

**StorageTek SL4000 Modular Library System**  
Library Guide

**E76470-06**

September 2019

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## **Glossary**



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# Preface

This guide provides a general overview of Oracle's StorageTek SL4000 modular tape library. This guide covers installation planning, configuration, and operation of the library. Most procedures involve using the SL4000 web application (referred to as the SL4000 GUI).

## Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at

<http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc>.

### Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit

<http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info> or visit

<http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

## Related Documentation

Go to the Tape Storage section of the Oracle Help Center

(<http://docs.oracle.com/en/storage/#tape>) for additional SL4000 documentation:

- *SL4000 SCSI Reference Guide*
- *SL4000 Security Guide*
- *SL4000 Safety and Compliance Guide*
- *SL4000 Licensing Information User Guide*



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# Release Notes

The following provides release information for Oracle's StorageTek SL4000 library software version 1.0.2.

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**IMPORTANT:** Once you upgrade the library to 1.0.2, Oracle recommends that you do not downgrade. If you must downgrade firmware, please contact service.

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## General Enhancements

- Enhanced support for future drive trays.
- Improved support for root switch (LOER card) replacement.
- Upgraded the Java Runtime Environment (JRE) to version 1.8 revision 201.
- Enhanced support for library controller (LOC) and storage (LOH) failure detection and replacement.

### Bug Fixes

- Cleaning tapes are marked as "Unknown" once moved to the CAP and the CAP is opened then closed.
- Corrected a problem with replacing LOC managed cards (LOY, LOF, LON, LOH, LOV) that resulted in the device identity objects not getting updated with current manufacturing, marketing and FRU data.
- Corrected several problems with moves interrupted by a door open.
- Corrected a problem with a CAP staying online and available after a move error.
- Corrected a problem with importing a tape to a system cell without exporting a tape.
- The cleaning tape status is no longer set to "Unknown" until after the CAP is opened.

## Drive Specific Enhancements

### Bug Fixes

- Media mapping for CT cleaning tapes has been corrected and will no longer be loaded into T10000C or T10000D drives.

## Feature Card Enhancements

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**Note:** To upgrade an existing feature card to 1.0.2, contact service.

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- If the feature card is removed, the library will be set to “Degraded”.
- Re-designed the LOH storage management and LOH replacement procedure.

### Bug Fixes

- Corrected a problem that occurred when a second feature card was installed and both feature cards were seeing the same storage, causing conflicts with boot.
- Each feature card now uses the two LOH drives directly above it in the card cage.
- Corrected various issues with feature card removal and replacement.
- Improved reporting of read/write errors on the LOH card.

## GUI Enhancements

- The library status now reads “Operative, Auditing, Online” while the top level audit job is running.

### Bug Fixes

- The GUI now displays all system reports, even those with large record counts.
- The GUI no longer displays open CAPs as available for import/export.
- The GUI no longer displays deleted support bundles.
- The GUI drive page now displays the drive tray and encryption card types.
- The library name is now limited to 24 characters.

## Minimum Requirements for Related Software

### ACSLs

- ACSLS 8.5.1+ is required to support SL4000 1.0.2. (the feature card must also be at version 1.0.2.).

### SDP2

- SDP2 version 2.5.1+ is required to support of SL4000 1.0.2.

## MIB Version

1.00

## LTO Drive Firmware Versions

The following LTO drive firmware versions have been verified in the SL4000 library. For the drives to work correctly, ensure the drives are at the minimum versions specified in the table below. Lower drive firmware versions may work, but are unreliable. For the IBM LTO drives to run in ADI mode, switch 5 must be on.



Drive Type	Drive Firmware Version	Encryption
HP Generation 5	I6PS	N/A
HP Generation 6	J5MS	N/A
IBM Generation 5	G360	Belisarius: 5.32.20
IBM Generation 6	JAX4	Belisarius: 5.32.20
IBM Generation 7	JAYE	LKM/D: 6.03.101
IBM Generation 8	JAYE	LKM/D: 6.03.101



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# Library Overview

Oracle's StorageTek SL4000 modular library system is an enterprise tape storage solution that offers flexibility, scalability, and high availability. The SL4000 is modular to meet the demands of rapidly growing and constantly changing environments.

## Contents

- [Library Modules Overview](#)
- [Hardware Components Overview](#)
- [Optional Library Features](#)
- [Storage Capacity Overview](#)
- [Power Configuration Overview](#)
- [Host Connectivity Options](#)
- [Library Management Applications](#)
- [Ordering](#)

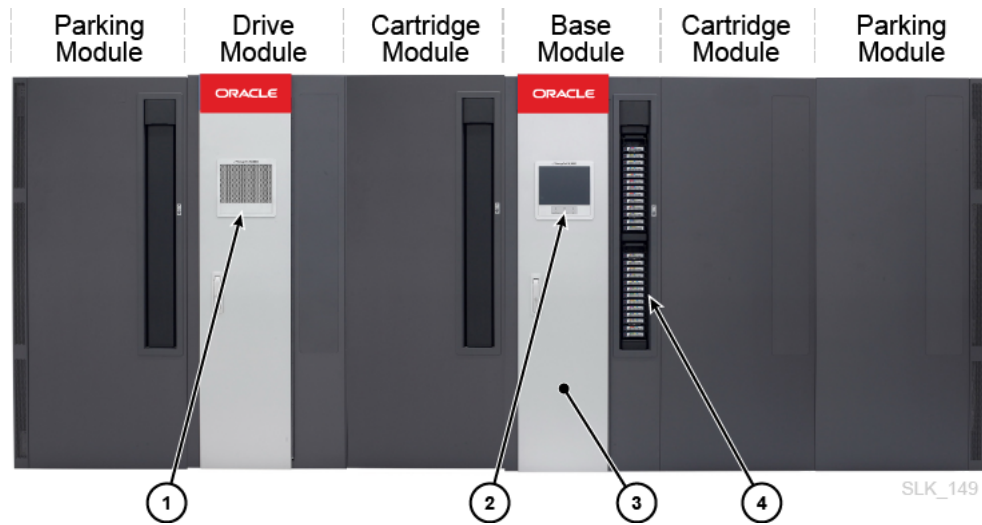
## See Also

- ["Library Dimensions and Weights"](#) on page 2-1

## Library Modules Overview

There can be a maximum of 15 modules per library (one Base Module and up to 14 expansion modules). The module types are:

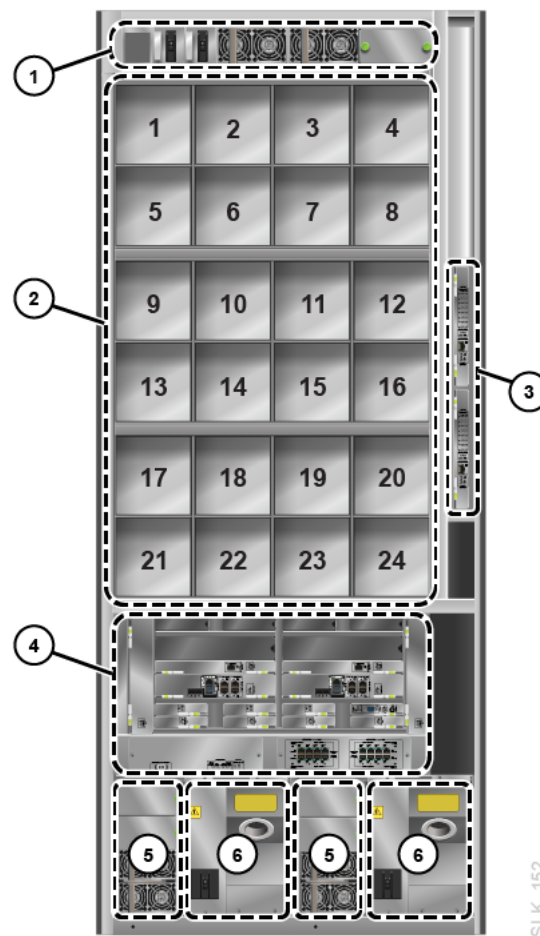
- [Base Module](#)
- [Drive Module](#)
- [Cartridge Module](#)
- [Access Module](#)
- [Parking Module](#)

**Figure 1–1 SL4000 Library Configuration Example**

1. Perforated window
2. Operator panel
3. Base Module front door
4. Rotational CAP (rotary CAP)

## Base Module

- One Base Module is required per library. A standalone Base Module is the smallest possible configuration.
- For best performance, place the Base Module at the center of the library.
- Comes standard with a rotational CAP, operator panel, one drive array (8 drive bays), two LTO drives, one PDU, two DC drive power supplies, and two DC rail power supplies. The library does not come with SFPs.
- The Base Module contains the card cage. It ships standard with one library controller, a root switch, three library storage cards, a video card, two DC converters, two fan assemblies, safety controller, and network patch panel. For more information, see ["Base Module Card Cage"](#) on page 1-8.
- Optional second and third drive array (for 24 drive bays max).
- Optional web camera.
- Optional feature card.
- 205 to 431 tape capacity depending on the number of drive arrays (see ["Calculating Physical Capacity"](#) on page 1-19).

**Figure 1–2 Base Module (Rear View)**

1. Rail power module (contains up to three DC power supplies and two rail controllers)
2. Tape drive bays
3. Drive switch card cage (contains up to two drive network switches, slot 1 on the bottom and slot 2 on top)
4. Base card cage
5. Drive DC power supplies
6. Power distribution units

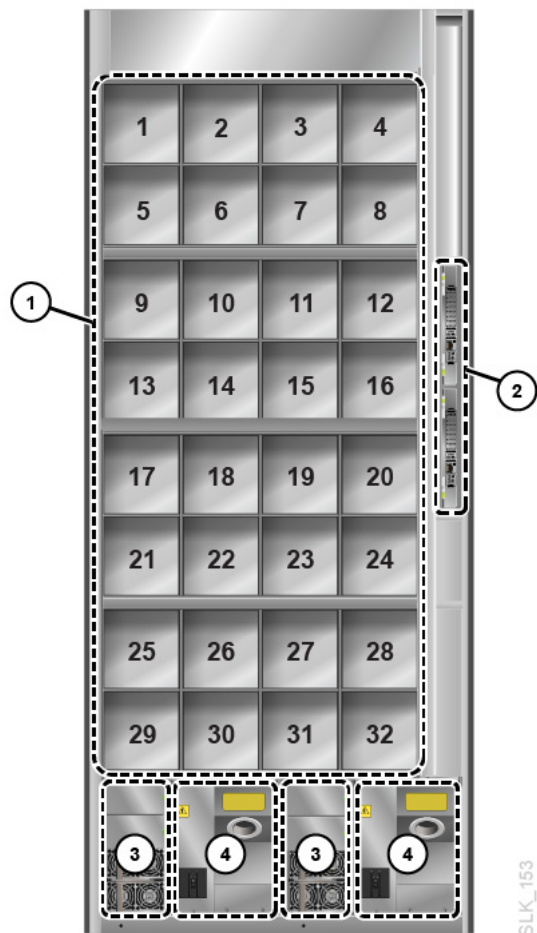
## Drive Module

The Drive Module increases the number of drive bays and provides additional tape storage.

- Maximum of three Drive Modules per library placed anywhere.
- Comes standard with one drive array (8 drive bays). The rear of the Drive Module contains drive bays, PDUs, DC power supplies, and a drive switch.
- Optional second, third, and fourth drive array (for 32 drive bays max).
- Optional rotational CAP (see "[Rotational Cartridge Access Port \(CAP\)](#)" on page 1-16).

- Optional web camera.
- 153 to 522 tape capacity depending on options selected (see ["Calculating Physical Capacity"](#) on page 1-19).

**Figure 1–3 Drive Module (Rear View)**



1. Tape drive bays
2. Drive switch card cage (slot 1 on the bottom and slot 2 on top)
3. Drive DC power supplies
4. Power distribution units

## Cartridge Module

The Cartridge Module provides additional storage cells.

- The maximum number of Cartridge Modules depends on the other modules present. The library is limited to 15 modules total. For example, if the library has a Base Module and two Drive Modules, the library can support up to 12 Cartridge Modules.
- Optional rotational CAP (see ["Rotational Cartridge Access Port \(CAP\)"](#) on page 1-16).
- 438 to 620 tape capacity each (see ["Calculating Physical Capacity"](#) on page 1-19).

## Parking Module

A Parking Module is a Cartridge Module with a modified module id block (see ["Module Identification Block"](#) on page 1-6). The library only requires Parking Modules in a redundant robotics configuration when the library does not have Access Modules.

Six columns (three on the front wall and three on the back wall) are inaccessible and cannot contain tapes (see [Figure B-9](#) and [Figure B-10](#)). The library "parks" a defective robot in this area without blocking access for the operational robot (see ["Robotics"](#) on page 1-16). You do not need to remove the inaccessible cartridge arrays. The module can be restored to a Cartridge Module at anytime by changing the module id block.

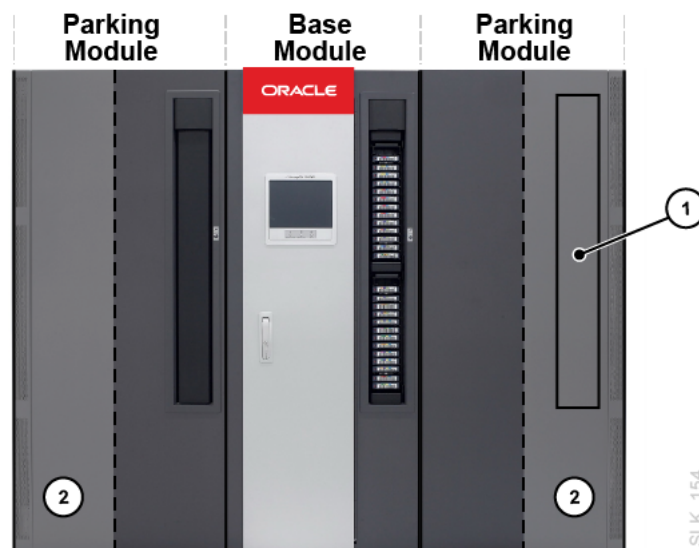
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**Note:** Performing maintenance on a disabled robot in a Parking Module disrupts library operations. For non-disruptive robot maintenance, use Access Modules instead (see ["Access Module"](#) on page 1-5).

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- 230 to 312 tape capacity (see ["Calculating Physical Capacity"](#) on page 1-19).
- Only the left Parking Module can have an optional CAP. The CAP area of the right Parking Module is inaccessible to the robot.
- Must be installed on each end of the library.

**Figure 1-4 Parking Module - Parking Area**



1. Inaccessible CAP area, CAP vacancy plate
2. Robot parking area (inaccessible tape cells)

## Access Module

An Access Module has a cartridge access door used for bulk loading of up to 234 tapes. Additionally, a library with two Access Module supports the redundant robotics feature (see ["Robotics"](#) on page 1-16). A sliding safety door in the Access Module can separate a defective robot from the rest of the library, allowing a service representative to access the disabled robot while the library remains online.

---

**Note:** Access Modules and Parking Modules cannot be installed in the same library.

---

- Access Modules must be placed on the ends of the library.
- A single Access Module supports bulk loading capabilities only. You should install a single Access Module on the left for an additional 104 storage cells (see ["Calculating Physical Capacity"](#) on page 1-19).
- Dual Access Modules support bulk loading and redundant robotics.

**Figure 1-5 Access Module**

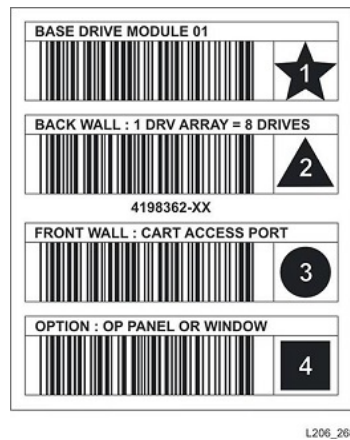


1. Side cover removed showing sliding door
2. Bulk load cartridge access door
3. Access module service panel and handle

## Module Identification Block

Each module has a module identification block that the robot scans during the first library startup or during a startup where you have selected Probe for Configuration Changes (see ["Library Settings Options"](#) on page 5-3). The id block lists the module type and module options, such as a CAP or the number of drives. For the location of the module identification block, see the ["Cell Maps"](#) on page B-5.



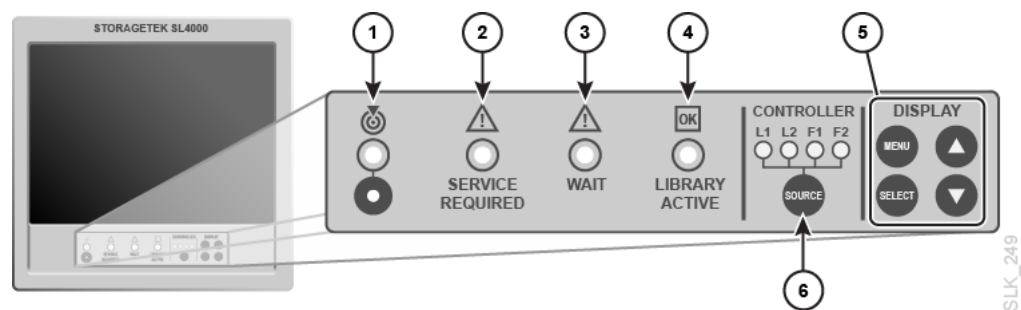
**Figure 1–6 Example Module Identification Block - Base Module**

## Hardware Components Overview

- Operator Panel
- Base Module Card Cage
- Supported Tape Drives
- Robotics
- Rotational Cartridge Access Port (CAP)
- Bulk Load Cartridge Access Ports (Access Module)
- Cooling

### Operator Panel

The front of the Base Module contains the operator panel. It consists of a touch screen to access the GUI and a series of indicators and buttons on a control panel below the screen.

**Figure 1–7 Operator Panel**

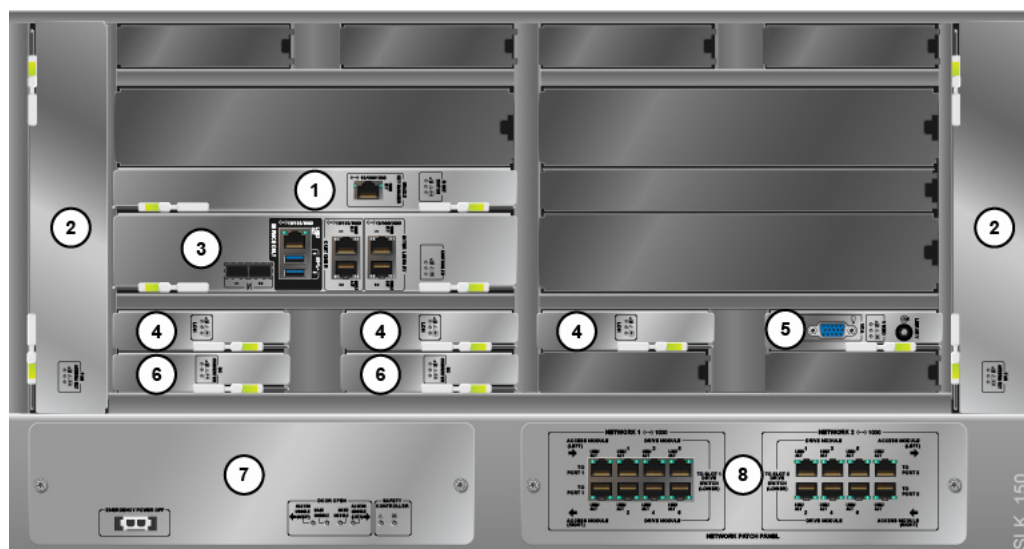
1. Locator light — blinks when you activate the locate function from the GUI.
2. Service action required indicator — the library is inoperable and requires maintenance.
3. Wait indicator — the library is going to an offline state. Do not enter the library until this indicator is off.
4. Library active indicator — the library has power and is running.

5. LCD display controls — used to adjust the monitor settings, such as brightness and contrast.
6. SOURCE (display toggle) — switches the display signal routing between the controllers or feature cards. If the display is currently at the VGA port, the initial press will toggle it to the front touch screen and subsequent presses will cycle through the controllers. L1 and L2 are the library controllers. F1 and F2 are feature cards.

## Base Module Card Cage

The rear of the Base Module houses the card cage, which contains controller cards, disk storage, cooling fans, switches, and power converters. The main controller card is the library controller. The configuration that ships standard is shown below.

**Figure 1–8 Base Card Cage Standard Configuration**



1. Root Switch (LOER)
2. Fan Assembly
3. Library Controller (LOC)
4. Library Controller Storage (LOH)
5. Video Card (LOV)
6. DC Power Converter (LOY)
7. Safety Controller (LON)
8. Network Patch Panel (LOEB)

### Feature Card Upgrade

You can optionally add up to two feature card upgrade kits to the Base Card Cage. Each kit contains two Storage Controller cards, a DC Power Converter, and a Feature Card. The locations of the feature card upgrade components are shown below.

You can use the feature card kit to run application software such as SDP 2.4.

**Figure 1–9 Base Card Cage Showing Feature Card Upgrade Locations****Feature Card Kit 1**

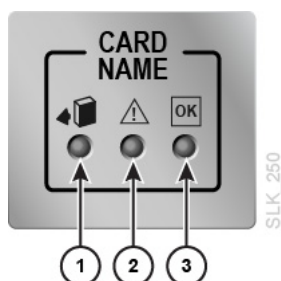
1. Feature Storage Card (physically the same as [Library Controller Storage \(LOH\)](#))
2. Feature Card (physically the same as the [Library Controller \(LOC\)](#))
3. [DC Power Converter \(LOY\)](#)

**Feature Card Kit 2**

4. Feature Storage Card (physically the same as [Library Controller Storage \(LOH\)](#))
5. Feature Card (physically the same as the [Library Controller \(LOC\)](#))
6. [DC Power Converter \(LOY\)](#)

**Controller Card Indicators**

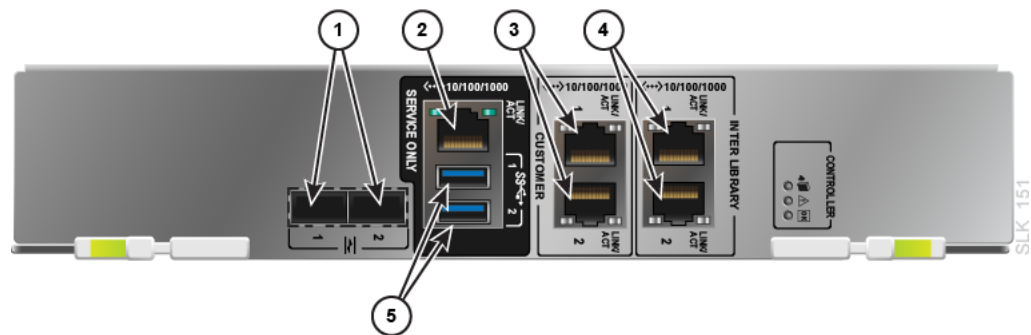
Most controller cards in the Base card cage have the same three indicator lights.



1. Ok to remove device (blue)
2. Service action required (yellow)
3. Power to device (solid green)

**Library Controller (LOC)**

The library controller is the main controller card in the library. It contains the ports used for the host connection and service maintenance. There are two FC ports and two Ethernet ports used for host connectivity. For more information, see "[Host Connectivity Options](#)" on page 1-27.



1. FC ports (these do not have a LINK light — see ["Is the FC connection working? There is no LINK light."](#) on page 10-2). The library controller does not ship with SFP modules, you must purchase those separately.
2. Service network port
3. Customer network ports 1 and 2
4. Inter-library network ports (not used in the SL4000)
5. USB ports (for keyboard and mouse)

### DC Power Converter (LOY)

Converts 48V DC from the power supplies to 12V DC. For more information, see ["Power Configuration Overview"](#) on page 1-21.



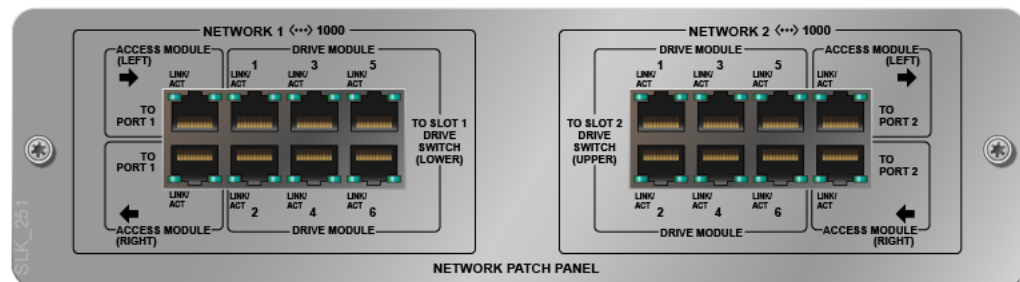
### Library Controller Storage (LOH)

A hard drive that stores information for the library software. The library comes standard with three storage cards and the data is mirrored on each.



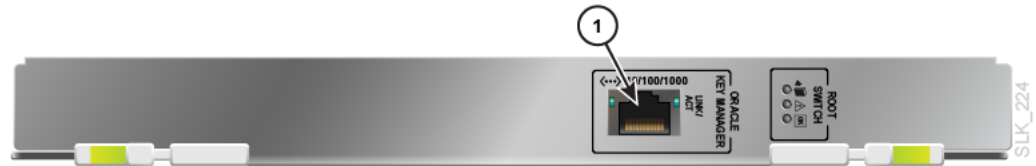
### Network Patch Panel (LOEB)

The Ethernet bulkhead that connects the Drive Module's drive switches and the Access Module's controllers to the Base Module. There are two networks: Network 1 and Network 2. For each network there are six Drive Module Ethernet ports and two Access Module Ethernet ports.



## Root Switch (LOER)

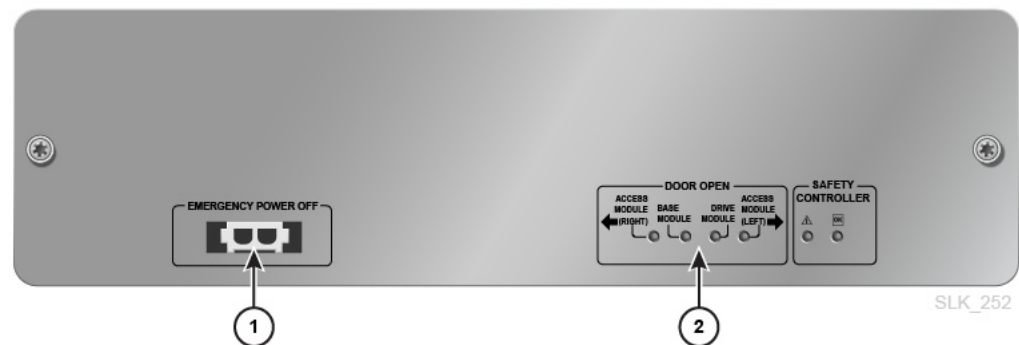
The root switch provides connectivity to the drive switches, robot network, and controller cards. It contains one Ethernet port to connect to the Oracle Key Manager network used for drive encryption (see the *Oracle Key Manager (OKM)* documentation for more information). For port configuration information, see ["Configure the Public Network, Service Network, or OKM Ports"](#) on page 5-2.



1. Oracle Key Manager (OKM) network port

## Safety Controller (LON)

Monitors the status of all the library doors and cuts power to the rail when any door opens unexpectedly. This card has a battery so that it can report "Door Has Been Opened" status if any door opens while the library has no power.



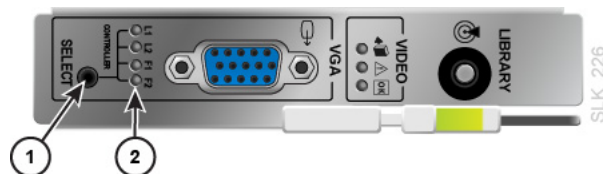
1. Emergency shut off — connects to the customer's emergency power off (EPO) system generally through an external switch (installed by the customer) which cuts power to the library in an emergency.

The connector is a two pin Universal Mate and Lock connector (TYCO 770024-1 with female contacts TYCO 770010-3). To connect to this port, you can use TYCO 770017-1 with male contacts TYCO 770009-1 (or equivalent part numbers).

2. Door open — indicates if a module has an open front access door

## Video Card (LOV)

The video card indicates which controller is displayed on the front touch screen or on a separate monitor connected to the VGA port.



1. SELECT (display toggle) — switches the display signal routing between the controllers or feature cards. If the display is currently at the front touch screen, the

initial press will toggle it to the VGA port and subsequent presses will cycle through the controllers.

2. Controller card indicator — L1 and L2 are the library controllers. F1 and F2 are feature cards. You can cycle through which controller is displayed by pressing the SELECT button.

## Supported Tape Drives

The SL4000 library supports the following tape drive types. The Base Module comes standard with two LTO drives. You must purchase additional drives through Oracle or upgrade the drives from a legacy Oracle library.

- StorageTek T10000 (all models)
- HP LTO Generations 5 and 6
- IBM LTO Generations 5, 6, 7, and 8

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**Note:** LTO-8 drives can read and write one generation back. LTO-5, 6, and 7 drives can read two generations back and write one generation back. For best capacity and performance, always use cartridges of the same generation as your drives.

---

## Tape Drive Encryption

There are two encryption key management options:

- Application-managed — an application manages the keys using the data path.
- OKM-managed — Oracle Key Manager (OKM) appliance manages the keys using an Ethernet connection outside the data path which is generally more secure. For more information on encryption, refer to the drive documentation and the *Oracle Key Manager (OKM)* documentation.

Support for application-managed and OKM-managed encryption depends on the drive type.

**T10000 Encryption** All T10000 generations are encryption-ready, however enabling either application-managed or OKM-managed encryption requires a T10K-EKEY-A-N encryption activation permit. You can order an encryption activation permit at any time (during initial purchase or afterward). After purchasing the permit, use Virtual Operator Panel (VOP) to enable encryption (see the VOP documentation on the Oracle Technical Network). T10000C and T10000D drives no longer require encryption license keys to enable encryption

**LTO Encryption** OKM-managed encryption requires an LTO-ENCRYPT-ACTIVE encryption activation permit. Application-managed encryption using the data path does not require a permit.

HP LTO 5 and 6 drives support both OKM-managed and application-managed encryption. IBM LTO 5, 6, and 7 drives require a Belisarius card in the drive tray to interface with OKM. You may purchase a drive with or without OKM compatibility. To upgrade a non-OKM-compatible drive, you can purchase a kit to add the Belisarius card.

**Re-using Encryption Activation Permits** If you previously purchased an activation permit for an older drive, you can re-use the activation permit when upgrading to a newer generation drive in the same family, as long as the total number of encryption enabled

drives does not exceed your total number activation permits for that family. For example, if you have six T10K-EKEY-A-N activation permits, you can only have a total of six encryption-enabled T10000 drives (regardless of generation).

### Supported Tape Cartridges

All tapes must have a readable external label (see "[Barcode Labels Overview](#)" on page C-1 for label requirements). The library will not import or mount a non-labeled or unknown tape type (anything other than LTO or T10000). Tape types include:

- Data — stores customer data
- Diagnostic — used by service representatives to run read/write tests on drives and run diagnostic tests (label starts with DG[space])
- Cleaning — cleans the tape path and read/write heads of the drives (label starts with CLN)

### Drive Trays

A drive tray houses a tape drive and contains the drive controller card which allows the drive to interface with the library. The drive tray slides into a drive bay of a drive array. Often "tape drive" and "drive tray" are synonymous.

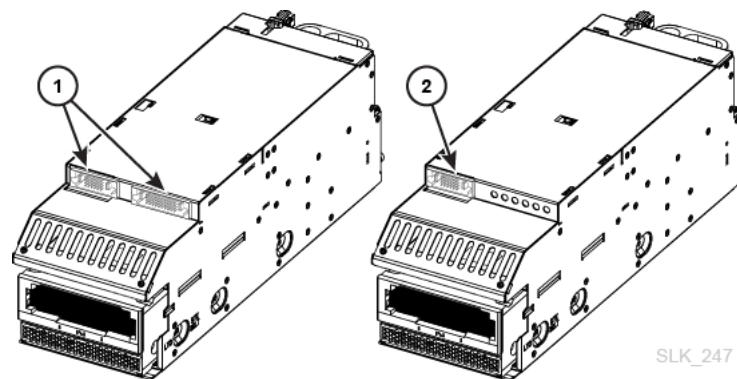
You can use an SL3000 drive tray in an SL4000 if the tray contains the SL4000 controller LOD card. The SL3000 drive controller HBD card is not supported. You can easily identify the tray type by noting the number of ports on top of the tray. The SL3000 HBD card has one port and the LOD has two ports.

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**Note:** The rear drive tray Ethernet ports are disabled in the SL4000.

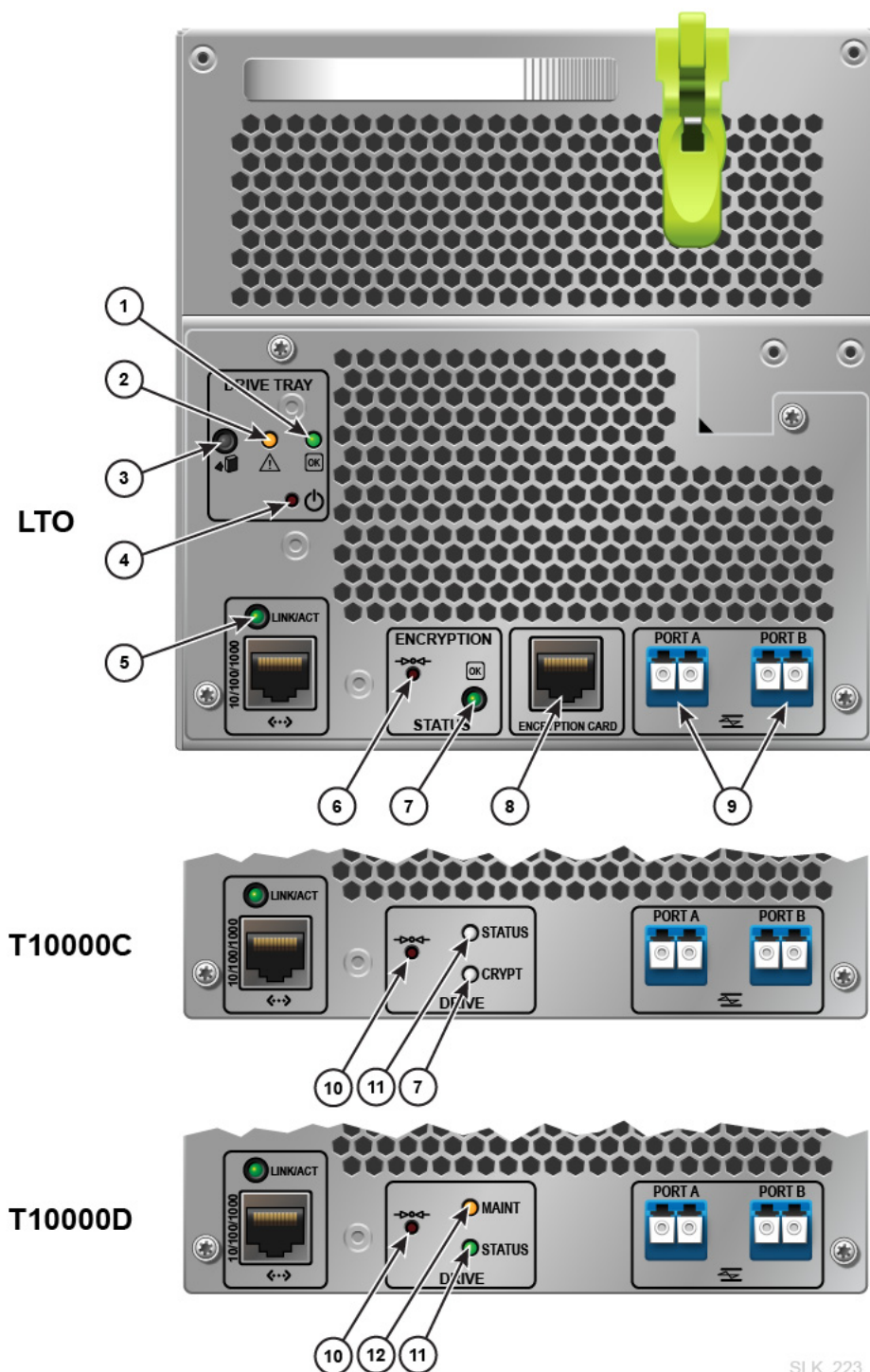
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**Figure 1-10 Identifying an LOD versus HBD Drive Tray**



1. LOD tray with SL4000 port and SL3000 port
2. HBD tray with SL3000 port only



**Figure 1–11 SL4000 Drive Tray - Rear View**

1. Power to drive (solid green). Power to tray only or installing code (blinking green).
2. Service action required (yellow)
3. Okay to remove drive tray from library (blue). Flashes when you use the locate feature (see "Physically Locate a Drive Using the Locator LED" on page 6-2).

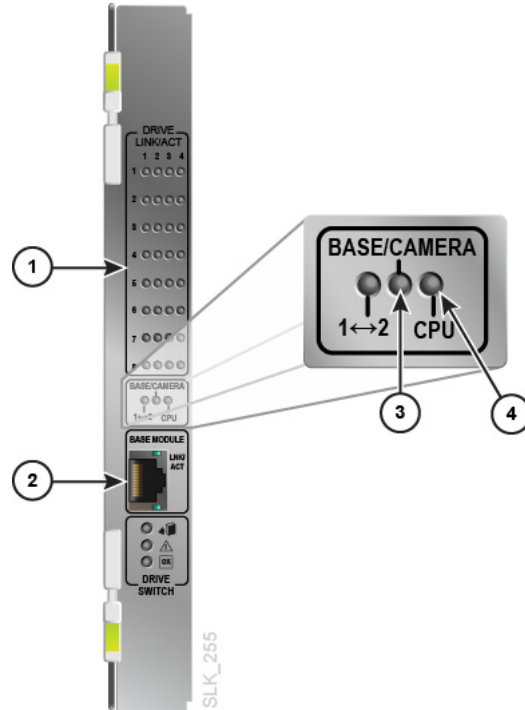


4. Power to tray on/off (push button) — Disabled on the SL4000. Instead use the GUI to turn the tray on or off (see ["Turn a Drive On or Off"](#) on page 6-3).
5. Ethernet link (green). The port is disabled on the SL4000 and only used by Oracle service representatives for maintenance.
6. Encryption reset to default IP address (push button)
7. Encryption indicator
8. Encryption card port. The port is disabled on the SL4000.
9. Fiber channel ports
10. Maintenance push button (DO NOT USE in the SL4000. It will take the drive offline.)
11. Drive status indicator
12. Drive maintenance indicator

### Drive Switch

The drive switch connects the drive trays to the rest of the library. The connection between the switch and the drive trays is internal, so you no longer need to connect Ethernet cables to individual drives.

The Base Module and each Drive Module contains a drive switch card cage, which holds up to two drive switches (see [Figure 1-2](#) and [Figure 1-3](#)). The Base Modules comes standard with one drive switch and the Drive Module comes standard with two drive switches. However, only one drive switch in the Drive Module is operational until you install a second root switch in the Base Module.



1. Drive tray connection indicators — each LED corresponds to a drive bay location. An active LED indicates the drive tray is installed and communicating with the library.

2. Ethernet port used to connect the Base Module's network patch panel to each Drive Module. Leave this port unconnected in the drive switches of the Base Module.
3. In the Base Module, this LED indicates there is an active connection between the network patch panel and the drive switch. In the Drive Module, this LED indicates there is an active connection between the drive switch and the web camera (if installed).
4. Indicates that the onboard processor for the drive switch is operational.

## Robotics

Robots retrieve and insert tapes into CAPs, storage cells, and drives. Robots move along two rails on the back wall of the library. Copper strips in the top rail provide power and a signal path between the robot and the library controller. Power is supplied from +48 VDC 1200 W load-sharing supplies in the rail power module (see ["DC Power Supplies"](#) on page 1-23).

Robots contain a barcode scanner that identifies volume serial numbers (volser) of tapes during CAP entries and library audits. The scanner also reads the module identification blocks in each module during library initialization.

Each library can have either one (standard) or two robots (known as redundant robotics). The optional redundant robotics feature increases library efficiency and allows library operations to continue if one robot fails. Redundant robotics requires 2N power (see ["Power Redundancy Options"](#) on page 1-22) and either two Parking Modules or two Access Modules.

## Rotational Cartridge Access Port (CAP)

A rotational CAP (referred to as rotary CAP in the GUI) is a vertically-mounted, rotating cylinder with two removable 13-cell magazines.

- The Base Module comes standard with a CAP.
- Each Drive Module or Cartridge Module can have one optional CAP per module. Only the left parking module can contain a CAP. The CAP on a right parking module is inaccessible.
- Each CAP has a keypad with an unlock indicator and a button to open the CAP (see ["Open or Close a CAP Using the GUI"](#) on page 8-2).

