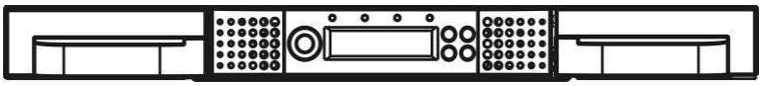
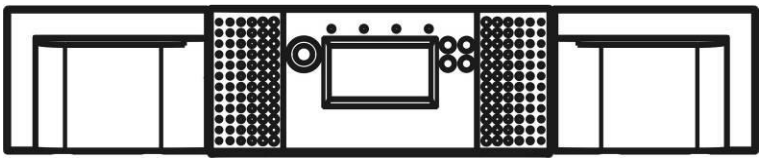
Tape Library 1U, 2U, 4U and 8U

User and Service Guide

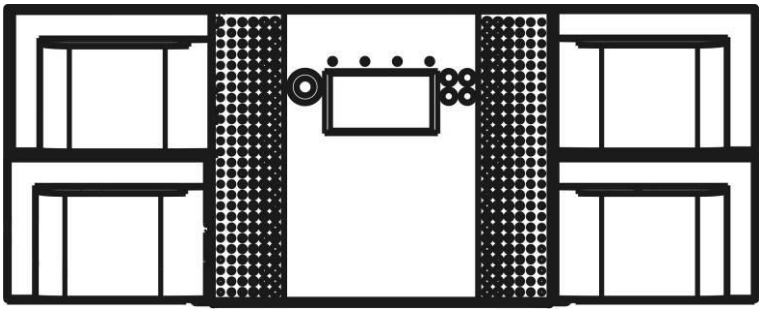
1U



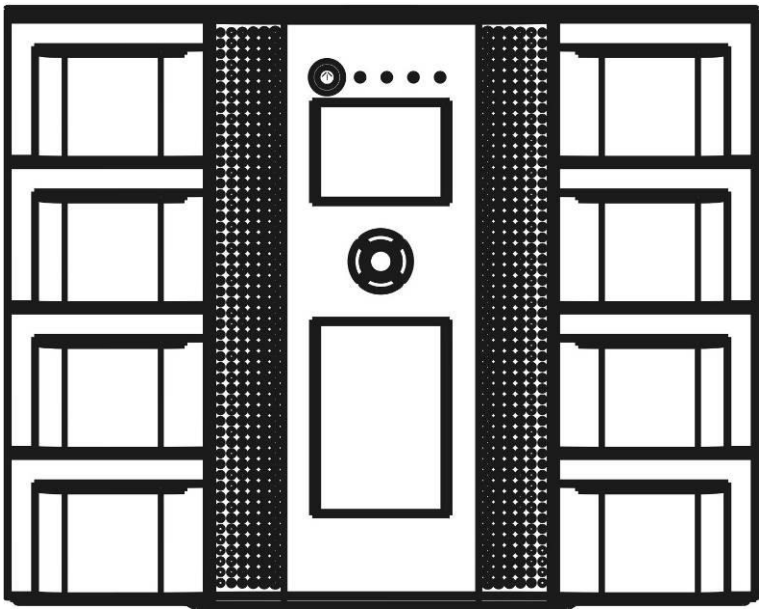
2U



4U



8U



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1 Preliminary remarks

1.1 General purpose

This document provides information about installing, operating, troubleshooting, and servicing a actiLib Tape Library. This document is intended for system administrators and general users who need physical and functional knowledge of the actiLib Tape Library.

1.2 Contacting actidata Storage Systems GmbH

Europe	
actidata Storage Systems GmbH Wulfshofstraße 16 44149 Dortmund Germany Tel. +49 (0) 231-963 632 0 www.actidata.com	

1.3 Product warranty caution

The actiLib Tape Library contains no user-serviceable components. Only an authorized service center should carry out any servicing or repairs.

The warranty for the tape library shall not apply to failures of any unit when:

- The tape library is repaired or modified by anyone other than the manufactures personnel or approved agent.
- The tape library is physically abused or used in a manner that is inconsistent with the operating instructions or product specification defined by the manufacturer.
- The tape library fails because of accident, misuse, abuse, neglect, mishandling, misapplication, alteration, faulty installation, modification, or service by anyone other than the factory service center or its approved agent.
- The tape library is repaired by anyone, including an approved agent, in a manner that is contrary to the maintenance or installation instructions supplied by the manufacturer.
- The manufacturer's serial number tag is removed.
- The tape library is damaged because of improper packaging on return.

In case of unauthorized repairs or modifications, your warranty becomes immediately void.

2 General warnings

DANGER

High voltage
Risk of electric shock

- Do not remove cover (or back). No user-serviceable parts are inside.
- Refer servicing to qualified service personnel.

WARNING

Weight of actiLib Tape Library
Risk of personal injury

Before lifting a library:

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

Risk of damage to devices

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

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

CAUTION

Static sensitive
Risk of damage to devices

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

NOTE

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

3 Contents

4 Figure

5 Table

6 Product overview and features

The actiLib Tape Library provides a compact, high capacity, low-cost solution for simple, unattended data backup.

The actiLib Tape Library is compatible with most operating systems and environments with the appropriate interface card. However, the library requires either direct support from the operating system or a compatible backup application to take full advantage of its many features.

Particular emphasis of the actiLib family includes:

- **Platform of the tape libraries -** independent of tape and drive form factors
- **Configurability -** from entry level cost optimized library to a feature rich configuration
- **Broad level of connectivity –** SCSI, FC and SAS depending upon installed tape drives
- **Expandability** – following devices can be added in the field
    - All unit highs: magazines and tape drives
    - 2U, 4U and 8U: extra library controller, iSCSI bridge
    - 2U, 4U and 8U: Library Extension Module
    - 4U and 8U: extra power supply
- **Technology upgrade -** customer can upgrade tape drive technologies (e.g. LTO5 to LTO6) in the field
- **Service friendly design** – following devices are accessible for quick replacement
  All unit heights: magazines, from the front of the library
  tape drives, from the back of the library
  2U, 4U and 8U library controller, power supply and extender from the back of the library
- **Maximum up time** - through advanced error handling and recovery capability

The actiLib family includes the following features:

- The library occupies one SCSI target address and uses separate LUNs for the tape drive and library robotics.
- USB interface to enable serviceability features (library and drive firmware upgrades) and/or customized features (storage on demand) implementation
- The library can be operated via the front operator control panel (OCP) over the network via the intregal remote management unit (RMU) or via the storage interface connection by the host application.
- Supports industry standard management protocols such as SNMP(SMI-S future development)
- Mail slot for import/export of cartridges during library operation
- Robotic with barcode reader
- The actiLib Tape Library encompasses rack formats for all unit highs. (1U, 2U, 4U 8U).
- The actiLib Tape Library encompasses tabletop functionality for 1U, 2U and 4U libraries.

6.1 Supported configurations

For maximal supported configurations, see **Table 1**.

Tape library				
Form factor (unit high)	1U	2U	4U	8U
Magazines				
Magazine	2	2	4	8
Mail slot	0, 1	0, 1	0, 3	0, 3
Tape slot	8	24	48	96
Tape drives				
Half-height drive	1	2	4	4
Full-height drive	0	1	2	4
Other devices				
Power supply	1	1	2	2
Library controller	1	1	1	1
iSCSI bridge	0	1	2	2
Library extension module (max. slot and drives)				
1U	--	--	--	--
2U	--	--	72 slot 4 drives	120 slot 4 drives
4U	--	72 slot 4 drives	96 slot 6 drives	144 slot 6 drives
8U	--	120 slot 4 drives	144 slot 6 drives	--

Table 1 Supported configurations

6.2 Front panel

The front panel of the actiLib Tape Library is used to access the power button, operator control panel (OCP), left and right magazines, LED's, and the mail slots.

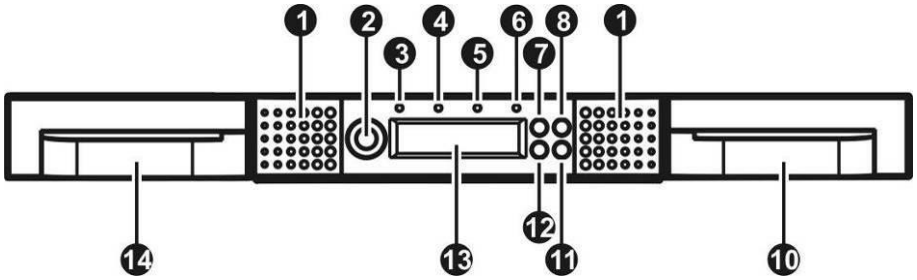


Figure 1 1U front panel

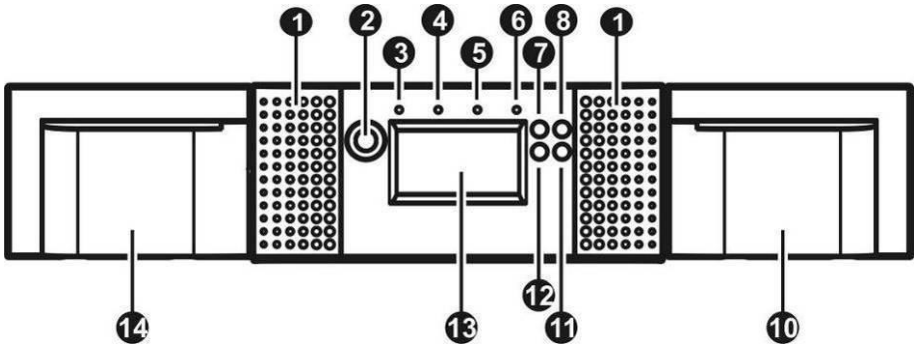


Figure 2 2U front panel

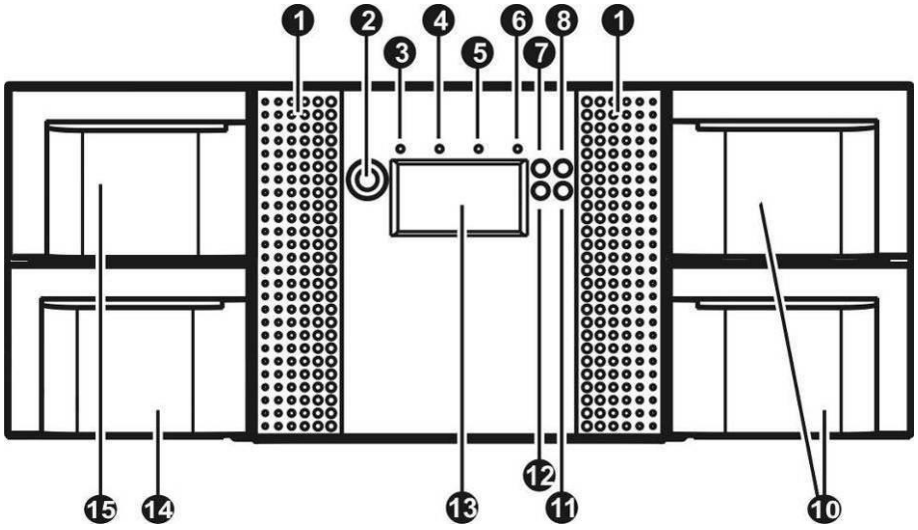


Figure 3 4U front panel

Number	Description
1	Air vents
2	Power button Pressing the button will initiate a controlled power down of the library (soft power down)
3	LED <READY> (green) is illuminated during power on; blinking during tape or library robotics activity.
4	LED <CLEAN> (amber) is illuminated when the tape drive has determined that a cleaning tape should be used. Cleaning is only necessary when the library directs to do so. Additional cleaning is not necessary.
5	LED <ATTENTION> (amber) is illuminated when the library has detected a condition that requires attention by the operator.
6	LED <ERROR> (amber) is illuminated when an unrecoverable tape drive or library error occurs. A corresponding error message is shown on the LCD screen.
7	<CANCEL> button [✕] is used to cancel a user action and return to the last menu item.
8	<PREVIOUS> button [◄] is used to navigate backward through menu items.
9	Right magazine with mail slot (only in 8U library)
10	Right magazines
11	<ENTER> button [↵] is used to enter to a sub menu or execute an action.
12	<NEXT> button [►] is used to navigate forward through menu items.
13	Operator control panel (OCP) consisting of 128 x 64 characters. The OCP displays actions and status information, menu items or error messages equivalent to the operation mode.
14	Left magazine with mail slot
15	Left magazines

Table 2 General front panel overview

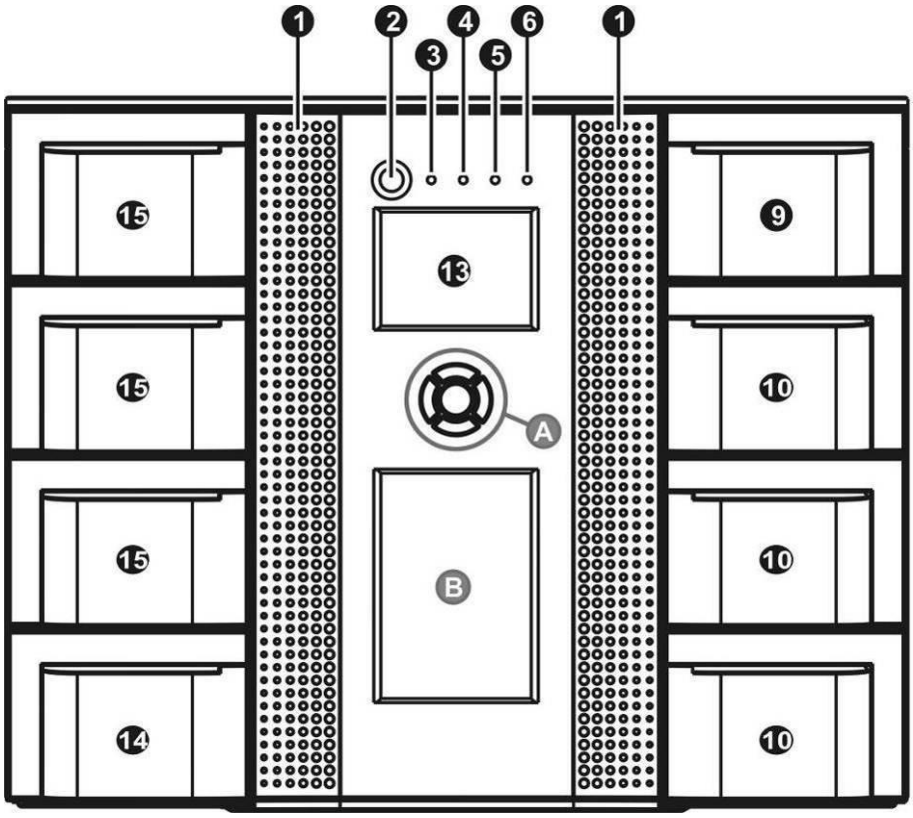


Figure 4 8U front panel

For general front panel overview, see **Table 2, Page 17.**

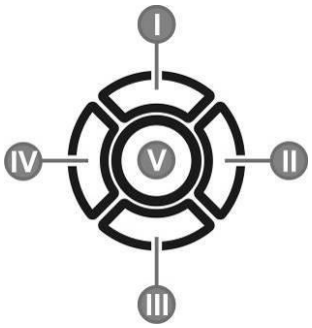
Letter	Description		
A		I	<UP> button [▲] is used to navigate through menu items.
		II	<RIGHT> button [►] is used to navigate through menu items.
		III	<DOWN> button [▼] is used to navigate through menu items.
		IV	<LEFT> button [◄] is used to navigate through menu items.
		V	<ENTER> button [↵] is used to enter to a sub menu or execute an action.
B	Window front panel		

Table 3 Additional front panel overview (8U)

6.3 Rear panel

The rear panel of the actiLib Tape Library provides access to the drive interface connectors, the power connector, Ethernet, serial and USB ports and the magazine release holes. All libraries support parallel SCSI, SAS and Fibre channel tape drives.

The position of the appended devices on the rear panel is in all libraries common. The power supply is on the left side, tape drives are in the middle and the library controller is on the right side of the library.

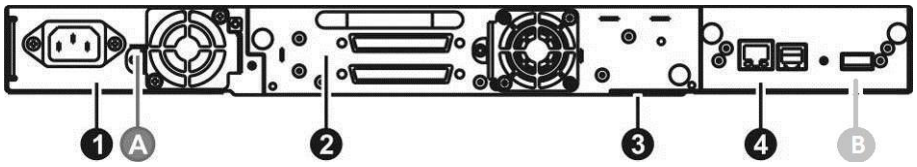


Figure 5 Library rear panel (1U)

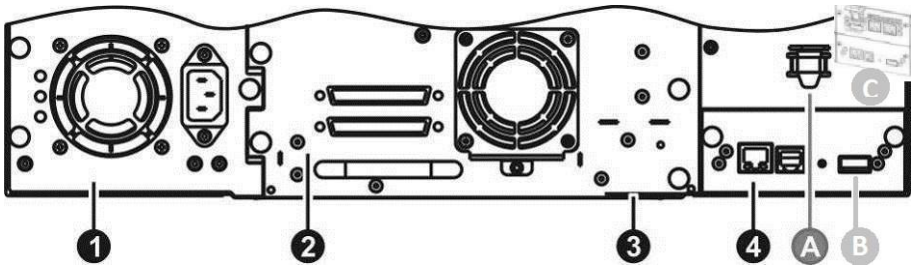


Figure 6 Library rear panel (2U and 4U)

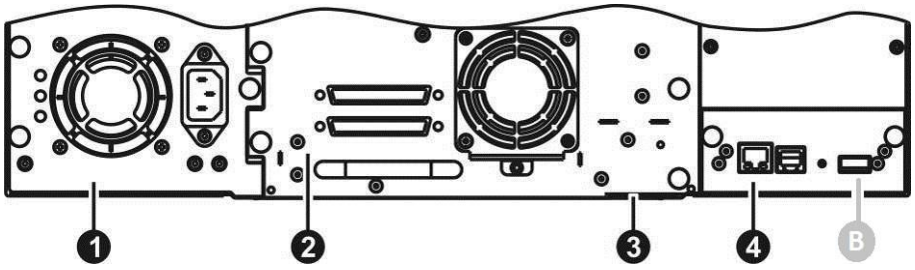


Figure 7 Library rear panel (8U)

Number	Description	Number	Description
1	Power supply	A	Storage location (for the shipping lock)
2	Tape drive(s)	B	USB port (Firmware upgrades, key storage)
3	Pull-out tab • containing the product information. (Serial Number /Model/Customer on demand)	C	iSCSI bridge (2U 1x /4U 1x or 2x) optional possible
4	Library controller		

6.3.1 Power supply

The power supply model utilized is dependent on the library model. The part# can be found in the price list.

For a 1U library, **see Figure 8.**
For a 2U library, see Figure 9
For a 4U or 8U library, see **Figure 10.**

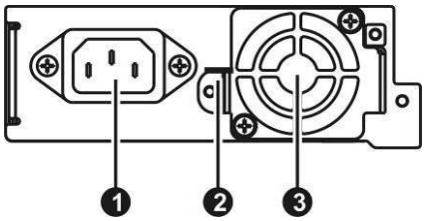


Figure 8 Power supply (1U)

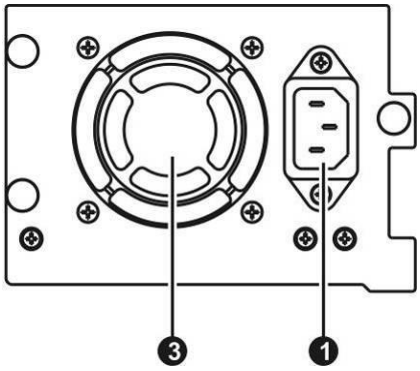


Figure 9 Power supply (2U)

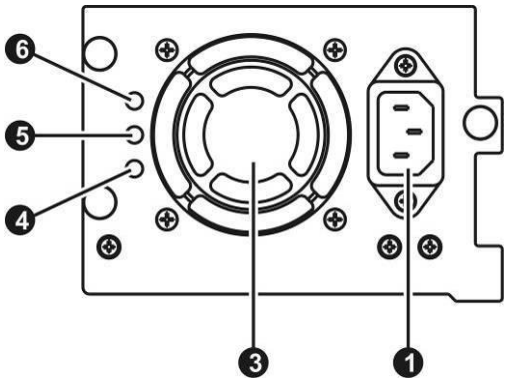


Figure 10 Power supply (4U, 8U)

Number	Description	Number	Description
1	Fan vent	4	LED (blue) is illuminated when the AC power is connected.
2	Storage location (for the shipping lock)	5	LED (amber) is illuminated when a fan failure occurs. The fan is running too slow or is defective.
3	Power connector The library requires a 110 / 220 V AC power connection.	6	LED (green) is illuminated when the power supply is producing good power for the library.

Table 4 Power supply overview

6.3.2 Tape drives

SCSI connectors till LTO 4 Generation

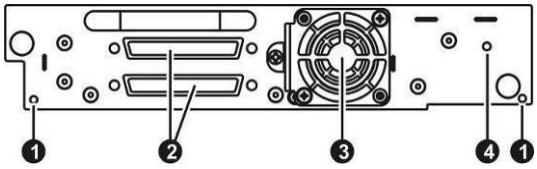


Figure 11 SCSI HH tape drive

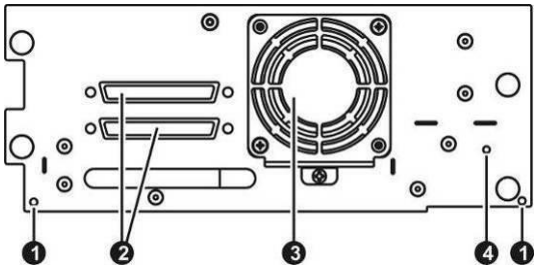


Figure 12 SCSI FH tape drive

Number		Number	Description
1	Magazine release holes	3	68-pin HD SCSI connectors
2	Fan vent	4	Tape drive LED

Table 5 SCSI tape drive overview only till LTO 4 Gen

SAS connectors all LTO Generations

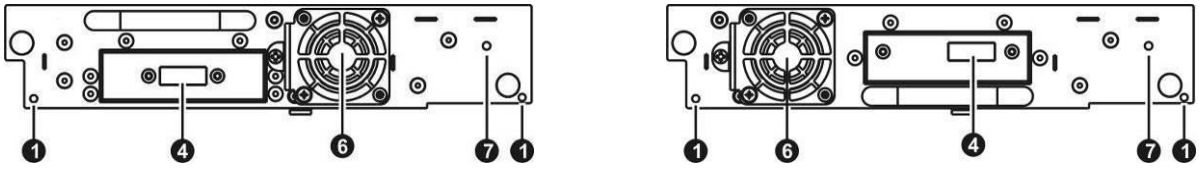


Figure 13 SAS HH tape drive

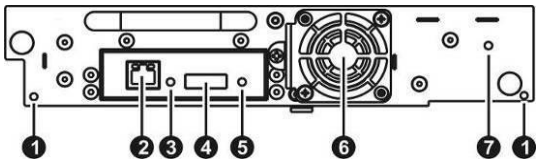


Figure 14 SAS HH tape drive with Ethernet port

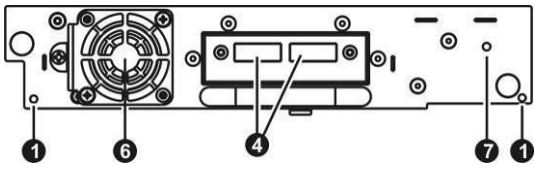


Figure 15 SAS HH tape drive with two SAS connectors

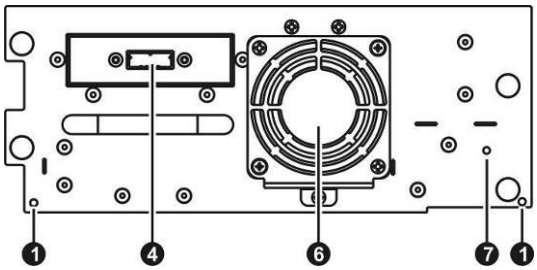


Figure 16 SAS FH tape drive

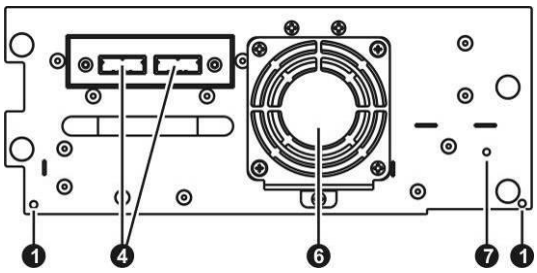


Figure 17 SAS FH tape drive with two SAS connectors

Number		Number	Description
1	Magazine release holes	5	LED <ERROR> (amber)
2	Ethernet port (service/diagnostics not used)	6	Fan vent
3	LED <READY> (green)	7	Tape drive LED
4	SAS connector(s)		

Table 6 SAS tape drive overview

Further details can be found on the Internet searching for HP / IBM drive.

FC connectors all LTO Generations

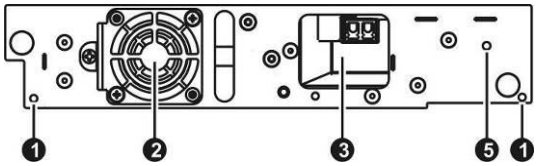


Figure 18 FC HH tape drive

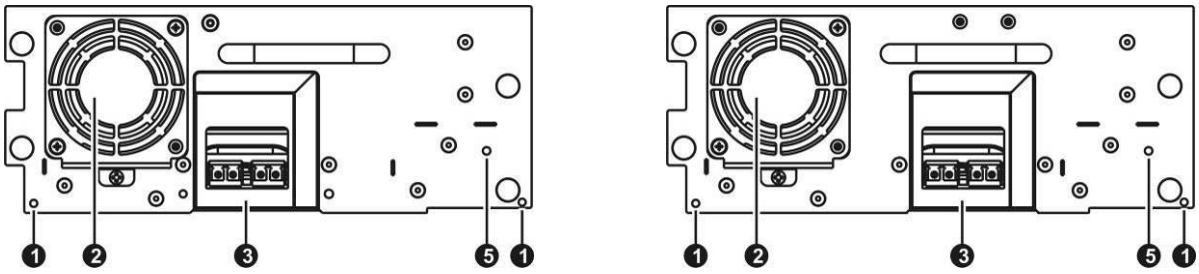


Figure 19 FC FH tape drive

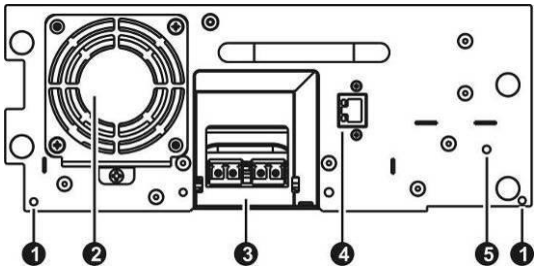
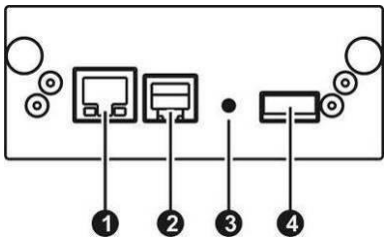


Figure 20 FC FH tape drive with Ethernet port

Number		Number	Description
1	Magazine release holes	4	Ethernet port (service/diagnostics not used)
2	Fan vent	5	Tape drive LED
3	FC connectors		

Table 7 FC tape drive overview

6.3.3 Library controller



Number	Description
1	Ethernet port (RMU connection)
2	Serial port (Engineering Diagnostics)
3	Controller LED blinking ok; if not failure
4	USB port (Firmware upgrades, key storage)

Figure 21 Library controller

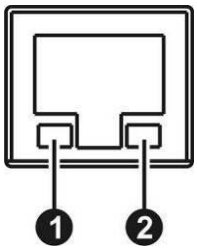
6.3.4 iSCSI bridge (not supported for Mainline)

The iSCSI bridge creates an interface between a network, which utilizes the Ethernet protocol, and peripherals which utilize a SAS bus architecture. The internal circuitry of the Bridge acts as a two-way interface converting the data packets, received from the network, into data transfers and electrical signals that storage devices such as tape drives understand on the SAS bus. Details see iSCSI User Manual.

