar por separado y no se deben eliminar junto con residuos domésticos.

Al deshacerse de este producto y de todas sus partes, hágalo de una manera responsable y respetuosa con el medio ambiente.

28. Limitaciones de potencia en Noruega

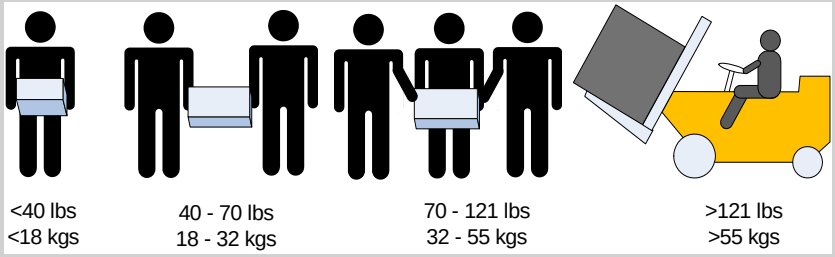
Appendix J: Предупреждения по технике безопасности при установке(Russian)

1. Инструкция по установке

Перед подключением оборудования к источнику питания следует ознакомиться с инструкцией по установке.

2. Травмы при переносе тяжелых предметов

Для поднятия этого изделия следует задействовать достаточное количество людей.



3. Тяжелое оборудование

Это очень тяжелое оборудование, поэтому его следует перемещать с помощью механического подъемника во избежание травм.

4. Опасность поражения электрическим током

Это устройство предназначено для установки в помещении с ограниченным доступом.

5. Опасность поражения электрическим током

Опасность поражения электрическим током!

Когда снят вентиляторный модуль, существует возможность повреждения контактов питания в его углублении.

НЕ вставлять инструменты или части тела в углубление вентиляторного модуля.

6. Перегрев

Не эксплуатировать это оборудование в помещении с температурой окружающей среды, превышающей максимально рекомендуемое значение: 45 °C (113 °F). Более того, для надлежащей вентиляции следует обеспечить зазор вокруг вентиляционных отверстий не менее 8 см (3 дюйма).

7. Установка шасси поверх другого оборудования

Не устанавливать шасси поверх другого оборудования. Падение шасси может привести к травмам и повреждению оборудования.

8. Опасность поражения электрическим током резервного источника питания

В этом изделии установлен резервный источник питания или модуль-заглушка. Если установлен модуль-заглушка, не эксплуатировать изделие со снятой или ненадежно закрепленной крышкой модуля-заглушки.

9. Двухполюсный предохранитель на фазном и нейтральном проводах

В этой системе установлен двухполюсный предохранитель на фазном и нейтральном проводах. Открывать кожух этого изделия или касаться внутренних деталей можно только после отсоединения всех шнуров питания.

10. Несколько источников питания

Опасность поражения электрическим током и опасные энергетические воздействия.

Блоки питания независимы друг от друга.

Чтобы обесточить все компоненты внутри платформы коммутации, следует отсоединить все блоки питания.

11. Опасность поражения электрическим током во время грозы

Во время грозы запрещается использовать оборудование и подключать или отключать кабели.

12. Подсоединение и отсоединение медных кабелей InfiniBand

Медные кабели InfiniBand тяжелые и негибкие, поэтому следует осторожно их подсоединять и отсоединять. За особыми предупреждениями и указаниями следует обратиться к производителю кабеля.

13. Установка или обслуживание в стойке

При установке или обслуживании этого изделия в стойке следует обеспечить устойчивость системы. Как правило, стойка заполняется оборудованием снизу вверх.

14. Установка оборудования

Устанавливать, заменять и/или обслуживать это оборудование должен только подготовленный и квалифицированный персонал.

15. Утилизация оборудования

Это оборудование утилизируется в соответствии с национальными законами и постановлениями.

16. Местные и национальные правила установки электрооборудования

Это оборудование устанавливается в соответствии с местными и национальными правилами установки электрооборудования.

