Overland Storage

NEO® XL-Series Tape Library

User Guide

November 2014
10400644-001

Contents

1 Introduction

1.1 Document Purpose

This document provides information to install, operate, and upgrade the NEO XL-Series Scalable Tape Library. The instructions are intended for the trained System Administrators and trained Users who need physical and functional knowledge of the XL-Series library.

The main components are:

Base library

Expansion module

2 General Warnings

2.1 Document Conventions:

	**WARNING**	Indicates that failure to follow directions could result in bodily harm or death.
	**CAUTION**	Indicates that failure to follow directions could result in damage to equipment or data.
!	**IMPORTANT**	Provides clarifying information or specific instructions.
	**NOTE**	Provides additional information.
	**TIP**	Provides helpful hints and shortcuts.

2.2 General Product Warnings

	**DANGER**	**High voltage** **Risk of electric shock** ▪ Do not remove covers (top, bottom or rear). No user-serviceable parts are inside. ▪ Refer servicing to qualified service personnel.

WARNING

Product Weight

Risk of personal injury

Before lifting a library:

- Observe local health and safety requirements and guidelines for manual material handling.
- Remove all tapes to reduce the weight.
- Remove all tape drives to reduce the weight.
- Obtain adequate assistance to lift and stabilize the library during installation or removal.

Risk of damage to devices

When placing a library into or removing the library from a rack:

- Extend the rack's leveling jacks to the floor.
- Ensure that the full weight of the rack rests on the leveling jacks.
- Install stabilizing feet on the rack.
- Extend only one rack component at a time.

CAUTION

Static Sensitive

Risk of damage to devices

- A discharge of static electricity damages static-sensitive devices or micro circuitry.
- Proper packaging and grounding techniques are necessary precautions to prevent damage.

NOTE

- Ventilation – Place the product in a location that does not interfere with proper ventilation.
- Heat – Place the product in a location away from heat sources.
- Power sources – Connect the product to a power source only of the type directed in the operating instructions or as marked on the product.
- Power cord protection – Place the AC line cord so that it is not possible to be walked on or pinched by items placed upon or against it.
- Object and liquid entry – Insure that objects do not fall onto and that liquids are not spilled into the product's enclosure.

3 Product Overview

WARNING

Only trained personnel should operate this equipment. Read all documentation and procedures before installation or operation. This product is intended for installation and operation in a computer rack with the front and rear doors closed and secured. Only personnel with technical and product safety training should be provided access to the library. Such personnel are referred to as users throughout this document. Do not insert any tools or any part of your body into openings of an operating system.

All NEO XL-Series installations begin with the 6U high Base Library, with capacity for 60 or 80 tape cartridges and up to 6 half-height LTO tape drives.

The NEO XL-Series is expandable, allowing a user to grow their tape storage capacity as their data requirements increase. As data storage needs grow, the NEO XL-Series can also grow by adding a 6U high Expansion Module. Each expansion module supports an additional 80 tape cartridges and an additional 6 half-height LTO tape drives.

Up to 6 Expansion Modules can be added to a Base Library, bring the total library capacity to 560 tape cartridges and 42 half-height LTO tape drives.

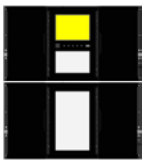
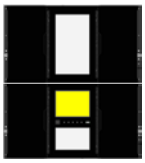
3.1 Supported Library Configurations

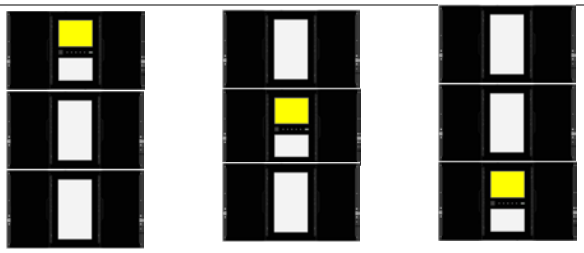
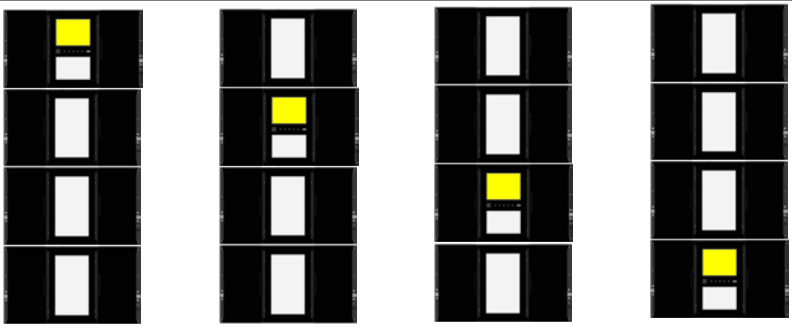
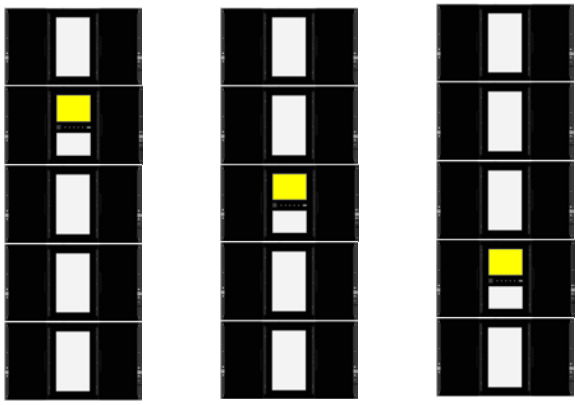
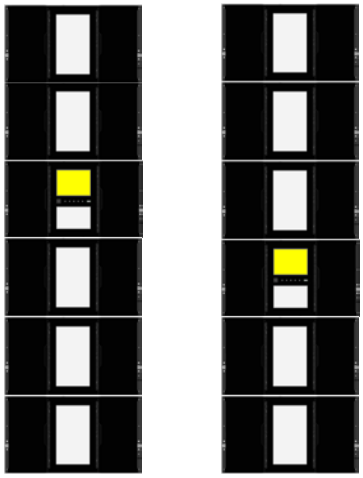
All NEO XL-Series libraries start with a Base Library Module. Up to 6 expansion modules can be added as needed to support customer requirements. The architecture has been designed to support a maximum of 3 expansion modules above and 3 expansion modules below the base module. Table 1 shows the supported configurations for libraries ranging from one to seven total modules.

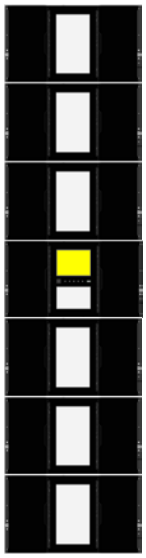
The Base Library is depicted by the following image with the Operator Control Panel shown in yellow:

Each Expansion Module is represented by the following image with a large clear viewing window in the center.

Table 1: Supported Library Configurations

Module Quantity	Supported Library Configurations
1 Module Library Base Library	
2 Module Library Base Library 1 Expansion Module	 

Module Quantity	Supported Library Configurations
3 Module Library Base Library 2 Expansion Modules	
4 Module Library Base Library 3 Expansion Modules	
5 Module Library Base Library 4 Expansion Modules	
6 Module Library Base Library 5 Expansion Modules	

Module Quantity	Supported Library Configurations
7 Module Library Base Library 6 Expansion Modules	

3.2 Supported Module Configurations

Table 2 describes the supported configurations for each module type – Base Library and Expansion Module.

Table 2: Supported Module Configurations

Module Type	Power Supplies	Drive Power Boards	Half-Height Tape Drives
Base Library	1 (standard) or 2 (redundant)	1	Up to 3
		2	Up to 6
Expansion Module	2 (redundant)	0	0
		1	Up to 3
		2	Up to 6

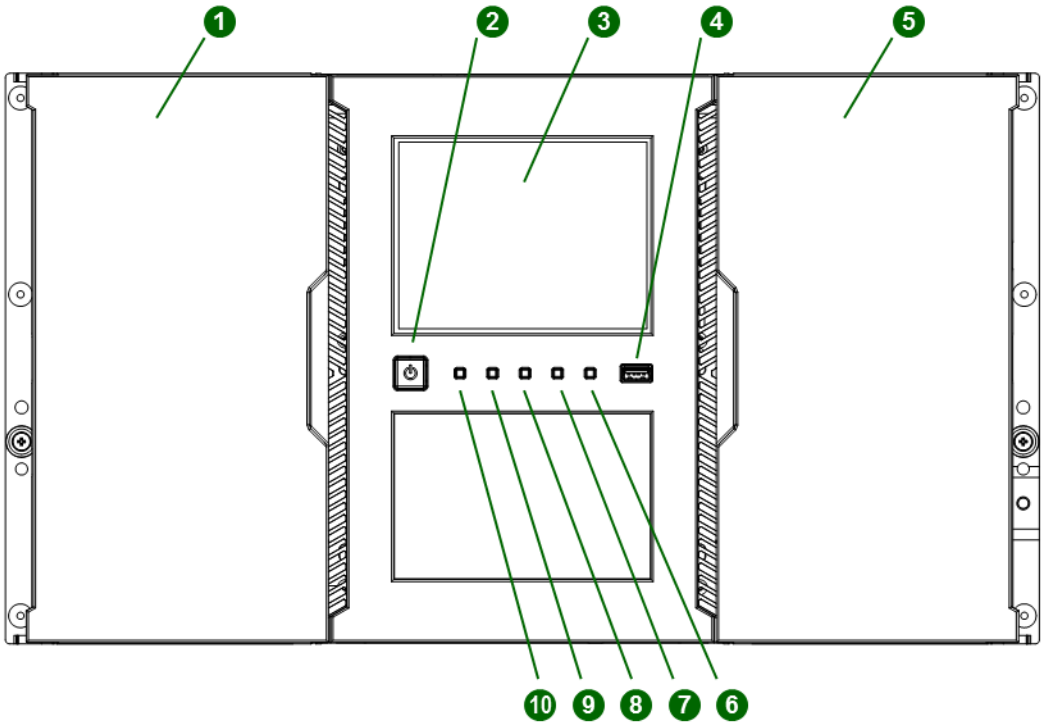
3.3 Supported Tape Drives

The NEO XL-Series was developed to integrate industry-standard LTO Ultrium tape drives from IBM. Mixed drive generations and mixed interfaces are supported within a single library and within a single module. Listed below are the tape drives that have been implemented and qualified for use in A NEO XL-Series.

Table 3: Supported Tape Drives

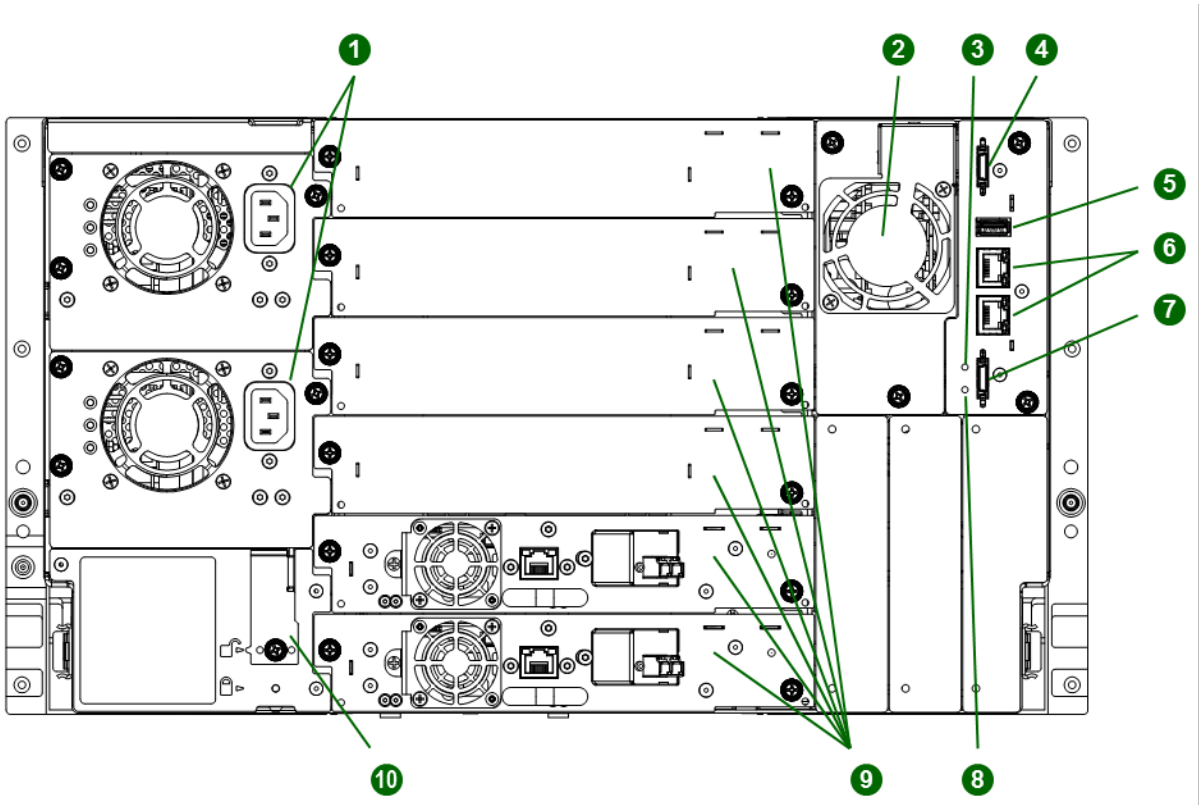
IBM LTO Drives
LTO-5 Half-Height FC
LTO-5 Half-Height SAS
LTO-6 Half-Height FC
LTO-6 Half-Height SAS

3.4 Front Panel



1	Magazine Access Door	
2	Power Button	(Base Library Only)
3	Operator Control Panel	(Base Library Only)
4	USB Port	(Base Library Only)
5	Mailslot/Magazine Access Door	
6	Error LED, Amber	(Base Library Only)
7	Attention LED, Amber	(Base Library Only)
8	Clean LED, Amber	(Base Library Only)
9	Ready LED, Green	(Base Library Only)
10	Unit Identification LED, Blue	(Base Library Only)

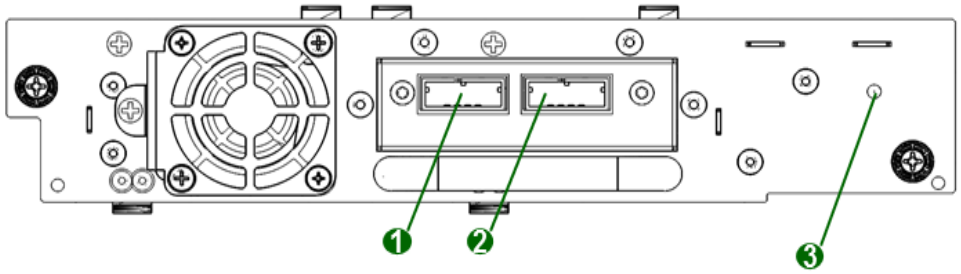
3.5 Rear Panel



1	Power Supplies	
2	Chassis Fan	
3	Controller Health Status LED, Green	
4	Upper Expansion Module Connection Port	
5	USB Port	(Base Library Only)
6	Ethernet Ports	(Base Library Only)
7	Lower Expansion Module Connection Port	
8	Unit Identifier LED, Blue	
9	Half-Height Tape Drive Bays	
10	Module Alignment Mechanism	

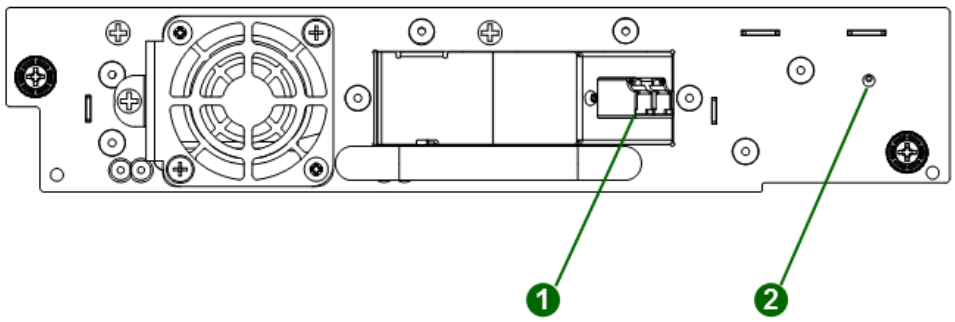
3.6 Tape Drive Back Panels

3.6.1 IBM LTO-5/6 HH SAS



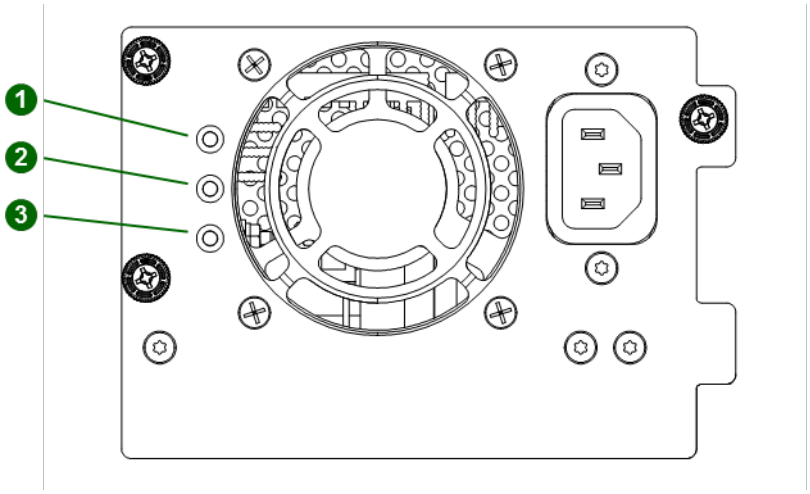
1	Tape Drive Ethernet Port (not used)
2	SAS Port A
3	Tape Drive Power LED, Green

3.6.2 IBM LTO-5/6 HH FC



1	FC Port A
2	Tape Drive Power LED, Green

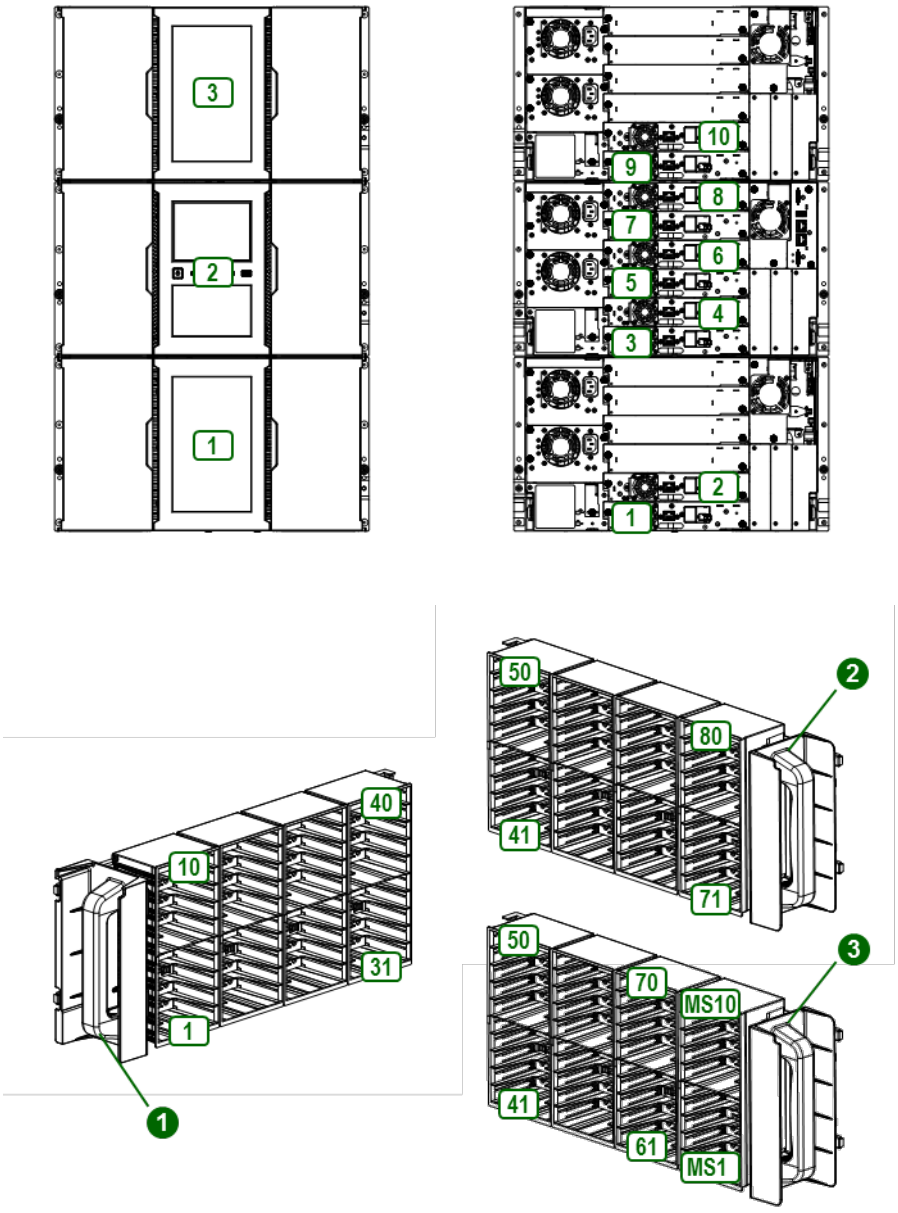
3.7 Power Supply Rear Panel LEDs



1	White	AC power connected, but Module Powered Off
2	Amber	Power Supply Fault Condition, such as fan not running, too hot or producing power outside of specification
3	Green	Module Powered On

3.8 Element Numbering

The library will generally display logical element numbering of modules, storage slots and tape drives starting with number one from the bottom up.



1	Left Magazine
2	Right Magazine, Mailslot Disabled
3	Right Magazine, Mailslot Enabled

4 Installing the Library

4.1 Planning Installation

- Choose a location for the library. See "**Location Requirements"**.
- Plan the SAS or Fibre Channel configuration and obtain the necessary cables. See **"SAS Configuration Requirements"** or "**Fibre Channel Configuration Requirements"**.
- Plan the rack layout. See "**Planning the Module and Rack Layout"**.
- Internal IP Range Selection

4.2 Location Requirements

NOTE

- The library was designed for rack installation and must be installed using the provided rack rails. Installation on a table top or other similar surface could result in library operation errors.
- Select a rack with access to the host server.
- Choose a location that meets the criteria in the table below.

Table 4: Location Requirements

Criteria	Definition
Rack Requirements	Standard 19-inch rack with an appropriate # of U's (Rack Units) of clearance for the planned module quantity
Rack Space Requirements	6U for the Base Library and 6U for each Expansion Module
Room Temperature	10-35º C (50-95º F)
Power Source	▪ AC Power Voltage: 100-240 VAC ▪ Line Frequency: 50-60 Hz ▪ Library Located near AC Outlet(s) The AC power cord is the library's main AC disconnect device and must be easily accessible at all times.
Air Quality	▪ Place the library in an area with minimal sources of particulate contamination ▪ Avoid areas near frequently used doors and walkways, stacks of supplies that collect dust, printers, and smoke-filled rooms ▪ Excessive dust and debris can damage tapes and tape drive
Humidity	20-80 percent RH non-condensing

4.3 SAS Configuration Requirements

Serial Attached SCSI (SAS) is a computer bus technology mainly used to transfer data to and from storage devices, including disk drives and tape drives. SAS is designed to transfer data at up to 6 Gbps.

SAS uses serial connections, with a direct connection between the host server and each of the storage devices. This eliminates the need to configure SCSI busses and assign SCSI IDs, as is required for parallel SCSI devices.

The host server must have a SAS host bus adapter with an external connector. The HBA uses multiple LUNs to communicate with the library. Verify that your HBA supports multiple LUNs, as most RAID controllers do not. Most

SAS HBA ports have four SAS channels. A tape drive uses one channel, so each HBA port can support up to four tape drives. You can use a cable with one connector on each end, but only one channel will be used.

Supported speeds by drive generation are shown in the table below.