The iSCSI bridge supports:
* 2U actiLib Tape Library with up to two SAS drives.
* 4U actiLib Tape Library with up to four SAS drives. To support three or four drives the library requires two iSCSI bridges!
* User management interface via network.
* NTP
* iSNS
* Multi path

6.3.5 Ethernet port

The Ethernet port is only available on the library controller drives and will connect the library to a network / PC for working with the RMU. On some LTO5/6 tape it is available for service/diagnostics (not used).



Number	Description
1	LED (amber) is illuminated when a connection is in place
2	LED (green) is illuminated when the connection is ready / in use

Figure 22 Ethernet port

7 Installing

This chapter provides instructions for installing the actiLib Tape Library.

7.1 Location requirements

Choose a location that meets the following criteria:

Criteria	Definition
Rack requirements	Standard 19-inch rack with an appropriate # of U's (unit high) of clearance
Room temperature	10-35º C (50-95º F)
Power source	▪ AC power voltage: 100-127 VAC; 200-240 VAC ▪ Line frequency: 50-60 Hz ▪ Place the library near to an AC outlet. The AC power cord is the libraries main AC disconnect device and must be easily accessible at all times.
Air quality	▪ Place the library in an area with minimal sources of particulate contamination. ▪ Avoid areas near frequently used doors and walkways, stacks of supplies that collect dust, printers, and smoke-filled rooms. ▪ Excessive dust and debris can damage tapes and tape drive.
Humidity	20-80 percent RH non-condensing
Clearance	▪ Back: Minimum of 15.4 cm (6 inches) ▪ Front: Minimum of 30.8 cm (12 inches) – for mail slot Minimum of 60 cm to remove magazines (24 inches) ▪ Sides: Minimum of 5.08 cm (2 inches)

Table 8 Location requirements

For further information, see **Chapter Technical specifications 12.**

7.2 SCSI requirements

The actiLib Tape Library incorporates a wide SCSI low-voltage differential (LVD) SCSI bus, but may also be attached to a single-ended (SE) SCSI bus.

Make sure your SCSI host adapter or controller supports these standards.

NOTE

- Do not connect any LTO SCSI device to a SE SCSI bus, as it will severely degrade performance.
- The actiLib Tape Library is not compatible with a standard differential (Diff) or a high-voltage differential (HVD) SCSI bus.
- The library is compatible with a narrow (50-pin) SCSI bus using a 68-pin to 50-pin adapter that terminates the unused 18 pins. This adapter is not included with the library and sometimes labeled high-byte termination.

7.2.1 SCSI host bus adapter (HBA)

To get optimum performance from your actiLib Tape Library you need a SCSI bus that can transfer data at a rate that supports the libraries maximum burst transfer speed.

For further information, see **Chapter Maximum storage capacity 12.3.**

If the host computer will have multiple parallel SCSI devices, you must decide how they will be configured into one or more parallel SCSI busses.

A parallel SCSI bus consists of the host bus adapter (HBA), the parallel SCSI devices, the parallel SCSI cables, and the terminators. The HBA and devices are connected in a chain, with each device connected to the next. The last device must have a SCSI terminator. Each device in the chain must have a unique SCSI address (SCSI ID).

An HBA might have one or two channels, with each channel supporting one parallel SCSI bus. Check to see how many channels the HBA has and what devices are already connected to the HBA. Some devices, such as parallel SCSI disk drives, could be inside the server.

The devices on a parallel SCSI bus share bandwidth so be careful about which devices you put together on a bus.

NOTE

- If you connect the library to an SE SCSI bus, or if there are SE devices attached to the same SCSI bus, the libraries performance is limited to the maximum data transfer speed and maximum cable lengths of the SE SCSI bus. For these reasons, do not use a SE SCSI bus with the library.
- If there is any SE devices on the same SCSI bus, the entire SCSI bus will negotiate down to SE speed, severely degrading performance.
- The HBA also has a SCSI address that is typically 7. Verify that each device on the bus has a unique SCSI address. If the pre-configured SCSI address will not be unique on a bus, you will need to change the SCSI address of one or more of the tape drives during the installation process.

7.2.2 LUN scanning

The actiLib Tape Library uses a single SCSI ID per tape drive to control the tape drive (LUN 0) and library robotic (LUN 1).

NOTE

- The library requires an HBA that supports LUN scanning. If LUN scanning is disabled, your host system will not scan beyond LUN 0 and will fail to discover the library. It will just see the tape drive.
- Some HBAs, such as RAID controllers do not support LUN scanning.

7.2.3 Serial attached SCSI (SAS)

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

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

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

NOTE

- The library has a mini-SAS connector on each SAS tape drive. Mini-SAS connectors are keyed.

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

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

7.3 Fibre channel requirements

Fibre channel (FC) allows an active intelligent interconnection scheme, called a Fabric , to connect devices. Everything between the ports on FC is called the Fabric. The Fabric is most often a switch or series of switches that takes the responsibility for routing.

The library allows the selection of the following Fibre Channel port behaviors:

- LN Port (default setting) – an automatic configuration that tries arbitrated loop first, then switched Fabric.

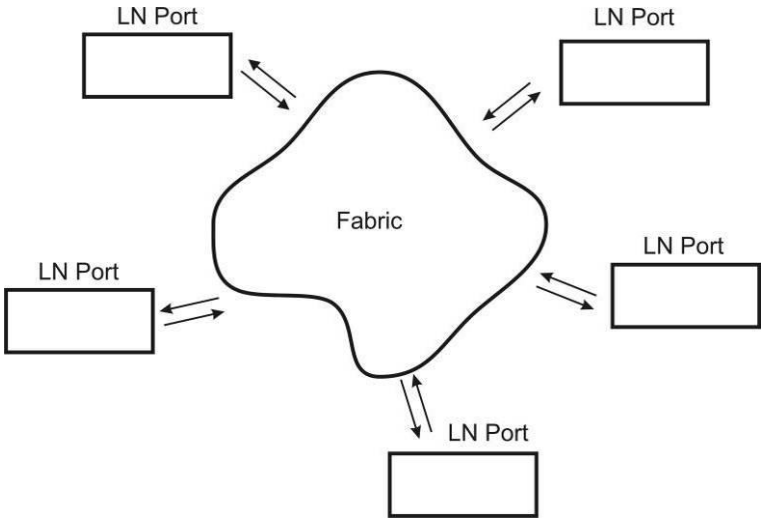


Figure 23 Fibre channel topology (LN Port)

- L Port – arbitrated loop

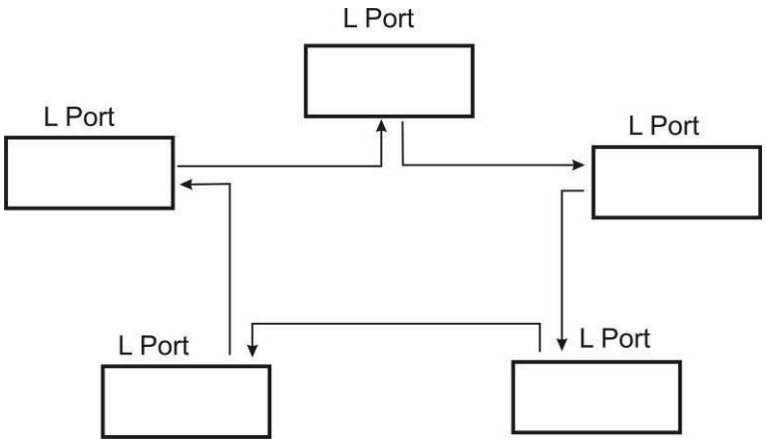


Figure 24 Fibre channel topology (L Port)

- N Port – point to point protocol in a switched Fabric topology

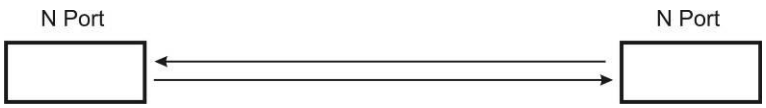


Figure 25 Fibre channel topology (N Port)

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

NOTE

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

  A lower Gb HBA might result in performance degradation when backing up highly compressible data to a higher Gb tape drive.

- In a SAN installation, all switches between the host and the must be of the appropriate type.

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

7.4 Preparing the host

CAUTION

Static sensitive
Risk of damage to devices

- A discharge of static electricity damages static-sensitive devices or micro circuitry.
- Proper packaging and grounding techniques are necessary precautions to prevent damage.
- See **Chapter Electrostatic discharge, chapter 10.2.**

Follow these general guidelines:

- Make sure that your backup application supports the selected HBA and tape drive interface type HBA.
- Check with a system administrator, if the host server is connected to a network, before power off.
- Install a suitably rated HBA.
- Make sure that LUN scanning is enabled on the SCSI host adapter.

7.5 Installing precautions

Adhere strictly the following steps to install the actiLib Tape Library:

WARNING

Weight of actiLib Tape Library
Risk of personal injury

Before lifting a library:

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

Risk of damage to devices

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

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

NOTE

- Do not expose the library to moisture.
- Use the library on a firm level surface free from vibration.
- Do not place anything on top of the library.

7.6 Unpacking the library

Before unpacking the library, clear a work surface to unpack the library. Select an open rack location allowing easy access to the host server and an easily accessible power outlet.

NOTE

If the temperature in the room where the library will be installed varies by 15° C (30° F) from the room where the library was stored, allow the library to acclimate to the surrounding environment for at least 12 hours before unpacking it from the shipping container.

Unpacking the actiLib Tape Library:

1. Before opening and removing the tape library from the box, inspect the container for shipping damage. If you notice any damage, report it to the shipping company immediately.
2. Open the box.
3. Carefully remove the shipping materials from the top of the library.
4. Remove the accessory package and set aside. (if included)
5. Remove the two rack rails and set aside. (if included)
6. Lift the library out of the carton and remove the bag from the loader.
   Save the packaging materials for future use.

NOTE

Do not place the library on either end or sides as this may damage the library.

7.7 Identifying the product components

Confirm that you received the following:

1. actiLib Tape Library
2. Library documentation

Optional components, depending on the ordered configuration:

1. Terminator (Only parallel)
2. Cables, for instance SCSI, SAS and / or Ethernet cables
3. Power cord
4. Rack mount kit:
   - 2 rack mount rails
   - 1 bag of eight M6 screws for the rack mounting (9.5 mm square holes in the rack column)
   - 1 bag of eight M6 screws for rack mounting (6.85 mm round holes in the rack column)
   - 2 mounting brackets
   - M3x6 torx screws to fix the mounting brackets (amount depending on the unit form factor)
   - M5 screws to secure the mounting brackets to the rack (amount depending on the unit form factor)

Required additional equipment for a successful installation:

1. Ethernet cable(s)
2. SCSI, SAS or FC cable(s) depending upon drives selected
3. Terminator(s)
4. Power cord to match main connector
5. #2 Phillips screwdriver

7.8 Removing the shipping lock

NOTE

The shipping lock, which prevents the robotic transport mechanism from moving during shipment, must be removed before the library is powered on.

You may skip this step for an 8U library, no shipping lock is utilized on the 8U.

To remove and store the shipping lock:

1. Remove the yellow label that is securing the shipping lock on the top of the library.

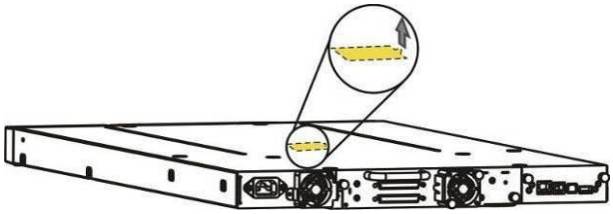


Figure 26 Remove the yellow label

2. Remove the shipping lock.

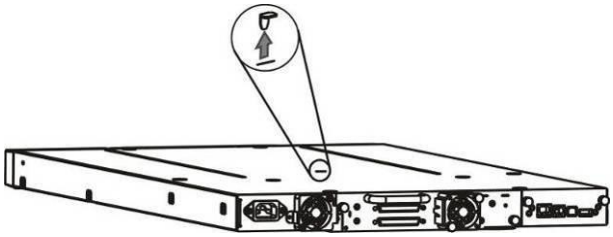


Figure 27 Remove the shipping lock

3. Store the shipping lock (in case of returning the unit see **chapter 11** replacement is required).
   For a 1U library, see **Figure 5, Page 19.**
   For a 2U or 4U library, see **Figure 6, Page 19.**
4. Replace the yellow label on the top of the library.

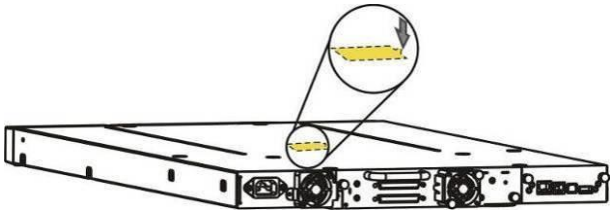


Figure 28 Replace the yellow label

7.9 Rack mounting the library

NOTE

First, read the **Chapter Installing precautions, Page 30**.

The rack rail components are optional accessories depending on the ordered configuration.

Skip this chapter, when the rack rail components not available.

Required tools:

- #3 Phillips screwdriver
- T10 torx screwdriver

Rack mounting the library:

The steps to install a library in a rack are for all unit highs common. In the following figures, a 1U library is shown as an example.

1. Determine the location and in the rack for the library to be installed.
2. Use a pencil to mark the location on each vertical rail in the rack.
3. In the rack mount kit are two sets of eight M6 screws. Determine the type of rack then choose the appropriate type of M6 screws.
4. Secure one rail to each side of the rack in your chosen rack location with a #3 Phillips screwdriver. Insure the rails are mounted level and at the same rack height on each side.
5. Secure both the front and back of each rack rail to the rack.

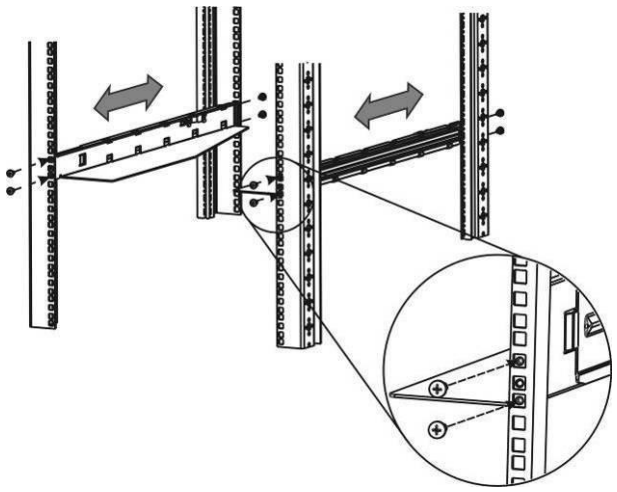


Figure 29 Install the rack rails (1U)

6. Install the mounting brackets of the library using the Torx screwsT10 included in the rack mount kit; see **Figure 30.**

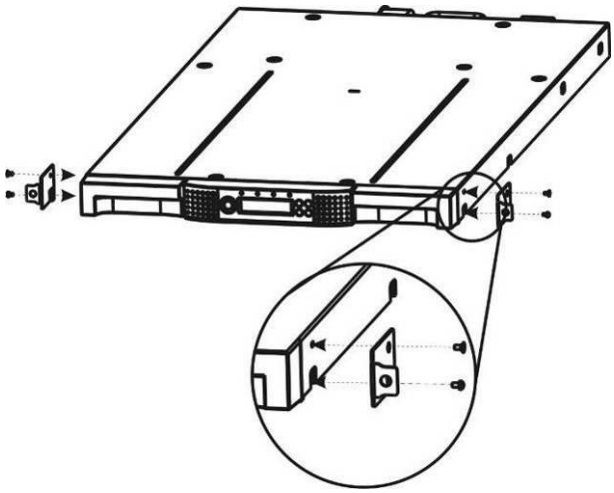


Figure 30 Install the mounting brackets (1U)

7. Slide the library onto the rack rails.
8. Secure the library to the rack using a 3# Phillips screwdriver placed through the small holes in the mounting bracket to tighten the M5 screw(s) on each side of the library.

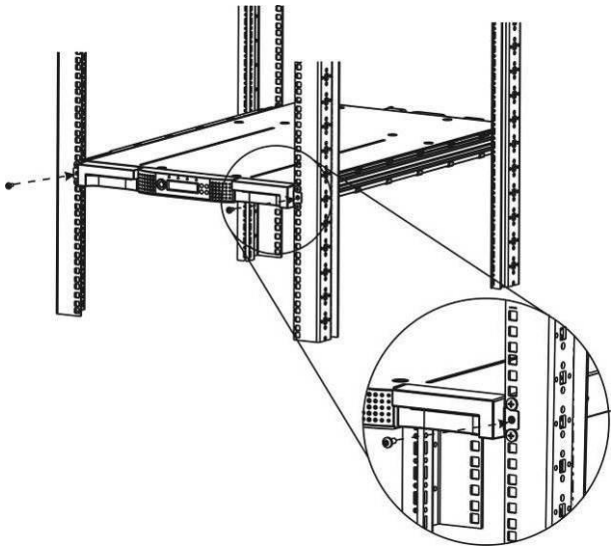


Figure 31 Secure the library to the rack (1U)

7.10 Installing a tape drive

A tape drive is installed from the rear of the library.

If the library does not already have the tape drive(s) installed, install the tape drive(s) now. If the library already has tape drives installed additional tape drives may be added after the installation of the library is complete.

Required tool:

- #2 Phillips screwdriver

To install tape drives:

1. Locate an appropriate vacant drive bay on the rear panel of the library.
   - 1U library:
     There is only one bay for 1 half-high tape drive.
   - 2U library:
     There is only bay space for either 1 full-high or 2 half-high tape drives. Always install the first tape drive in the bottom drive bay. If the first device is a half-high tape drive, you may install an additional half-high tape drive in the top bay. If only one half height drive is installed you must install the block off plate over the upper empty drive position.
   - 4U and 8U library:
     Install the first tape drive in the bottom drive bay. Install each additional tape drive in the drive bay directly above the existing tape drives.
2. If available, loosen the screws of the drive bay cover and remove the screws by holding the cover in place.
3. Remove one drive bay cover to install a half-height tape drive; remove two drive bay covers to install a full-height tape drive.
4. Slightly pull out the pull-out tab for the product ID label so it does not interfere with the tape drive, see **Figure 32**

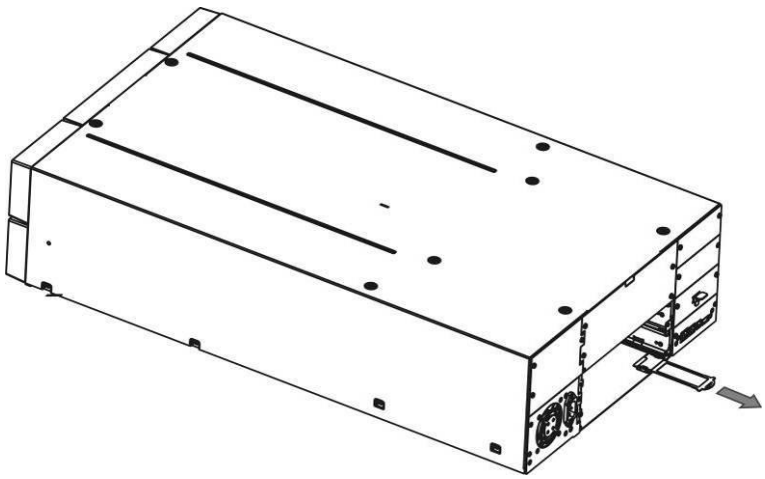


Figure 32 Pullout tab for product ID (4U)

5. Before installing the tape drive, inspect the connectors on the tape drive. Ensure that the connectors are intact, free of any foreign objects, and have no cracks or deformed or bent contacts.

6. Insert the tape drive into the drive bay, and align the connectors on the library while supporting the drive, see **Figure 33, Step 1**.

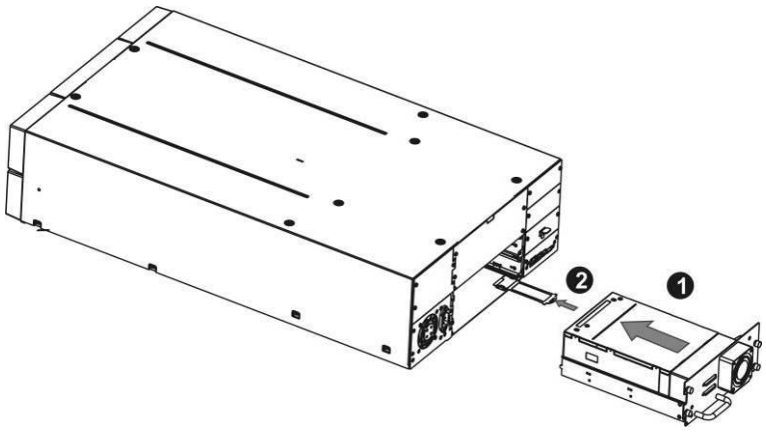


Figure 33 Install a tape drive (4U)

7. Push the tape drive into the drive bay until the tape drive seats itself against the back of the library.
8. Slightly push the pull-out tab for the product ID label back into library, see **Figure 33, Step 2**.
9. Tighten the blue captive screws with your fingers to secure the tape drive to the library.

7.11 Installing the library controller

The library controller is installed from the rear of the library.

If the library does not already have a library controller installed, install the library controller now.

Required tool:

- #2 Phillips screwdriver

To install a library controller:

1. Locate the appropriate vacant library controller bay on right side on the rear panel of the library, shown in **Chapter Rear panel 6.3**.
2. If available, loosen the screws of the library controller bay cover and remove the screws by holding the cover in place.
3. Before installing the library controller, inspect the connectors on the library controller. Ensure that the connectors are intact, free of any foreign objects, and have no cracks or deformed or bent contacts.
4. Insert the library controller on the alignment rails and push the library controller into the library controller bay until it seats itself against the back of the library, see **Figure 34.**
   (In the following figure, a 4U library is shown as an example.)

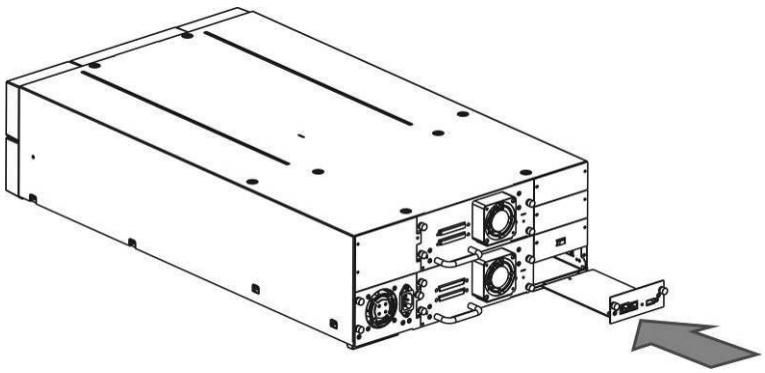


Figure 34 Install a library controller (4U)

5. Tighten the blue captive screws with your fingers to secure the library controller to the library.

7.12 Installing a power supply

NOTE

Skip this chapter for a 1U library, because a power supply is already installed and no user serviceably part.

Verify that the power to the library is off and the power cord is not attached

The power supply is installed from the rear of the library.

If the 2U, 4U or 8U library does not have a power supply installed, install the power supply in the bottom left power supply bay now.
The 4U or 8U library may be configured for a redundant power by installing a second power supply now.

Required tool:

- #2 Phillips screwdriver

To install a power supply:

6. Locate the power supply bay on the left side of the rear panel of the library, shown in **Chapter Rear panel 6.3.**
   - 2U library:
     There is only 1 power supply bay.
   - 4U and 8U library, There are 2 power supply bays:
     Always install:
     Install the first power supply in the bottom left power supply bay. The unit can run with one power supply
     If redundant power supplies are desired for fault tolerance install a second
     Install a redundant power supply in the power supply bay directly above the existing power supply.
     Both supplies must be plugged in the AC mains to operate in failover mode.
7. If available, loosen the screws of the power supply bay cover and remove the screws by holding the cover in place.
8. Before installing the power supply, inspect the connectors on the power supply. Ensure that the connectors are intact, free of any foreign objects, and have no cracks or deformed or bent contacts.
9. Insert the power supply on the alignment rails and push the power supply into the power supply bay until it seats itself against the back of the library, see **Figure 35.**
   (In the following figures, a 4U library is shown as an example.)

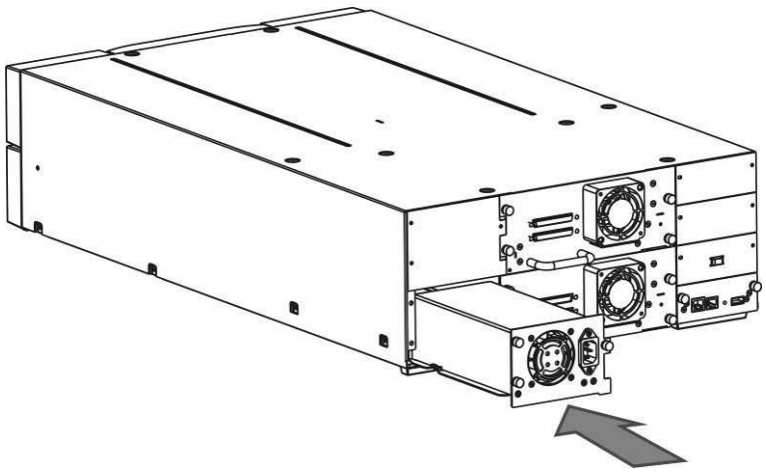


Figure 35 Install a power supply (4U)

10. Tighten the blue captive screws with your fingers to secure the power supply to the library.

7.13 Connecting the cables

7.13.1 Connecting the power cord

DANGER

High voltage
Risk of electric shock

- Use only approved power cords.
- Observe local health and safety requirements and guidelines for manual material handling.

WARNING

Usage of not approved power cords
Risk of personal injury
Risk of damage to devices

Before connecting a power cord to the library:

- Ensure that the power cord meets individual country specific safety.
- Use a sufficient conductor amp capacity to avoid overheating the library.

The manufacturer disclaims all liability in the event a non-manufacturer approved power cord is used.

To connect the power cord to the library:

1. Plug the power cord into the power connector (AC connector) on the rear panel of the power supply, see **Chapter Power supply, Page 20.**
2. Plug the power cord into the power outlet of the power supply.

7.13.2 Connecting the parallel SCSI cable

NOTE

Use only cables and terminators specified for your LTO SCSI tape drive or labelled as multimode.

To connect the parallel SCSI cable to the tape drive:

1. Power down the host server before attaching new devices to the library.
2. Attach one end of the parallel SCSI cable to one of the connectors on the rear panel of the tape drive.

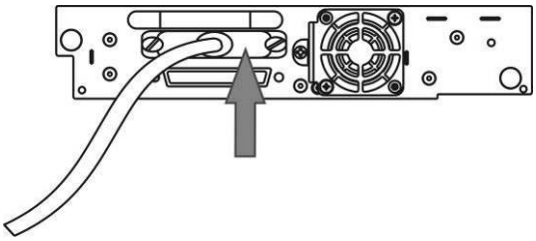


Figure 36 Connect the SCSI cable

3. Attach the terminator to the remaining parallel SCSI connector on the back panel of the tape drive if the library is the last or only device on the parallel SCSI bus. Otherwise, attach one end of a parallel SCSI cable to the remaining port and the other end to the next device on the parallel SCSI bus.

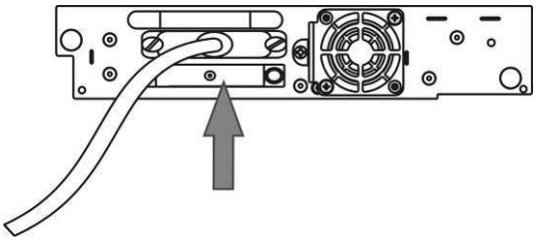


Figure 37 Connect the terminator

4. Make sure the last device on the parallel SCSI bus is properly terminated.

7.13.3 Connecting the FC cable

NOTE

Use only cables specified for your LTO FC tape drive.