17. Правила установки электрооборудования

Это устройство устанавливается в соответствии с последним изданием национальных правил установки электрооборудования. В Северной Америке оборудование устанавливается в соответствии с действующими требованиями Национальных правил эксплуатации и обслуживания электрических установок США и Канады.

18. Замена аккумулятора

Осторожно! Заменять только аккумулятором, одобренным организацией UL и рассчитанным на максимальный аномальный зарядный ток не менее 4 мА.

Существует риск взрыва при замене аккумулятора другим аккумулятором неправильного типа.

Отработавшие аккумуляторы утилизируются в соответствии с указаниями.

19. Шнур питания, включенный в номенклатуру UL и сертифицированный Канадской ассоциацией стандартизации (CSA)

Подключение к электропитанию в Северной Америке выполняется с помощью шнура питания, включенного в номенклатуру UL и сертифицированного Канадской ассоциацией стандартизации (CSA), 3-жильного, [16 AWG], длиной от 1,5 м [6 футов] до 4,5 м, с литой вилкой, рассчитанной на 125 В [13 А].

Подключение к электропитанию в Европе выполняется с помощью гармонизированного шнура питания с маркировкой <HAR>, 3-жильного, с сечением жилы не менее 1,0 мм², рассчитанного на номинальное напряжение 300 В, с ПВХ оболочкой. Шнур должен иметь литую вилку, рассчитанную на 250 В, 10 А.

20. Высокий ток утечки

Осторожно! Высокий ток утечки. Заземлить перед подключением к электропитанию.

21. Добавить информацию о подключении к заземлению

Перед подключением этого устройства к сети электропитания следует подсоединить винты заземляющего зажима устройства к защитному заземлению здания. (Информация о подключении к заземлению):

В здании должна быть предусмотрена возможность подключения к защитному заземлению, к которому техник должен стационарно подключить оборудование.

ТЕХНИК должен убедиться, что розетка, от которой будет питаться оборудование, подключена к защитному заземлению здания. Если розетка не подключена к защитному заземлению, ТЕХНИК должен организовать прокладку ПРОВОДА ЗАЩИТНОГО ЗАЗЕМЛЕНИЯ от отдельного зажима защитного заземления до провода защитного заземления в здании. Оборудование устанавливается в помещении с уравниванием потенциалов (например, в телекоммуникационном центре или специальном помещении для компьютеров).

22. Правила установки электрооборудования

Это устройство устанавливается в соответствии с последним изданием национальных правил установки электрооборудования. В Северной Америке оборудование устанавливается в соответствии с действующими требованиями Национальных правил эксплуатации и обслуживания электрических установок США и Канады.

23. Подсоединение устройств

Для подключения к разъемам RS232 и Ethernet используются кабели типа DP-1 или DP-2, сертифицированные организацией UL. (Примечание. При подключении к сети без ограниченного источника электропитания)

Максимальная токовая защита. В проводку здания в легкодоступном месте следует включить устройство защиты от перегрузки по току номиналом 20 А.

24. Опасное радиационное воздействие

Внимание! Выполнение не изложенных здесь регулировок, настроек и процедур может вызвать опасное радиационное воздействие.

ЛАЗЕРНОЕ ИЗДЕЛИЕ КЛАССА 1 и ссылка на последние стандарты по безопасности лазерных изделий IEC 60 825-1:1993 + A1:1997 + A2:2001 и EN 60825-1:1994 + A1:1996 + A2:2001.

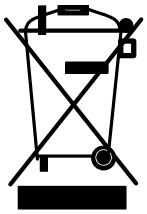
25. Соответствующий кожух

Производитель конечного изделия и/или конечный пользователь должны обеспечить соответствующий электрический, механический и противопожарный кожух.

26. Не использовать коммутатор как полку или рабочую

Внимание! Оборудование, установленное на направляющих, не должно использоваться как полка или рабочая поверхность. Направляющие не предназначены для удерживания устройства, выдвинутого из стойки. Они предназначены для стационарной установки только в конечном положении и не используются для обслуживания устройства.

27. Директива WEEE



В соответствии с Директивой 2002/96/EC (WEEE) отходы электрического и электронного оборудования должны собираться и утилизироваться отдельно от обычных бытовых отходов.