**Figure 1–12 Rotational CAPs**

1. CAP (closed)
2. No CAP installed
3. CAP (open)
4. Keypad

## Bulk Load Cartridge Access Ports (Access Module)

Using the Access Module you can to enter and eject up to 234 tapes. Only one Access Module is required to support the bulk loading feature (see ["Access Module"](#) on page 1-5).

## Web Camera

You can optionally add a web camera to the Base Module or Drive Module to remotely see inside the library. The camera mounts on the interior of the module access door. See ["View the Inside of the Library Using the Web Camera"](#) on page 11-4.

## Cooling

The library contains cooling fans for the following components:

### Fan Assembly

The library comes standard with two fan assemblies in the Base Module card cage that provide cooling for the electronics in the card cage (see ["Base Module Card Cage"](#) on page 1-8 for the location). The library controller monitors these fans for proper operation. The fault indicator on the fan assembly indicates a failure. The assembly can be replaced without interfering with library operations.

### Tape Drives

Each tape drive tray contains two fans for drive cooling. The tape drive's power converter card supplies power for the fans. Air is drawn from the front of the drive and flows through the fan to the back of the drive.

### **DC Power Supplies**

Each 1200 Watt DC power supply contains two fans that pull air from the library, through the back of the supply, and out the back of the library.

## **Optional Library Features**

- [Features that Require an Activation File](#)
- [Features that Do Not Require an Activation File](#)

### **Features that Require an Activation File**

Some optional library features require you to purchase and install a hardware activation file. See "[Add or Remove Optional Library Features](#)" on page 5-5.

#### **Activated Tape Cartridge Capacity**

Capacity activation files determine the number of tapes allowed in the library. Tapes in system cells do not count toward licenced capacity. If the library contains more tapes than the activated capacity, it will continue to function normally, however, it is illegal to use non-activated capacity. Either eject tapes or purchase and install another capacity activation file (see "[How to Fix a Tape Count Warning](#)" on page 5-6).

#### **Multiport Networking (Redundant Control Paths)**

Multiport networking activates the second FC port and second customer Ethernet port on the library controller. This feature requires you to purchase and upload Redundant Control Paths activation file (see "[Host Connectivity Options](#)" on page 1-27).

### **Features that Do Not Require an Activation File**

#### **Media Validation**

You can validate the integrity of T10000 tapes using media validation. You must assign T10000C or D drives to the "Media Validation" partition/pool to enable media validation. The partition does not contain tapes, and hosts cannot access the drives in the media validation partition. The library uses the drives in the partition to evaluate the integrity of T10000 tapes. Use the GUI to configure the drive partition (see "[Add or Remove Drives from the Media Validation Partition \(Pool\)](#)" on page 13-1).

#### **Library Partitioning**

Library partitioning reserves library resources (drives, storage cells, and CAPs) for the exclusive use of specific StorageTek Library Control Interface (SCI) and FC-SCSI hosts. The SL4000 supports up to 16 partitions. Partitioning is an optional feature that comes standard with the library, but is disabled by default. You can enable partitioning in the library settings (see "[Configure the Library with the Configuration Wizard](#)" on page 5-1).

#### **Feature Card**

See "[Feature Card Upgrade](#)" on page 1-8.

#### **Web Camera**

See "[Web Camera](#)" on page 1-17.

## Storage Capacity Overview

There are two types of capacity:

- **Physical Capacity** — the number of storage cells in the library, excluding reserved system cells. Physical storage capacity can range from 300 to 9,017 cells and 1 to 120 drives.

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**Note:** Oracle recommends adding physical capacity in advance to meet future storage needs. Although modules can be added at any time, adding a module is disruptive to library operations.

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- **Activated Capacity** — the number of tapes allowed in the library as defined by the cumulative amount of capacity hardware activation files installed on the library. Use the GUI to install the capacity activation files (see ["Add or Remove Optional Library Features"](#) on page 5-5). Unlike the SL3000, the SL4000 does not designate active and inactive cells. The capacity activation files only limit the total number of tapes allowed in the library. The total tape count displayed in the GUI excludes tapes in the system cells.

---

**Note:** If the library contains more tapes than installed capacity activation files, the library will continue to function. However, it is illegal to use unactivated capacity. Either eject tapes or purchase and install another capacity activation file (see ["How to Fix a Tape Count Warning"](#) on page 5-6).

---

## Calculating Physical Capacity

Use the table below to calculate the storage cell capacity of a library (excluding system cells). For each module in the library, start with the standard cell count. Then, either add or subtract based on the module's position and add-on options. Finally, add the cell counts of each module together to get the total capacity of the library.

**Table 1–1 Storage Cell Capacity Per Module**

Physical Configuration	Base Module	Drive Module	Cartridge Module	Parking Module	Access Module
Standard	339	378	516	308	0
2nd Drive Array <sup>1</sup>	-55/-66	-55/-66	--	--	--
3rd Drive Array <sup>1</sup>	-60/-72	-60/-72	--	--	--
4th Drive Array <sup>1</sup>	--	-65/-78	--	--	--
Module to Left	+88	+88	+104	+4	0
Module to Right	+13	+51	0	0	--
CAP	Std.	-39/-77 <sup>2</sup>	-78	-78 <sup>3</sup>	--

<sup>1</sup> For additional drive arrays, the first number listed is the change in capacity when there is no module to the left, and the second number is the change in capacity when there is a module to the left.

<sup>2</sup> The -39 is the change in capacity when there is no module to the right, and -78 is the change in capacity when there is a module to the right.

<sup>3</sup> For left Parking Module only.

**Capacity Calculation Example 1**

The example library has a Parking Module, Drive Module, Cartridge Module, Base Module, Cartridge Module, and Parking Module (see [Figure 1-1](#)).

**Left Parking Module**

Contains a CAP. There is a module to the right.

$$308 \text{ (standard)} - 78 \text{ (CAP)} + 0 \text{ (module to right)} = 230$$

**Drive Module**

Contains a CAP and four drive arrays. There is a module to the right and left.

$$378 \text{ (standard)} - 78 \text{ (CAP with module to right)} - 66 \text{ (2nd drive array)} - 72 \text{ (3rd drive array)} - 78 \text{ (4th drive array)} + 52 \text{ (module to right)} + 88 \text{ (module to left)} = 224$$

**Left Cartridge Module**

There is a module to the right and left.

$$516 \text{ (standard)} + 0 \text{ (module to right)} + 104 \text{ (module to left)} = 620$$

**Base module**

Contains three drive arrays. There are modules to the right and left.

$$339 \text{ (standard)} - 66 \text{ (2nd drive array)} - 72 \text{ (3rd drive array)} + 13 \text{ (module to right)} + 88 \text{ (module to left)} = 302$$

**Right Cartridge Module**

Contains a CAP. There is a module to the right and left.

$$516 \text{ (standard)} - 78 \text{ (CAP)} + 0 \text{ (module to right)} + 104 \text{ (module to left)} = 542$$

**Right Parking Module**

$$308 \text{ (standard)} + 4 \text{ (module to left)} = 312$$

**Library Total**

$$230 \text{ (Parking Module)} + 224 \text{ (Drive Module)} + 620 \text{ (Cartridge Module)} + 302 \text{ (Base Module)} + 542 \text{ (Cartridge Module)} + 312 \text{ (Parking Module)} = 2,230$$

**Capacity Calculation Example 2**

The example library has a Base (in center) and seven Cartridge Modules on each side of the Base (15 modules total). This represents the maximum storage capacity for an SL4000.

**Base module**

Contains one drive array. There is a module to the right and left.

$$339 \text{ (standard)} + 13 \text{ (module to right)} + 88 \text{ (module to left)} = 440$$

**Cartridge Modules**

$$\text{Left-most Cartridge Module: } 516 \text{ (standard)} + 0 \text{ (module to right)} = 516$$

$$\text{Right-most Cartridge Module: } 516 \text{ (standard)} + 104 \text{ (module to left)} = 620$$

$$\text{All other Cartridge Modules: } 516 \text{ (standard)} + 104 \text{ (module to left)} + 0 \text{ (module to right)} = 620$$

**Library Total**

$$440 \text{ (Base)} + 516 \text{ (left-most Cartridge Module)} + 620 \text{ (right-most Cartridge Module)} + 12 \times 620 \text{ (other Cartridge Modules)} = 9,016$$

### Capacity Calculation Example 3

The example library has a Cartridge Module, Base Module, Drive Module, another Cartridge Module, and a single Access Module on the right for bulk loading. Oracle does not recommend installing a single Access Module on the right. If the Access Module was installed on the left end of the library, 104 additional cells would be accessible in the far left Cartridge Module.

#### Left Cartridge Module

Module is on the left end of the library. There is a module to the right.

516 (standard) = 516

#### Base module

Contains two drive arrays. There are modules to the right and left.

339 (standard) + 13 (module to right) + 88 (module to left) – 66 (2nd drive array) = 374

#### Drive Module

Contains three drive arrays. There is a module to the right and left.

378 (standard) + 13 (module to right) + 88 (module to left) – 66 (2nd drive array) – 72 (3rd drive array) = 341

#### Right Cartridge Module

This is a module to the right and left.

516 (standard) + 0 (module to right) + 104 (module to left) = 620

#### Access Module

Module is on the right end of the library (not recommended for single Access Module).

0 (standard) = 0

#### Library Total

516 (left Cartridge Module) + 374 (Base) + 341 (Drive Module) + 620 (right Cartridge Module) + 0 (Access Module) = 1,851

#### See Also

- ["Library Modules Overview"](#) on page 1-1

## Power Configuration Overview

All power supplies and power distribution units (PDUs) reside in the Base Module and Drive Modules (each module ships standard with one PDU). When selecting a power configuration, consider any power redundancy requirements along with the features and number of drives in the library.

- [Power Redundancy Options](#)
- [AC Power Source Options](#)
- [DC Power Supplies](#)
- [Calculating Power Supply Quantities](#)
- [Calculating Total Power Consumption](#)
- [Cooling](#)

## Power Redundancy Options

There are three power configurations that offer various levels of power redundancy.

Configuration	AC Power	DC Power	Feature Support
N+1 (standard)	No redundancy One PDU per Base or Drive Module	Provides one extra drive DC supply and one extra robotics DC supply	Limited support for T10000 drives and no redundant robotics support
2N	Redundant Two PDUs per Base or Drive Module	Provides a set of DC power supplies for each PDU	Required for redundant robotics and redundant electronics support Full support for T10000 drives.
2N+1	Redundant Two PDUs per Base or Drive Module	Provides additional power supplies for each PDU, meaning N+1 DC power redundancy for each PDU (except the second PDU only has N DC power supply redundancy for the robot)	Supports redundant robotics and redundant electronics Full support for T10000 drives.

## AC Power Source Options

Each PDU in the library requires a separate AC power source with:

- 240 VAC, 50/60 Hz, at 30 amps (range: 200–240 VAC, 47–63 Hz, 24 amps), single phase

### AC Power Cables

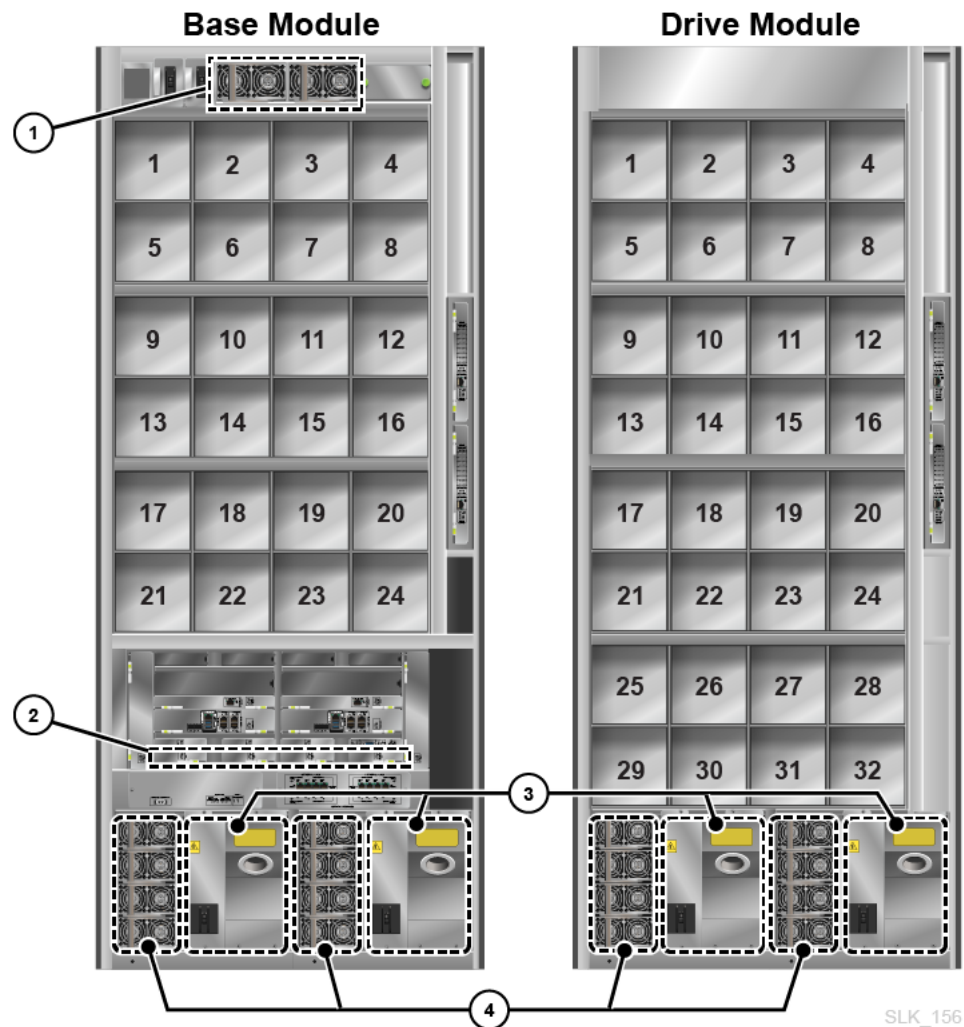
- N+1 — order one power cord for the Base module and an additional power cord for each Drive Module
- 2N or 2N+1 — two power cords for the Base module and two additional power cords for each Drive Module

Power Cord - Length/Type	Power Source	Circuit Breaker	Wall Connector	Library Connector
US 3.7 m (12 ft) 12 AWG	240 VAC/30A	30A	L6-30P	L6-30R
International 4 m (13 ft) HAR	240 VAC/30A	30A	330P6W	L6-30R



## DC Power Supplies

**Figure 1–13 Power Supply Locations - Base and Drive Module (Rear View)**



1. Rail DC power supplies (1200W DC)
2. DC power converters
3. PDUs (240 VAC)
4. Drive DC power supplies (1200W DC)

### Base Card Cage DC Power Converters

The DC converters in the card cage (see "[Base Module Card Cage](#)" on page 1-8 for location) convert 48VDC from the drive DC power supplies to 12VDC. These converters replace the functionality of the cPCI power supplies in the SL3000. Each Base Module ships standard with two DC converters.

A minimum card cage configuration (one controller, one root switch, three storage cards, one video card, and one fan assemblies) requires a minimum of two DC converters for N+1 and three for 2N or 2N+1 redundancy.

A maximum card cage configuration (four controllers, two root switches, seven storage cards, one video card, and two fan assemblies) requires a minimum of three DC converters for N+1 and four for 2N or 2N+1 redundancy.

### Rail Power Supplies

The robots use load-sharing 1200 W DC power supplies located at the top of the Base Module (the Drive Module does not contain rail DC supplies) — see [Figure 1–13](#). The rail DC power supply are physically the same power supply used for the drives.

Each Base Module ships standard with two rail DC power supplies used for N+1 and 2N configurations. You must order a third DC power supply for the 2N+1 configuration.

### Tape Drive Power Supplies

The drives use load-sharing 1200 W DC power supplies. Up to four power supplies are located to the left of each PDU in both the Base and the Drive Module — see [Figure 1–13](#).

The library ships standard with two drive power supplies per Base and two per Drive Module. The number of additional power supplies required depends on the library configuration (see "[Calculating Power Supply Quantities](#)" below).

## Calculating Power Supply Quantities

The number of power supplies required depends on:

- Power configuration (N+1, 2N, or 2N+1)
- Base card cage configuration
- Number and type of drives (T10000 and LTO)

To determine the number of power supplies to order for your library configuration:

1. Determine the maximum power consumption of the card cage (see "[Card Cage Power Consumption](#)" on page 1-24).
2. Calculate the maximum power consumption of the drives:
  - a. Determine the number of each drive type and multiply by the watts-per-drive for each drive type (see "[Drive Power Consumption](#)" on page 1-25).
  - b. Add together the watts used by each drive type to calculate the total watts consumed.
3. Add the card cage and drive power consumptions together. See "[DC Power Supplies Required for the Base Module](#)" on page 1-25 and "[DC Power Supplies Required for the Drive Module](#)" on page 1-25 to determine the number of DC power supplies needed.

### Card Cage Power Consumption

Configuration	Maximum Watts
Minimum (one controller, one root switches, three storage cards, one video card, and two fan assemblies)	352
Mid (two controllers, two root switches, three storage cards, one video card, and two fan assemblies)	511

Configuration	Maximum Watts
Maximum (two controllers, two feature cards, two root switches, seven storage cards, one video card, and two fan assemblies)	793

### Drive Power Consumption

Drive Type	Watts Used by Each Drive
T10000A/B/C	91
T10000D	117
LTO	48

### DC Power Supplies Required for the Base Module

Total Watts Used by All Drives	Power Supplies Required for N+1	Power Supplies Required for 2N	Power Supplies Required for 2N+1
1 - 1,063	2	2	4
1,064 - 2,263	3	4	6
2,264 - 3,463	4	6	8
3,464 - 3,805	5	8	8

### DC Power Supplies Required for the Drive Module

Total Watts Used by All Drives	Power Supplies Required for N+1	Power Supplies Required for 2N	Power Supplies Required for 2N+1
1 - 1,200	2	2	4
1,201 - 2,400	3	4	6
2,401 - 3,600	4	6	8
3,601 - 4,443	5	8	8

### Example: Calculating Required Number of DC Power Supplies

The example library has a Base and one Drive Module with both drive types (T10000 and LTO). The Base has the minimum configured card cage (352W).

### Base Module Drive Power Consumption Example

Drive Type	Quantity of Drives	Multiply by Watts Per Drive	Total Watts Per Drive Type
T10000D	6	117	702
T10000C	6	91	546
LTO8	4	48	192

Total Drive Consumption for Base = 702 + 546 + 192 = 1,440 W

### Drive Module Drive Power Consumption Example

Drive Type	Quantity of Drives	Multiply by Watts Per Drive	Total Watts Per Drive Type
T10000C	10	91	910
LTO7	4	48	192

Total for Drive Module = 910 + 192 = 1,102 W

The Base consumes 1,792W (352 W for card cage and 1,440 W for drives). The Drive Module consumes 1,102 W.

The tables below list the power supplies required for the example library. Two tape drive DC power supplies ship standard with the Base and two power supplies ship standard with the Drive Module. Therefore, subtract two from the DC supplies required when determining what to order.

### DC Supplies Required for Base Example

Library Power Configuration	DC Supplies Required	DC Supplies to Order (= Required - 2)
N+1	3	1
2N	4	2
2N+ 1	6	4

### DC Supplies Required for Drive Module Example

Library Power Configuration	DC Supplies Required	DC Supplies to Order (= Required - 2)
N+ 1	2	0
2N	2	0
2N+1	4	2

The number of DC supplies that you need to order depends on the power configuration. For instance, if the example library had a 2N+1 configuration, it would require an order of six additional DC power supplies (four supplies for the Base and two supplies for the Drive Module). The 2N+1 also requires an additional DC supply for the rail. Therefore, you would need to order a total of seven DC power supplies

## Calculating Total Power Consumption

For environmental or economical reasons, you might want to determine the total power consumption (Watts), CO<sub>2</sub> emission values, and British Thermal Units (Btu/hr) for the library and drives.

Components	Quantity	Idle Watts	Max Watts
Base Library (required)	1	301	518
Includes: card cage, 1 robot, 1 CAP, operator panel			

Components	Quantity	Idle Watts	Max Watts
Redundant Robotics (optional)	1	48	154
Additional CAPs (optional)	Each	10	14
Drive Module/Cartridge Module	Each	3	5
Access Module	Each	9	29
T10000A/B/C	Each	61	93
T10000D	Each	64	127
LTO	Each	30	46

### Calculating Total Watts, CO<sub>2</sub> Emissions, and Btu/hr

To calculate the total power consumption in Watts for the library, add up all the applicable wattage values for the library configuration.

To calculate kilograms of CO<sub>2</sub> emissions per day, multiply watts by the CO<sub>2</sub> emissions constant. Use the constant that is applicable for your country (0.02497 for US).

To convert electrical values to Btu/hr, multiply the number of watts by 3.412 (1 W = 3.412 Btu/hr).

### Power Consumption Example 1

Component	Quantity	Watts
SL4000 Base	1	518
LTO8 Tape Drives	16	736
Library Total	--	1,254

- Emissions:  $1,254\text{W} \times 0.02497 = 31.3 \text{ Kg of CO}_2$
- Power consumption:  $1,254\text{W} \times 3.412 = 4,279 \text{ Btu/hr}$

### Power Consumption Example 2

Component	Quantity	Watts
SL4000 Base	1	518
T10000D Tape Drives	8	1,016
Drive Module	1	5
T10000C Tape Drives	8	744
Cartridge Module	1	5
CAPs (3 at 10 Watts each)	3	30
Library Total	--	2,318

- Emissions:  $2,318\text{W} \times 0.02497 = 57.9 \text{ Kg of CO}_2$
- Power consumption:  $2,318\text{W} \times 3.412 = 7,909 \text{ Btu/hr}$

## Host Connectivity Options

The SL4000 library supports two types of host connections:

- Small computer system interface (SCSI) over a physical Fibre Channel interface
- Ethernet using 10/100/1000 Base-T and CAT 5e/1Gb cable

### FC-SCSI Connection

The library comes standard with two FC ports (1 and 2) on the library controller card. However, by default only port 1 is fully active. Activating port 2 requires the Redundant Control Paths activation file. The library supports simultaneous access using both FC ports. However, the application using the SCSI interface must manage these connections. You must use a multi-path device driver or an application that is aware of the multiple paths.

See the *SL4000 SCSI Reference Guide* for more information on the SCSI command set, FC operations, topologies, and command implementations.

The library controller does not ship with SFP modules, you must purchase those separately.

#### See Also

- ["Behavior of an Unavailable Fibre Channel Port"](#) on page 10-2

### TCP/IP Connection

The library controller provides two separate Ethernet connections (labeled as customer ports) on the library controller for communication with client applications.

- Port 1 provides the primary host connection (standard).
- Port 2 provides the dual connection (known as dual TCP/IP). Activation of this port requires the Redundant Control Paths activation file. Enabling dual Ethernet bonds the two ports into a single interface, requiring only one IP address for the pair of ports on each library controller card. Dual TCP/IP prevents a loss of connection between the library and host by automatically avoiding a failed port.

#### See Also

- ["Connect to Both Customer Ports on the Library Controller for Redundancy"](#) on page 2-9

## Library Management Applications

- [Software Vendors \(ISVs\)](#)

### Software Vendors (ISVs)

- Oracle Hierarchical Storage Manager (HSM)
- Oracle Secure Backup
- Hewlett Packard Enterprise Data Protector
- Commvault Software
- Dell/EMC NetWorker
- IBM Spectrum Protect

- Veritas Netbackup
- DIVA

Not every application is tested on every platform or version. To verify the software is supported, contact an Oracle sales representative or application vendor.

## Ordering

Contact Sales Assistance at +1.888.672.2534.

You must order tape cartridges separately. You can use existing tapes if they are compatible and still within their warranty period. Professional Services and Data Center Services offer media and drive migration:

- Call 1-877-STK-TAPE to order media from your local reseller or to obtain media pre-sales support.
- E-mail: [tapemediaorders\\_ww@oracle.com](mailto:tapemediaorders_ww@oracle.com)

The table below provides the marketing part numbers for library components and upgrade options. ATO is for initial orders and PTO is for upgrade orders.

Part Type	Description	ATO	PTO
Module	Base module, no active cells, one drive array, CAP, two LTO drives, one PDU, two DC drive power supplies, two DC rail power supplies.	7112359	N/A
Module	Drive Module, no active cells, one drive array	7112361	7112379
Module	Cartridge Module, no active cells (438 to 620 storage cells)	7112362	7112380
Module	Left Access Module, 234 bulk loading CAP	7112363	7112381
Module	Right Access Module, 234 bulk loading CAP	7112364	7112382
Upgrade	Dual robot	7112369	7112388
Upgrade	CAP (with two 13 cell magazines)	7112370	7112389
Upgrade	Spare CAP Magazine (13 cells)	7112375	7112394
Upgrade	Tape drive array (eight drive bays)	7112371	7112390
Upgrade	Web Camera	7116404	7116405
Upgrade	Feature Card	7112373	7112392
Power	1200W DC power supply (for tape drives and robotics)	7112368	7112386
Power	200 - 240 VAC 30 Amp PDU	7112365	7112383
Power	US Power Cord 30A/220V, L6-30P plug, L6-30R connector, 3.6 meters long	7112366	7112384
Power	International Power Cord, 30A/220V, 330 P6W plug, L6-30R connector, 4 meters long	7112367	7112385
Activation File	25 Tape Cartridge Cells	N/A	7112417
Activation File	100 Tape Cartridge Cells	N/A	7112418
Activation File	200 Tape Cartridge Cells	N/A	7112419
Activation File	500 Tape Cartridge Cells	N/A	7112420
Activation File	1000 Tape Cartridge Cells	N/A	7112421
Activation File	Redundant Control Paths	N/A	7112416
Tape Drive	T10000D tape drive: 16 Gb FC	N/A	7105799
Tape Drive	T10000D tape drive: 16 Gb FICON	N/A	7105800
Tape Drive	IBM LTO8 FC without OKM compatibility	N/A	7118443

Part Type	Description	ATO	PTO
Tape Drive	IBM LTO7 FC with OKM compatibility	N/A	7113979
Tape Drive	IBM LTO7 FC without OKM compatibility	N/A	7113981
Tape Drive	OKM interface upgrade kit for IBM LTO (Bel card)	N/A	7113290
Encryption Permit	T10000 encryption activation permit for one drive <sup>1</sup>	N/A	T10K-EKEY-A-N
Encryption Permit	LTO encryption activation permit for one drive <sup>2</sup>	N/A	LTO-ENCRYPT-ACTIVE

<sup>1</sup> See [T10000 Encryption](#) and [Re-using Encryption Activation Permits](#)

<sup>2</sup> See [LTO Encryption](#) and [Re-using Encryption Activation Permits](#)

## Support Options

Service and support representatives are available to assist with hardware and software problem resolution. During the initial order and installation planning, you can contact local and remote support with any questions.

### Service Delivery Platform

The StorageTek Service Delivery Platform (SDP) is a support enhancement solution that provides faster problem resolution, analysis and trending, and improved diagnostic capabilities. SDP is a remote application that can be installed on a Linux server that connects to the library and any StorageTek T-series tape drives. SDP collects device events and alerts support analysts, providing remote diagnosis and automatic service requests (ASR).

For more information, contact an Oracle representative or visit:

<http://www.oracle.com/technetwork/systems/asr/documentation/oracle-installed-storage-330027.html>

### Oracle Premier Support for Systems

Oracle Premier Support is a fully integrated support solution that features:

- Complete system coverage and unlimited 24/7 access to Oracle system specialists
- Essential product updates, such as firmware
- Personalized, proactive IT support and rapid-response hardware service

For more information, visit: <http://www.oracle.com/us/support/index.html>

### Contacting Support

Oracle Global Customer Support Contacts Directory:

<http://www.oracle.com/us/support/contact-068555.html>

Submit, update, or review service requests at My Oracle Support:

<https://support.oracle.com/>

## Order an SL3000 to SL4000 Conversion Kit

Oracle representatives can use the following procedures to order an SL3000 to SL4000 conversion kit.

- [Order a Conversion Kit Task 1: Locate Tape Storage Products within Webquote](#)
- [Order a Conversion Kit Task 2: Update Configurator for the Library Kit](#)
- [Order a Conversion Kit Task 3: Check the SL3000 SFPs](#)




- [Order a Conversion Kit Task 4: Verify the Drives Trays Have LOD Cards](#)
- [Order a Conversion Kit Task 5: Order Drive Tray Conversion Kits for HBD Trays](#)

### Order a Conversion Kit Task 1: Locate Tape Storage Products within Webquote

1. Sign in to Webquote.
2. Click **Create Hardware/Software Quote**.
3. Click **Add Hardware**.
4. Select **Configurable Systems**.
5. Under the System Types list, select **Tape Storage**.

### Order a Conversion Kit Task 2: Update Configurator for the Library Kit

1. Follow [Order a Conversion Kit Task 1: Locate Tape Storage Products within Webquote](#), and then click the configure icon  for:  
**7120109 SL3000 Conversion Model Family**.
2. Under Base Conversion System, select:  
**7120190 base conversion kit** (includes a conversion for one drive array)
3. If the library has a Drive Expansion Module (DEM), select:  
Quantity 1 of **7120191 drive expansion module conversion kit**  
(includes a conversion kit for one drive array)
4. If the library has Access Expansion Modules (AEMs), select:  
Quantity 2 of **7120192 access expansion module conversion kit**
5. If the library has two robots, select:  
Quantity 1 of **7120193 dual robot conversion kit**
6. Select the quantity of **7120194 drive array conversion kits** based on the number of drives in the Base and DEM:

Drives in Base	Drives in DEM	Quantity 7120192 needed
1 to 8	No DEM or 1 to 8	0
9 to 16	No DEM or 1 to 8	1
17 to 24	No DEM or 1 to 8	2
17 to 24	9 to 16	3
17 to 24	17 to 24	4
17 to 24	25 to 32	5


7. Select **Installation Services**.
8. Click **Done**.

### Order a Conversion Kit Task 3: Check the SL3000 SFPs

The SL4000 can work with 16Gb, 8 Gb, and 4Gb SFPs. If the SL3000 doesn't have SFPs within this range, order **7101676 2 Sun Storage 16 Gb FC short wave optics, Qlogic**.

To order compatible SFPs:

1. In Webquote, click **Add Hardware**.
2. Select **Standalone Options/ Spare Part**.

3. Search for **7101676**. Click **Go**.
4. Enter the quantity. Click **Add to Quote** .

#### Order a Conversion Kit Task 4: Verify the Drives Trays Have LOD Cards

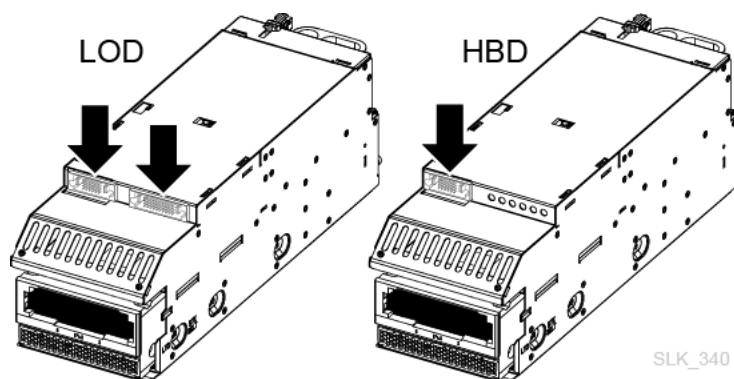
Drive trays must have the LOD card to work with the SL4000. There are two ways to check the tray type: physically or through SLC.

##### OPTION 1: Check the Tray Type in SLC

1. Log into SLC.
2. Highlight the **Drive Folder**.
3. In the **Tray Type** column, verify that all drives are "LOD" or "LOD 2"


##### OPTION 2: Check the Physical Connectors on the Tray

1. Remove the tray from the library.
2. Look for the connectors on the front of the drive tray. The LOD tray has two connectors.



#### Order a Conversion Kit Task 5: Order Drive Tray Conversion Kits for HBD Trays

Order an LOD conversion kit for *each* HBD tray in the library. The kit you should order depends on the drive type. The LTO drive tray upgrade kit supports moving encryption cards from old trays to new trays. The SL3000 drive trays with LOD cards and SL4000 drive trays with LOD cards are the same and are interchangeable.

1. Follow [Order a Conversion Kit Task 1: Locate Tape Storage Products within Webquote](#), and then click the configure icon  for the drive type:
  - For T10K: **T10K-SD-UPG-FAMILY StorageTek Serialized Upgrades T10000**
  - For LTO: **LTO-SLD-UPG-FAMILY StorageTek Serialized Upgrades LTO**
2. From the Library Type drop-down, select:
  - For T10K: StorageTek SL4000 Modular Library System
  - For LTO: StorageTek SL3000 Modular Library System
3. Select the kit for the drive type:
  - For T10000 A/B/C: **7110135**
  - For T10000 D: **7110136**
  - For IBM LTO: **7110132**
  - For HP LTO: **7110133**

4. Select **Installation Service**, and then click **Done**.
5. Order one kit for each drive of that type. Update the quantity as necessary and click **Save**.
6. Repeat for each other drive type in the library.



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## Planning for the Hardware Installation

### Contents

- [Library Configuration Guidelines to Maximize Performance](#)
- [Library Dimensions and Weights](#)
- [Installation Site Requirements](#)
- [Fire Suppression Planning](#)
- [Networking](#)
- [Cable Routing](#)
- [Approximate Installation Time](#)
- [Initial Configuration Wizard Information](#)
- [Initial Configuration Steps After Physically Installing the Library](#)

### Library Configuration Guidelines to Maximize Performance

- Place the Base Module in the center of the library string.
- Place a balance of Cartridge Modules to the left and the right of the Base Module.
- Spread the Drive Modules out within the library string to reduce robot contention.
- If only adding one Access Module for bulk loading, place the module on the left side of the library string.
- When installing additional CAPs, balance the CAPs between the left and right sides of the library string. If partitioning the library, install enough CAPs to provide at least one CAP for each partition. This allows each partition to contain a dedicated CAP.
- Install enough tape drives to adequately handle peak workload. Logically group tape drives and compatible tapes together.
- Pre-install physical capacity to grow into it non-disruptively.

### Library Dimensions and Weights

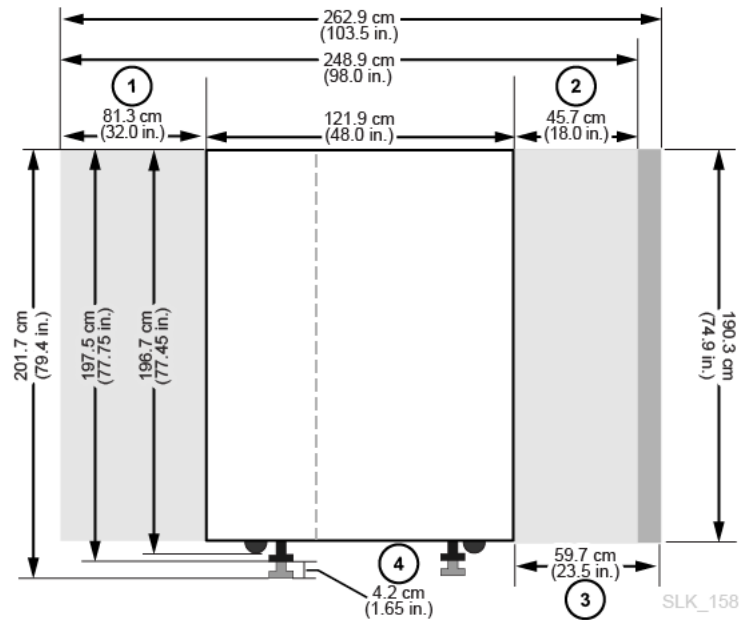
- [Base Module Measurements](#)
- [Drive Module Measurements](#)
- [Cartridge Module and Parking Module Measurements](#)
- [Access Module Measurements](#)

- Covers, Doors, and Service Clearances
- Shipping Weights and Dimensions

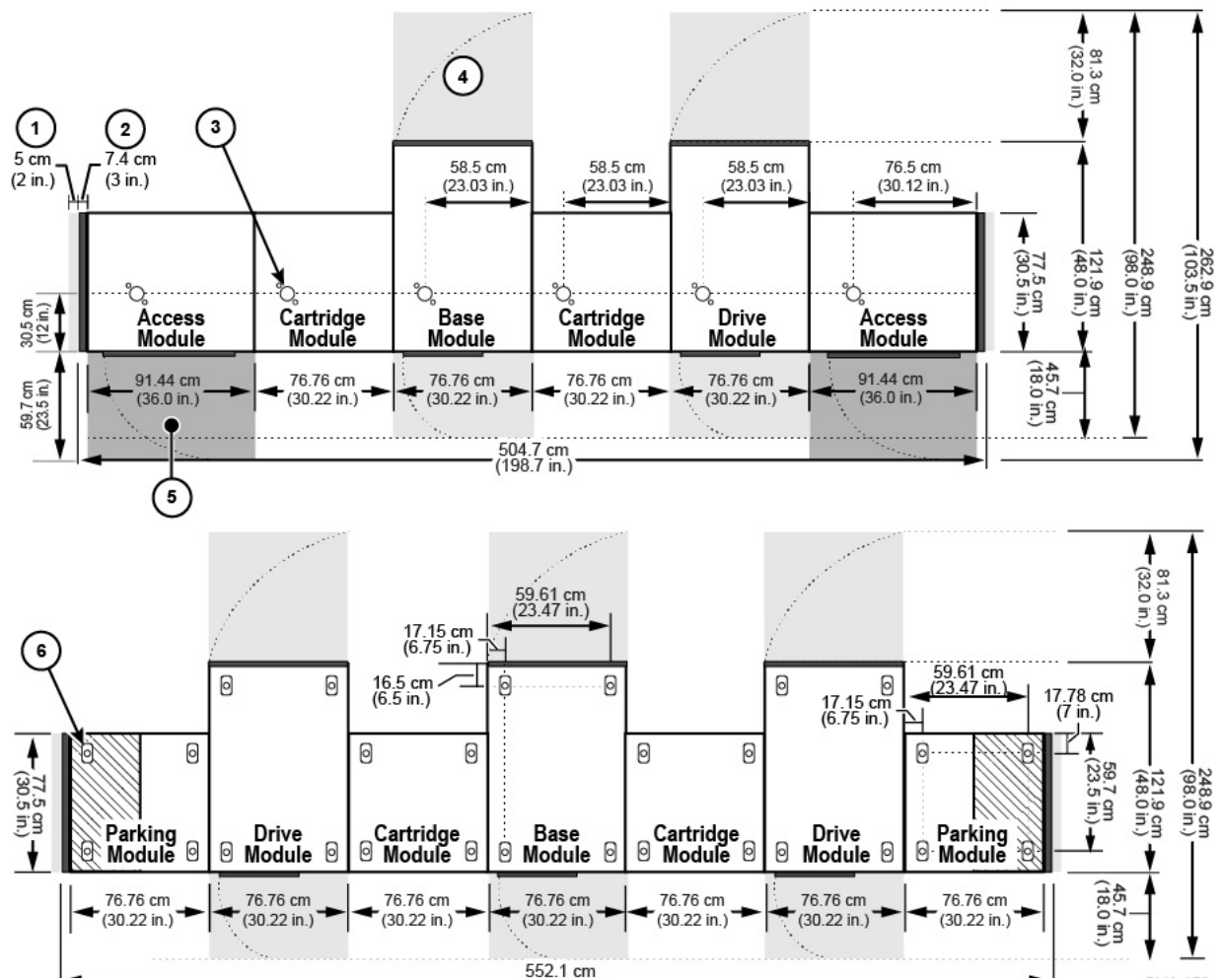
#### See Also

- "Library Modules Overview" on page 1-1

**Figure 2–1 Clearances and Dimensions (Side View of SL4000)**



1. Base and Drive Module rear service clearance
2. Base and Drive Module front service clearance
3. Access Module service clearance
4. Weight pad adjustment range

**Figure 2–2 Clearances and Dimensions (Overhead View of Example SL4000 Layouts)**

1. Side cooling area
2. Side cover
3. Nozzle cutout for fire suppression system
4. Base Module and Drive Module service clearance (light gray areas)
5. Access Module service clearance (dark gray areas)
6. Weight distribution pad

## Base Module Measurements

Dimension	Measurement
Height	196.7 cm (77.45 in.) on casters for transport
	197.5 cm (77.75 in.) to 201.68 cm (79.4 in.) on weight pads for permanent install
Width	76.8 cm (30.22 in.) when placed between modules
	81.3 cm (32 in.) transport width (no side covers) <sup>1</sup>
	91.5 cm (36 in.) standalone with side covers on both sides <sup>2</sup>
Depth	121.9 cm (48 in.)