Table 5: Supported SAS Speeds

LTO Generation	Supported Speeds
LTO-5	1.5 Gbps, 3 Gbps, 6 Gbps
LTO-6	1.5 Gbps, 3 Gbps, 6 Gbps

CAUTION

High quality SAS cables rated at the transfer rate the SAS drives are required. Always verify that the SAS cable you are using is rated for the data transfer speed of the interface of your components. SAS cables described as "equalized" may not support 6 Gb/s data rates and should not be used with LTO-5 or later generation tape drives unless these cables are verified for 6 Gb/s data rates.

CAUTION

The library has one or more mini-SAS connectors on each SAS tape drive. Mini-SAS connectors are keyed. Do not force a SAS cable's mini-SAS connector into the tape drive as it might be keyed differently.

A SAS tape drive is identified by a unique identifier called a World Wide Name (WWN) or World Wide Identifier (WWID). The library assigns the WWID to the drive bay. When a tape drive is replaced, the WWID is re-assigned to the new tape drive.

The operating system tracks the WWID for the tape drive on each HBA channel. Each of the drive connectors on the fan-out cable is associated with an HBA channel. Once a tape drive has been plugged in, it should remain on the same channel to retain the association between the HBA channel and WWID.

4.4 Fibre Channel Configuration Requirements

The Fibre channel tape drive can be connected directly to the server with a host bus adapter (HBA) or through a storage area network (SAN).

The installation requires one Fibre Channel cable for each tape drive. The tape drives all utilize an LC-style connector. Some drives will have two FC ports, but only one cable connection is needed per drive. The cable can be connected to either drive FC port.

Supported speeds by drive generation are listed in the table below.

Table 6: Supported Fibre Channel Speeds

LTO Generation	Supported Speeds
LTO-5	2 Gbps, 4 Gbps, 8 Gbps
LTO-6	2 Gbps, 4 Gbps, 8 Gbps

NOTE

- Use an appropriate HBA for your tape drive due to performance requirements.

  A lower Gbps HBA might result in performance degradation when moving highly compressible data to a higher Gb tape drive.
- In a SAN installation, all switches between the host and the library must be of the appropriate type.

  A lower Gb switch in the path may result in performance degradation. Configure zoning so only the backup servers may access the library.

4.5 Planning Module and Rack Layout

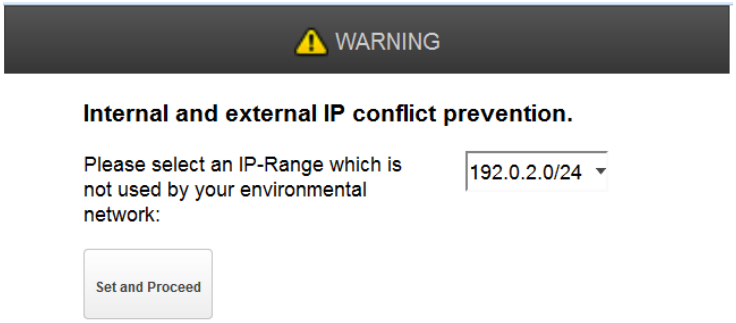
If possible, install the Base Library in the middle of the rack to provide space for the permitted 3 Expansion Modules above and 3 Expansion Modules below. See **5.1 Supported Library Configurations** for additional details.

4.6 Internal IP Range Selection

For internal communication between modules the tape library uses an Ethernet connection with an internal IP address range. To prevent any conflict between the internal IP address range and the external IP addresses it is required to select the internal IP range before the tape library gets connected to the external Ethernet port.

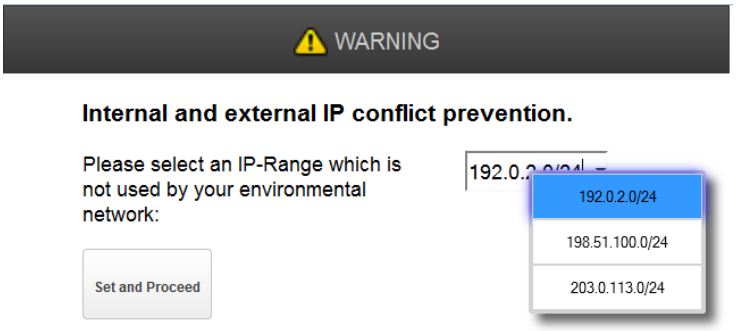
Therefore a file which contains the internal IP range is stored onto the base library backplane: **/opt/storage/mfg/stack/network.range and LCM /opt/storage/configuration/network.range**

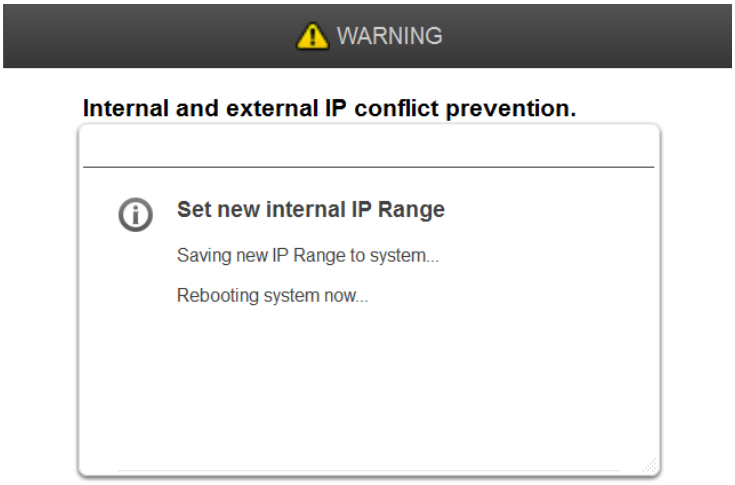
The Values must be in the following format: **RANGE=192.0.2**



Please note: the last section of the IP address is not set because it will be set internally.

The file will be created through the OCP IP Range selection page when the Stack starts for the very first time or if the unit was reset to Manufacturing Defaults / Reset via OCP/RMI.





4.7 Host Preparation

CAUTION

Static Sensitive

Risk of damage to devices

- A discharge of static electricity damages static-sensitive devices or micro circuitry.
- Proper packaging and grounding techniques are necessary precautions to prevent damage.

Follow these general guidelines:

- Check with a system administrator before powering off the host computer.
- For a SAS library, confirm availability or install a SAS HBA that supports multiple LUNs.
- For a direct-attach Fibre Channel library, confirm availability of install an FC HBA.
- For connection of a Fibre Channel library through a compatible switch, verify that sufficient ports are available.

4.8 Installation Precautions

WARNING

Product Weight

Each NEO XL-Series module weighs more than 40 kg (88 lbs.) without drives or tapes and more than 70 kg (144 lbs.) with 6 tape drives and 80 tapes.

Risk of personal injury

Before moving or lifting a library:

- Observe local health and safety requirements and guidelines for manual material handling.
- Remove all tapes to reduce the weight and to prevent cartridges from falling into the robotics path and damaging the library.
- Remove all tape drives to reduce the weight.
- Obtain adequate assistance to lift and stabilize the library during installation or removal.

Risk of damage to devices

When placing a library into or removing the library from a rack:

- Extend the rack's leveling jacks to the floor.
- Ensure that the full weight of the rack rests on the leveling jacks.
- Install stabilizing feet on the rack.
- Extend only one rack component at a time.

CAUTION

- Do not expose the library to moisture.
- Do not place a module on either the ends or sides as this may cause damage.

4.9 Unpacking Base Library and Expansion Modules

Before unpacking any modules, clear a work surface near the targeted rack for installation.

CAUTION

If the temperature in the room where the library will operate varies by 15° C (30° F) from where the module was stored, allow it to acclimate for at least 12 hours prior to unpacking.

Unpacking a Base Library or Expansion Module:

1. Before opening and removing a module from the box, inspect the container for shipping damage.
2. If you notice any damage, report it to the shipping company immediately.
3. Cut and remove the bands on the outside of the container.
4. Lift up the outer cardboard box – it is not secured to the pallet.
5. Remove the inner cardboard sleeve surrounding the module.
6. Remove the rack rails.
7. Remove the accessory kit box.

8. Remove the foam pieces from the top of the module.
9. With assistance, lift the module out of the bottom foam nest, remove the wrapping from the module and then place the module on the work surface.

CAUTION Do not place a module on either the ends or sides as this may cause damage.

10. Save the packaging materials for future use.

4.10 Identifying Library Components

If you have unpacked a Base Library, confirm that you have received the following components:

1. Base Library
2. Two Rack Rails
3. Accessory Kit
   a. Two packets of rack mount hardware
   b. Two North American Power Cords
   c. Two European Power Cords

If you have unpacked an Expansion Module, confirm that you have received the following components:

1. Expansion Module
2. Two Rack Rails
3. Accessory Kit
   a. Two packets of rack mount hardware
   b. Two North American Power Cords
   c. Two European Power Cords
   d. Expansion Interconnect Cable

For SAS libraries, you must provide SAS cabling with the correct configuration for your HBA. For Fibre Channel libraries, you must provide one Fibre Channel cable for each tape drive.

4.11 Preparing Top and Bottom Modules

Skip this step if you are installation a library without expansion modules.

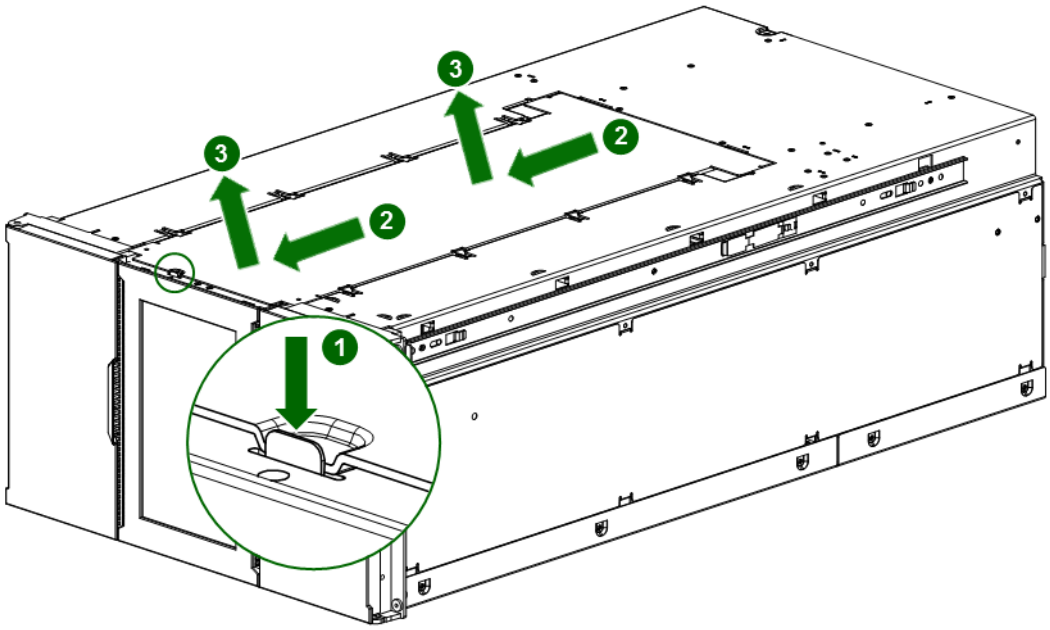
The base module has removable top and bottom covers. You will need to transfer one or both covers from the base module to expansion modules. The covers are identical and the procedure to change them is the same for both top and bottom covers.

- If you are installing expansion modules below the base library, move the bottom cover from the base library to the expansion module that will be installed at the bottom of the library.
- If you are installing expansion modules above the base library, move the top cover from the base library to the expansion module that will be installed at the top of the library.

To move a library cover plate from the base module to an extension module:

1. Remove the library cover plate from the base module.
   a. Place the base module on a work table. If you are removing the bottom cover, gently turn the base module over so you can access the bottom of the module.

b. Insert a small flathead screwdriver or Torx screwdriver into the hole to retract the spring lock, slide the cover until it reaches the tool, remove the tool and continue sliding the cover to the front of the module until all the tabs are released.



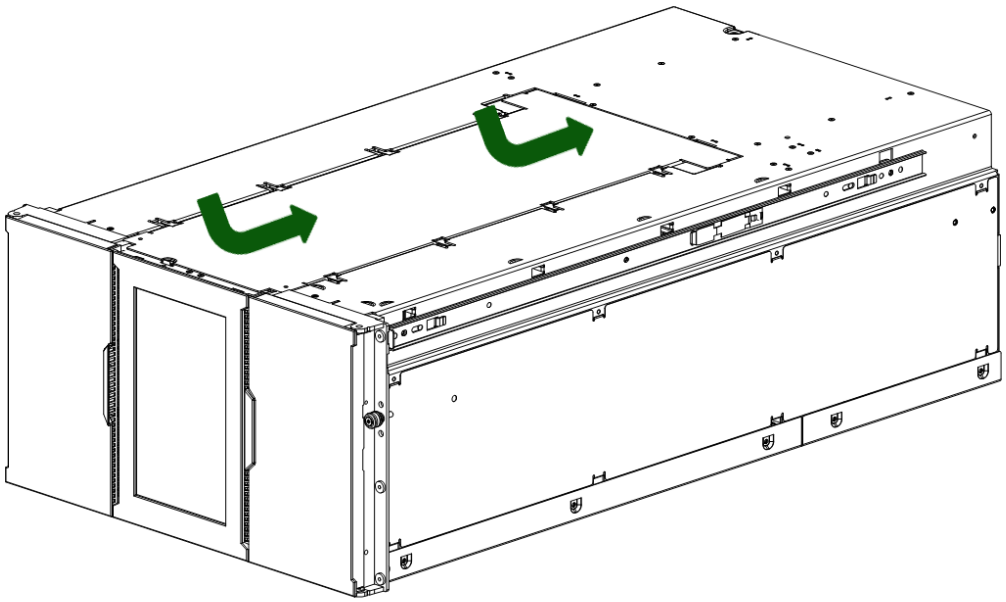
c. Remove the cover from the module.

d. If the base module is upside down, gently return it to its normal position.

2. Install the cover on the expansion module.

a. Place the expansion module on the work table. If the module will be the bottom module in the library, gently turn the module over so you can access the bottom of the module.

b. Align all tabs on the cover with the slots on the module, gently push it down, and then slide the cover towards the back of the module until the spring lock engages.



c. If the expansion module is upside down, gently return it to its normal position.

4.12 Installing Modules in a Rack

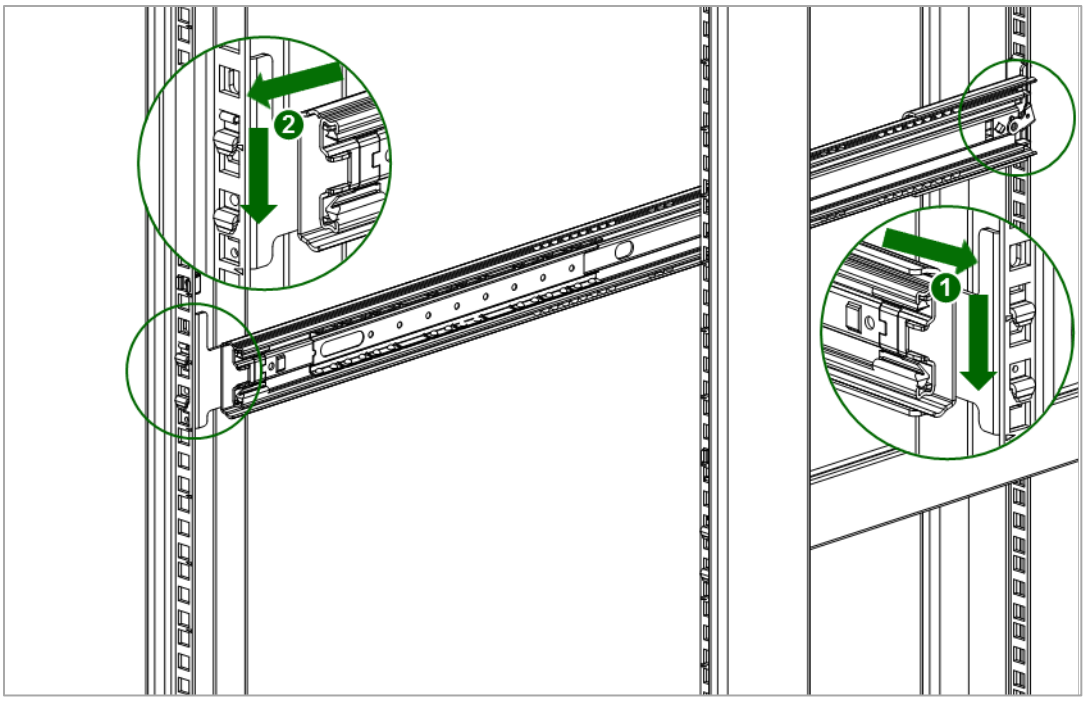
NEO XL-Series modules are easy to install racks compliant to EIA 310A Standard, at least 1 meter deep. You need a #2 Phillips screwdriver for this process.

To locate the rail locations when installing multiple modules:

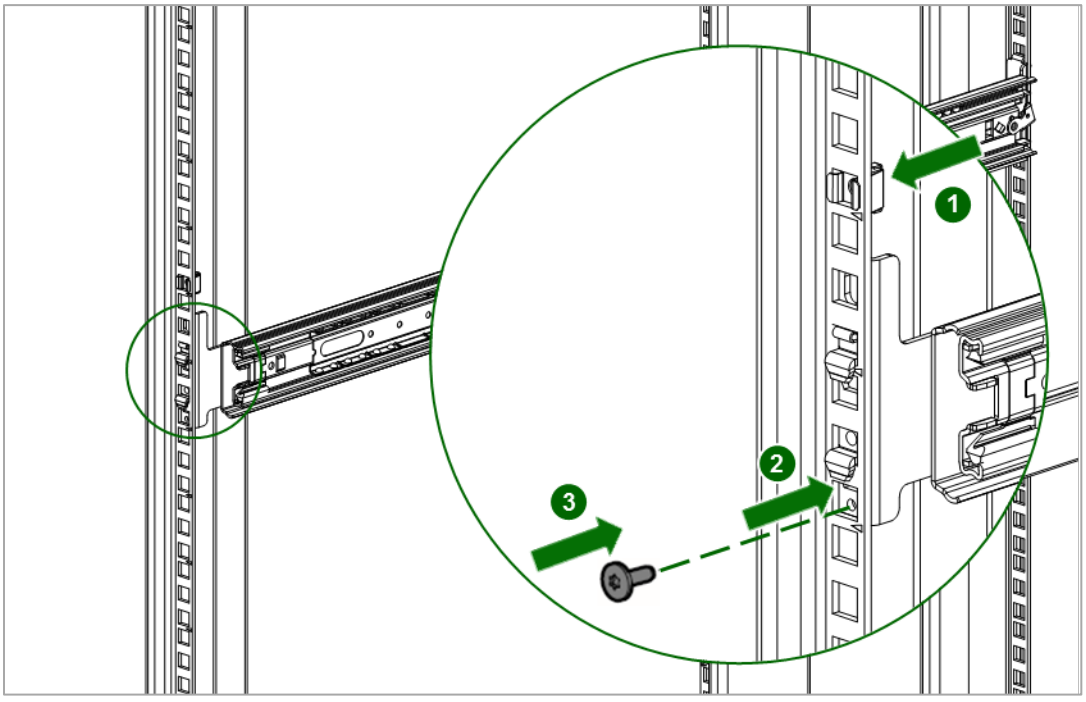
1. Locate the bottom of the lowest full U where the lowest module will be installed.
2. Continue noting the locations for any additional modules 6U higher.

To install the rails into the rack, starting from the lowest rack location:

1. From the front of the rack, insert the rack rails into the back and then front vertical supports.
   a. Position a rail according to the left-right front-rear orientation information stamped on the rail.
   b. Rotate the front of the rail up while inserting the rear rail hanger into the rear vertical support, and then lower the front of the rail until it is nearly level.
   c. Extend the front of the rail until the hangers come through the holes in the vertical support and the retention spring snaps into place.
   d. Repeat sub steps a, b, and c with the other rail.



2. On the front of both rails in a square-hole rock, install a clip nut above the mounting bracket as shown, and for increased stability, install the retention inserts from the packet labeled **Retention Inserts**.

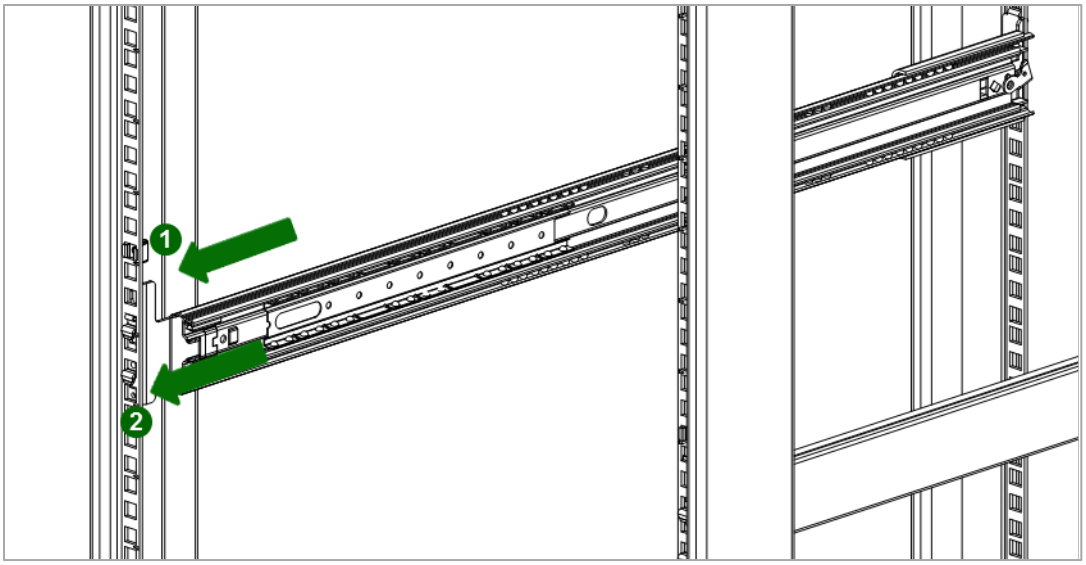


The library has a three-part rail system:

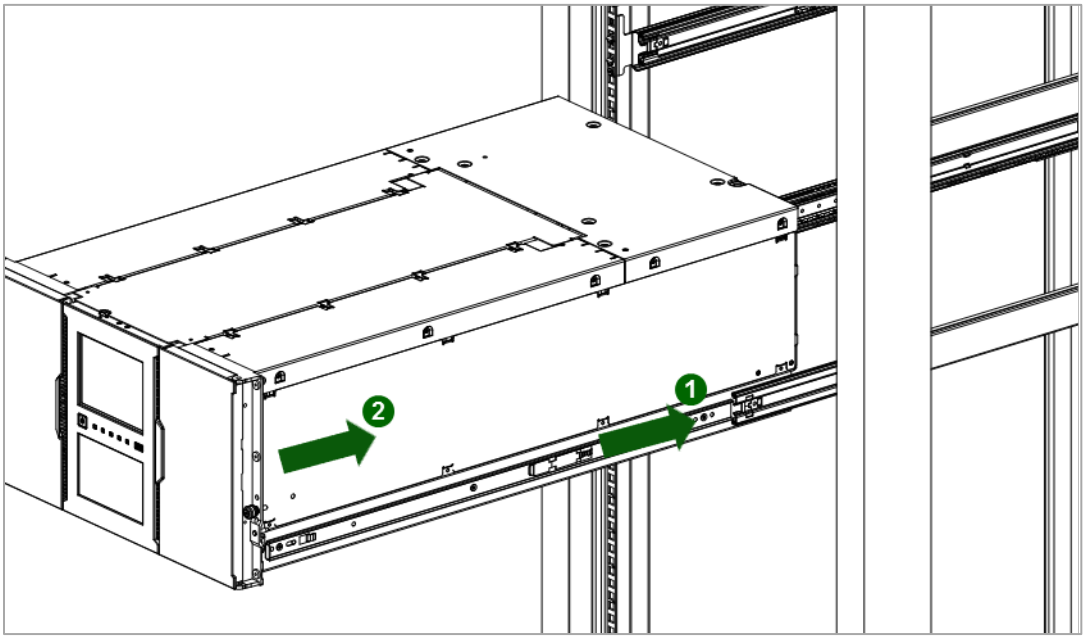
- Outer rail is installed in the rack.
- Middle rail connects to the inner and outer rails so the module can be slid out of the rack.
- Inner rail is attached to the module.