Each FC tape drive has two FC ports.

- Cable <Port A> only.
- Configure <Port B> for <Auto Detect> on <Fibre Speed> and <Port Type>.

To connect the FC cable to the tape drive:

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

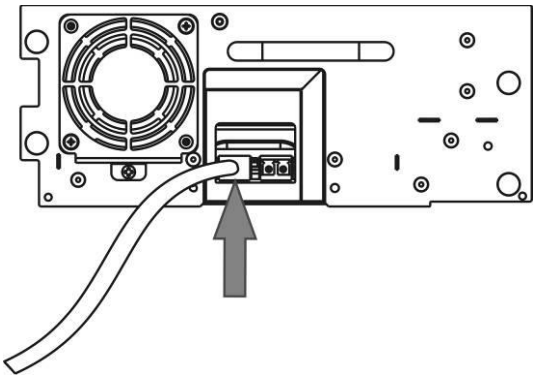


Figure 38 Connect the FC cable

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

7.13.4 Connecting the SAS cable

NOTE

Use only cables specified for your LTO SAS tape drive.

Each SAS tape drive has a mini-SAS connector.

- Mini-SAS connectors are keyed.
- Do not force a SAS cable's mini-SAS connector into the tape drive mini-SAS connector because it might be keyed differently.

SAS signal rates require clean connections and a minimum number of connections between the HBA and the library.

- Do not use adapters or converters between the HBA and the library.
- A maximum SAS cable length of six meters is recommended.

To connect the SAS cable to the tape drive:

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

7.13.5 Connecting the Ethernet cable and a USB device

To connect the Ethernet cable to the library:

The connection to the Ethernet network is via an industry stand RJ45 copper interface on the rear panel of the library. The Ethernet connection is used to access the library RMI over the network.

To connect the library to the Ethernet network, inset the Ethernet cable into the Ethernet port of the library, see **Chapter Library controller 6.3.3**. When the plug is in the correct position, a click should be heard.

To connect the USB device to the library:

The USB port is on the rear of the library. It can be used for FW upgrades / Skin file updates via OCP see **Chapter Library controller 6.3.3.**

7.14 Verifying the host

Depending on the server configuration, you may need to change the SCSI ID of the library.

When the host server is powered on, install the software and/or driver(s) that are compatible with the library. Backup software packages may require additional software or licensing to communicate with the library robotics.

To confirm the host server's operating system recognized the library, consult the operating system documentation.

7.15 Powering up/down the library

Press the power button on the front bezel to power up/down the actiLib Tape Library. The powering up can take a few minutes including scanning the inventory and configuration (e.g. drives installed)
In the following figure, a 4U library is shown as an example.

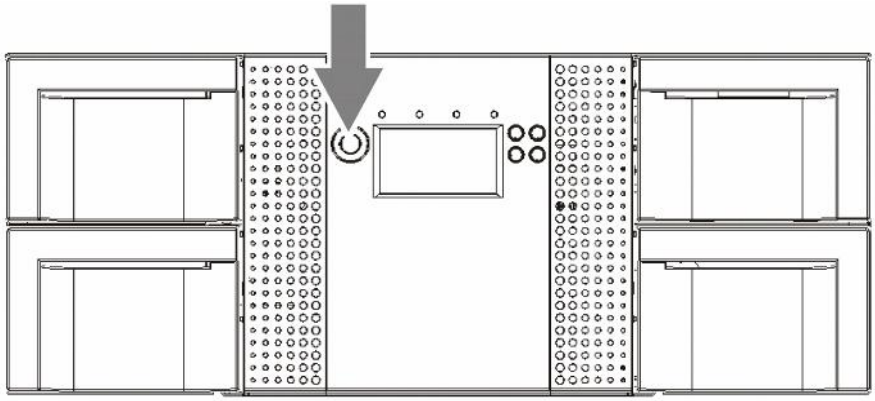


Figure 39 Power up/down the library (4U)

7.16 Tape cartridges

Before you begin using the library, an understanding of the media type, use, maintenance, and how to properly label and write-protect your tape cartridges will help you to prolong the life of your tape cartridges as well as the library.

7.16.1 Tape cartridge type

The tape cartridge types supported depend on the drive types installed. The library will support any type of LTO data cartridge and cleaning cartridge the installed LTO drive will support.

Tape drive generation	Tape cartridge type
LTO2	▪ Ultrium LTO2, 200 GB data cartridge ▪ Universal cleaning cartridge, (50 cleans)

LTO3	▪ Ultrium LTO3, 400 GB data cartridge ▪ Universal cleaning cartridge, (50 cleans)
LTO4	▪ Ultrium LTO4, 800 GB data cartridge ▪ Universal cleaning cartridge, (50 cleans)
LTO5	▪ Ultrium LTO5, 1,6 TB data cartridge ▪ Universal cleaning cartridge, (50 cleans)
LTO6	▪ Ultrium LTO6, 3,2 TB data cartridge ▪ Universal cleaning cartridge, (50 cleans)

Table 9 Tape cartridge type

	LTO1 tape drive	**LTO2 tape drive**	**LTO3 tape drive**	**LTO4 tape drive**	**LTO5 tape drive**	**LTO6 tape drive**
LTO1 media	Read / Write	Read / Write	Read only	Incompatible	Incompatible	Incompatible
LTO2 media	Incompatible	Read / Write	Read / Write	Read only	Incompatible	Incompatible
LTO3 media	Incompatible	Incompatible	Read / Write	Read / Write	Read only	Incompatible
LTO4 media	Incompatible	Incompatible	Incompatible	Read / Write	Read / Write	Read only
LTO5 media	Incompatible	Incompatible	Incompatible	Incompatible	Read / Write	Read / Write
LTO6 media	Incompatible	Incompatible	Incompatible	Incompatible	Incompatible	Read / Write

Table 10 Backward compatibility (tape cartridge)

Some tape drives include support for both rewriteable and WORM data cartridges. Write-Once, Read-Many (WORM) data cartridges provide an enhanced level of data security against accidental or malicious alteration of data on the tape cartridge. The WORM data cartridge can have new data appended to the maximum full capacity of the tape cartridge, but the user will be unable to erase or overwrite any data previously recorded to the cartridge.

7.16.2 **Using and maintaining tape cartridges**

NOTE

- Do not degauss Ultrium LTO data cartridges! These data cartridges are pre-recorded with a magnetic servo signal. This signal is required in order to use the cartridge with Ultrium LTO tape drives.
- Keep Ultrium LTO cartridges separated from strong magnetic fields such as computer monitors, electric motors, speakers, or X-ray equipment.
- Exposure to electromagnetic energy or magnetic fields can destroy data and the embedded servo code written on the media by the cartridge manufacturer, which can render the cartridge unusable.

Before you use the library to ensure the longest possible life for your data cartridges, follow these guidelines:

- Use only the data cartridges that are designated for your model of the library
- Clean the tape drive when the <Clean Drive> LED is illuminated. Be sure to use only Ultrium universal cleaning cartridges.
- Do not drop a LTO data cartridge. Excessive shock can damage the internal contents of the tape cartridge, or the tape cartridge case itself, making that tape cartridge unusable.
- Do not expose your data cartridges to direct sunlight or sources of heat, including portable heaters and heating ducts.
- The operating temperature range for your data cartridges is 10 to 35º C. The storage temperature range is -40 to +60º C in a dust-free environment in which relative humidity is always between 20 percent and 80 percent (non-condensing).
- If the data cartridge has been exposed to temperatures outside the ranges specified above, stabilize the cartridge at room temperature for the same amount of time it was exposed to extreme temperatures or 24 hours, whichever is less.
- Place identification labels only in the designated area on the tape cartridge. Labels placed in other areas can cause operation problems and the tape to become stuck in the drive.

7.16.3 **Labeling tape cartridges**

Attaching a barcode label to each tape cartridge enables the library and application software to identify the tape cartridge quickly, thereby speeding up inventory time. Make it a practice to use bar code labels on your tape cartridges.

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

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

NOTE

The misuse and misunderstanding of bar code technology can result in backup and restore failures. To ensure that your bar codes meet manufactures quality standards, always purchase them from an approved supplier and never print bar code labels yourself.

Ultrium tape cartridges have a recessed area located on the front of the cartridge next to the write-protect switch. Use this area for attaching the adhesive-backed bar code label. Only apply labels as shown in **Figure 40.**

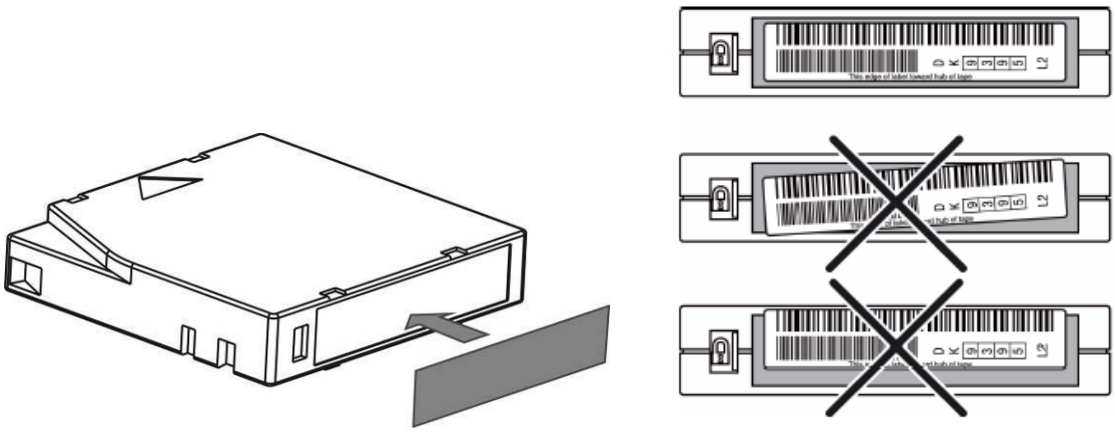


Figure 40 Proper barcode label placement

NOTE

The bar code label should only be applied with the alphanumeric portion facing to the left- side of the tape (toward the write protect switch, see below table #3) and within the marked Barcode label area.

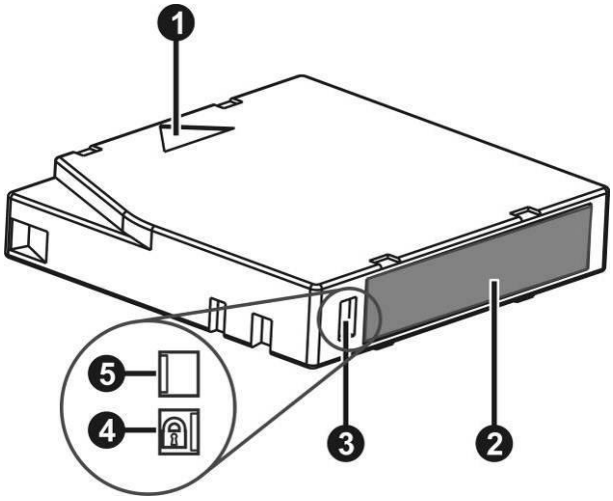
Never apply multiple labels onto a cartridge, as extra labels can cause the cartridge to jam in a tape drive.

7.16.4 **Write-protecting tape cartridges**

All rewritable data cartridges have a write-protect switch to prevent accidental erasure or overwriting of data.

Before loading a cartridge into the library, make sure the write-protect switch on the front of the cartridge is in the desired position, see **Figure 41**.

- Slide the switch to the right to write-protect the cartridge. A small pad-lock is visible indicating that the cartridge is write-protected.
- Slide the switch to the left to allow the Library to write data to the cartridge.



Number	Description
1	Insertion arrow
2	Barcode label
3	Write-protect switch
4	Write-protected
5	Write-enabled

Figure 41 Write-protecting a tape cartridge

7.17 Magazines

The actiLib Tape Library makes use of removable magazines in each model. Tape cartridges are stored in magazines. Magazines may be removed and inserted individually. Magazines are locked to prevent unauthorized removal when inserted in the library and unlock Magazine access may become password protected. For safety reasons, the robotic motion is stopped whenever when a magazine is removed from the library..

The magazines can be unlocked using the Operator Control Panel (OCP) or the Remote Management Unit (RMU).

OCP, see **Chapter Releasing and replacing magazines, Page 50**
RMU, see **Chapter Releasing and replacing , Page 121**

In case the OCP or RMU initiated process has failed or the library no longer has power a manual emergency release is available, see **Chapter Emergency release, Page 137**.

7.17.1 Slot numbering scheme

NOTE

In the following figures an asterisk (*) and the red circle indicates the mail slots.

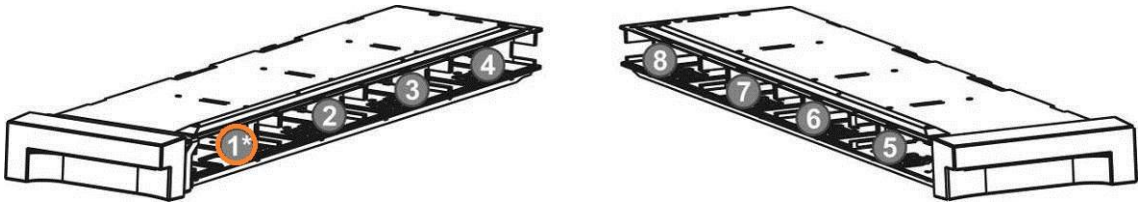


Figure 42 Slot numbering scheme (1U)

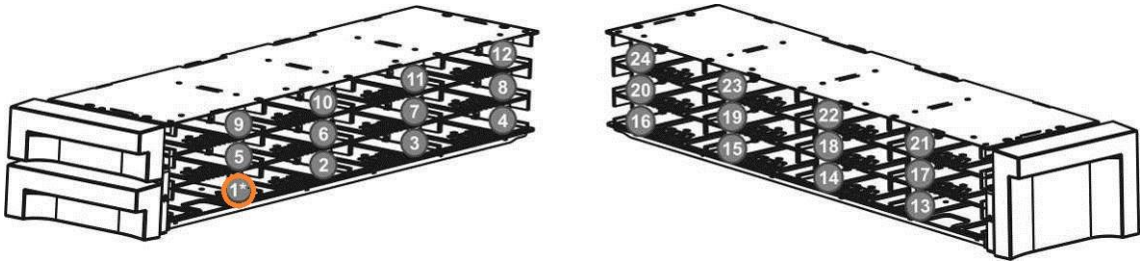


Figure 43 Slot numbering scheme (2U – Single mail slot)

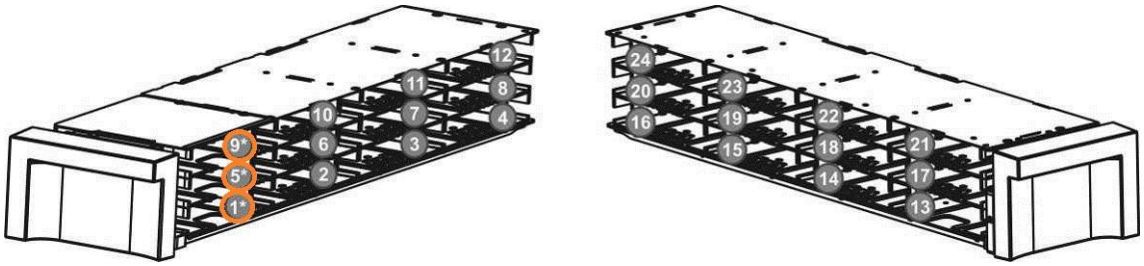


Figure 44 Slot numbering scheme (2U – Triple mail slot) only with special magazine

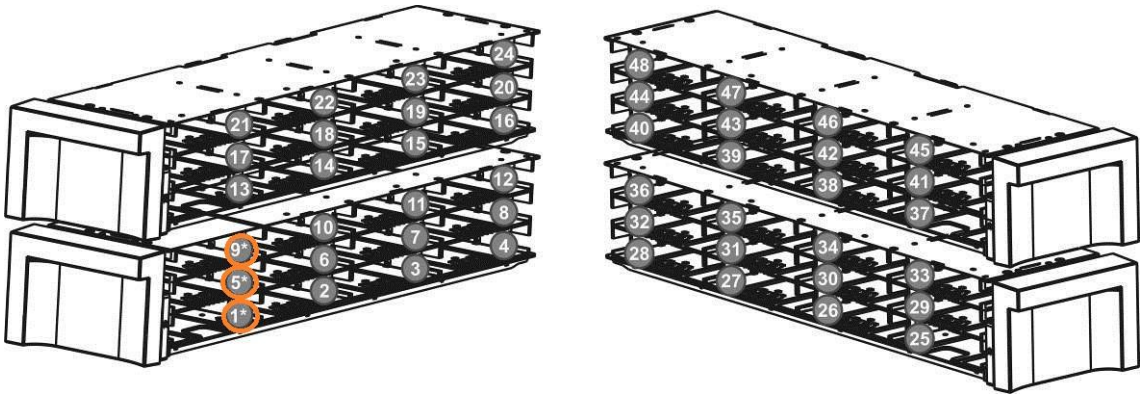


Figure 45 Slot numbering scheme (4U)

Figure 46 Slot numbering scheme (8U)

7.17.2 **Mail slot**

Mail slots are used to import/export individual tape cartridges without interrupting the library operation. The command to open the mail slot may be denied if the robotics is busy with some operation. In that case “Busy“ is displayed on the OCP and the command has to be repeated once the robotics operation is finished.

The 1U library provides in the bottom left position a single mail slot magazine (slot 1).

The 2U library provides in the bottom left position a single (slot 1) or triple (optional hardware; slot 1,5,9) mail slot magazine.

The 4U library provides in the bottom left position a triple mail slot magazine (slot 1,5,9).

The 8U library provides in the bottom left position a triple mail slot. In the top right position a normal magazine can be reconfigured to 12 mail slots (slot 85…96).slot

For supported configurations, see **Table 1**

8 Operating

This chapter provides information about the operation and configuration of the actiLib Tape Library.

8.1 Operator control panel (OCP)

8.1.1 Operating Modes

The OCP operates in two basic modes:

1. User interaction mode
   This mode is employed when a user is pushing buttons on the operating panel.
2. System driven mode
   This is the normal mode of operation. In this mode, the operating panel displays status associated with the actions that were caused from commands issued from the host software application. Actions like loading, rewinding or moving tape cartridges will be displayed.

Whenever an operating button is pressed and released, the operating panel automatically transitions to user interaction mode. The user interaction mode will be active until 3 minutes after the user stops pushing buttons, or the requested robotic action stops – whichever is longer. At this time, the operating panel will return to the system driven mode.

In case of administrator programed user security feature the user interaction mode is restricted to the information and login menu item, until a login with correct PIN is done.

8.1.2 OCP Philosophy

OCP operation must obey some basic rules. These rules of operation constitute a philosophy:

1. Any operational conflict between commands received over SCSI or RMU and those entered via the front panel will be avoided with a reservation mechanism on a ‘first-come, first-served’ basis.

   Any reservation by OCP is cancelled by an OCP logout or the timeout, which cancels the User Interaction Mode.
2. The library firmware will not allow a user to select an impossible request. Those situations will include, but are not limited to:
   - Moving a tape cartridge from any source to a full magazine slot
   - Moving a tape cartridge from an empty magazine slot
   - Loading a tape cartridge from any source to a full tape drive
   - Unloading a tape cartridge from an empty tape drive
3. Any error detected by the library or drive controller and not recoverable through predetermined firmware algorithms will be considered as fatal. An error code will be displayed on the LCD and the error LED will become illuminated. The error code will remain on the OCP until a push button is pressed, which will cause the OCP to return to the home screen.
4. Numeric error codes are only used for unrecoverable, fatal errors (see chapter **Main error codes, Page 145)**, otherwise text status messages are provided.

8.1.3 Moving media within the library

Choose the appropriate library model:

1U library:	**Commands menu (OCP - 1U), Figure 54, Page 59**
2U and 4U library:	**Commands menu (OCP - 2U, 4U), Figure 66, Page 73**
8U library:	**Move Media , Page 88**

8.1.4 Cleaning tape drives

Choose the appropriate library model:

1U library:	**Service menu (OCP - 1U), Figure 58, Page 63**
2U and 4Ulibrary:	**Service menu 2 of 2 (OCP - 2U, 4U), Figure 69, Page 76**
8U library:	**Clean drives dialog, Table 23, Page 99**

8.1.5 Releasing and replacing magazines

Choose the appropriate library model:

1U library:	**Commands menu (OCP - 1U), Figure 54, Page 59**
2U and 4U library:	**Commands menu (OCP - 2U, 4U), Figure 66, Page 73**
8U library:	**Unlock right/left** Magazine **, Page 87**

8.2 1U Operator control panel (OCP)

8.2.1 Power-Up Display

When the s1U library is powered up, or is reset from power on, it goes through several internally controlled processes that allow it to be initialized and enter normal operation mode. These processes are called Power-On-Self-Test (POST). While the POST is occurring, the OCP will have appropriate progress information displayed to keep the user informed. When the library completes POST, it will display the current drive mount status in the OCP home screen. If the drive is empty, the following status will be displayed.

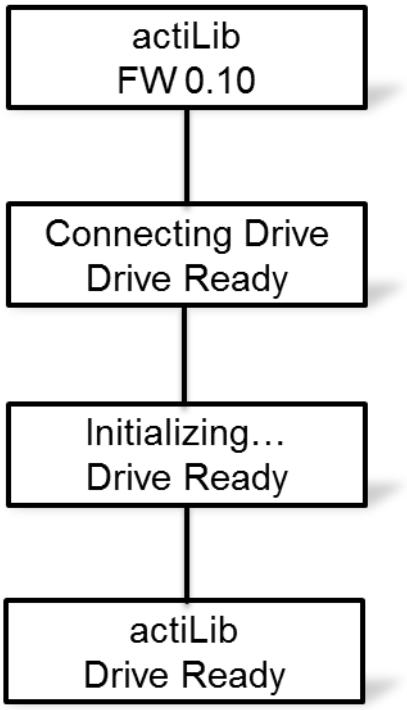


Figure 47 Home screen (OCP - 1U)

8.2.2 Note about the LED's

All LED's are updated during power up and reset sequences. Upon power up or after software reset, the library will illuminate all LED's as soon as POST allows. This will help the user to verify if all LED's are functional. When initialization starts, all LED's will be extinguished and the ready/activity LED will flash at a rate of approximately 1-second per cycle, 50% duty cycle. When the robot mechanical initialization is complete, the ready/activity LED will stop flashing and be constantly illuminated. The magazine status LED's will also show the appropriate status (locked, unlocked or removed).

If a library failure occurs, the ready/activity LED will be turned off and the error LED will be illuminated. The OCP will also display an appropriate error code to help identify the failure.

8.2.3 Input modes (OCP Navigation)

There are several modes to enter values in the different menu items within the OCP. These modes differ depending upon the menu item selected. The data entry modes are selectable predefined values, toggle values (e.g. on/off) and numerical value entry like network addresses.

Selectable predefined values

After navigating to the menu item, the various predefined values can be selected with the <PREVIOUS> and <NEXT> button. As soon as the display shows the correct value it can be entered by pressing the <ENTER> button.

Toggle values

Toggle values areused to switch between two different states like on and off. After navigating to the menu item the display shows the actual state. Pressing the <ENTER> button will switch to the possible new state. Pressing the <ENTER> button a second time will take over this new state. This procedure works vice-versa.

Numerical values

Numerical values are used for IP network addresses, PIN numerical entries and other configuration entries. After navigating to the menu item, the actual current value, will be displayed and the cursor stays on the left most significant digit. The single digit can be incremented / decremented with the <PREVIOUS> and <NEXT> buttons. After selecting the correct value pressing the <ENTER> button will enter the selected value and the cursor is moved to the next editable digit to the right. It can be edited in the same way. After pressing the <ENTER> button at the last digit the complete entry will be stored. Pressing the <CANCEL> button any time before the last digit complete entry will cancel the whole edit process and the original value will become valid again.

8.2.4 Power ON/OFF

The operator control panel contains the power on/off button. Pressing this button will initiate a controlled power down of the unit (soft landing). The following operations will take place before the unit shuts down completely, once the power button is pushed from a power on state.

- The display indicates with an appropriate message that the shutdown is in progress and provides the opportunity to abort the shutdown by pushing the <CANCEL> button within 3 seconds.
- The library controller finishes all ongoing library and drive activities.
- The robotics is moved to its home position.
- The library controller switches off the power supply’s secondary side.