Dimension	Measurement
Service Area	Front: 45.7 cm (18.0 in.) Rear: 81.3 cm (32.0 in.) Side Cooling Area: 5 cm (2 in.) Side Install Area: 45.7 cm (18.0 in.)
Weight	Frame only: 357 kg (786 lb) 8 drives and tapes: 618 kg (1362 lb) 16 drives and tapes: 656 kg (1447 lb) 24 drives and tapes: 682 kg (1504 lb) Side Covers: 18.5 kg (41 lb) per side

<sup>1</sup> 81.3 cm is the minimum transportation clearance because alignment tabs on each side of the module add 4.5 cm to the 76.8 cm width.

<sup>2</sup> One side cover adds 7.4 cm (2.9 in.) to the module width. Only the ends of the library require side covers.

## Drive Module Measurements

Dimension	Measurement
Height	196.7 cm (77.45 in.) on casters for transport: 197.5 cm (77.75 in.) to 201.68 cm (79.4 in.) on jack pads for permanent install
Width (module only)	76.8 cm (30.22 in.) when placed between modules 81.3 cm (32 in.) transport width (no side covers) <sup>1</sup> 83.8 cm (33 in.) with one side cover
Depth (doors closed)	121.9 cm (48 in.)
Service Area	Front: 45.7 cm (18.0 in.) Rear: 81.3 cm (32.0 in.) Side Cooling Area: 5 cm (2 in.) Side Install Area: 45.7 cm (18.0 in.)
Weight	Frame only, no CAP: 265 kg (584 lb) 8 drives and tapes: 540 kg (1190 lb), 582 kg (1284 lb) with CAP 16 drives and tapes: 596 kg (1314 lb), 621 kg (1369 lb) with CAP 24 drives and tapes: 647 kg (1426 lb), 660 kg (1456 lb) with CAP 32 drives and tapes: 709 kg (1564 lb), 723 kg (1594 lb) with CAP

<sup>1</sup> 81.3 cm is the minimum transportation clearance because alignment tabs on each side of the module add 4.5 cm to the 76.8 cm width.

## Cartridge Module and Parking Module Measurements

Dimension	Measurements
Height	196.7 cm (77.45 in.) on casters for transport 197.5 cm (77.75 in.) to 201.68 cm (79.4 in.) on jack pads for permanent install
Width (module only)	76.8 cm (30.22 in.) when placed between modules/side cover 81.3 cm (32 in.) transport width (no side covers) <sup>1</sup> 83.8 cm (33 in.) with one side cover
Depth	77.5 cm (30.5 in.)
Weight (Cartridge Module)	Frame only: 175 kg (385 lb) Installed, with tapes: 340 kg (749 lb)
Weight (Parking Module)	Frame only: 175 kg (385 lb) Installed, with tapes: 257 kg (567 lb)



<sup>1</sup> 81.3 cm is the minimum transportation clearance because alignment tabs on each side of the module add 4.5 cm to the 76.8 cm width.

## Access Module Measurements

Dimension	Measurement
Height	196.7 cm (77.45 in.) on casters for transport 197.5 cm (77.75 in.) to 201.68 cm (79.4 in.) on jack pads for permanent install
Width	91.4 cm (36.0 in.) when placed between module and side cover 96 cm (37.8 in) transport width (no side covers) <sup>1</sup> 99.1 cm (39 in.) with one side cover
Depth	77.5 cm (30.5 in.)
Service Area	Front: 59.7 cm (23.5 in.)
Weight	Frame only: 204.2 kg (450 lb)

<sup>1</sup> 96 cm is the minimum transportation clearance because alignment tabs on each side of the module add 4.5 cm to the 91.5 cm width.

## Covers, Doors, and Service Clearances

Dimension	Measurement
Height	190.3 cm (74.9 in.) frame only
Door thickness	Front: 1.9 cm (0.75 in.) Back: 4.5 cm (1.75 in.)
Door latches	2.53 cm (0.9 in.)
Service clearance	Front: 45.7 cm (18 in.) for Base and Drive Module only, 59.7 cm (23.5 in.) for Access Module Back: 81 cm (32 in.) for Base and Drive Module only Side: 5 cm (2 in.) for cooling, 45.7 cm (18.0 in.) for install
Side cover	7.4 cm (2.9 in.) width 18.5 kg (41 lb) each

## Shipping Weights and Dimensions

The SL4000 library modules and other components are shipped on pallets. The table below lists each module and its shipping specifications. If equipment on a pallet must be transported on elevators, the elevator cars must be capable of safely handling the weight.

Component	Height	Width	Depth	Weight
Base Module	213.3 cm (84 in.)	99 cm (39 in.)	159.3 cm (62.7 in.)	433 kg (954 lb)
Drive Module	213.3 cm (84 in.)	99 cm (39 in.)	159.3 cm (62.7 in.)	381 kg (839 lb)
Cartridge/Parking Module	215 cm (84.7 in.)	99 cm (39 in.)	100.7 cm (39.6 in.)	250 kg (552 lb)
Access Module	215 cm (84.7 in.)	113 cm (44.6 in.)	100.7 cm (39.6 in.)	290 kg (640 lb)
LTO drive tray	32 cm (12.6 in.)	31 cm (12.2 in.)	66 cm (26 in.)	9.5 kg (20.9 lbs)
T10000 drive tray	34 cm (13.4 in.)	31 cm (12.2 in.)	66 cm (26 in.)	10.5 kg (23.1 lbs)
Drive array	48.3 cm (19 in.)	65.5 cm (25.75 in.)	83.8 cm (33 in.)	24.5 kg (54 lbs)
CAP	32 cm (12.6 in.)	39.4 cm (15.5 in.)	135.4 cm (54.5 in.)	32.7 kg (72 lbs)

Component	Height	Width	Depth	Weight
Redundant robot	63.2 cm (24.9 in.)	46.7 cm (18.4 in.)	196.9 cm (77.5 in.)	35 kg (77 lbs)
PDU	41.3 cm (16.25 in.)	32.7 cm (12.9 in.)	44.7 cm (17.6 in.)	7.7 kg (17 lbs)
Power Supply	14 cm (5.5 in.)	29 cm (11.4 in.)	40 cm (15.7 in.)	4 kg (8.8 lbs)
Power Cord	10.2 cm (4 in.)	31.8 cm (12.5 in.)	31.8 cm (12.5 in.)	1.6 kg (3.5 lbs)

Pallets have a pallet-ramp design to provide safe removal of the module at the customer site. The modules have wheels to allow for easy positioning. Once positioned, the installer must raise the modules from their wheel-base to rest upon weight-plates for stability and leveling.

## Installation Site Requirements

- [Physical Space Requirements](#)
- [Floor Requirements](#)
- [Environmental Requirements](#)
- [Power Requirements](#)
- [Waste Disposal](#)

### Physical Space Requirements

The library requires adequate physical space and a service area. Ensure that the components can pass through doorways and fit in elevators (see "[Library Dimensions and Weights](#)" on page 2-1). If you plan on adding modules in the future, ensure there is enough space.

The suggested library adjustment height is 200 cm (77.6 in.). Ensure the top of the library does not interfere with ceiling fixtures at the installation site.

### Floor Requirements

You can install the library on a raised, solid, or carpeted floor if there is adequate airflow.

- Raised floor — ensure there are no ventilation panels directly below the library.
- Solid floor — route the cables from the ceiling to avoid creating a tripping hazard.
- Carpeted floor — ensure the carpet is approved for computer-room equipment and provides protection from electrostatic discharge (ESD).

#### Weight

Verify the site floor can support the weight of the library. It must support 454 kg (1,000 lb) per weight distribution pad. There are four distribution pads per module (see [Figure 2-2](#)).

If using an elevator to transport the equipment, verify it can safely handle the weight (see "[Shipping Weights and Dimensions](#)" on page 2-5).

#### Floor Slope

Robots must travel along a level plane throughout the library. Any excessive out-of-plane conditions could cause binding, premature wear, and damage to the

robots. The library weight pads adjust to account for minor slope. However, you should ensure that the floor does not have excessive slope before installation.

## Environmental Requirements

For optimal reliability, maintain the environment between the recommended ranges.

Description	Temperature	Relative Humidity (non-condensing)	Wet Bulb Maximum	Maximum Altitude
<i>Operating</i>	15 to 32°C (60 to 90°F) dry bulb	20% to 80% <sup>1</sup>	29.2°C (84.5°F)	3.05 km (10,000 ft)
<i>Storage</i>	10 to 40°C (50 to 104°F)	10% to 95%	35.0°C (95.0°F)	3.05 km (10,000 ft)
<i>Shipping</i>	-40 to 60°C (-40 to 140°F)	10% to 95%	35.0°C (95.0°F)	15.24 km (50,000 ft)

<sup>1</sup> Oracle recommends maintaining a relative humidity of 40% to 50%.

### Airborne Contaminants

Airborne particulates can damage tape libraries, drives, and tapes. The operating environment for the tape library must meet to the following requirements:

- ISO 14644-1 Class 8 Environment
- Total mass of airborne particulates must be less than or equal to 200 micrograms per cubic meter
- Severity level G1 per ANSI/ISA 71.04-1985

Particles ten microns or smaller are particularly harmful to most data processing hardware. Gasses that are particularly dangerous to electronic components include chlorine compounds, ammonia and its derivatives, oxides of sulfur, and petrol hydrocarbons. In the absence of appropriate hardware exposure limits, health exposure limits must be used.

Humidification with chlorinated water is a common source of airborne chlorine. Appropriately-designed carbon filters must be used to ensure safe levels of airborne chlorine when chlorinated water is used for humidification.

**Table 2–1 Gas Limit Recommendations**

Chemical	ASHRAE	OSHA (PEL)	ACGIH	NIOSH
Acetic Acid (CH <sub>3</sub> COOH)	Not defined	10 ppm	Not defined	Not defined
Ammonia (NH <sub>3</sub> )	3500 µg/m <sup>3</sup>	350 ppm	25 ppm	Not defined
Chlorine (Cl <sub>2</sub> )	2100 µg/m <sup>3</sup>	31 ppm (c)	Not defined	0.5 ppm (c)
Hydrogen Chloride (HCl)	Not defined	5 ppm (c)	Not defined	Not defined
Hydrogen Sulfide (H <sub>2</sub> S)	50 µg/m <sup>3</sup>	320 ppm (c)	10 ppm	10 ppm
Ozone (O <sub>3</sub> )	235 µg/m <sup>3</sup>	30.1 ppm	Not defined	Not defined
Petrol-hydrocarbons (C <sub>n</sub> H <sub>n</sub> )	Not defined	500 ppm	75 ppm	300 ppm
Sulfur Dioxide (SO <sub>2</sub> )	80 µg/m <sup>3</sup>	35 ppm	2 ppm	0.5 ppm (c)
Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> )	Not defined	1 ppm	Not defined	1 ppm (c)

Some basic precautions to follow:

- Do not allow food or drink into the data center.

- Do not store cardboard, wood, or packing materials in the data center clean area.
- Identify a separate area for unpacking new equipment from crates and boxes.
- Do not allow construction or drilling in the data center without first isolating sensitive equipment. Dry wall and gypsum are especially damaging to equipment.

### Seismic or Earthquake Ratings

The requirements for seismic compatibility vary dramatically throughout the world. Therefore, Oracle does not offer a standard "seismic" feature for the SL4000 library. If you have seismic concerns, Oracle recommends that you work with local experts who are familiar with the local code and requirements. Professional Services can also help coordinate this activity.

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**CAUTION:** You must consult a qualified seismic engineer to verify seismic zone exposures and adequate site preparation.

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For sites in areas of seismic activity, you might want to permanently fix the library position for added stability. The library has mounting holes in the floor of each module where you can use half-inch carriage bolts (mounting studs) to permanently fix the library's position.

### Power Requirements

See ["Power Configuration Overview"](#) on page 1-21.

### Waste Disposal

Plan for the disposal of all packing material. Determine if waste bins or recycling containers will be provided on site or whether an independent company will handle the disposal at additional cost.

### Fire Suppression Planning

The library does not ship with a fire suppression system, but each module has a 5 cm (2 inch) diameter circular nozzle opening (see [Figure 2-2](#)). To custom fit the nozzles, you can drill openings in the cover plates (each plate is 7 cm (2.75 inch) square and 1.2 mm (0.048 inch) thick). Professional Services can assist with fire suppression planning.

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**IMPORTANT:** Nozzles must remain clear of robotic operations and cannot protrude more than 1.9 cm (0.75 inches) into the library.

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You can connect the library to your Emergency Power Off (EPO) system using the connector in the Base Module safety controller card (see ["Safety Controller \(LON\)"](#) on page 1-11).

## Networking

Oracle recommends a dedicated and secure private network for communication between the library and host software. A secure private network connection using an Ethernet hub or switch is required for maximum throughput and minimum resource contention. Switches must be set to auto negotiate. Each external library port must be on a separate subnet. If network ports are on the same subnet, you will only be able to reach one port

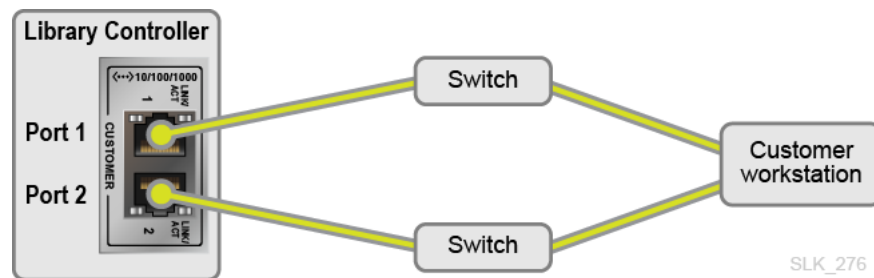
### Reserved IP Address Range

The library reserves IP addresses 192.168.0.0/11. Avoid using addresses in the range 192.168.0.0/11 for any external interface.

### Connect to Both Customer Ports on the Library Controller for Redundancy

If using dual TCP/IP, connect each customer port to a physically separate, non-stacked switch. Connecting both customer ports to a single physical switch or single logical switch may cause the customer network ports to stop functioning.

The following diagram shows an example configuration where the "customer workstation" could be a system running a browser to connect to the library GUI or a server running an application that directly uses the SCI interface to control the library.



### See Also

- ["Host Connectivity Options"](#) on page 1-27

## Cable Routing

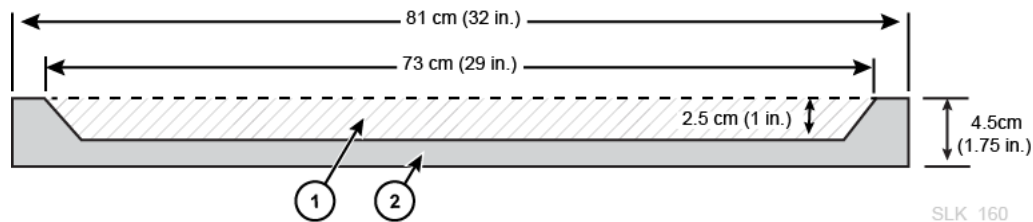
The top and bottom of the Base and Drive Module rear door have openings to allow for cable routing. The openings are 2.5 cm (1 inch) by 73 cm (29 inches).

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**Note:** The rear door has two square holes near the bottom on the face of the door. These are for access to the PDU on/off switch, not for cable routing.

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When routing cables, make sure to include locations for power, library control, and Ethernet cables. As a best practice, route power cables through one opening and signal cables through another opening.

**Figure 2-3 Door Cable Routing Opening**

1. Cable routing area
2. Overhead view of back door

## AC Power Cables

Make sure to plan for the locations of power cables and list the locations for their associated circuit breakers. Order appropriate cables for the power configuration (see ["AC Power Source Options"](#) on page 1-22).

## Library Network Cables

You can place the library in a 62.5-micron-cable Storage Area Network (SAN). However, the cable that connects the library to the network must be a 50-micron cable.

Maximum supported cable distance depends on the link speed, the type of fiber (50 or 62.5 micron), and the device the library is attached to. The typical distances are:

- 8 Gbps = up to 21 m (69 ft) for 62.5-micron, 50 m (164 ft) for 50-micron
- 4 Gbps = up to 70 m (230 ft) for 62.5-micron, 150 m (492 ft) for 50-micron
- 2 Gbps = up to 150 m (492 ft) for 62.5-micron, 300 m (984 ft) for 50-micron
- 1 Gbps = up to 175 m (574 ft) for 62.5-micron, 500 m (1640 ft) for 50-micron

If your library attaches to a host bus adapter (HBA), refer to the HBA's documentation for the supported cable distances.

## Approximate Installation Time

The times listed below do not include library initialization, testing, audits, and feature upgrades. Contact an Oracle sales representative for more information.

Module/Component	Time Estimate (hours)	Personnel Required	Total Person Hours
Base with 8 drives (standard)	3	2	6
Drive Module (each)	2	2	4
Cartridge Module (each)	2	2	4
Two Parking Modules	2	2	4
Access Module (each)	2	2	4
CAPs (each)	1	2	2
Tape drive (each drive)	0.5	1	0.5
Firmware	0.2	1	0.2
Integration (cables, hubs, switches, connections)	8	1	8
Tapes (each)	0.02	1	Varies

Module/Component	Time Estimate (hours)	Personnel Required	Total Person Hours
Software configuration	2 to 8	1	Varies

## Initial Configuration Wizard Information

Before powering on the library for the first time, gather the following library configuration information. You will need the following information to complete the initial configuration wizard of the library GUI.

- ☐ IPv4 or IPv6 information for the public port, service port, and OKM port (if using OKM). Each port must be on a different subnet.
  - For IPv4, determine the IP address, netmask, and gateway
  - For IPv6, determine the IP address, prefix length, and gateway
- ☐ HTTP (default 80) and HTTPS (default 443) listening ports
- ☐ Library time zone:
  - Determine if using UTC or regional
  - Determine if using NTP server or setting the time manually
- ☐ Library name
- ☐ Determine desired system cell label format (see ["Volume Label Format Options"](#) on page 5-5)
- ☐ OPTIONAL: DNS information for the library controller public port:
  - Domain name
  - Up to three DNS server addresses

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**Caution:** If using DNS, verify all DNS server information is correct and that the Customer Port has a valid link before configuration. Invalid DNS information can cause library startup to take 2 hours.

---

## Initial Configuration Steps After Physically Installing the Library

After physically installing the modules and tape drives, use the following list as a guideline for initial library configuration and connecting to SCSI host applications.

### What to do before a library power up or restart

- Connect Ethernet cables to the library controller Customer port, and optionally connect to the Service and OKM ports.
- Install the tape drives (if not already installed). Connect Fibre Channel cables to all drives. DO NOT connect Ethernet cables to individual drives. The drive IP network is internal to the library.
- If using FC-SCSI host applications, connect Fibre Channel cables to the library controller ports. Initially, only port 1 is fully active (see ["Behavior of an Unavailable Fibre Channel Port"](#) on page 10-2).

### What to do after the library powers up and completes initialization

- Verify the LINK light is active on the FC switches for the tape drives and the library controller connection. The library controller does not have FC link lights.

To verify the connection, you must check the FC switch or use the GUI (see ["Is the FC connection working? There is no LINK light."](#) on page 10-2).

- Install hardware activation files: redundant control path and tape capacity as appropriate (see ["Add or Remove Optional Library Features"](#) on page 5-5).
- OPTIONAL: Partition the library (see ["Partitioning the Library"](#) on page 9-1). Create CAP pools (["Manage CAP Pools"](#) on page 8-4). Create partitions and assign cells to partitions (["Move Storage Cells and Drive Bays to a Partition"](#) on page 9-3).
- Load tapes using the CAP (if not done before power up).
  - For shared CAPs, you must assign ownership to a partition before importing tapes (["Assign Ownership of a Shared CAP to a Partition"](#) on page 8-6)
  - Open the CAP, load tapes, and use the GUI to move the tapes out of the CAP (see ["Enter Tapes Through a CAP"](#) on page 8-2).

#### **How to remotely access the library's tape drives**

- You will need to configure a separate admin server to remotely access the drives. You will use this admin server for OKM drive enrollment, VOP 2.3.3 operations, IBM drive encryption firmware upgrades, and drive firmware upgrades.
- The SL4000 drive network differs from that of the SL3000, and therefore requires different routing. Refer to the OKM documentation for the OKM SL4000 setup information.
- After configuring the admin server, try pinging an SL4000 drive using the drive's IP address as found in the GUI (see ["IP Addressing of Drives"](#) on page 6-2).

#### **How to connect SCSI host applications to the library**

- Verify that the library and drive FC ports are logged into the FC switches. Zone the FC switch so that the drives and library robots will be available to host applications. At this point, the hosts should be able to see the drives.
- Verify the hosts appear in the GUI (see ["View Actively Logged-In SCSI Hosts"](#) on page 10-2). In the GUI, the World Wide Port Name (WWPN) is the WWPN of the host HBAs. Rename the hosts (["Add, Modify, or Delete a SCSI Host"](#) on page 10-1).
  - More "hosts" than expected may appear in the list. These are most likely FC switch ports. After identifying them, you may rename or ignore these "hosts".
- Assign partitions (see ["Assign Partitions to a SCSI Host and Alter LUN Assignment"](#) on page 9-5). Each host must have one and only one LUN 0 per host port.
- The host applications should now be able to see the robots.
- Configure the host applications. For example, install necessary patches to support the SL4000 library, setup the devices (paying attention to the drive order, which may be the SCSI addressing order), inventory the tapes, and so on.



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## Basic GUI Operations

### Contents

- [Log into the GUI](#)
- [Areas of the GUI](#)
- [Export a GUI Table to a Spreadsheet](#)
- [Search and Sort Tables](#)
- [Navigate the GUI with Keyboard](#)

### See Also

- ["Configuring User Login Setting"](#) on page 4-1

## Log into the GUI

You can access the GUI remotely with a browser, through the front touch screen, or through a keyboard and monitor connected to the Base module.

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**Note:** After five invalid attempts to log in, you will be locked out for 30 minutes. Contact the library administrator to unlock your account (see ["Unlock a User Account"](#) on page 4-5).

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### See Also

- ["Configuring User Login Setting"](#) on page 4-1

## Log in Remotely

1. Obtain the library host name or IP address. If not using the standard port numbers, obtain the port number from the library administrator.
2. In a browser, navigate to:

*<Hostname or IP address of the library>:<port>*

You only need the port number if not using the standard port numbers of 80 (http) or 433 (https). For example, if using the port 7102:

`MyLibrary.mycompany.com:7102`

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**Note:** If you receive an "HTTPS connection untrusted" warning, configure the browser to trust the user interface server by following the browser's on-screen instructions (see "[Manage the Library's SSL/TLS Certificate for HTTPS](#)" on page 5-11).

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3. On the log in screen, enter your user name and password. Click **Log In**.

### Supported Browsers

- Microsoft Edge 25.x
- Microsoft Internet Explorer 11
- Google Chrome 53+
- Mozilla Firefox 45+
- Apple Safari 8 and 9

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**Note:** There may be slight differences and anomalies in browser operation. If you are having issues, try a different browser.

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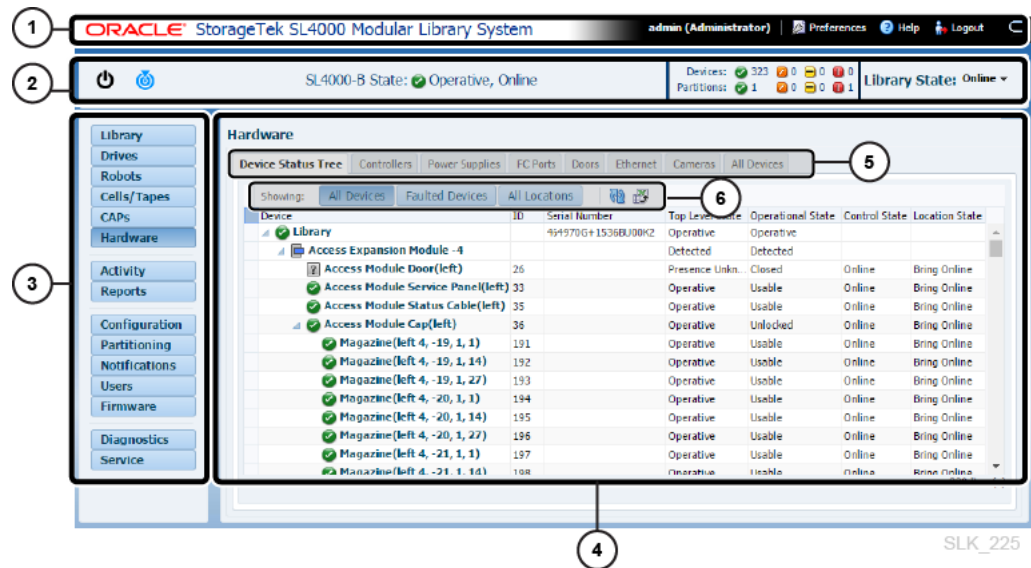
## Log in Locally at the Front Touch Screen of the Library

1. Touch the op panel screen to activate it. If nothing displays, the display is either set to the rear VGA port or a different controller. Press the SOURCE button (see "[Operator Panel](#)" on page 1-7 for a diagram) to set the controller source to the active library controller (L1).
2. On the log in screen, enter your user name and password. Click **Log In**.

## Log in Locally Using a Keyboard, Mouse, and Monitor

1. Connect a keyboard and mouse to the USB ports on the library controller in the Base card cage (see "[Library Controller \(LOC\)](#)" on page 1-9 for a diagram).
2. Connect a monitor to the VGA port on the video card in the Base card cage (see "[Video Card \(LOV\)](#)" on page 1-11 for a diagram).
3. Press the SELECT button on the video card to set the display to the VGA port (see "[Video Card \(LOV\)](#)" on page 1-11 for a diagram). Set the controller source to the active library controller (L1).
4. On the log in screen, enter your user name and password. Click **Log In**.


## Areas of the GUI



1. **Masthead** — Displays the current user and contains user preferences, help, and logout.
2. **Status bar** — Displays the current library, device, and partition state (see "[View the State of the Library, Devices, and Partitions in the Status Bar](#)" on page 11-1) and control over the state of the library (see "[Set the Library Online or Offline](#)" on page 11-10, "[Restart the Library or Reboot Library Operating System](#)" on page 11-10, and "[Turn Off the Library](#)" on page 11-10).
3. **Navigation** — Click to view different parts of the GUI. Depending upon the user's role, some of these buttons may not appear (see "[Available Functions for Each User Role](#)" on page A-1).
4. **Content area** — Changes depending on the navigation and tab selected.
5. **Tabs** — Displays different content for the current page.
6. **Action buttons** — Performs various GUI tasks (such as Add a Partition, Refresh, and so on). Hover over the icons to display tool tips.

## Export a GUI Table to a Spreadsheet

You can export an .xls file for any of the tables found in the GUI.

1. Navigate to the table.
2. Click **Export** .
3. Save the file to the desired location.
4. Open the file in a spreadsheet application (such as Microsoft Excel).

**Note:** The extension of the file is .xls, but the format is html. When opening the file in a spreadsheet program, you may be required to verify that the file is not corrupt and from a trusted source.



5. You may need to change the format of any Date/Time columns. If using Excel, select the columns. Select Format Cell, Custom, and then enter the format, such as mm/dd/yy hh:mm:ss.0;@.

If you select Format Cell, Date, and select a date type like MM/DD/YY HH:MM, then time will be rounded to the nearest minute.

## Search and Sort Tables

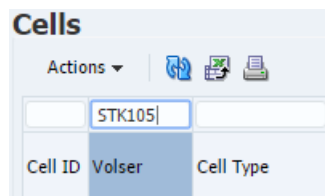
You can search and sort the tables in the GUI. If you need additional sorting capabilities, you can export the table as a spreadsheet (see ["Export a GUI Table to a Spreadsheet"](#) on page 3-3).

### Sort a Table

1. Hover over a column title.
2. Click the up or down arrows   to sort the column.

### Search in a Table Using Filters

1. Click in the white search bar above a column title.





2. Enter a search value. The value must match exactly (not case sensitive), or you can use a search operator:
  - > (greater than) and < (less than) — valid for numeric fields or strings with values. For example Media Type: <LtoGen6 or Date/Time: >2017-06-16 (YYYY-MM-DD must be specified fully, therefore >2017-06 would not work).
  - ! (not equal to) — such as !Complete or !DefaultPartition
  - \* (wildcard) — For example, Z\* matches all rows starting with the letter Z.
    - Wildcard is valid for text fields only, not valid for numeric or date fields.
    - Only use one wildcard per filter. Do not use with any other search operator.
  - For numeric fields, do not use a comma in your search (for example, use 5280 instead of 5,280).
  - Null values will never match any filter.

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**Note:** The search is not case sensitive and you can only use one search operator at a time, so !Default\* (which uses two operators) will return no results.

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3. Press **Enter** or click **Refresh** .
4. To remove the filter: Delete the text, and then press **Enter** or click **Refresh** .

### Multi-column Filtering Example

You can enter search items into multiple columns to further limit the results. For example, if you wanted to locate all cleaning and diagnostic LTO tapes in the Tapes table, you could search for **LTO\*** for media type and **!Data** for medium type.

	LTO*	!Data						
Volser	Media Type	Medium Type	Cell ID	Cell Type	Module	Col	Side	Row
CLNU05	LtoUniv_Cleaning	Cleaning	101	System	Drive (Left 1)	-1	Back	50
CLNU00	LtoUniv_Cleaning	Cleaning	450	Storage	Cartridge (Left 2)	-11	Back	7
DG 503	LtoGen5_1500GB	Diagnostic	511	Storage	Cartridge (Left 2)	-12	Back	16

## Navigate the GUI with Keyboard

For accessibility purposes, you can use the following keyboard actions to navigate the GUI.

- **Tab traversal** — All active elements of the page are accessible by tab traversal. Use the **Tab** key to move to the next control and **Shift+Tab** to move to the previous control. In most cases, when a control has focus, you can initiate the action by pressing **Enter**.
- **Arrow keys** — Some complex components use arrow keys to navigate after the component receives focus using the **Tab** key.

### See Also

- ["Set Accessibility Options"](#) on page 4-3



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## Configuring User Login Setting

### Individual User Tasks:

- [Change Your Password](#)
- [Add a Recovery Email Address to Your User Id](#)
- [Recover a Forgotten Password](#)
- [Set Accessibility Options](#)
- [Set the Session Timeout](#)
- [Set the Initial Page to Display After Login](#)
- [Display the Library's Current Date and Time in the Status Bar](#)
- [Display Dates and Times in UTC](#)
- [Restore Hidden Warnings and Confirmation Prompts](#)

### Administrator Tasks:

- [Add, Modify, or Delete a User](#)
- [Change the Password of Another User](#)

### See Also

- ["User Roles"](#) on page A-1

## Change Your Password

This procedure assumes that you can successfully login to the GUI. If you have forgotten your password, see ["Recover a Forgotten Password"](#) on page 4-2.

1. Click **Preferences** in the upper right corner of the GUI, and then select **Reset Password**.
2. Enter a new password.

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**Note:** Your password must be at least 8 characters long and contain a mix of letters and numbers.

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## Change the Password of Another User

With the Administrator role you can change the password of other users. See ["Add, Modify, or Delete a User"](#) on page 4-4.

## Add a Recovery Email Address to Your User Id

You can associate an email address with your user ID if you need to reset your password. However, resetting your password through email will only work if the SMTP server is configured on the library and email activity is enabled (see "[Configure Email Notifications](#)" on page 12-2).

1. Click **Preferences** in the upper right corner of the GUI.
2. Select **User Preferences**.
3. Enter the email address to use to recover a forgotten password.

### See Also

- "[Recover a Forgotten Password](#)" on page 4-2

## Recover a Forgotten Password

### OPTION 1 — Contact the library's Administrator user to reset your password

Library administrators can refer to "[Add, Modify, or Delete a User](#)" on page 4-4 for procedures.

### OPTION 2 — Generate a recovery email

You can only use this option if the SMTP server is configured (see "[Configure Email Notifications](#)" on page 12-2) and a recovery email address is associated with your user ID ("[Add a Recovery Email Address to Your User Id](#)" on page 4-2). The password reset email expires after 2 hours.

1. Navigate to the GUI login screen, and then click **Forgot Password**.
2. Click **Generate Recovery Email**. If this button is not displayed, email notifications are disabled for the library. Use one of the other two options to recover your password.
3. Enter your email address. If the email is associated with a user ID, the library will send a recovery email.
4. Follow the instructions in the recovery email. Enter your new password, and click **Save**.

### OPTION 3 — Download Service User Key and Contact Oracle Support

1. Navigate to the GUI login screen, and then click **Forgot Password**.
2. Click **Download service user key file**.
3. Send the key file to Oracle.

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**Note:** The key file is encrypted. Oracle then decrypts the file to get an Administrator user ID and password to login to the library. Oracle personnel can refer to the *SL4000 Installation and Service Guide* for procedures.

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4. Oracle support will login to the library and reset your password.



## Set Accessibility Options

The first time you log in to the GUI, it will prompt you to set the accessibility options (this prompt remains each time you login until you select "Do not show these options"). However, you can change the settings at anytime:

1. Click **Preferences** in the upper right corner of the GUI.
2. Select **Accessibility Settings**
3. Select accessibility settings:
  - **Screen reader** - If you are using a screen reader to interface with the GUI, select this option. The GUI generates components that have rich user interface interaction and are accessible through the keyboard.
  - **High contrast** - The GUI generates high-contrast-friendly visual content. High-contrast mode is designed for use with operating systems or browsers that have high-contrast features enabled.
  - **Large-fonts** - The GUI generates browser zoom-friendly content.

### See Also

- ["Navigate the GUI with Keyboard"](#) on page 3-5

## Set the Session Timeout

The GUI session will time out after a period of inactivity. The default timeout is 60 minutes.

1. Click **Preferences** in the upper right corner of the GUI.
2. Select **User Preferences**.
3. Enter the session timeout in minutes between 20 and 1440 (24 hours).

## Set the Initial Page to Display After Login

1. Click **Preferences** in the upper right corner of the GUI.
2. Select **User Preferences**.
3. Select a start page from the drop-down list.

---

---

**Note:** If there are multiple tabs on the page, you cannot select a specific tab to display. Only the first tab will display upon login.

---

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## Display the Library's Current Date and Time in the Status Bar

You can display the library's current date and time in the GUI status bar, beneath the library status indicator. This may be helpful when viewing requests, jobs, system reports, and so on. The status bar displays the time in both local and UTC. However, if you have chosen to display times in UTC, then the status bar only displays UTC time (see ["Display Dates and Times in UTC"](#) on page 4-4).

1. Click **Preferences** in the upper right corner of the GUI.
2. Select **User Preferences**.
3. Select **Show Time in Status Area**.

## Display Dates and Times in UTC

You can display all dates and times throughout the GUI in Universal Coordinated Time (UTC). This only affects the date and times displayed for the individual user. It does not change the library date and time configuration settings.

1. Click **Preferences** in the upper right corner of the GUI.
2. Select **User Preferences**.
3. Select **Display dates and times in UTC**.

### See Also

- ["Date and Time Configuration Options"](#) on page 5-3

## Restore Hidden Warnings and Confirmation Prompts

As you encounter pop-up warnings, you can select to not show the warning again. However, to show the prompts again you can restore the hidden warnings at any time.

1. Click **Preferences** in the upper right corner of the GUI.
2. Select **User Preferences**.
3. Select **Reset all warning prompts**.

## Add, Modify, or Delete a User





---

---

**Note:** Only the Administrator role can manage users.

---

---

1. Click **Users** in the left navigation area of the GUI.
2. Click **Add User** , or select a user and then click **Change Role** , **Change Password** , or **Delete** .

---

---

**Note:** You can only assign the Administrator, User, Operator, or Viewer roles (see ["User Roles"](#) on page A-1). Service roles are only created when the library requires maintenance (see ["Add a Service User"](#) below).


---


---

3. For each user, you can optionally add a recovery email address. If the SMTP server is configured on the library, this will allow the user to recover a forgotten password (see ["Recover a Forgotten Password"](#) on page 4-2).

## Add a Service User

If Oracle service personnel need to access the library for maintenance, the Administrator can create a service user and provide Oracle with the key file. All service users expire 72 hours after creation.

1. Click **Users** in the left navigation area of the GUI.
2. Click **Create Service User** .
3. Select the role as directed by Oracle (for a description of each role see ["User Roles"](#) on page A-1).

4. Select the service user in the list, and then click **Download Service User Key File** .
5. Send the key file to Oracle.

---


**Note:** The key file is encrypted. Oracle then decrypts the file to get the user ID and password to login to the library. Oracle service personnel can refer to the *SL4000 Installation and Service Guide* for procedures.

---

#### See Also

- ["Log In As a Service User"](#) on page 15-1

## Unlock a User Account

After five invalid login attempts, the system will lock the user out for 30 minutes. The Administrator role can unlock an account by going to the **Users** screen, selecting the user, and clicking **Unlock User(s)** .



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## Configuring the Library

### Contents

- [Configure the Library with the Configuration Wizard](#)
- [View the Library Configuration Properties](#)
- [Add or Remove Optional Library Features](#)
- [View the History of Feature Activation Activity](#)
- [Import or Export the Library Configuration](#)
- [Upload and Manage Library Firmware](#)
- [Manage the Library's SSL/TLS Certificate for HTTPS](#)
- [Default Port Numbers](#)

### See Also

- ["Managing the SCSI Host Connection" on page 10-1](#)
- ["Partitioning the Library" on page 9-1](#)
- ["Configuring Notifications - Email, SNMP, SCI, or ASR" on page 12-1](#)
- ["Logging" on page 14-1](#)
- ["Configure Drive Auto Cleaning" on page 6-4](#)


## Configure the Library with the Configuration Wizard

---

**IMPORTANT:** Network and time configuration changes require you to restart the library. You must restart the library immediately for time changes to take effect.

---

Use the configuration wizard to configure network settings, time settings, and library settings.

1. Click **Configuration** in the left navigation area of the GUI.
2. From the Settings tab, click **Configure** .
3. Select the options you want to configure, click **Next**. Follow the wizard instructions.
  - See ["Configure the Public Network, Service Network, or OKM Ports" on page 5-2](#)

- See ["Date and Time Configuration Options"](#) on page 5-3
- See ["Library Settings Options"](#) on page 5-3

---

**Caution:** If using DNS, verify all DNS server information is correct and that the Customer Port has a valid link before applying the configuration. Invalid DNS information can cause library startup to take 2 hours.

---

4. Select **Accept Changes**. Click **Apply**.

## Configure the Public Network, Service Network, or OKM Ports

---

**Note:** Each port must be on a separate subnet. If network ports are on the same subnet, you will only be able to reach one port.

---

In the configuration wizard, you can enter applicable IPv4 or IPv6 information for each port. For the physical location of the customer and service port, see ["Library Controller \(LOC\)"](#) on page 1-9. For the physical location of the OKM port, see ["Root Switch \(LOER\)"](#) on page 1-11.

- **Public Network Port (Customer Port)** — IP information is required. DNS information is optional, but all DNS information must be valid before applying the configuration. Incorrect DNS information or unreachable DNS servers, will cause the library startup to take up to 2 hours.
- **Service Network Port** — IP address and netmask information is required. Gateway information is optional. You can accept the default information.
- **Oracle Key Manager Port** — IP information is optional. You can select **Port Disabled**, which will unconfigure and take down the port.

Each installed network port has its own configuration step in the configuration wizard. You must proceed through each port one screen at a time. For example, to configure only the OKM port, click **Next** to bypass the public and service port pages. There is no way to start at the OKM port page.

### Select the Library Interface to Use for OKM

The drives in the library can communicate with an Oracle Key Manager (OKM) cluster over any of the three external interfaces on the library (Public, Service, OKM). Oracle recommends that you use the OKM interface. The OKM appliance and the SL4000 interface must be on the same subnet.

Use the configuration wizard to select which library interface to use for OKM (see ["Configure the Library with the Configuration Wizard"](#) on page 5-1). Select **Configure Network Settings** and click **Next** until you reach the **Choose OKM Interface** page. Select the network interface and accept the changes. The library will need to restart.

After configuring the OKM interface on the SL4000, you will need to modify the gateway settings of the OKM appliance. For more information, see the OKM documentation.

### See Also

- ["Oracle Key Manager \(OKM\) Ports"](#) on page 5-13

- ["IP Addressing of Drives"](#) on page 6-2

## Date and Time Configuration Options

Set the library date and time using the configuration wizard (see ["Configure the Library with the Configuration Wizard"](#) on page 5-1). You must restart the library immediately for the time changes to take effect.

- **Library Time Zone** - Select the geographic time zone where the library resides. Internally the library always runs on UTC (coordinated universal time), but the library uses the "Library Time Zone" parameter to adjust the times displayed at the local operator panel. For browser connections, the GUI automatically adjusts the time to the local time of the browser.
- **Configure Date and Time** - Select an option from the drop-down menu: "Using Network Time Protocol" and then enter the address of up to five Network Time Protocol (NTP) servers. Or, select "Manually" and then, enter the time using the same time zone as the library time zone. The library will adjust its internal clock to UTC based on the library time zone parameter selected above.