To install the modules in the rack, starting with the bottom module:

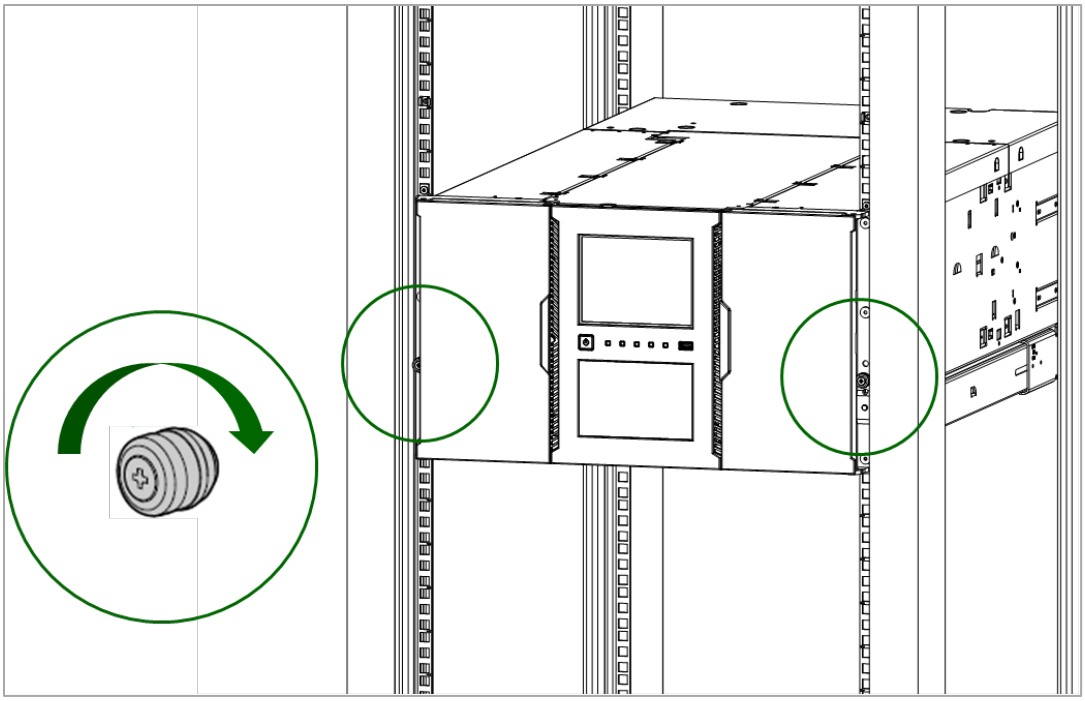
1. Extend the middle rails until they lock into place. Move the sliding assembly to the front of the middle rails.



2. Slide the inner rails into the middle rails. Slide the module into the rack



3. If you are installing multiple modules, verify that this module has been installed directly above or below its adjacent module and is contained within the correct 6U volume. The gap between modules must be less than 4 mm.
4. Use your fingers to tighten the captive thumbscrew on each side of the module.



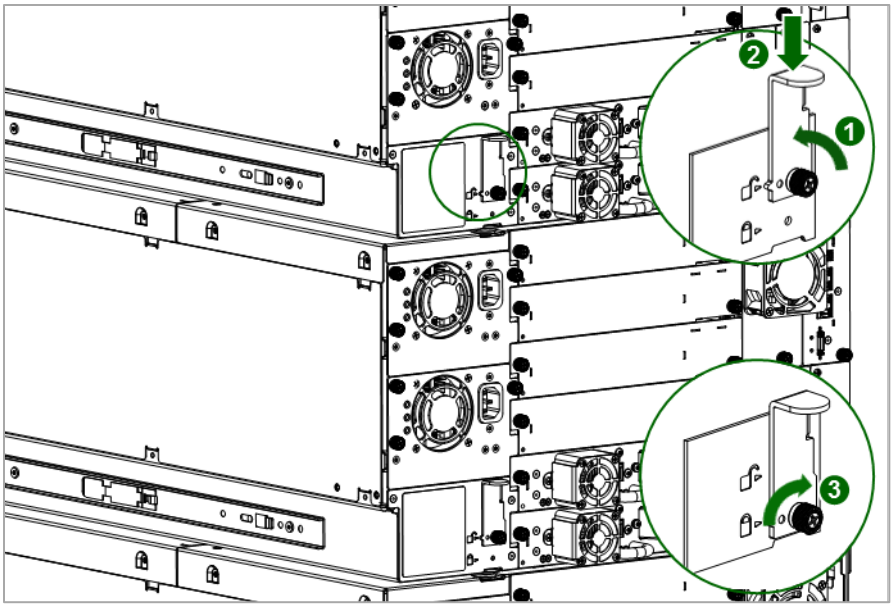
5. Repeat steps 2 through 4 to install the rest of the modules into the rack.

4.13 Aligning and Connecting Modules

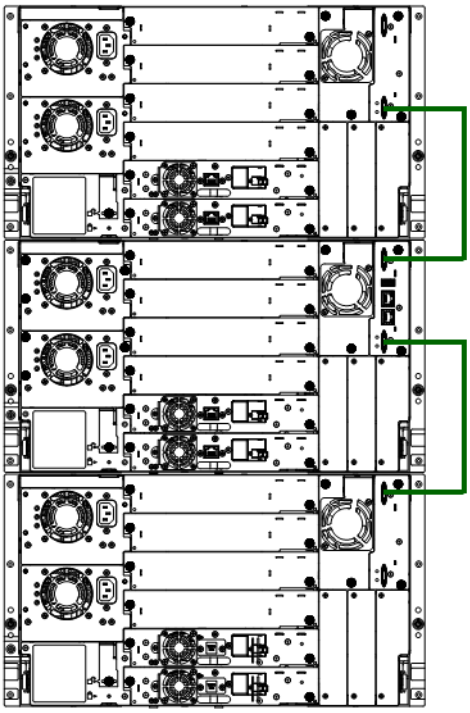
Skip this step if the library does not have expansion modules.

Aligning the modules ensures that the robot can move freely between the modules. The library will not operate unless the alignment mechanism is in the locked position.

1. From the front of the library, loosen the thumbscrews on each of the modules two full turns.
2. From the back of the library, starting with the bottom pair of modules, align each module with the module below. Repeat for each pair of modules.
   a. Loosen the thumbscrew on the module alignment mechanism.
   b. Lower the alignment mechanism. If you encounter resistance, adjust the position of the upper module so the pin in the alignment mechanism moves into the hole in the lower module. When the alignment mechanism is in the locked position, tighten the thumbscrew.



3. Verify that the lowest module in the library has its alignment mechanism secured in the unlocked position with the thumbscrew.
4. From the front of the library, use your fingers to tighten the thumbscrews on each of the modules to secure the modules to the rack.
5. From the back of the library connect the lower module of each pair to its adjacent module using the expansion interconnect cable as shown.



4.14 Installing Tape Drives

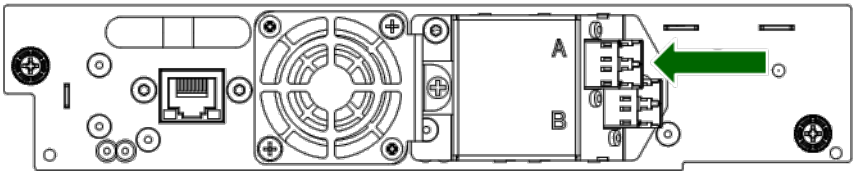
1. Locate an appropriate vacant drive bay on the back of the library.

2. To assist in aligning the drive, only remove the drive bay covers for one drive at a time. Remove the face plate covering the drive bay by removing the screws holding it in place. Remove one drive bay cover to install a half-height tape drive.
3. Holding the tape drive by the handle and supporting it from the bottom, slide the tape drive along the alignment rails into the drive bay until it is flush with the back of the library.
4. Tighten the blue captive screws with your fingers to secure the tape drive to the chassis. If the thumbscrews cannot be tightened, verify that the tape drive is aligned properly.

CAUTION All drive bays without tape drives installed must have drive bay covers installed.

4.15 Connecting Fibre Channel Cables

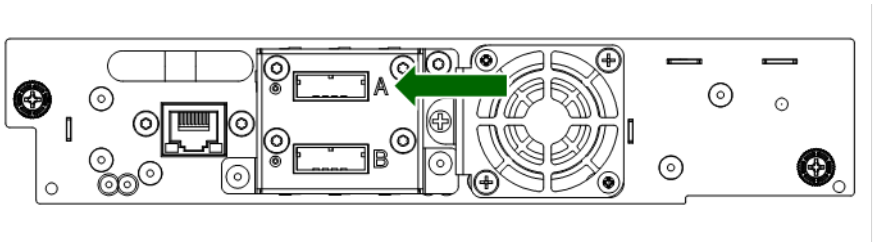
1. Remove the FC port caps if necessary. Attach one end of the FC cable to port A on the tape drive.



2. Attach the other end of the FC cable to a switch or HBA.

4.16 Connecting SAS Cables

1. Attach the HBA end of the SAS cable into the connector on the HBA. If you are using a SAS fanout cable, the end of the cable with only one connector should be plugged into the HBA.
2. Connect the drive end of the cable.
   - If you are using a cable with a single connector on each end, attach the other end into the connector on the tape drive.
   - If you are using a SAS fanout cable, attach one mini-SAS connector into the connector on each tape drive. The unused ends of the SAS fanout cable are single channel and not suitable for use with disk arrays. Use the other ends to connect tape drives, or coil and secure them to the rack to minimize stress on the connectors.



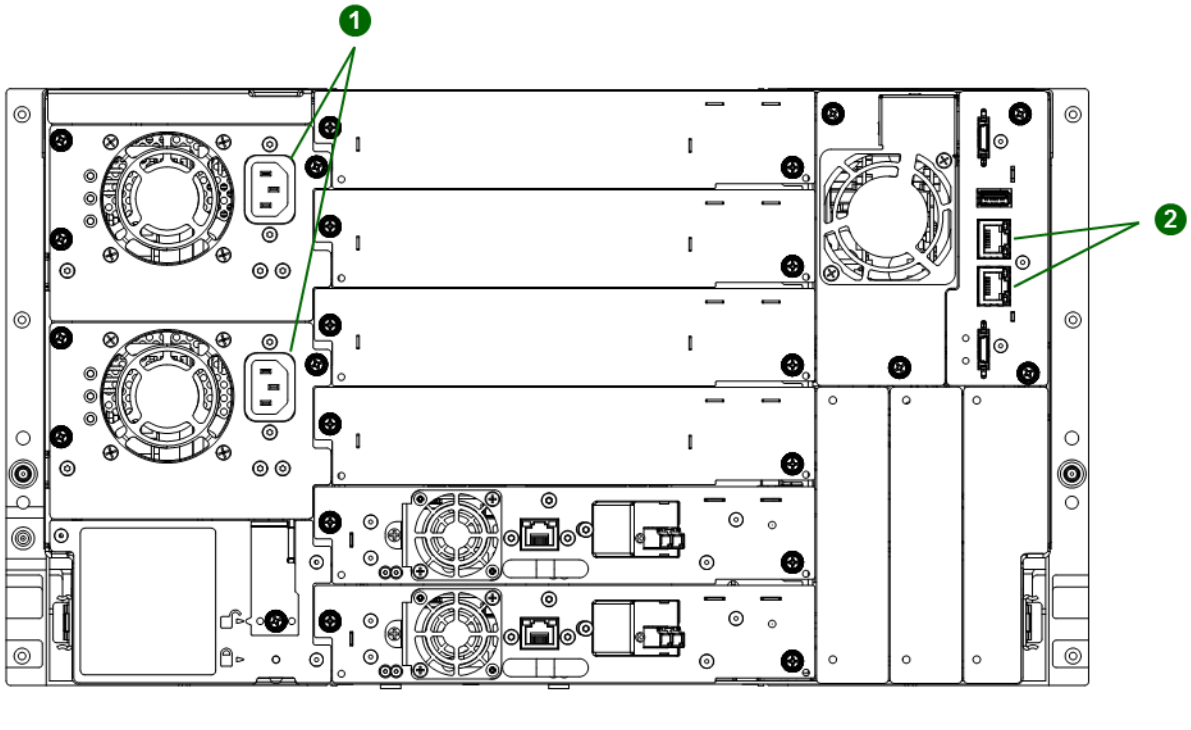
NOTE SAS signal rates require clean connections between the HBA and tape drive. Do not use adapters or converters between the HBA and the tape drive. For reliable operation, use a maximum SAS cable length of six meters.

4.17 Powering On the Library

1. Plug the power cables into the power connectors on each module and into power outlets.

NOTE Both the NEOxl 60 with the redundant option and the NEOxl 80 libraries have dual redundant power supplies. To increase redundancy, plug each power cord into a different AC power circuit.

2. To use the RMI, connect an Ethernet cable from the bottom Ethernet ports on the library module controller to your network.
3. Power on the library by pressing the power button on the base module just below the OCP; the green light will illuminate. When the library is powered on, it inventories the tape cartridges in the magazines, checks the firmware version on all modules, configures the tape drives, confirms the presence of the existing modules, and searches for any new modules.



1 Power Connectors
2 Ethernet Ports (Base Library Only)

4.18 Using the Configuration Wizard

Start the Initial Configuration Wizard from the OCP. The wizard will guide you through configuring the time zone, date and time, and network settings, setting the administrator password, and then start an initial system test. You can skip items and stop the wizard at any time. Once you have configured the network settings and set the administrator password, you can initiate the wizard from the RMI to complete the remaining configurations.

4.19 Verifying the Host Connection

To verify the connections between the host computer and the library:

1. Install the application software and/or drivers that are compatible with the library. Backup software packages might require additional software or licensing to communicate with the robotics.

2. Verify the connection between the library and the host using the host server's operating system utilities.

4.20 Labeling and Loading Tape Cartridges

The library will power on without cartridges, but needs cartridges before performing data read and write operations, or any tests or operations that transfer cartridges.

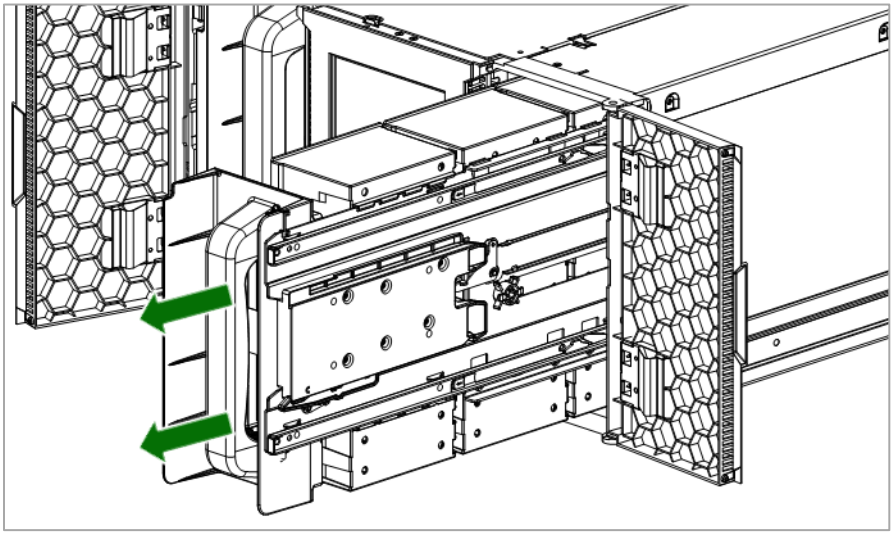
Barcode labels are recommended in production environments to improve inventory time in the library and ease cartridge handling processes outside the library.

4.20.1 Using the Mailslot

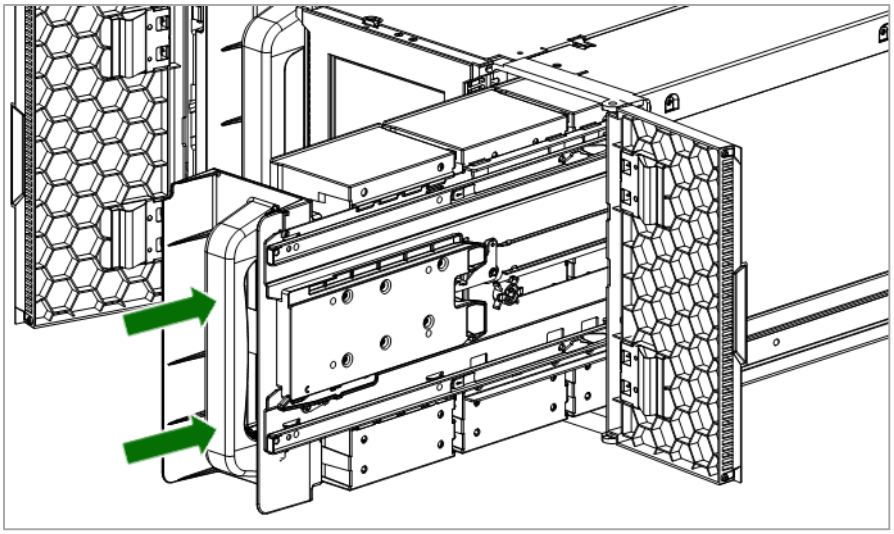
If the mailslot is enabled, you can use it to load cartridges into the library. On the Home screen, tap **Open Mailslot**, open the magazine access door, and then pull the mailslot out.

4.20.2 Bulk Loading Magazines

1. Extend one of the magazines from the library.
   a. From the OCP or RMI, select the module and then select Open Magazine.
   b. Open the magazine access door.



2. Load the tape cartridges into the magazine starting with the back of the magazine. Push the magazine in the library as each bin is filled.
3. Push the magazine handle slowly until the magazine release latch snaps into place. The magazine locks into place.



4. Repeat steps 1 through 3 for each of the other magazines.

4.21 Verifying the Installation

Verify that the library has the current firmware revision. The library firmware revision is displayed in the top left corner of the OCP and RMI screen.

If necessary, update the library firmware from the OCP or RMI **Maintenance > Software Upgrades > System Firmware** screen.

After configuring the library, you can save the configuration settings to a USB flash drive from the OCP or to a file on your computer from the RMI **Configuration > Save/Restore** screen. Having a backup of the library configuration is helpful when recovering from a configuration error or if the library needs service.

4.22 Configuring Additional Features

The library has many features to customize it for your organization.

- Enabling the mailslot. See "**Enabling or Disabling Mailslots**".
- Naming the library via the partitioning wizard. See "**Configuring Library Partitions**".
- Partitioning the library. See "**Configuring Library Partitions**".
- Enabling and configuring SNMP network management. See "**Configuring SNMP**".
- Setting up email event notification. See "**Configuring Event Notification Parameters**"

5 Tape Cartridges and Magazines

This chapter explains which media to use with your library, and how to label and write-protect your tape cartridges. Careful labeling and handling of the tape cartridges will prolong the life of the tape cartridges and the library.

5.1 Tape Cartridges

Use the Ultrium data and cleaning tape cartridges designed for your model of library.

Table 7: LTO-5 Tape Drive

Cartridge Type
LTO-5 Ultrium 3 TB Data Cartridge
LTO-5 Ultrium 3 TB WORM Data Cartridge
Ultrium Universal Cleaning Cartridge

Table 8: LTO-6 Tape Drive

Cartridge Type
LTO-6 Ultrium 6.25 TB Data Cartridge
LTO-5 Ultrium 6.25 TB WORM Data Cartridge
Ultrium Universal Cleaning Cartridge

NOTE LTO-3 and later tape drives support both rewriteable and WORM data cartridges. Write-Once, Read-Many (WORM) data cartridges provide an enhanced level of data security against accidental or malicious alteration of data on the tape cartridge. The WORM data cartridge can be appended to maximize the full capacity of the tape cartridge, but you will be unable to erase or overwrite data on the cartridge.

5.1.1 Using and Maintaining Tape Cartridges

CAUTION Do not degauss LTO data cartridges! These data cartridges are pre-recorded with a magnetic servo signal. This signal is required to use the cartridge with the LTO tape drive. Keep magnetically charged objects away from the cartridge.

To ensure the longest possible life for your data cartridges, follow these guidelines:

- Use only the data cartridges designated for your device.
- Clean the tape drive when the Clean drive LED is illuminated.

CAUTION Use only Ultrium Universal cleaning cartridges.

- Do not drop a cartridge. Excessive shock can damage the internal contents of the cartridge or the cartridge case itself, making the cartridge unusable.
- Do not expose data cartridges to direct sunlight or sources of heat, including portable heaters and heating ducts.
- The operating temperature range for data cartridges is 10 to 35º C. The storage temperature range is -40 to +60º C in a dust-free environment in which relative humidity is always between 20 percent and 80 percent (non-condensing).
- If the data cartridge has been exposed to temperatures outside the specified ranges, stabilize the cartridge at room temperature for the same length of time it was exposed to extreme temperatures or 24 hours, whichever is less.

- Do not place data cartridges near sources of electromagnetic energy or strong magnetic fields such as computer monitors, electric motors, speakers, or X-ray equipment. Exposure to electromagnetic energy or magnetic fields can destroy data and the embedded servo code written on the media by the cartridge manufacturer, which can render the cartridge unusable.
- Place identification labels only in the designated area on the cartridge.

5.1.2 Labeling Tape Cartridges

The device contains a bar code reader that reads the tape labels and stores the inventory data in memory. The device then provides the inventory information to the host application, OCP, and RMI. Having a bar code label on each tape cartridge enables the bar code reader to identify the cartridge quickly, thereby speeding up inventory time. Make it a practice to use bar code labels on your tape cartridges.

! IMPORTANT Note: the tape library does not support unlabelled media. Make sure every cartridge has a barcode label in place.

A proper bar code label includes the media ID in the last two characters of the bar code. The library will not load an incompatible cartridge, based on the barcode media ID, into a tape drive. For example, the library will not load a cartridge labeled as LTO-3 into an LTO-6 tape drive. This saves the time needed to load the cartridge and have the tape drive reject it.

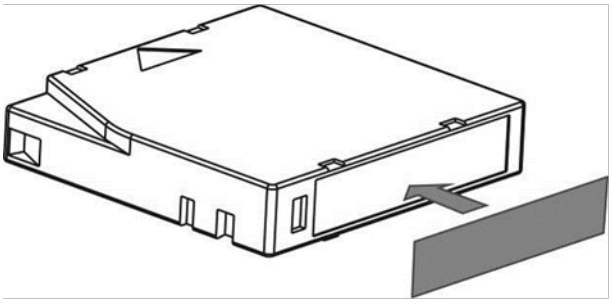
Though not recommended, disabling bar code checking in the **Configuration > Ignore Barcode Media ID** screen will allow all media moves regardless of the bar code media ID.

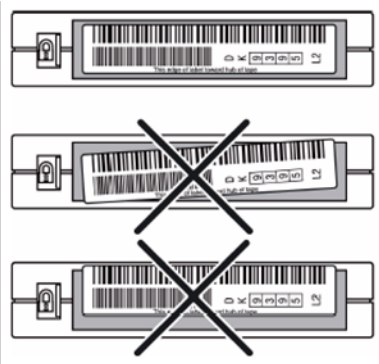
Your host software may need to keep track of the following information via the associated bar code:

- Date of format or initialization
- Tape's media pool
- Data residing on the tape
- Age of the backup
- Errors encountered while using the tape (to determine if the tape is faulty)

! IMPORTANT Misusing and misunderstanding bar code technology can result in backup and restore failures. Use only high quality labels. Self-printed labels are not recommended as they are often a source of barcode reading issues.