8.2.5 **Menu flow charts**

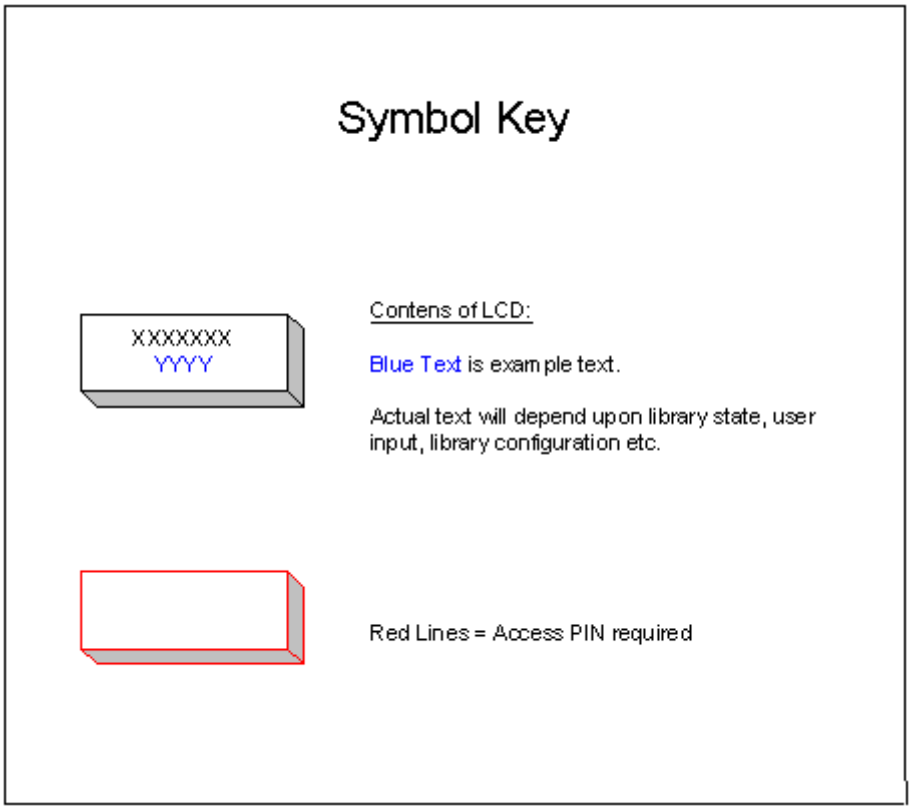


Figure 48 Menu symbol key (OCP - 1U)

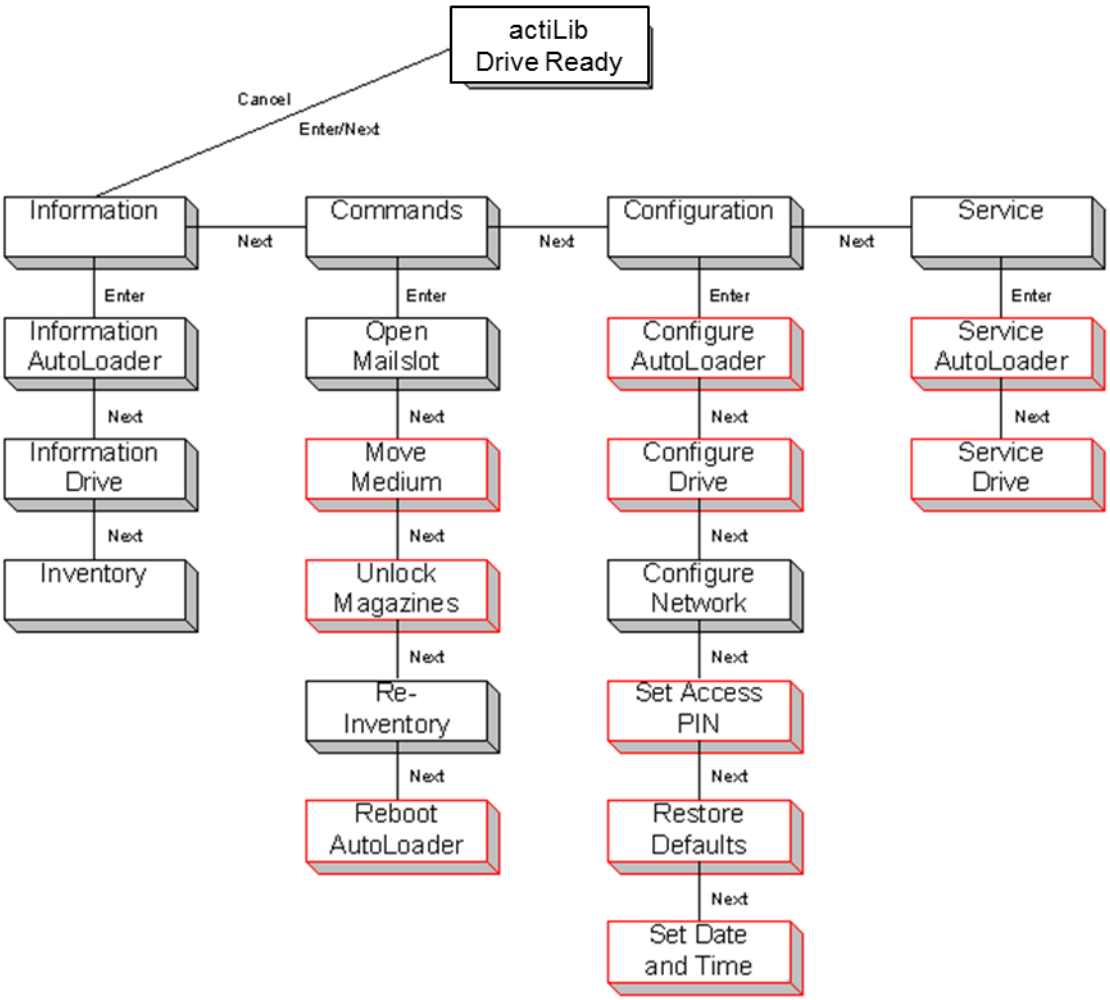


Figure 49 Main menu (OCP - 1U)

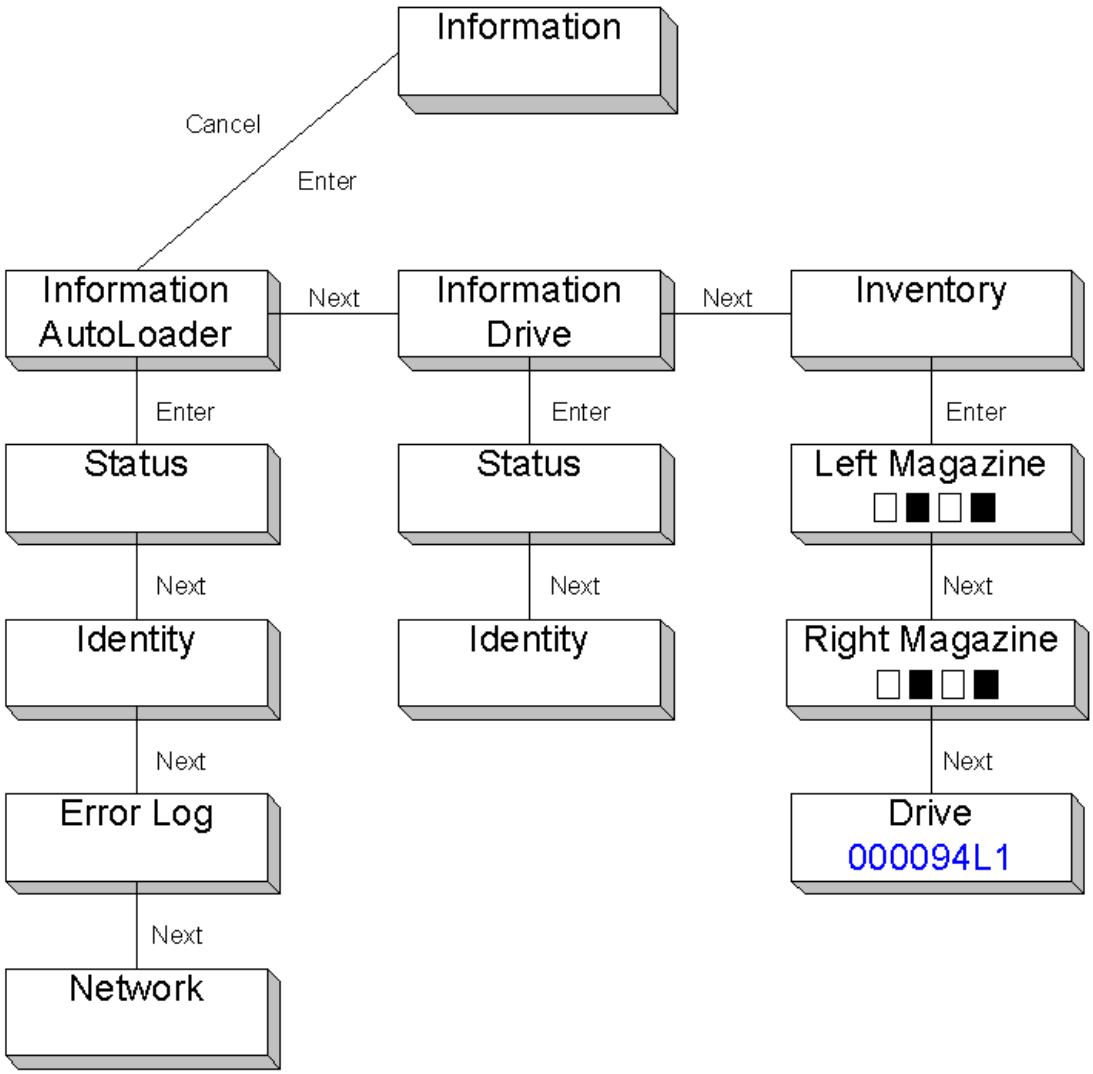


Figure 50 Information menu (OCP - 1U)

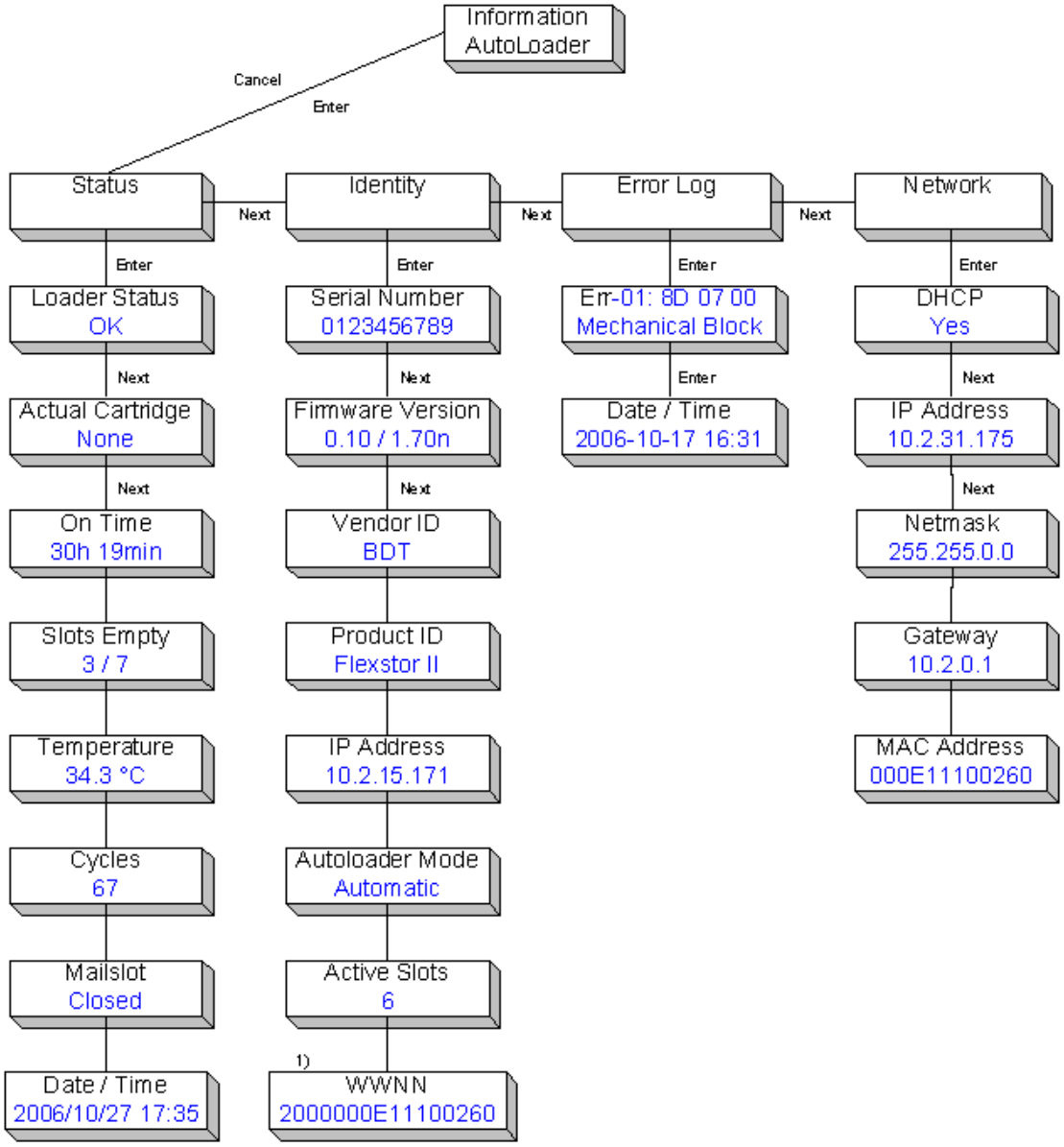


Figure 51 Library information menu (OCP - 1U)

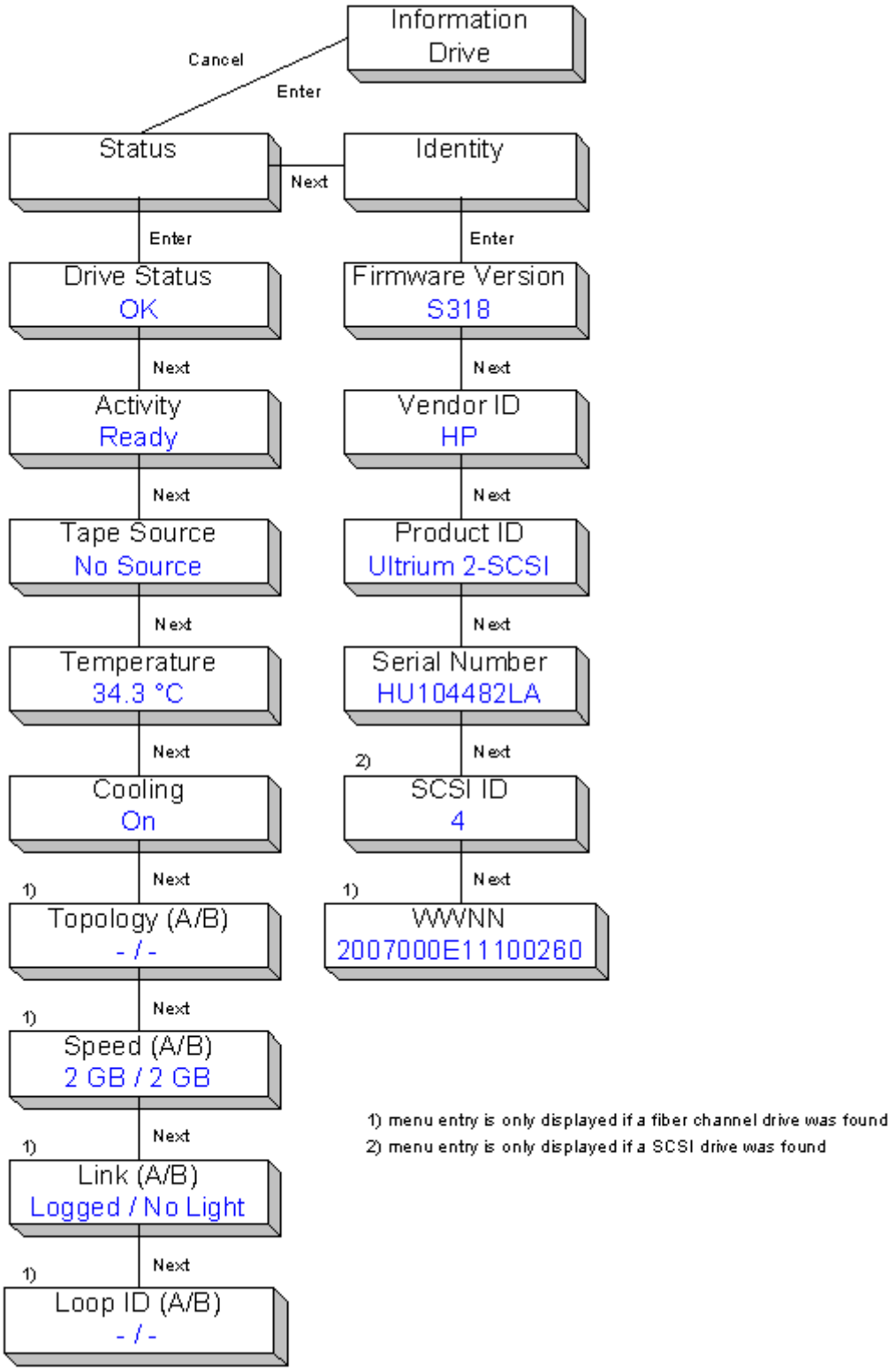


Figure 52 Drive information menu (OCP - 1U)

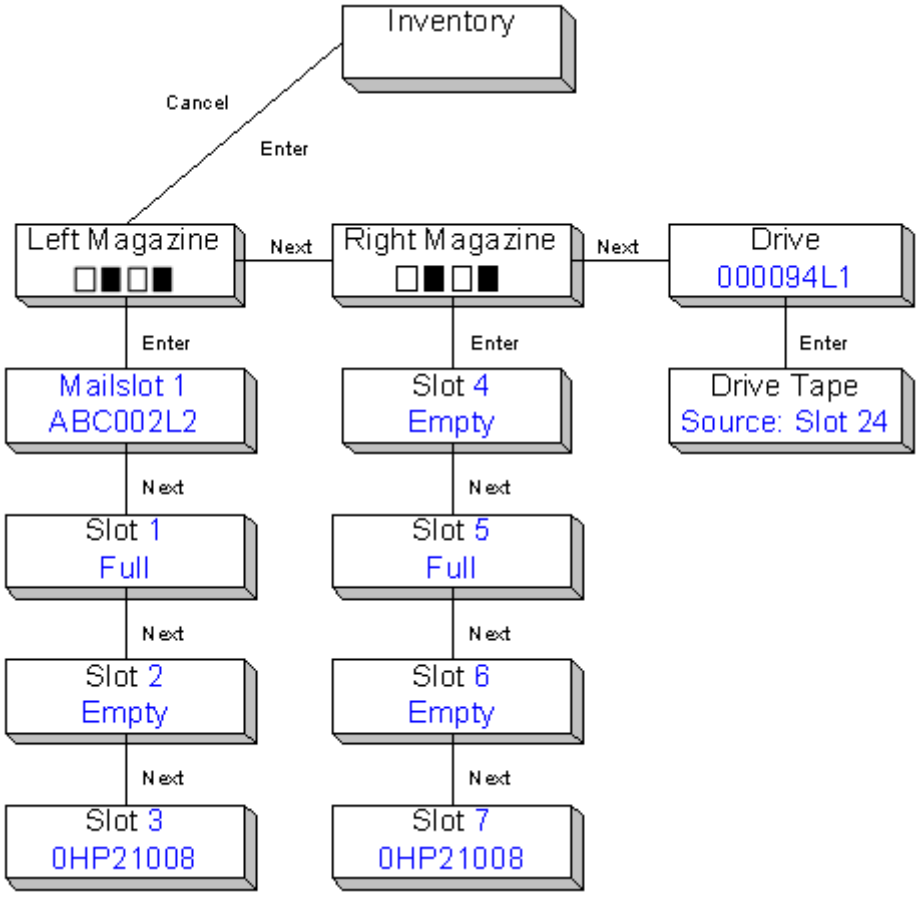


Figure 53 Inventory menu (OCP - 1U)

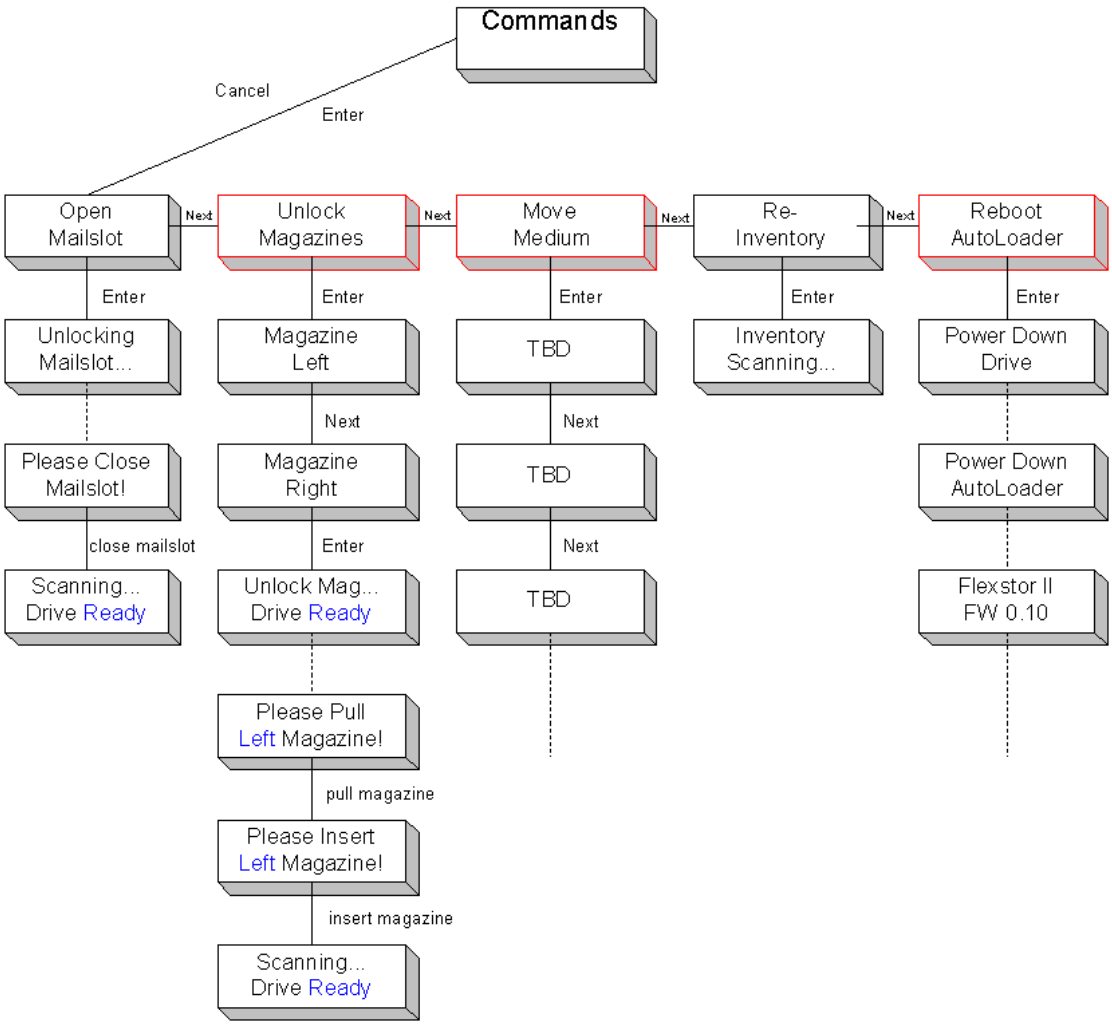
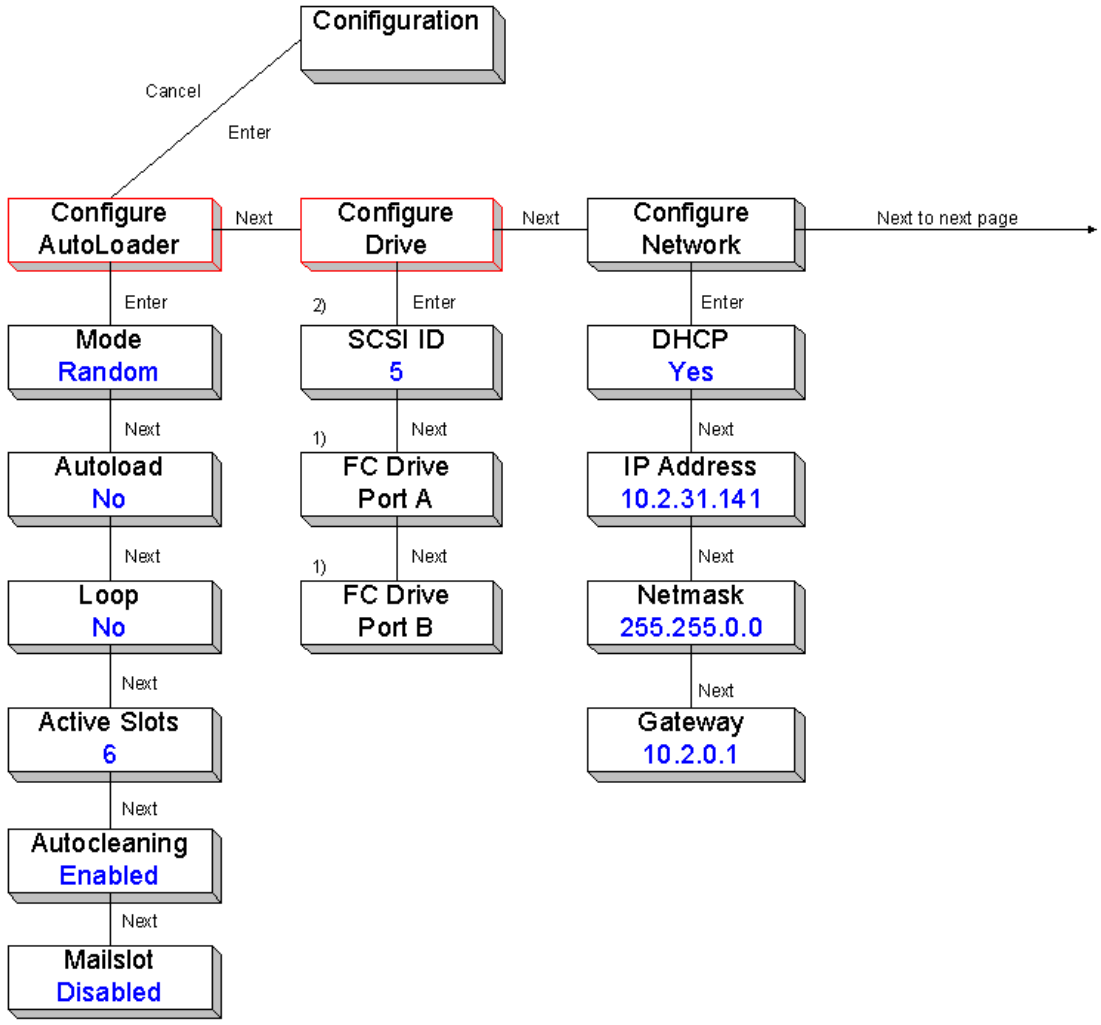


Figure 54 Commands menu (OCP - 1U)



1) menu entry is only displayed if a fiber channel drive was found
2) menu entry is only displayed if a SCSI drive was found

Figure 55 Configuration menu (OCP - 1U)

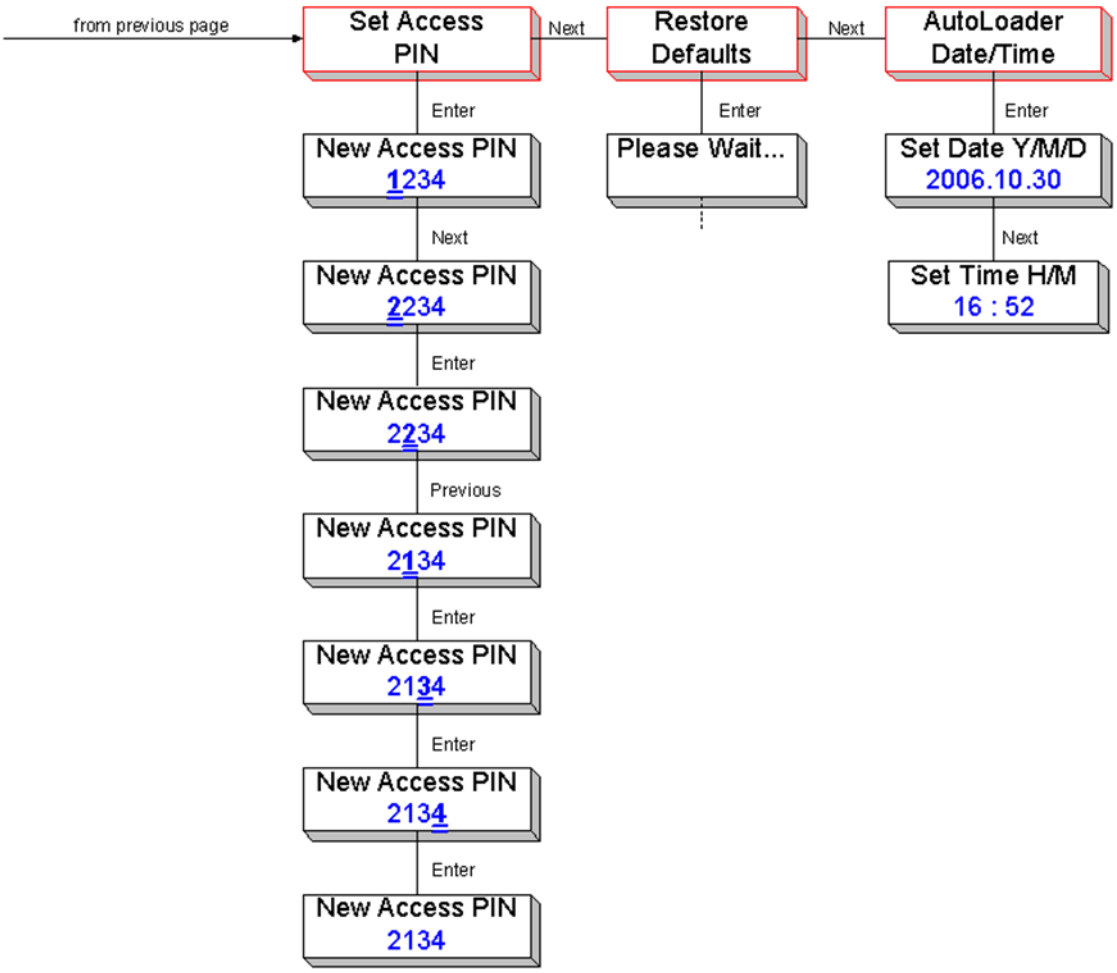


Figure 56 Configuration menu, continuation (OCP - 1U)