### See Also

- Individual users can choose to display the dates and times in UTC — ["Display Dates and Times in UTC"](#) on page 4-4

## Library Settings Options

You select library settings when powering down (see ["Turn Off the Library"](#) on page 11-10) or configuring the library (see ["Configure the Library with the Configuration Wizard"](#) on page 5-1).

- **Library Partitioning Active** - Selecting this option enables partitioning in the library (see ["Partitioning the Library"](#) on page 9-1). You no longer need a hardware activation file to enable partitioning.
- **Bypass audit if door opened with power off** – Normally, if a door opens while the library is off, the library will run a full audit when it resumes operation. However, if you plan to enter the library while it is off, but will not move any tape cartridges, then you can enable this option to bypass the full audit. This is also known as "suppress HBO" (suppress Has Been Opened). Only select this option if you are not going to add, remove, or move any tapes or drive trays.
- **Probe for physical configuration changes upon next restart** - The robot will scan the module identification blocks during startup and perform a full audit. You must select this option when modifying the physical configuration (see also ["What Occurs to Partitions When the Physical Configuration Changes"](#) on page 5-4).

The probe only occurs on the initial restart after you select this option. Then, this option resets, so that subsequent restarts will not probe for configuration changes.

*Physical configuration changes include:*

- Adding or removing modules, rotational CAPs, or drive arrays.
- Converting a Cartridge Module into a Parking Module or vice versa.

*Physical configuration changes do not include:*

- Adding, removing, or moving tape cartridges or drive trays.
- Adding or removing robots or controller cards.

- **Enable redundant electronics** – Enables redundant electronics (RE) (feature not available at initial release). If you enable RE with only one controller installed, the library will assume the absent standby controller has failed. This will result in a fault for the missing controller. The library will remain in a "Degraded" state until you install the second controller.
- **System Cell Volume Label Format** – Controls the presentation of system cell volumes (see "[Volume Label Format Options](#)" on page 5-5). To change the label format of tapes in storage cells, you must change the partition attributes (see "[Partition Attributes](#)" on page 9-2).
- **Park Robot(s)** - The robots move to the ends of the library, into the service area of the Parking Module or Access Module. This option is only available when you power down the library from the GUI status bar.
- **IPv4 HTTP Listening Port** - Default is 80. Valid custom values are 10000-22000. IPv6 HTTP listens only on port 7102.
- **IPv4HTTPS Listening Port** - Default is 443. Valid custom values are 10000-22000. IPv6 HTTPS listens only on port 7103.

### What Occurs to Partitions When the Physical Configuration Changes

In a partitioned library, changing the physical configuration causes the library to:

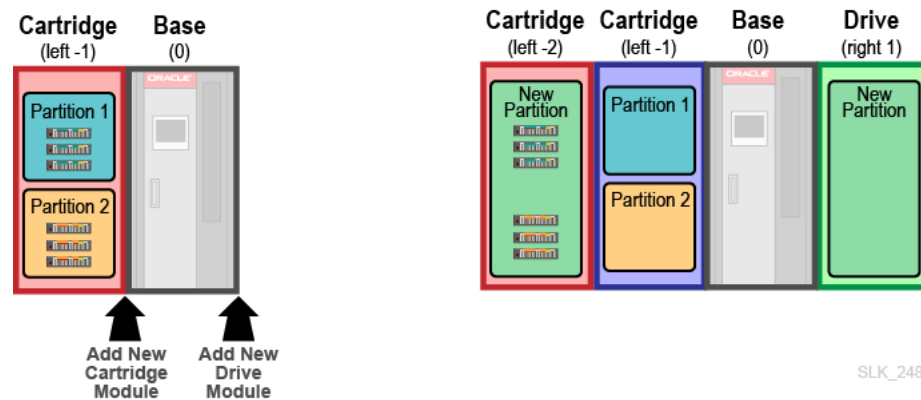
- Remove storage cells and drive bays that no longer exist from the partition they were in.
- Remove CAPs that no longer exist from the CAP pool they were in.
- Place new storage cells and drive bays into a newly created partition (the library does not assign a CAP pool or SCSI hosts to this new partition).
- Place new CAPs into a newly created CAP pool (the library does not assign this CAP pool to a partition).

The library will assume that all configuration changes occur at the ends of the library, even if you add a module to the middle. For example:

- **Initial configuration** — Cartridge (left -1), Base (0)
- **New configuration** — Cartridge (left -2), *new Cartridge (left -1)*, Base (0), *new Drive (right 1)*

Even though you install the new Cartridge Module between the old Cartridge Module and Base Module, the library assumes that the old Cartridge Module (now left -2) is the new module, since it is closer to the end. The library places cells in Cartridge (left -2) into a new partition. The library partitions the newly added Cartridge (left -1) the same as before. The library assumes that the Drive Module is new, so it places all storage cells and drive bays into the new partition.



**Figure 5–1 Example Configuration Change with Partitioning**

SLK\_248

## Volume Label Format Options

You can select the system cell volume format when configuring the library settings (see ["Library Settings Options"](#) on page 5-3) and the storage cell volume format when defining a partition (see ["Partition Attributes"](#) on page 9-2). The volume format controls how the library presents the volser to external applications and within the GUI tables. For the examples listed below, the tape barcode is "STA015L4".

- **Prepend Last Two Characters** - Moves the last two characters of the barcode to the front. For example, "L4STA015".
- **Full Label** - Presents the full eight-character label, also known as the raw label. For example, "STA015L4".
- **Trim Last Character** - Removes the last character of the barcode. For example, "STA015L".
- **Trim Last Two Characters** (default) - Removes the last two characters of the barcode. For example, "STA015".
- **Trim First Character** - Removes the first character of the barcode. For example, "TA015L4".
- **Trim First Two Characters** - Removes the first two characters of the barcode. For example, "A015L4".

## View the Library Configuration Properties

Click **Library** in the left navigation area of the GUI. The page displays library properties, such as library name, model, serial number, state, cell counts, and disk usage. For more information on a total tape count warning, see ["How to Fix a Tape Count Warning"](#) on page 5-6.

You can also view the library properties by clicking **Hardware** in the left navigation area. Then select **All Devices** on the Device Status tab. Right click **Library**, and select **Properties**.

## Add or Remove Optional Library Features



Hardware activation files are .jar files that enable library features such as activated tape capacity or redundant control path (multi-port) networking. After purchasing a feature, you must download the hardware activation file and then upload it to the library before you can use the feature.

## Download a Hardware Activation File

1. Go to the Oracle Software Delivery Cloud at:  
<http://edelivery.oracle.com/>
2. Click **Sign In /Register**.
3. Read the terms and restrictions. Indicate your acceptance.
4. Search for SL4000, and then select the hardware activation file. Click **Select Platform**.
5. Select **GENERIC (All Platforms)**, and then click **Select**.
6. Verify the correct hardware activation file is listed under Selected Products, and then click **Continue**.
7. Select the available release. Click **Continue**.
8. Read the terms and restrictions. Indicate your acceptance, and then click **Continue**.
9. Save the zip file, and then extract it to a location accessible to the GUI browser.

## Upload or Delete Hardware Activation Files on the Library

You cannot upload hardware activation files through the local operator panel. You must upload using a remote connection.


1. Click **Configuration** in the left navigation area of the GUI.
2. Click the **Features** tab.
3. To add a feature: click **Upload** , and browse to the activation file (.jar).  
To remove a feature: select the feature in the table, and then click **Delete** .

### See Also

- ["View the History of Feature Activation Activity"](#) on page 5-7

## What Occurs When You Delete a Feature Activation File


### Deleting a Capacity Activation File


After deleting a capacity activation file, the activated tape capacity decreases by the capacity of the activation file. If there are more tapes in the library than remaining activated capacity, a Storage Cells alert  will appear on the Library page (see ["View the State of the Library, Devices, and Partitions in the Status Bar"](#) on page 11-1). To correct this, either eject tapes or re-install a capacity activation file (see ["How to Fix a Tape Count Warning"](#) on page 5-6).

### Deleting the Multiport FC or Dual TCP/IP Activation File

After deleting the Multiport FC activation file, the library powers off the unavailable FC ports, which are port 2 and port 4 (for a library with a second library controller card).

## How to Fix a Tape Count Warning


**Total Tape Count:**  **185 tape(s) in 100 activated cells**

If the library contains more tapes than the activated capacity, a warning  displays on the Library page. The library will continue to function normally, however, it is illegal to use unactivated capacity. Either eject tapes or purchase and install another capacity activation file (see ["Add or Remove Optional Library Features"](#) on page 5-5).

Capacity activation files determine the number of tapes allowed in the library. For example, if you install a 100 capacity activation file and a 200 capacity activation file, the library has a activated capacity of 300 and can legally store a maximum of 300 tapes. Tapes in system cells do not count toward licenced capacity.

## View the History of Feature Activation Activity

You can view a list of when and who installed or removed activation files.

1. Click **Configuration** in the left navigation area of the GUI.
2. Click the **Features** tab.
3. Click **Feature History** .


### See Also

- ["Add or Remove Optional Library Features"](#) on page 5-5

## Import or Export the Library Configuration

You can export or import a library configuration .xml file. You can use the file to clone the configuration of one library to another library with the same module configuration, or restore the configuration of an existing library. Oracle recommends exporting the configuration after any major configuration changes and saving the file in a safe location in case of a failure.

### Export a Library Configuration File

1. Click **Configuration** in the left navigation area of the GUI.
2. From the Settings tab, click **Import/Export Configuration** .
3. Select **Export Configuration to File**. If changes are made in another window or by another user after you click export, the changes will not be contained in the export file.
4. Download the file.

### What is Exported in the Configuration File

- Library settings
- Hardware activation files
- Network settings
- NTP settings
- GUI usernames and preferences
- Partition configuration and mapping
- CAP pool configuration and mapping
- SCSI host configuration and partition mapping
- Notification destinations

- Notification users and passwords (SNMP and SCI)
- ASR settings
- Logging levels

### What is NOT Exported in the Configuration File

- GUI user passwords


## Import a Library Configuration File

The library you are importing to must have the same module configuration as the library in the configuration file.

---

**CAUTION:** Importing a configuration file is disruptive and replaces the current settings with the values in the configuration file. The library must restart.

---

1. Stop all library activity.
2. If importing partitioning information, complete the checklist in ["What to Check Before Importing a Configuration with Partition Information"](#) on page 5-9 below.
3. Click **Configuration** in the left navigation area of the GUI.
4. From the Settings tab, click **Import/Export Configuration** .
5. Select **Import Configuration from File**.
6. Browse to the libraryConfigSettings.xml file.
7. Review the configuration (the library will require a restart to apply the configuration). Click **Apply**.
8. After a clone, perform the following actions:
  - **Network Settings:** On a clone, the duplicated network configuration will conflict with the network configuration of the original library. To avoid network conflict, after the configuration import, you should unplug the library controller customer port Ethernet cable. You will then need to manually change the network settings of the cloned library locally at the op panel or through an attached monitor, keyboard, and mouse.
  - **Library Settings:** Create a unique library name and verify the time settings. Run through the complete Library Configuration Wizard to update the settings (see ["Configure the Library with the Configuration Wizard"](#) on page 5-1).
  - **SCSI Host Configuration:** Review and update the SCSI host and SCSI host mapping.
  - **Partitioning and CAP Pool Configuration:** Review and update partitioning and CAP pools.
9. After either a clone or restore, perform the following actions:
  - **User Passwords:** The configuration file does not transfer GUI user passwords. The administrator that performed the configuration import must create a temporary password and notify each user to reset their passwords.

- **Notification Settings:** Verify the notification settings (email, SNMP, SCI, ASR) are still valid and test each of the notification types to confirm connectivity.

### What to Check Before Importing a Configuration with Partition Information

Importing partition mapping can result in tapes being "owned" by an unintended partition, unless you verify the following:

- ❑ Verify all drives, CAPs, and robots are fully initialized.
  - a. If the library state is "Operative" the library hardware is in a good state to continue.
  - b. If the library state is not "Operative", scan the **Hardware Device Status** tree to for failed components. Verify the issue will not impact the Import Configuration Partition Mapping.
- ❑ Close all CAPs.
  - a. Click **CAPs**. Verify the "Physical State" of all CAPs is "Closed".
  - b. To close a CAP, see "[Open or Close a CAP Using the GUI](#)" on page 8-2.
- ❑ Move all tapes out of CAP or Drive cells:
  - a. Click **Cells/Tapes**. From the **Tapes** tab, filter for **!Storage** in the Cell Type column.
  - b. Verify that the list shows only System cells. Move any tapes out of CAP or Drive cells.

## Upload and Manage Library Firmware

You can upload new firmware, activate new firmware, or revert to an older version.

---

**CAUTION:** Changing the library firmware is disruptive and can take up to 20 minutes. You will be logged out of the GUI, and will not be able to log in or use the library until the activation completes. Activating new firmware resets the library time to UTC time. You may need to reconfigure the library time.

---

### Download Firmware from My Oracle Support

1. Go to My Oracle Support (MOS): <https://support.oracle.com/>
2. Sign in to your MOS account.
3. Click the **Patches & Updates** tab near the top of the screen.
4. In the Patch Search section under the Search tab, click **Product or Family (Advanced)**.
5. In the Product field, enter **SL4000** and then select **StorageTek SL4000 Modular Library System** from the drop-down list.
6. In the Release field, select the firmware version.
7. Click **Search**.
8. Click the link under Patch Name column.

9. Click **Download** and save the file to a location on your system. Unzip the downloaded file. The unzipped folder should contain files similar to the ones listed below:
  - `summit-1.0.0.65.27052.tar`
  - `ReleaseNotes1.0.0.65.27052.pdf`
  - `LicenseAgreement.txt`
10. Verify the integrity of the firmware file using the md5 checksum file (`summit-1.0.0.65.27052.tar.md5`).
  - *For Linux:* Use the command `md5sum -c summit-1.0.0.65.27052.tar.md5` in the directory containing the unzipped files.
  - *For Windows:* Use a third party tool such as WinMD5 or the file checksum integrity verifier Windows-KB841290-x86-ENU.exe (available from <https://www.microsoft.com/en-us/download/details.aspx?id=11533>).

## Upload and Activate New Firmware

Before uploading, download the firmware to a location accessible to your browser (see "[Download Firmware from My Oracle Support](#)" on page 5-9). You can only upload firmware when connected remotely. You cannot upload firmware from the front touch screen or if connected using a monitor and keyboard attached to the back of the library.

1. You should export the library configuration before activating new code (see "[Export a Library Configuration File](#)" on page 5-7). If you need to revert to a previous version of code, the library configuration does not transfer.
2. Click **Firmware** in the left navigation area of the GUI.
3. Click the **Library Firmware** tab.
4. Click **Upload**.
5. Click **Choose File** and then browse to the firmware .tar file that you downloaded previously (such as `summit-1.0.0.65.27052.tar`). Click **Open**, and then click **Upload**.
6. Once the upload completes, click **OK**.
7. Click **Activate**. Activating code will reset the library time to UTC. Confirm the activation.

## Revert to the Previous Firmware Version

1. Export the library configuration (see "[Export a Library Configuration File](#)" on page 5-7). Reverting to a previous version of firmware erases the library configuration.
2. Click **Firmware** in the left navigation area of the GUI.
3. Click the **Library Firmware** tab.
4. Click **Revert**. Confirm the activation.
5. Import the library configuration (see "[Import a Library Configuration File](#)" on page 5-8).

### See Also

- "[View Library Firmware](#)" on page 11-6


- ["Block, Allow, or Force Device Firmware Upgrades"](#) on page 15-10

## Manage the Library's SSL/TLS Certificate for HTTPS

A certificate encrypts SSL/TLS traffic to and from the library. At initial installation, the library has a default certificate. At a minimum, you should replace the default certificate with a new self-signed certificate. Then, optionally, you can installed a certificate signed by a certifying authority (CA). See the *SL4000 Security Guide* for more information.

### Generate a Self-Signed Certificate


A self-signed certificate is secure, but will require you to manually tell the browser to trust the certificate before you can view the login screen. To eliminate this browser security exception, you can install a certificate signed by a certifying authority (CA) (see ["Install a Third-Party Signed Certificate"](#) on page 5-11).

1. Click **Configuration** in the left navigation area of the GUI.
2. Click the **Certificate** tab, and then click **New Certificate** .
3. Enter in the certificate information.

### Install a Third-Party Signed Certificate

The library must have a self-signed certificate before you can install a third-party signed certificate. You cannot go directly from the default certificate to a third-party certificate. Installing a third-party certificate is a multistep process of submitting a certificate signing request (CSR) to the CA, obtaining the certificate from the CA, combining the certificates into a single file, and then importing the certificate file to the library.

#### Task 1 Export CSR File

1. Click **Configuration** in the left navigation area of the GUI.
2. Click the **Certificate** tab, and then click **Export CSR** .
3. Submit the CSR to the third-party certifying authority (CA).

#### Task 2 Combine the Certificates into a Single File

Once obtain a certificate from the CA, use any text editor to assemble the following certificates into a single file for upload:

- Primary certificate of the trust anchor CA (such as VeriSign's public primary root CA)
- Intermediate certificate of the issuing SSL CA. In cases where there is no intermediate issuer, you can omit the intermediate certificate portion of the combined file. This is highly site-specific, so check with your company's security experts for requirements.
- Your newly issued SSL certificate

The combined certificate file should look like:


```
-----BEGIN CERTIFICATE-----
(Encoded Primary certificate)
-----END CERTIFICATE-----
-----BEGIN CERTIFICATE-----
(Encoded Intermediate certificate)
```

```

-----END CERTIFICATE-----
-----BEGIN CERTIFICATE-----
(Your encoded SSL certificate)
-----END CERTIFICATE-----

```

### Task 3 Import the Certificate File and Restart the Library

1. Click **Configuration** in the left navigation area of the GUI.
2. Click the **Certificate** tab, and then click **Import Certificate** .
3. Browse to the combined certificate file, and then click **Ok**.
4. Restart the library.

The GUI may show the new certificate immediately, but the certificate will not take affect until after the library restarts.

## Default Port Numbers

By default, the library uses the port numbers listed in the table below. If using a firewall, configure it to allow traffic to use these ports. Enable the ports listed below on each of the network interfaces that are in use (except for the OKM interface — you only need to enable the OKM ports on the network interface used to connect to the OKM cluster. See ["Oracle Key Manager \(OKM\) Ports"](#) on page 5-13).

Port	IP	Protocol	Description	Direction
22	TCP	SSH	SSH access to Linux running on library. Only enabled for 72 hours after an "Escalation" role service user is created.	To library
25	TCP	SMTP	Connection to external SMTP (Simple Mail Transfer Protocol) server. Required if you have configured any e-mail destinations.	From library
53	TCP & UDP	DNS	DNS (domain name server) lookup.	From library
80	TCP	HTTP	Default port for browser access.	To library
161	UDP	SNMP	Inbound GET requests using SNMP.	To library
162	UDP	SNMP	Outbound SNMP TRAPS.	From library
123	TCP	NTP	Connection from library to an external NTP server.	From library
443	TCP	HTTPS	Default port for browser and web services interfaces.	To library
7104	TCP	HTTP	Alternate port for browser access.	To library
7102	TCP	HTTPS	Alternate port for browser and web services interfaces.	To library
7104	TCP	HTTP	Browser GUI based access to WebLogic console running on the library. Only accessible by an "Escalation" user.	To library
7105	TCP	HTTPS	Browser GUI based access to WebLogic console running on the library. Only accessible by an "Escalation" user.	To library
Externally Defined	TCP	HTTP & HTTPS	Servers that are configured to receive outbound SCI calls will listen for SCI calls on ports of their choice. Open these port number in any firewalls and provided the port numbers configuring the destination on the library.	From library
Externally Defined	TCP	OKM	If the library is configured to retrieve tape drive encryption keys from a OKM cluster, open the ports used for OKM (see the OKM documentation).	From library

## Browser and Web Services Interface Ports

The GUI can use both HTTP and HTTPS. The SCI protocol uses only HTTPS to secure for the credentials passed in each request. By default, these two protocols are on their



standard port number of 80 for HTTP and 443 for HTTPS. You can modify these ports in the GUI (see ["Configure the Library with the Configuration Wizard"](#) on page 5-1).

## Service Access Ports

Under normal library operations only customer-created users may log in to the library. However, the administrator can enable service access when necessary (see ["Add a Service User"](#) on page 4-4). Creating a service user with an Escalation role enables access to the library that is not normally allowed. Specifically, an Escalation user can log in to Linux on the library using SSH on port 22 and can access the WebLogic console function using port 7104 for HTTP or 7105 for HTTPS. Service users expire 72 hours after creation. The library disables port 22 if there are no enabled service users. The library always enables ports 7104 and 7105, but unless an Escalation user exists, there are no valid users that can log in to the WebLogic console.

## SNMP Ports

The library supports SNMP v3 protocol. The library uses ports 161 (inbound) and 162 (outbound) for SNMP GET commands and SNMP traps respectively.

## E-mail Ports

The library can send e-mail messages when certain events occur (see ["Configure Email Notifications"](#) on page 12-2). If you configure e-mail destinations, you must also configure an SMTP server and open port 25.

## DNS Ports

DNS configuration is optional. You only need to configure DNS if destinations (SNMP, E-mail, Outbound SCI) use host names. You can add up to three DNS servers (see ["Configure the Library with the Configuration Wizard"](#) on page 5-1). DNS uses port 53.

## NTP Ports

The library can use an external NTP server to control the library clock (see ["Date and Time Configuration Options"](#) on page 5-3). If using an external NTP server, you must open port 123.

## Oracle Key Manager (OKM) Ports

You can connect an OKM cluster to the library's customer interface, service interface, or OKM interface. You select the interface during network configuration of the library (see ["Configure the Library with the Configuration Wizard"](#) on page 5-1). Unlike legacy tape libraries, the SL4000 only requires a single connection to OKM, rather than individual connections to each encrypted tape drive. You must open the ports used by OKM appliance on the selected connection. See the OKM documentation for details on which port numbers to use.



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## Managing Drives

### Contents

- [View Drive Information](#)
- [Physically Locate a Drive Using the Locator LED](#)
- [Set a Drive Online or Offline](#)
- [Turn a Drive On or Off](#)
- [Reset a Drive \(Power Cycle the Drive\)](#)
- [Force a Drive to Unload a Tape Cartridge](#)
- [Configure the Drive Fast Load Setting](#)
- [Configure Drive Auto Cleaning](#)
- [Manually Clean a Drive](#)
- [Add a Drive Alias](#)
- [Drive Serial Number Spoofing](#)
- [Configure MDVOP](#)

### See Also

- ["Move or Mount a Tape Cartridge" on page 7-2](#)
- ["Add or Remove Drives from the Media Validation Partition \(Pool\)" on page 13-1](#)
- ["Select the Library Interface to Use for OKM" on page 5-2](#)

## View Drive Information

The drive table displays drive information such as state, SCSI element ID, IP address, serial number, and WWN.

1. Click **Drives** in the left navigation area of the GUI.
2. For more options, select a drive and then right-click or use the **Actions** drop-down.

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**Note:** To select multiple drives at once: shift-click or ctrl-click the drives in the table.

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- ["Physically Locate a Drive Using the Locator LED" on page 6-2](#)
- ["Set a Drive Online or Offline" on page 6-2](#)

- ["Reset a Drive \(Power Cycle the Drive\)"](#) on page 6-3
- ["Manually Clean a Drive"](#) on page 6-4
- ["Force a Drive to Unload a Tape Cartridge"](#) on page 6-3
- ["Turn a Drive On or Off"](#) on page 6-3

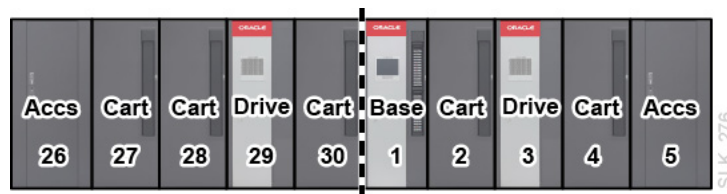
## IP Addressing of Drives

The GUI shows the IP address of installed drives (follow the procedure above and locate the IP Address column). The drive IP address assignment depends on the drive bay and module frame ID.

SL4000 Network Address	Third Octet	Fourth Octet
192.168.0.0/19	1-30 determined by the frame ID	1-32 determined by drive bay
One subnet for all drive network hosts		

### Frame ID Values

Drive IP addressing uses the frame ID of the module. The library controller and root switch compute the frame ID when the library initializes. Valid values range from 1 to 30. The Base Module is always 1 and the module to the left of the Base is always 30. The value increments when moving to the right and decrements when moving to the left. Note that the frame ID values are different than the module numbers (see ["The Center Line of the Library and Module Numbers"](#) on page B-1).



## Physically Locate a Drive Using the Locator LED

You can flash the "Ok to Remove" blue LED on the rear of the drive to locate the drive. See [Figure 1-11](#) for a diagram showing the location of the LED.

1. Select a one or more drives from the drive table or cell map (see ["View Drive Information"](#) on page 6-1 or ["View the Cell Map"](#) on page 11-2).
2. From the **Actions** drop-down (or right-click menu), select **Locate** and then **Activate Locator LED**.
3. Open the rear door of the Base or Drive Module and locate the drive tray with the blinking blue LED.
4. To turn the LED off, repeat the steps above, except select **Deactivate Locator LED**.

## Set a Drive Online or Offline

You typically take a drive offline when servicing the drive or updating the drive firmware. The library will not mount a tape to an offline drive. If you take a mounted drive offline, the drive's state switches to "going offline" and then to "offline" once the tape dismounts.

1. Select one or multiple drives from the drive table or cell map (see ["View Drive Information"](#) on page 6-1 or ["View the Cell Map"](#) on page 11-2).
2. From the **Actions** drop-down (or right-click menu), select **Go Online** or **Go Offline**.

## Turn a Drive On or Off

The power button on the rear of the drive tray is non-functional (see [Figure 1-11](#) for a diagram). Therefore, you must use the GUI to power the drive on or off.

1. Select one or multiple drives from the drive table (see ["View Drive Information"](#) on page 6-1).
2. From the **Actions** drop-down (or right-click menu), select **Power On Drive** or **Power Off Drive**.

## Reset a Drive (Power Cycle the Drive)

Resetting a drive powers the drive off and then back on and performs initialization of the drive. This action may resolve a drive problem.

1. Select one or multiple drives from the drive table or cell map (see ["View Drive Information"](#) on page 6-1 or ["View the Cell Map"](#) on page 11-2).
2. From the **Actions** drop-down (or right-click menu), select **Power Cycle Drive**.

## Force a Drive to Unload a Tape Cartridge

Forcing a drive to unload will stop any read/write operations in process. Typically, applications send a unload command to the drive on the data path before issuing a command to the library to dismount the drive. However, you may need to initiate a forced unload through the GUI if there is a problem with the drive.

1. Select a drive from the drive table (see ["View Drive Information"](#) on page 6-1).
2. From the **Actions** drop-down (or right-click menu), select **Force Unload Drive**.

## Configure the Drive Fast Load Setting

The fast-load setting defines how the drive handles replying to mount requests. If either the partition setting or individual drive setting is fast, then the library fast loads the drive.

1. Click **Drives** in the left navigation area of the GUI.
2. Select one or more drives in the table.
3. From the **Actions** drop-down (or right-click menu), select **Drive Setting** and then select **Normal** or **Fast** for Fast-Load Type.
  - **Normal** (default) – The library will reply to a mount request only after the selected tape is loaded and threaded in the drive.
  - **Fast** – The library will reply to a mount request after the selected tape is inserted into the drive, but before loading and threading completes.

## Configure Drive Auto Cleaning

If auto cleaning is enabled, the library will automatically mount a cleaning tape from a system cell to a drive that has indicated it needs cleaning following a dismount. This cleaning operation occurs before the library returns the status for the dismount operation. If disabled, the host software must manage drive cleaning. The library only uses cleaning tapes from system cells for auto cleaning. Cleaning tapes for host managed drive cleaning reside in storage cells.

You can enable auto cleaning for an entire partition or for an individual drive. The library auto cleans a drive if auto cleaning is enabled for either the drive or the partition containing the drive. For example, if you disable auto cleaning for a partition, but enable auto cleaning for a single drive within that partition, the library will still auto clean that drive. Likewise, if you enable auto cleaning for the partition, but disable it for a single drive within that partition, the library will still auto clean that drive.

### Set Drive Auto Cleaning for an Individual Drive

1. Click **Drives** in the left navigation area of the GUI.
2. Select one or more drives in the table.
3. From the **Actions** drop-down (or right-click menu), select **Drive Setting** and then select **Yes** or **No** for Auto Clean Enabled.

### Set Drive Auto Cleaning for a Partition

1. Click **Partitioning** in the left navigation area of the GUI.
2. Select the partition, and then click **Edit Partition** .
3. Select **Drive Auto Clean** (when checked, the library automatically handles drive cleaning).

#### See Also

- ["Set the Cleaning Tape Usage Thresholds"](#) on page 7-3
- ["Manually Clean a Drive"](#) on page 6-4

## Manually Clean a Drive

Normally, either the library or the host manages drive cleaning. However, there may be occasions when you need to perform a manual clean. Refer to the drive manufacturer's documentation for information on whether manual cleaning is allowed.

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**CAUTION:** Cleaning a drive before it is due is not recommended. Excessive drive cleaning can prematurely wear out a drive head.

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1. Verify the system cells contain a valid cleaning tape for the drive you need to clean (see ["View a List of Tape Cartridges"](#) on page 7-1).
2. Navigate to the drive table (see ["View Drive Information"](#) on page 6-1). Verify the drive needs cleaning by looking at the status of the "Cleaning Needed" column.
3. Select the drive, and then from the **Actions** drop-down (or right-click menu), select **Clean Drive**.

**See Also**

- ["Configure Drive Auto Cleaning"](#) on page 6-4

## Add a Drive Alias

You can configure a drive alias to display in the library GUI. This can assist with drive identification.

1. Click **Drives** in the left navigation area of the GUI.
2. Select one or more drives in the table.
3. From the **Actions** drop-down (or right-click menu), select **Drive Setting** and then select enter a drive alias.

## Drive Serial Number Spoofing

The library "spoofs" the true serial number of LTO drives, meaning the library uses the right-most 10 characters of the drive tray serial number rather than the drive manufacturing serial number. The library only spoofs drive serial numbers for LTO drives (T10000 drive spoofing is not supported). The library returns the spoofed value for the SCSI medium changer "read element status" command and the "inquiry" command.

Spoofing helps when replacing a failed drive because the "spoofed" serial number of the drive is the same after the replacement, eliminating the need to reconfigure applications. When requesting drive service, you can provide the spoofed value to look up the service contract for the drive.

## Configure MDVOP

Use the following procedure to setup the network on a VOP admin station to manage multiple SL4000s.

1. On the admin station, change the gateway setting for the static route of the IP port used to manage the SL4000 library. You can automate this with either a shell script on Unix or a .bat file on Windows.
2. Once the route's gateway points to the SL4000 library you want to manage, set up individual MDVOP configuration files (.vop files) to manage that library.
3. Launch the specific MDVOP configuration for that library.





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## Managing Tape Cartridges

### Contents

- [View a List of Tape Cartridges](#)
- [View a List of Cleaning Cartridges](#)
- [Move or Mount a Tape Cartridge](#)
- [Import/Export Tapes in System Cells](#)
- [Set the Cleaning Tape Usage Thresholds](#)
- [Tips for Handling Tape Cartridges](#)

### See Also

- ["Validating Media" on page 13-1](#)
- ["Enter Tapes Through a CAP" on page 8-2](#)
- ["Eject Tapes Through a CAP" on page 8-4](#)

## View a List of Tape Cartridges

1. Click **Cells/Tapes** in the left navigation area of the GUI.
2. Click the **Tapes** tab.

### See Also

- ["View a List of Cleaning Cartridges" on page 7-1](#)
- ["View a List of All Cells in the Library" on page 11-5](#)
- ["View the Cell Map" on page 11-2](#)

## View a List of Cleaning Cartridges

You can use the list of cleaning tapes to view the cleaner status, current cleaning count, cleaning thresholds, type, and location of all cleaning tapes in the library. Cleaning tapes in system cells are for library-managed auto cleaning. Cleaning tapes in storage cells are for host-managed cleaning.

1. Click **Cells/Tapes** in the left navigation area of the GUI.
2. Click the **Cleaning Tapes** tab.

### See Also

- ["Configure Drive Auto Cleaning" on page 6-4](#)

- ["Set the Cleaning Tape Usage Thresholds"](#) on page 7-3
- ["Import/Export Tapes in System Cells"](#) on page 7-3

## Move or Mount a Tape Cartridge

You can move a tape from a cell or drive to an empty cell, drive, or CAP cell. The User and Operator role can only move a tape to a cell within the same partition. The Administrator and service roles can move tapes between two offline partitions and into system cells or drives or CAPs (see ["User Roles"](#) on page A-1). Moving cartridges in online partitions using the GUI is disruptive to host applications and is not allowed (see ["How the Library Avoids Conflicting Move Requests Between SCSI, SCI, and the GUI"](#) on page 7-2).

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**Caution:** Moving a cartridge between partitions may confuse some applications requiring you to re-sync the application with the library.

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1. If moving a tape between two partitions, take both affected partitions offline (see ["Place a Partition Online or Offline"](#) on page 9-6).
2. Select the tape from the GUI tapes table or cell map (see ["View a List of Tape Cartridges"](#) on page 7-1 or ["View the Cell Map"](#) on page 11-2).
3. From the **Actions** drop-down (or right-click menu), select **Move Tape**.
  - If moving the tape to a drive, the destination drop-down only displays empty, compatible drives.
  - If moving the tape to a CAP, the destination drop-down only displays locked CAPs. You cannot move a tape into a CAP owned by another partition.
  - If moving a tape from a drive, the first option in the destination drop-down is the home cell.
4. Select the destination. If moving to or from a drive, select the options below.
  - **Force unload** — When selected, the drive stops any in-process read or write operations and unloads the tape. Generally, a force unload is only done through the GUI if there is a problem with the drive. This operation is disruptive.
  - **Read-only mount** — When selected, the drive only reads the tape and rejects any write commands. LTO drives do not support this feature.

## How the Library Avoids Conflicting Move Requests Between SCSI, SCI, and the GUI


The ability for SCSI, SCI, and the GUI to request a cartridge move depends on the partition online/offline state and if the partition is SCSI enabled.

Interface Type Requesting the Move	Partition Online, SCSI Enabled	Partition Online, SCSI Disabled	Partition Offline, SCSI Enabled	Partition Offline, SCSI Disabled
SCSI	Allowed	Not possible	Not allowed	Not possible
SCI	Not allowed	Allowed	Not allowed	Not allowed
GUI	Not allowed	Not allowed	Allowed	Allowed

## Import/Export Tapes in System Cells

You can import cleaning and diagnostic tapes into system cells and export tapes from system cells. During the import and export, the selected CAP will be unavailable to host applications. You must coordinate this activity with the hosts.

Cleaning tapes in system cells are for library-managed (automatic) drive cleaning (see ["Configure Drive Auto Cleaning"](#) on page 6-4). If you are using host-managed drive cleaning, import and export cleaning cartridges as you would with normal data tapes (see ["Enter Tapes Through a CAP"](#) on page 8-2 and ["Eject Tapes Through a CAP"](#) on page 8-4).

1. Click **Cells/Tapes** in the left navigation area of the GUI.
2. Click the **Cleaning Tapes** tab.
3. Click **Import/Export System Cells** .
4. Select the CAP to use.
5. Select tapes to export (optional). You are not required to export existing tapes in order to import new tapes. The number of tapes you can export is limited to the size of the selected CAP. Click **Ok**.
6. Remove any ejected tapes from the CAP.
7. Optionally, you can now import cleaning and diagnostic tapes into system cells. Verify there are enough empty system cells for the number of tapes you want to import. Insert the tapes into the CAP. Press the **CAP** button to close the CAP.

---

**Note:** The library will not import data tapes into the system cells. If you place any data tapes in the CAP while importing to system cells, the library reopens the CAP. Remove the data tapes from the CAP (see ["Enter Tapes Through a CAP"](#) on page 8-2 to import them to storage cells).

---


## Set the Cleaning Tape Usage Thresholds

You should replace cleaning tapes after a certain number of uses (generally 50 max). The usage threshold gives a warning once the number of remaining uses for a cleaning tape falls below the threshold. You should set the threshold high enough to allow adequate time to replace the tape. The default threshold is 5 remaining uses.

---

**Note:** When you import a cleaning tape, the library sets the usage count for that tape to zero, regardless if the tape has been used before. Therefore, Oracle recommends only importing new cleaning tapes.

---

1. Click **Cells/Tapes** in the left navigation area of the GUI.
2. Click the **Cleaning Tapes** tab.
3. Click **Set Cleaning Thresholds** .
4. Set the threshold for each type of cleaning tape. The threshold will apply to all cleaning tapes of that type.

### See Also

- ["Configure Drive Auto Cleaning"](#) on page 6-4

- ["Manually Clean a Drive"](#) on page 6-4

## Tips for Handling Tape Cartridges

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**CAUTION:** Improperly handling tapes can cause loss of data or damage to a library component.

---

- Keep tapes clean and inspect for damage before each use.
- Never open a tape cartridge.
- Do not handle tape that is outside the cartridge; the tape edge might be damaged.
- Do not expose the tape or cartridge to direct sunlight, moisture, excessive temperatures, or magnetic fields.
- Transport cartridges in shock resistant cases

## Inspecting a Tape Cartridge

Always inspect a tape before you insert it into a drive or a library. A defective or dirty tape can damage a drive. Never use a damaged tape. Look for:

- Dirt or debris
- Cracked or broken housing
- Damaged write-protect switch
- Liquid in the tape cartridge
- Labels not firmly attached, or that extend over the tape cartridge edge

## Cleaning the Tape Cartridge Exterior

Wipe all dust, dirt, and moisture from the cartridge with a lint-free cloth. Use Oracle StorageTek Tape Cleaner Wipes to clean the cartridge exterior. These wipes are saturated with isopropyl alcohol. Do not let any solution touch the tape or get inside the cartridge.

---

**CAUTION:** To avoid damage to cartridges, do not use acetone, trichloroethane, toluene, xylene, benzene, ketone, methylethyl ketone, methylene chloride, ethyldichloride, esters, ethyl acetate, or similar chemicals to remove labels or clean cartridges.

---

## Storing Tape Cartridges

Store tapes in a clean environment. Do not take a tape cartridge out of its protective wrapping until you are ready to use it. Use the tear string (not a sharp instrument) to remove the wrapping. Before using a tape cartridge, ensure that it has been in its operating environment for at least 24 hours so that it can adjust to changes in temperature and humidity.

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# Managing and Operating CAPs

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**Note:** There are two CAP types: rotational CAPs (rotary) and Access Module CAPs. The term "CAP" refers to both types, unless otherwise noted.

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## Contents

- Guidelines for Using CAPs
- Lock or Unlock a CAP
- Open or Close a CAP Using the GUI
- Enter Tapes Through a CAP
- Eject Tapes Through a CAP
- Manage CAP Pools
- Assign a CAP Pool to a Partition
- Assign Ownership of a Shared CAP to a Partition
- Default CAP States

## Guidelines for Using CAPs

- Insert cartridges with the correct orientation (hub gear facing down and label facing you). You can skip slots in the CAP magazine when loading cartridges.
- Verify all cartridges are properly labeled before placing them into a CAP. Do not enter unlabeled cartridges
- To enter cartridges more efficiently, load the CAP magazines before issuing the enter command.
- If only one CAP is required to do the job, do not use multiple CAPs. Opening multiple CAPs will increase the audit time.

## Lock or Unlock a CAP

1. Click **CAPs** in the left navigation area of the GUI.
2. Click the **CAPs** tab.
3. Select a CAP from the list. From the **Actions** drop-down (or right-click menu), select **Lock** or **Unlock**.

### **Locked State**

While in the locked state, the CAP's "Unlock" LED indicator will be off. The library disables all means of opening the CAP, allowing the robot to access the CAP. To lock a CAP using the GUI, it must be closed, online, and owned by a partition.

### **Unlocked State**

While in the unlocked state, the CAP's "Unlock" LED will be on. A CAP in the unlocked state can be opened by an operator by pushing the CAP button. When unlocked, the robot cannot access the CAP cells. To unlock a CAP using the GUI, it must be closed, online, owned by a partition (or controlled by the GUI), and not currently in use by the robot.

### **See Also**

- ["Default CAP States"](#) on page 8-7
- ["Open or Close a CAP Using the GUI"](#) on page 8-2

## **Open or Close a CAP Using the GUI**

1. Click **CAPs** in the left navigation area of the GUI.
2. Click the **CAPs** tab.
3. Select a CAP from the list. From the **Actions** drop-down (or right-click menu), select **Open** or **Close**.

### **Open**

Selecting **Open** is equivalent to pressing the CAP button on a closed and unlocked CAP.

### **Close**

Selecting **Close** is equivalent to pressing the CAP button on an open CAP. Once closed, the library locks and audits the CAP cells.