LTO tape cartridges have a recessed area located on the face of the cartridge next to the write-protect switch. Use this area for attaching the adhesive-backed bar code label. Only apply labels as shown:



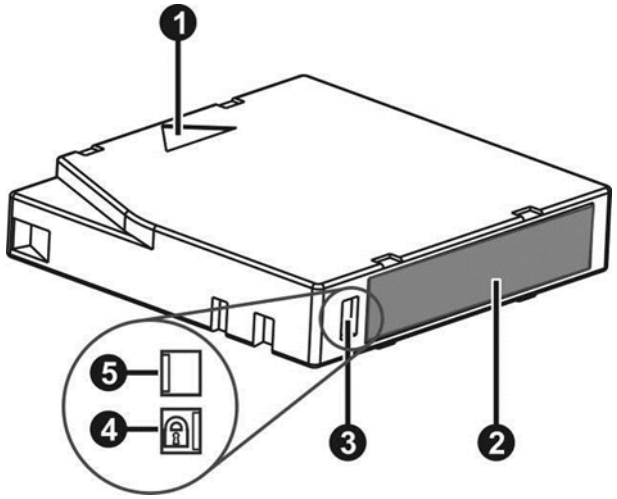


! IMPORTANT The bar code label should only be applied as shown, with the alphanumeric portion facing the hub side of the tape cartridge. Never apply multiple labels onto a cartridge because extra labels can cause the cartridge to jam in a tape drive.

5.1.3 Write Protecting Tape Cartridges

All rewriteable data cartridges have a write-protect switch to prevent accidental erasure or overwriting of data. Before loading a cartridge into the device, make sure the write-protect switch on the front of the cartridge is in the desired position.

- Slide the switch to the left to allow the device to write data to the cartridge.
- Slide the switch to the right to write-protect the cartridge. An indicator, such as a red mark or small padlock, is visible showing that the cartridge is write-protected.



1	Insertion Arrow
2	Barcode Label
3	Write-Protect Switch
4	Write-Protected
5	Write-Enabled

5.1.4 Read and Write Compatibility

Table 9: Ultrium Read/Write Compatibility

	LTO-1 Drive	LTO-2 Drive	LTO-3 Drive	LTO-4 Drive	LTO-5 Drive	LTO-6 Drive
LTO-3 Media	Incompatible	Incompatible	Read/Write	Read/Write (no encryption)	Read Only	Incompatible
LTO-4 Media, Unencrypted	Incompatible	Incompatible	Incompatible	Read/Write	Read/Write	Read Only
LTO-4 Media, Encrypted	Incompatible	Incompatible	Incompatible	Read/Write with encryption key	Read/Write with encryption key	Read/Write with encryption key

	LTO-1 Drive	LTO-2 Drive	LTO-3 Drive	LTO-4 Drive	LTO-5 Drive	LTO-6 Drive
LTO-5 Media, Unencrypted	Incompatible	Incompatible	Incompatible	Incompatible	Read/Write	Read/Write
LTO-5 Media, Encrypted	Incompatible	Incompatible	Incompatible	Incompatible	Read/Write with encryption key	Read/Write with encryption key
LTO-6 Media, Unencrypted	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Read/Write
LTO-6 Media, Encrypted	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Read/Write with encryption key

6 Operating the Library

The library provides two main interfaces:

- Operator control panel (OCP) — With the OCP, you can monitor, configure, and control the library from the front panel.
- Remote management interface (RMI) — With the RMI, you can monitor, configure, and control the library from a web browser. The RMI hosts a dedicated, protected Internet site that displays a graphical representation of the library.

The OCP and RMI are similar in design and functionality.

Table 10: Status Icons

	The green Status OK icon indicates that the library is fully operational and that no user interaction is required
	The blue exclamation point Status Warning icon indicates that user attention is necessary, but that the device can still perform most operations.
	The red X Status Error icon indicates that user intervention is required and that the device is not capable of performing some operations.

6.1 Using the OCP

The OCP has a power button, an LCD touch screen, and five LEDs. With the OCP you can monitor, configure, and operate most library functions from the library front panel. To navigate the OCP, tap on the LCD touch screen.

Table 11: Front Panel LED Indicators

Module ID	Blue when activated. The unit identification (UID) LEDs are controlled by the user through the OCP and **RMI Maintenance > UID LED Control** screen. The UIDs on the OCP and back panel UID are activated and deactivated together. The UIDs are helpful for locating the library in a data center.
Ready	Green, steady when power is on, blinking with tape Ready drive or library robotic activity
Clean	Amber when a tape drive cleaning operation is recommended.
Attention	Amber if the library has detected a condition for which user attention is necessary, but that the library can still perform most operations.
Error	Amber if an unrecoverable tape drive or library error occurs. A corresponding error message is displayed on the LCD screen. User intervention is required; the library is not capable of performing some operations.

6.2 Using the RMI

With the RMI, you can monitor, configure, and operate most library functions from a web browser.

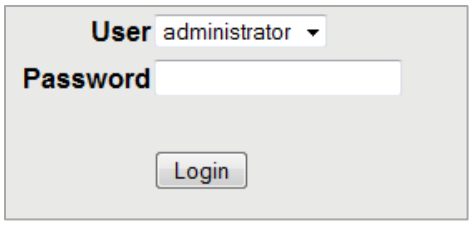
When possible, it is recommended that the RMI be used as the primary library interface because the web interface provides access to additional features, includes online help, and is easier to use. However, the RMI is not required to use the product, except to configure advanced features, such as SNMP, IPv6, encryption, and partitions.

Before using the RMI, you must configure the library network settings and set the administrator password with the OCP. This can be done with the Initial Configuration Wizard. See “**Using the Initial Configuration Wizard**”.

To start the RMI, open the latest version of a supported HTML browser and enter the IP address of the library in the browser’s address bar. Supported browsers include Internet Explorer, Firefox, Chrome and Safari.

TIP Check the online help in the RMI for additional information. The help pages are updated with firmware updates and often contain up-to-date technical details that might not be contained in this document. To access RMI help, click the **?** icon on the right side of the RMI top banner.

6.3 Logging into the Library



To login to the library:

1. OCP: If the OCP screen saver is on, tap the screen.
   RMI: Open a supported web browser and enter the IP address of the library in the browser's address bar.
2. Select the **User**.
3. If required, enter the **Password**.
4. Click **Login**.

The user levels are:

- User – No password is required (leave the **Password** blank unless the user password has been set).
  The user account provides access to status information, but not configuration, maintenance or operation functions.
- Administrator – The administrator password is required to login as the administrator user. The same administrator password is used for the RMI and OCP. There is not a default administrator password; the administrator password must be set with the OCP before administrator functions can be used with the RMI.
  The administrator user has access to all functionality except for the log configuration and Service features.
- Service – **Access to this user is by Service personnel only**. The service password is set at the factory. The same service password is used for the RMI and OCP. Both the administrator and service passwords are required for a service person to enter the service area.

TIP By default, the administrator password is unset; all of the digits are null. You must set the administrator password from the OCP to protect the administrator functions on the OCP and access the administrator functions on the RMI.

6.4 Using the Library Main Screen

The library main screen is organized into the following regions:

- Top Banner – Contains the home button and displays the overall status and information about the library and user
- Left Pane – Displays the library identity and module status
- Center Pane – Provides access to operate and configure the library and to view additional status information
- Right Pane – (RMI only) Displays a log of recent events

6.4.1 Top Banner Elements

-  – **Home Icon** – Returns to the library main screen
- **Library Health** – An icon indicating the overall health status of the library
  -  – The green check mark Status OK icon indicates that all library components are fully operational and that no user intervention is required.
  -  – The yellow triangle exclamation point Status Warning icon indicates that user attention is necessary, but that the library can still perform most operations. Click the icon to display the event ticket log.
  -  – The red circle X Status Error icon indicates that user intervention is required and the library is not capable of performing some operations. Click the icon to display the event ticket log.
- **Status** – The status of the library robotic
  - **Idle** – The library robotic is ready to perform an action.
  - **Moving** – The library robotic is moving a cartridge.
  - **Scanning** – The library robotic is performing an inventory of cartridges.
  - **Offline** – The library robotic has been taken off line by the library.
- **Library Time & Date** – helpful when analyzing event logs and support tickets, and might be needed when contacting support.
- **User** – The user account for this session.
- **Logout** – Logs out of this session.
- **?** – Accesses online help.

6.4.2 Left Pane Elements

- **Library Status** – Overall library confirmation and status
    - **Serial #** – The base library serial number
    - **Hostname** – The library hostname
    - **Network Configuration** – The IP version (IPv4 or IPv6) and IP address
    - **Firmware** – The library firmware version
- **Module Status Overviews** – A summary of each module's configuration and health. Click or tap the module status area to select the module.
    - Module Health Icon
        - The green check mark Status OK icon indicates that the module and each of its components are fully operational and that no user intervention is required.
        - The yellow triangle explanation point Status Warning icon indicates that user attention is necessary, but that the library can still perform most operations.
        - The red circle X Status Error icon indicates that user intervention is required and the module is not capable of performing some operations.
    - Module Number – Modules are numbered based on their location in the physical library. The bottom module is **Module 1**. The base library module is annotated with (**Base**).
    - Drive Status – The number of drives installed in the module and the health of each drive. Click or tap on the drive to display drive configuration and status information in the center pane.
        - A black square indicates that the drive is fully operational and that no user intervention is required.
        - A yellow square indicates that user attention is necessary, but that the drive can still perform most operations.
        - A red square indicates that user intervention is required or the drive is not capable of performing some operations.
    - Magazine Slot Usage – The number of cartridge slots available and the number in use.
    - Drive Operation Status – The \ current drive activity for each drive in the module. The drive operation status is only displayed for the selected module.
        - Write – The drive is performing a write operation.
        - Read – The drive is performing a read operation.
        - Idle – A cartridge is in the drive but the drive is not performing an operation.
        - Empty – The drive is empty.
        - Encryp – The drive is writing encrypted data.

6.4.3 Center Pane Elements

- **Open Mailslot** – (Administrator user only) Click or tap to unlock the mailslot on the selected module. Mailslots must be enabled before the slots can be used as mailslots. See "**Enabling or Disabling Mailslots**".
- **Open Magazine** – (Administrator user only) Click or tap to unlock a magazine in the selected module. Only one magazine in the library can be open at a time. See "**Opening a Magazine**".
- **Configuration** – (Administrator user only) Click or tap to configure the library. See "**Configuring the Library**".
- **Maintenance** – (Administrator user only) Click or tap to access maintenance functions. See "**Maintaining the Library**".

- **Operation** – (Administrator user only) Click or tap to access operation functions. See "**Operating the Library**".
- **Status** – Click or tap to access status information. See "**Viewing Status Information**".
- **Service Area** – (Service user only) Click or tap to access to functionality restricted to Service engineers.

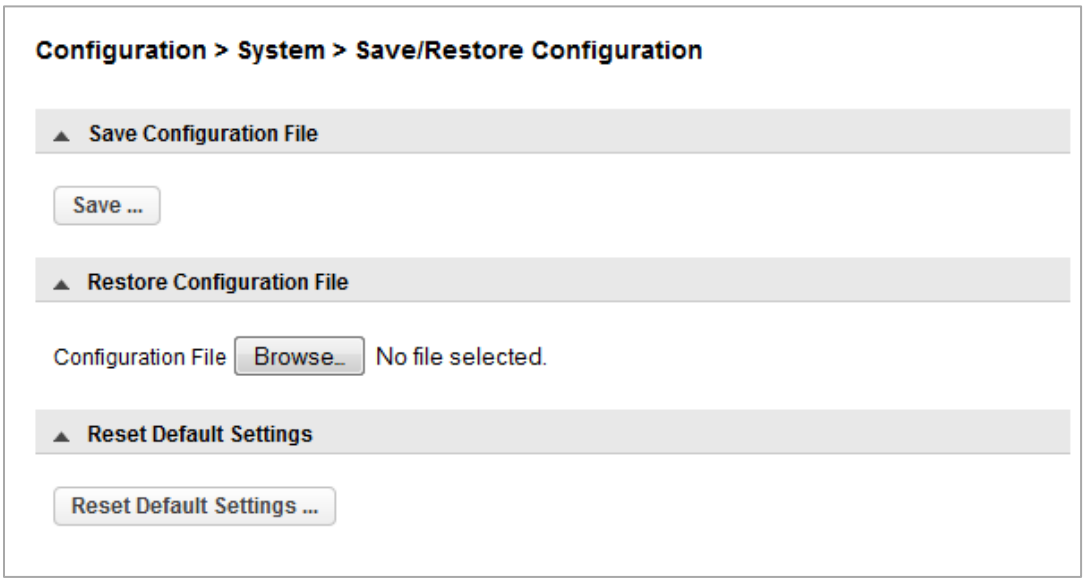
6.5 Configuring the Library

6.5.1 Using the Initial Configuration Wizard

The wizard guides you through setting the administrator password, configuring the time zone, date and time, and library network settings, and then starting an initial system test. You can skip items and stop the wizard at any time. Once you have configured the network settings and set the administrator password from the OCP, you can initiate the wizard from the RMI or OCP to complete the remaining configurations.

6.5.2 Saving, Restoring and Resetting the Library Configuration

From the **Configuration > System > Save/Restore Configuration** screen you can save the library configuration settings to a file, restore the settings, or reset the library configuration to the default settings. The saved configuration database will make it easier it recover the library configuration if you need to replace the base module or base module controller.



Saving the library configuration to a file

1. Navigate to the **Configuration > System > Save/Restore Configuration** screen as shown above.
2. For saving the configuration file to a USB device on the library, insert a USB flash drive into one of the USB ports on the base module.
3. Select the destination location:
   - **RMI** – (RMI only) Downloads the configuration file to the browser or system running the RMI
   - **USB Device Front** - Downloads the configuration file to a USB flash drive inserted into the USB port on the front of the library
   - **USB Device Rear** - Downloads the configuration file to a USB flash drive inserted into the USB port in the back of the library
4. Click **Save**

Restoring the library configuration from a file

1. Restoring the configuration file from a USB device, copy the configuration file you want to restore onto the USB device and remove any other configuration files from the USB device.
2. Navigate to the **Configuration > System > Save/Restore Configuration** screen.
3. If you will be restoring the configuration file from a USB device on the library, insert the USB flash drive containing the configuration file into one of the USB ports on the base module.
4. Select the source location:
   - **RMI** – (**RMI** only) Restores the configuration file from the computer running the RMI. Click **Browse** to navigate to and select the configuration file.
   - **USB Device Front** – Restores the configuration file from a USB flash drive inserted into the USB port on the front of the library.
   - **USB Device Rear** – Restores the configuration file from a USB flash drive inserted into the USB port in the back of the library.
5. Click **Browse**.

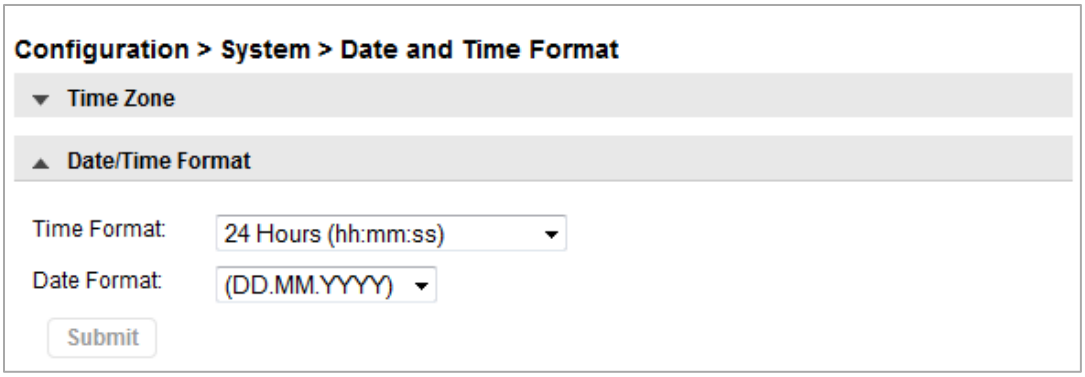
Resetting the default settings

To reset the library configuration to the default settings, click **Reset Default Settings**. For the default settings, see "**Defaults and Restore Defaults Settings**".

6.5.3 Configuring the Date and Time Format

To configure date and time format parameters and to use an SNTP server, from the Configuration area, navigate to the **System > Date and Time Format** screen.

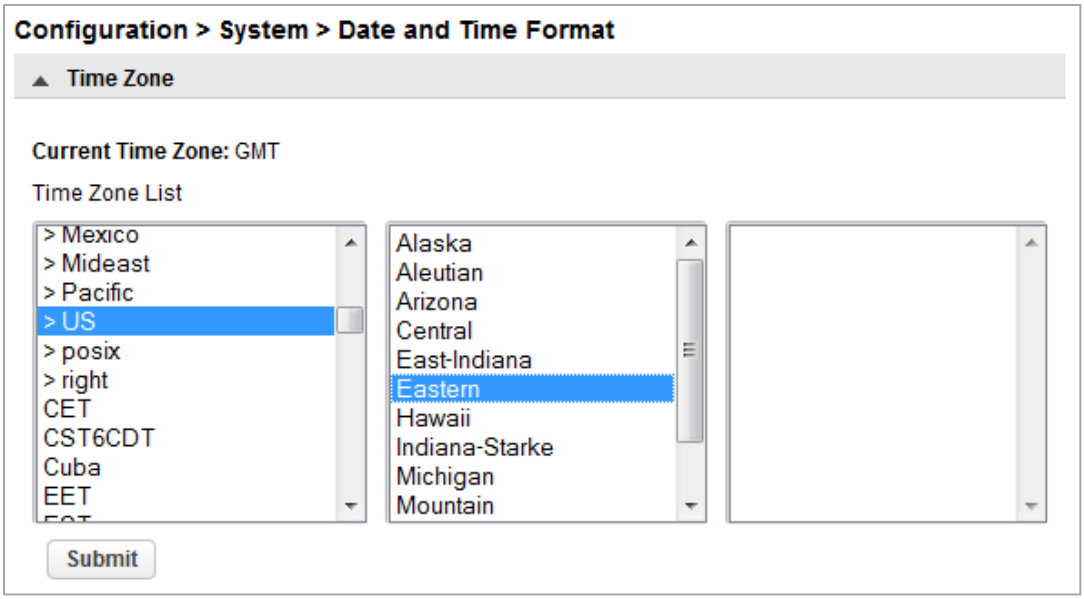
NOTE The library does not adjust its time for daylight saving time; the time must be adjusted manually.



6.5.3.1 Setting the time zone

1. Click **Time Zone**.

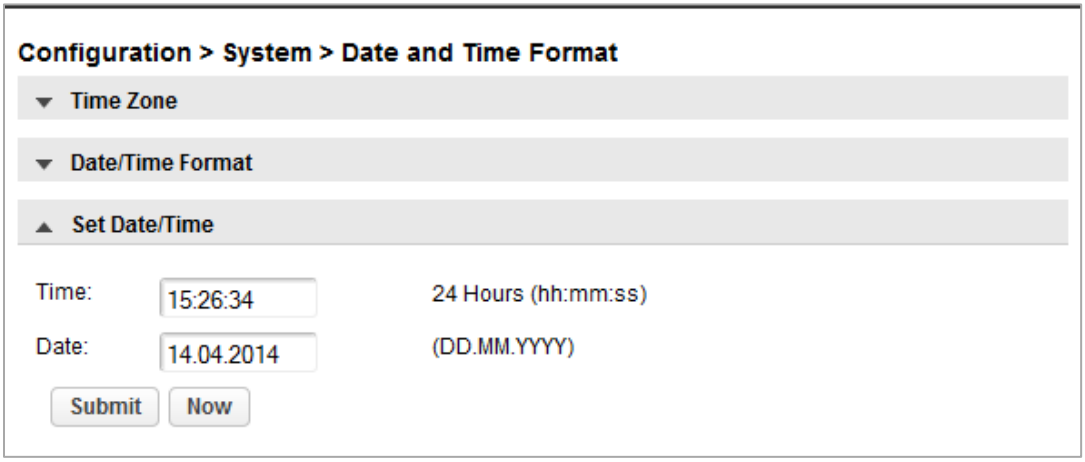
   A list of continents, countries, and regions is displayed. When an item proceeded with *'>',* for example> **US**, is selected, a submenu is displayed in the next column.



2. Expand the time zone list, as necessary, until a location with the appropriate time zone is visible.
3. Select a location with the appropriate time zone.
4. Click **Submit**.

6.5.3.2 Setting the date and time format

1. Click **Date/Time Format**.



2. Select a time format.
3. Select a date format:

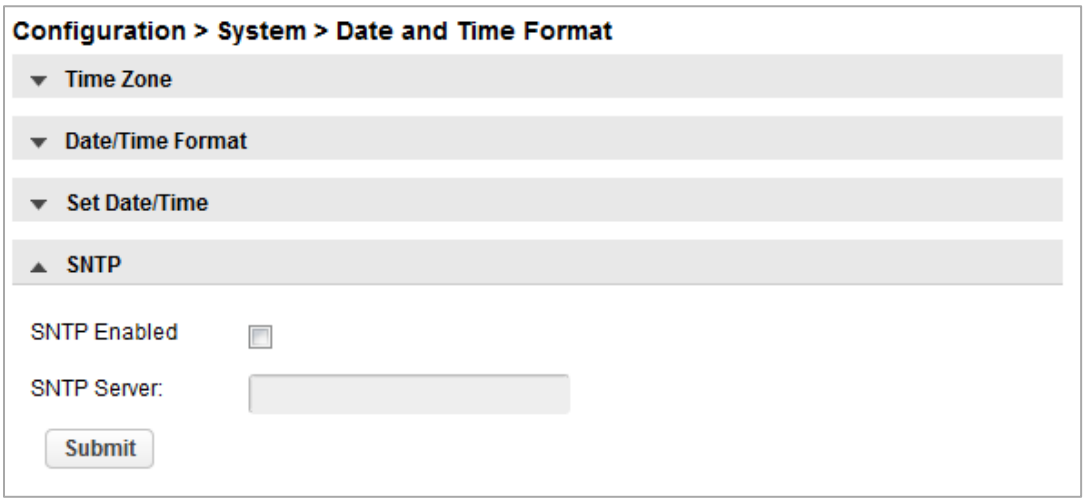
   For example, July 30, 2013 is displayed as:

   - DD.MM.YYYY - 30.07.2013
   - MM/DD/YYYY - 07/30/2013
   - YYYY-MM-DD - 2013-07-30
4. Click **Submit**.

6.5.3.3 Enabling SNTP (Simple Network Time Protocol) Synchronization

The library must have network access to an SNTP server.

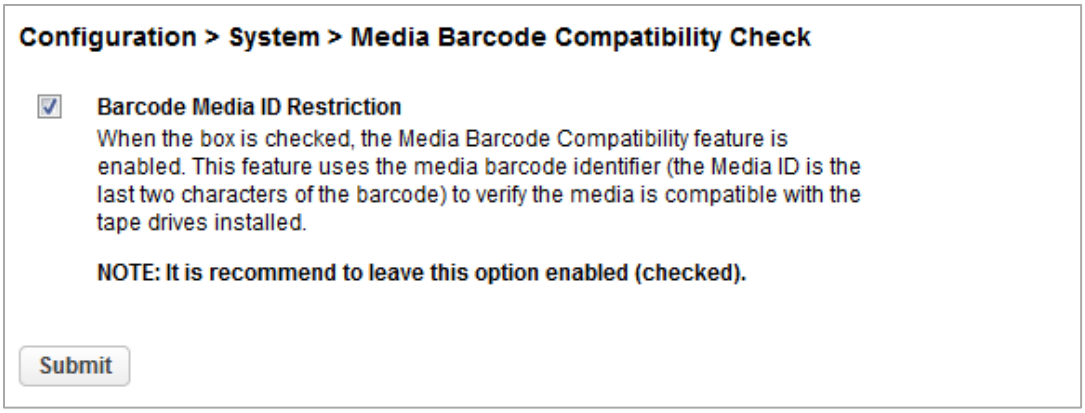
1. Click **SNTP**.



2. Click **SNTP Enabled**.
3. Enter the SNTP server address.
4. Click **Submit**.

6.5.4 Configuring Media Barcode Compatibility Checking

From the **Configuration > System > Media Barcode Compatibility Check** screen you can enable or disable the barcode media ID check.