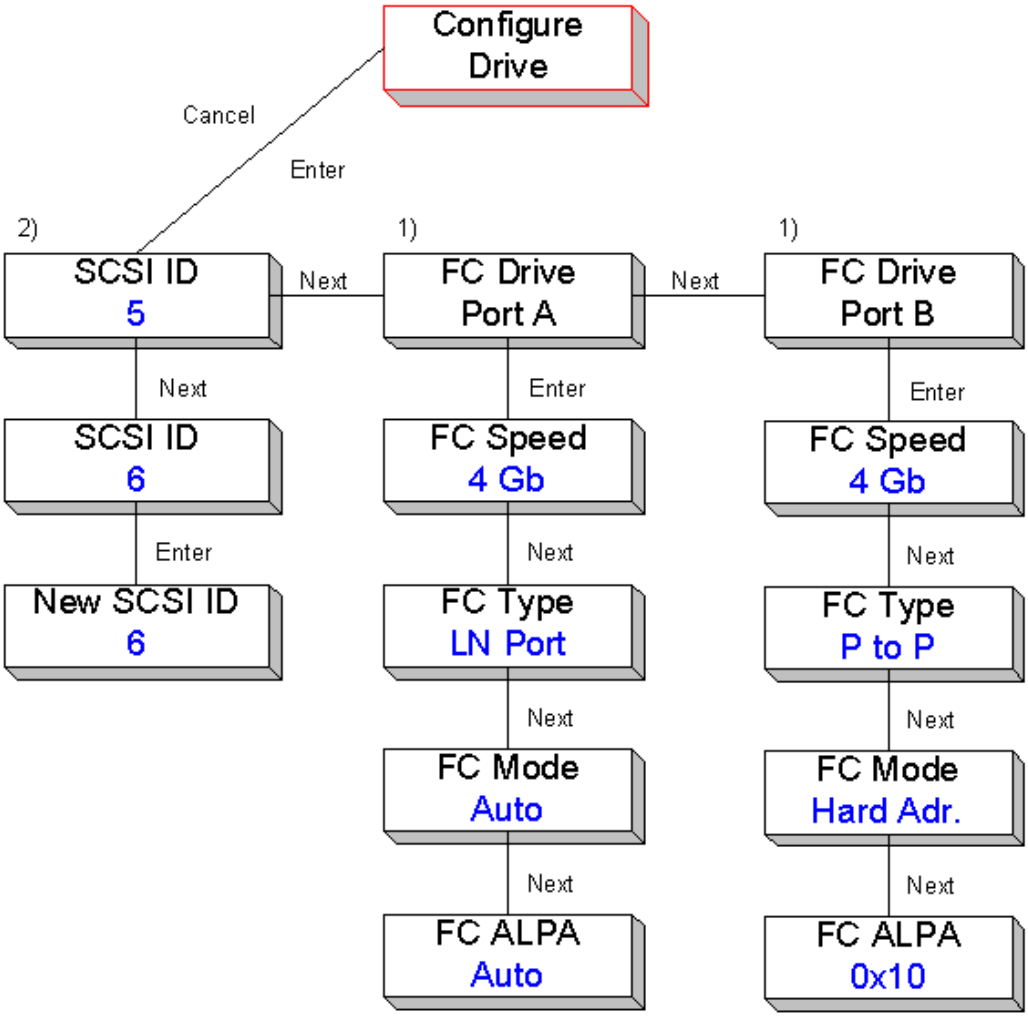


Figure 57 Drive configuration menu (OCP - 1U)

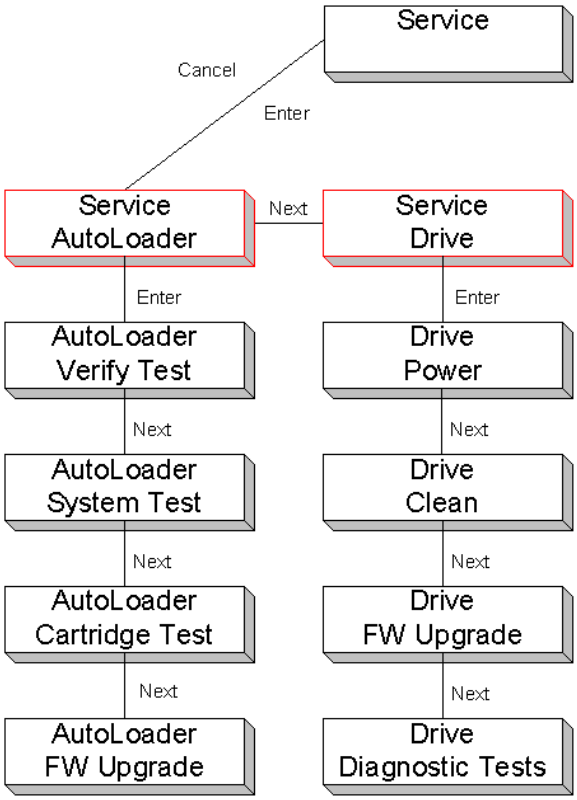


Figure 58 Service menu (OCP - 1U)

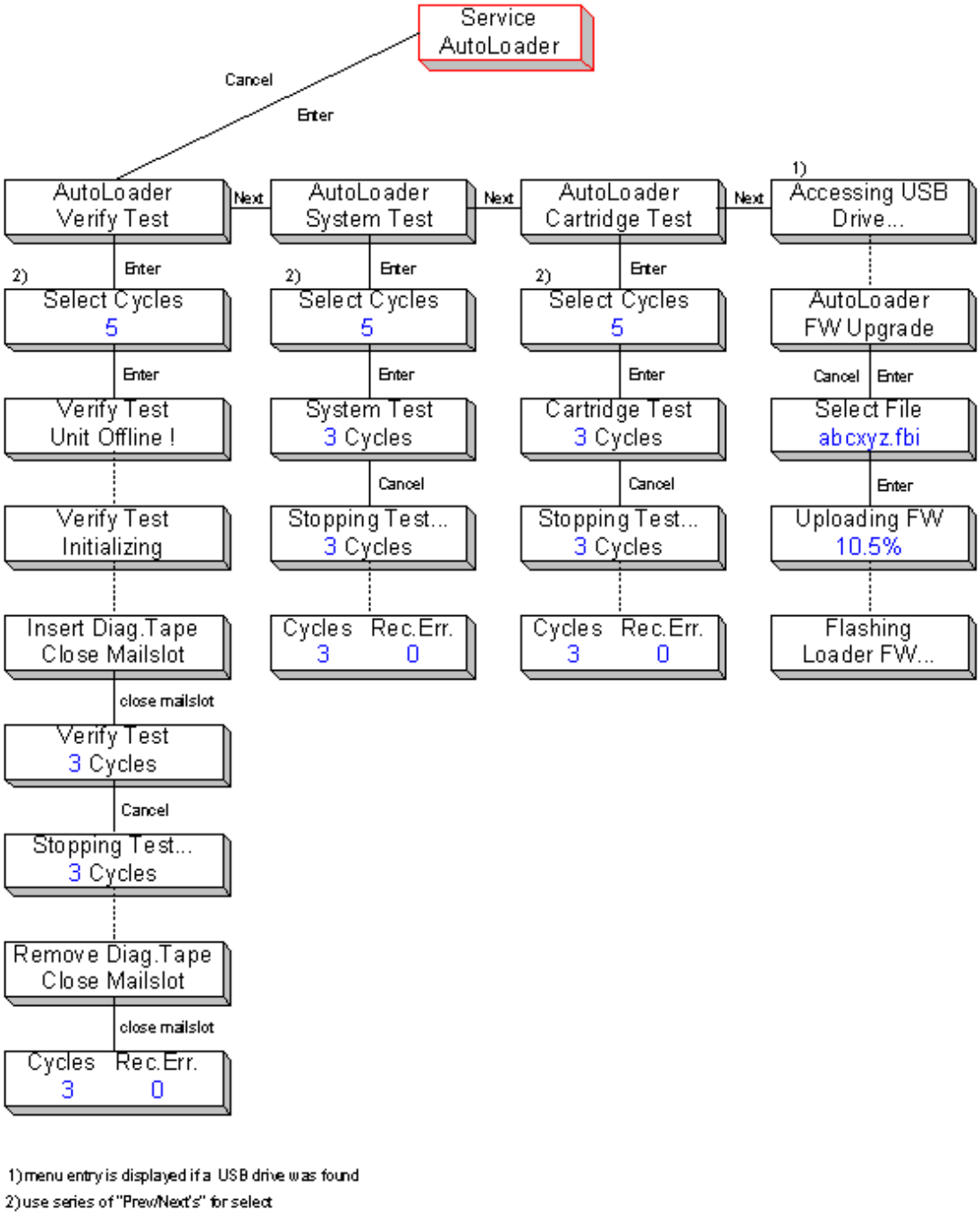


Figure 59 Library service menu (OCP - 1U)

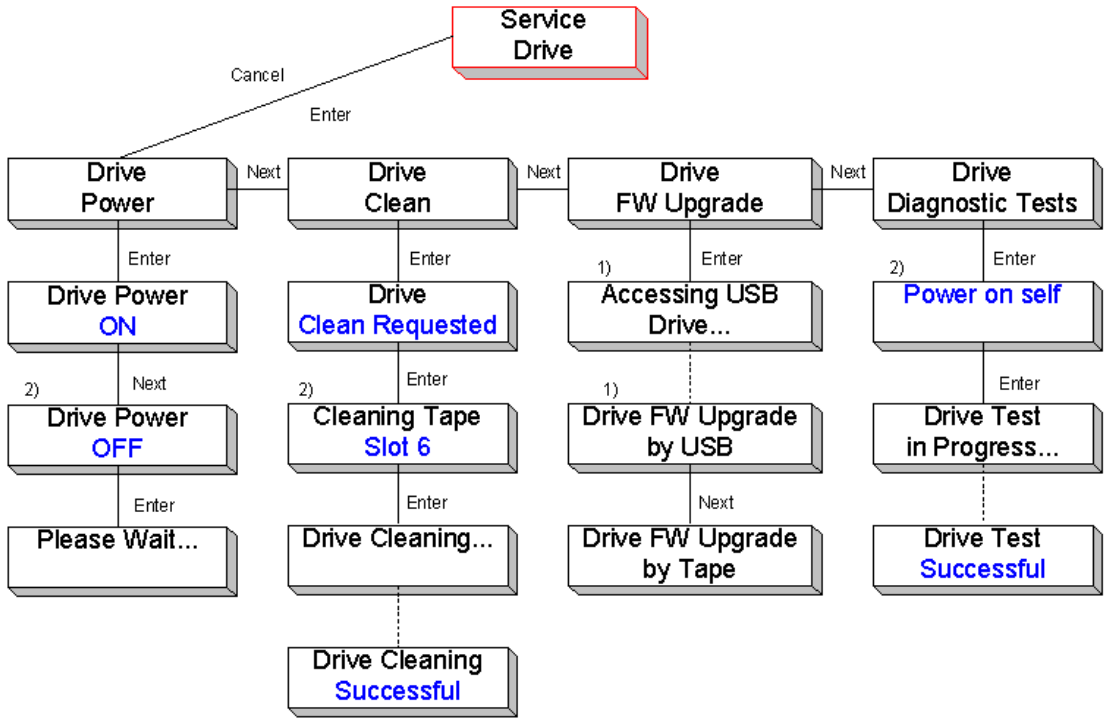


Figure 60 Drive service menu (OCP - 1U)

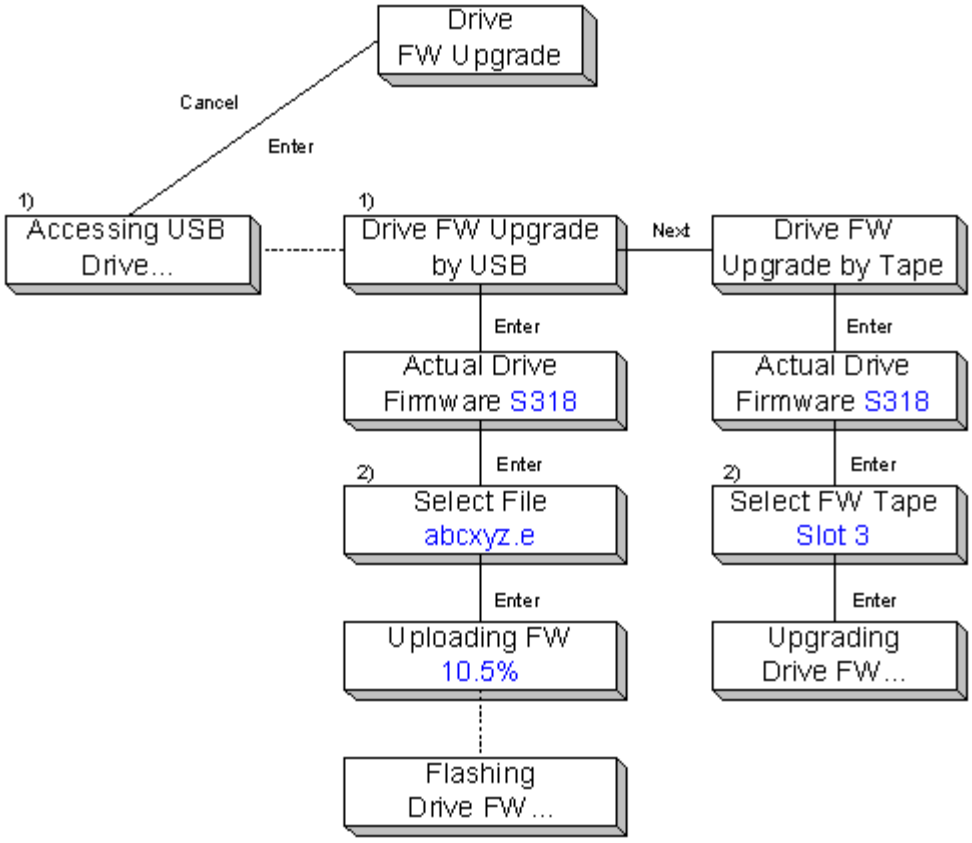


Figure 61 Drive FW Upgrade menu (OCP - 1U)

8.3 2U, 4U Operator control panel (OCP)

8.3.1 Power-Up Display

When the library powers up, or resets, it goes through several internally controlled processes that initialize and prepare the unit for normal operation. These processes are called Power-On-Self-Test (POST). While the POST is in process, the OCP will have appropriate information displayed to keep the user informed. When the library finishes POST, it will display the current library status for a defined time or until a front panel key is pressed.

After this initial status screen the home screen will be displayed until, any key is pressed. This home screen shows the overall health of the library, indicating the status of the robotic and the connected drives.

The standard appearance of the home screen shows the “actidata actiLib” skin.
For OEM any skin can be designed within the space above the status indication.
The further pictures are kept neutral in that area for independent usage.

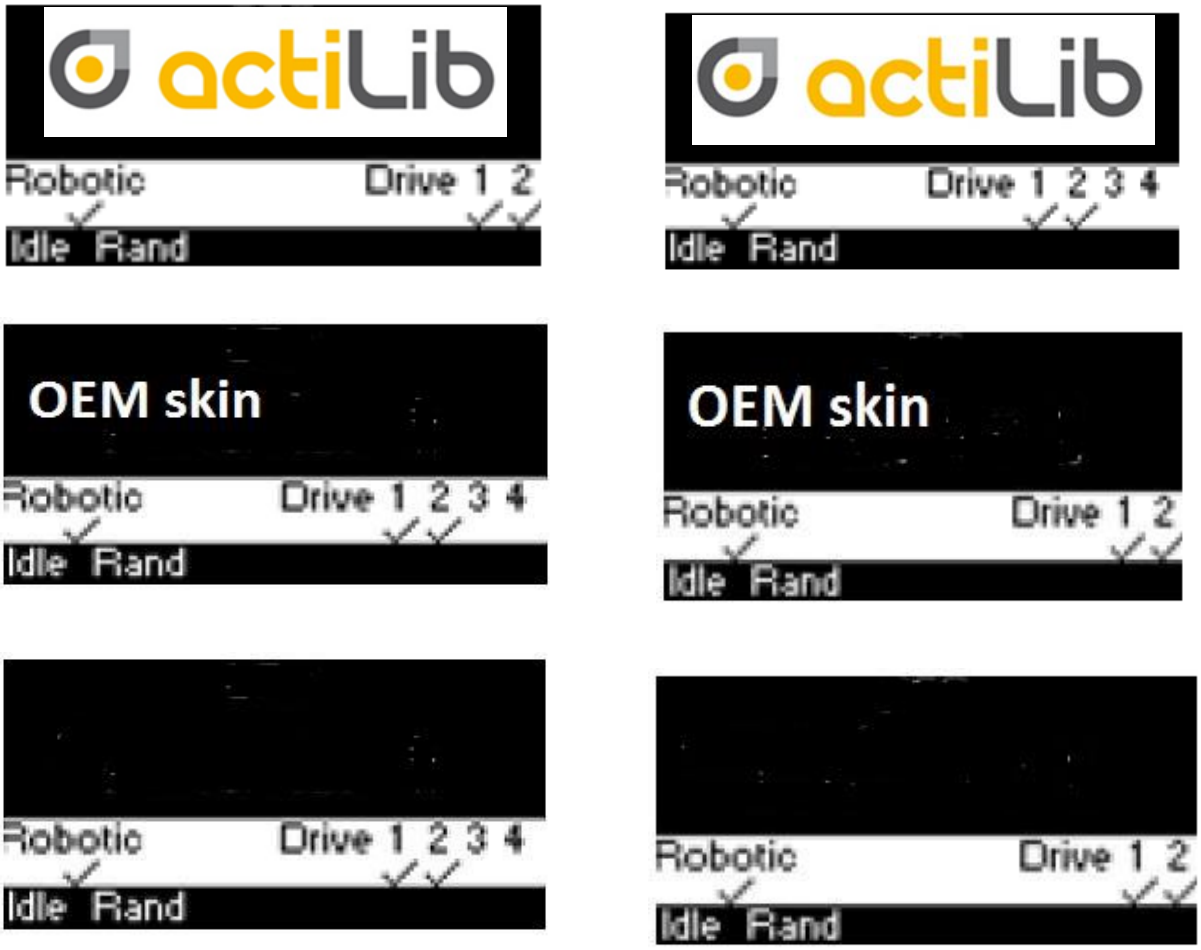


Figure 62 Home screen (OCP - 2U, 4U)

8.3.2 Note about the LED’s

All LED’s are updated during power up and reset sequences. Upon power up or software reset, the library will illuminate all LED’s as soon as POST allows. This will help the user to verify if all LED’s are functional. When initialization starts, all LED’s will be extinguished and the ready/activity LED will flash at a rate of

approximately 1-second per cycle, 50% duty cycle. When the mechanical initialization is complete, the ready/activity LED will stop flashing and remain constantly illuminated.

If a library failure occurs, the ready/activity LED will be turned off and the error LED will be illuminated. The OCP will also display a specific error code to help identify the failure.

The following are additional operational details of LED's.

- The <Ready/Activity> LED will be lit any time the unit is powered on and functional (i.e. successfully completed the power-on self-test). The LED will blink whenever there is any tape library or drive activity. The LED will also blink when the unit is offline.
- The <Clean> LED will only be lit when a cleaning required has been issued by one of the drives. The LED will be turned off after a successful drive cleaning operation is performed to the requesting drive..
- The <Media Attention> LED will indicate that there is a piece of LTO media which is bad/marginal, or invalid. The LED will be cleared when all marginal and invalid cartridges have been exported from the tape library.
- The <Error> LED will be lit when there is an unrecoverable (i.e. hard) drive or tape library failure. This will occur simultaneously with the hard error message displayed on the screen; the LED will remain illuminated until the error state is resolved.

8.3.3 Input Modes

There are several modes to enter values in the different menu items. These values are selectable predefined values, toggle values (e.g. on/off) and numerical values like network addresses.

Selectable predefined values

After navigating to the menu item, the various predefined values can be selected with the <NEXT> and <PREVIOUS> button. As soon as the display shows the correct value, it may be confirmed by pressing the <ENTER> button.

Toggle values

Toggle values are used to switch between two different states like on and off. After navigating to the menu item the display shows the actual state. Pressing the <ENTER> button will switch to the possible new state. Pressing <ENTER> button a second time will take over this new state.

Numerical values

Numerical values are needed for network addresses, PIN entries, and other configuration entries. After navigating to the menu item to be changed, the actual value will be displayed and the cursor stays on the first digit. The value may be incremented / decremented with the <NEXT> and <PREVIOUS> button. After pressing the <ENTER> button the cursor is set to the next editable digit. It can be changed in the same way. After pressing the <ENTER> button at the last digit the complete entry will be stored. Pressing the <CANCEL> button will cancel the whole edit process and the old value is valid again.

8.3.4 Power ON/OFF

Part of the operator control panel is the power on/off button. Pressing this button will initiate a controlled power down of the library (soft landing).

The following operations will take place before the unit shuts down completely:

- The display indicates with an appropriate message that the shutdown is in progress.
- The library controller finishes all ongoing loader and drive activities.
- The robotics is moved to its home position.
- The library controller switches off the power supply's secondary side.
- To abort the shutdown process the user has to press the <CANCEL> button within the first 3 seconds.

NOTE

The shutdown process may be aborted by pressing the cancel button within the first 3 seconds.

8.3.5 Menu flow charts

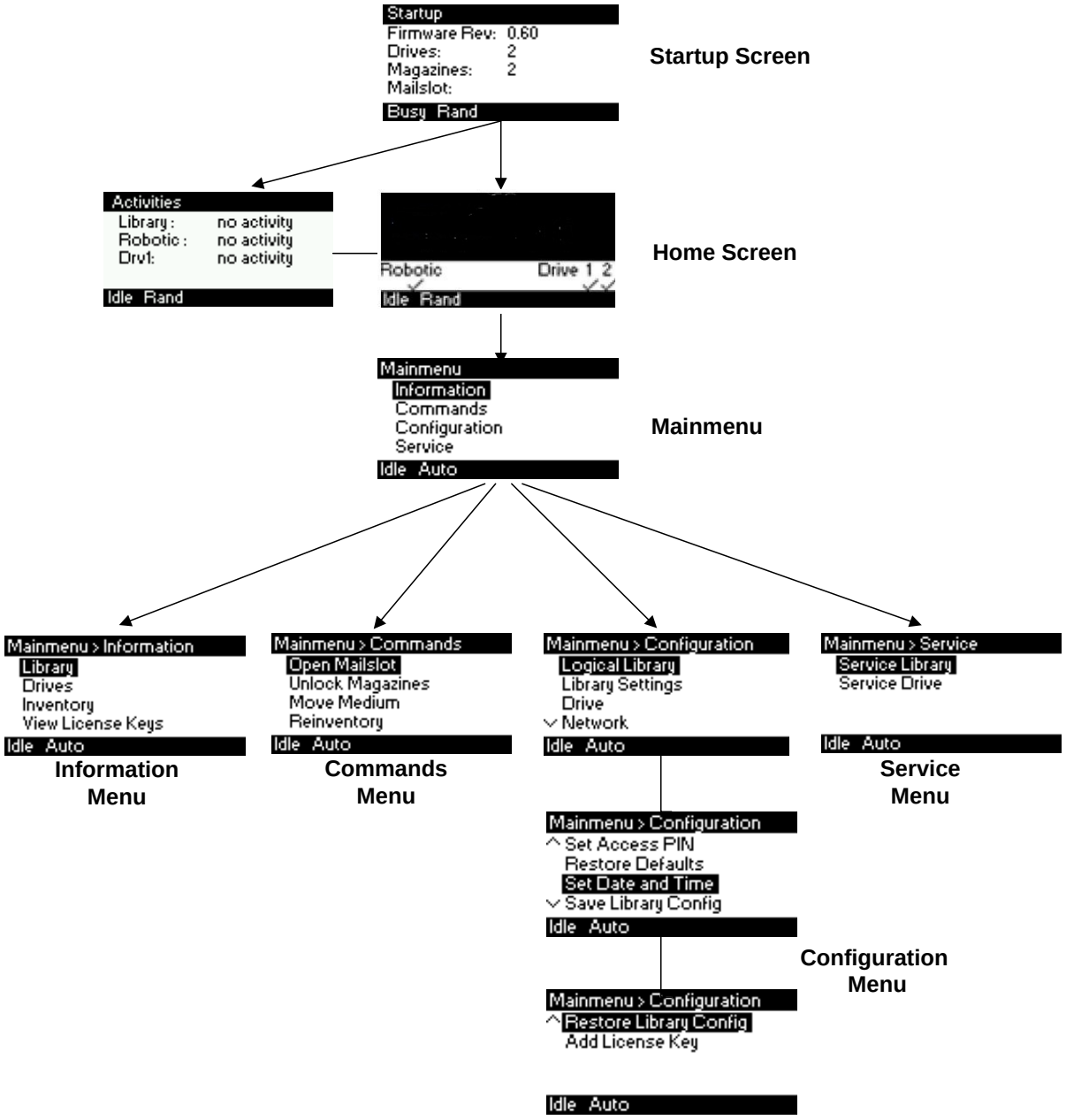


Figure 63 Main menu (OCP - 2U, 4U)

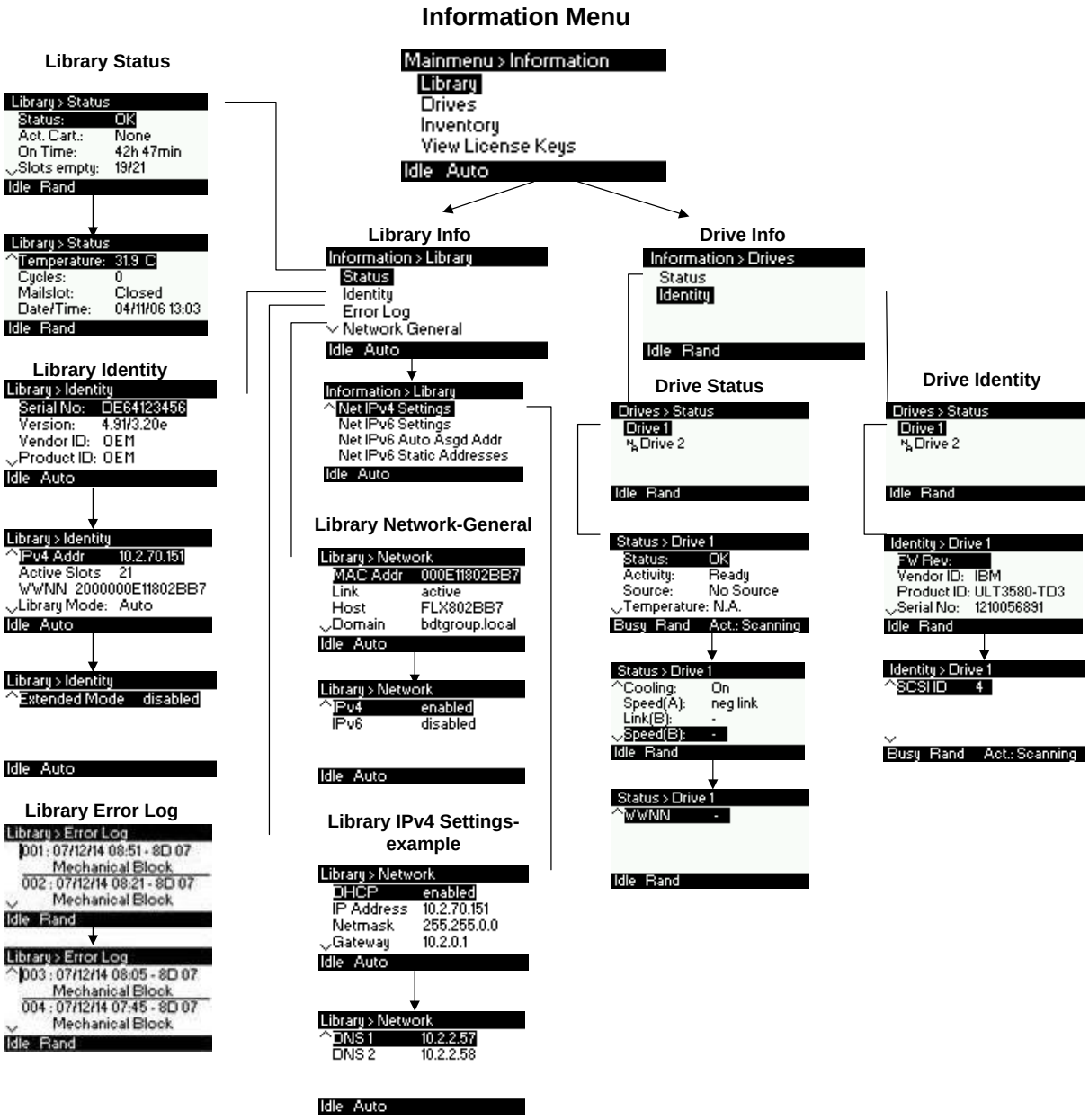


Figure 64 Information menu 1 of 2 (OCP - 2U, 4U)