Следует утилизировать это изделие и все его части ответственным и экологически безопасным способом.

28. Ограничения для сетей электропитания Норвегии

This unit is intended for connection to a TN power system and an IT power system of Norway only.

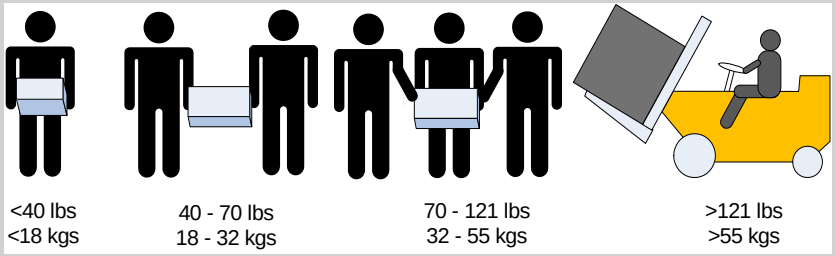
Appendix K: Avertismente privind siguranţa la instalare (Romanian)

1. Instrucţiuni de instalare

Citiţi toate instrucţiunile de instalare înainte de a conecta

2. Accidentare cauzată de greutate

Apelaţi la un număr suficient de persoane pentru a ridica în siguranţă acest produs.



3. Echipament greu

Acest echipament este foarte greu şi trebuie să fie mutat folosind un dispozitiv mecanic de ridicare pentru a evita producerea de leziuni.

4. Instalarea într-un loc cu acces limitat

Această unitate este destinată instalării într-un loc cu acces limitat.

5. Risc de şoc electric

Risc de şoc electric!

Odată ce modulul ventilator este îndepărtat, pinii electrici sunt accesibili în cavitatea modulului.

NU introduceţi instrumente sau părţi din corp în cavitatea modulului ventilator.

6. Temperatură în exces

Acest echipament nu trebuie să fie acţionat într-o zonă unde temperatura ambiantă depăşeşte valoarea maximă recomandată: 45°C (113°F). În plus, pentru a asigura un flux de aer adecvat, lăsaţi un spaţiu liber de cel puţin 8 cm (3 inchi) în jurul fantelor de ventilare.

7. Suprapunerea cadrului

Cadrul nu trebuie să fie suprapus peste niciun alt echipament. În cazul în care cadrul cade, poate cauza leziuni corporale şi deteriorări ale echipamentului.

8. Conexiunea la o sursă de alimentare electrică suplimentară - pericol electric

Acest produs include o sursă de alimentare suplimentară sau un spaţiu gol în locul acesteia. În cazul în care spaţiul pentru sursa de alimentare este gol, nu operaţi produsul când capacul orb este îndepărtat sau nu este fixat în mod sigur.

9. Siguranţă fuzibilă bipolară/neutră

Acest sistem este prevăzut cu siguranţă fuzibilă bipolară/neutră. Îndepărtaţi toate cordoanele de alimentare înainte de a deschide capacul acestui produs sau înainte de a atinge orice componente interne.

10. Multiple mufe electrice

Risc de şoc electric şi pericol electric.

Toate aparatele cu alimentare de la reţea sunt independente.

Deconectaţi toate sursele de alimentare cu energie pentru a asigura decuplarea în interiorul platformei de comutare.

11. În timpul descărcărilor electrice - pericol electric

În timpul perioadelor cu descărcări electrice luminoase, nu lucraţi cu echipamentul sau nu conectaţi sau deconectaţi cablurile.

12. Conectarea/deconectarea cablului din cupru InfiniBand

Cablurile InfiniBand din cupru sunt grele şi inflexibile, de aceea trebuie să fie ataşate sau detaşate de conectori cu grijă. Consultaţi producătorul de cabluri pentru avertismente/instrucţiuni speciale.

13. Montarea sau depanarea într-un rack

Când acest produs este montat sau depanat într-un rack, trebuie să fie luate măsuri de precauţie speciale pentru a se asigura că sistemul rămâne stabil. În general, trebuie să umpleţi rack-ul cu echipamente începând de jos în sus.