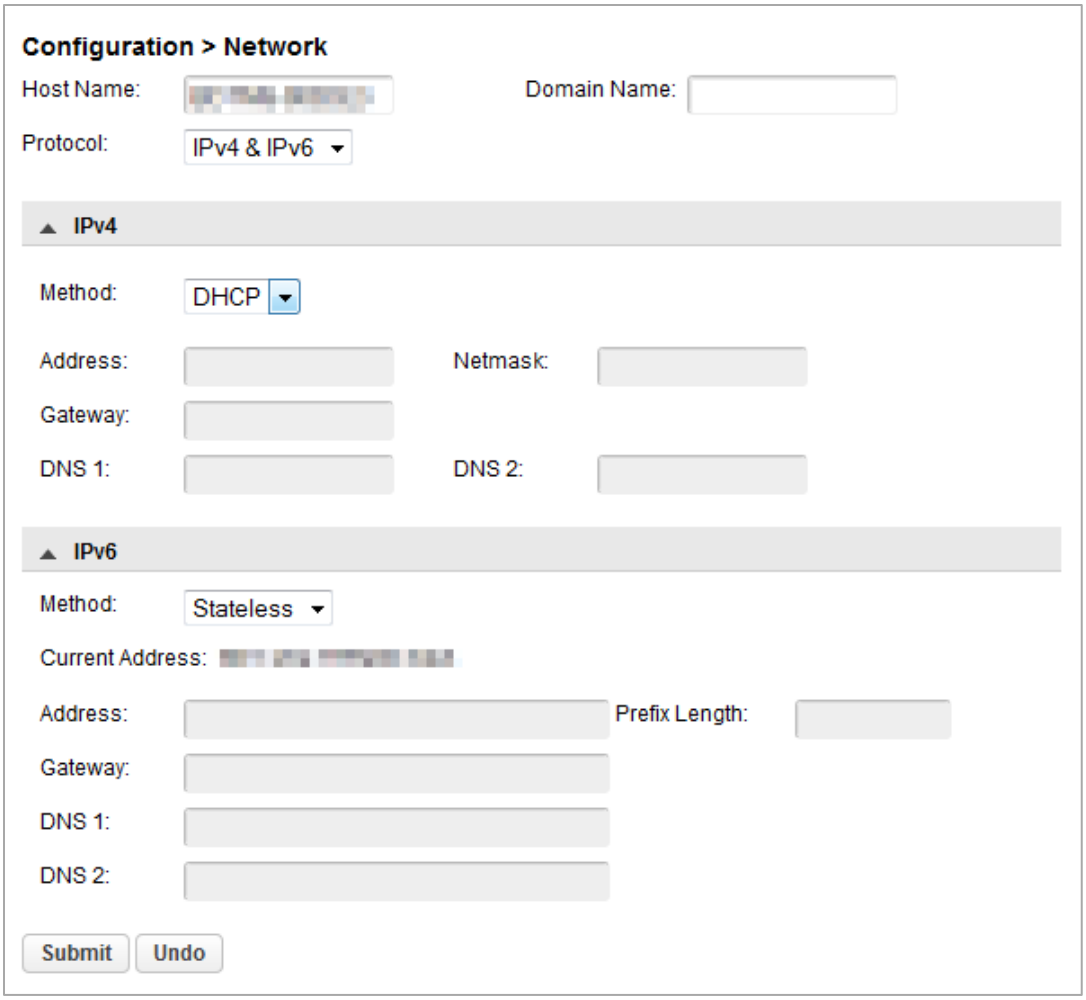
When **Barcode Media ID Restriction** is enabled, the library will only allow appropriate tape cartridges to be loaded into tape drives. The barcode media ID is the last two characters of the barcode. For example, an LTO-6 labeled cartridge will not be allowed to move into an LTO-4 tape drive.

When disabled, the library will move any tape to any tape drive. If the cartridge is incompatible with the tape drive, the library will display a message.

NOTE It is strongly recommended that all cartridges have barcode labels with the correct media ID, and that the Barcode Media ID Restriction is enabled.

6.5.5 Configuring the Library Network Settings

From the **Configuration > Network** screen you can configure the library network settings.

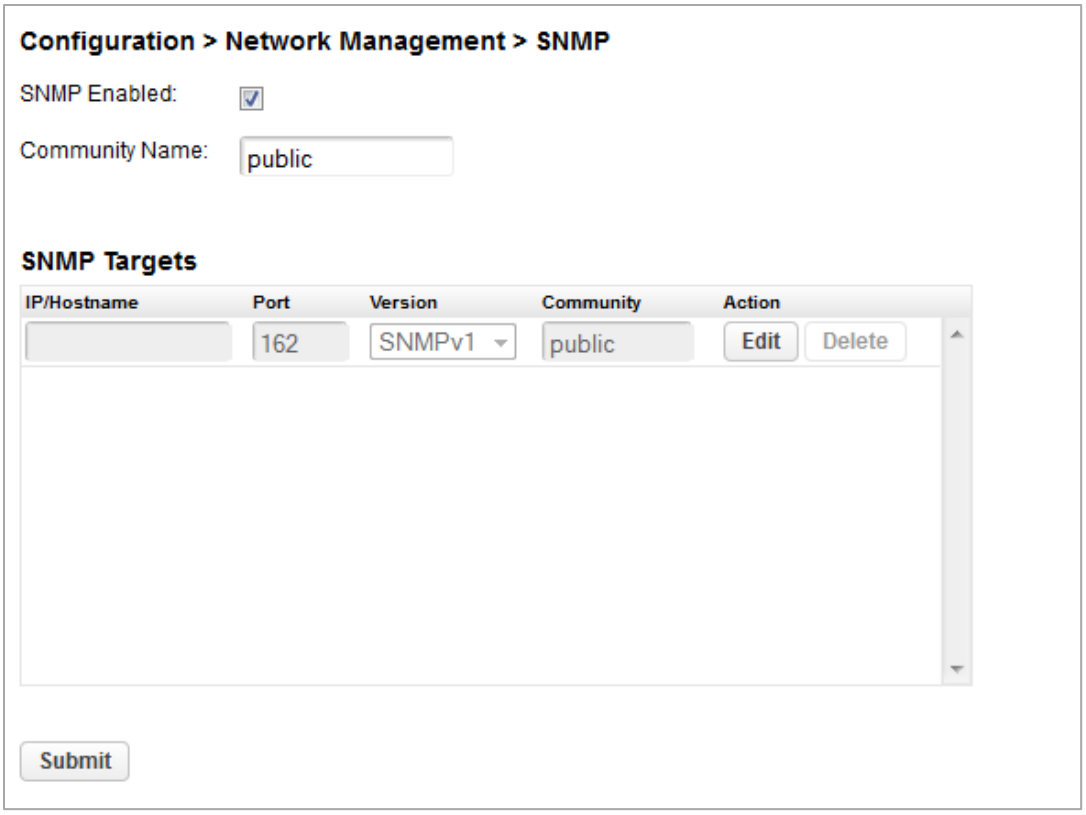


1. Navigate to the **Configuration > Network** screen.
2. Configure or update the **Host Name** and **Domain Name**. The RMI URL is *<Host Name>.<Domain Name>*.
3. Select the internet protocol to use for the library.
4. Configure the settings for the selected internet protocol.

   To have the library obtain an internet address from a DHCP server, select the DHCP or Stateless method.
5. Click **Submit**.

6.5.6 Configuring SNMP

Use the **Configuration > Network Management** screen to enable and configure SNMP (Simple Network Management Protocol), which allows applications to manage the device. The library supports both SNMP configuration and SNMP traps.



- **SNMP Enabled** – When checked, the library can be managed by computers listed in the SNMP Target IP Addresses field.
- **Community Name** – A string used to match the SNMP management station and library. It must be set to the same name on both the management station and the library. The default community name is *public*.
- **SNMP Targets** – List of configured SNMP targets.

To add an SNMP target or edit information for an SNMP target:

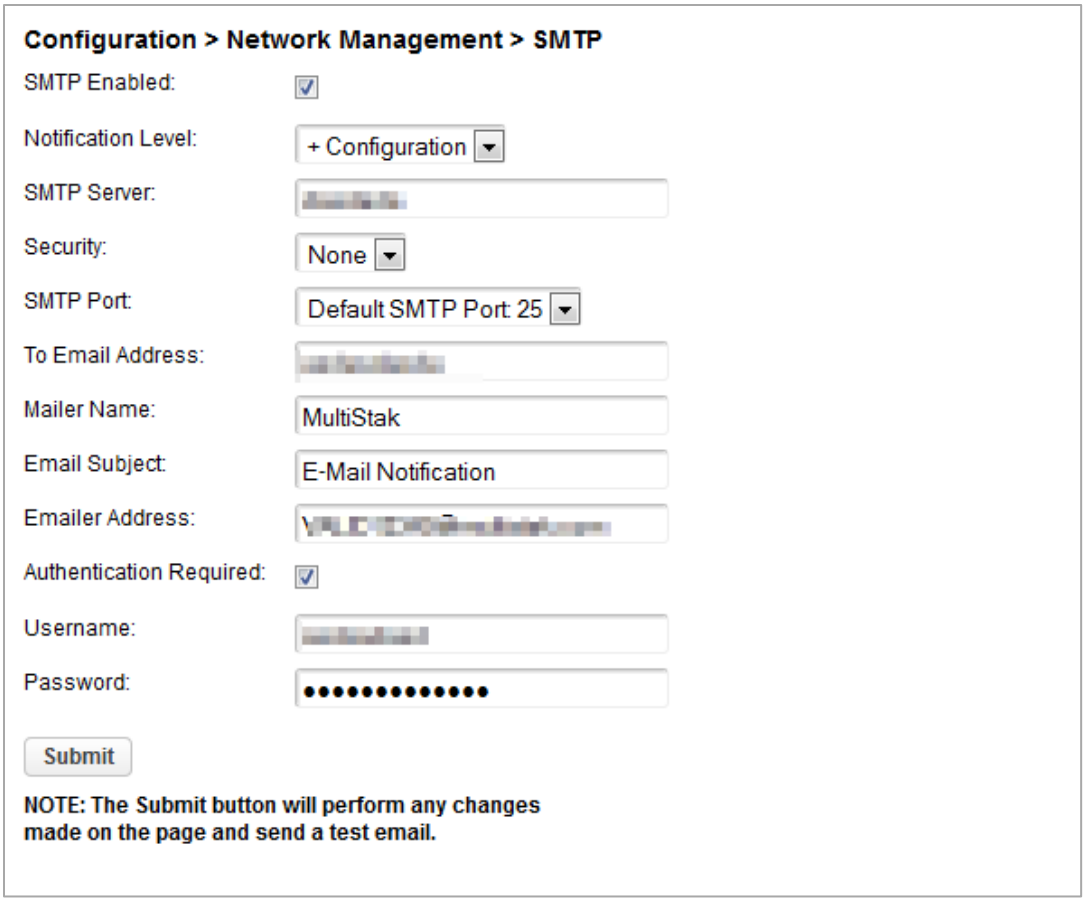
1. Click **Edit** for the appropriate SNMP target. When adding an SNMP target, click **Edit** next to a target without an IP/Hostname.
2. Enter the target IP address or hostname
3. Enter the port.
4. Select the SNMP version.
5. Enter the SNMP community string for the target.
6. Click **Submit**.

To delete an SNMP target:

1. Click **Delete** for the target to be deleted.
2. Click **Submit**.

6.5.7 Configuring Event Notification Parameters

From the **Configuration > Network Management > SMTP** screen you can enable SMTP (Simple Mail Transfer Protocol) functionality and configure e-mail notification of library events. The library must have network access to an SMTP server.

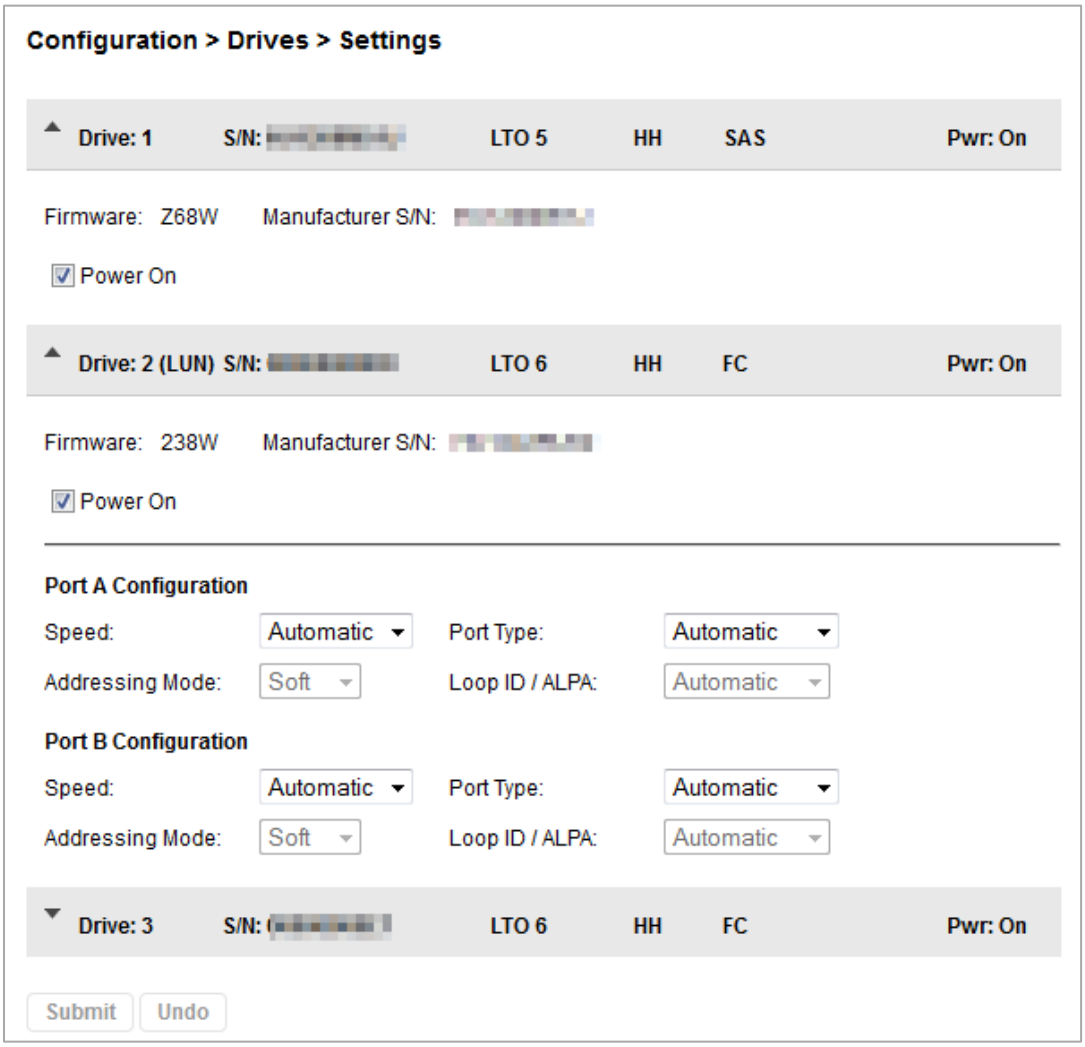


- **SMTP Enabled** – Check to enable SMTP. When checked, the remaining configurations are active.
- **Notification Level** – The types of events for which the library should send e-mail
  - **Inactive** – No events are sent.
  - **Critical** – Only critical events are sent.
  - **+ Warnings** – Only critical and warning events are sent.
  - **+ Configuration** – Only critical, warning, and configuration events are sent.
  - **+ Information** – All events are sent.
- **SMTP Server** – Hostname or IP address of the SMTP server
- **Security** – Security protocol for accessing the SMTP server
  - **None**
  - **SSL**
  - **TLS**
- **SMTP Port** – SMTP server port. The default port for the selected protocol will be selected. You can choose one of the default ports or configure a custom port.
- **To Email Address** – The address to receive the reported events (for example firstname.lastname@example.com). Only one email address can be configured.
- **Mailer Name** – Name of the sender of the e-mail
- **Email Subject** – Subject line for the e-mail message
- **Emailer Address** – Return address to use for the e-mail message
- **Authentication Required** – When checked, a username and password are required to access the SMTP server.

- **Username** – User account for logging into the SMTP server when authentication is required
- **Password** – Password associated with the Username when authentication is required

6.5.8 Configuring Tape Drives

From the **Configuration > Drives** screen you can see and modify drive configuration.



- Drive number – Drives are numbered from the bottom of the library up beginning with one. The drive currently hosting the SCSI communication for the library is designated with (LUN).
- Serial Number – The serial number assigned to the tape drive by the library. This serial number is reported to host applications. The serial number cannot be modified.

This is not the serial number assigned to the drive by the manufacturer; the serial number assigned by the manufacturer is shown in Manufacturer S/N.

- LTO generation
  - LTO 3: Ultrium 920, Ultrium 960
  - LTO 4: Ultrium 1760, Ultrium 1840
  - LTO 5: Ultrium 3000, Ultrium 3280
  - LTO 6: Ultrium 6250

- Drive form factor
  - HH – half height
  - FH – full height
- Drive interface
  - FC – Fibre Channel
  - SAS – Serial Attached SCSI
- (Modified) – When present indicates that a setting has been changed. To apply the changes, click **Submit**. To reset all changed fields to their previously saved values, click **Undo**.
- **Pwr** – Indicates whether the drive is currently powered on or off.
- **Firmware** – The version of firmware currently installed on the drive.
- **Manufacturer S/N** – The serial number assigned to the drive when it was manufactured. Use this serial number when working with your Service.
- **Power On** – Checked when the drive is powered on.

NOTE Always power off a tape drive before removing it from the library or moving it to a new location within the library.

- Port configuration (FC only) – Drive port configuration.
  - **Speed** –The currently selected ◦ speed. The default is Automatic.
  - **Port Type**
    - **Automatic**
    - **Loop** – Enables selection of the Addressing Mode.
    - **Fabric**
  - **Addressing Mode** – When Port Type is set to Loop, Addressing Mode can be set to **Soft**, **Hard**, or **Hard Autoselect**.
  - **ALPA** – When Addressing Mode is set to Hard, you can choose an ALPA address from the drop down list.

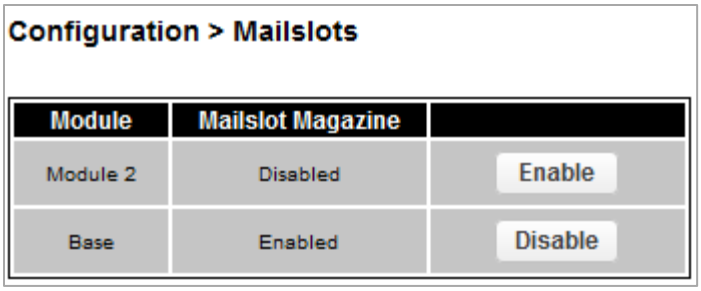
To modify the configuration of one or more tape drives:

1. Modify any of the configurable values.
2. Click **Submit**.

NOTE To configure the number of barcode characters to report to the host application and whether to report them from the left or right end of the label, use either the Basic Partition Wizard or Expert Partition Wizard. See “**Using the Basic Partition Wizard**” or “**Using the Expert Partition Wizard**”.

6.5.9 Enabling or Disabling Mailslots

The **Configuration > Mailslot** screen lists each of the mailslots and shows whether each is enabled or disabled. To change the state, click the button for the mailslot and then click **Submit**. Slots not enabled as mailslots are available as storage slots.



6.5.10 Configuring Library Partitions

The library has a flexible partitioning scheme with a few key constraints:

- Each partition must have at least one tape drive. One drive in each partition will host the library LUN for the partition.
- The maximum number of partitions is 20.
- Magazine slots are allocated in five-slot groups.
- Mailslots must be enabled for a module before they can be allocated to a partition.

  A partition does not need to have a mailslot. If a partition does not have a mailslot, the magazine must be accessed to import or export cartridges. Opening a magazine takes the library off line.

  Although the mailslot magazine is shared between partitions, the mailslot elements are assigned individually to partitions.

Wizards guide you through the partition configuration process. The wizards are only accessible from the RMI.

- Basic Partition Wizard – You specify the number of partitions and the wizard removes the current partition configuration and assigns the drives and storage slots as evenly as possible to the partitions. Any extra drives or slots are assigned to the first partition.

  Use the Basic Partition Wizard to configure partitions that will have similar resources or to configure the number of barcode characters to report to the host application and whether to report them from the left or right end of the label for a library with a single partition.
- Expert Partition Wizard – You add or remove partitions from the current partitions configuration and then edit each partition configuration to add or remove library resources.

  Use the Expert Partition Wizard to configure partitions that will have different resources or to adjust resource assignments for existing partitions or those created with the Basic Partition Wizard.

CAUTION The library will go off line while partitions are being configured. Ensure that all host operations are idle before running a partition wizard.

6.5.10.1 Using the Basic Partition Wizard

1. Click **Configuration** > **Basic Wizard** to start the wizard.

The **Information** screen displays the existing partitions, which will be deleted by the wizard.

2. Click **Proceed** and then click **Next**.
3. The **Create Partition Scheme** screen displays the number of slots, mailslots, tape drives, and maximum available partitions for the library.

NOTE If you want to enable or disable the mailslots, **Cancel** out of the wizard and update the mailslot configuration before configuring partitioning.

4. Select the number of partitions.
5. Select the number of barcode characters reported to the host application. This option provides interchange compatibility with libraries with more limited barcode reading capabilities. The maximum length is 15 and the default is 8. This configuration will apply to all partitions.

NOTE The industry standard length for LTO barcode labels is eight characters. Barcode labels longer than eight characters might scan incorrectly, particularly if they are not high quality labels.

6. Select whether to report the barcode characters from the left or right end of the barcode label to the host application when reporting fewer than the maximum number of characters. For example, when reporting only six characters of the barcode label 12345678, if alignment is left, the device will report 123456. If alignment is right, the device will report 345678. The default is left. Click Next.
7. The **Finish Configuration** screen displays the proposed allocation of library resources into partitions.
   - To update the configuration, click **Back**.
   - To have the wizard configure partition as shown, click **Finish**.

     After the wizard reconfigures the partition, the library will come on line automatically.
   - To exit the wizard, click **Cancel** or **Exit**.

TIP You can use the Expert Partition Wizard to adjust the allocation of resources after creating the partitions with the Basic Partition Wizard.

6.5.10.2 Using the Expert Partition Wizard

Click **Configuration > Expert Wizard** to start the wizard. The **Create Partition Scheme** screen lists the current partitions, if any, and the free resources. Use the wizard to configure one partition at a time.

NOTE If you want to enable or disable the mailslots, **Cancel** out of the wizard and update the mailslot configuration before configuring partitioning.

1. To add a partition, click **Add** and then click **Next**.

NOTE The **Add** button will only be active if there are available resources. If there are no available resources, either edit a partition and release resources from it or remove a partition that contains extra resources.

2. Enter a name for the partition.
3. Select the number of barcode characters reported to the host application. This option provides interchange compatibility with libraries with more limited barcode reading capabilities. The maximum length is 15 and the default is 8. This configuration will apply to all partitions.

NOTE The industry standard length for LTO barcode labels is eight characters. Barcode labels longer than eight characters might scan incorrectly, particularly if they are not high quality labels.

4. Select whether to report the barcode characters from the left or right end of the barcode label to the host application when reporting fewer than the maximum number of characters. For example, when reporting only six

characters of the barcode label 12345678, if alignment is left, the device will report 123456. If alignment is right, the device will report 345678. The default is left. Click **Next**.

5. In the **Assign Storage Slots** screen, use the >> and << buttons to assign slots to the new partition and then click **Next**.
6. In the **Assign Mail Slots** screen, use the >> and << buttons to assign mailslots to the new partition and then click **Next**.

   Individual mailslot elements cannot be shared between partitions. Importing or exporting cartridges in a partition without an assigned mailslot will require magazine access, which will take the library off line.
7. In the **Assign Drives** screen, use the >> and << buttons to assign drives to the new partition and then click **Next**.
8. If the partition has multiple tape drives, select the drive that will host the SCSI communication for the partition and then click **Next**.

   The lowest numbered drive in the partition is the default.
9. Verify the partition configuration and then click **Finish**.

   After the wizard reconfigures the partition, the library will come on line automatically.