### **See Also**

- ["Lock or Unlock a CAP"](#) on page 8-1
- ["Enter Tapes Through a CAP"](#) on page 8-2
- ["Eject Tapes Through a CAP"](#) on page 8-4
- ["Import/Export Tapes in System Cells"](#) on page 7-3

## **Enter Tapes Through a CAP**

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**Note:** If entering tapes through a shared CAP, you must assign ownership of the CAP (see ["Assign Ownership of a Shared CAP to a Partition"](#) on page 8-6).

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CAP magazines are removable. You can place tapes in any magazine cell and in any order (making sure the hub-side is down). See ["Guidelines for Using CAPs"](#) on page 8-1.

After entering tapes through the CAP, the library audits the CAP. Based on commands from the host software or GUI, the library moves the tapes to storage cells, records the


location, and sends the location to the host. When the CAP is empty, the library returns the CAP to its default state.

---

**CAUTION:** To avoid equipment damage, do not force the CAP to open or close. Do not enter unlabeled tapes or place tapes upside-down.

---

### Enter Tapes Using a Rotational CAP


1. If using a shared CAP, verify the CAP is owned by the partition you want to add the tapes to (see ["Assign Ownership of a Shared CAP to a Partition"](#) on page 8-6).
2. If the CAP is in auto enter mode, proceed to the next step. If it is in manual mode, initiate the enter operation at the host (see the host documentation).
3. Press the **CAP** button .

The button light turns ON and the door opens.

4. Place the tapes in the CAP. Verify the hub gear is face down and barcode is toward you.
5. Press the **CAP** button.

The CAP closes and temporarily locks, and the CAP button light turns OFF.

### Enter Tapes Using an Access Module

1. If using a shared CAP, verify the CAP is owned by the partition you want to add the tapes to (see ["Assign Ownership of a Shared CAP to a Partition"](#) on page 8-6).
2. If the CAP is in auto enter mode, proceed to the next step. If it is in manual mode, initiate the enter operation at the host (see the host documentation).
3. Once the "Unlocked" indicator lights, push the Access Module **CAP** button .

The "Wait" indicator blinks until the safety door is completely down. Depending on the level of activity in the library, this may take several minutes.

4. When the "Enter" indicator light is solid, lift the latch and open the door. Place the tapes in the CAP with the hub gear face down and barcode toward you.
5. Close and latch the Access Module access door.
6. Push the Access Module **CAP** button.

The "Enter" light turns off and the "Wait" light starts blinking. The safety door moves up.

## Moving all Tapes in a CAP to Storage Cells Using the Library GUI

During normal operation, the host application should move tapes out of the CAP and into storage cells. However, you can manually unload the CAP using the GUI when necessary.

1. Click **CAPs** in the left navigation area of the GUI.
2. Verify the CAP is closed and locked.
3. Select a CAP from the list, and then from the **Actions** drop-down (or right-click menu) select **Unload CAP**.

The library will move the tapes to empty cells within the partition that currently owns the CAP.

4. You may need to update your host application with the location of the new tapes.

## Eject Tapes Through a CAP


Once the library ejects all tapes and the robot verifies the CAP is empty, the library erases the location of the tapes from the library database. The CAP returns to its default state.

---


**CAUTION:** To prevent equipment damage, do not force the CAP to open or close.

---

### Eject Tapes Using a Rotational CAPs

1. If ejecting tapes through a shared CAP, assign ownership of the CAP (see ["Assign Ownership of a Shared CAP to a Partition"](#) on page 8-6).
2. Initiate the eject operation. Specify the tapes to eject. The CAP button light turns ON.
3. Press the **CAP** button  to open the CAP.
4. Remove all tapes from the CAP.
5. Push the **CAP** button to close the CAP.  
The CAP closes and locks, and the CAP button light turns OFF.
6. The robot continues filling the CAP until all selected tapes are ejected. Wait until the CAP door is unlocked, and then repeat step 2 through step 4.

### Eject Tapes Using an Access Module

1. If ejecting tapes through a shared CAP, assign ownership of the CAP (see ["Assign Ownership of a Shared CAP to a Partition"](#) on page 8-6).
2. Initiate the eject operation. Specify the tapes to eject.
3. Push the **Access Module CAP** button .  
The "Wait" indicator blinks until the safety door is in place, and then the "Enter" light is solid. Depending on the level of activity in the library, this process may take several minutes.
4. Lift the latch and open the door. Remove the tapes from the Access Module CAP. Close and latch the Access Module access door.
5. Push the **Access Module CAP** button. The "Enter" light turns off and the "Wait" light begins blinking. The safety door moves up. If more tapes need to be exported, the robot continues filling the necessary Access Modules.
6. The robot continues filling the Access Module until all selected tapes are ejected. Wait until the door is unlocked, and then repeat step 2 through step 4.

## Manage CAP Pools

A CAP pool is a group of CAPs in the library that you assign to a partition. You can only create and configure CAP pools in a partitioned library (a non-partitioned library only contains a single default pool always assigned to the default partition).

To export and import tapes, you must assign a CAP pool to a partition (see ["Assign a CAP Pool to a Partition"](#) on page 8-6) and assign ownership of a CAP within that pool




(see ["Assign Ownership of a Shared CAP to a Partition"](#) on page 8-6).

- [Create a CAP Pool](#)
- [Assign CAPs to a Pool](#)
- [Delete a CAP Pool](#)


#### See Also

- ["Assign Ownership of a Shared CAP to a Partition"](#) on page 8-6
- ["Assign a CAP Pool to a Partition"](#) on page 8-6

## Create a CAP Pool

1. Click **CAPs** in the left navigation area of the GUI.
2. Click the **CAP Pools** tab.
3. Click **Add** .

---

**Note:** If the **Add** icon  is grayed-out, you need to enable partitioning with an activation file (see ["Add or Remove Optional Library Features"](#) on page 5-5).

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4. Enter a CAP pool name.
5. A new CAP pool has no CAPs assigned to it. See ["Assign CAPs to a Pool"](#) below.

## Assign CAPs to a Pool

You can assign each CAP to only one CAP pool. The CAP must be empty and idle before you can change its pool assignment.

---

**IMPORTANT:** Any partitions assigned to the modified pool will temporarily go OFFLINE when you modify the CAPs in the pool.


---

1. Click **CAPs** in the left navigation area of the GUI.
2. Click the **CAPs** tab.
3. Verify that the CAP you want to assign is empty.

---


**Note:** To empty a CAP, ideally hosts should move the tapes out of the CAP. However, you can select the CAP, and then from the **Actions** drop-down (or right-click menu) select **Unload CAP**. To manually move the individual tapes, see ["Move or Mount a Tape Cartridge"](#) on page 7-2.

---

4. Click **Assign CAPs to Pools** .
5. Select a CAP pool from the drop-down list.

## Delete a CAP Pool

You can only delete a CAP pool if it is not assigned to a partition and contains no CAPs.

1. Assign all CAPs in the pool to another pool (see ["Assign CAPs to a Pool"](#) above).
2. Remove the CAP pool partitioning assignment (see ["Edit the Partition Attributes"](#) on page 9-3).
3. Click **CAPs** in the left navigation area of the GUI.
4. Click the **CAP Pools** tab.
5. Select the CAP pool in the list, and then click **Delete** .

## Assign a CAP Pool to a Partition

You can assign a CAP pool to a partition when creating or modifying the partition (see ["Add a Partition"](#) on page 9-2 or ["Edit the Partition Attributes"](#) on page 9-3). Each partition can have only one CAP pool assigned to it. However, you can assign a CAP pool to multiple partitions. The number of partitions assigned to the CAP pool determines if the CAPs in the pool are dedicated or shared:

- **Dedicated CAP** — If the CAP pool is assigned to only one partition, the CAPs within the pool are "dedicated" and the partition automatically assumes ownership of all CAPs within the pool.
- **Shared CAP** — If a CAP pool is assigned to multiple partitions, the CAPs within the pool are "shared". In order for a partition to use a shared CAP for import/export operations, the partition must "own" the CAP (see ["Assign Ownership of a Shared CAP to a Partition"](#) on page 8-6). Once the import/export operation completes, the partition must then release ownership of the CAP so that other partitions can use it.

---

---

**Note:** Avoid assigning a shared CAP pool to a SCSI partition. For more information, refer to the *SL4000 SCSI Reference Guide*.

---

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## Assign Ownership of a Shared CAP to a Partition

If you assign a CAP pool to more than one partition, a partition must "own" a CAP within the pool before the partition can import or export tapes. If you assign the CAP pool to only one partition, that partition automatically owns all CAPs within the pool and you do not need to follow the procedures below.

1. Click **CAPs** in the left navigation area of the GUI.
2. Click the **CAPs** tab.
3. Select a CAP from the list. From the **Actions** drop-down (or right-click menu), select **Set CAP Owner**.
4. Select a partition from the drop-down list.

### See Also

- ["Assign a CAP Pool to a Partition"](#) on page 8-6
- ["Manage CAP Pools"](#) on page 8-4
- ["Default CAP States"](#) on page 8-7

## Default CAP States

A CAP can either be locked or unlocked (see ["Lock or Unlock a CAP"](#) on page 8-1). The default state of a CAP (meaning the CAP state immediately after library initialization) depends on the CAP pool status and whether the partition that owns the CAP is SCSI enabled.

**Table 8–1** *Default CAP State Based on CAP Pool and Partition Status*

CAP Pool Status	CAP Status	Partition is SCSI enabled	Partition is not SCSI enabled
Library only has single default pool (no partitioning activation file installed and library has single default partition)	All CAPs are "Dedicated" (the default partition automatically owns all CAPs in the library)	All CAPs are unlocked	All CAPs are locked
CAP pool not assigned to a partition	CAPs in pool are "Free" and locked	N/A	N/A
CAP pool assigned to a single partition	CAPs in pool are "Dedicated" (the partition owns all CAPs in the pool)	CAPs in pool are unlocked	CAPs in pool are locked
CAP pool assigned to more than one partition	CAPs in pool are "Shared" and remain locked until a partition explicitly takes ownership of a CAP in the pool	If owned by a partition, the CAP will be unlocked	If owned by a partition CAP will be locked.

### See Also

- ["Lock or Unlock a CAP"](#) on page 8-1
- ["Open or Close a CAP Using the GUI"](#) on page 8-2
- ["Assign a CAP Pool to a Partition"](#) on page 8-6
- ["Assign Ownership of a Shared CAP to a Partition"](#) on page 8-6



---

## Partitioning the Library

Library partitioning is an optional feature that divides library resources (drive bays, storage cells, and CAPs) into smaller subsections to allow different hosts to independently use a portion of the library. The library supports up to 16 partitions. Each partition appears as a standalone library to the host, which allows more than one application to use the library simultaneously.

---

**IMPORTANT:** Partitioning now comes standard. However, to use partitioning, you must enable it in the library settings (see "[Configure the Library with the Configuration Wizard](#)" on page 5-1).

---

### Contents

- [Partitioning Guidelines to Maximize Library Performance](#)
- [Add a Partition](#)
- [Edit the Partition Attributes](#)
- [Move Storage Cells and Drive Bays to a Partition](#)
- [Delete a Partition](#)
- [Assign Partitions to a SCSI Host and Alter LUN Assignment](#)
- [View the Host Connections of a Partition](#)
- [Place a Partition Online or Offline](#)
- [Why is there a Default Partition in a "Non-Partitioned" Library?](#)
- [Why is there a Media Validation Partition?](#)
- [What Occurs When You Disable Partitioning](#)


### See Also

- ["Add or Remove Drives from the Media Validation Partition \(Pool\)" on page 13-1](#)
- ["Create a CAP Pool" on page 8-5](#)
- ["Assign a CAP Pool to a Partition" on page 8-6](#)
- ["Assign Ownership of a Shared CAP to a Partition" on page 8-6](#)


## Partitioning Guidelines to Maximize Library Performance

- Partition storage slots in the largest blocks possible. Cluster cartridges and drives together based on workload. Ensure that each partition has an adequate number of data cartridges, scratch cartridges, and tape drives to support peak workload.
- Avoid partitioning individual drives and storage cells. Individually add and remove resources only when you need to fine-tune a partition that has already been broadly defined in larger blocks.
- Install enough CAPs to provide at least one CAP for each partition. This allows each partition to contain a dedicated CAP.
- For quicker enter and ejects, partition storage cells close to the CAPs. For quicker access to stored data, partition storage cells close to the drives.

## Add a Partition

1. Click **Partitioning** in the left navigation area of the GUI.
2. Click **Create New Partition** .

---

**Note:** If the Create New Partition icon is grayed-out , you need to enable partitioning in the library settings (see ["Configure the Library with the Configuration Wizard"](#) on page 5-1).

---

3. Enter the partition attributes (see ["Partition Attributes"](#) on page 9-2 for a description). Click **Ok** to create the partition.
4. A newly created partition does not have any resources assigned to it. To allocate resources, see ["Move Storage Cells and Drive Bays to a Partition"](#) on page 9-3.

## Partition Attributes

You can set the partition attributes when adding or modifying a partition (see ["Add a Partition"](#) on page 9-2 or ["Edit the Partition Attributes"](#) on page 9-3).

- **Partition Name** – Limit of 20 characters.
- **Drive Auto Clean** – If selected, this enables library-managed drive cleaning for drives within the partition (see ["Configure Drive Auto Cleaning"](#) on page 6-4). If not selected, the host software must manage drive cleaning.
- **Volume Label Format** – Controls presentation of the storage cell volers (see ["Volume Label Format Options"](#) on page 5-5).
- **Initial Control State** – The initial state of the partition. An "Online" partition can respond to client requests. An "Offline" partition will reject all client requests until you set it "Online".
- **SCSI Access Enabled** – "Yes" means only SCSI clients can access the partition. "No" means only StorageTek Library Control Interface (SCI) clients can access the partition. See also ["How the Library Avoids Conflicting Move Requests Between SCSI, SCI, and the GUI"](#) on page 7-2.
- **Fast-Load Type** – Defines how the partition handles replying to mount requests.
  - **Normal** (default) – The library will reply to a mount request only after the selected tape is loaded and threaded in the drive.


- **Fast** – The library will reply to a mount request after the selected tape is inserted into the drive, but before loading and threading completes.
- **CAP Pool Name** – Select the CAP pool from the list (to create or modify CAP pools, see ["Create a CAP Pool"](#) on page 8-5). In order to import/export tapes, you must assign a CAP pool to the partition.

## Edit the Partition Attributes

---

**CAUTION:** Modifying the partitioning configuration can be disruptive to client systems. Any altered partitions currently online will temporarily go OFFLINE and then come back online. Partitions that were already offline will remain offline.

---

1. Click **Partitioning** in the left navigation area of the GUI.
2. Select the partition in the table, and then click **Edit Partition** .
3. Update the partition attributes (see ["Partition Attributes"](#) on page 9-2).

### See Also

- ["Move Storage Cells and Drive Bays to a Partition"](#) on page 9-3
- ["Assign Partitions to a SCSI Host and Alter LUN Assignment"](#) on page 9-5


## Move Storage Cells and Drive Bays to a Partition

Initially, all resources are assigned to a predefined default partition. After you add at least one additional partition (see ["Add a Partition"](#) on page 9-2), you can move storage cells and drive bays between partitions. All storage cells and drive bays in the library must always belong to a partition.

---

**Note:** No actual configuration changes are made to the library until you click **Apply** on the summary page. After applying changes, any altered partitions currently online will temporarily go OFFLINE. Partitions that were already offline will remain offline.

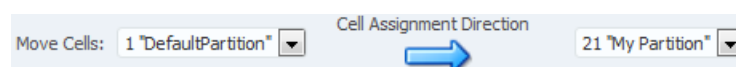
---

1. Click **Partitioning** in the left navigation area of the GUI.
2. Click **Assign Cells** .
3. From the drop-down lists, select the source and destination partition. The arrow indicates the direction the resources will move. Initially, the default partition must be the source partition.

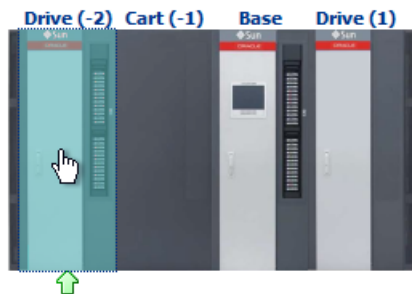
---

**Note:** Click the arrow to reverse the direction.

---




4. Click a module to modify (the green arrow below a module  indicates the currently selected module).



5. Choose a **Select Cells By** method (see "Partitioning Selection Methods" below for definitions), and then click cells on the cell map (see "Partitioning Cell Map Legend" below). The number over a cell or drive bay indicates the partition ID.

**Oops...I made a mistake, how do I move cells back?**

Click the cell assignment direction arrow to flip the direction . Choose a **Select Cells By** method, and then click cells on the cell map. The cells reassign to the source partition.

6. Click another module and repeat.
7. Once you have completed the partitioning design, click **Next**.

---

**IMPORTANT:** Applying changes will take any modified partitions temporarily OFFLINE. Unaffected partitions will remain ONLINE. You should stop any host operations involving the modified partitions before applying the partitioning changes.

---

8. Review the Cell Assignment Count Summary and Cell Assignment Details, and then click **Apply**.







## Partitioning Selection Methods

In the Base Module and Drive Module, rows and columns do not align between drive bays and storage cells, therefore the only selection options you can use to select both storage and drive cells simultaneously are Side, Module, and Cell-by-Cell. The other selection methods only select like-cells, meaning the method only selects storage cells or only drive bays.

- **Cell-by-cell** – Assign cells one at a time by clicking individual cells.
- **Cell Block** – Assign like-cells in a rectangular block (two clicks required). Click the top-left corner of the block, and then click the bottom-right corner of the block (do not click-and-drag).
- **Column** – Assign all like-cells in a column by clicking any cell in the column.
- **Side** – Assign all cells on a side (front or back) by clicking any cell on the side.
- **Row** – Assign all like-cells in a row by clicking any cell in the row.
- **Module** – Assign all cells currently assigned to the source partition in a module by clicking any cell in the module.



## Partitioning Cell Map Legend

Cell Map Icon	Meaning
	Tape - indicates that the cell is occupied or the drive is mounted.
 (no color overlay)	Unallocated - cell assigned to the source partition (in this case partition with ID 1).
 (yellow overlay)	Allocated - cell assigned to the destination partition (in this case partition with ID 21)
 (red overlay)	Unselectable - cell assigned to a partition that is not one of the partitions currently selected in the drop-down lists. Or, the cell is a system cell. System cells cannot be assigned to any partition.
	CAP cell - you cannot assign these cells to a partition. The CAP cells assigned to the partition depend on the CAP pool.
	Inaccessible - a system cell. You cannot add these cells to a partition and hosts cannot access these cells.

## Delete a Partition

You can only delete a partition if it contains no storage cells or drive bays.

1. Move all storage cells and drive bays from the partition to be deleted to another partition (see ["Move Storage Cells and Drive Bays to a Partition"](#) on page 9-3).


---

**TIP:** To quickly reassign all the cells in a module that belong to the source partition, choose the **By Module** selection method, and then click anywhere on the cell map.

---

2. On the assign cells summary screen, verify that the partition you want to delete contains zero resources, and then click **Apply**.

Cell Assignment Counts Summary						
Partition Name	ID	Changes	Drive Bays Count	Drive Count	Storage Cells Count	Tape Count
PartitionToDelete	01	Yes	0	0	0	0

3. To delete the empty partition, click **Partitioning** in the left navigation area of the GUI.
4. Select the partition in the table, and then click **Delete** . If Delete is grayed-out, you must first move all storage cells and drive bays to another partition (see ["Move Storage Cells and Drive Bays to a Partition"](#) on page 9-3).

---

**Note:** Any SCSI hosts assigned to this partition will have their LUNs deleted. Additionally, the library may renumber some LUNs if the host has higher-numbered LUNs than the deleted partition. You will have to reconfigure the host.


---

## Assign Partitions to a SCSI Host and Alter LUN Assignment

---

**IMPORTANT:** Assigning a partition to a SCSI host will take the partition temporarily OFFLINE. Altering LUN numbering will be disruptive, requiring you to reconfigure the host.

---

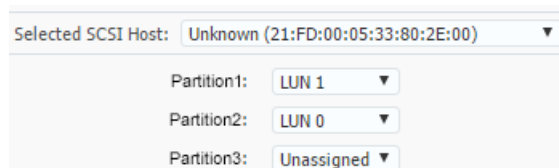
1. Click **Partitioning** in the left navigation area of the GUI.
2. Click the **SCSI Host Configuration** tab.
3. Click **Configure SCSI Connections** .
4. Select a SCSI host from the drop-down list.

---

**Note:** If a partition does not appear, SCSI access is not enabled. To enable SCSI access, see ["Edit the Partition Attributes"](#) on page 9-3.

---

5. For each partition, select a LUN assignment. There must be a LUN 0 and you cannot have duplicate LUNs for a host. You can leave partitions unassigned.



The screenshot shows a GUI window titled "Selected SCSI Host: Unknown (21:FD:00:05:33:80:2E:00)". Below the title bar, there are three rows for partition configuration:

Partition	LUN Assignment
Partition1:	LUN 1
Partition2:	LUN 0
Partition3:	Unassigned

6. If there are additional SCSI hosts to assign, select the host from the list and repeat.
7. Click **Ok** to initiate the reconfiguration, which will take the affected partitions offline and re-assign LUNs. Reconfigure the hosts as necessary.

#### See Also

- ["Managing the SCSI Host Connection"](#) on page 10-1
- ["Add, Modify, or Delete a SCSI Host"](#) on page 10-1
- ["View the SCSI LUN Mapping"](#) on page 10-2
- ["View Actively Logged-In SCSI Hosts"](#) on page 10-2
- ["View the Host Connections of a Partition"](#) on page 9-6

## View the Host Connections of a Partition

1. Click **Partitioning** in the left navigation area of the GUI.
2. Click the **Partitions** tab.
3. Select a partition in the list. From the **Actions** drop-down (or right-click menu), select **Properties**.

#### See Also

- ["Managing the SCSI Host Connection"](#) on page 10-1
- ["Assign Partitions to a SCSI Host and Alter LUN Assignment"](#) on page 9-5

## Place a Partition Online or Offline

Partitions will automatically be taken offline during partitioning and SCSI host configuration changes. However, you can also manually change the partition state. An offline partition will reject all client requests until you set it online.

1. Click **Partitioning** in the left navigation area of the GUI.
2. Click the **Partitions** tab.

3. Select the partition.
4. From the **Actions** drop-down (or right-click menu), select **Go Online** or **Go Offline**.

## Why is there a Default Partition in a "Non-Partitioned" Library?

All resources (drive bays, storage cells, and CAPs) within the SL4000 library must always be contained within at least one partition. Therefore, in a non-partitioned library (meaning a library with partitioning disabled), there is a single default partition that contains the entire library. Initially, this partition is named "DefaultPartition", but you can rename or edit its partitioning attributes at anytime (see ["Edit the Partition Attributes"](#) on page 9-3).

## Why is there a Media Validation Partition?

The Media Validation partition dedicates T10000C and D drives for validating the integrity of T10000 tapes (see ["Validating Media"](#) on page 13-1). By default there is always a Media Validation partition (even in a library with partitioning disabled) and you cannot delete or rename the Media Validation partition. Initially the partition is empty and contains no resources. To add drives to the partition, see ["Add or Remove Drives from the Media Validation Partition \(Pool\)"](#) on page 13-1.

## What Occurs When You Disable Partitioning

After deactivating partitioning in the library settings, the library:

- Moves everything into a single default partition and deletes all other partitions.
- Moves all CAPs into a single DefaultPool owned by the DefaultPartition and deletes all other CAP pools.
- Deletes all SCSI LUNs greater than zero from all SCSI hosts and assigns SCSI LUN zero on each host to the default partition.



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## Managing the SCSI Host Connection

### Contents

- [Add, Modify, or Delete a SCSI Host](#)
- [View the SCSI LUN Mapping](#)
- [View Actively Logged-In SCSI Hosts](#)
- [Behavior of an Unavailable Fibre Channel Port](#)
- [Is the FC connection working? There is no LINK light.](#)

### See Also

- ["Assign Partitions to a SCSI Host and Alter LUN Assignment"](#) on page 9-5
- ["View the Host Connections of a Partition"](#) on page 9-6




## Add, Modify, or Delete a SCSI Host

The library automatically detects SCSI hosts connected to the SAN. However, you can manually add, modify, rename, or delete SCSI hosts.

---

**Note:** You can only delete a host if it is currently logged out.

---

1. Click **Partitioning** in the left navigation area of the GUI.
2. Click the **SCSI Host Configuration** tab.
3. Click **Add** , or select a SCSI host and then click **Modify**  or **Delete** .
  - **Host Alias** - limited to 64 characters
  - **World Wide Name** - 16 characters (8 byte) hexadecimal fields not prefixed with "0x" (for example B97F877BF079F405)

### See Also

- ["Assign Partitions to a SCSI Host and Alter LUN Assignment"](#) on page 9-5
- ["View the Host Connections of a Partition"](#) on page 9-6
- ["View the SCSI LUN Mapping"](#) on page 10-2
- ["View Actively Logged-In SCSI Hosts"](#) on page 10-2

## View the SCSI LUN Mapping

In a non-partitioned library, all hosts are automatically connected to the default partition on LUN 0. After configuring partitioning, you can alter the LUN assignment and assign multiple partitions to each host (see ["Assign Partitions to a SCSI Host and Alter LUN Assignment"](#) on page 9-5).

1. Click **Partitioning** in the left navigation area of the GUI.
2. Click the **SCSI Host Configuration** tab.

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**Note:** Users with service roles (see ["User Roles"](#) on page A-1) will see additional columns in this table to help diagnose SCSI connectivity issues.

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## View Actively Logged-In SCSI Hosts

The library lists actively logged in hosts and displays which ports the hosts are connected to. Additionally, you can view the LUN assignment of the hosts.

1. Click **Partitioning** in the left navigation area of the GUI.
2. Click the **Active SCSI Hosts** tab. The table only shows host that are actively logged into the library.
3. To view the LUN assignment, select a host and then click **Show LUNs**  or see ["View the SCSI LUN Mapping"](#) on page 10-2.

### See Also

- ["Add, Modify, or Delete a SCSI Host"](#) on page 10-1
- ["Assign Partitions to a SCSI Host and Alter LUN Assignment"](#) on page 9-5
- ["View the Host Connections of a Partition"](#) on page 9-6

## Behavior of an Unavailable Fibre Channel Port

The library controller comes standard with two FC ports (1 and 2). By default only port 1 is fully active (available). Port 2 is unavailable until you install the Redundant Control Paths (multi-port) hardware activation file (see ["Add or Remove Optional Library Features"](#) on page 5-5).

The library can receive commands on an unavailable port. However, the unavailable port only fully supports Inquiry, Report LUNs, Report Target Port Groups, and Request Sense. For all other commands, the library terminates the command with Check Condition status and sets the sense key to Not Ready, Logical Unit Not Accessible, Target Port in Unavailable State.

For more information, see the *SL4000 SCSI Reference Guide*.

## Is the FC connection working? There is no LINK light.

The Fibre Channel ports on the Library Controller card do not have lights to indicate there is a link. To see if the ports are connected to a host:

1. Click **Hardware** in the left navigation area of the GUI.
2. Click the **FC Ports** tab.

3. If a host is currently connected, the port **Link State** will be **Up**.

---

**Note:** By default only FC port 1 is fully active (available) and can receive all supported SCSI commands. You must install the Redundant Control Paths (multi-port) activation file to fully activate port 2, see "[Behavior of an Unavailable Fibre Channel Port](#)" on page 10-2.

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**See Also**

- "[Behavior of an Unavailable Fibre Channel Port](#)" on page 10-2

Is the FC connection working? There is no LINK light.

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## Operating and Managing the Library

### Contents

- [View the State of the Library, Devices, and Partitions in the Status Bar](#)
- [View the Cell Map](#)
- [View Hardware Device Status](#)
- [View the Inside of the Library Using the Web Camera](#)
- [View Library Requests, Jobs, and Resources](#)
- [Cancel a Library Request](#)
- [View a List of All Cells in the Library](#)
- [View the SCSI Element IDs](#)
- [View Firmware Levels](#)
- [View a Graph of Device Telemetry Data](#)
- [Set the Control State of a Device Online or Offline](#)
- [Set the Library Online or Offline](#)
- [Turn Off the Library](#)
- [Turn On the Library](#)
- [Restart the Library or Reboot Library Operating System](#)
- [Audit All or Part of the Library](#)

### See Also

- ["Managing Tape Cartridges" on page 7-1](#)
- ["Managing and Operating CAPs" on page 8-1](#)
- ["Managing Drives" on page 6-1](#)

## View the State of the Library, Devices, and Partitions in the Status Bar





The status bar, located near the top of the GUI screen, displays the current library state and the number of devices and partitions in each state. The overall library state automatically updates based on the status of devices within the library.

---

**Note:** Clicking the library state in the status bar displays the current Library Condition Indicators and notes any offline or inoperative devices.

---

### Library States





- **Starting Up** — the library will be in this state immediately after powering on or restarted. The library is waiting for devices to "announce" their presence. If the library remains in "Starting Up" state for more than a few minutes, click the library state to see what the library is waiting for.
- **Initializing**  — the library is initializing the robots.
- **Operative**  — the library is fully operational.
- **Operative, Partially Online** — the library is operational, but some devices are in an offline state. Click the "Operative, Partially Online" status for a list of offline devices.
- **Degraded**  — a device in the library has failed or is offline, but the library can continue to function.
- **Inoperative**  — a device has failed and the library cannot function (such as a failed robot in a single robot configuration).

### Partition and Device States

**Device Status** — In the status bar, clicking the device count adjacent to the indicator takes you to the hardware device tree (see "[View Hardware Device Status](#)" on page 11-3). The device counts in the status bar include all devices but not modules, while the device counts in the device tree include modules. Therefore, the device counts in the status bar and device tree will differ slightly.

**Partition Status** — In the status bar, clicking any of the partition counts takes you to the partition page (see "[Partitioning the Library](#)" on page 9-1) where you can filter or sort by control or operational state.

Status Indicators:


- **Operative**  — the device/partition is operating properly. A device is operative if the library can fully use the device, its control state is online, and its operational state is operative.
- **Offline**  — the device/partition is in the offline control state.
- **Degraded**  — a device/partition has failed, but the library can continue to function.
- **Inoperative**  — a device/partition has failed causing the library to not function.

## Locate a Failed Device







If the library is "Partially Online", "Degraded", or "Inoperative", click the library state in the status bar to view offline or failed devices. Or, click **Hardware**, followed by the **Device Status** tab, and then click the **Faulted Devices** tab to identify which device is causing the state.

## View the Cell Map

You can use the cell map to view the current location of tapes and drives in the library.

1. Click **Library** in the left navigation area of the GUI.
2. Click a module. A green arrow  indicates the currently selected module.
3. Hover over a cell to view the cell address, partition assignment, tape type, and so on. Click a cell to view more options:
  - ["Move or Mount a Tape Cartridge"](#) on page 7-2
  - ["Physically Locate a Drive Using the Locator LED"](#) on page 6-2
  - ["Set a Drive Online or Offline"](#) on page 6-2
  - ["Reset a Drive \(Power Cycle the Drive\)"](#) on page 6-3

## Cell Map Legend

Cell Map Icon	Meaning
	Tape. Indicates cell is occupied or drive is mounted.
	Tape cell.
	CAP cell.
	Reserved system cell, generally used to store cleaning and diagnostic tapes. Hosts cannot access these cells.
	Drive.
	Empty drive bay.

### See Also

- ["View a List of All Cells in the Library"](#) on page 11-5

## View Hardware Device Status

You can display status information for all devices in the library.

1. Click **Hardware** in the left navigation area of the GUI.
2. Select a tab:
  - **Device Status Tree** tab - shows a hierarchal device tree for all devices in the library. The library cannot populate the device tree while in "Starting Up" state. Select a viewing option for the device tree:
    - **All Devices button** - shows all installed devices (default view)
    - **Faulted Devices button** - shows only the devices in a troubled state
    - **All Locations button** - shows all installed devices, plus empty location where a device could be installed (for example an unoccupied drive bay)

---

**TIP:** Right-click in the device tree, and then use "Collapse", "Collapse All Below", "Expand", or "Expand All Below" to view specific portions of the device hierarchy.

---

- **All other tabs** - show devices of that type in table format. These tabs may be incomplete if the library is in "Starting Up" state.

## View the Inside of the Library Using the Web Camera



The web camera is an optional feature installed on the inside of a Base or Drive Modules used to view library operations. This can be useful to view the tape drives without opening the library door.

1. Click **Hardware** in the left-navigation area of the GUI.
2. Click the **Cameras** tabs.

---

**Note:** If library contains cameras but they are not showing up in the list, from the **Actions** drop-down select **Detect Cameras**.

---

3. Select the camera from the list, and then use the **Actions** drop-down (or right-click menu) to select **View** .
4. Use the arrow buttons  to move the camera's field of view or click **Reset** to center the camera straight forward.

## View Library Requests, Jobs, and Resources

Every external command to the library (SCSI, SCI, GUI, SNMP, GET) and many internal actions will result in a request. You can use the Requests page to monitor the requests to the library. As the library executes requests, it generates "request output messages" which describe the actions taken by the library or any errors encountered. You can view these messages in the GUI.

Some library requests generate jobs. For example, moving a tape from one cell to another would generate a parent "Move" job and two sub-jobs: "Fetch" and "Put". Jobs allocate cells, devices (robots, drives, and so on), and rail segments. Only one job at a time can use each resource. Use the Jobs and Resources page to monitor library activity.

1. Click **Activity** in the left navigation area of the GUI.
2. Click the **Requests** tab, **Jobs** tab, or the **Resources** tab.
3. To view more information: Select a row in the table, and then from the **Actions** drop-down (or right-click menu), select **Details**.

For Requests, the Details screen shows several tabs:

- **Details** - summary of detailed information about the request.
- **Output Messages** - the list of request messages generated as the library processed the request
- **Log Messages** - (selected roles only) log message that references the request.

For Jobs, you can select **Request Details** to view information about the parent request that spawned the job. If a **Download** button is present, then you can save the entire Details or open it in an application.

4. To only view active requests or jobs, filter for 'Active' in the Status column ("[Search and Sort Tables](#)" on page 3-4).

**See Also**

- ["Cancel a Library Request"](#) on page 11-5

## Cancel a Library Request

---

**Note:** You can only cancel requests that are "Active" or "Submitted".

---

1. Click **Activity** in the left navigation area of the GUI.
2. Click the **Requests** tab or the **Jobs** tab.
3. Select the request or job. From the **Actions** drop-down (or right-click menu), select **Request Cancel** (for requests) or **Cancel Parent Request** (for jobs).

---

**TIP:** To cancel multiple requests: ctrl-click or shift-click to select the requests, and then from the **Actions** drop-down (or right-click menu), select **Request Cancel/Cancel Parent Request**.

---

### Cancellation is Not Immediate

After you cancel a request, the library completes all in-progress robot operations and attempts to leave itself in a consistent state. For in-progress moves, the library returns the tape to the source cell, if possible. For canceled diagnostic tests, the library attempts to return the tape to the cell it started in before the diagnostic began.

**See Also**

- ["View Library Requests, Jobs, and Resources"](#) on page 11-4
- ["Search and Sort Tables"](#) on page 3-4

## View a List of All Cells in the Library

1. Click **Cells/Tapes** in the left navigation area of the GUI.
2. Click the **All Cells** tab.

**See Also**

- ["View the Cell Map"](#) on page 11-2
- ["View a List of Tape Cartridges"](#) on page 7-1
- ["View a List of Cleaning Cartridges"](#) on page 7-1

## View the SCSI Element IDs

Hover over a cell on the cell map (see ["View the Cell Map"](#) on page 11-2), or view the drive table or cell table "SCSI element ID" column (see ["View Drive Information"](#) on page 6-1 and ["View a List of All Cells in the Library"](#) on page 11-5).

## View Firmware Levels

The library and devices contain firmware. You can view the current firmware version and build date.

## View Device Firmware

1. Click **Firmware** in the left navigation area of the GUI.
2. Click one of the following tabs:
  - **Available Device Firmware** - shows the device firmware that was delivered as part of the library firmware image.
  - **Reported Device Firmware** - shows the firmware that the devices themselves report. This firmware may or may not be the same version as what is shown on the Available table since some devices may be blocked from receiving upgrades (see "[Block, Allow, or Force Device Firmware Upgrades](#)" on page 15-10).

## View Library Firmware

1. Click **Firmware** in the left navigation area of the GUI.
2. Click the **Library Firmware** tab.

### See Also

- "[Upload and Manage Library Firmware](#)" on page 5-9

## View a Graph of Device Telemetry Data

Some devices in the library periodically collect time-stamped measurements. Using the GUI, you can view a graph of the telemetry data.

1. Click **Hardware** in the left-navigation area of the GUI.
2. Select a device from the device tree. You can view telemetry for the following:
  - Library Controller
  - Robot
  - Drive
  - Root Switch
  - Drive Switch
  - Fan assembly
  - DC power controller
3. Use the **Actions** drop-down (or right-click menu) to select **Device Telemetry**, and then select a type of measurement.
4. By default, the graph shows the past three days of telemetry data. Adjust this time span by clicking the buttons above the graph.
5. For further analysis of telemetry data, you can download the graph's source data in CSV format, and then import the data into a graphing application of your choice.

## Types of Telemetry Measurements

Telemetry data can be a running total (such as robot and CAP operational data) or show an instantaneous value for a point in time (such as temperature or fan speed). Running totals reset after each library startup. The following describes the device data collected.

### Robot Measurements

- **Gets** - running total of gets performed by robot
- **Get Retries** - running total of retries performed during gets
- **Failures** - running total of failures during gets
- **Puts** - running total of puts performed by robot
- **Put Retries** - running total of retries performed during puts
- **Put Failures** - running total of failures during puts

### CAP Measurements

The library collects CAP measurements for both rotational and Access Module CAPs.

- **Operations** - running total of open and close operations performed by CAP
- **Retries** - running total of retries
- **Unrecoverable Errors** - running total of unrecoverable errors for the CAP (typically zero or one because an unrecoverable error requires replacement)
- **Reboots** - running total of CAP restarts (typically just one at library startup, but this can be higher if you replace the CAP controller card while the library is running)

### Library Energy Measurements

Each PDU in the library has a single sensor that collects the energy draw and energy consumption for the PDU. Total power consumption is the sum of all PDU energy usage in the library.

- **Kilowatts** - average power draw over measurement period, in KW
- **Kilowatt hours** - energy consumption over measurement period, in KW-hours
- **Duration** - measurement period

### Device Power Measurements

Some devices contain "hot swap controller chips" that collect the energy draw and energy consumption for the device and any downstream components.

- **Input Voltage** - input DC voltage to the device in volts.
- **Watts** - power draw in watts at the time of measurement
- **Input Amps** - input current to the device in amps.

Devices monitored in the Base card cage:

- Library controllers
- Feature cards
- Root switches, which each have a 12V input sensor and a 48V power sensor for the web camera
- Fan assemblies
- Storage hard drives
- Video card

Robot-related devices monitored:

- Rail controller, which has an input sensor to the rail controller and an input sensor to the rail
- Robot controller, which captures input to the robot controller and robot, including all mechanical mechanisms

Drive-related devices monitored:

- Drive switches
- Drive controller which captures input to the drive tray (including power for the drive controller, fans in the drive tray, tape drive and encryption card, if present)

Access Module devices monitored:

- Access module controllers which capture the input to the Access Module (including power for access module controller and the mechanical mechanisms in the module)

Other devices monitored:

- Rotational CAPs (rotary)

### Network Statistics Measurements

Ethernet switches and some device controllers in the library collect a running total of network performance data. The root and drive switches collect data infrequently due to the high number of ports, about every 10 to 20 minutes. The rail, robot, drive, and Access Module controllers collect data every few minutes. Each device has multiple sensors that represent the network ports on that device that link to another device. The sensor names reflect the destination of the link.

- **Port Speed** - speed at which the port is running.
- **Transmit Bytes** – bytes transmitted by the port.
- **TX Dropped Packets** – transmit packets dropped by the port due to lack of resources or internal MAC sublayer transmit error.
- **TX Collisions** – collisions experienced by a port during packet transmissions.
- **TX Pause Events** – PAUSE packets transmitted on the port.
- **Receive Bytes** – bytes of data received by the port.
- **RX Dropped Packets** – packets received by a port that were dropped due to lack of resources. This increments only if the receive error was not counted by the RX Alignment Errors or the RX FCS Errors counters.
- **RX Pause Frames** – PAUSE packets received by a port.
- **RX Alignment Errors** – packets received by a port that have a bad FCS with a nonintegral number of bytes.
- **RX FCS Errors** – packets received by a port that have a bad FCS with an integral number of bytes.
- **RX Symbol Errors** – Number of times a valid length packet was received at a port and at least one invalid data symbol was detected.