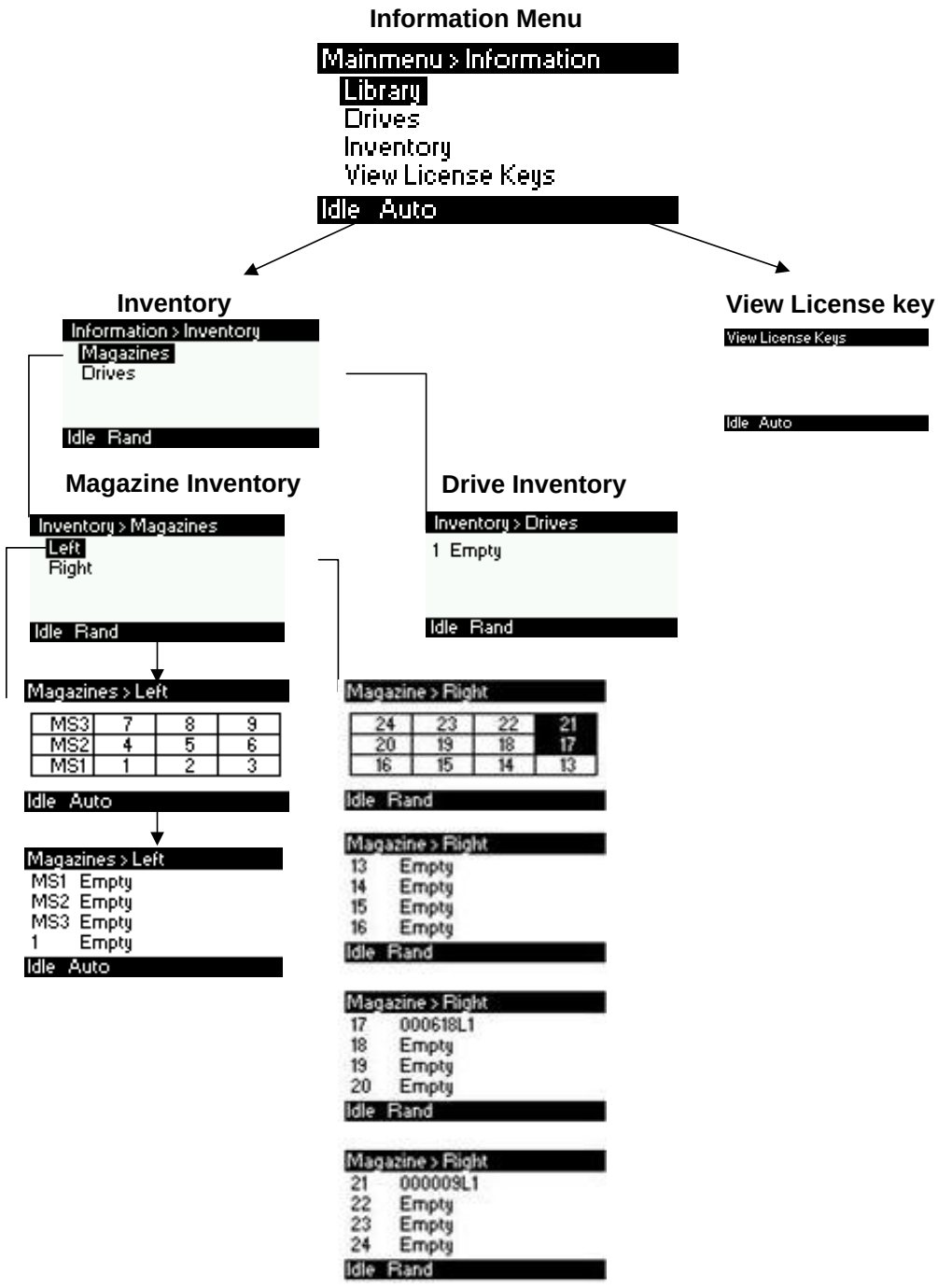


Figure 65 Information menu 2 of 2 (OCP - 2U, 4U)

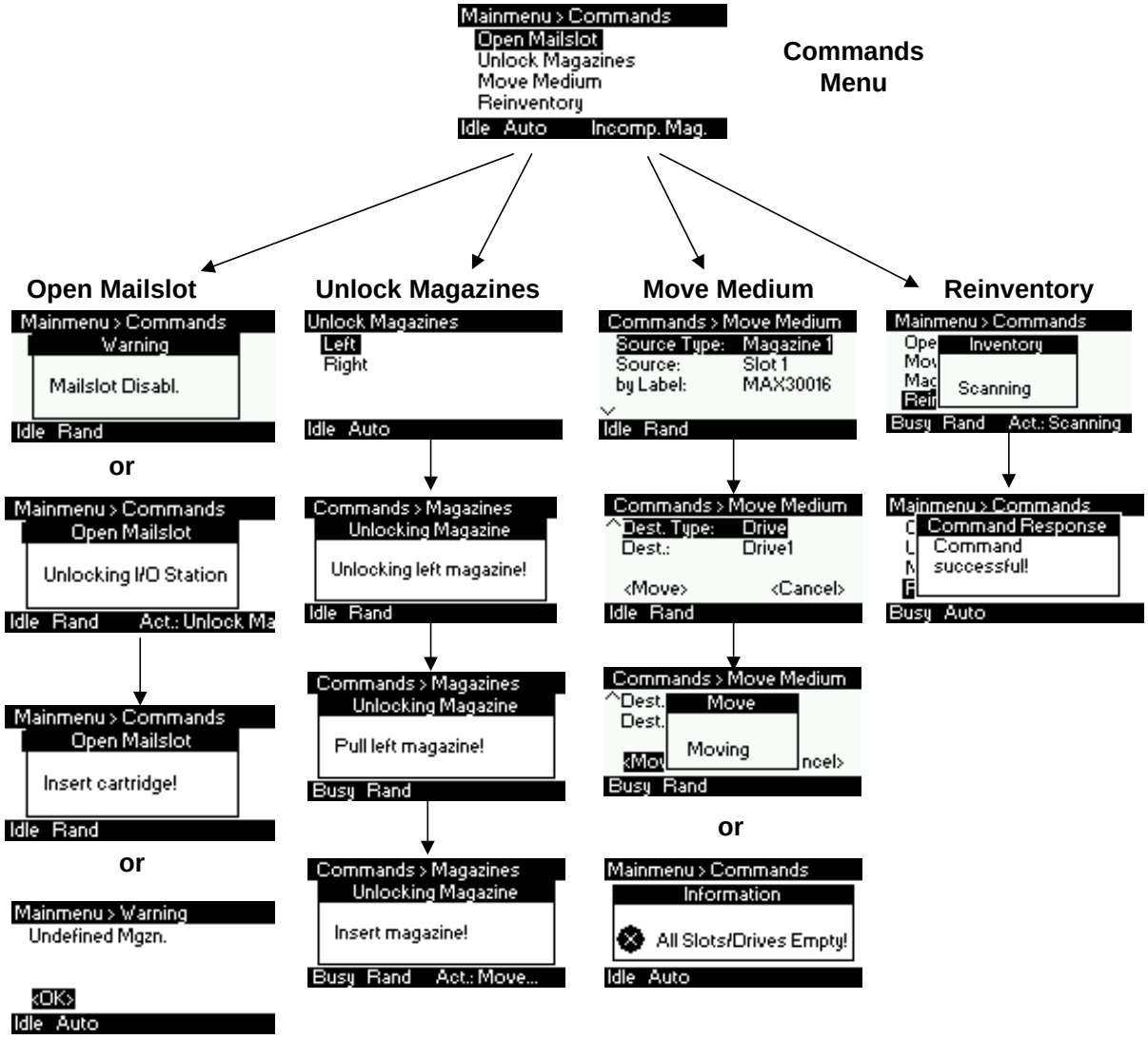


Figure 66 Commands menu (OCP - 2U, 4U)

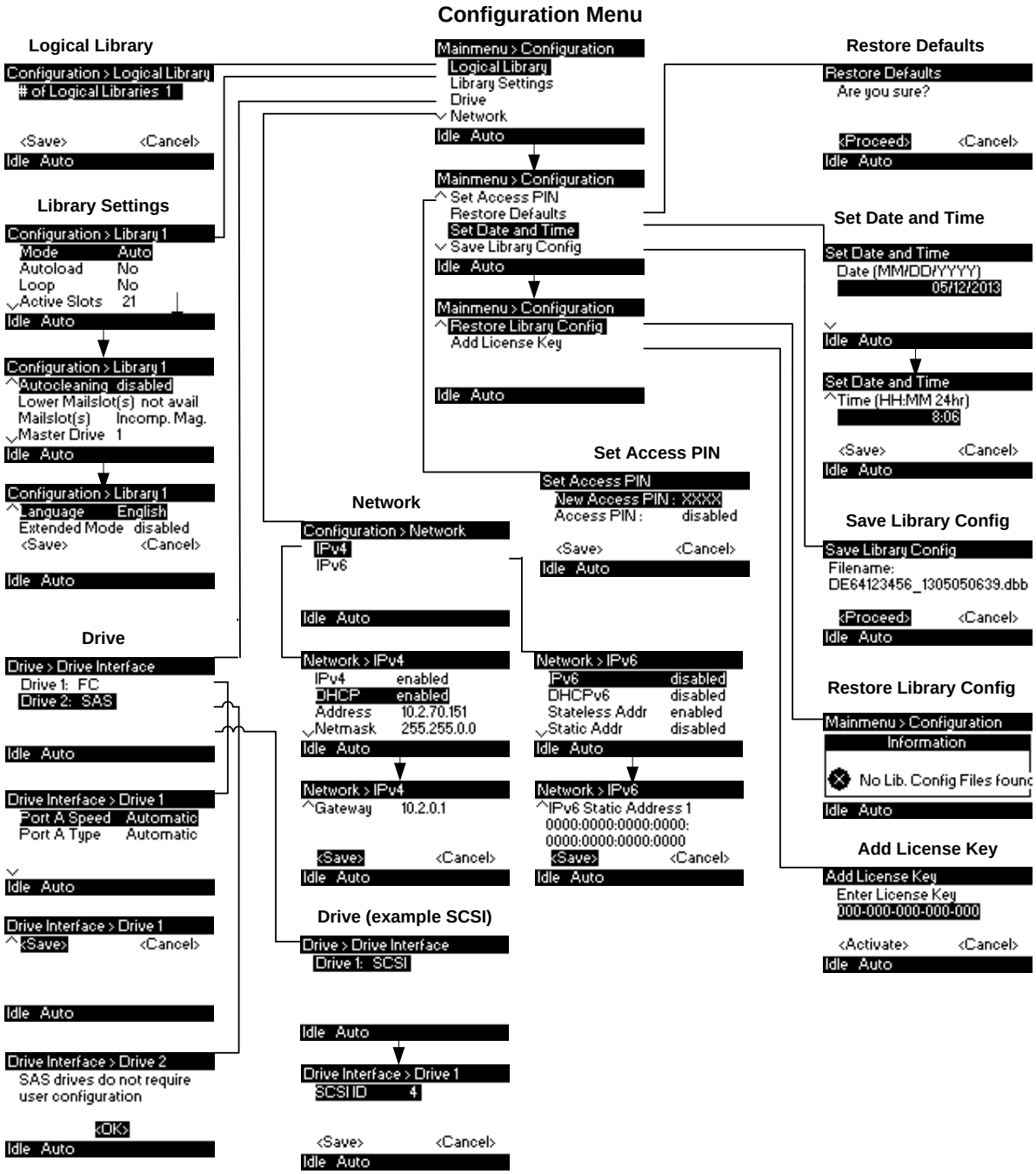


Figure 67 Configuration menu (OCP - 2U, 4U)

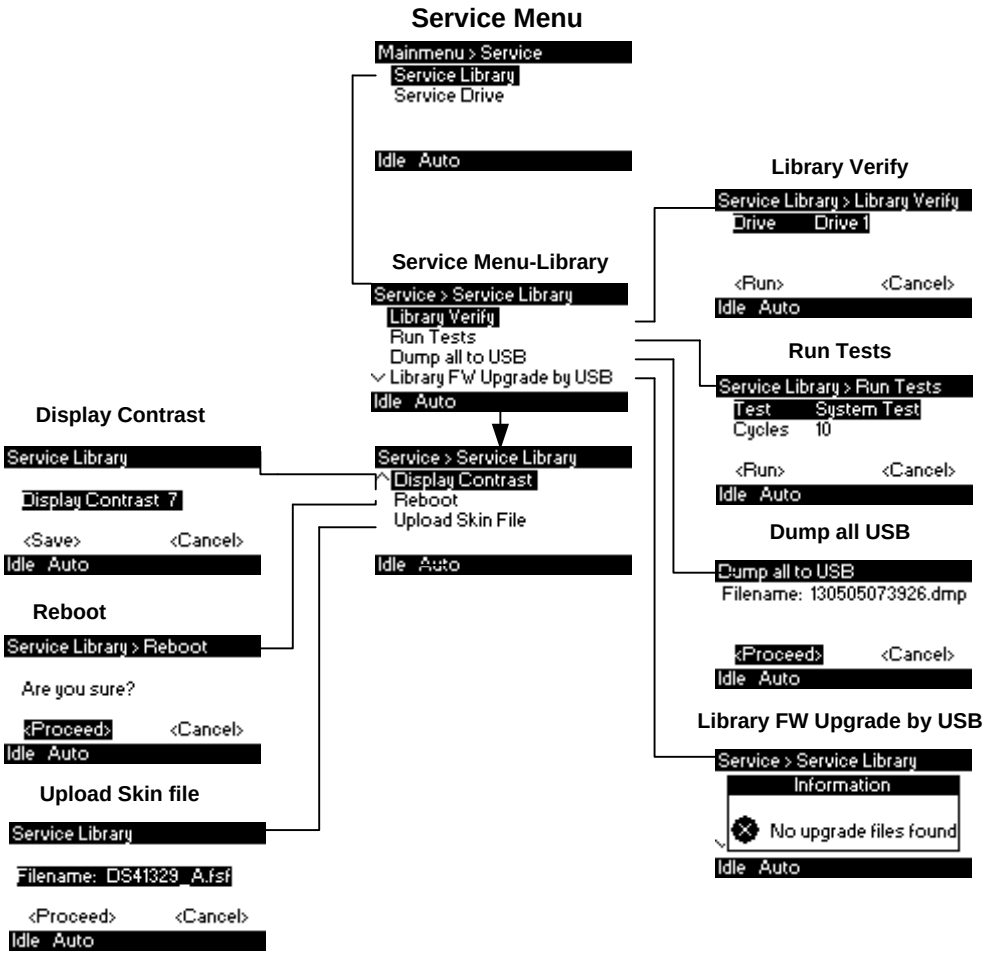


Figure 68 Service menu 1 of 2 (OCP - 2U, 4U)

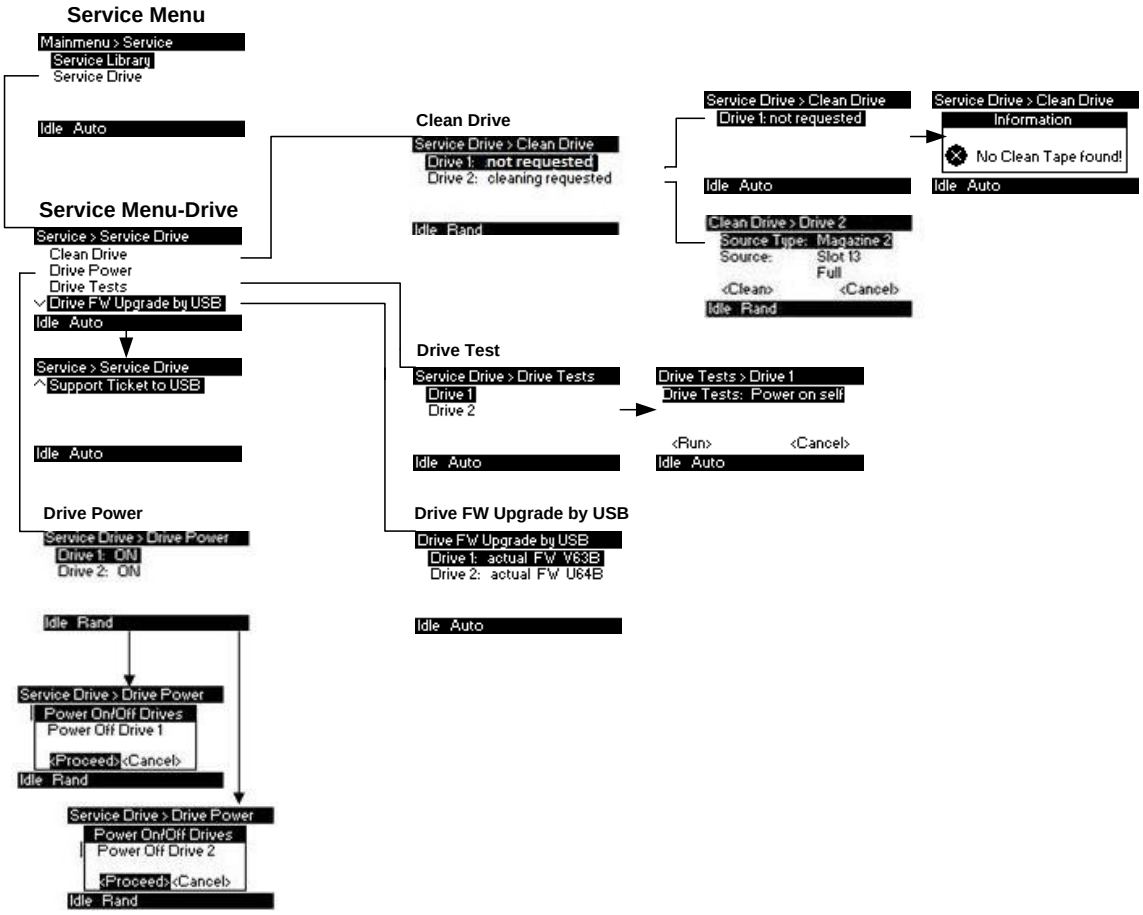


Figure 69 Service menu 2 of 2 (OCP - 2U, 4U)

8.4 8U Operator control panel (OCP)

From the OEM Skin shown when the unit is powered up or the unit is not operated for some time,

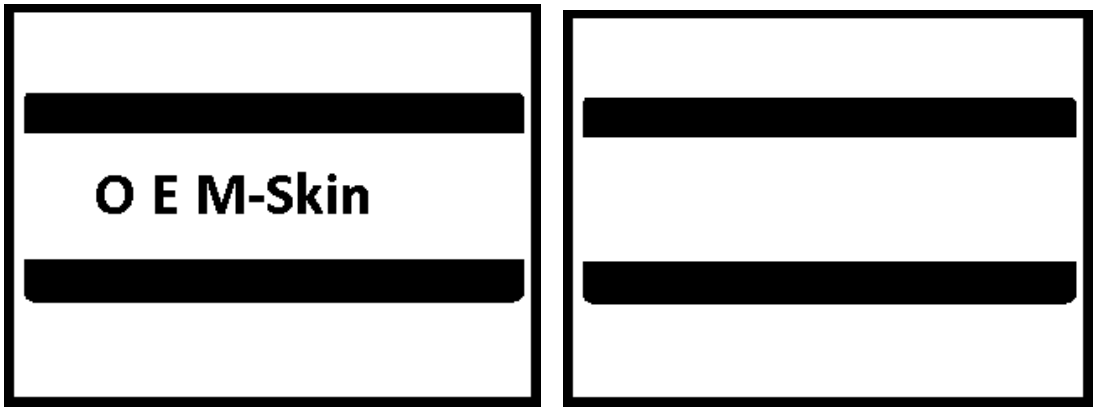


Figure 70 OEM Skin (OCP - 8U)

the first screen shown indicates the status of the unit. From there the Navigation Menu as described below is shown on the OCP with an OEM header (not shown on further pictures).

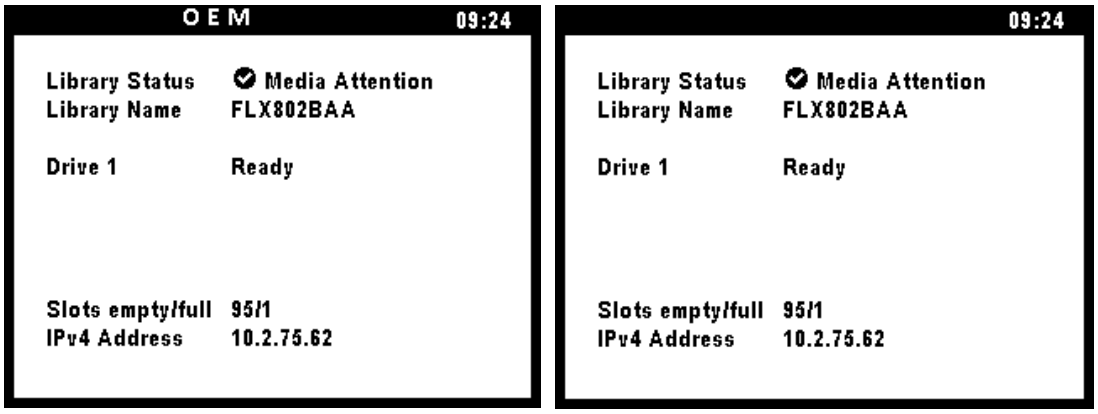


Figure 71 Status Screen (OCP - 8U)

8.4.1 Navigation menu

The navigation screen is divided into two columns.

The left column lists the main menu items, and the right column lists the submenu topics of the currently selected main menu item.

To select one of the main menu items, press the <UP/DOWN> button – the menu topics will scroll so that the active topic will always be in the centre of the screen. When scrolling to a new menu item, the submenu topics will be automatically displayed on the right side of the screen.

To select a main menu item, press the <OK> button – the main menu item is now fixed and the submenu topic item is now inverted. Pressing the <UP/DOWN> button will now scroll the submenu topics up and down.

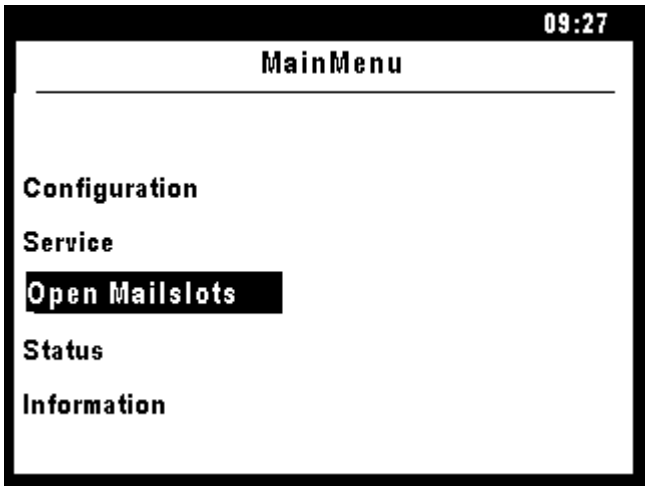


Figure 72 Navigation menu (OCP - 8U)

8.4.2 Navigation dialog (8U)

Button	Action	Comment
Up	Choose previous item in dialog	Circular movement
Down	Choose next item in dialog	Circular movement
Left	For some dialogs, a new page is shown if there are more than one similar dialogs. E.g. in the drive configuration dialog, you can step from Drive 1 to the next/previous tape drive. All configurations you made are lost if you have not saved the changes made in the current page.	If the displayed dialog has more than one page, arrows will appear on the right side pointing up/down. When you press down on the last item of the current page, you switch to the next page of the dialog topic.
Right	See above	See above
Enter	Select the current item to change the current value. Pressing the <ENTER> button again makes the changes valid and you can choose another item with the up/down button.	

NOTE

In a dialog all changes are lost if you are change with the left/right button to another dialog unless you press the save button.

8.4.3 General behaviour (8U)

1. **Error handling**

   Any error is displayed as a pop up on top of the current screen. This dialog has to be confirmed. A warning will be handled in the same manner, but it will disappear after a defined period of time. The dialog will show the error code in hexadecimal format and the associated text description.

2. **Command response**

   After a command is executed an information window will pop up to give brief information about success or failure.

3. **Animations**

   Any command where the execution takes longer, a pop up dialog with information about current actions or necessary user instructions is displayed.

8.4.4 Home screen

After a timeout of approximately 3 minutes without user interaction, the menu returns to the home screen automatically. The home screen displays the following information.

Description	Values	Comments
Library Status	Ready, Warning, Error	including any library activities
Library Name	string	
IP Address	valid IP V4 Address	
Drive 1	Ready, Error (error code), Not present, Disabled, Idle	Drive status
Drive 2	Ready, Error (error code), Not present, Disabled, Idle	Drive status
Drive 3	Ready, Error (error code), Not present, Disabled, Idle	Drive status
Drive 4	Ready, Error (error code), Not present, Disabled, Idle	Drive status
Slots empty/full	Xx/xx	0 – max. Slots with reserved slots

Drive status:

- Ready => drive is connected.
- Error => drive is connected and has reported an error.
- Not present => drive was removed.
- Disabled => drive present and powered off.
- Idle => drive is connected and has a cartridge loaded.