To remove a partition:

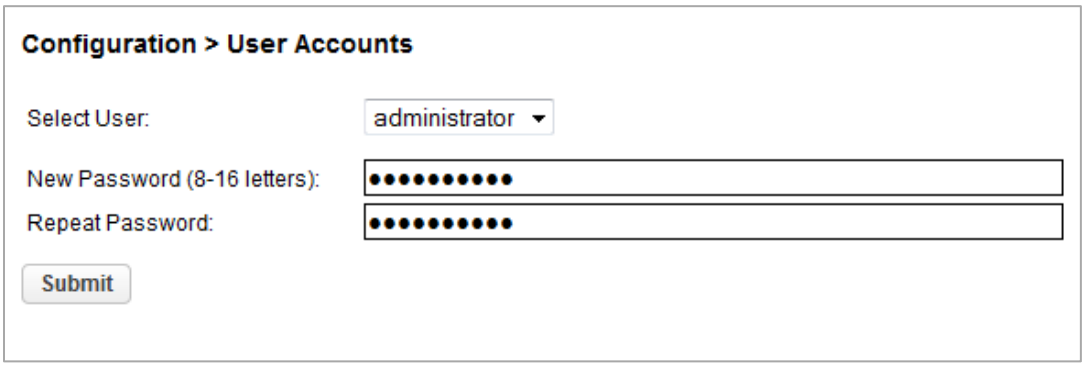
1. Select the partition, click Remove, and then click **Next**.
2. Verify that you want to remove the partition and then click **Finish**.

   After the wizard removes the partition, the library will come on line automatically.

6.5.11 Configuring Passwords for User Accounts

From the **Configuration > User Accounts** screen you can set the password for the user or administrator accounts.

- User – The *user* account allows access to library status information and does not allow access to configuration, maintenance, or operation features. A password is not required for the user account. Setting a user password restricts access to status information to only those who know the user password.
- Administrator – Setting an administrator password provides access to the administrator functions with the RMI or OCP, and restricts access to administrator functions to only those who know the administrator password. The library initially has a null administrator password, which until set allows unrestricted access to all administrative functions through the OCP but not the RMI. Once the administrator password has been set from the OCP, it can be changed from either the OCP or RMI.

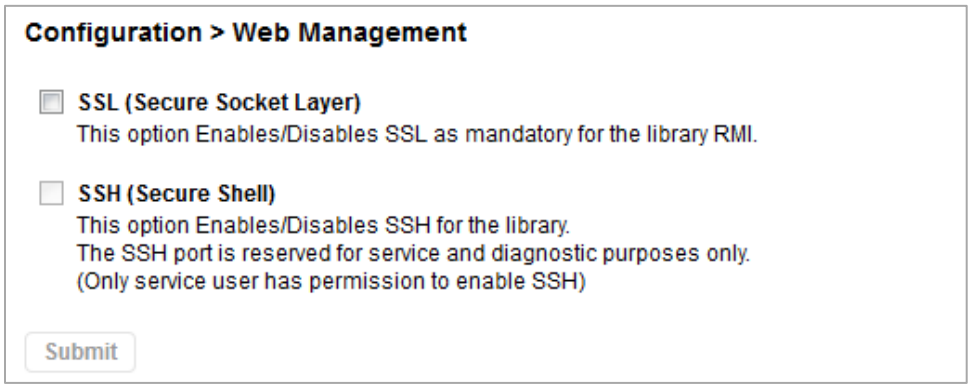


Select the user and then enter the new password twice. The password must contain 8-16 characters, which can include upper and lower case letters, numbers, and special characters.

6.5.12 Enabling SSL or SSH

Enable or disable secure access to the RMI using Secure Socket Layer (SSL) or Secure Shell (SSH) from the **Configuration > Web Management** screen. When SSL is enabled, connections to the RMI must use HTTPS. The default is disabled.

When SSH is enabled, the library will only accept SSH connections. The default is enabled.



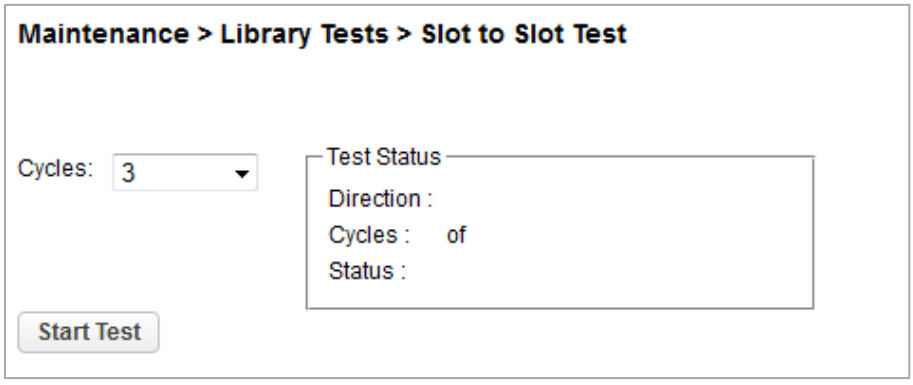
6.6 Maintaining the Library

From the Home screen click or tap on **Maintenance** to access the library maintenance features.

6.6.1 System Test

The system test exercises overall library functionality by moving cartridges within the library.

- During each cycle the library will move a cartridge from a full slot to an empty slot and then return it to its original slot. You can select the number of cycles for the test. If the test is cancelled, the library will return the cartridge to its original slot.
- The library will not move cleaning cartridges during the test.
- The test operates over the whole library and does not take into account partition configuration.
- During the test the library is off line.



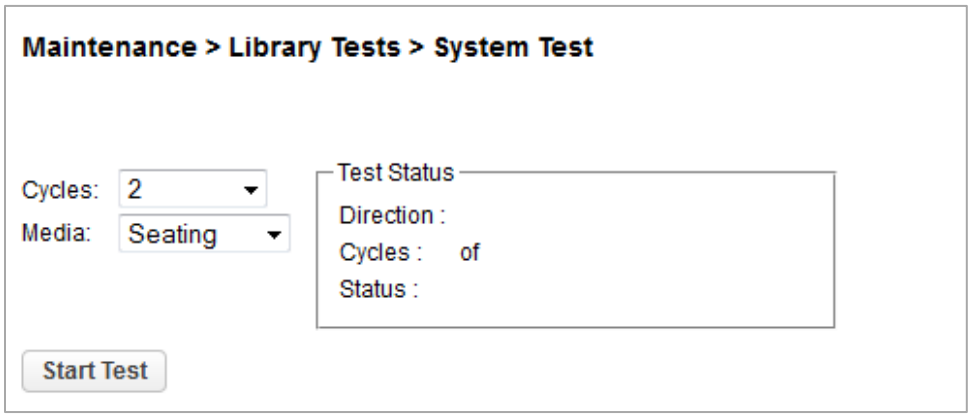
To run the system test, navigate to the **Maintenance > Library Tests > System Test** screen, select the number of cycles and then click **Start Test**.

6.6.2 Slot to Slot Test

The slot to slot test randomly exchanges cartridges between slots to verify that the library is operating correctly. At the end of the test the cartridges are NOT returned to their original slots. If a tape is moved to an incompatibly drive, the drive will reject the tape, as designed.

CAUTION The test can move cartridges between partitions.

For service and diagnostics, use the robotic test.

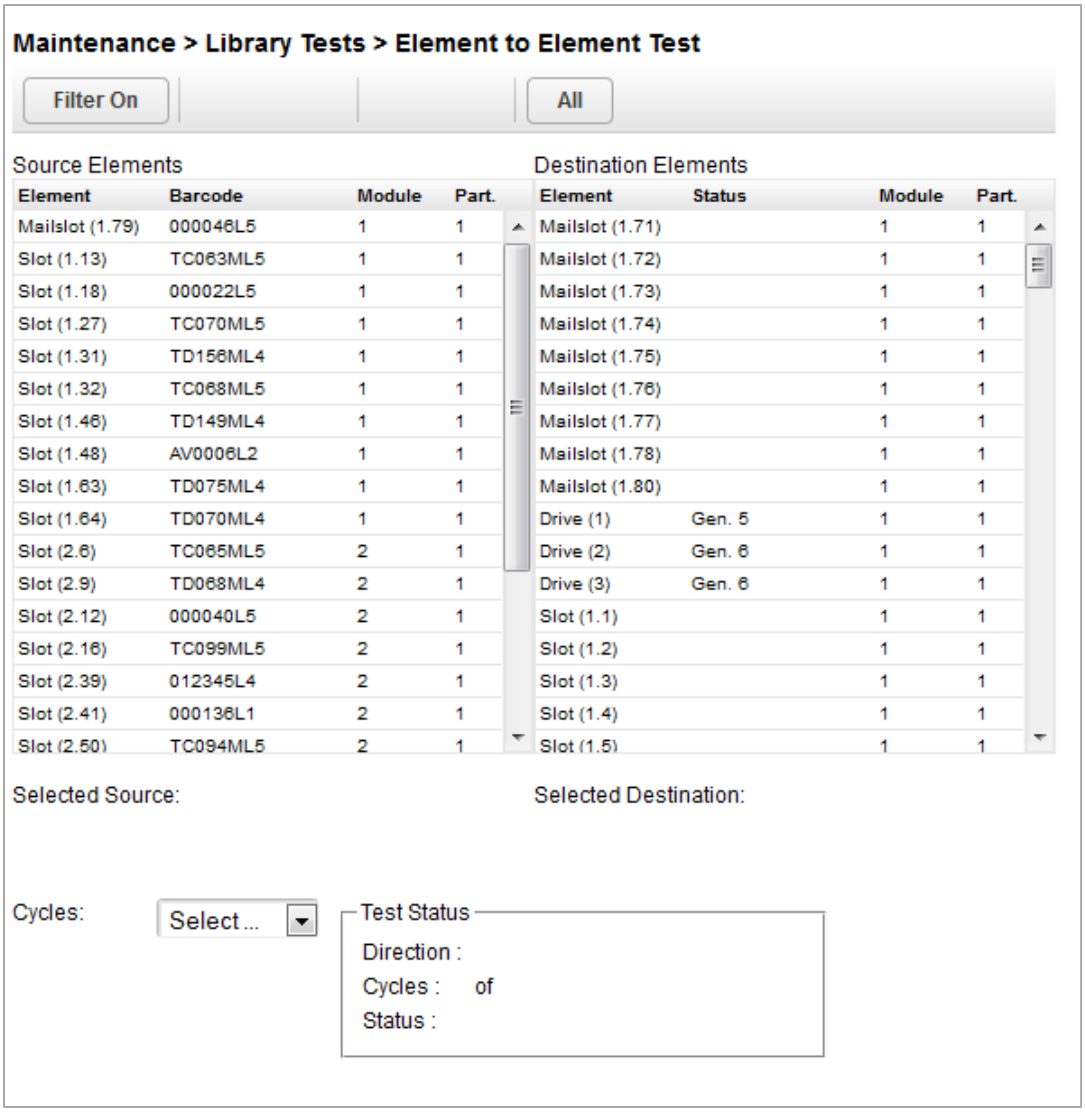


To run the slot to slot test, navigate to the **Maintenance > Library Tests > Slot to Slot Test** screen, select the number of cycles and click **Start Test**.

6.6.3 Element to Element Test

The element to element test moves a selected cartridge to a selected slot or tape drive, and then returns it to the original slot. You can select the number of times to move the selected cartridge to the destination location and back.

The element to element test is intended to show that the library is operating correctly. To diagnose problems with the robotic assembly or verify that it has been correctly replaced, use the robotic test.



To run the element test:

1. Navigate to the **Maintenance > Library Tests > Element to Element Test** screen.
2. Select a cartridge from the **Source Elements** list.

   To select from a subset of the cartridges:

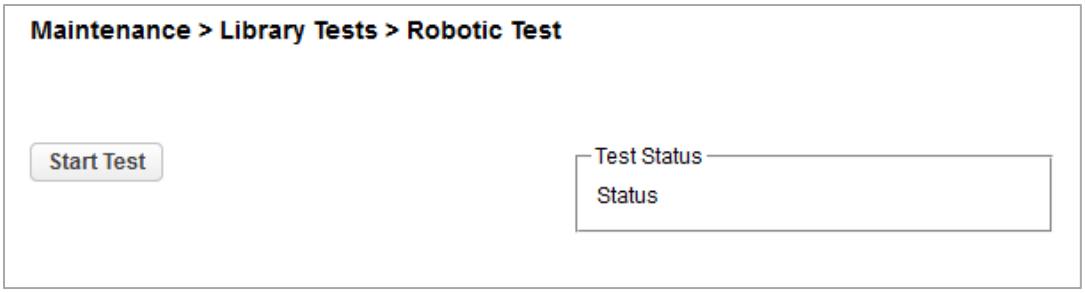
   a. Click **Filter On**.

   b. Enter characters into the search box and then click **Search**.

      The **Source Elements** list is updated to only include cartridges with a barcode label including the search characters.
3. Select a location from the **Destination Elements** list.
4. Select the number of cycles.
5. Click **Start Test**.

6.6.4 Robotic Test

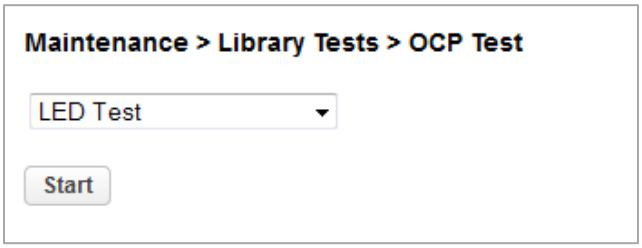
The robotic test performs a full inventory and exercises all robotic assembly movements and sensors.



To run the robotic test, navigate to the **Maintenance > Library Tests > Robotic Test** screen, then click **Start Test**.

6.6.5 OCP Test and Calibration

To test or calibrate the OCP, navigate to the **Maintenance > Library Tests > OCP Test** screen, select the operation, and then click **Start**. Follow the instructions on the screen.

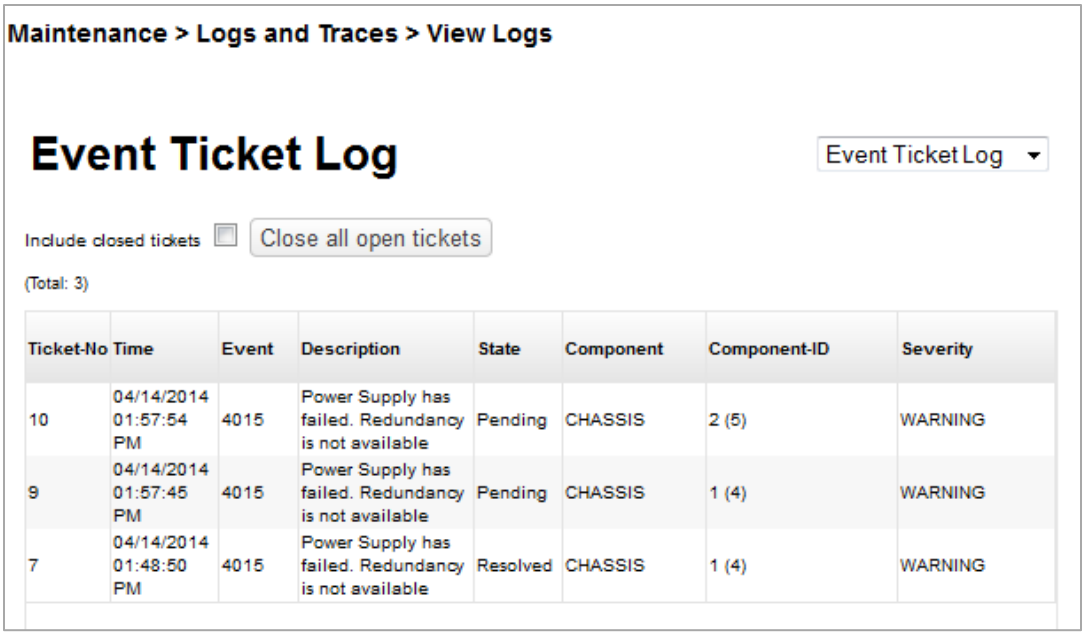


- LED test – illuminates each of the front panel LEDs
- Touch panel calibration test – allows you to calibrate the front panel touch screen

6.6.6 Viewing Log Files

To view the library log files, navigate to the **Maintenance > Logs and Traces > View Logs** screen and then select one of the logs. The available logs are:

- Event Ticket Log – Records library error and warning events
- Information Log – Records library information warnings
- Configuration Log – Records configuration changes

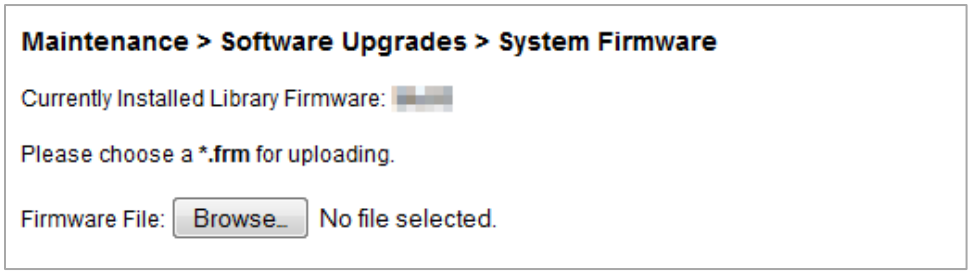


The log entries are displayed in order of most recent to oldest. The log entries contain a date and time code, event code, severity, component identifier and event details. The format for the date and time is: *YY.MM.DD HH.MM.SS.ss*.

- YY.MM.DD – The date displayed as Year.Month.Day
- HH.MM.SS.ss – The time displayed as Hour.Minute.Second.Hundredths of a second

6.6.7 Managing System Firmware

The firmware version currently installed on the library is displayed in the library status area on the Home page. You update the library firmware from the **Maintenance > Software Upgrades > System Firmware** screen.



To update library firmware from the RMI, click **Choose File** and select the firmware file from the local computer.

To update the library firmware from the OCP:

1. Copy the firmware file to the USB thumb drive.
2. Insert the USB thumb drive into the USB port on the front of the library.

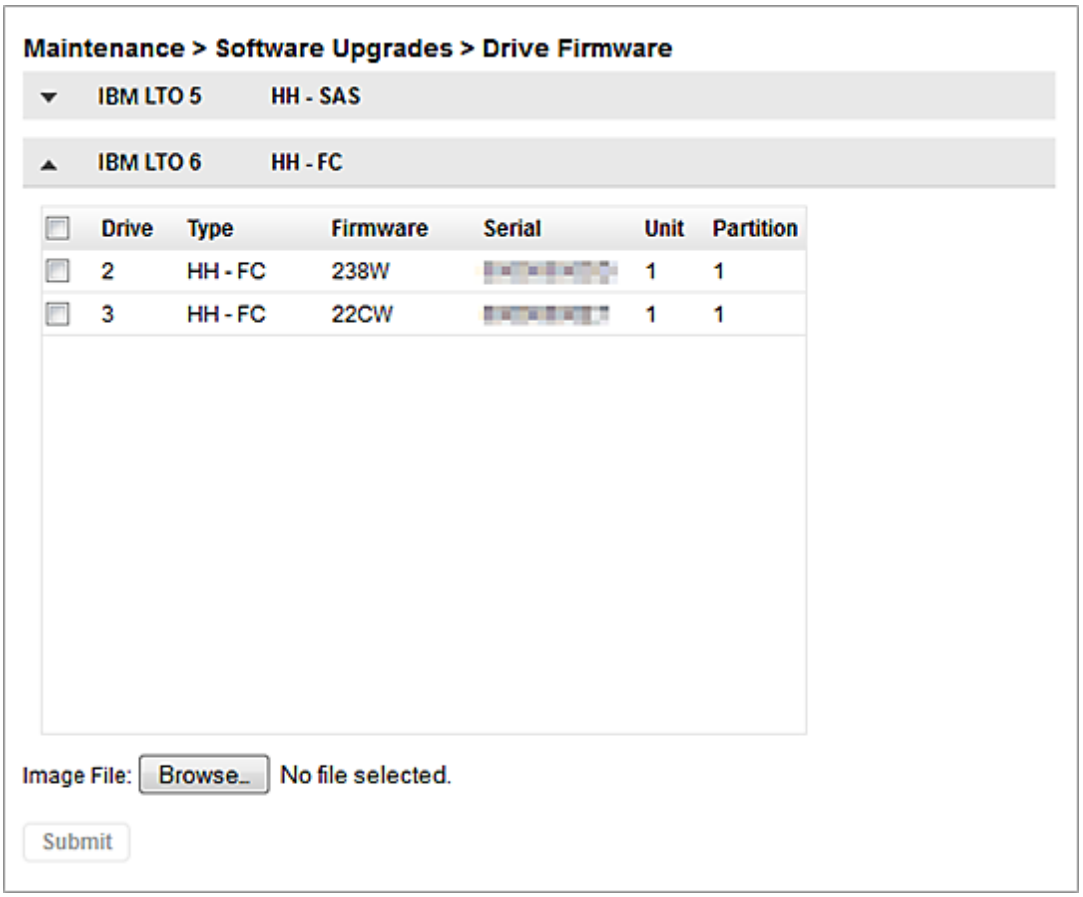
   The library detects the USB thumb drive.
3. Select the firmware file.
4. Click **Start Upgrade**.

When you update the library firmware, the library will update the firmware of the expansion modules to a compatible version.

6.6.8 Managing Drive Firmware

Drive firmware can be updated on multiple drives of the same type at the same time. Drive firmware can only be updated from the RMI. Each drive will only accept appropriate firmware.

To see the firmware version currently installed on the drives, navigate to the **Status > Drive Status** screen.

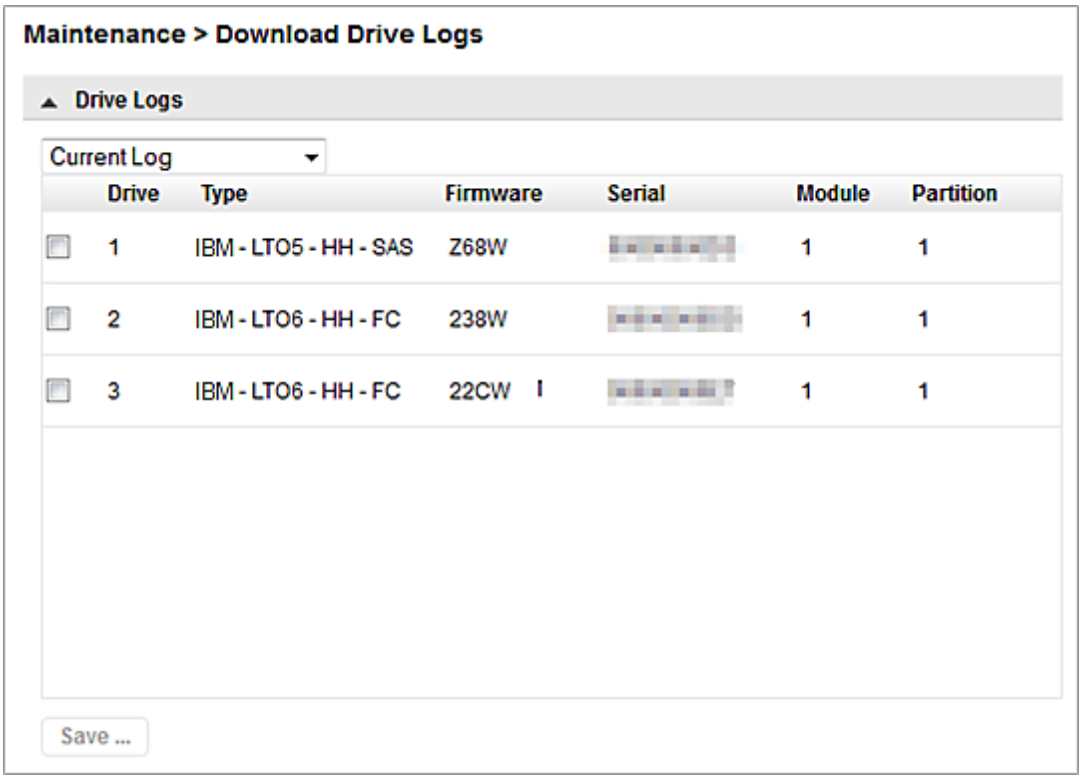


To update drive firmware from the RMI:

1. Navigate to the **Maintenance > Software Upgrades > Drive Firmware** screen. The tape drives are organized by drive type.
2. Expand the appropriate drive type and select one or more of the tape drives.
3. Click **Choose File**, and then select the file from the local computer.
4. Click **Submit**.

6.6.9 Downloading Support Tickets

From the **Maintenance > Download Support Ticket** screen you can download a support ticket from the library or any of the tape drives.