14. Instalarea echipamentului

Acest echipament trebuie să fie instalat, înlocuit şi/sau depanat numai de către personal instruit şi calificat.

15. Eliminarea echipamentului

Eliminarea acestui echipament trebuie să se realizeze în conformitate cu toate legile şi regulamentele naţionale.

16. Codurile electrice locale şi naţionale

Acest echipament trebuie să fie instalat conform codurilor electrice locale şi naţionale.

17. Codurile ed instalare

Acest dispozitiv trebuie să fie instalat în conformitate cu ultima versiune a codurilor electrice naţionale ale ţării în cauză. Pentru America de Nord, echipamentul trebuie să fie instalat conform cerinţelor aplicabile din Codul electric naţional al SUA şi Codul electric canadian.

18. Înlocuirea bateriei

Avertisment: Înlocuiţi numai cu o baterie recunoscută UL, certificată pentru curent de încărcare anormal maxim de minimum 4 mA

Există risc de explozie în cazul în care bateria este înlocuită cu o baterie necorespunzătoare.

Eliminaţi bateriile folosite în conformitate cu instrucţiunile.

19. Cordon de alimentare electrică înregistrat UL şi certificat CSA

Pentru conectarea la o sursă de alimentare pentru America de Nord, selectaţi un cordon de alimentare care este înregistrat UL şi certificat CSA, cu 3 conductoare, [16 AWG], terminat cu o fişă turnată, cu putere nominală egală cu 125 V, [13 A], cu o lungime de minimum 1,5 m [şase picioare], dar nu mai lung de 4,5 m.

Pentru conectarea la o sursă de alimentare în Europa, selectaţi un cordon de alimentare care este armonizat la nivel internaţional şi marcat „<HAR>”, cu 3 conductoare, cu minimum 2 fire de 1,0 mm, cu putere nominală egală cu 300 V şi cu o manta izolantă din PVC. Cordonul de alimentare trebuie să fie prevăzut cu o fişă turnată cu putere nominală egală cu 250 V, 10 A.

20. Curent de scurgere de înaltă frecvenţă

Avertisment: Curent de scurgere de înaltă frecvenţă; Împământarea este esenţială înainte de a conecta sursa de alimentare.

21. Adăugarea de informaţii privind legarea la pământ

Înainte de a conecta acest dispozitiv la o linie electrică de energie, şuruburile bornelor de protecţie de legare la pământ ale acestui dispozitiv trebuie să fie conectate la priza de pământ de protecţie din instalaţia clădirii. (Informaţii privind legarea la pământ):

Instalaţia clădirii va asigura un mijloc de conectare la priza de pământ, iar echipamentul va fi în mod permanent conectat la priza de pământ de un agent de întreţinere.

UN AGENT DE ÎNTREŢINERE va verifica dacă priza - borna de ieşire prin intermediul căreia va fi alimentat echipamentul cu energie electrică asigură o conexiune la priza de pământ a clădirii. În caz contrar, AGENTUL DE ÎNTREŢINERE va dispune instalarea unui CONDUCTOR DE PROTECŢIE DE LEGARE LA PĂMÂNT de la borna separată de protecţie de legare la pământ la cablul de protecţie de legare la pământ al clădirii. Echipamentul va fi instalat într-o zonă unde există legături echipotenţiale (precum un centru de telecomunicaţii sau o cameră a computerelor dedicată).

22. Codurile de instalare

Acest dispozitiv trebuie să fie instalat în conformitate cu ultima versiune a codurilor electrice naţionale ale ţării în cauză. Pentru America de Nord, echipamentul trebuie să fie instalat conform cerinţelor aplicabile din Codul electric naţional al SUA şi Codul electric canadian.

23. Interconectarea unităţilor

Cablurile pentru conectarea la unitatea RS232 şi la interfeţele Ethernet trebuie să fie de tipul DP-1 sau DP-2 certificate UL. (Notă- când se regăsesc într-un circuit non-LPS)

Protecţie la supracurent: Un dispozitiv de protecţie la supracurent, înregistrat în circuitul de ramificare, uşor accesibil şi cu o putere nominală egală cu 20 A trebuie să fie integrat în cablajul clădirii.