8.4.5 Main menu functions

8.4.5.1 Mail slot open function

There are no dialogs available for this menu entry. Entering this entry starts directly the mail slot opening operation or if no Mailslot(s) are defined the below information

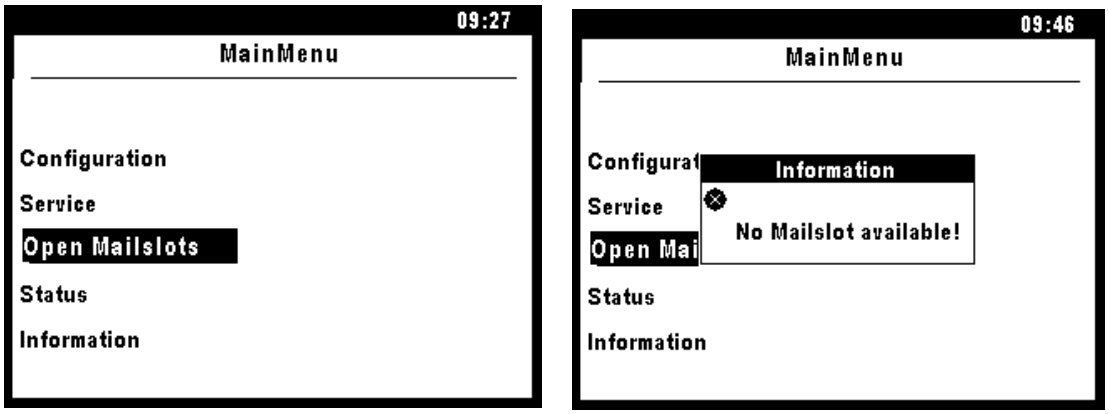


Figure 73 Open Mailslot(s) (OCP - 8U)

8.4.5.2 Status menu functions

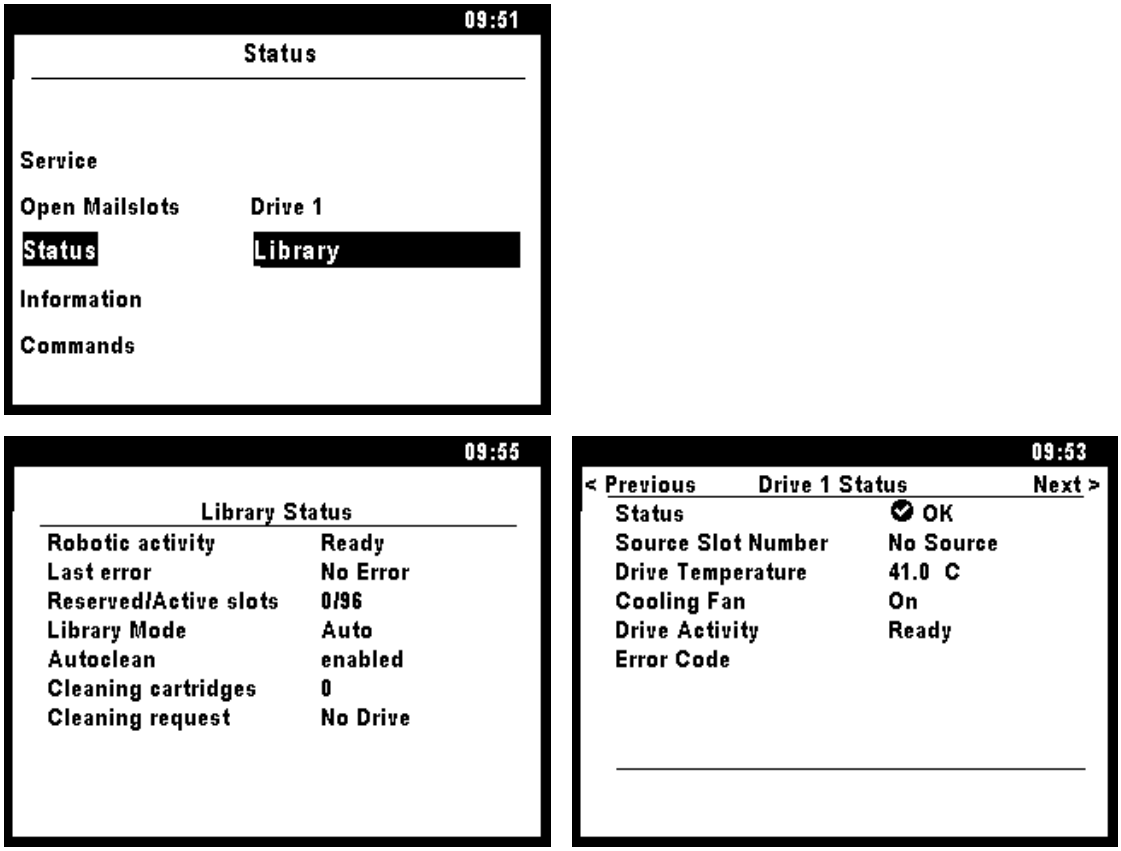


Figure 74 Status – Library or Drive(s) (OCP - 8U)

The Information Menu leads into the following sub menus:

- Library

- Drive X

Description **Library Status**	**Values**	**Comments**
Robotic Activity	Moving, Recovery, Idle, Ready, etc.	Activities reported by robotics
Last Error	“String”, No Error	Last entry of error trace
Reserved/Active Slots	Xx/xx	0 – max. Slots 96
Library Mode	Manual,(Random | Sequential), Auto	
Autoclean	Enabled, Disabled	
Cleaning Cartridges	Xx	Count of cleaning cartridges
Cleaning Request	Drive X, No Drive	Which tape drives requests cleaning

Table 11 Library Status

Description **Drive X Status**	**Values**	**Comments**
Status	Ok, Idle, Rewind, etc.	Activities from tape drives
Source Slot Number	Not loaded, unknown, label + slot number, No Source	Drive Slot
Drive Temperature	xx.x °C	In degrees Celsius
Error Code	String, “ “,	
SCSI drive dialog		
Cooling Fan	On, Off	fan status
Drive Activity	String, Ready	Ready => drive is connected. Error => drive is connected and reported an error. Not present => drive was connected and valid drive data available. Disabled => drive present and powered off. Idle => drive loaded
FC drive dialog		
Cooling Fan	On, Off	fan status
Drive Activity	String, Ready	See above

Link(A/B)	no light, no link, logged out, logged in	status of connection for port A and B
Speed(A/B)	- , 1, 2, 4, 8 GB/s	current speed
SAS drive dialog		
Cooling Fan	On, Off	fan status
Drive Activity	String, Ready	See above

Table 12 Drive X Status

8.4.5.3 Information menu functions

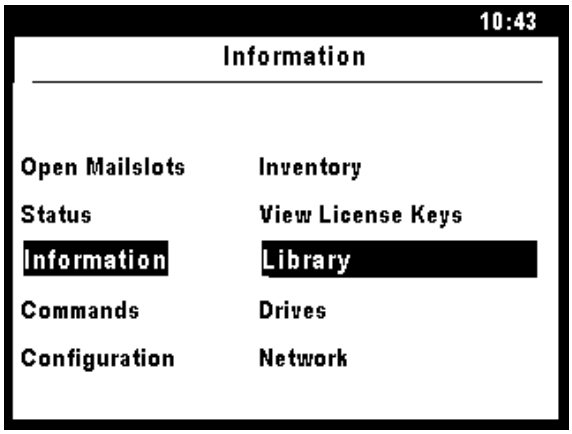


Figure 75 Information menu (OCP - 8U)

The Information Menu leads into the following sub menus:

- Network
  - Network General
  - IPv4
  - IPv6
- Inventory
  - Drives
  - Magazine X
- Library
  - General
- Drives
  - Drive x
- View License Keys

8.4.5.3.1 Network menu functions

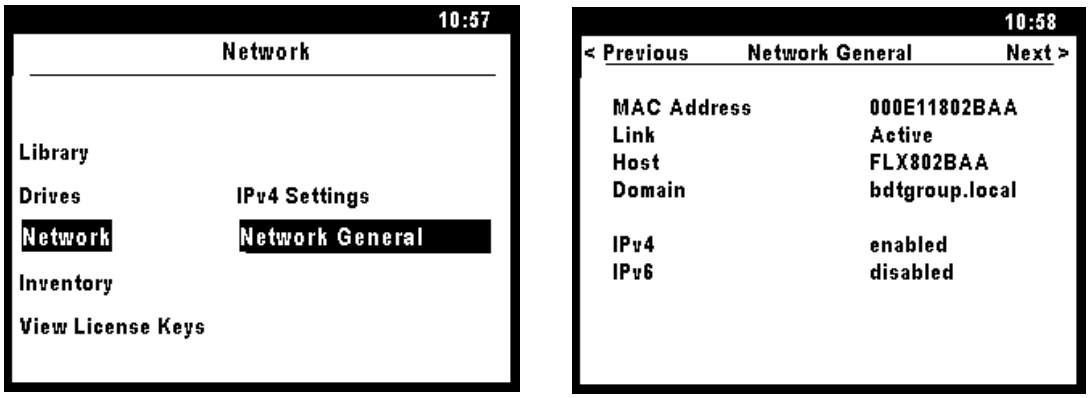


Figure 76 Network General (OCP - 8U)

Description Text Network General	**Values**	**Comments**
Mac Address	xx xx xx xx xx xxh	
Link	Active, inactive	
Host	xxxxxxxxx	
Domain	xxxxxxxx.xxxxx	
IPv4	enabled, disabled	
IPv6	enabled, disabled	
Description Text Network IPvX	**Values**	**Comments**
IPvX DHCP	enabled, disabled	
IPvX Address	xxx.xxx.xxx.xxx	IPvX Address without leading zeros
Netmask	xxx.xxx.xxx.xxx	
Gateway	xxx.xxx.xxx.xxx	
DNS Server 1	xxx.xxx.xxx.xxx	
DNS Server 2	xxx.xxx.xxx.xxx	

Table 13 Network General and IPvX (information menu)

8.4.5.3.2 Library menu functions

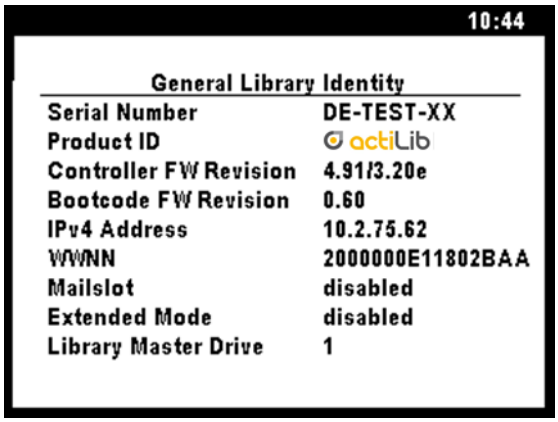
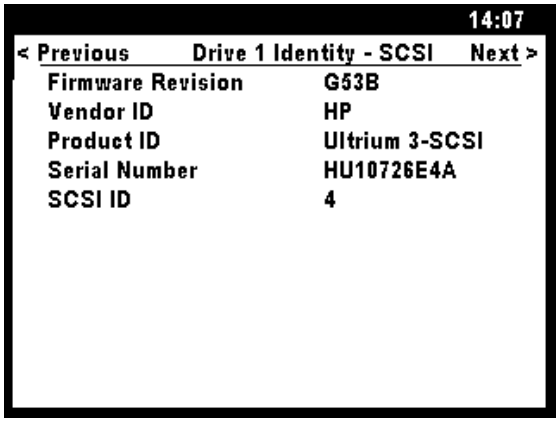


Figure 77 General Library Identity (OCP - 8U)

Description **Library**	Values	Comments
Serial number	0123456789	
Product ID	String	OEM Name
Controller FW Revision	x.xx/x.xxx	FW for Controller / Robotic
Boot code FW Revision	x.xx	
IPvX – Address	xxx.xxx.xxx.xxx	IPvX Address without leading zeros
WWNN	xxxxxxxxxxxxxxxx	
Mail slot	Enabled | Disabled	
Extended Mode	Enabled | Disabled	
Library Master Drive	X	

Table 14 General Library Identity (information menu)

8.4.5.3.3 Drives menu functions



example SCSI Drive

Figure 78 Drive X Identity (OCP - 8U)

Description Drive	Values	Comments
SCSI drive dialog		
Firmware Revision	String	
Vendor ID	String	
Product ID	String	Drive Type
Serial Number	String	
SCSI ID	Xx	
FC drive dialog	**Values**	**Comments**
Firmware Revision	String	
Vendor ID	String	
Product ID	String	
Serial Number	String	
WWNN	String	
Topology A	Auto | point to point | arb loop	
Speed A	Auto | 1 | 2 | 4 | 8 Gb/s	
Loop ID A	-- | 0..127	
Topology B	Auto | point to point | arb loop	
Speed B	Auto | 1 | 2 | 4 | 8 Gb/s	
Loop ID B	-- | 0..127	
SAS drive dialog	**Values**	**Comments**
Firmware Revision	String	
Vendor ID	String	
Product ID	String	
Serial Number	String	
WWPID A	String	
WWPID B	String	
Firmware Revision	String	

Table 15 Drive X (information menu)

8.4.5.3.4 Inventory menu functions

This is a graphical dialog, which shows the inventory of the library magazine by magazine.

Pressing the Left/Right buttons changes to the next/previous magazine in the order:
Lower left, lower right, 2nd level left, 2nd level right, etc.

Pressing the Up/Down buttons gets you back to previous menu.

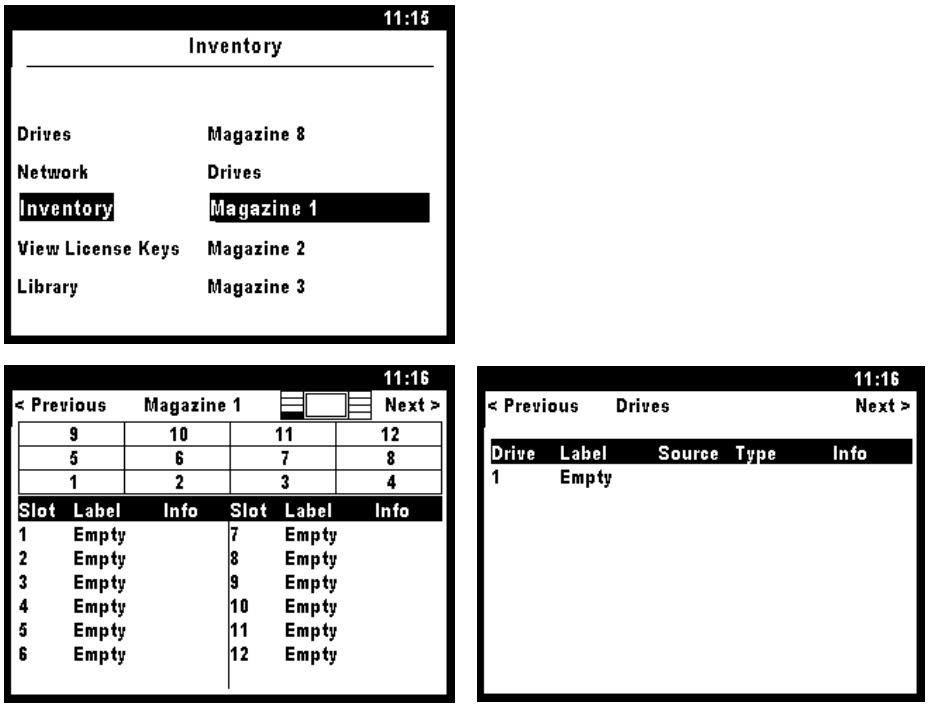


Figure 79 Inventory menu – Drives and Magazines (OCP - 8U)

The following information will be supplied:

Description **Inventory Magazines**	**Values**	**Comments**
Slot	xx; MSx	xx Slot# in Magazine 0….max 96 MS indicates Mailslot
Label	Empty, Full, Label information 8 characters	
Info	XX; WP; !	

Table 16 Inventory Magazines (information menu)

8.4.5.3.5 View License Keys menu functions

This function shows the License Key once defined.

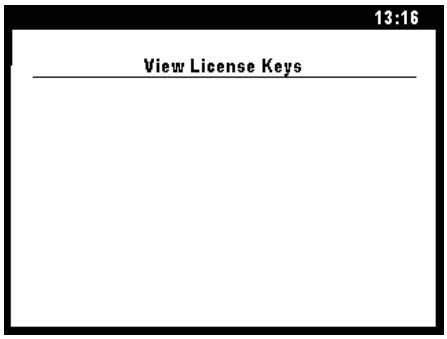


Figure 80 View License keys (OCP - 8U)

8.4.5.4 Commands menu functions

The Information Menu leads into the following sub menus:

- Unlock Right Mag.
- Move Medium
- Reinventory
- Unlock Left Mag.

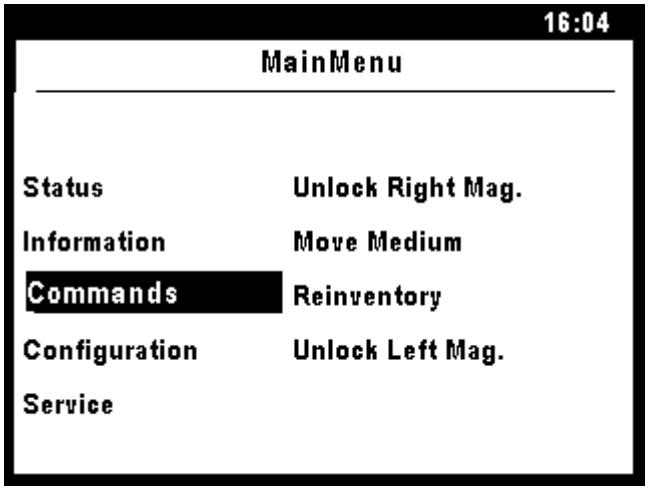


Figure 81 Commands Main Menu (OCP - 8U)

8.4.5.4.1 Unlock right/left Magazine menu functions

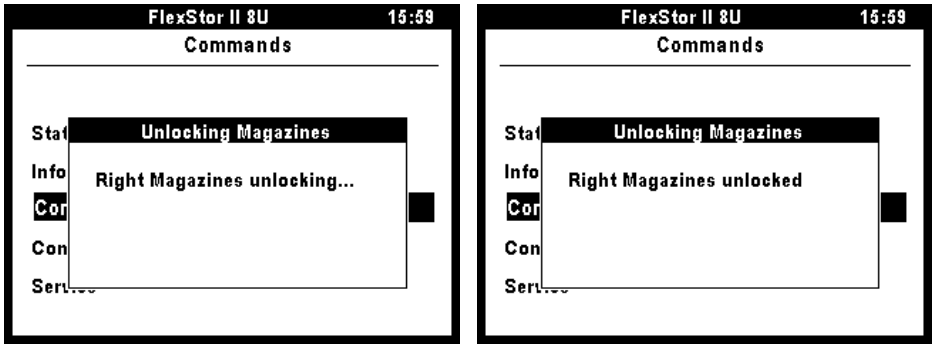


Figure 82 Unlock magazine dialog (OCP - 8U)

For right magazines:

Chose <Unlock Right Mag.> in the commands menu.

After unlocking is complete the command response pop up should indicate the success of the unlocking or an error message.

For left magazines:

Chose <Unlock Left Mag.> in the commands menu.

After unlocking is complete the command response pop up should indicate the success of the unlocking or an error message.

8.4.5.4.2 Reinventory menu functions

To re-inventory the library:

Chose <Inventory> in the commands menu.

After scanning is complete the command response pop up should indicate the success of the scanning or an error message.

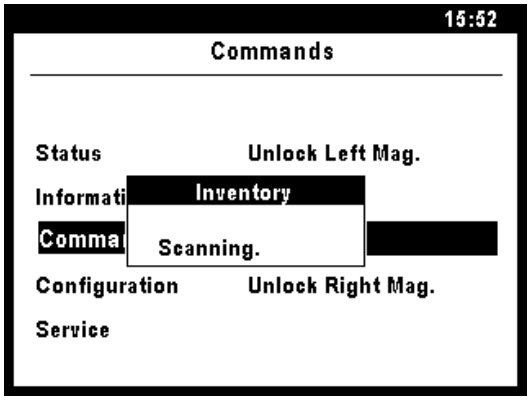


Figure 83 Reinventory (OCP - 8U)

8.4.5.4.3 Move Media menu functions

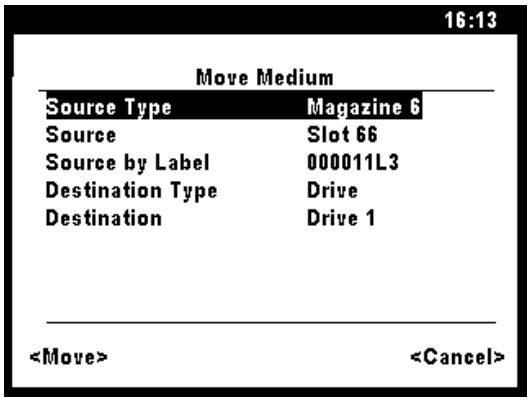


Figure 84 Move Media (OCP - 8U)

Description	Values	Comments

Move Media		
Source Type	Magazine X	
Source	Slot number, Barcode label	Inherits list depending on selected sort criteria.
Source by label	String	
Destination Type	Drive, Magazine	All free slots and enabled drives
Destination	Slot number, Drive1..4	

Table 17 Move Media (commands menu)

8.4.5.5 Configuration menu functions

The Information Menu leads into the following sub menus:

- Restore Library Config
- Add License Key
- Logical Library
- Library Settings
- Drives
- Network
- Set Access Pin
- Restore Defaults
- Set Date and Time
- Save Library Config

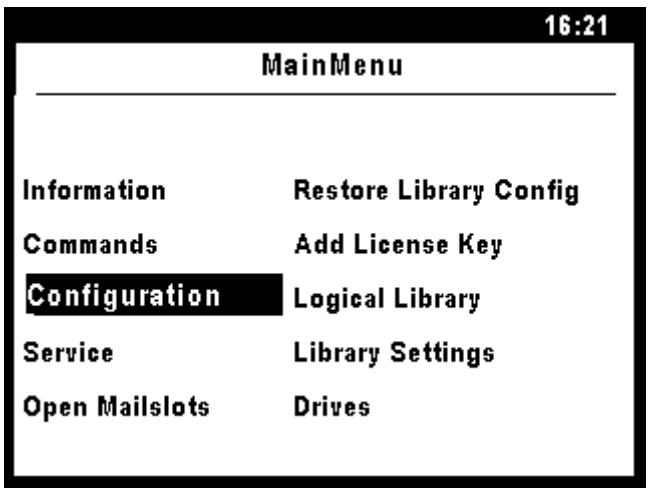


Figure 85 Configuration Main Menu (OCP - 8U)

8.4.5.5.1 Restore Library Config menu functions

The Library configuration can be restored based on a saved .dbb file, which is selected from the USB stick. This will not include the Skin file data from OEM users.

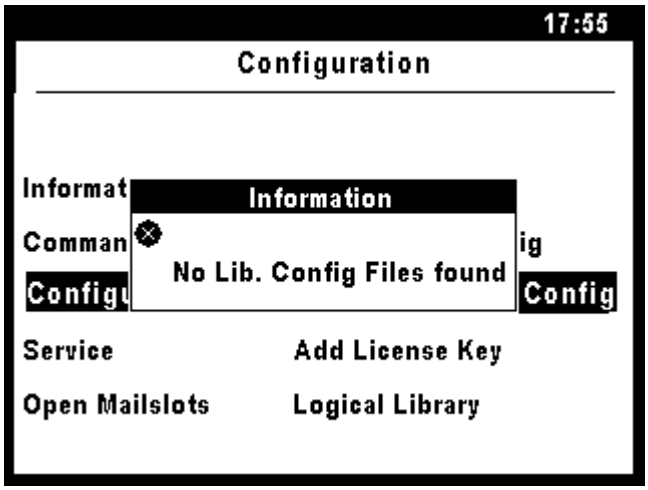


Figure 86 Restore Lib Config (OCP - 8U)

8.4.5.5.2 Add License Key menu functions

Note:

This item has no function in the actidata version of the Library.

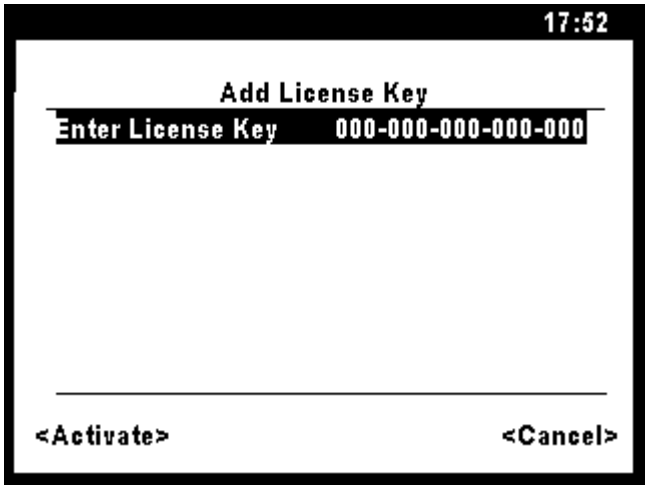


Figure 87 Add License Key (OCP - 8U)

8.4.5.5.3 Logical Library menu functions

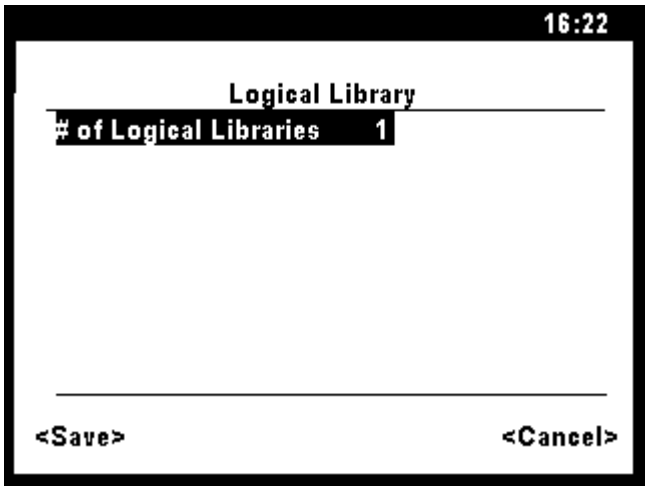


Figure 88 Logical Library (OCP - 8U)

8.4.5.5.4 Library Settings menu functions

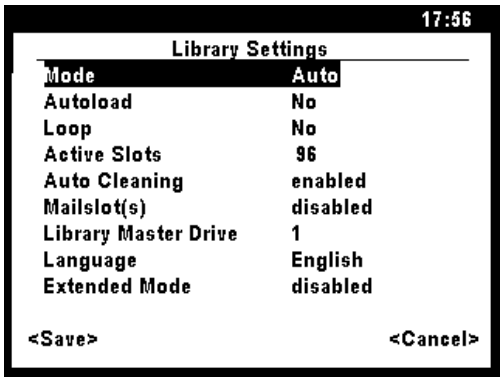


Figure 89 Library Settings (OCP - 8U)

Description **Library Settings**	**Values**	**Comments**
Mode	Auto, Random, Sequential	
Autoload	Yes, No	in library mode <Random> not available
Loop	Yes, No	in library mode <Random> not available
Active Slots	0…96	
Auto Cleaning	Enabled, disabled	
Mailslot(s)	Enabled, disabled; Bottom left (1), (3)	

Library Master Drive	1...4	only enabled drives
Language	English, Francais, Espanol, Italiano, Deutsch	count of reserved slots
Extended Mode	Enabled, disabled	

Table 18 Library dialog (configuration menu)

8.4.5.5.5 Drives menu functions

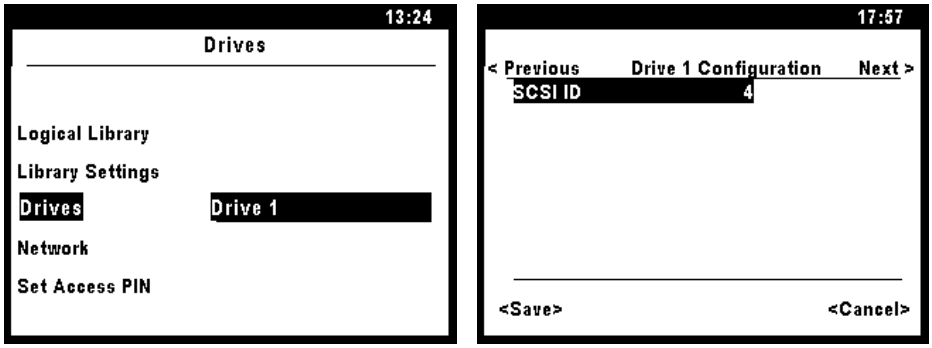


Figure 90 Drive X Configuration (OCP - 8U)

Description Drives	**Values**	**Comments**
SCSI and SAS drive dialog		
SCSI	Valid SCSI ID's	From 4 to 15
FC drive dialog		
Port A Fibre Speed	Auto Detect | 1 | 2 | 4 | 8 Gb/s	shows only speeds supported by drive
Port A Type	Automatic | point to point | arb loop	According to loop mode
Port A Loop Mode	Soft | Hard	No choice available if Type is set to Automatic or point to point
Port A Loop ID	0..124	No choice available if Type is set to Automatic or point to point
Port B Fibre Speed	Auto Detect | 1 | 2 | 4 | 8 Gb/s	shows only speeds supported by drive
Port B Type	Automatic | point to point | arb loop	According to loop mode
Port B Loop Mode	Soft | Hard	No choice available if Type is set to Automatic or point to point
Port B Loop ID	0..124	No choice available if Type is set to Automatic or point to point

Table 19 Drives (configuration menu)

8.4.5.5.6 Network menu functions

The Network Menu allows to set the IPvX connections.