To download a drive support ticket:

1. Expand the **Drive Support Ticket List**, if necessary, by clicking the down arrow on the left side.

   The drive list displays:

   - **Drive** – The drive number. Drives are numbered starting with one from the physical bottom of the library to the top.
   - **Type** – The drive form factor (half height or full height) and interface
   - **Firmware** – The current drive firmware version
   - **Serial** – The drive serial number
   - **Unit** – The module containing the tape drive
   - **Partition** – The logical library associated with the tape drive
2. Select the ticket to download.
   - **Current Ticket** – Pulls and saves a new support ticket from the drive.
   - **Last Unload Ticket** – Saves the ticket that was pulled automatically after the last cartridge was unloaded from the drive
3. Check the drive.
4. Click **Save**.

To download a library support ticket:

5. Expand the Library Support Ticket area, if necessary, by clicking the down arrow on the left side.
6. Click **Save**.

To download a drive support ticket:

1. Expand the **Library Support Ticket** list, if necessary, by clicking the down arrow on the left side.
2. Click **Save**.

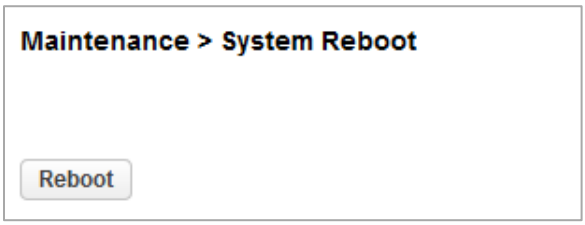
6.6.10 Downloading Log and Trace Files

NOTE Users and Administrators should download support tickets instead of log and trace files because the support ticket will have complete information about each library event and is easier to read. See "**Downloading Support Tickets**".

To download the library log and trace files from the RMI, navigate to the **Maintenance > Logs and Traces > Download Logs and Traces** screen and then click **Save**.

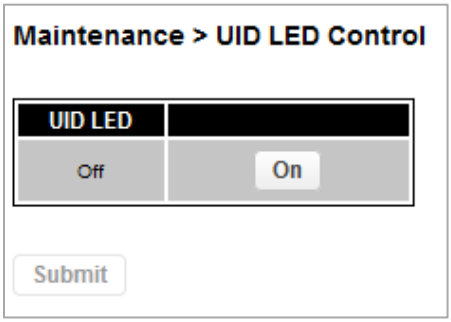
6.6.11 Rebooting the Library

From the **Maintenance > System Reboot** screen, click **Reboot**.



6.6.12 Controlling the UID LED

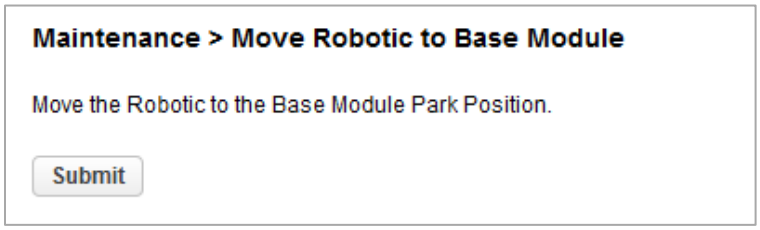
The UID LEDs are a pair of blue LEDs — one on the OCP and the other on the base module controller. The UID LEDs are useful for identifying the library in a data center. The UID LEDs are operated synchronously and controlled by the user. From the **Maintenance > UID LED Control** screen you can see whether the LEDs are lit, and toggle the status.



6.6.13 Moving the Robotic to the Base Library Module

Before extending a module from the rack, the robotic assembly must return to its park position in the base library module. Under normal circumstances, when the library is powered off using the front power button the robot automatically parks and locks into the base module behind the OCP. After powering off the library and before proceeding with extending a module from the rack, look inside the base module window to verify that the robotic assembly is behind the OCP.

If the library did not move the robotic assembly to its park position, you can do so from the **Maintenance > Move Robotic to Base Library** screen.

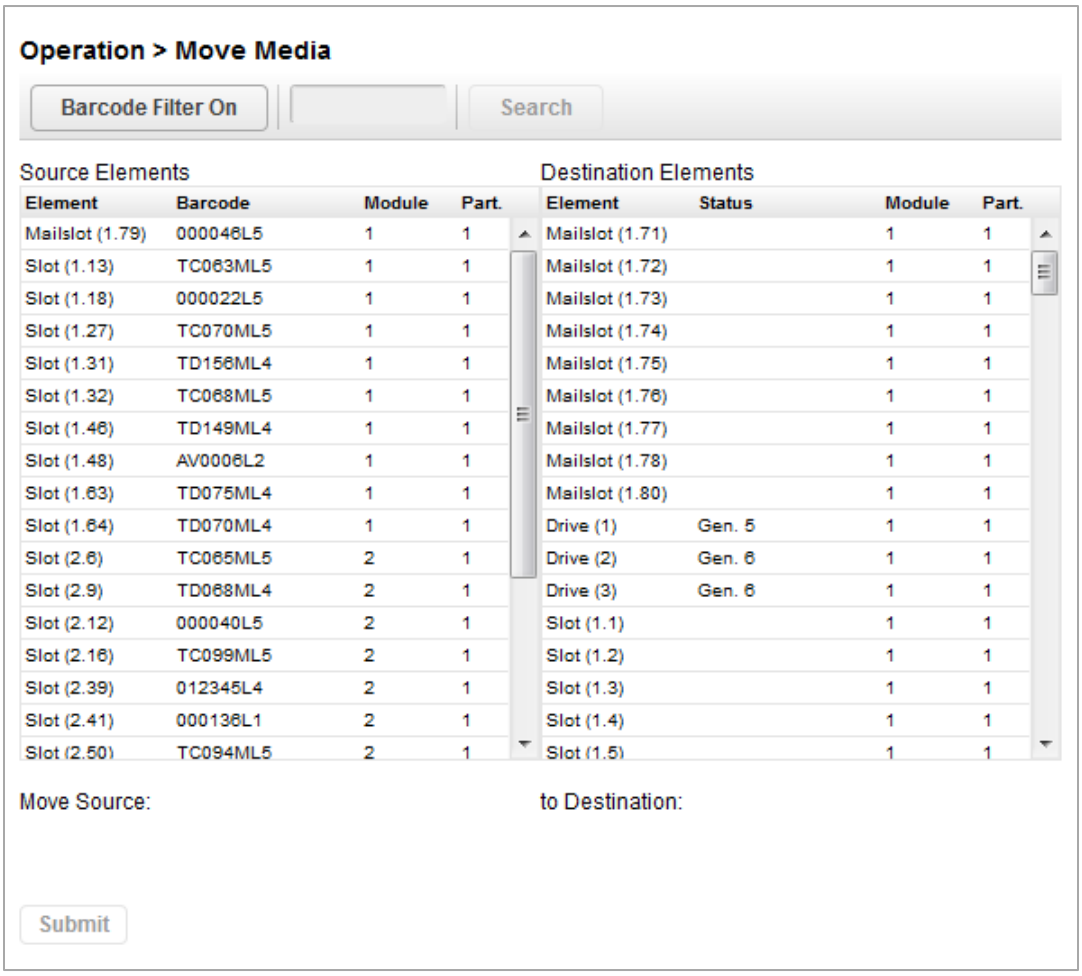


6.7 Operating the Library

Click or tap the **Operations** button on the Home screen to access the operations features.

6.7.1 Moving Media

From the **Operation > Move Media** screen you can move a tape cartridge located in a source element to an available destination element within the same partition.



- **Source Elements** – Tape drives, enabled mailslots, and storage slots that contain a tape cartridge
- **Destination Elements** – Tape drives, enabled mailslots, and storage slots that do not contain a tape cartridge

Tape drives are listed at the top of each element list and listed in the order of their drive numbers.

Tape drives are numbered from the physical top of the library starting with Drive (1).

Slots are listed in the order of the slot numbers. Slots are numbered *m.s*, where *m* is the module number and *s* is the slot within the module.

6.7.1.1 Filtering Based on Barcode

To see a subset of the cartridges in the library, enter some or all of the barcode label characters in the search area and click **Search**. The **Source Element** list updates to display only the cartridges with labels that include the characters in the search box.

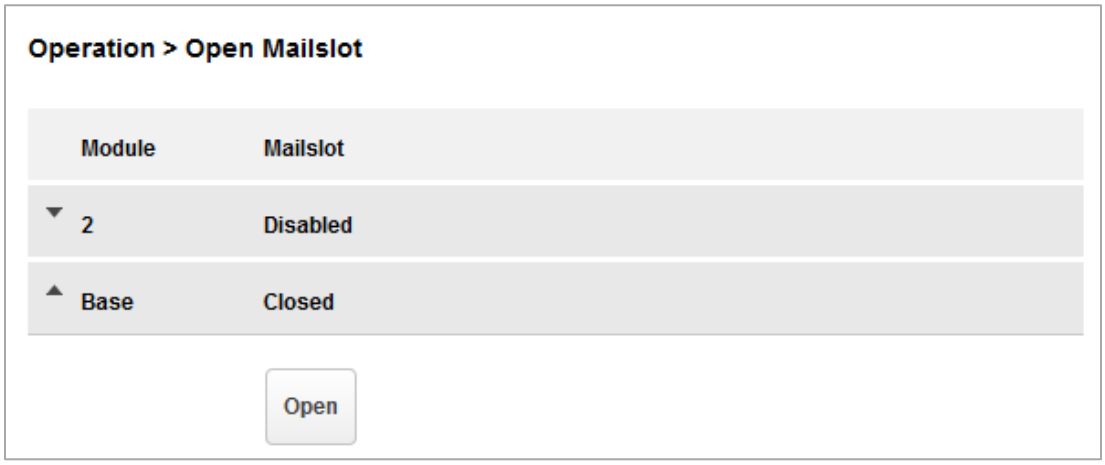
To perform a different search or display all of the available cartridges, click **Barcode Filter Off**.

6.7.1.2 Moving a Cartridge

1. Select the cartridge from **Source Elements**.
2. Select the destination location from **Destination Elements**.
3. Click **Submit**.

6.7.2 Opening the Mailslot

From the **Operation > Open Mailslot** screen you can see the status and unlock any enabled mailslot in the library.



To open a mailslot, click **Unlock** for the appropriate mailslot and then click **Submit**. The library will release the lock. You can then pull the mailslot out of the library to access the mailslot.

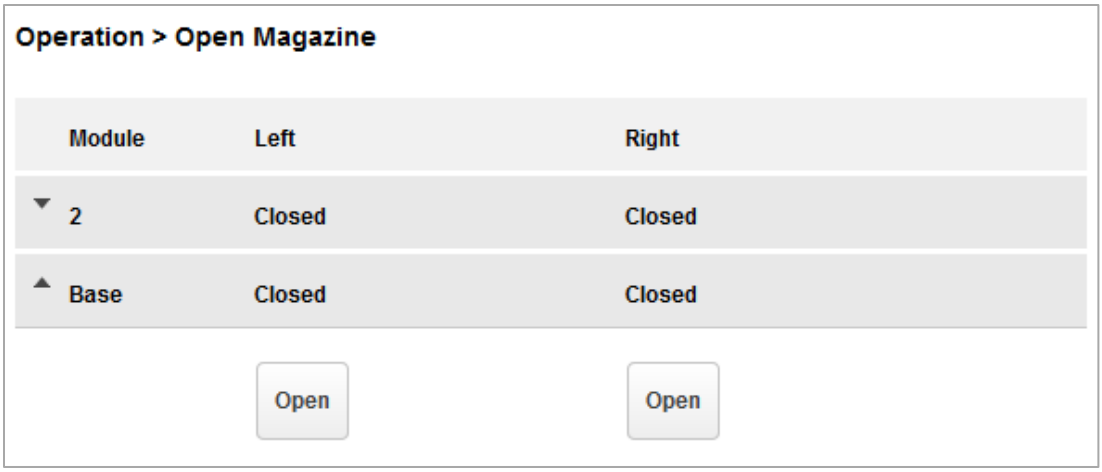
NOTE The mailslot will relock after 30 seconds.

The mailslot must be enabled before it can be opened. To enable a mailslot, see "**Enabling or Disabling Mailslots**".

WARNING Hazardous moving parts exist inside this product. Do not insert tools or any portion of your body into the interior of the library through the mailslot safety door.

6.7.3 Opening a Magazine

From the **Operation > Open Magazine** screen you can unlock any magazine or enabled mailslot in the library.



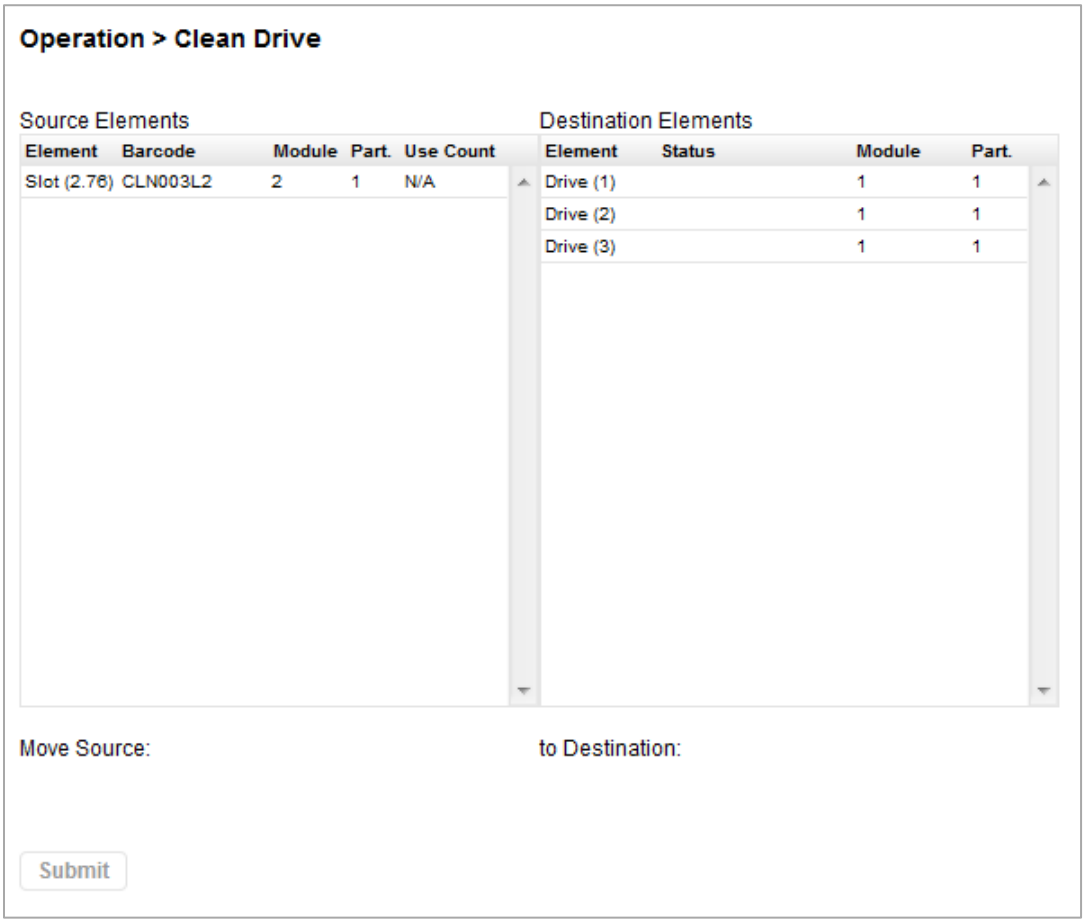
To unlock a magazine, click **Unlock** for the magazine and then click **Submit**. The library will release the lock. You can then open the door and pull the magazine out of the library to access the storage slots.

NOTE

- Opening a magazine will take the library off-line.
- The magazines will relock after 30 seconds.

6.7.4 Cleaning a Tape Drive

From the **Operation > Clean Drive** screen you can initiate a drive cleaning operation.



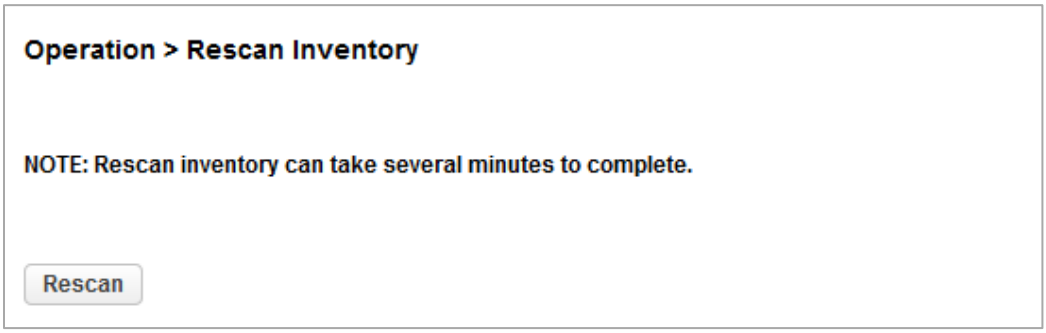
1. Select a cleaning cartridge from the **Source Elements** list. The library uses the barcode label to identify cleaning cartridges.

   If no cleaning cartridges are available, load one into a mailslot or magazine slot.
2. Select the tape drive to be cleaned from the **Destination Elements** list.

   Tape drives currently containing a cartridge are not listed. To clean a tape drive not listed, move the cartridge out of the drive.
3. Click **Submit**

6.7.5 Rescanning the Cartridge Inventory

To have the library rescan the cartridges, navigate to the **Operation > Rescan** screen and click **Rescan**. The library will change to Scanning status and will be unavailable to perform other operations until the scan is complete.

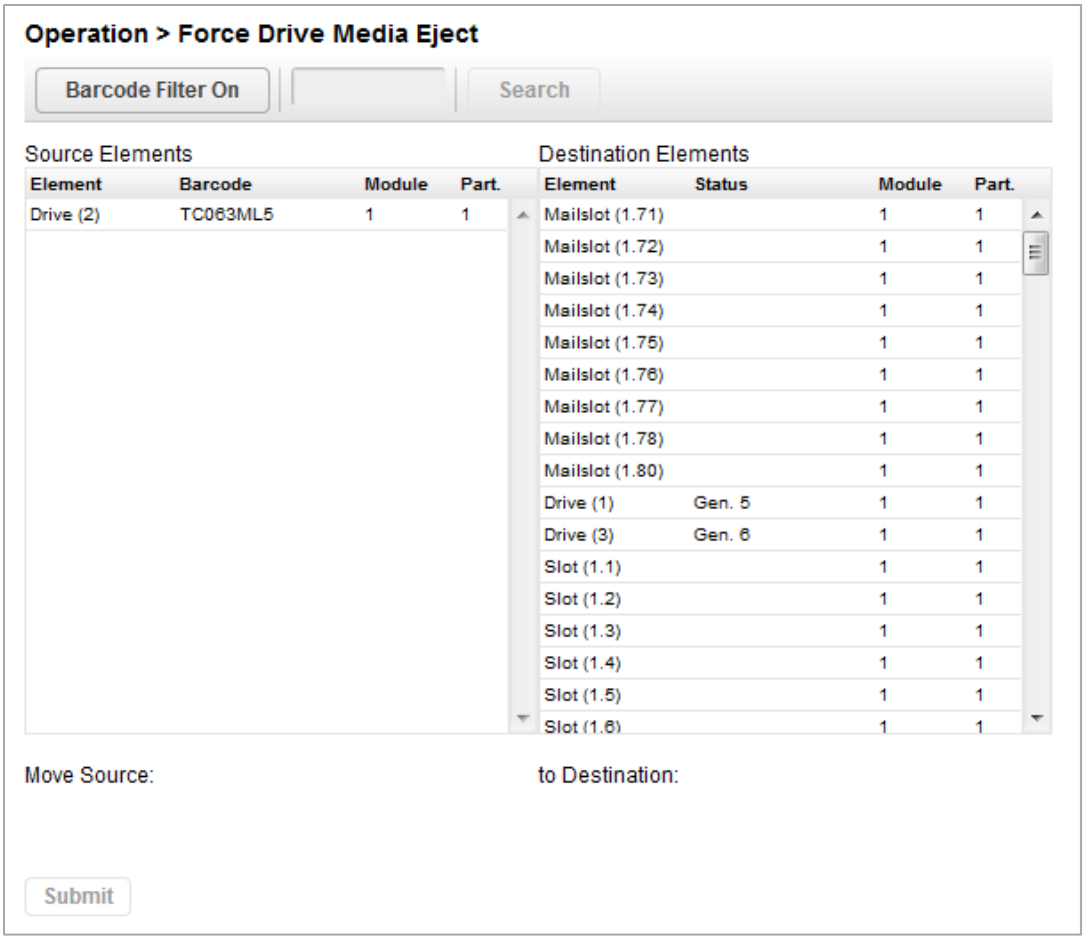


6.7.6 Forcing a Drive to Eject a Cartridge

The force drive media eject operation attempts to force the tape drive to eject the cartridge and place it into an open slot. Access to this feature requires the administrator password.

Before performing this option, it is recommended that you attempt to eject the tape using the backup software or library move media operation. While a drive is being force ejected, a window indicating the process is ongoing should appear. No operations will be available until the force eject completes.

NOTE If the drive has difficulty ejecting the cartridge, the media is possibly bad or damaged.



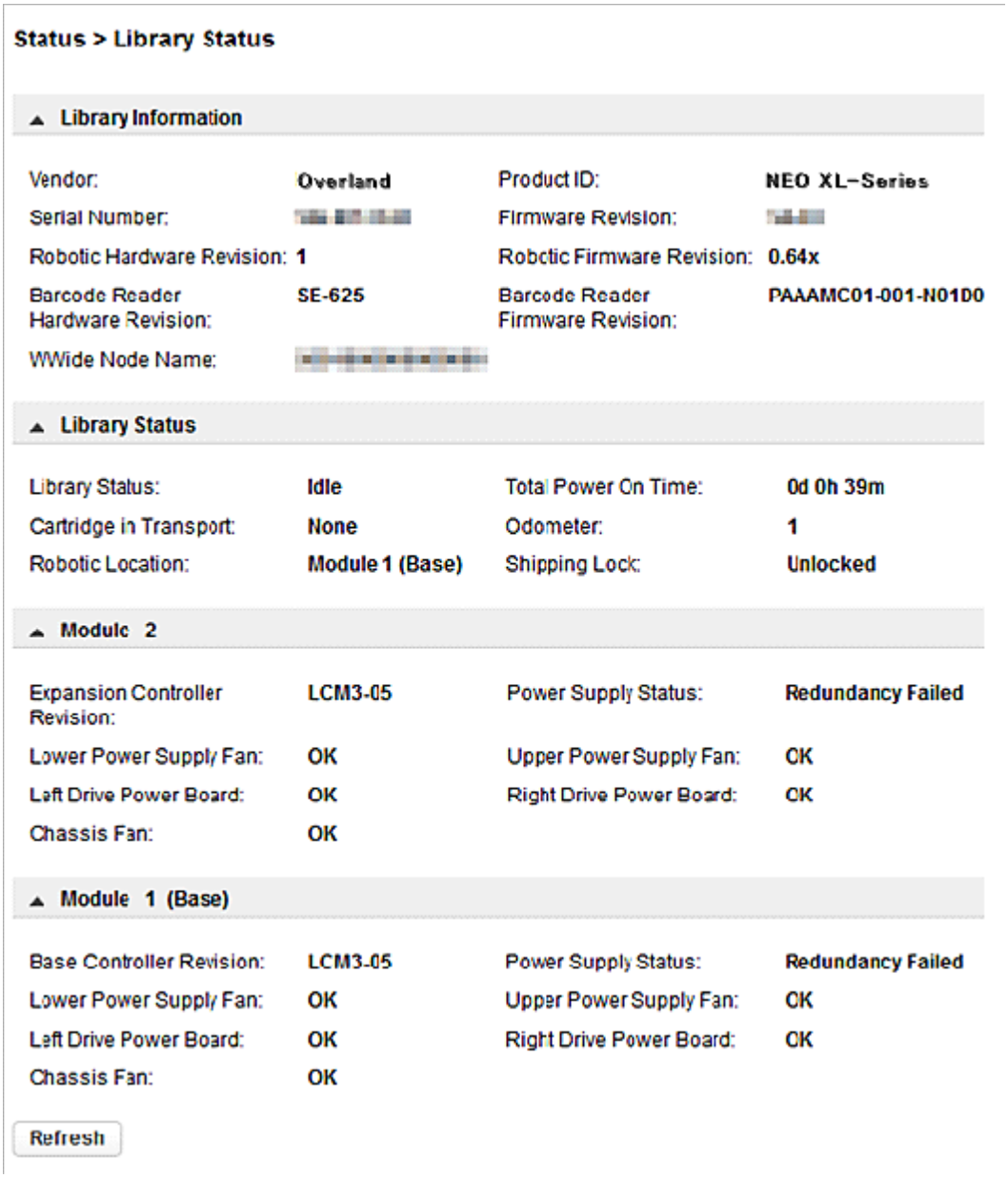
1. Navigate to the **Operation > Force Drive Media Eject** screen.
2. Select the drive in the **Source Elements** list.
3. Select the destination in the **Destination Elements** list.
4. Click **Submit**.