Devices that record network statistics:

- Access Module controller
- Drive controller
- Drive switch



- Rail controller
- Robot controller
- Root switch

### Fan Measurements

- **Performance** - an overall assessment of the fan's health based on comparing the measured fan speed to the expected speed. The actual speed may be higher or lower than the expected speed.
  - **GOOD** — measured speed is within 15% of the expected speed.
  - **MARGINAL** — measured speed is between 15% and 20% of the expected speed.
  - **POOR** — measured speed is more than 20% away from the expected speed.
  - **UNSTABLE** — the fan speed cannot be measured accurately
  - **NO\_READING** — the fan performance cannot be determined at the time of the measurement.
- **Speed** - actual fan speed in RPM at the time of the measurement

Devices that record fan measurements:

- Drive controller (up to three fans, depending on drive type)
- Fan assembly (four fans)

### Temperature Measurements

- **Temperature** - in degrees Celsius at time of measurement

Devices that record temperature:

- Library controllers (two sensors)
- Robot controllers (two sensors)
- Drive controllers
- Root switches (two sensors)
- Drive switches
- Access Module controllers
- DC convertors (two sensors).

## Set the Control State of a Device Online or Offline

An offline device is unavailable to hosts. You should take a device offline before removing it from the library.

1. Click **Hardware** in the left navigation area of the GUI. Locate the device in the device tree.
2. Select the device and then from the Actions drop-down (or right-click menu) select **Control State**, and then click **Go Online** or **Go Offline**.

---

---

**Note:** Some devices (such as drives and robots) will complete in-process jobs before going offline. When this occurs, the GUI indicates "offline pending" for the device.

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## What's the Difference Between Control State and Location State?

The control state indicates the current online or offline state of the device. The location state (either Bring Online or Keep Offline) determines whether the library should bring the device in that slot online when you insert a new device or when the library powers on.

## Set the Library Online or Offline

An offline library is unavailable to hosts, therefore taking the library offline is disruptive to host operations. You should stop any host activity before taking the library offline.

1. Click **Online** or **Offline** in the upper right corner of the GUI.
2. Change the library state.



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**Note:** If there are jobs in-process when you take the library offline, the library will remain in a "going offline" state until it completes the jobs, and then transition to "offline".

---

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## Turn Off the Library


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**Note:** Powering down the library will interrupt all host jobs. If you shut off power to the library without performing the following procedure, you risk possible equipment damage, tape damage, and loss of data.

---

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1. Stop any host activity. Ensure all library requests have completed (see "[View Library Requests, Jobs, and Resources](#)" on page 11-4).
2. Click the power button  in the upper left of the GUI.
3. Select **Power Down Library**.
4. Optionally, select settings "Bypass audit" or "Probe for configuration" when the library turns on (for a description of these options, see "[Library Settings Options](#)" on page 5-3)

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**Note:** You must select "Probe for configuration changes" if you plan to add or remove modules, drive arrays, or CAPs.

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5. Click **Power Down**. The library operator panel will go black once the power down sequence completes.

6. Open the back doors of the Base Module (and any Drive Modules if present).
7. Turn off the breaker on each PDU.

## Turn On the Library

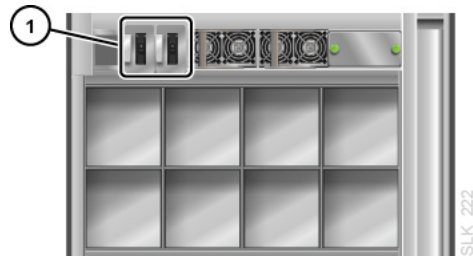
Once you turn on the library, the initialization sequence will begin. If someone opened an access door while the library was off, the library performs a full audit (unless you selected bypass audit in the library settings, see "[Library Settings Options](#)" on page 5-3).

1. Open the rear doors of the Base Module (and any Drive Modules if present).
2. Turn on the breaker for each PDU.
3. If necessary, turn on the rail controller modules at the top of the Base module.

---

**Note:** You can turn on the PDU and rail controller breakers in any order. However, you must turn on all breakers within two minutes of turning on the first breaker.

---




1. Rail controller modules

## Restart the Library or Reboot Library Operating System

- **Restart the Library** — completely stops and restarts the library controller.
- **Reboot Library OS** — only restarts the operating system, it does not completely restart all library systems. This option generally takes a shorter amount of time.

Neither option power cycles the library. To power cycle, you must manually flip the PDU switches.

1. Click the power button  in the upper left of the GUI.
2. Select **Restart Library** or **Reboot Library OS**.

---

**Note:** If you bypass the audit, the contents of the library must not change. The library will not perform an audit when it initializes.

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3. Click **Restart**.
4. You will be logged out of the GUI, wait until the library initializes to log back in.

## Audit All or Part of the Library

An audit verifies cell contents and updates the library database, which contains the volume ID (volser), current location, and verified status for each tape. The library automatically performs a full library audit after a front access door closes (excluding the Access Module door when used as a CAP) or after the library initializes (unless you select bypass audit in the "[Library Settings Options](#)" on page 5-3).

1. Click **Cells/Tapes** in the left navigation area of the GUI.
2. From the **Actions** drop-down (or right-click menu), select **Audit**.
3. Select the starting and ending address. Select the cell types to audit.

To run a full library audit, select the following values:

- Starting Address
  - Column: smallest value available (most likely the most negative value)
  - Side: Back
  - Row: 1
- Ending Address
  - Column: highest positive value available
  - Side: Front
  - Row: 52
- Cell Types: All

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## Configuring Notifications - Email, SNMP, SCI, or ASR

The library can send notifications to external destinations when certain library events occur. The library supports four destination types: Outbound StorageTek Library Control Interface (SCI), Simple Network Management Protocol (SNMP), Email, and Automatic Service Requests (ASR). Each destination type uses a specific protocol and requires destination-type specific information, such as IP addresses, email addresses, and credentials.

### Contents

- [Alerting Event Categories](#)
- [View a List of Library Events](#)
- [Configure Email Notifications](#)
- [Configure SNMP Notifications](#)
- [Configure Outbound SCI Notifications](#)
- [Add an SDP2 Server to Receive ASR Notifications](#)
- [View the History of ASR Notification Activity](#)
- [Create a Test Event Alert](#)

## Alerting Event Categories

Library events are grouped into categories. You select the alerting event category of interest when configuring each notification destination type. When an event occurs, the library sends a message to all destinations configured to receive that event category. In the table below, x denotes that the destination type supports the event category.

Event Category	Events Included	Email	SNMP	SCI	ASR
Fault	Fault detected.	x	x	x	x
Cartridge_movement	Tape moved between storage cells, tape mounted, tape dismounted.	x	-	x	-
Media_validation	Media validation partition modified, validation data notification (sent one minute after media validation starts and then every 10 minutes)	x	-	x	-
Device	Device state changed, device removed, device failed, and device fault detected.	x	x	x	x
Door	Door opened, door closed, and audit completed.	x	x	x	-

Event Category	Events Included	Email	SNMP	SCI	ASR
Cap	CAP ownership overridden, CAP ready to open, CAP opened, CAP closed, and audit complete.	x	-	x	-
Partition	Partition change. Generally, any partitioning changes involve at least two partitions, because the commands that change partitions move cells and drives from one partition to another.	x	-	x	-
Cleaning required	Drive needs cleaning by an application. The library does not send this call if library auto-cleaning is enabled.	x	-	x	-
Library	Library or rail state changed, capacity changed, library audit completed, and lost cartridge found.	x	x	x	x
Heartbeat	Heartbeat stopped.	-	-	x	x
Test	Test notification sent by library (see <a href="#">"Create a Test Event Alert"</a> on page 12-6).	x	x	x	x

## View a List of Library Events

You can view a list of when and what events have occurred for the library.

1. Click **Activity** in the left navigation area of the GUI.
2. Click the **Events** tab.


### See Also

- ["Alerting Event Categories"](#) on page 12-1

## Configure Email Notifications

- [Configure the SMTP Server](#)
- [Configure Email Recipients](#)
- [Test an Email Notification](#)

### Configure the SMTP Server

1. Click **Notifications** in the left navigation area of the GUI.
2. Click **Configure**  under the Email tab.
3. Enter the SMTP information:
  - **Enabled** - Globally enables or disables all email activity for the library (including password recovery emails)
  - **SMTP Host Address** - Enter the email server host address.
  - **From Name** and **From Email Address** - The information that will appear in the "from" fields of the email client. Set short but meaningful values. For example:
    - Name: STK\_Alert\_YourLibraryName
    - Email Address: STK\_Alert@YourLibraryName




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**Note:** If the recipient is using a spam filter, they should whitelist the library email address to prevent the filter from blocking the emails.

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- **SMTP Protocol** - TCP is open and unauthenticated. SSL and TLS are secure and require a username and password.
- 4. After making any changes to the SMTP settings, you should add a recipient (see ["Configure Email Notifications"](#) below) and send a test email (see ["Test an Email Notification"](#) on page 12-3).

## Configure Email Recipients

1. Click **Notification** in the left navigation area of the GUI.
2. Click the **Email** tab.
3. Click **Add** , or select a recipient and then click **Modify**  or **Delete** .
  - **Locale** - sets the language of the notification.
  - **Alerting Event Types** - the notification categories that the library should send (see ["Alerting Event Categories"](#) on page 12-1). You should include the "Test" event for the administrator's email. Then, when you trigger a "Test Notification" through the Notifications Test tab (see ["Create a Test Event Alert"](#) on page 12-6), the administrator will receive an email.

## Test an Email Notification

You can run a test to validate that the email notifications are properly defined. The test sends a message using the configured SMTP server.

1. Click the **Email** tab, select a recipient from the list.
2. Click **Test** , and then confirm the test.
3. If SMTP Server has been setup correctly, you will see "Message accepted for delivery".

If the attempt times out or results in an error, there are other issues with the SMTP configuration, then resolve the issue and retry the test. Try pinging the email server to verify that the library can reach it.

## Configure SNMP Notifications




Simple Network Management Protocol (SNMP) is an application layer protocol that performs network management operations over Ethernet using the User Datagram Protocol/Internet Protocol (UDP/IP). With SNMP, clients can query the library for information (configuration, operation, statistical) and the library can inform clients of potential problems.

- [Configure SNMP Users](#)
- [Configure SNMP Trap Recipients](#)
- [Test an SNMP Recipient](#)

## Configure SNMP Users




If your SNMP manager will perform GET requests against the library, you must define an SNMP user.

1. Click **Notification** in the left navigation area of the GUI.
2. Click the **SNMP Users** tab.

3. Click **Add** , or select a user and then click **Modify**  or **Delete** .
- **Authentication Protocol** - Choose SHA for best security or MD5 for compatibility with systems that use MD5. Enter an authentication password.
- **Privacy Protocol** - Choose NONE, AES, or DES. Select AES (Advanced Encryption Standard) for best security or DES (Data Encryption Standard) for compatibility with systems that use DES. Enter a privacy password for AES or DES.


## Configure SNMP Trap Recipients

An SNMP trap recipient is a network management station that you designate to receive trap notifications sent by the SNMP agent on the library.

1. Click **Notification** in the left navigation area of the GUI.
2. Click the **SNMP Trap Recipients** tab.
3. Click **Add** , or select a recipient and then click **Modify**  or **Delete** .
- **Host address** - the IP address of the management host that will receive the trap.
- **Alerting Event Types** - the notification categories that the library should send (see "[Alerting Event Categories](#)" on page 12-1). You should include the "Test" event for each recipient so that you can test the configuration. See "[Test an SNMP Recipient](#)" on page 12-4.
- **Authentication Protocol** - Choose SHA for best security or MD5 for compatibility with systems that use MD5. Enter an authentication password.
- **Privacy Protocol** - Choose NONE, AES, or DES. Select AES (Advanced Encryption Standard) for best security or DES (Data Encryption Standard) for compatibility with systems that use DES. Enter a privacy password for AES or DES.
- **Engine ID** - In most cases, accept the default value. If you must override this value, enter a hexadecimal value that starts with 0x and does not contain either all zeroes (0) or all sixteens (F).


## Test an SNMP Recipient

You can run a test to validate that the SNMP recipients are properly defined. The test sends a test trap (level 13) to the recipient.

1. Select a destination.
2. Click **Test** , and then confirm the test.

## Download the MIB File

The management information base (MIB) is an ASCII text file containing the object identifiers (OIDs) that define the characteristics of a managed device (the library). When a manager requests information, or a managed device generates a trap, the MIB translates the numeric strings into readable text that identifies each data object within the message.




1. Click **Notification** in the left navigation area of the GUI.
2. Click the **SNMP Users** tab.
3. Click **Download MIB File** .



## Configure Outbound SCI Notifications

Outbound StorageTek Library Control Interface (SCI) messages will be sent to clients registered as listeners. Sending an outbound SCI message is similar to sending an SNMP trap.

### Configure the Library to Send Outbound SCI

1. Click **Notifications** in the left navigation area of the GUI.
2. Click the **SCI** tab.
3. Click **Add** , or select a destination and then click **Modify**  or **Delete** .
  - **Username and password** - optional depending on the security policy of the client
  - **IP address, port number, and URL** - enter the client information
  - **Retention Time Limit** - the amount of time (in hours) the library will store outbound messages when a destination is unavailable. The library will periodically attempt to send pending messages to the destination. The library deletes any pending messages it cannot send within the retention time limit.
  - **Alerting Event Types** - the notification categories that the library should send (see "[Alerting Event Categories](#)" on page 12-1). You should include the "Test" event so that you can test the SCI destination configuration.

### Configure the Destination to Receive SCI Notifications

At a minimum, you must configure the destination to use SSL/TSL for the library connection. If you added a username and password when configuring the destination on the library, it sends the credentials as a username/password token in the SOAP headers of the messages.

#### Implement the WSDL Interface

The library sends outbound SCI messages using a WSDL interface. An application developer must implement this interface at the destination so that the library can make successful outbound SCI calls.

You can find the WSDL at:


`http://<hostname>:<port>/OutboundWebService/`

- `<hostname>` is the hostname of the library in your DNS.
- `<port>` is the port you have configured for the library. The default port number is 80.

The developer must implement the outbound SCI interface methods so that these calls return quickly by capturing the data sent on the call and then returning the call immediately. The application should wait to process data until after returning the call.

### Test a SCI Destination


You can run a test to validate SCI destinations are properly defined. The test sends a "test" event message to the destination.

1. Select a destination.
2. Click **Test** , and then confirm the test.


## Add an SDP2 Server to Receive ASR Notifications

If you are using a local Service Delivery Platform 2 (SDP2) server, the library can send Automatic Service Requests (ASRs) to Oracle. For more information, refer to the SDP documentation.

### Add the ASR Destination

1. Click **Notifications** in the left navigation area of the GUI.
2. Click the **ASR** tab.
3. Click **Configure** .
4. Select **Enabled**. Enter the SDP2 server information. Select the network interface to use to communicate with SDP2, and then click **Ok**.

### Register an ASR Destination

1. Click **Register and Test ASR Destination**  to begin the client registration. The library automatically fills in the client identifier.
2. See the SDP2 documentation to complete the ASR registration.

## View the History of ASR Notification Activity

You can view a list of when and what ASR notifications have been sent out by the library.

1. Click **Notifications** in the left navigation area of the GUI.
2. Click the **Notification History** tab.

## Create a Test Event Alert

You can create a test event to verify all configured notification destinations. Creating a test even only notifies destinations (email, SNMP, SCI, or ASR) that are configured to receive the "test" event type.

1. Click **Notifications** in the left navigation area of the GUI.
2. Click the **Test** tab.
3. Click **Test Notifications**.

---

## Validating Media

You can validate the integrity of T10000 cartridges using the media validation (MV) feature.

### Contents

- [Add or Remove Drives from the Media Validation Partition \(Pool\)](#)
- [Validate a T10000 Tape \(Media Validation\)](#)

### See Also

- ["Partitioning the Library" on page 9-1](#)
- ["Managing Tape Cartridges" on page 7-1](#)
- ["Managing Drives" on page 6-1](#)



## Add or Remove Drives from the Media Validation Partition (Pool)

To use media validation (MV), you must dedicate drives to a special Media Validation partition containing T10000C or D drives. The partition can only contain drives (not storage cells). Hosts cannot access the drives within the MV partition. The library automatically cleans MV drives regardless of the auto clean status for other partitions or individual drives in the MV pool.

---

**Note:** When adding or removing drives from the MV partition, affected partitions will temporarily go OFFLINE.

---

1. Click **Partitioning** in the left navigation area of the GUI.
2. Click **Assign Cells** .
3. *To add a drive* — From the first drop-down list, select the source partition to move the drive from (if you have not partitioned the library, select the **DefaultPartition**). From the second drop-down list, select **Media Validation**.  
*To remove a drive* — From the first drop-down list, select **Media Validation**. From the second drop-down list, select the destination partition to move the drives to.
4. Click a module that contains drives (the green arrow below a module  indicates the currently selected module).
5. Choose a **Select Cells By** method (for a description see ["Partitioning Selection Methods" on page 9-4](#)).

- Click a T10000C/D drive or an empty drive bay to add/remove. You can add non-supported drives, however these will not be used for media validation.

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**TIP:** Hovering over a drive will show the drive type.

---

On the cell map, media validation drive bays are indicated by MV .

- Click **Next**, and then apply the changes.

#### See Also

- "[Validate a T10000 Tape \(Media Validation\)](#)" on page 13-2

## Validate a T10000 Tape (Media Validation)

The media validation (MV) feature evaluates the integrity of a T10000 tape contained in a storage cell. To use media validation, you must assign T10000C or D drives to the Media Validation partition (see "[Add or Remove Drives from the Media Validation Partition \(Pool\)](#)" on page 13-1).

- Click **Cells/Tapes** in the left navigation area of the GUI, and then click the **Tapes** tab.
- Select a T10000 T1 or T2 tape from the tapes table. From the **Actions** drop-down (or right-click menu), select **Media Validation**.

---

**Note:** You can only validate tapes in storage cells, not system cells. If you want to run media validation on a tape in a system cell, you must first move that tape into a storage cell.

---

- Select the type of validation (see "[Media Validation Types](#)" below).
- Select a drive. You should validate the media on a drive that is the same level or higher than used to write the media. For example, if the media was written using a T10000C drive, you could validate it on a C or D drive. However, if the media was written on a D drive, only use a D drive to validate the media.

The drop-down shows the T10000C or D drives currently available in the Media Validation partition. To add a drive, see "[Add or Remove Drives from the Media Validation Partition \(Pool\)](#)" on page 13-1.

## Media Validation Types

Type	Description	Starts at	Approximate Duration per Tape
<b>Basic Verify</b>	Mount and dismount to determine if media information record (MIR) is unreadable or out of sync. The only test that is valid for blank tapes.	NA	2 minutes
<b>Standard Verify</b>	Verifies: <ul style="list-style-type: none"> <li>- 1000 records from the beginning of tape (the highest-priority area of media)</li> <li>- The end of data (EOD)</li> <li>- Outermost wraps on top and bottom bands to verify edges</li> </ul> Records are not decompressed nor decrypted.	Beginning of tape (BOT)	Maximum of 30 minutes regardless of the data and the compression ratio used

Type	Description	Starts at	Approximate Duration per Tape
<b>Rebuild MIR</b>	Verifies the MIR and rebuilds it if necessary. Records are not decompressed nor decrypted.  If there are errors, the drive begins reading data at tape speed from the last-known valid position on the MIR.  If MIR is invalid or out of sync, the drive begins reading from the BOT, to gather the information to rebuild the MIR.	Last-known valid position in the MIR  Or, beginning of tape to rebuild MIR	T10000C — 5 hours max T10000D — 9 hours max
<b>Complete Verify</b>	Verifies all data records on tape are readable. Reads data at tape speed. Records are not decompressed nor decrypted.	Beginning of tape	T10000C — 6 hours max T10000D — 9 hours max
<b>Complete Verify Plus</b>	Verifies all records on the tape are readable. Checks Data Integrity Validation (DIV). Data is decompressed and decrypted if records contain cyclic redundancy check (CRC) codes added by host.  The drive must be encryption capable and connected to Oracle Key Manager. Not valid for FICON drives.	Beginning of tape	T10000C— 6 hours for compression ratios less than 2.5:1.  T10000D — 9 hours for compression ratios less than 3:1



**Contents**

- [Logging Overview](#)
- [View a System Report](#)
- [View a Fault Report](#)
- [View or Download a Library Log](#)
- [A log message or support bundle was there previously, where did it go?](#)

**See Also**

- ["Create, Download, or Delete Support Bundles"](#) on page 15-11
- ["Modify the Logging Levels"](#) on page 15-11

## Logging Overview

**What is a System Report?**

Jobs and intelligent devices (those with onboard processors) generate system reports when a potential fault has occurred. The library evaluates the information in the system report and attempts to recover from the issue. If the library cannot resolve the issue, it creates a fault report, support bundle, and notification (email, SNMP, outbound SCI, or ASR).

After a job or device generates a system report, the library attempts to recover. The library will either initiate a recovery job or initiate handling of the fault. A typical recovery job will:

- Perform one or more diagnosis tests
- Generate a suspect FRU list and create a final system report indicating the failed device (if a failed FRU is identified)
- Log the status of the diagnosis

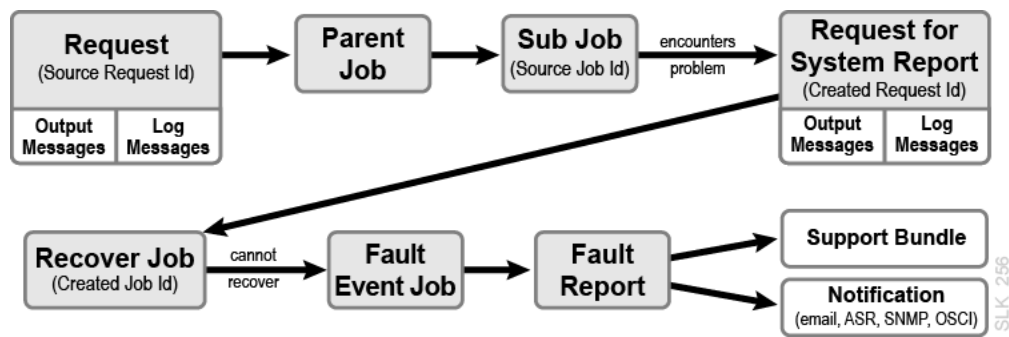
**What is a Fault Report?**

If the library cannot recover from an issue indicated in a system report, it generates a fault report. The report lists the faulted device and log information. Faults also generate a support bundle and notifications (email, SNMP, outbound SCI, ASR).

**What is a Support Bundle?**

Support bundles contain encrypted log files and database information used for fault diagnosis by Oracle service personnel. The library automatically generates a support bundle when it detects a fault.

## Fault Example



In this example, an external client (such as the GUI) creates a request. That request creates a parent job, which creates a sub job. The sub job encounters an issue and submits a request for a system report. The system report generates a recovery job. When the recovery job is unsuccessful, it creates a fault event job which creates a fault report. The fault then generates a support bundle and sends out notifications to any destination registered to receive the fault event category (see ["Alerting Event Categories"](#) on page 12-1).

The initial request is the "source request", and the sub job that encountered the issue is the "source job". The request submitted by the sub job to create the system report is the "created request". The recovery job is the "created job". Depending on the actions taken by the library to complete the requests, the details about the request may contain output messages and log messages.

### See Also

- ["View a Fault Report"](#) on page 14-3
- ["View a System Report"](#) on page 14-2
- ["View Library Requests, Jobs, and Resources"](#) on page 11-4
- ["Create, Download, or Delete Support Bundles"](#) on page 15-11
- ["Configuring Notifications - Email, SNMP, SCI, or ASR"](#) on page 12-1

## View a System Report

1. Click **Reports** in the left navigation area of the GUI.
2. Click the **System Reports** tab.
3. Select a report in the table. Use the **Actions** drop-down (or right-click menu) to view additional information.
  - **Source Request Details** — information about the request that spawned the problematic job. If the issue was not a direct result of a request (such as a sudden device failure), there will be no source request or source job information.
  - **Source Job Details**— information about the job that encountered the issue.
  - **Created Request Details** — information about the request made by the problematic job or intelligent device to generate the system report. Every system report will have a created request Id.



- **Created Job Details** — in some cases, the generation of a system report may create a job to recover from the issue. The created Job Details contains information about the job that was spawned by the system report.

Some Request Details pages will contain additional tabs that you can use to view more information about the issue.

- **Output Messages** - the list of request messages generated as the library processed the request
- **Log Messages** - (selected roles only) log messages that references the request.

#### See Also

- ["Logging Overview"](#) on page 14-1

## View a Fault Report

1. Click **Reports** in the left navigation area of the GUI.
2. Click the **Fault Reports** tab.
3. Select a report in the table. Use the **Actions** drop-down (or right-click menu) to view properties, view the corresponding system report properties, mark as reviewed, or download the corresponding support bundle.

#### See Also

- ["Logging Overview"](#) on page 14-1

## View or Download a Library Log

1. Click **Service** in the left navigation area of the GUI.
2. Click the **Library Logs** tab.
3. Select the starting and ending time for the log. You should select a start and end time around a specific event. Enter text to search for (optional). Click **View Log**.

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**Note:** Viewing hours or days of logs may result in a truncated view and may take multiple minutes to populate. If the GUI viewer truncates the log, download the log to see the entire time period.

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4. Optionally, click **Download Log** to save or view the log in an external application. Click **Download All Logs** to create an encrypted ZIP of all log files that you can send to Oracle support.

## Analyzing the Log

The log may contain diagnostic information that you can use for troubleshooting. The easiest way to analyze the log is to download and open it in a searchable text viewer.

Use the GUI's system reports, fault reports, or jobs page to identify the date/time and deviceId, jobId, or requestId relating to the issue. Then, search the log for that ID. For example, if the GUI indicates the library rail is inoperative and the rail has a deviceId of 38, you might search for "deviceId: 38" and review any log entry relating to that device for clues on the issue.

## **A log message or support bundle was there previously, where did it go?**

To prevent running out of storage space on the disk drive, the library rotates (overwrites) older logs, storing a maximum of 500MB of diagnostic log data. Due to log rotation, some request and job details may no longer have a log messages tab. Similarly, the library keeps the latest ten supports bundles and then removes the oldest once a new one is created. You should copy or download any log information or support bundles as soon after an event as possible.

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## Servicing the Library

### Contents

- [Log In As a Service User](#)
- [Run a Diagnostic Test](#)
- [Block, Allow, or Force Device Firmware Upgrades](#)
- [Create, Download, or Delete Support Bundles](#)
- [Modify the Logging Levels](#)
- [Clear the Database](#)
- [Modify the Database](#)
- [View and Modify the Library File System](#)
- [Open and Go Inside the Library](#)
- [Open an Access Module Door by Overriding the Lock](#)
- [Ping a Host](#)
- [Run a Host Trace Route](#)
- [Calibrate the Local Op Panel Touch Screen](#)
- [Restart the Local Op Panel Touch Screen](#)
- [Reset the Library to Factory Defaults](#)

### See Also

- ["View or Download a Library Log" on page 14-3](#)
- ["Add a Service User" on page 4-4](#)

## Log In As a Service User

Service users are created in one of two ways: the library automatically generates a service user after it detects a fault or the administrator manually creates a service user.

When the library detects a fault, it automatically creates a user with the "Service" role (see ["User Roles" on page A-1](#)) and generates an encrypted support bundle which contains the service role key file. However, if the fault requires more than 72 hours to resolve or requires a higher-level service role, the administrator of the library must create a service user and then provide the key file to Oracle (see ["Add a Service User" on page 4-4](#)). Oracle service personnel then decrypt the key file, which provides the service user ID and password (see the *SL4000 Installation and Service Guide* for procedures). All service users automatically expire 72 hours after creation.

## Run a Diagnostic Test

Diagnostic tests can help identify issues with the library or components, and verify the installation. Diagnostic tests are typically run by Oracle service personnel.


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**IMPORTANT:** You should run diagnostic tests that move tapes one at a time, otherwise a conflict could terminate one or both of the tests.


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1. Click **Diagnostics** in the left navigation area of the GUI.
2. Check to see if the diagnostic test you plan to run is disruptive. Before running a disruptive test, stop any host operations and take the library offline (see ["Set the Library Online or Offline"](#) on page 11-10).
3. Select a diagnostic test from the list, and then click **Run** .

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**Note:** If Run is grayed-out , you must take the library offline before running the test.

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4. Enter the values for the test (see ["Diagnostic Tests Descriptions"](#) on page 15-2 below), and then click **Ok**.
5. To view the progress of the test, click the **Diagnostics Results** tab.

For detailed test information, select the diagnostic in the list, and then from the **Actions** drop-down (or right-click menu), select **Request Details**. Click the **Output Messages** tab.

## Diagnostic Tests Descriptions

For some diagnostic tests, you must obtain parameters from the GUI before running the test. Use the following list to obtain the required GUI values.

### **allCaps (DISRUPTIVE TEST)**

Opens and closes all eligible CAPs. A CAP must be empty and closed to be eligible. This test skips any CAPs that are open, opening or closing or that contain cartridges. This test terminates when it reaches iterationCount or the timeLimit, whichever comes first. This test does not physically open the Access Module door. This test overwrites any existing CAP ownership for the duration of the diagnostic. When this diagnostic completes, the library returns ownership to the previous owner.

- **stopOnError** (check box) - If selected, this diagnostic test stops if it encounters an error. If not selected, and the test encounters an error, the test continues until it reaches the iterationCount or timeLimit.
- **iterationCount** - Number of iterations to perform. One iteration opens, and then closes each eligible CAP.
- **timeLimit** - Total time limit for the test. Allow approximately 100 seconds per rotational CAP per iteration.

### **allDrives (DISRUPTIVE TEST)**

Mounts and then dismounts a diagnostic tape to each eligible drive in the library. Drives must be empty to be eligible. This test skips any drives containing tapes or any drives that are empty but for which the library has no compatible diagnostic cartridges. This test terminates when it reaches iterationCount or timeLimit, whichever comes first.

- **stopOnError** (check box) - If selected, this diagnostic test stops if it encounters an error. If not selected, and the test encounters an error, the test continues until it reaches the `iterationCount` or `timeLimit`.
- **iterationCount** - Number of iterations to perform. Each iteration mounts and dismounts a diagnostic tape in each drive.
- **timeLimit** - Total time limit for the test. Allow approximately 25 seconds per drive per iteration.

#### **allLeds**

Sets all supported LEDs on all devices to the `desiredLedState` for the `holdTime`. Some LEDs do not change state instantaneously, therefore choose a `holdTime` that is long enough to allow all device LEDs to change state (for example 300 seconds).

- **desiredLedState** - The desired LED test state — LIT, UNLIT, SLOWBLINK, FASTBLINK
- **holdTime** - Duration in seconds that the LEDs remain in the `desiredLedState` before reverting to their original state.

#### **cellCalibration**

Calibrates the robot to a cartridge array or drive. For a cartridge array, specify a cell ID for any cell in the array.

- **deviceId** - ID of robot to calibrate — see ["Determine a Robot ID"](#) on page 15-10.
- **cellId** - A cell ID from the cartridge array to use for the calibration, or the cell ID of the drive. — see ["Determine a Cell ID"](#) on page 15-9.
- **isHandFull** (check box) - If selected, the robot picks up a tape before performing the calibration (this may interfere with normal operations if a client application needs the tape while this diagnostic runs). When the diagnostic completes, the robot returns the tape to its original cell. If not selected, the robot hand remains empty for the test.
- **fetchOrPutCellId** - If `isHandFull` was selected, this parameter is the cell ID that contains the tape to use. If `isHandFull` was not selected, the library ignores this parameter — see ["Determine a Cell ID"](#) on page 15-9.

#### **customerAcceptance (DISRUPTIVE TEST)**

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**IMPORTANT:** The library must contain at least 8 tapes in storage cells to perform a complete customer acceptance test.

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Runs a series of diagnostic tests to qualify the system after installation, but before customer hand-off. The customer acceptance test does the following in order:

1. Obtains all system versions
2. Obtains all device states
3. Obtains all feature information
4. Sets all supported LEDs on all devices to the `desiredLedState` for the `holdTime`. Then returns the LEDs to their original state.
5. Opens and closes all closed and empty CAPs
6. Moves a tape into or out of each corner of the library (8 total).

7. Mounts and dismounts a diagnostic tape on all drives if the library contains a compatible diagnostic tape for that drive type
8. Moves a tape from a system cell into each of the first and last cell of every CAP magazine
9. Moves a tape based on the cellMoveType parameter

Input parameters:

- **stopOnError** (check box) - If selected, this diagnostic test stops if it encounters an error. If not selected, and the test encounters an error, the test continues until it reaches the iterationCount or timeLimit.
- **iterationCount** - Number of iterations to perform. Each iteration repeats tests 6, 7, 8, and 9 above.
- **timeLimit** - Total time limit for the test in minutes.
- **holdTime** - Duration in that the LEDs blink before reverting to their original state. Allow approximately 4 minutes.
- **cellMoveType** - The library does a move based on the move type parameter:  
MAGAZINES — moves a tape into or out of the highest and lowest cell of each storage array within the library  
ALL — moves a tape into or out of every cell in the library  
NONE — does not perform a move

#### **devices**

Provides information about all installed devices and the locations where a device could be installed.

To see the information, go to **Diagnostic Results** tab. Select the "devices" test, and then from the **Actions** drop-down (or right-click menu), select **Request Details**. Click the **Output Messages** tab.

#### **diagnosticMove**

Performs repeated cell to cell moves between a pair of cells. This test terminates when it reaches the number of iterations or the time limit, whichever comes first.

- **stopOnError** (check box) - If selected, the test stops if it encounters an error. If not selected, and the test encounters an error, the test continues until it reaches the iterationCount or timeLimit.
- **iterationCount** - Number of iterations to perform. One iteration is a move from sourceCellId to destinationCellId and then back to sourceCellId.
- **timeLimit** - Total time limit for the diagnostic test. Allow approximately 20 to 60 seconds per iteration.
- **suppressNotification** (check box) - If selected, the library will ignore any errors detected during the diagnostic. The errors will not generate faults.
- **partitionId** - The ID of the partition to use for the moves — see "[Determine a Partition ID](#)" on page 15-10.
- **sourceCellId** - Enter 'random' to have the library select a cell. Or, enter a cell ID that contains a tape within the specified partition — see "[Determine a Cell ID](#)" on page 15-9.
- **destinationCellId** - Enter or 'random' to have the library select a cell. Or, enter the cell ID of an empty cell within the specified partition — see "[Determine a Cell ID](#)"

on page 15-9.

### features

Lists all possible features that could be enabled using activation files. Lists the all features that are currently active.

To see the information, go to **Diagnostic Results** tab. Select the "features" test, and then from the **Actions** drop-down (or right-click menu), select **Request Details**. Click the **Output Messages** tab.

### libraryCalibration

Performs robot calibration for the entire library.

- **deviceId** - ID of robot to be calibrated — see "[Determine a Robot ID](#)" on page 15-10.
- **isHandFull** (check box) - If selected, the robot picks up a tape before performing the calibration (note that this may interfere with normal operations if that tape is needed while this diagnostic is running). If not selected, the robot hand remains empty for the calibration.
- **fetchOrPutCellId** - If isHandFull is selected, enter the ID of a cell containing a tape (the robot will return the tape to its original cell when the diagnostic completes). If isHandFull is not selected, the library ignores this parameter — see "[Determine a Cell ID](#)" on page 15-9.

### mountDismountDrives (DISRUPTIVE TEST)

Mounts all drives or dismounts all drives. This test is intended for use when all drives need to have a tape for some other testing.

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**Note:** Disable library auto cleaning before using this test. This test does not properly handle cleaning tapes that are mounted when the test starts.

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- **isOperationMount** (check box) - If selected, the test mounts a tape in every drive. For empty drives, the library mounts a tape of the highest media generation supported by the drive. If there are insufficient tapes of the highest media generation for the drives, the library may leave some drives empty. For already occupied drives (those in Mounted or Tape Present state), the library dismounts the tape, and then remounts it back into the drive.

If not selected, the test dismounts all drives. The library force unloads any occupied drives (those in Mounted or Tape Present state). The library moves the tapes to cells in the same module as the drive, if possible.

### moveInRange (DISRUPTIVE TEST)

Moves a tape into and out of each cell in the specified range. The test starts at startCellId, then increments the row. At the bottom of the column of cells, the test increments the side and begins at the first row in the new column of cells. Once the test completes a column (back-side first, then front-side), the test moves to the next column. The test ends when it reaches the endCellId.

**If Testing Storage and System Cells** — For empty test cells, the library chooses a tape from another cell, moves the tape into the empty test cell, then back to its starting cell. For occupied test cells, the library removes the tape, places it in an empty cell then back to the test cell.

**If Testing Drive Cells** — To be eligible for this test, the drive must empty and the library must contain a compatible diagnostic tape. The library mounts a diagnostic tape from a system cell, then dismounts and returns it to the system cell.

- **startCellId** - ID of the first cell in the range — see "[Determine a Cell ID](#)" on page 15-9
- **endCellId** - ID of the last cell in the range (must be greater than the starting cell, based on ordering by column then side then row) — see "[Determine a Cell ID](#)" on page 15-9
- **stopOnError** (check box) - If selected, the test stops if it encounters an error. If not selected, and the test encounters an error, the test continues until it reaches the iterationCount or timeLimit.
- **timeLimit** - Total time limit for the test.

#### **moveToAllCells (DISRUPTIVE TEST)**

Moves a tape into and out of all system, storage, and drive cells in the library. This creates a child moveInRange diagnostic test (see "[moveInRange \(DISRUPTIVE TEST\)](#)" on page 15-5 for details).

- **stopOnError** (check box) - If selected, this diagnostic test will stop if any error is encountered. If not selected, the test will continue until the timeLimit is reached or all cells in the range have been tested.
- **timeLimit** - Total time limit for the diagnostic test.

#### **moveToCapMagazines (DISRUPTIVE TEST)**

Moves a tape between the top and bottom cell of each CAP magazine. If the CAP cell is empty, the library chooses a tape from another cell, moves the tape into the CAP cell, then back to its starting cell. If the CAP cell is occupied, the library moves the tape to an empty cell, and then back to the CAP cell. The library always returns tapes to their original cells, if possible, even if the test reaches the time limit or an error occurs.

- **inputCapId** - ID of CAP to test — see "[Determine a CAP ID](#)" on page 15-9
- **stopOnError** (check box) - If selected, the test stops if it encounters an error. If not selected, and the test encounters an error, the test continues until it reaches the iterationCount or timeLimit.
- **iterationCount** - Number of iterations to perform. One iteration tests the top and bottom cell in each of the CAP's magazines.
- **timeLimit** - Total time limit for the test.

#### **moveToCorners (DISRUPTIVE TEST)**

Moves a tape into and out of each corner cell in the library. Corner cells are the top and bottom storage cells in the first and last columns on each wall of the library (8 cells total). If a corner cell is empty, the library chooses a tape from a nearby cell, moves the tape into the corner cell, then back to its starting cell. If a corner cell is occupied, the library moves the tape out of and then back into the cell. The library always returns tapes to their original cells, if possible, even if the test reaches the time limit or an error occurs.

- **stopOnError** (check box) - If selected, the test stops if it encounters an error. If not selected, and the test encounters an error, the test continues until it reaches the iterationCount or timeLimit.
- **iterationCount** - Number of iterations to perform. One iteration is a move into and out of each corner cell.



- **timeLimit** - Total time limit for the test.

#### **robotToStorageMagazines (DISRUPTIVE TEST)**

Moves a tape between the top and bottom cell in each cartridge array in the library. If a cell is empty, the library chooses a tape from a nearby cell, moves the tape into the cell, then back to its starting cell. If a cell is occupied, the library moves the tape out of and then back into the cell. The library always returns tapes to their original cells, if possible, even if the test reaches the time limit or an error occurs.

- **stopOnError** (check box) - If selected, the test stops if it encounters an error. If not selected, and the test encounters an error, the test continues until it reaches the iterationCount or timeLimit.
- **iterationCount** - Number of iterations to perform. One iteration tests all cartridge arrays in the library.
- **timeLimit** - Total time limit for the diagnostic test.

#### **robotCellToCellMove (DISRUPTIVE TEST)**

Moves a robot between two cells (does not move any tapes). While this test is running, the specified robot moves between the two cells. If the library has a second robot, it moves out of the way, unable to perform other actions while this diagnostic runs.

- **robotId** - ID of robot to move — see ["Determine a Robot ID"](#) on page 15-10.
- **sourceCellId** and **destinationCellId** - The cell IDs of the two cells that robot will move between (does not affect tapes in those cells) — see ["Determine a Cell ID"](#) on page 15-9.
- **numberOfMoves** - Number of cycles to perform. Each cycle is a round trip from the source cell to the destination cell and back.

#### **robotMove**

Moves a robot to a specified cell (does not move any tapes). If the library has a second robot, it moves out of the way, but will resume operation as soon as this diagnostic completes.