24. Expunerea la radiaţii periculoase

Atenţie – Utilizarea elementelor de comandă sau ajustarea sau executarea altor proceduri decât a celor indicate în acest document poate avea ca rezultat expunerea la radiaţii periculoase.

PRODUS LASER CLASA 1 şi referire la cele mai recente standarde pentru laser IEC 60 825-1:1993 + A1:1997 + A2:2001 şi EN 60825-1:1994+A1:1996+ A2:2001

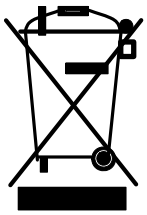
25. Carter adecvat

Un carter electric, mecanic şi ignifug adecvat va fi furnizat de fabricantul produsului final şi/sau utilizatorul final.

26. Nu utilizaţi comutatorul ca raft sau spaţiu de lucru

Atenţie: Echipamentul montat pe o linie de alunecare/şină nu va fi utilizat ca raft sau spaţiu de lucru. Scopul şinelor nu este de a glisa unitatea de pe rack. Acestea sunt destinate instalării permanente numai la punctul final de oprire şi nu vor fi folosite pentru depanare şi întreţinere

27. Directiva DEEE



În conformitate cu Directiva DEEE 2002/96/CE, toate deşeurile de echipamente electrice şi electronice (EEE) trebuie colectate separat şi nu trebuie eliminate împreună cu deşeurile menajere obişnuite.

Eliminaţi acest produs şi toate componentele sale în mod responsabil şi ecologic.

28. Restricţii electrice pentru Norvegia

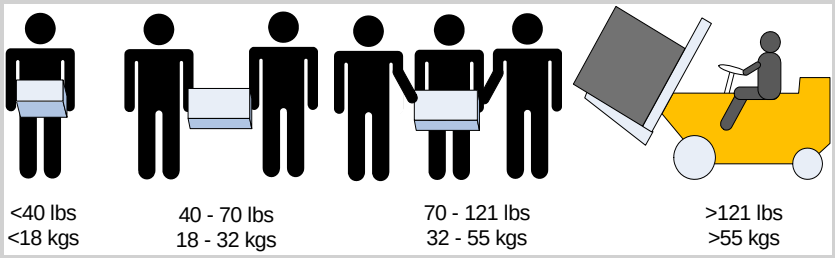
Appendix L: 安裝安全性警告 (Chinese)