6.8 Viewing Status Information

To access the status area, from the Home screen, click or tap **Status**.

6.8.1 Viewing Library and Module Status

Summary information and status is displayed in the top banner and left side bar. For additional library module configuration and status information navigate to the **Status > Library Status** screen.



Library information

- **Vendor**
- **Serial Number** – Library serial number
- **Robotic Hardware Revision**
- **Barcode Reader Hardware Revision**
- **WWide Node Name** – A worldwide unique identifier that the library reports over SCSI and can be used by operating systems or software applications to identify and track the library.
- **Product ID**
- **Firmware Revision** – Version of the currently installed library firmware
- **Robotic Firmware Revision** – Version of the currently installed robotic assembly firmware. The robotic assembly firmware is bundled and installed with the library firmware.

- **Barcode** Reader Firmware Revision – Version of the currently installed barcode reader firmware. The barcode reader firmware is bundled and installed with the library firmware.

Library Status

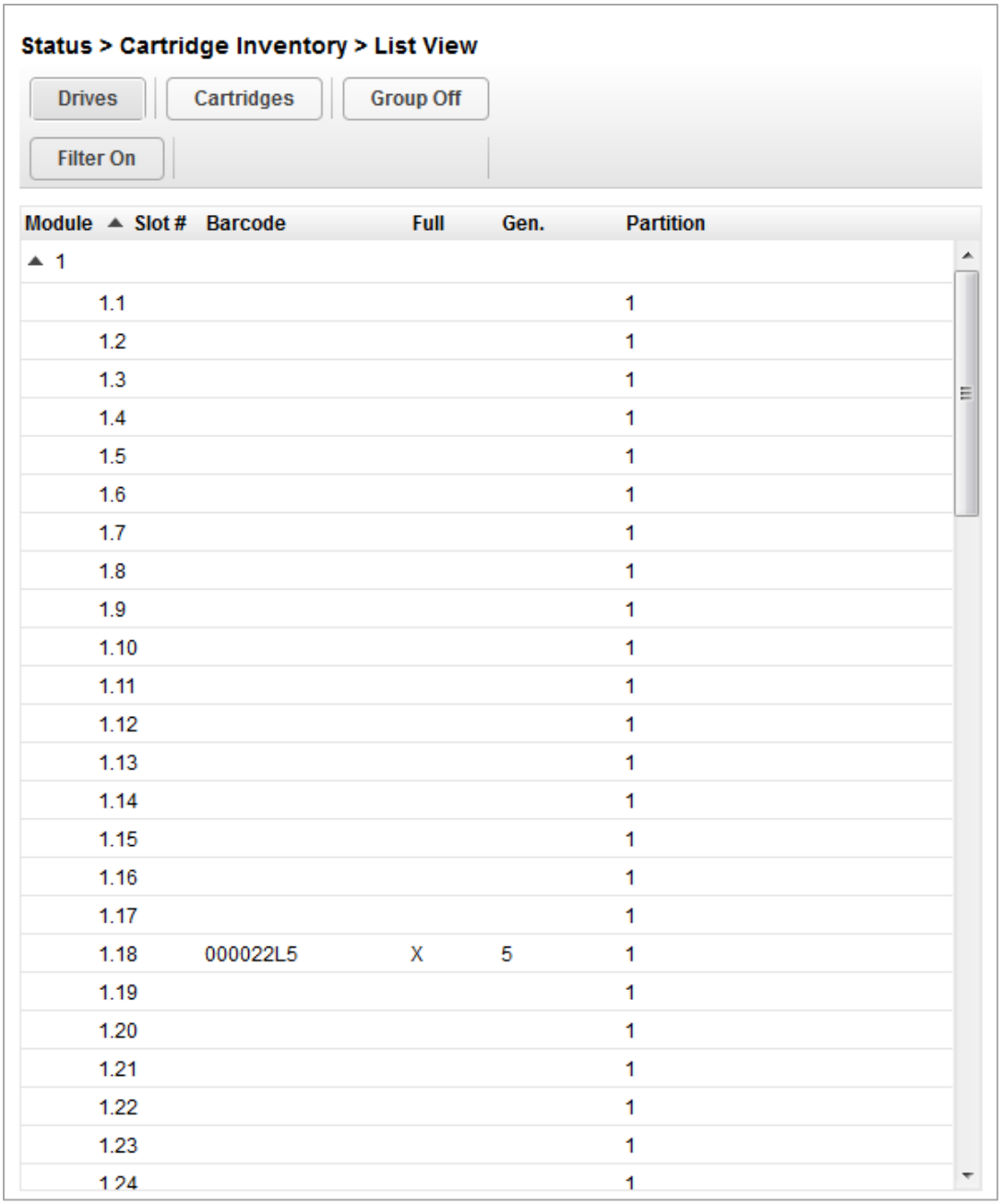
- **Library Status**
  - **Idle** – The library robotic is ready to perform an action.
  - **Moving** – The library robotic is moving a cartridge.
  - **Scanning** – The library robotic is performing an inventory of cartridges.
  - **Offline** – The library robotic has been taken off line by the library.
- **Cartridge in Transport** – When applicable, displays the barcode label of the cartridge currently in the robotic assembly
- **Total Power On Time** – Total time that the base module has been powered on since it was manufactured
- **Odometer** – Robotic assembly move count

Module status

- **Base Controller Revision or Module Controller Revision** – Hardware revision of the controller board currently installed in the module.
- **Left Drive Power Board Status** – Status of the drive power board (DC-DC converter) for the top three half-height drive slots in the module.
- **Right Drive Power Board Status** – Status of the drive power board (DC-DC converter) for the lower three half-height drive slots in the module.
- **Power Supply Status** – Displays the status of power redundancy.

6.8.2 Using Inventory Lists

The inventory lists display each of the elements, such as slots and tape drives, with information about the cartridge stored in the element. To see the elements organized by module, from **Status**, navigate to **Cartridge Inventory→List View**. To see the elements organized by logical library or partition, from **Status**, navigate to **Partition map→List View**.



Module	Slot #	Barcode	Full	Gen.	Partition
1					
	1.1				1
	1.2				1
	1.3				1
	1.4				1
	1.5				1
	1.6				1
	1.7				1
	1.8				1
	1.9				1
	1.10				1
	1.11				1
	1.12				1
	1.13				1
	1.14				1
	1.15				1
	1.16				1
	1.17				1
	1.18	000022L5	X	5	1
	1.19				1
	1.20				1
	1.21				1
	1.22				1
	1.23				1
	1.24				1

In the Inventory List you can see:

- **Module** – The module number
- **Slot #** – The slot number in the form <module>.<slot>, where module is the module number and slot is the slot number
- **Label** – Barcode label
- **Full** – X if a cartridge is using the element
- **Gen** – LTO generation of the cartridge
- **Partition** – The partition number

6.8.2.1 Filtering by Barcode Label

To filter the list based on barcode label, enter characters in the filter box and then click **Search**.

1. Click **Filter On**.

   The search box is displayed.

2. Enter characters into the search box and then click **Search**.

   The characters can be anywhere in the barcode label. The search characters are not case sensitive. There are no wildcards.

To disable filtering, click **Filter Off**.

6.8.2.2 Listing Just Drives or Cartridges

To limit the list to tape drives, click **Drives**.

To limit the list to cartridges, click **Cartridges**.

To see all elements, click **Partition** or **Slots**.

6.8.2.3 Viewing Elements by Group

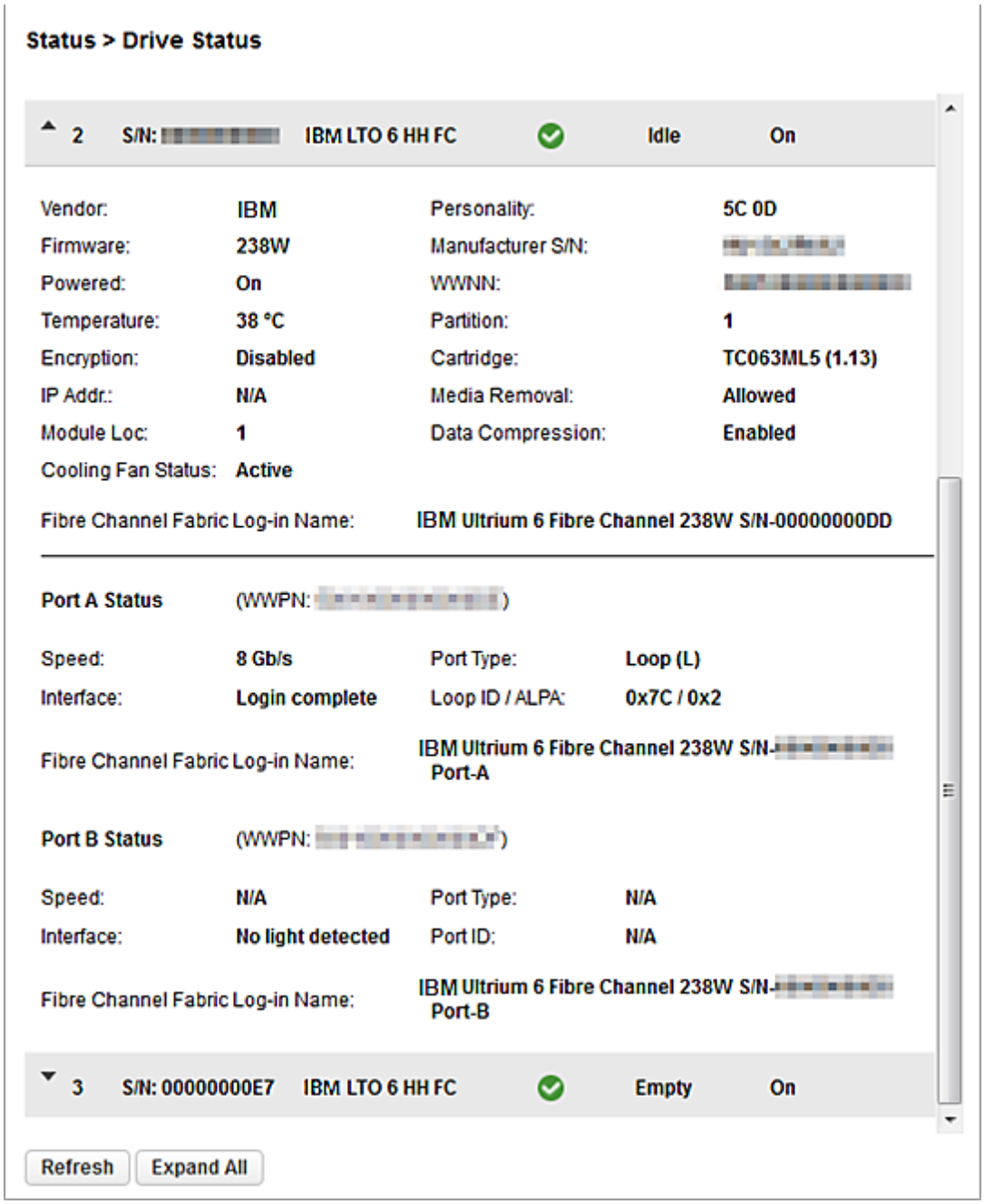
When the list is grouped, you can expand or contract the list for each group by clicking the triangle next to the number in the first column. Grouping is enabled by default.

To disable grouping, click **Group Off**.

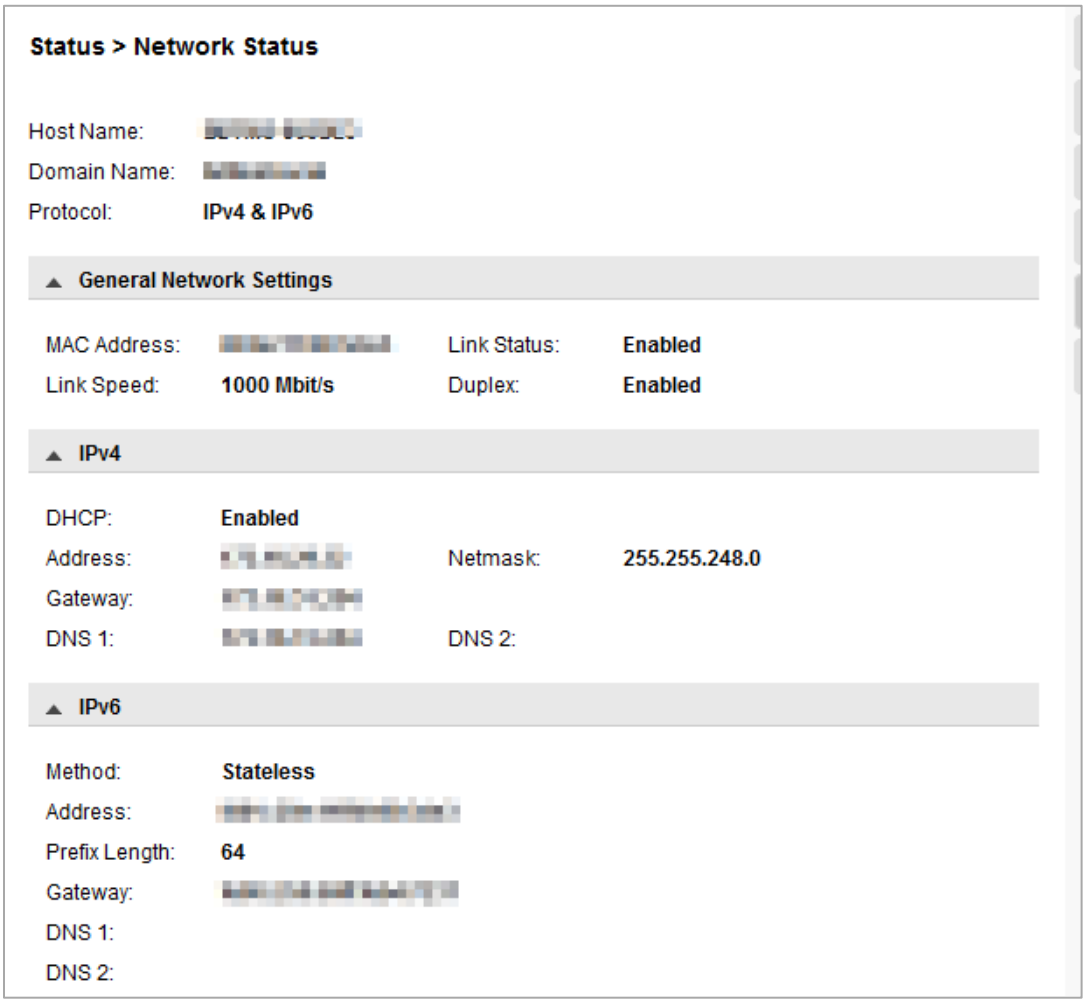
To enable grouping, click **Group On**.

6.8.3 Viewing Drive Status

In the **Status> Drive Status** screen you can see the configuration and status of each drive installed in the library.



6.8.4 Viewing Network Status



In the **Status > Network** screen you can see:

- **Host Name** – Library hostname
- **Domain Name**
- **Protocol** – IPV4 or IPv6
- **MAC Address** – A unique identifier for the library controller network interface
- **Link Status** – Enabled or disabled
- **Link Speed** – Speed of the Ethernet connection to the library
- **Duplex** – Enabled or disabled

IPv4 settings

- **DHCP** – When Enabled, the library requests an IP address from a DHCP server each time the library is powered on.
- **Address** – IP address in use by the library. If DHCP is enabled, this address was obtained from the DHCP server. When DHCP is not enabled, the address was configured.
- **Netmask** – The network mask of the library controller used when DHCP is not enabled.
- **Gateway** – The gateway used when DHCP is not enabled.
- **DNS 1**

- **DNS 2**

IPv6 settings

- **Stateless Addressing** – When Enabled, the device will generate an address for itself based on the routing information obtained from a router advertisement and the MAC address. The device can manage up to five global addresses at the same time, which can be assigned from different routers.
- **Static Addressing** – When Enabled, the library will use a statically-configured address.
- **Static Assigned Address** – The IPv6 address when Static Addressing Enabled is On.

7 Acronyms and Abbreviations

FC	Fibre Channel
FH	Full Height
HBA	Host Bus Adapter
HH	Half Height
LUN	Logical Unit Number
OCP	Operator Control Panel
RMI	Remote Management Interface
SAN	Storage Area Network
SAS	Serial Attached SCSI
SNMP	Simple Network Management Protocol
SSH	Secure Shell
SSL	Secure Socket Layer
UID	Unit Identification
USB	Universal Serial Bus
WORM	Write Once, Read Many
WWPN	World-Wide Port Name

8 Technical specifications

Table 12: Physical specifications

Characteristic	Product alone	Packaged
Height	268 mm	615 mm
Width	475 mm	800 mm
Depth	892 mm	1200 mm
Weight	Base module: 35,5 Kg Expansion module: 31,0 Kg	Base module: 54.5 Kg Expansion module: 50.0 Kg

Each module is shipped on a wooden pallet. **Pallets** may be stacked three high.

Table 13: Environmental specifications

Characteristic	Specification
Temperature	
Operating	5° to 40° C
Non-operating	-40° to 60° C
Recommended operating temperature	10° to 35° C
Temperature shock immunity - maximum rate of change	10° C per hour
Miscellaneous	
Dust concentration	less than 200 microgram / cubic meter
Altitude	5000 meters (16,450 feet)
Humidity	
Operating	10% to 80% RH non-condensing
Non-operating	5% to 90% RH non-condensing

Table 14: Electrical specifications

Characteristic	Specification
Current	5.0 - 3.5 A
Voltage	100 - 240 V 50/60 Hz
Power	350W

Table 15: Regulatory specifications (CSA test conditions)

Characteristic	Tested condition or value
Equipment mobility	Stationary - rack mount
Connection to the mains	Pluggable - Type A
Operating condition	Continuous
Access location	Operator accessible
Over voltage category (OVC)	OVCII
Mains supply tolerance (%) or absolute mains supply values	-10%, +6%
Tested for IT power systems	No
IT testing, phase-phase voltage (V)	N/A
Class of equipment	Class I
Considered current rating (A)	20 A (branch circuit protection)
Pollution degree (PD)	PD 2
IP protection class	IPXO
Altitude during operation (m)	Max 2000
Altitude of test laboratory (m)	38
Mass of equipment (kg)	Max 25 kg
Manufacturer's Declared Ambient (0C)	40°C

NOTE The CSA test conditions might differ from the product specification limits.

Default and restore default settings

Table 16: Default settings

Parameter	Default setting	Reset to default?
Users and passwords		
Administrator login	User: administrator Password: null	No
User login	User: user Password: null	
Network configuration (ethO)		
DHCP	Enabled	

Parameter	Default setting	Reset to default?
Host name	Blank	
IP address	(obtain from DHCP)	
Subnet mask	(obtain from DHCP)	
Default gateway	(obtain from DHCP)	
Network configuration		
IPv4	Enabled	No
DHCPv4	Enabled	No
IPv6	Disabled	No
Static V6	Disabled	No
Stateless V6	Disabled	No
DNS configuration	Blank	No
Network access services		
Primary network interface (ethO)	Enabled	
SSH	Enabled	
SSL	Disabled	
LDAP	Disabled	Disabled with configuration retained
Slots		
Mailslots	Disabled	Yes
Administrator password required for mailslot removal	Enabled	Yes
Reserved slots	0	Yes
Partitions	Disabled (no partitions)	All deleted leaving a single partition
Date and Time		
NTP /SNTP setting	Disabled	Disabled with configuration retained
Date	Blank or existing	
Time	Blank or existing	
Time zone	GMT	
E-mail notifications (SMTP)	Disabled	Disabled with configuration retained
SNMP/SMI-S		
SNMP v1, v2	Disabled	Disabled with configuration retained
SCSI defaults		
Library product ID - INQUIRY product ID string (Std Inquiry page)	Multistak	
Library vendor ID - INQUIRY vendor ID string (Std Inquiry page)	BDT	

Parameter	Default setting	Reset to default?
SCSI element addressing	Starting element addresses **Values in decimal:** • Slot: 1001 • Picker: NA • Drives: 1 • I/E slots: 101 **Values in hex:** • Slot: Ox3E9 • Picker: NA • Drives: Ox1 • I/E slots: Ox65	Yes
Miscellaneous settings		
Return drive serial numbers to host	Enabled	
Return barcodes to host (RES SCSI data)	Enabled	
Barcode format and length returned to host	8 digits, left justified	Yes
Language settings	English	Yes
Auto unload (library controlled unload)	Enabled	
Log tracing	Continuous, all levels selected	Yes
Ignore barcode media ID	Disabled	Yes
All licensed features	Disabled	Disabled, configuration retained where possible
Licenses	Not applicable	Not deleted
OCP		
Barcode format displayed on OCP	8 digits, left justified	Yes
OCP contrast		No
Screen saver		Yes
Drive defaults		
Drive speed and topology setting	Auto speed/Fabric	Yes
Drive hosting the library LUN	Drive 1 or the lowest numbered existing drive	Yes
Drive power	All drives powered on	Yes
Auto clean	Disabled	Yes

Electrostatic discharge

To prevent damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

Topics include:

- Preventing electrostatic damage
- Grounding methods

Preventing electrostatic damage

To prevent electrostatic damage, observe the following precautions:

Avoid hand contact by transporting and storing products in static-safe containers.

Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.

Place parts on a grounded surface before removing them from their containers.

Avoid touching pins, leads, or circuitry.

Always be properly grounded when touching a static-sensitive component or assembly. See the next section.

Grounding methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm (± 10 percent) resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an authorized reseller install the part.

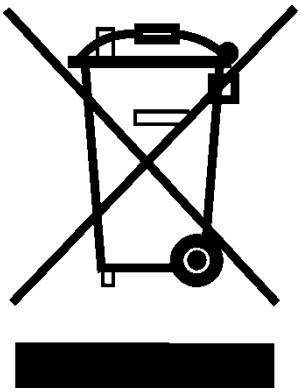
NOTE For more information on static electricity, or assistance with product installation, contact your authorized reseller.

9 Regulatory Information

NOTE To comply with the following regulations and standards, the library must be properly installed in an office or industrial environment with shielded cables and adequate grounding of the SCSI bus and the input power.

9.1 Recycling and disposal

NOTE Disposal of waste equipment by users in private household in the European Union and Norway.



This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your equipment by handling it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at this time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

9.2 CE mark

The CE mark is a mandatory conformity mark on many products placed on the single market in the European Economic Area (EEA). The CE marking certifies that a product has met EU consumer safety, health or environmental requirements.

9.3 CCL mark

CSA C22-2 No. 60950-1 – Electrical safety – UL 60950-1
68475

9.4 FCC (United States)

The computer equipment described in this manual generates and uses radio frequency (RF) energy. If the equipment is not installed and operated in strict accordance with the manufacturer's instructions, interference to radio and television reception might result.

Tested To Comply
With FCC Standards
For Home or Office Use

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

Part 15, Class A, of the FCC Rules, is designed to provide reasonable protection against radio and television interference in a residential installation. Although the equipment has been tested and found to comply with the allowed RF emission limits, as specified in the above-cited Rules, there is no guarantee that interference will not occur in a particular installation. Interference can be determined by turning the equipment off and on while monitoring radio or television reception. The user may be able to eliminate any interference by implementing one or more of the following measures:

- Reorient the affected device and/or its receiving antenna.
- Increase the distance between the affected device and the computer equipment.
- Plug the computer and its peripherals into a different branch circuit from that used by the affected device.
- If necessary, consult an experienced radio/television technician for additional suggestions.

9.5 Canadian verification

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations (ICES-003, Class A).