- **deviceId** - ID of robot to move — see ["Determine a Robot ID"](#) on page 15-10
- **cellId** - Destination cell ID — see ["Determine a Cell ID"](#) on page 15-9

#### **robotMoveToLocation (DISRUPTIVE TEST)**

Moves a robot mechanism using "mils" to specify the desired position. This test is primarily intended manufacturing.

---

**Caution:** Incorrectly running this test can cause the robot to collide with another robot or the interior of the library. Before running this test, you must move the other robot and other mechanisms to allow for free movement.

---

- **deviceId** - ID of robot to move — see ["Determine a Robot ID"](#) on page 15-10
- **mechName** - Name of the mechanism to move: TRACK, ZMECH, WRIST, REACH, GRIP — see ["Robot Mechanisms"](#) on page 15-10
- **expectedFinalMilsPosition** - The final mils position of the selected mechanism. Only use values between the operational limits — see ["Determine the Robot Range"](#) on page 15-10.

**robotMoveToTachCount (DISRUPTIVE TEST)**

Moves a robot mechanism using "tach counts" to specify the desired position. This test is primarily intended manufacturing.

---

**Caution:** Incorrectly running this test can cause the robot to collide with another robot or the interior of the library. Before running this test, you must move the other robot and other mechanisms to allow for free movement.

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- **deviceId** - ID of robot to move — see "[Determine a Robot ID](#)" on page 15-10
- **mechName** - Name of the mechanism to move: TRACK, ZMECH, WRIST, REACH, GRIP— see "[Robot Mechanisms](#)" on page 15-10
- **expectedFinalTachPosition** - The final tach position of the selected mechanism. Only use values between the operational limits — see "[Determine the Robot Range](#)" on page 15-10 and "[Mils to Tach Conversion Factors](#)" on page 15-10

**robotSweep (DISRUPTIVE TEST)**

Moves a robot mechanism through its full range of motion.

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**Caution:** Incorrectly running this test can cause the robot to collide with another robot or the interior of the library. Before running this test, you must move the other robot and other mechanisms to allow for free movement.

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- **deviceId** - ID of robot to move — see "[Determine a Robot ID](#)" on page 15-10
- **mechName** - Name of the mechanism to move: TRACK, ZMECH, WRIST, REACH, GRIP— see "[Robot Mechanisms](#)" on page 15-10

**singleCap (DISRUPTIVE for the specified CAP)**

Opens and closes a specified CAP. The CAP must be closed and empty at the start of the test. When you use this test on an Access Module, the door does not physically open.

- **inputCapId** - ID of CAP to test — see "[Determine a CAP ID](#)" on page 15-9
- **iterationCount** - Number of iterations to perform. One iteration opens and then closes the CAP.
- **timeLimit** - Total time limit for the diagnostic test. Allow approximately 100 seconds per iteration.

**singleDrive (DISRUPTIVE for the specified drive)**

Mounts and then dismounts a diagnostic tape for a specified drive. The library uses a compatible diagnostic tape from a system cell, mounts the drive, dismounts it, and returns the tape to its original cell.

- **inputDriveId** - ID of the drive to test — see "[Determine a Drive ID](#)" on page 15-10.
- **stopOnError** (check box) - If selected, the test stops if it encounters an error. If not selected, and the test encounters an error, the test continues until it reaches the iterationCount or timeLimit.
- **iterationCount** - Number of iterations to perform. One iteration is a mount and dismount of a diagnostic tape.

- **timeLimit** - Total time limit for the diagnostic test. Allow approximately 25 seconds per iteration.

### singleLed

Sets all LEDs on a device to a specified state for a specified time. After the specified time period passes, the LEDs return to their previous state.

- **deviceId** - ID of device — see "[Determine a Device ID](#)" on page 15-9.

The valid devices are: Access Module Controller, Access Module Service Panel, Base Module Service Panel, CAP, Library Controller, DC Converter, Drive Controller, Drive Switch, Fan Assembly, Power Supply, Rail Controller, Robot Controller, Root Switch, Safety Controller, Safety Door, Storage Card, and Video Card.

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**Note:** To select a drive, use the deviceId of the Drive Controller.

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- **desiredLedState** - The desired LED test state — LIT, UNLIT, SLOWBLINK, FASTBLINK
- **holdTime** - Duration in seconds the LED remains in the desiredLedState before reverting to the original state.

### versions

Collects software and firmware version information for the library controller, web logic, ADF, database, operating system, java, and all devices except tape drives.

To see the information, go to **Diagnostic Results** tab. Select the "versions" test, and then from the **Actions** drop-down (or right-click menu), select **Request Details**. Click the **Output Messages** tab.

## How to Locate Diagnostic Test Values

The list below specifies how to find commonly required diagnostic test values using the GUI (see also "[Diagnostic Tests Descriptions](#)" on page 15-2).

### Determine a Cell ID

1. Click **Cells/Tapes** in the left navigation area of the GUI.
2. Select the **Tapes** to locate a tape cartridge or **All Cells** tab to locate an empty cell. The cell ID is an integer value found in the Cell ID column (such as 666), it is not the cell address (such as 1,F,1).

### Determine a Device ID

1. Click **Hardware** in the left navigation area of the GUI.
2. Select the tab that corresponds to the device.
3. The ID column indicates the device ID.

### Determine a CAP ID

1. Click **CAPs** in the left navigation area of the GUI.
2. Select the **CAPs** tab. The ID column indicates the CAP ID.

### Determine a Drive ID

1. Click **Drives** in the left navigation area of the GUI.
2. The Drive ID column indicates the drive ID.

### Determine a Robot ID

1. Click **Robots** in the left navigation area of the GUI.
2. The ID column indicates the robot ID.

### Determine a Partition ID

1. Click **Partitioning** in the left navigation area of the GUI.
2. Select the **Partitions** tab. The ID column indicates the partition ID.

### Determine the Robot Range

1. Click **Robots** in the left navigation area of the GUI.
2. From the **Actions** drop-down (or right-click menu), select **Robot Diagnostics** and then select **Get Robot Ranges**.

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**IMPORTANT:** Only use values between the operational limits. Values outside the operational limits, but inside the physical limits, may cause high currents and robot damage.

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### Robot Mechanisms

- **TRACK** — Horizontal robot motion along the rails.
- **WRIST** — Rotary motion of the hand allowing it to move from back wall to front wall.
- **REACH** — Mechanism that moves the gripper out of hand to get or put a tape into a cell or drive
- **GRIP** — Mechanism that grips a tape cartridge and holds it while moving into or out of the hand.

### Mils to Tach Conversion Factors

- **TRACK** - 0.552024828 tachs/mil
- **WRIST** - 0.3669 tachs/mil
- **ZMECH** - 1.3503 tachs/mil
- **REACH** - 0.8128 tachs/mil
- **GRIP** - 20.48 tachs/mil




## Block, Allow, or Force Device Firmware Upgrades

Updating the library firmware automatically pushes new firmware to the devices. In rare cases, Oracle service representatives may need to block automatic firmware updates for particular devices.

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**Note:** Only Escalation users can block firmware upgrades from being pushed to a device (see "User Roles" on page A-1).

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1. Click **Firmware** in the left navigation area of the GUI.
2. Click the **Device Locations** tab. The Code Load Enabled column indicates if automatic firmware upgrades are allowed.
3. Select a device, and then click **Block Upgrade** , **Allow Upgrade** , or **Force Upgrade**  (which forces an immediate upgrade and allows future upgrades).




#### See Also

- "Upload and Manage Library Firmware" on page 5-9
- "View Library Firmware" on page 11-6


## Create, Download, or Delete Support Bundles

Support bundles contain encrypted log files used for fault diagnosis by Oracle service personnel. Oracle service personnel can refer to the *SL4000 Installation and Service Guide* for procedures on decrypting these files.

The library automatically generates a support bundle when it detects a fault. However, you can create a support bundle at any time. The bundle only captures recent data, therefore you should create the bundle as soon as possible after the event you want to investigate occurs.

1. Click **Reports** in the left navigation area of the GUI.
2. Click the **Support Bundles** tab.
3. Click **Create** , or select a bundle and then click **Download**  or **Delete** .

---

**Note:** A new bundle may take time to generate. Click **Refresh** , and wait until the bundle state is 'Completed' before downloading. You can only create one support bundle at a time.

---

4. After downloading a support bundle, send it to Oracle.

## Modify the Logging Levels

---

**IMPORTANT:** You should only change the logging level when directed to by Oracle support. Otherwise, leave the logging levels at their defaults.

---

1. Click **Service** in the left navigation area of the GUI.
2. Click the **Logging Levels** tab.
3. Clicking **Apply Defaults** immediately sets and saves all logging levels to their default values. There is no undo.
4. Select a logging level for each of the library's loggers (see "Logging Level Options" on page 15-12).

5. Click **Save**.

## Logging Level Options

- **SEVERE** — Used only for situations where the library has encountered an unrecoverable error requiring human intervention. Severe level messages usually generate an ASR.
- **WARNING** — Used in abnormal situations where the library has encountered a problem, but does not require immediate human intervention. The library can recover and continue operations.
- **INFO** — Provides a summary of library actions about the specific logger.
- **CONFIG** — Used for logging any change to the library configuration. This can be from a SCI or GUI command (such as changing partitions or reconfiguring the LDAP server) or from a hardware change (such as adding or removing a FRU).
- **FINE** — Used to capture detailed debugging information. 'FINE' is not the default setting for any logger. However, Oracle support can enable 'FINE' to troubleshoot a problem. 'FINE' messages should be infrequent enough to be captured for hours or perhaps days while troubleshooting.
- **INHERITED** — Uses the setting of the parent logger. For example, if `deviceInterface.Controller` is set to **INHERITED**, it will have the same logging level as `deviceInterface` (the parent of `deviceInterface.Controller`).

## Clear the Database

When troubleshooting issues, it may be necessary to clear the library database. This should only be done if directed to by Oracle services.


---

---

**CAUTION:** Only administrators and service users can clear the database. Administrators should only clear the database if directed to by Oracle services.

---

---

1. Click the power button  in the upper left corner of the GUI.
2. Select **Restart Library**.
3. Select **Clear Database**.
4. Click **Restart**. The library will scan the module id blocks and perform a full audit.

## Modify the Database

---

---

**CAUTION:** Only Escalation users can modify the database (see "[User Roles](#)" on page A-1). Only use this function for diagnosis and repair under the direction of Oracle engineering. Improperly modifying the database can render the library inoperable.

---

---

1. Click **Service** in the left navigation area of the GUI.
2. Click the **Database** tab.
3. Enter the SQL command, and then click **Execute**.



INSERT, UPDATE, DELETE, CREATE, ALTER, DROP, and SELECT are the only supported commands.

## View and Modify the Library File System

---

**CAUTION:** Only Escalation users can access the file system (see "[User Roles](#)" on page A-1). Only use this function for diagnosis and repair under the direction of Oracle engineering. Improperly modifying the files can render the library inoperable.

---

1. Click **Service** in the left navigation area of the GUI.
2. Click the **File System** tab.
3. Select a file, and then click **Download**  (to save the file locally) or **Modify**  (to open the file in a text editor).

## Open and Go Inside the Library

---

**Note:** Opening a Base or Drive Module door will trigger a full audit when the library comes back online, unless you have select bypass audit for the library settings (see "[Library Settings Options](#)" on page 5-3).

---

## Safety Precautions When Entering the Library

---

**WARNING:** You should lock the access door open and retain the key to prevent injury while inside the library.

---

- Verify the library is offline. Do not enter the library or move any of the robot mechanisms if you suspect the robots are on.
- Always leave the access door open while inside the library.
- Locate the mechanical door releases (yellow handles on the inside of the access doors). If the doors close while inside the library, push the mechanical release to unlock and open the door.
- Know the physical restrictions. Be careful not to bump your body or snag clothing on the arrays (there is only 0.4 m [18 in.] of aisle clearance).
- Avoid damaging the robot's mechanical or electronic components when manually moving a robot.

## Entering the Library

1. Observe all safety precautions (see "[Safety Precautions When Entering the Library](#)" on page 15-13 below).
2. Take all drives offline (see "[Set a Drive Online or Offline](#)" on page 6-2).
3. Take the library offline (see "[Set the Library Online or Offline](#)" on page 11-10).
4. Unlock the door.

5. Pull up on the door latch and open the door.

## Exiting the Library

1. Before you exit the library, verify that there are no loose items in the library.
2. Close the door and latch it.
3. Lock the door and place the key in a safe location.
4. Bring the library online (see ["Set the Library Online or Offline"](#) on page 11-10).

## Open an Access Module Door by Overriding the Lock

This procedure does not lower the internal Access Module safety door.

---

**CAUTION:** Opening an Access Module door by overriding the lock has the same effects on the library as opening a Base or Drive Module front door. It causes an abrupt interruption of library activity. The library will run a full library audit once you shut the door, unless you selected bypass audit for the library settings (see ["Library Settings Options"](#) on page 5-3).

---

1. Turn the maintenance key on the Access Module to "Door Lock Override". The key cannot be removed from the lock while it is in the unlocked position.
2. Lift the Access Module door latch and open the door. DO NOT force the door to open.  
  
The robots lose power, all in-process jobs stop, and the library takes the robots and Access Module offline.
3. To close the Access Module door, close and latch it. DO NOT force the door to close.
4. Lock the door and retain the key.

Once the door shuts, the library re-initializes, the robots initialize, the library does a full audit, and the library brings the Access Modules online.

## Ping a Host

If you are having host connectivity issues, you can ping the host. Pinging can determine whether the host IP address is reachable from the library and tests the connection speed between the library and the host.

1. Click **Service** in the left navigation area of the GUI.
2. Click the **Network Tools** tab.
3. Click **Ping**.
4. Enter the host IP address and the maximum number of attempts (the default is four). Click **Ok**.

## Run a Host Trace Route

If you are having host connectivity issues, you can trace the route to the host.



1. Click **Service** in the left navigation area of the GUI.
2. Click the **Network Tools** tab.
3. Click **Trace Route**.
4. Enter the host IP address and the maximum number of hops (the default is 20). Click **Ok**.

## Calibrate the Local Op Panel Touch Screen

Alignment of the touch screen is calibrated at the factory. If the touch screen becomes mis-aligned, you can re-calibrate it.

1. Login to the SL4000 GUI locally at the operator panel.
2. Click **Configuration** in the left navigation area of the GUI.
3. Click the **Touch Panel** tab.
4. Click **Run Calibration**.
5. Tap the series of targets on the touch panel. Once the calibration completes, the panel returns to displaying the library interface.

## Restart the Local Op Panel Touch Screen

If the library op panel touch screen becomes non-responsive, you may need to restart the touch panel.

1. If the screen is blank, the display source might be set to the rear VGA port. Press the **SOURCE** button below the op panel and wait a couple of seconds.

The SOURCE button switches the display between the rear VGA output and the controllers or feature cards. If the display is currently at the VGA port, the initial press toggles it to the front touch screen and subsequent presses cycle through the controllers. L1 and L2 are the library controllers. F1 and F2 are feature cards.

2. If the op panel is still non-responsive, login to the SL4000 GUI remotely or through a direct Ethernet connection.
3. Click **Configuration** in the left navigation area of the GUI.
4. Click the **Touch Panel** tab.
5. Click **Restart Touch Panel**.

## Reset the Library to Factory Defaults

Resetting the library to factory defaults will erase all stored information about drives, tapes, partitions, notification destinations, logs, date and time settings, network settings, and all other library settings. The library will restart, requiring the Installer role to run the Initial Installation Wizard to reconfigure the library.

---

**CAUTION:** Resetting the library to defaults cannot be canceled or undone. After resetting, only Oracle services can log back in with the Installer credentials (see "[User Roles](#)" on page A-1).

---

1. Click **Service** in the left navigation area of the GUI.

2. Click the **Reset** tab.
3. Click **Reset to Factory Default Settings**.
4. Wait until the library completes the reset. Once the screen remains blank for a few minutes, manually turn the PDU breakers off and then back on.

## User Roles

A user's role determines their access to GUI and SCI functions (see "[Available Functions for Each User Role](#)" on page A-1).

- **Administrator** (C3) – a library administrator. This role has access to nearly every function and can manager other users.
- **User** (C2) – the role for day-to-day operators of the library. This role can perform most actions on the library, but some are off-limits, such as configuring partitions or creating users.
- **Operator** (C1) – a role with fewer privileges than a User. This role only has access to a small subset of actions such as viewing data and operating CAPs.
- **Viewer** (V) – a read-only role. Users with this role can view, but not alter, anything on the library.
- **Service** (S1) – a special role for service technicians. This role can pull service bundles, run diagnostics, change configuration settings, and so on.
- **Advanced Service** (S2) – an enhanced service role with additional access for diagnosing and repairing the library.
- **Escalation** (S3) – the highest level of service role with extensive access to repair the library.
- **Installer** (I) – a special role used during the initial installation and configuration of the library. This role is only available before library handoff to the customer.

### See Also

- "[Configuring User Login Setting](#)" on page 4-1

## Available Functions for Each User Role

The following table lists which user roles have the authorization/permissions to perform a particular function (x = the role can perform the function).

Category	Function	V	C1	C2	C3	S1	S2	S3	I
Activity	View library activity (requests, jobs, resources, events)	x	x	x	x	x	x	x	x
Activity	Cancel a request	-	-	x	x	x	x	x	x
CAPs	Unlock/lock and open/close CAPs	-	x	x	x	x	x	x	x
CAPs	Set and clear the CAP owner	-	x	x	x	x	x	x	x
CAPs	Create, assign, and delete CAP pools	-	-	-	x	x	x	x	x
Cells/Tapes	Move or mount a tape within the same partition	-	-	x	x	x	x	x	x

Category	Function	V	C1	C2	C3	S1	S2	S3	I
Cells/Tapes	Move or mount a tape to any cell regardless of partition	-	-	-	x	x	x	x	x
Cells/Tapes	Import/export tapes in system cells	-	x	x	x	x	x	x	x
Cells/Tapes	Set the cleaning tape threshold	-	-	x	x	x	x	x	x
Cells/Tapes	Audit cells	-	-	x	x	x	x	x	x
Configuration	View library configuration settings	x	x	x	x	x	x	x	x
Configuration	Export the library configuration	-	x	x	x	x	x	x	x
Configuration	Import the library configuration	-	-	-	x	-	x	x	x
Configuration	Run the wizard to configure library, network, and time settings	-	-	-	x	-	x	x	x
Configuration	Add or remove hardware activation files	-	-	-	x	-	x	x	x
Devices	Activate/deactivate the locator LED	-	x	x	x	x	x	x	x
Devices	Obtain device telemetry	-	x	x	x	x	x	x	x
Devices	Reset a device (drives, controllers, and so on)	-	-	x	x	x	x	x	x
Devices	Change the online/offline state of a device	-	-	x	x	x	x	x	x
Devices	View device properties and status (using the Hardware page)	x	x	x	x	x	x	x	x
Diagnostics	Run and view diagnostic tests	-	-	x	x	x	x	x	x
Diagnostics	Run drive FDE diagnostics	-	-	-	-	x	x	x	x
Diagnostics	Run robot diagnostics	-	-	-	-	-	x	x	x
Drives	Initiate drive cleaning	-	x	x	x	x	x	x	x
Drives	Force a drive unload	-	-	x	x	x	x	x	x
Drives	Power a drive on/off	-	-	x	x	x	x	x	x
Firmware	View the library and device firmware level	x	x	x	x	x	x	x	x
Firmware	Alter the library or device firmware level	-	-	x	x	x	x	x	x
Firmware	Block, force, or allow firmware upgrades	-	-	-	-	-	-	x	-
Logging	Set the logging level	-	-	x	x	x	x	x	x
Logging	View and download logs, fault reports, and system reports	-	-	x	x	x	x	x	x
Logging	View, create, download, or delete support bundles	-	-	x	x	x	x	x	x
Logging	Clear robot logs	-	-	-	-	x	x	x	x
Logging	Clear library and drive logs	-	-	-	-	-	x	x	x
Library	View library contents and properties (tapes, cells, drives, CAPs)	x	x	x	x	x	x	x	x
Library	Power-down or restart the library	-	-	x	x	x	x	x	x
Library	Change the online/offline state of the library	-	-	x	x	x	x	x	x
Library	Reset the library to factory defaults	-	-	-	-	-	-	x	x
Media Val.	Modify the media validation pool	-	-	-	x	-	x	x	x
Media Val.	Start or cancel media validation operations	-	-	x	x	x	x	x	x
Media Val.	View in progress media validation operations	x	x	x	x	x	x	x	x
Notifications	View the notification configuration (SNMP, SCI, email)	x	x	x	x	x	x	x	x
Notifications	Test notifications (SNMP, SCI, email)	-	-	x	x	x	x	x	x
Notifications	Configure and submit ASRs	-	-	x	x	x	x	x	x
Notifications	Configure notification destinations and users (SNMP, SCI, email)	-	-	x	x	-	x	x	x
Partitioning	View the partitioning table and properties	x	x	x	x	x	x	x	x
Partitioning	Change the online/offline state of a partition	-	-	x	x	-	x	x	x
Partitioning	Edit partition information (name, connection type, and so on)	-	-	-	x	x	x	x	x
Partitioning	Create, delete, and assign cells to a partition	-	-	-	x	-	x	x	x

Category	Function	V	C1	C2	C3	S1	S2	S3	I
Reports	Access to system and fault reports	x	x	x	x	x	x	x	x
Reports	Access to support bundles	-	-	x	x	x	x	x	x
SCSI	View SCSI hosts and LUNs	x	x	x	x	x	x	x	x
SCSI	Configure SCSI hosts	-	-	-	x	-	x	x	x
Service	Add a service key	-	-	-	-	x	x	x	-
Service	Ping or trace route to a host	-	-	x	x	x	x	x	x
Service	View raw FRU-ID data	-	-	-	-	x	x	x	x
Service	Move the robot to the service area	-	-	-	-	-	x	x	x
Service	Alter the database or file system	-	-	-	-	-	-	x	-
User	Set user preferences (session time out, initial display, and so on)	x	x	x	x	x	x	x	x
User	Reset your own password	x	x	x	x	x	x	x	x
User	View users	-	x	x	x	x	x	x	x
User	Download service user key	-	x	x	x	x	x	x	x
User	Add service user	-	-	x	x	-	-	-	x
User	Add, delete, or modify a user	-	-	-	x	-	-	-	x
User	Reset another user's password	-	-	-	x	-	x	-	x



---

## Library Addressing Reference

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**Note:** "Left" and "right" are in reference to viewing the library from the CAP-side (front) unless otherwise specified.

---

### Contents

- [Comparison of Cell Addressing Schemes](#)
- [The Center Line of the Library and Module Numbers](#)
- [Library Cell Addressing Scheme](#)
- [SCSI Element Addressing](#)
- [Cell Maps](#)

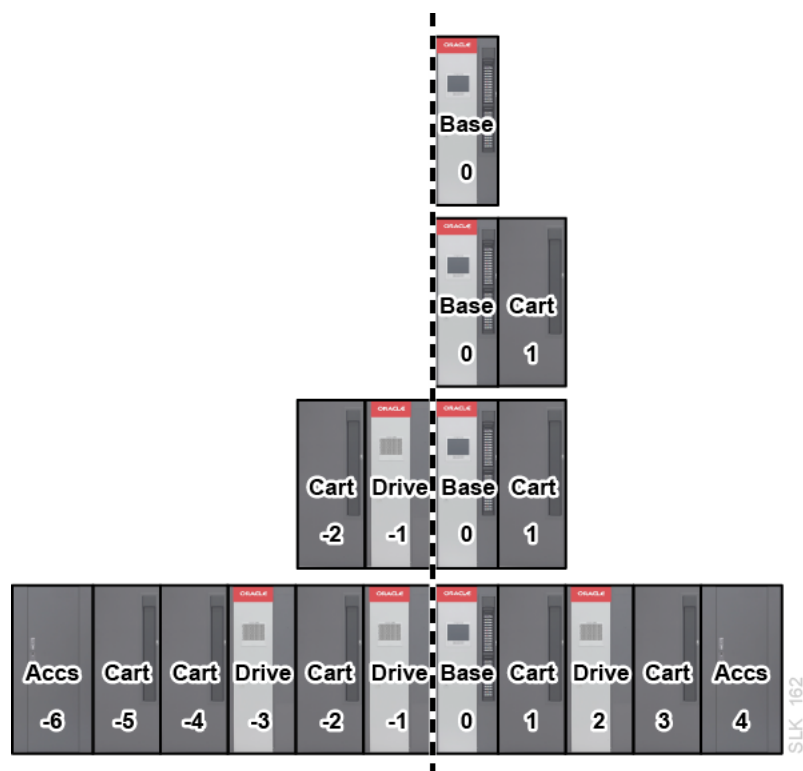
### Comparison of Cell Addressing Schemes

- [Library Cell Addressing Scheme](#) (Library, Rail, Column, Side, Row) — used by the firmware and internal communications to represent all devices and locations within the library.
  - Begins at 1 and uses negative numbers.
  - Side indicates the front or back wall of the library (B or 1 for back wall, F or 2 for front wall).
- [SCSI Element Addressing](#) — used by hosts with FC-SCSI connections to the library.
  - Uses single positive number for the element ID.
  - Storage cells begin at 2000, drive bays begin at 1000, CAPs begin at 10.
  - Unlike the SL3000, the SL4000 assigns empty drive bays an element number.
  - Default element numbering is reassigned with any library configuration change.

### The Center Line of the Library and Module Numbers

Addressing uses the left edge of the Base Module (as viewed from the front of the library) as a reference point, called the center line. The figure below shows the location of the center line for various library configurations.

Module numbers starts with the Base as module zero (0) and increments positively to the right and negatively to the left.



## Library Cell Addressing Scheme

- [Cell Addressing Overview](#)
- [Cell Addressing of Tape Drive Bays](#)
- [Cell Addressing of Rotational CAP Cell](#)

### Cell Addressing Overview

Cell addressing designates physical location using Library, Rail, Column, Side, Row (L, R,C,S,W). The GUI only uses (C, S, W) for the SL4000.

#### Library

Always 1 for SL4000 libraries.

#### Rail

Always 1 for SL4000 libraries.

#### Column

Indicates the horizontal location of a storage cell or drive bay referenced from the center line:

- Positive (+) value indicates right of center line
- Negative (-) value indicates left of center line
- Zero (0) is never used for a column number. The first column to the right of the center line (viewed from the front of the library) is column 1. The first column to the left of the center line is column -1.

*Base Module* — Contains columns 1 to 6 for storage cells and 1 to 4 for drive cells.



*Drive Module* — Contains six columns for storage cells and four for drive bays. Column numbering for storage cells continues consecutively from the adjacent module. Column numbering for drive bays uses the storage cell columns that are closest to zero. For example, a Drive Module immediately to the right of the Base Module will contain storage cell columns 7 through 12 and drive columns 7 through 10. A Drive Module immediately to the left of the Base Module will contain storage cell columns -6 through -1 and drive columns -4 through -1.

*Cartridge Module* — Contains six columns for storage cells. Column numbering continues consecutively from the adjacent module.

*Parking Module* — Contains three columns for storage cells. The outer most three columns are inactive. Column numbering continues consecutively from the adjacent module.

*Access Module* — Contains three columns for storage cells. Column numbering continues from the adjacent module.

**Side**

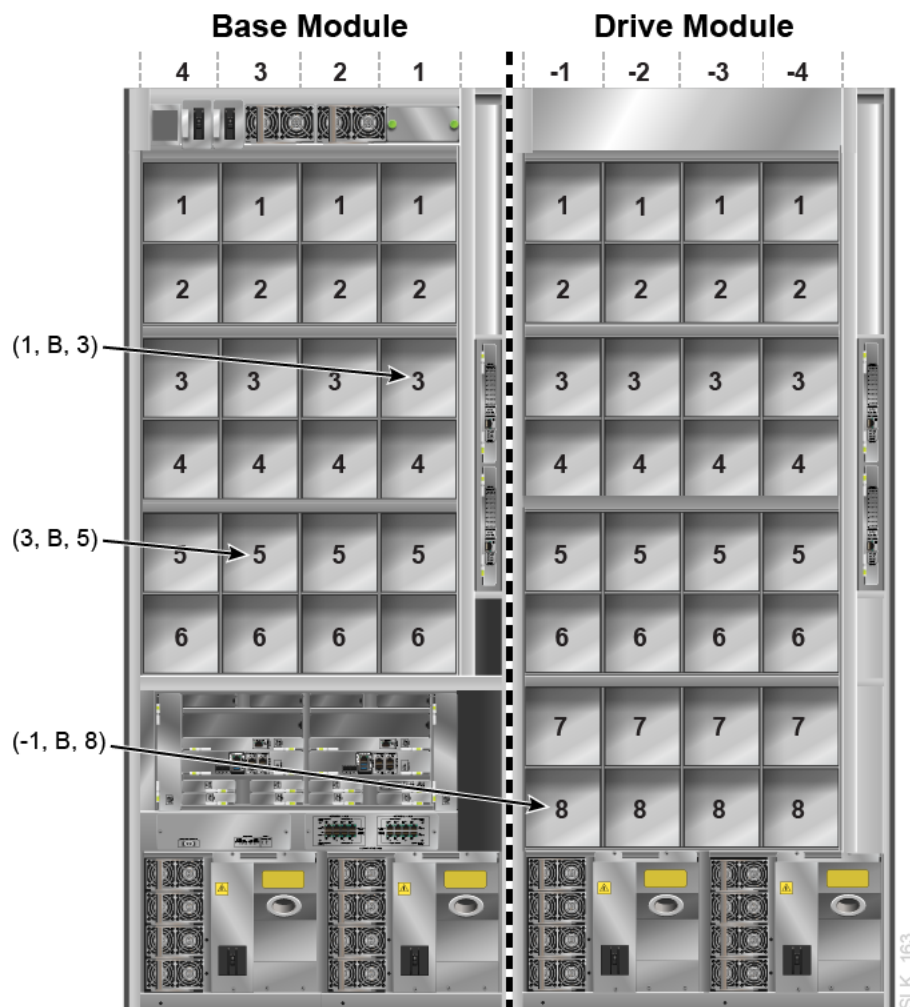
- Back wall (drive side) = 1 (B in GUI)
- Front wall (CAP side) = 2 (F in GUI)

**Row**

The vertical location of a storage cell, consecutively numbered top down (1 to 52).

## Cell Addressing of Tape Drive Bays

The library addressing distinguishes a drive bay by column and row. The side value is always 1 (shown as B in the GUI).

**Figure B-1 Example Library Addressing of Tape Drives (viewed from back of library)**

## Cell Addressing of Rotational CAP Cell

### Column

The CAP column depends on the location of the module containing the CAP. The CAP column value corresponds to the fifth column from the left-side of the module. For example, module number 2 (second module to the right of the Base) will have storage columns 13 through 18 and the rotational CAP column will be 17. Module number -3 (third module to the left of the Base) will have storage cell columns -18 through -13 and the rotational CAP column will be -14.

### Side

Always 2 (shown as F in the GUI), since the CAPs are only located on the front of the module.

### Row

When addressing a specific cell: the row value is the cell in the CAP magazine (values 1 to 26).

### Example CAP Cell Address

For this example, the library has Cartridge Module, Drive Module, Base Module, and all modules have a CAP. The top cell of the Cartridge Module CAP would be (-8, F, 1).

## SCSI Element Addressing

---

**Note:** Changing the library configuration or partition configuration can cause the library to re-assign element IDs.

---

The SCSI element address depends on the element type. Each library or partition uses a fixed starting address for each element type. Then, within each element type, the element addresses are sequential.

- **Storage Elements** (storage cells)
  - Begins at 2000 in left-most module.
  - Numbered top to bottom, back to front, and left to right.
- **Import/Export Elements** (CAPs)
  - Begins at 10 for the left-most rotational CAP in the library.
  - All rotational CAPs are numbered first (top to bottom and left to right), followed by the left Access Module CAP and then the right Access Module CAP (numbered top to bottom, back to front, and left to right).
- **Data Transfer Elements** (drives and empty drive bays)
  - Begins at 1000 in the left-most Drive Module or Base and increments by one for every drive or empty drive bay.
  - Numbered top to bottom, left to right.



### See Also






- ["View the SCSI Element IDs" on page 11-5](#)

## Cell Maps

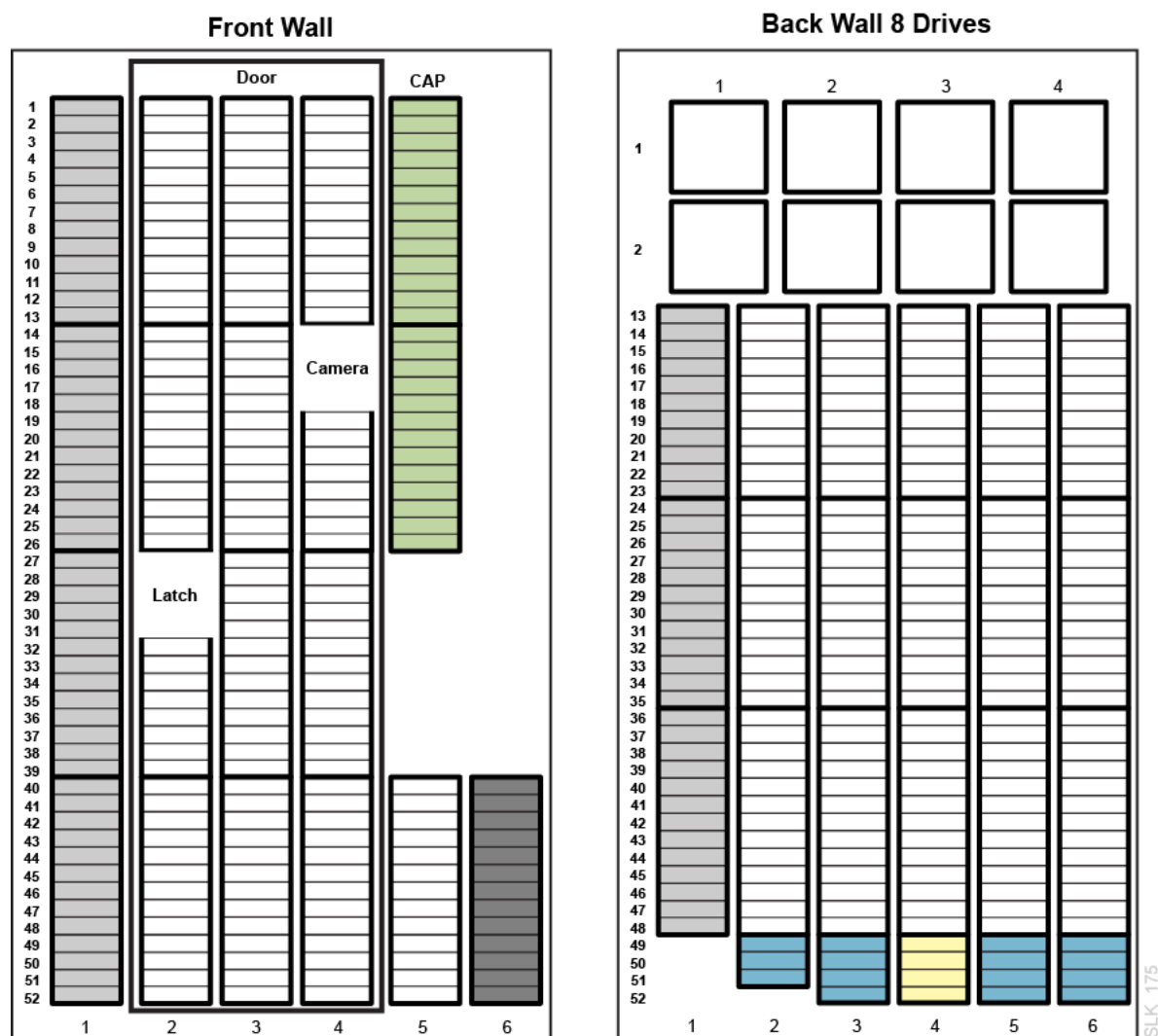
- Base Module front wall and back wall 8 drives ([Figure B-2](#))
- Base Module back wall 16 drives and 24 drives ([Figure B-3](#))
- Drive Module front wall ([Figure B-4](#))
- Drive Module back wall ([Figure B-5](#) and [Figure B-6](#))
- Cartridge Module front wall ([Figure B-7](#))
- Cartridge Module back wall ([Figure B-8](#))
- Left Parking Module ([Figure B-9](#))
- Right Parking Module ([Figure B-10](#))
- Left Access Module ([Figure B-11](#))
- Right Access Module ([Figure B-12](#))

### Legend

Cell	Description
	Normal data storage cell
	CAP cell

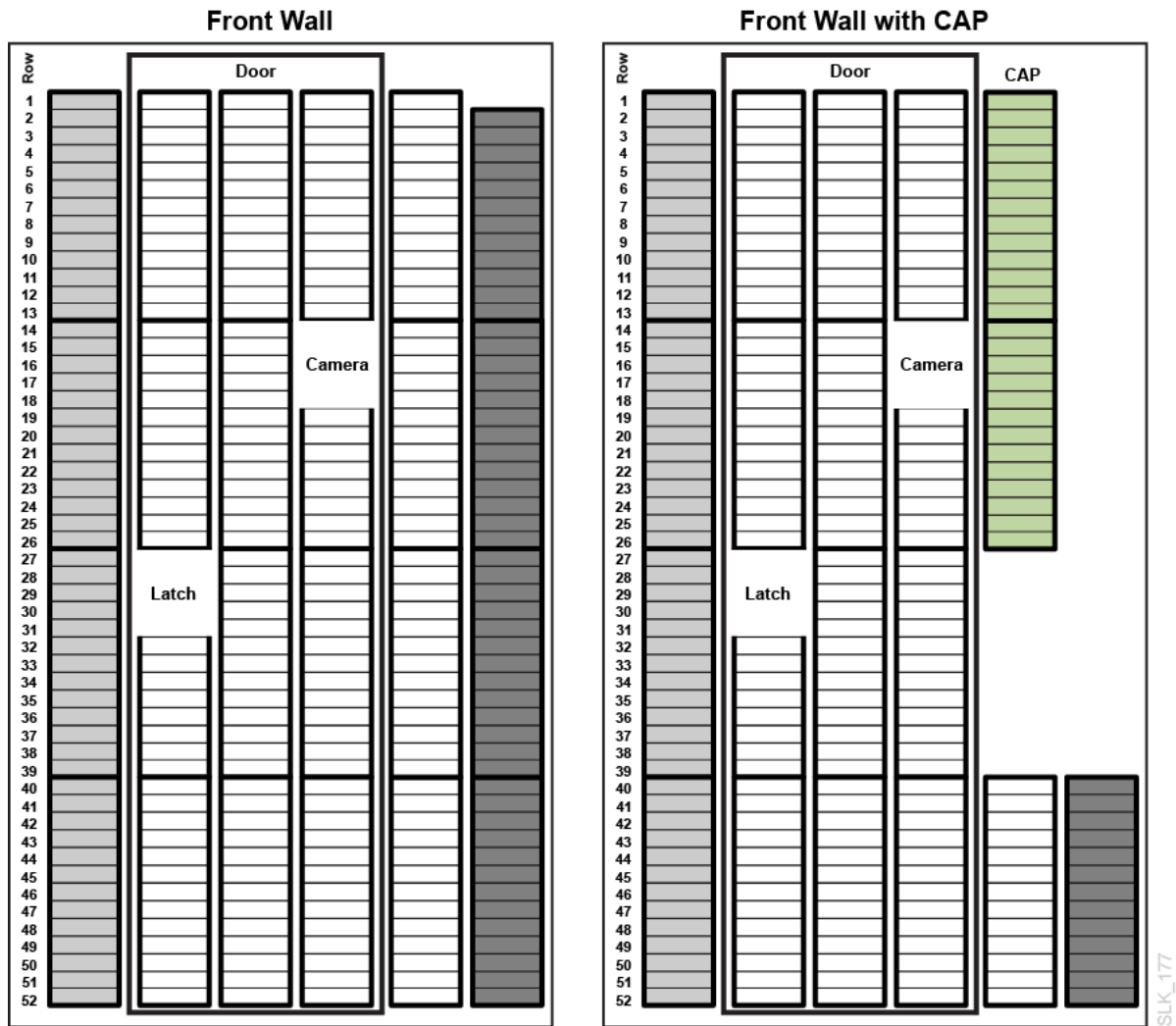
Cell	Description
	Unavailable with no module to left
	Unavailable with no module to right
	Unavailable in a Parking Module
	Module identification block (see "Module Identification Block" on page 1-6)
	System cell for cleaning and diagnostic tapes