1. 安裝指示

本設備附有備援電源供應器或在適當位置配有空白蓋板。

2. 因重量導致的人身受傷

為了安全起見，請安排足夠的人員以合力抬起本產品。



3. 重設備

本設備極重，應使用機械式起重機來搬移，以避免人員受傷。

4. 安裝於進出管制區域

本設備設計安裝於進出管制區域。

5. 有觸電的危險

有觸電的危險！
拆除風扇模組後，即可接觸到模組空腔內的電源針腳。
請勿將工具或機身零件插入到風扇模組空腔內。

6. 溫度過高

本設備不應在超過所建議的最高環境溫度的區域中運作：45°C (113°F)。此外，為了保證氣流的流通正常，請在通風口旁保留至少 8 公分 (3 英吋) 的間距。

7. 堆疊機箱

機箱不應堆疊在任何其他設備上。如果機箱掉落，可能造成人員受傷與設備損壞。

8. 複式電源連接時的電擊危險

本設備附有備援電源供應器或在適當位置配有空白蓋板。如果是電源供應器空白蓋板，在空白蓋板已取下或未牢牢固訂的情況下，請勿操作本產品。

9. 雙極 / 中性保險絲

本系統具有雙極 / 中性保險絲。請拔掉所有電源線後，再打開本產品的蓋板或碰觸任何內部零件。

10. 多電源輸入座

電擊與能源危害的危險。
所有 PSU 均各自獨立。
將所有電源供應器斷電，確保交換器平台內部在電源關閉狀態。

11. 閃電時的電擊危險

在閃電期間，不要使用本設備或連接或拔下纜線。

12. InfiniBand 銅纜連接 / 拔下

InfiniBand 銅纜很重且沒有彈性，因此必須小心裝在連接器上或自連接器上拔下。如需相關的特殊警告 / 指示，請洽詢纜線製造商。

13. 機架安裝與維修

此產品已安裝在機架中或在機架中維修時，必須採取特定預防措施以確保系統維持穩定。一般您應該將設備從底部到頂端放滿機架。

14. 設備安裝

本設備僅限由經過訓練與 / 或合格的人員安裝、更換或維修。

15. 設備棄置

棄置本設備應遵照所有國內法規。

16. 當地與國家電氣法規

請遵照當地與國家電氣法規安裝本設備。

17. 安裝法規

請務必遵循最新版的國家電氣法規，安裝本設備。在北美地區，請務必遵循美國國家電工法規和加拿大電工法規中的適用規定，安裝本設備。

18. 更換電池

警告：只能以 UL 認可電池，且取得最大異常充電電流低於 4mA 認證的電池進行更換。
若更換錯誤類型的電池，會有爆炸的危險。
請依據指示棄置廢電池。

19. UL 列名和 CSA 認證電源線

北美地區在接上電源時，請選用獲得 UL 列名和 CSA 認證、三個導體、[16 AWG] 附成型插頭，額定值為 125 V、[13 A]，長度至少 1.5 公尺 [六英尺]，但不超過 4.5 公尺的電源線。
歐洲地區在接上電源時，請選用國際協調式且標示有 <HAR> 字樣、三個導體、標稱截面至少 1.0 平方公厘，額定值為 300 V，採用 PVC 絕緣的電源線。電源線需有成型插頭，額定值為 250 V, 10 A。

20. 高漏電流

21. 新增 GND 連線資訊

須連接至大樓安裝中的保護地線。(GND 連線資訊) :
大樓安裝應提供連接保護地線的方式；設備一律只能由維修人員連接至地線。
維修人員應檢查插座 (供電給設備的插座) 是否提供連接大樓保護地線的方式。如果沒有，維修人員應安排從獨立保護地線端子，將保護接地導體安裝至大樓的保護地線。設備應安裝於有等電位聯結的區域 (例如，電信中心或專用電腦室)。

22. 安裝法規

請務必遵循最新版的國家電氣法規，安裝本設備。在北美地區，請務必遵循美國國家電工法規和加拿大電工法規中的適用規定，安裝本設備。

23. 互連設備

連接至 RS232 設備和乙太網路介面的纜線必須是 UL 認證類型 DP-1 或 DP-2。(請注意位於非 LPS 電路時)
過電流保護：準備好使用的列名分支電路過電流保護裝置最大額定值 20 A 必須整合在配線中。

24. 危險的放射線暴露

小心 – 使用非本手冊指定的控制、調整或執行程序可能導致曝露在危險的放射線下。
配備光纜連接埠的產品

CLASS 1 雷射產品，並參照最新的雷射標準 IEC 60 825-1:1993 + A1:1997 + A2:2001 與 EN 60825-1:1994+A1:1996+ A2:2001
配備光纜連接埠的產品

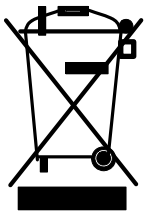
25. 適當外殼

終端產品廠商或終端使用者應提供適合的電氣、機械和防火外殼。

26. 切換開關不可用作機架或工作空間

小心：滑軌 / 導軌安裝設備不可用作機架或工作空間。導軌不適用於將設備滑出機架使用。僅限永久安裝在最後安置區域時使用，不可用於維修和保養。

27. WEEE 指令



根據 WEEE 指令 2002/96/EC，所有廢棄的電氣與電子設備 (EEE)，應分開集中，而且不應與一般家庭廢棄物一起棄置。
請以負責和環保的方式棄置本產品及其所有零件。

28. 挪威國家電源限制

本設備僅限連接至挪威的 TN 電源系統和 IT 電源系統。