**Figure B-2 Base Module - Front Wall and Back Wall with 8 Drives**



**Figure B-3 Base Module- Back Wall 16 Drives and 24 Drives**

**Figure B-4 Drive Module - Front Wall**





**Figure B-6 Drive Module - Back Wall 24 Drives and 32 Drives**

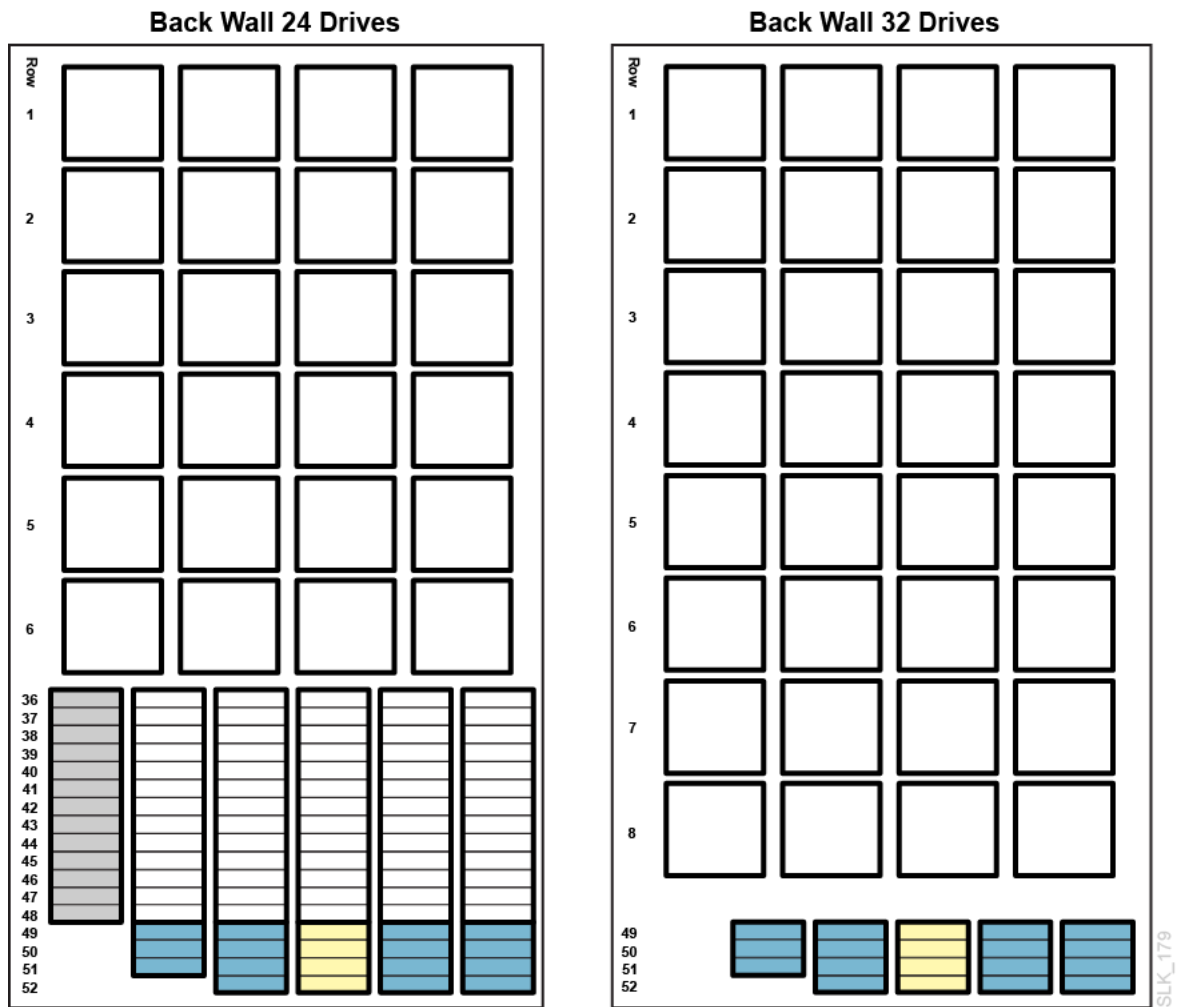
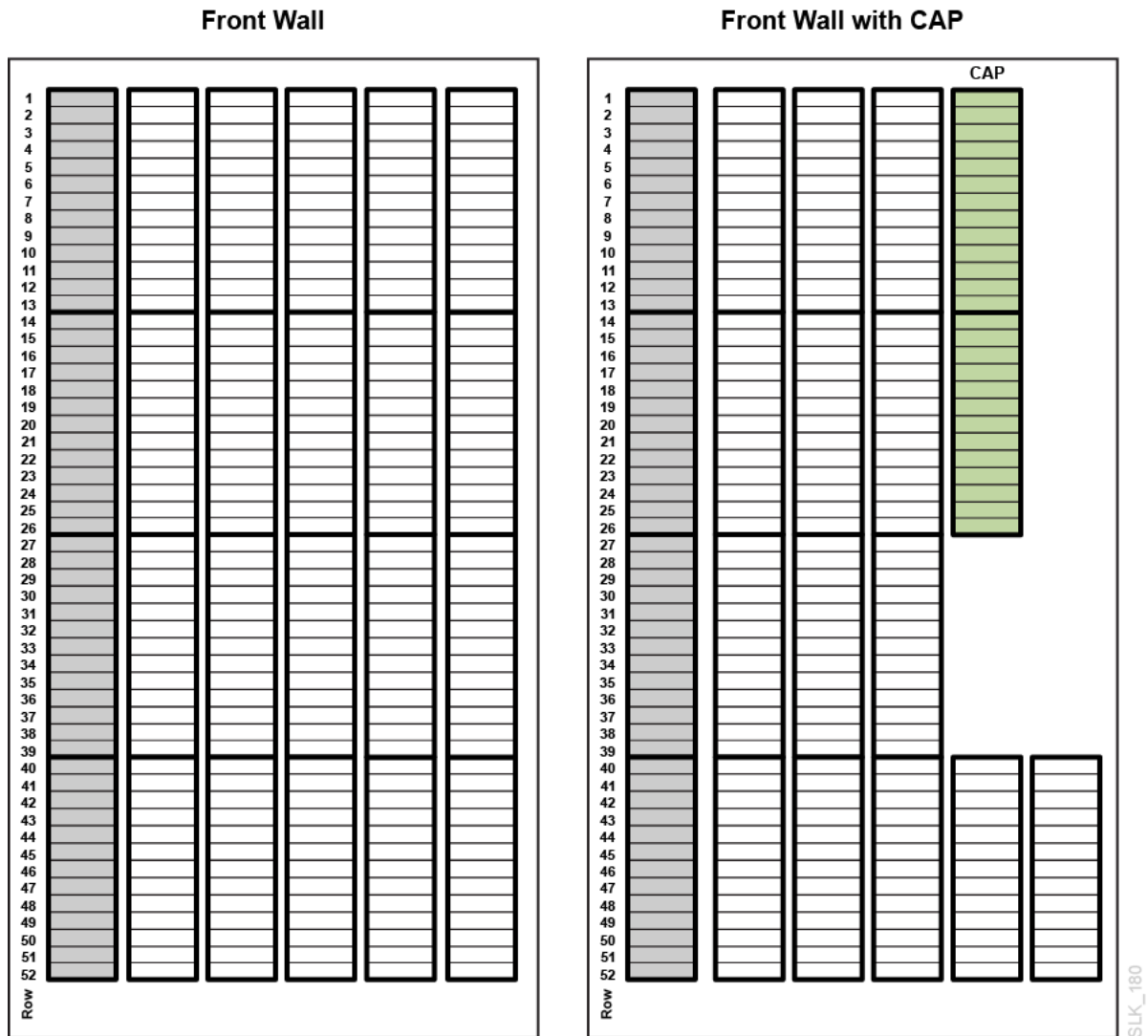




Figure B-7 Cartridge Module - Front Wall



**Figure B-8 Cartridge Module - Back Wall**

Back Wall					
1					
2					
3					
4					
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9					
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SLK\_181

Figure B-9 Parking Module, Left

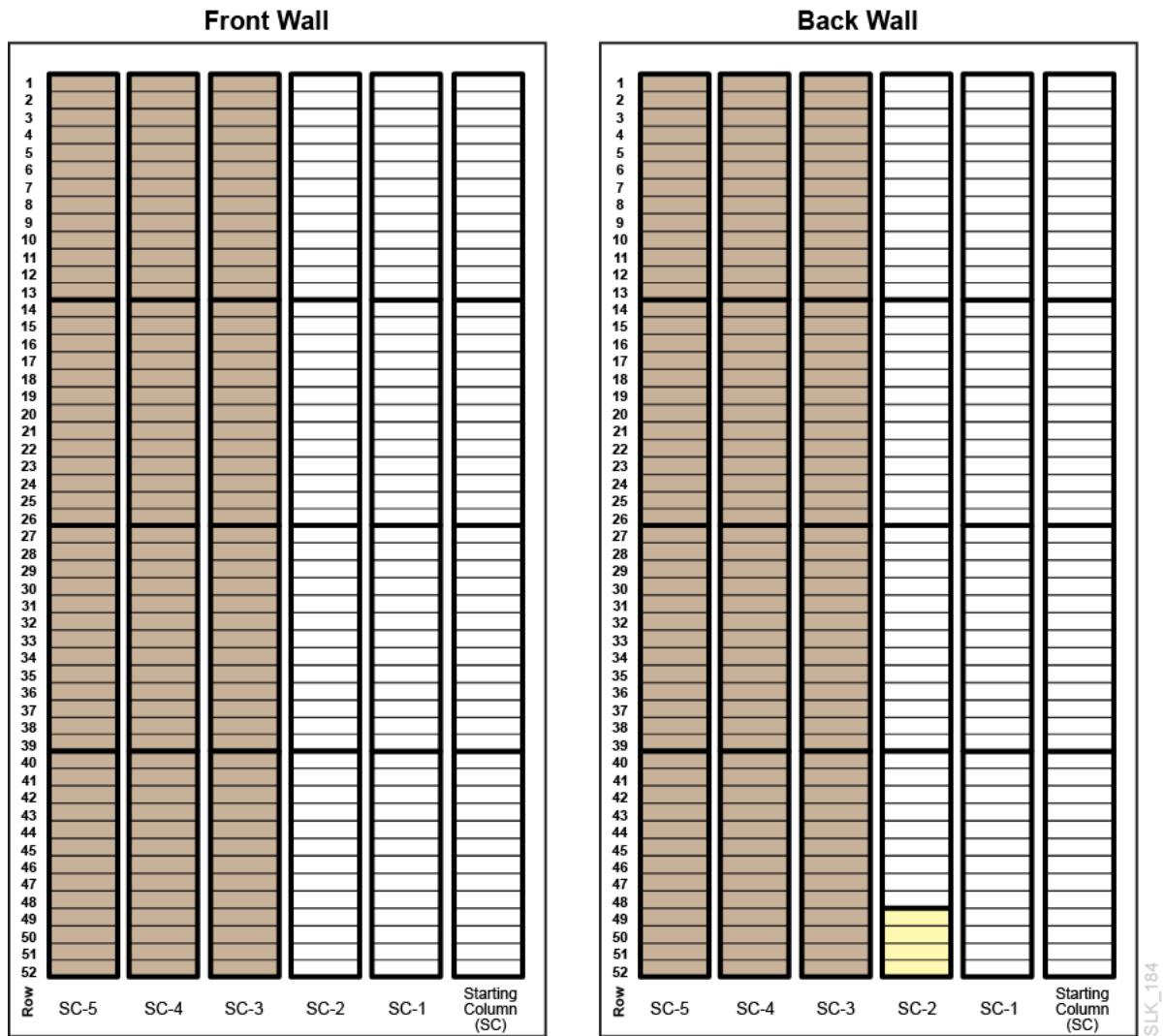


Figure B-10 Parking Module, Right

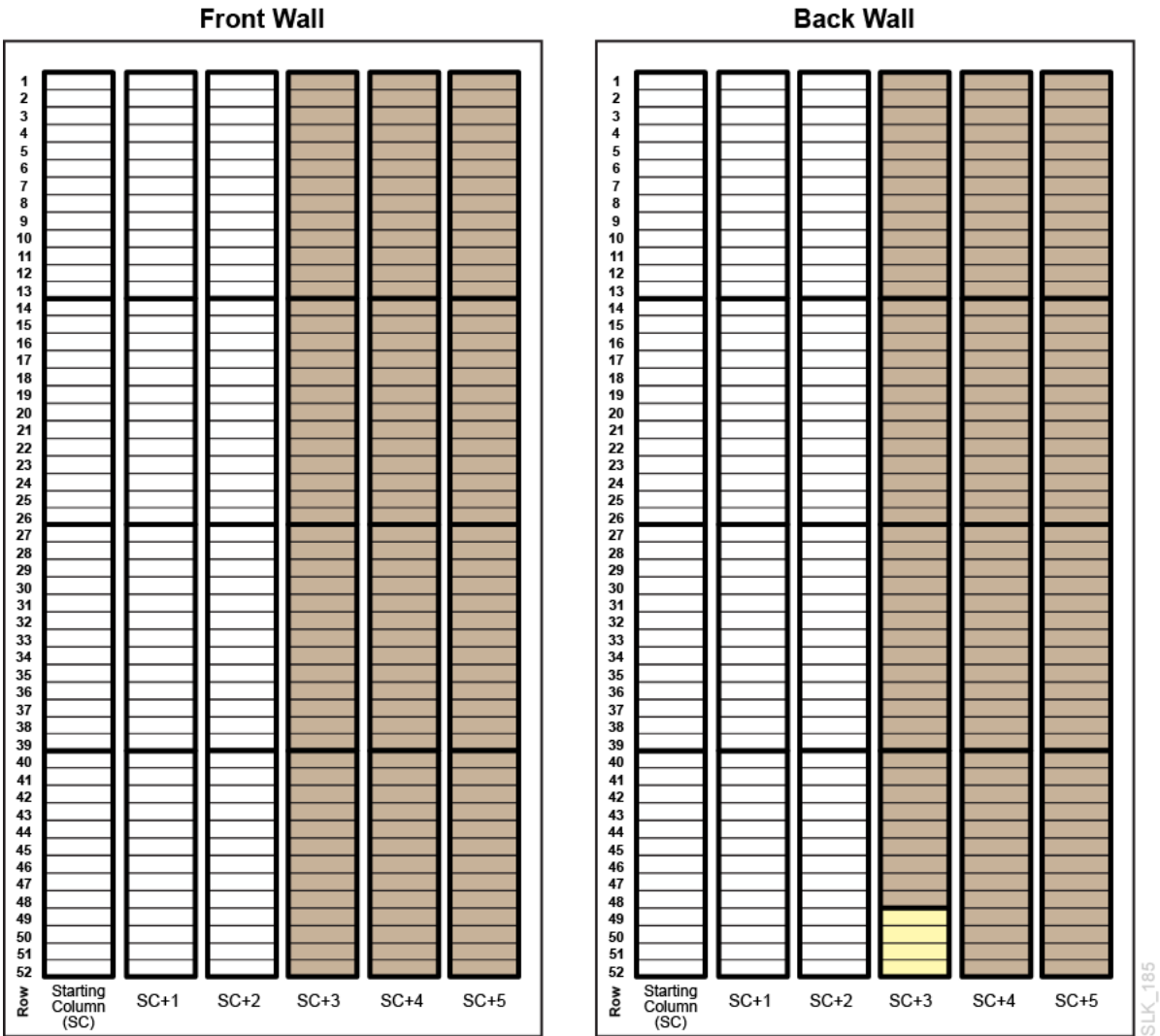
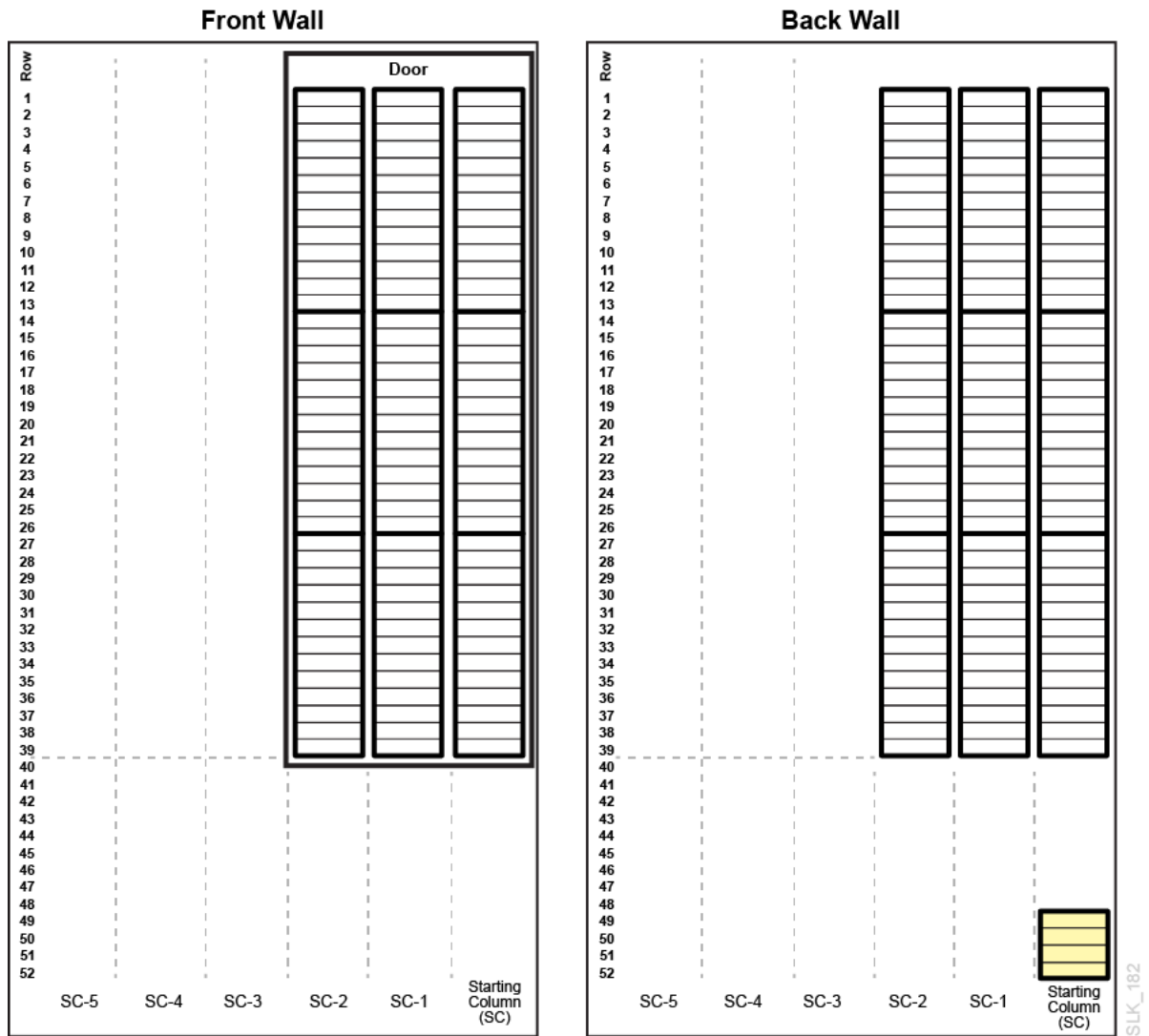
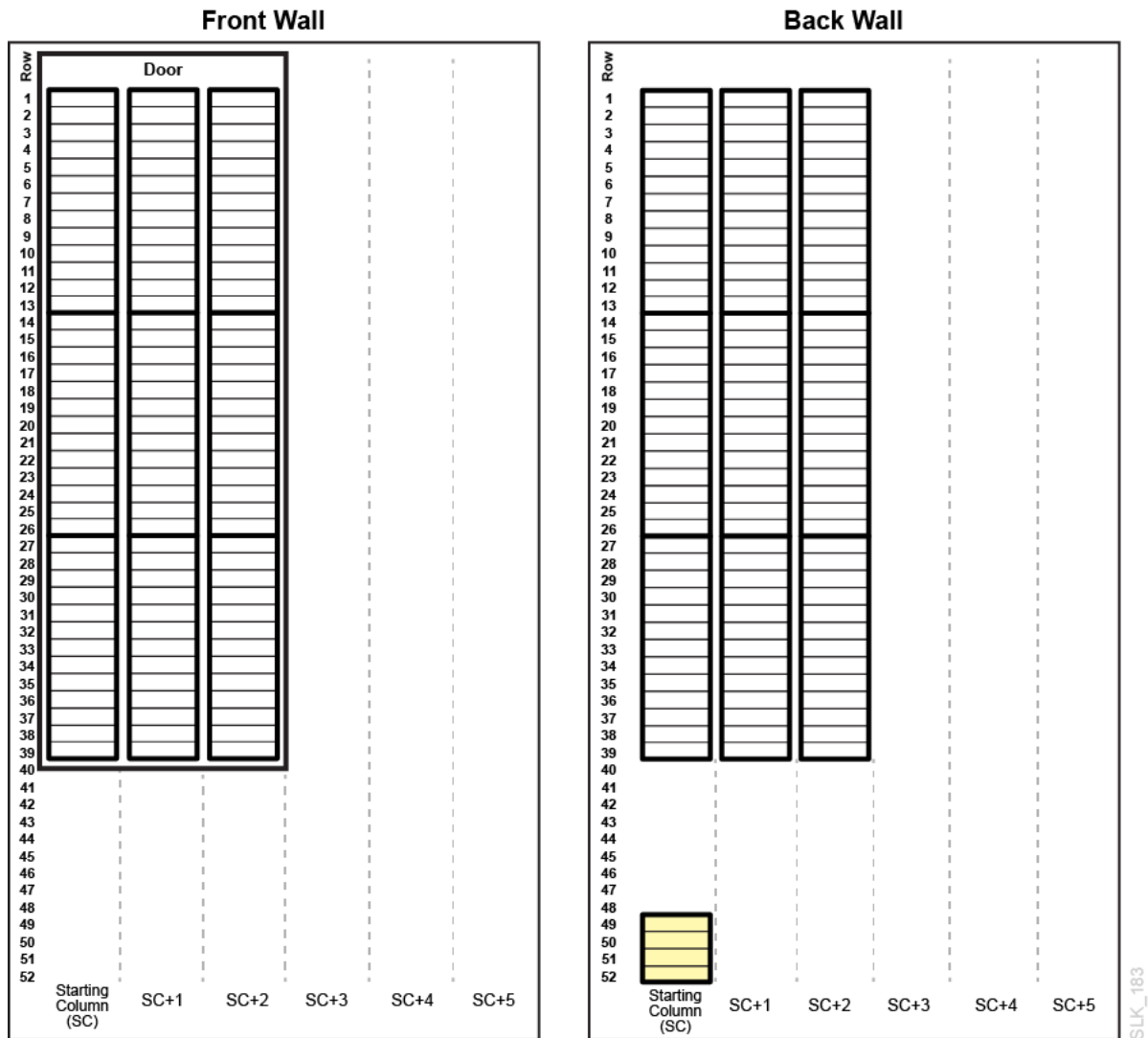


Figure B-11 Access Module, Left



**Figure B-12 Access Module, Right**

---

## Barcode Labels Overview

This appendix describes the requirements for tape barcode labels used in Oracle's StorageTek tape libraries. All tapes must have a proper barcode label. Mis-aligned, mis-oriented, or improperly-labeled tapes may cause equipment damage.

### Contents

- [Barcode Standards](#)
- [Label Design](#)
- [Label Care](#)

### See Also

- ["Volume Label Format Options"](#) on page 5-5

## Barcode Standards

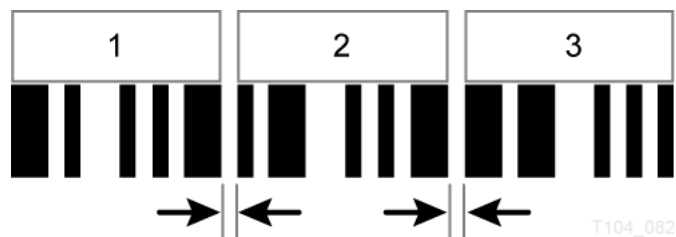
StorageTek libraries use labels based on the Code 39 barcode standard (refer to ANSI/AIM BC1/1995, Uniform Symbology Specification - Code 39). This standard uses discrete barcodes, meaning a fixed pattern of bars represents a single character. Each character is composed of five black and four white bars, where three bars are wider than the others.

For example, [Figure C-1](#) represents the letter A using six narrow bars and three wide bars (two black and one white).

**Figure C-1 Code 39 Barcode Standard — Letter A**



When multiple barcode characters are arranged together as a label, a narrow white bar is placed between the individual characters. This bar is called the inter-character gap.

**Figure C-2 Code 39 Barcode Standard — Inter-Character Gap**

## Label Design

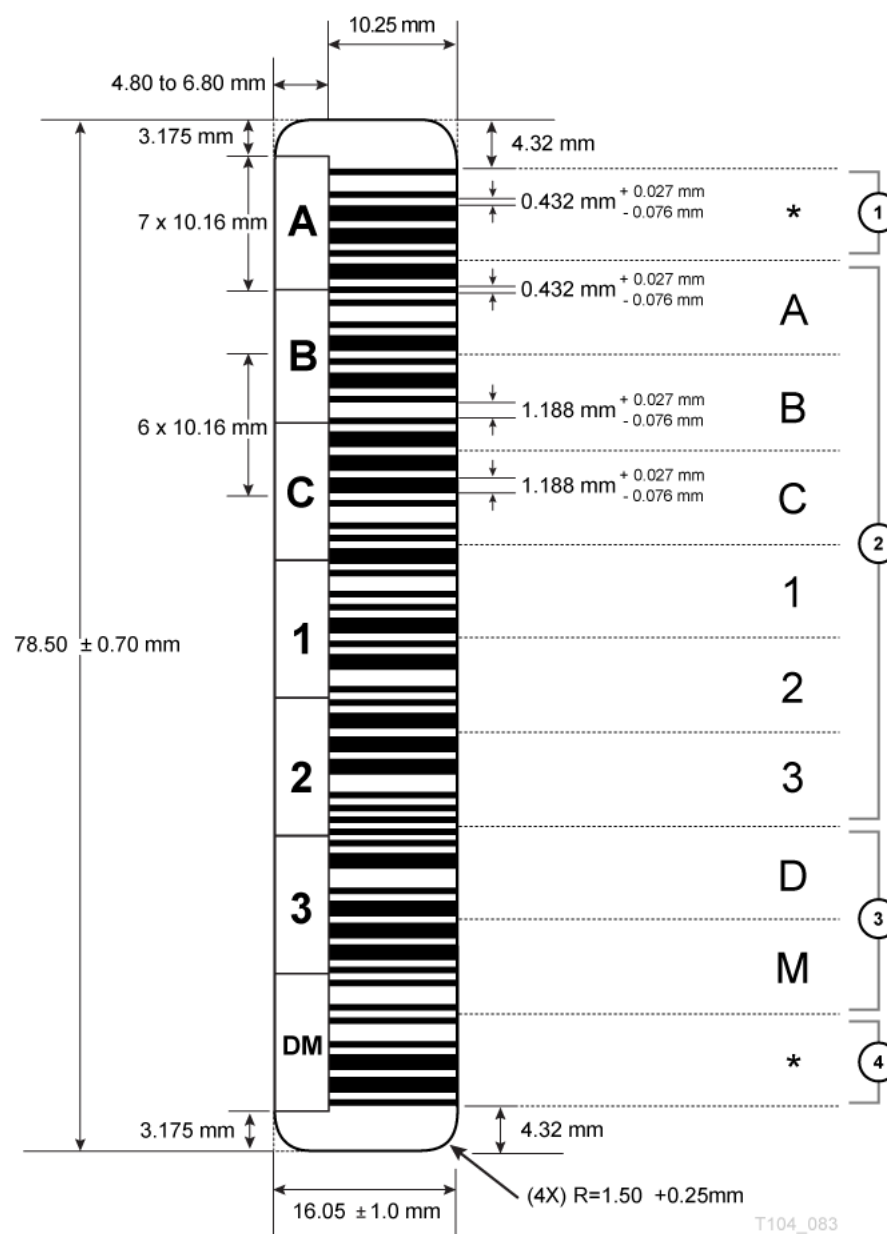
Each label must have a six-character volume serial ID (vol-id) and a one- or two-character media ID. The media ID identifies the tape type. The labels can only use the uppercase letters A through Z, the numbers 0 through 9, and an asterisk (\*) for the start and stop character (for example, \*ABC123L6\*, where ABC123 is the vol-id and L6 is the media ID).

The StorageTek T-series tape labels made by Tri-optic use a dollar sign (\$) as the start and stop character. Never use the asterisk or dollar sign as part of the customer-defined characters of a barcode. Barcode algorithms only decode the characters between the end stops, ignoring any characters outside. Refer to the table below for examples.

**Table C-1 Start and Stop Character Placement**

Actual Barcode Label	After Decoding	Result
*ABC123L6*	ABC123L6	Correct label
*ABC*23L6*	ABC	Misplaced stop character
*ABC1234L6	Unreadable	No stop character



**Figure C-3 Barcode Placement Standards (T10000 and LTO)**

1. Start character
2. Volume ID
3. Media ID
4. Stop character

## LTO Labels

These tapes require an eight-character label — a six-character vol-id and a two-character media ID. The media ID characters are:

- L5 = Generation 5
- L6 = Generation 6

- L7 = Generation 7
- L8 = Generation 8
- LV = Generation 5 WORM
- LW = Generation 6 WORM
- LX = Generation 7 WORM
- LY = Generation 8 WORM
- CU = Universal cleaning

## T10000 Labels

These tapes require an eight-character label — a six-character vol-id and a two-character media ID. The media ID characters are:

- T1 = T10000 A/B data
- T2 = T10000 C/D data
- TS = T10000 A/B sport
- TT = T10000 C/D sport
- CT = cleaning (A and B only)
- CL = universal cleaning

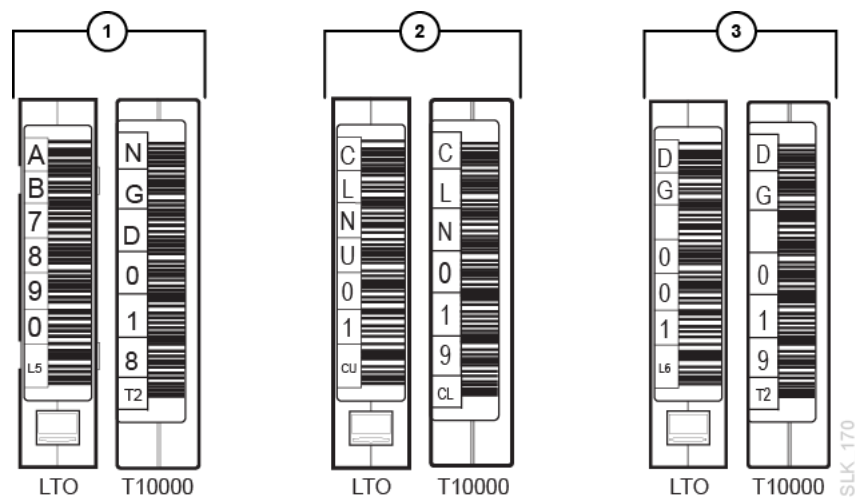
## Cleaning and Diagnostic Labels

Cleaning and diagnostic tapes require unique labels to distinguish them from data tapes. The first three alphanumeric characters in the vol-id determine the type of tape.

- **Cleaning tapes** — use CLNnnn for the vol-id plus the cleaning-specific media ID, where CLN is the cleaning tape identifier and nnn is a sequence of numbers (for example, CLN001CU could be an LTO cleaning tape label).
- **Diagnostic tapes** — use DG[space]nnn plus the media ID, where DG[space] is the diagnostic tape identifier, and nnn is a sequence of numbers (for example, DG 001L6 could be an LTO6 diagnostic tape label).

## Tape Label Examples

**Figure C-4 Example Tape Labels**



1. Data tapes
2. Cleaning tapes
3. Diagnostic tapes

## Label Care

Proper label care is required to prevent barcode read errors or damage to the equipment:

- Keep the barcode intact. Do not mark or damage the barcode label or place any kind of tape across the label.
- Remove old labels completely before applying a new label. Do not apply a new label on top of an old one.
- Do not use sharp instruments to seat or remove a label.



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# Glossary

## **access door**

A door on the Base and Drive Module for service personnel to enter the library. See the section "[Open and Go Inside the Library](#)" on page 15-13.

## **Access Module**

An optional module installed on the ends of a library that allows for bulk tape loading and redundant robotics support. One module supports bulk loading only. Two modules support bulk loading and redundant robotics. Abbreviated as "Accs" in the GUI and previously referred to in the SL3000 as an Access Expansion Module (AEM). See the section "[Access Module](#)" on page 1-5.

## **audit**

The process of scanning the tape barcodes and updating the library database. The library automatically runs a full audit after initialization of one of the front access door has been opened. See the section "[Audit All or Part of the Library](#)" on page 11-12.

## **Base card cage**

The assembly in the Base module that houses controller cards which process commands from a host system, coordinate the activities of robots, CAPs, and tape drives, and monitors status inputs from sensors and switches. See the section "[Base Module Card Cage](#)" on page 1-8.

## **Base Module**

The main module in an SL4000 library that contains the card cage, power distribution units (PDUs), power supplies, and tape drives. This module is required for all libraries. Abbreviated as "Base" in the GUI. See the section "[Base Module](#)" on page 1-2.

## **bulk load**

Loading numerous tapes into the library using an Access Module. See also glossary term [Access Module](#).

## **CAP pool**

A group of CAPs that you can assign to a partition. The partition must have ownership of a CAP within the pool to use it for import/export. If a CAP pool is only assigned to one partition the partition automatically owns all CAPs in the pool. You can assign a CAP pool to multiple partitions, but each partition can only be assigned one CAP pool.

**cartridge access port (CAP)**

A device in the library that allows an operator to import or eject tapes. The SL4000 can contain rotational CAPs (26 slots) and AEM CAPs (234 slots). CAP is synonymous with import/export mail cell in SCSI and open system libraries. See the section ["Managing and Operating CAPs"](#) on page 8-1.

**cartridge array**

A plastic array of slots that holds multiple tapes. The number of slots per array depends on the location in the library. Arrays range from 8 to 14 slots.

**Cartridge Module**

Optional module in the library that adds storage capacity. Abbreviated as "Cart" in the GUI and previously referred to in the SL3000 as a Cartridge Expansion Module (CEM). See the section ["Cartridge Module"](#) on page 1-4.

**cell**

The location in the library in which a tape can be stored. See the section ["View a List of All Cells in the Library"](#) on page 11-5.

**cleaning tape**

A tape that contains special material to clean the tape path in a tape drive. Has a "CLN" prefixed label. Contrast with glossary terms [data tape](#) and [diagnostic tape](#). See the section ["View a List of Cleaning Cartridges"](#) on page 7-1.

**data tape**

A tape that stores customer data. Contrast with glossary terms [cleaning tape](#) and [diagnostic tape](#).

**device**

A mechanical component of the library, excluding tapes, but including all other physical components in the library (such as controllers, robots, CAPs and so on). Devices may be nested within each other. See the section ["View Hardware Device Status"](#) on page 11-3.

**diagnostic tape**

A tape with a "DG" label that is used for diagnostic routines. Contrast with glossary terms [cleaning tape](#) and [data tape](#). See the section ["Run a Diagnostic Test"](#) on page 15-2.

**drive array**

A group of eight drive bays installed in the Base or Drive Module. Each bay can hold one drive tray. The Base Module holds up to three drive arrays. The Drive Module holds up to four drive arrays. See the section ["Library Modules Overview"](#) on page 1-1.

**drive bay**

A slot in a drive array that holds one drive tray. Synonymous with drive slot.

**Drive Module**

An optional library module that provides additional drive tray capacity and tape storage. Abbreviated as "Drive" in the GUI and previously referred to in the SL3000 as a Drive Expansion Module (DEM). See the section ["Drive Module"](#) on page 1-3.

**dynamic World Wide Name (dWWN)**

A feature that applies dynamic names to network devices rather than fixed names. When a dWWN-named device is replaced, it is assigned the same WWN as the one replaced, preventing reconfiguration of the network.

**enter**

The process of placing a tape into the cartridge access port (CAP) so that the library can insert it into a storage cell. Synonymous with import. See the section "[Enter Tapes Through a CAP](#)" on page 8-2.

**eject**

The action in which the library places a tape into the cartridge access port (CAP) so that an operator can remove the tape from the library. Synonymous with export. See the section "[Eject Tapes Through a CAP](#)" on page 8-4.

**FC-SCSI**

A library connection type which uses the small computer system interface over a physical Fibre Channel interface. See the section "[Managing the SCSI Host Connection](#)" on page 10-1.

**hardware activation file (feature activation file)**

A .jar file that you purchase and upload to active optional feature on the library. See the section "[Add or Remove Optional Library Features](#)" on page 5-5.

**job**

Some requests generate jobs which direct the library to perform some action necessary to complete the request. Some jobs can generate sub-jobs necessary to complete the parent job. See also glossary term **request**. See the section "[View Library Requests, Jobs, and Resources](#)" on page 11-4.

**label**

An identifier associated with a tape. Labels are humanly readable, machine readable, or both. Synonymous with **volume serial number (volser or vol-id)**. See the section "[Volume Label Format Options](#)" on page 5-5.

**library controller**

Controls operations and communicates with the operator console and other modules. It resides in the **Base card cage**. See the section "[Library Controller \(LOC\)](#)" on page 1-9.

**magazine**

A removable array that holds tapes for entering or ejecting tapes through the cartridge access port (CAP).

**media**

Same as **tape cartridge**.

**operator panel**

A flat-panel display with a touch screen interface. This feature is attached to the front door of the Base Module. See the section "[Operator Panel](#)" on page 1-7.

**Parking Module**

A converted Cartridge Module installed on the ends of a library configuration. Parking expansion modules can house a defective robot in a redundant robotics

library. Robot maintenance is disruptive to the library. Abbreviated as "Park" in the GUI and previously referred to in the SL3000 as a Parking Expansion Module (PEM). Contrast with glossary term **Access Module**. See the section "[Parking Module](#)" on page 1-5.

**partition**

A portion of the library that presents itself to a host client as an independent library. Cells and drives in one partition cannot be seen by another partition. See the section "[Partitioning the Library](#)" on page 9-1.

**physical capacity**

The number of storage cells in the library (excludes system cells for cleaning tapes, diagnostic tapes, and the module identification block).

**power distribution unit (PDU)**

A device for the distribution of AC line power from one inlet to multiple outlets. Multiple PDUs provide higher availability because the power continues if one PDU (or its AC source if the PDUs use separate AC sources) loses power.

**rail**

That portion of the upper robot track that provides power and communication to the robot.

**raw label**

The full barcode label including volser and media ID. See the section "[Label Design](#)" on page C-2.

**request**

Every external command to the library (SCSI, SCI, GUI, SNMP, GET) and many internal actions will result in a request. A request may spawn a job to direct the library to perform the actions necessary to complete the request. See also **job**. See the section "[View Library Requests, Jobs, and Resources](#)" on page 11-4.

**robot**

An electromechanical device that moves tapes among CAPs, storage cells, and drives. One or two robots are used in an SL4000 library. See the section "[Robotics](#)" on page 1-16.

**safety door**

The rolling "garage door" that separates the Access Module from the rest of the library. During service operations, the safety door lows to prevent the robot from striking someone working inside the Access Module. See the section "[Access Module](#)" on page 1-5.

**SCSI elements**

A four-digit number that represents the addressing scheme used by hosts operating on a Fibre Channel interface. See also **FC-SCSI**. See the section "[View the SCSI Element IDs](#)" on page 11-5.

**service area**

The space surrounding the library for service representatives to perform maintenance. See the section "[Covers, Doors, and Service Clearances](#)" on page 2-5.



**slot**

A location in the library than can hold a device. Drive bays and slots in the Base card cage are examples of slots. A slot is different from a cell. Cells hold tape cartridges.

**spoofed serial numbers**

A feature that overrides the manufacturer's serial number of an LTO tape drive with the right most 10 characters of the drive tray serial number. See [Drive Serial Number Spoofing](#).

**StorageTek Library Control Interface (SCI)**

The web services (WSDL) interface used to control the library.

**system cell**

Cell reserved by the library as a drop-off cell or used to store a cleaning or diagnostic tape.

**tape cartridge**

A container holding magnetic tape that can be processed without separating the tape from the container. The library uses data, diagnostic, and cleaning tapes. Sometimes a tape cartridge is referred to as "tape", "cartridge", or "media". See the section ["Managing Tape Cartridges"](#) on page 7-1.

**tape drive**

An electromechanical device that moves magnetic tape and includes mechanisms for writing and reading data to and from the tape. Sometimes referred to as "drive". See the section ["Managing Drives"](#) on page 6-1.

**TCP/IP**

A library connection type using Ethernet (10/100/1000 Base-T and CAT-5e cable).

**volume serial number (volser or vol-id)**

An alphanumeric label that the host software uses to identify a tape cartridge. It attaches to the spine of a tape and is both human and machine readable. Generally, a eight-character alphanumeric label. See the section ["Volume Label Format Options"](#) on page 5-5

**World Wide Name (WWN)**

A 64-bit integer that identifies a Fibre Channel port. See also [dynamic World Wide Name \(dWWN\)](#).