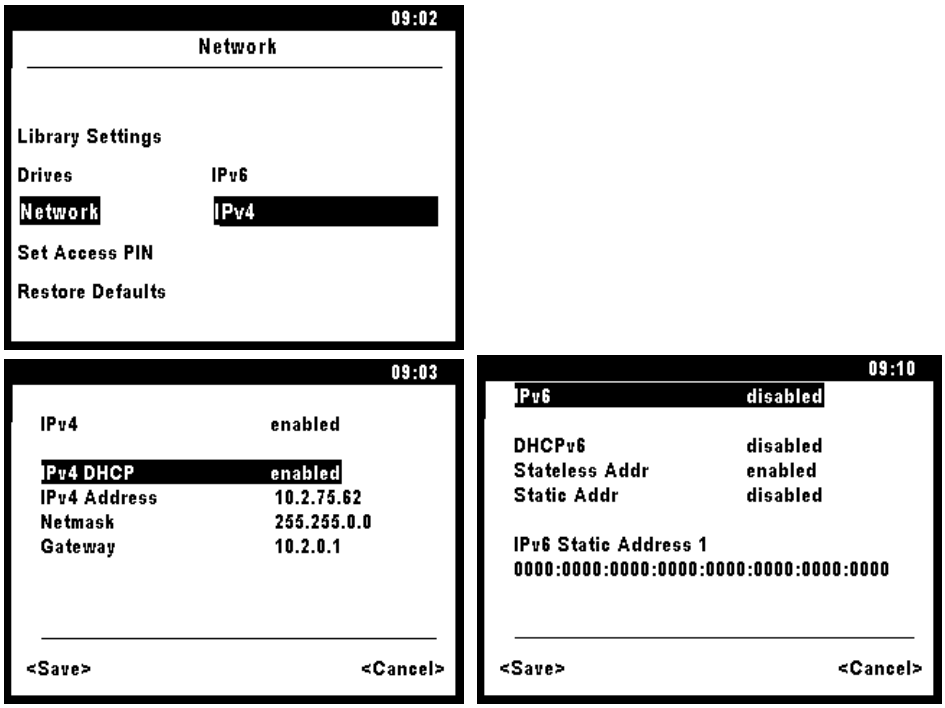


Figure 91 Network IPvX (OCP - 8U)

Description Network IPvX	**Values**	**Comments**
DHCPvX	Enable, disable	IPv4, IPv6
IPv4– Address	IPv4	IPv4, Values form 0 – 254
Net mask	IPv4	IPv4
Gateway	IPv4	IPv4
Stateless Addr	Enable, disable	IPv6
Static Addr	Enable, disable	IPv6
IPv6 Static Address1	0000:0000:0000:0000:0000:0000:0000:0000	IPv6

Table 20 Network IPvX (configuration menu)

8.4.5.5.7 Set Access PIN menu functions

Description Set Access PIN	**Values**	**Comments**

New Access PIN	xxxx	
Access PIN	Enable, disable	

Table 21 Set Access PIN (configuration menu)

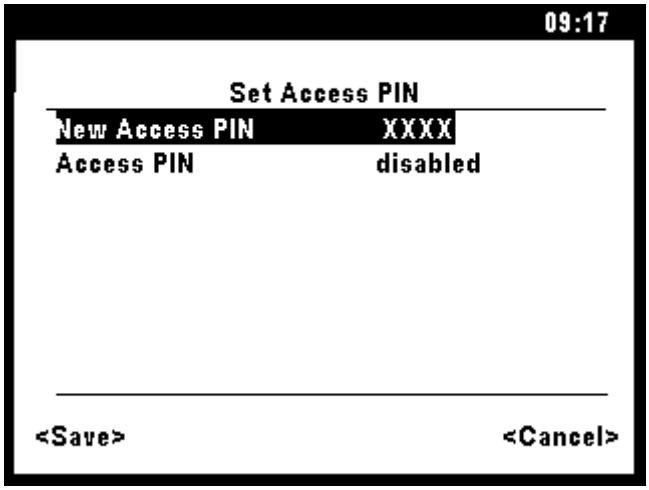


Figure 92 Set access Pin (OCP - 8U)

8.4.5.5.8 Restore Defaults menu functions

The Manufacturing Defaults can be restored, which may deviate to the OEM defaults.

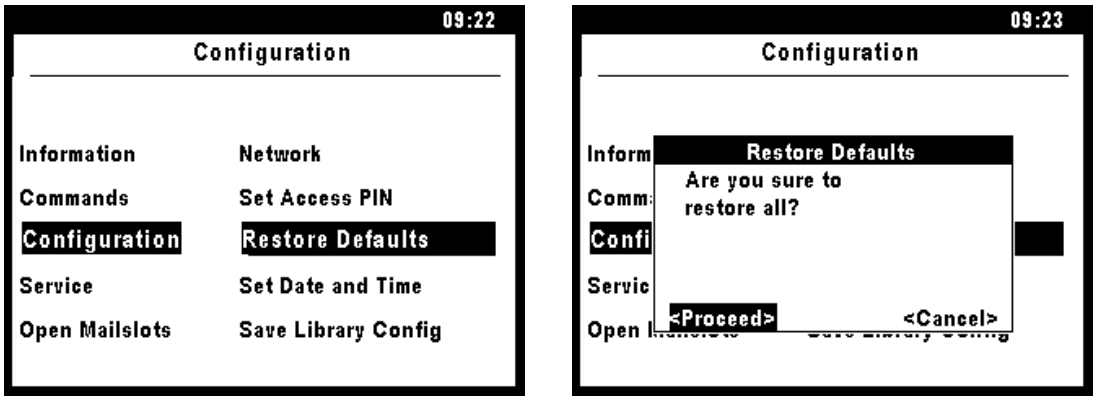


Figure 93 Restore Defaults (OCP - 8U)

8.4.5.5.9 Set Date and Time menu functions

System time and date can be set in the below shown formats. System time will not be actualized by replacing the Library Controller by a FRU, it has to be set manually via OCP/RMU.

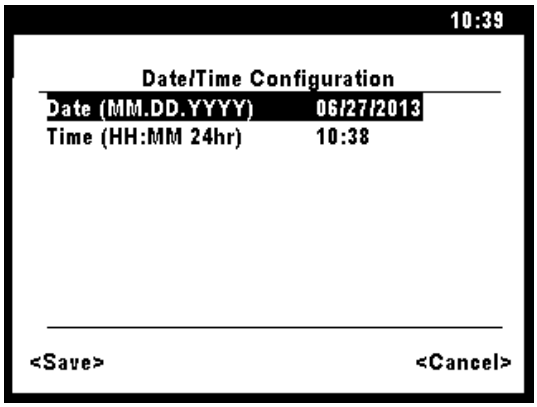


Figure 94 Set Date and Time (OCP - 8U)

8.4.5.5.10 Save Library Config menu functions

This function will save the library config in a .dbb file on the USB stick. But as this is a document, no OCP picture / no Skin file data (e.g. support link/ password) will be included.

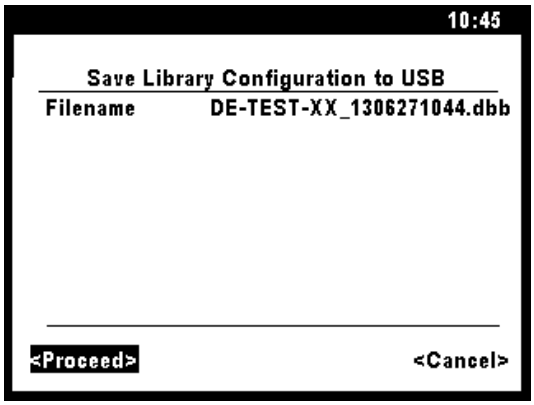


Figure 95 Save Library Config (OCP - 8U)

8.4.5.6 Service menu functions

The Service Menu leads into the following sub menus:

- Service Drives
- View Logs
- Service Library

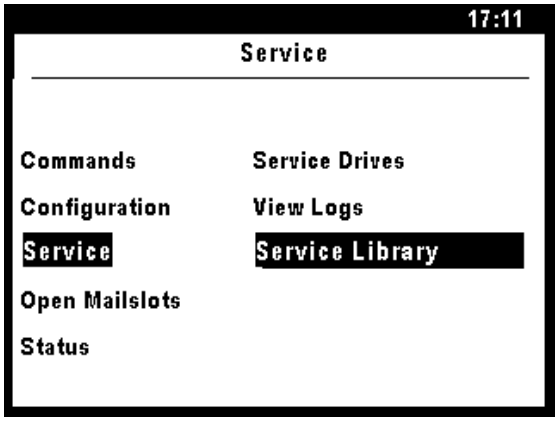
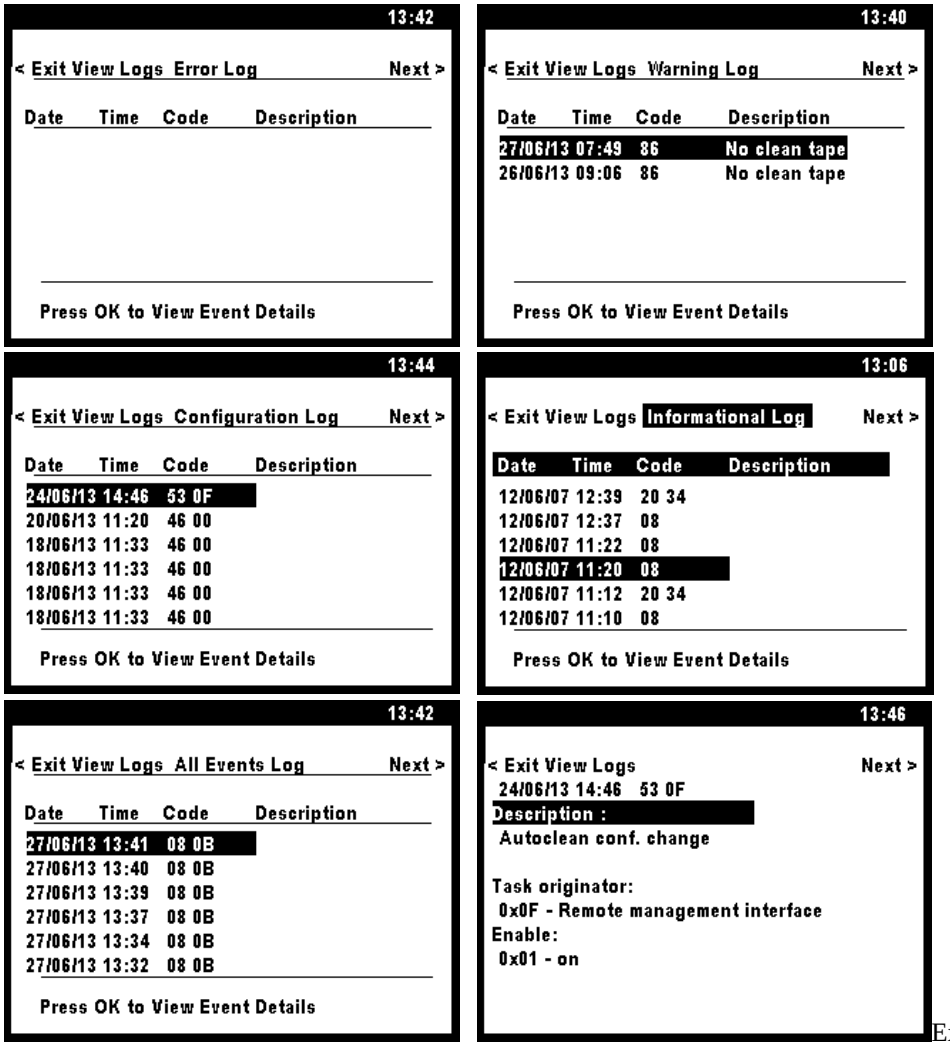


Figure 96 Service Main Menu (OCP - 8U)

8.4.5.6.1 View logs menu functions

The following screenshots display typical log dialogs. All logs are displayed in the same manner. You can browse to each dialog entry by pressing right button. If you press enter you will see a more detailed description of the chosen log entry. To choose a entry use the up/down button. There is no circular function at this page handling. If you reached the first or last element you can only move backwards. To exit this dialog, press left button.



Example Detail Config.

Figure 97 View logs and Detailed view for one entry (OCP - 8U)

The following logs are available, also Details per entry if shown on the bottom “Press OK ….”:

- Error
- Warning
- Informational
- Configuration
- All events

8.4.5.6.2 Service Library menu functions

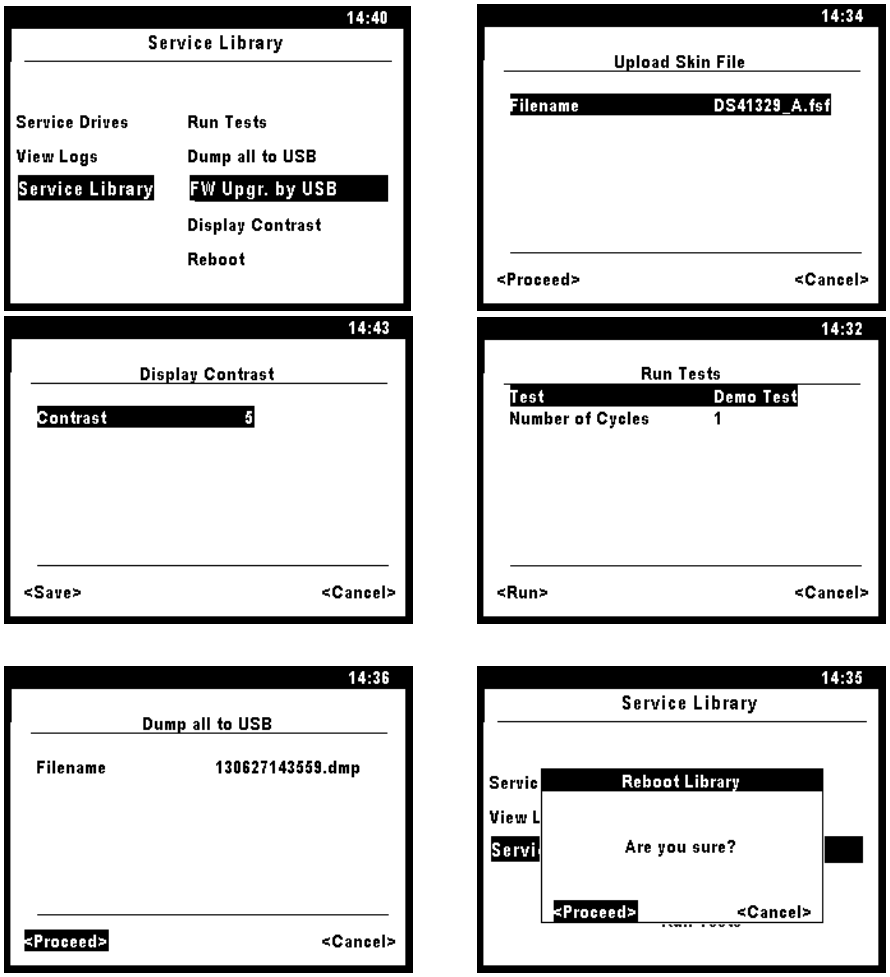


Figure 98 Service Library and Detailed view for one entry (OCP - 8U)

The following functions are available:

- Display Contrast
- Reboot
- Upload Skin File
- Run Tests
- Dump all to USB
- FW Upgr. by USB

Description Service Library	**Values**	**Comments**
Run Tests		
Test	Slot to Slot Test, Wellness Test, Demo test	
Cycles	1, 2, 5, 10, 20, 50, 100, 200, 500,	

	1000, endless	
Drive	All Drives, Drive 1..4	select drives to test
Dump All to USB		
Filename	String.dmp	filename on USB memory stick
Upload Skin File		
	String.fsf	filename from USB memory stick including data from OEM users
FW Upgrade by USB		
Filename	String	filename from USB memory stick
Display Contrast		
Contrast	0…9	
Admin password dialog (security settings)		
New admin password	xxxx	0000 is a valid password
Restore all dialog (default settings) (pop up dialog for user confirmation)		

Table 22 Service library (service menu)

8.4.5.6.3 Service drive menu functions

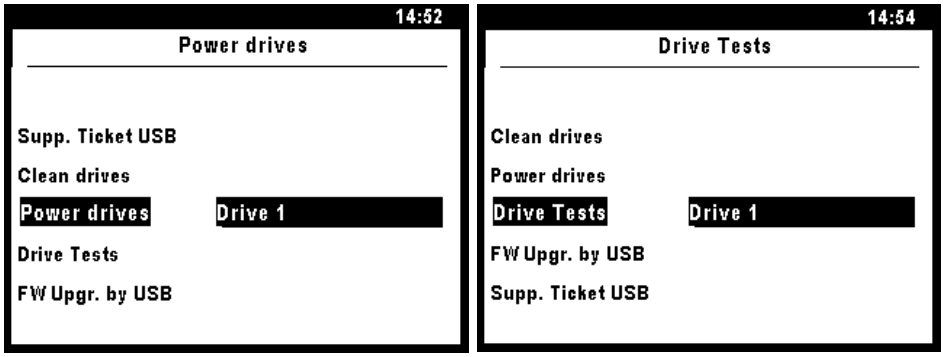


Figure 99 Service Library samples (OCP - 8U)

The following functions are available:

- FW Upgr. By USB
- Support ticket USB
- Clean Drives
- Power Drives
- Drive Tests

Description Service Drive	Values	Comments
Drive Tests		
Drive tests	Power on self	All enabled drives
Source	MS	
Clean drives dialog		
Target Drive	Drive 1..4	Shows only enabled drives
Clean	Ok, Cancel	Cleaning tape must be defined and loaded; if not available info is shown on OCP
Power drives dialog		
Target Drive	Drive 1..4	Shows only enabled drives
Power on / off	Proceed, Cancel	Depends on current state of selected drive.
FW Upgrade by USB		
Target Drive	Drive 1..4	Shows only enabled drives
Source	String	filename from USB memory stick to select (xxxx.fbi)
Support Ticket by USB		
Target Drive	Drive 1..4	Shows only enabled drives who support Tickets; if not available info is shown on OCP

Table 23 Service drive dialogs (service menu)

8.4.6 Menu flow charts (8U)

8.4.6.1 Information menu

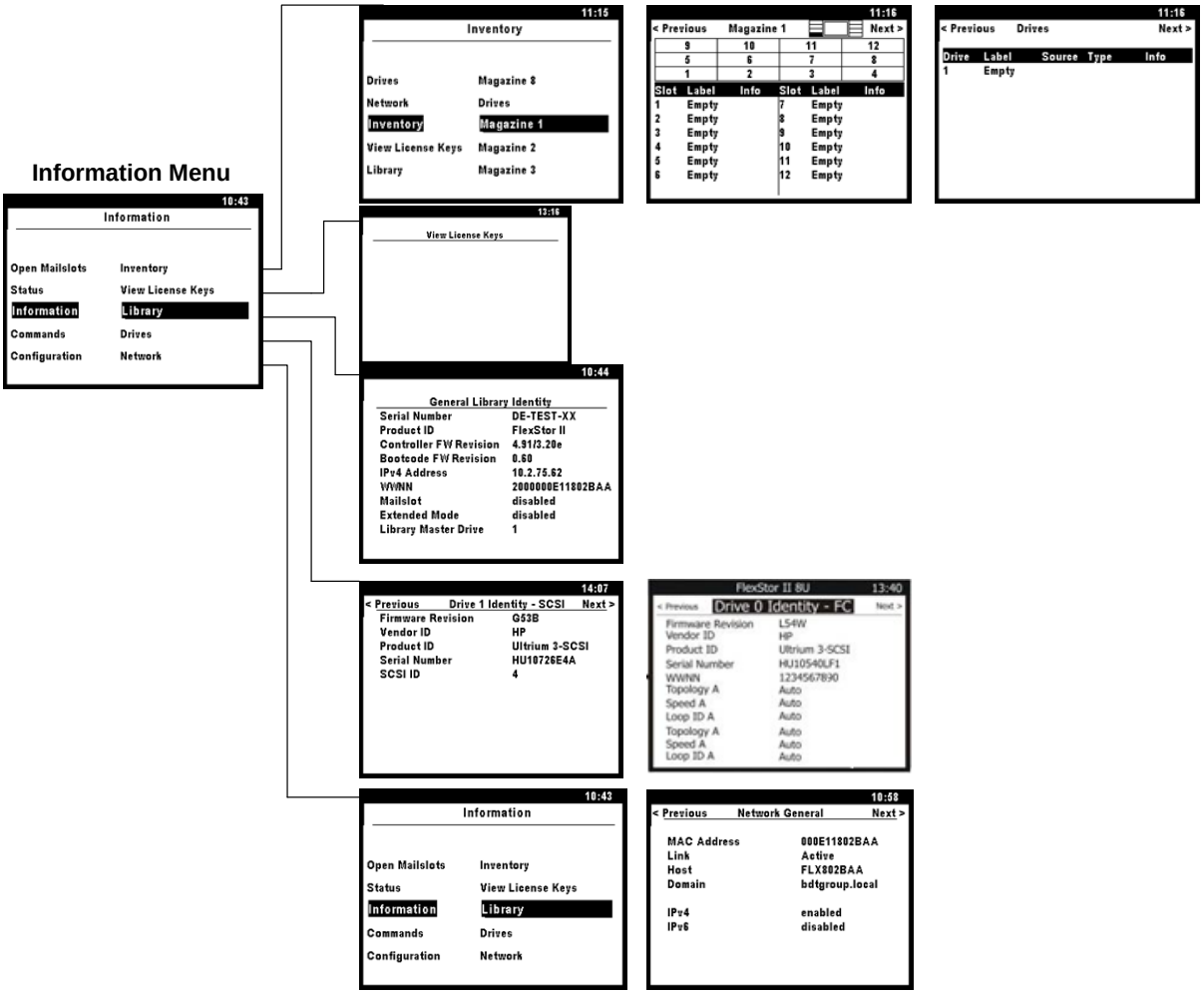


Figure 100 Information menu (OCP - 8U)

8.4.6.2 Commands menu

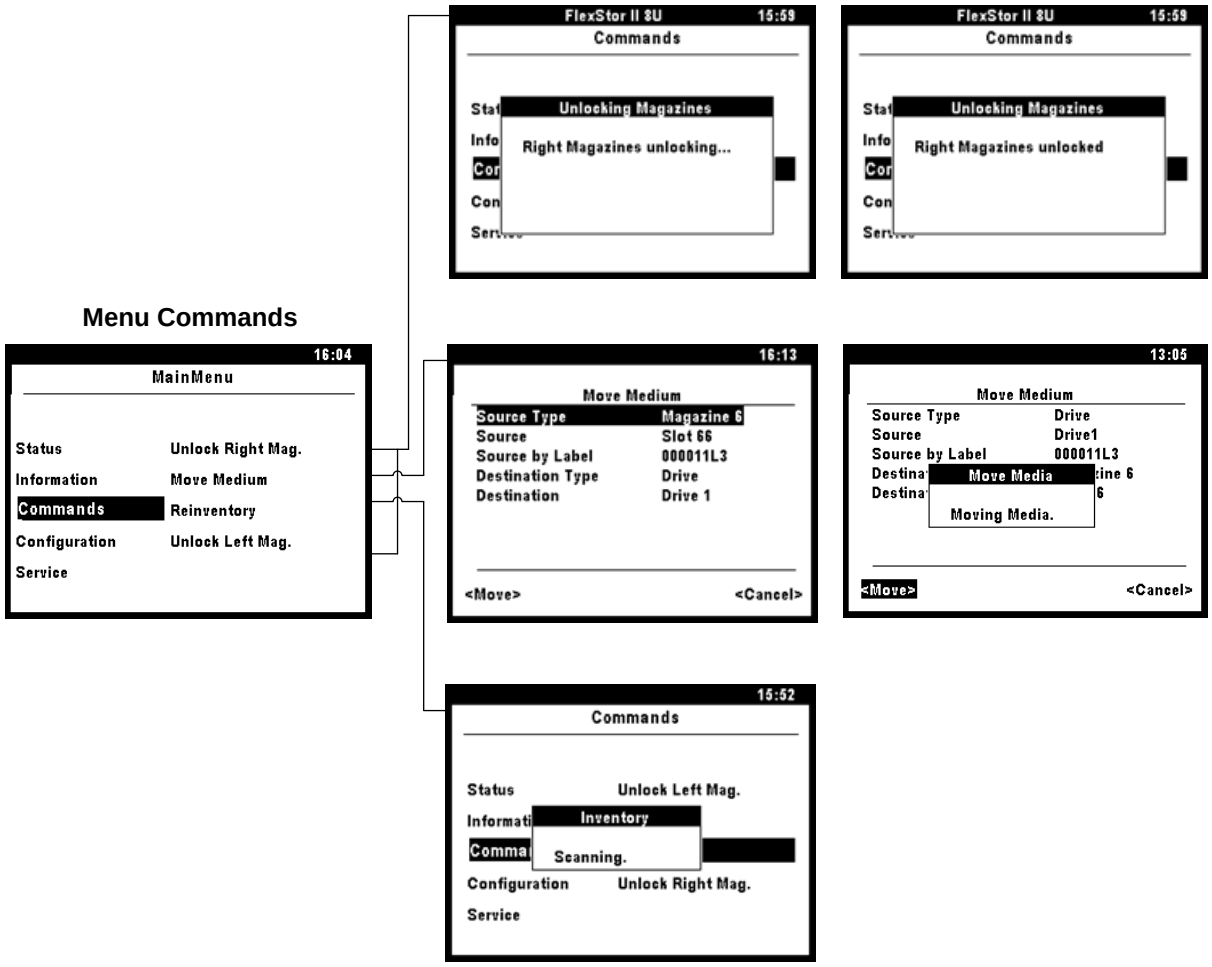


Figure 101 Commands menu (OCP - 8U)

8.4.6.4 Configuration menu

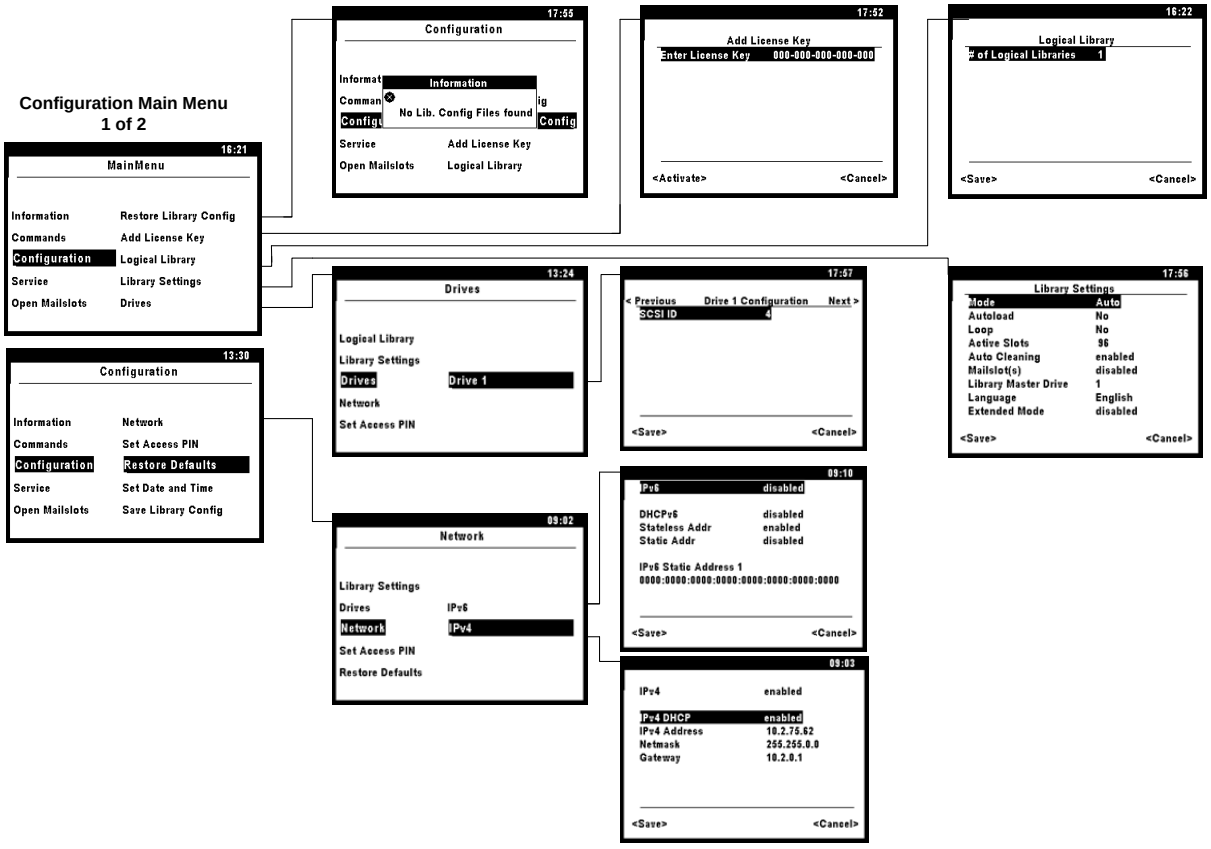


Figure 102 Configuration menu 1 of 2 (OCP - 8U)

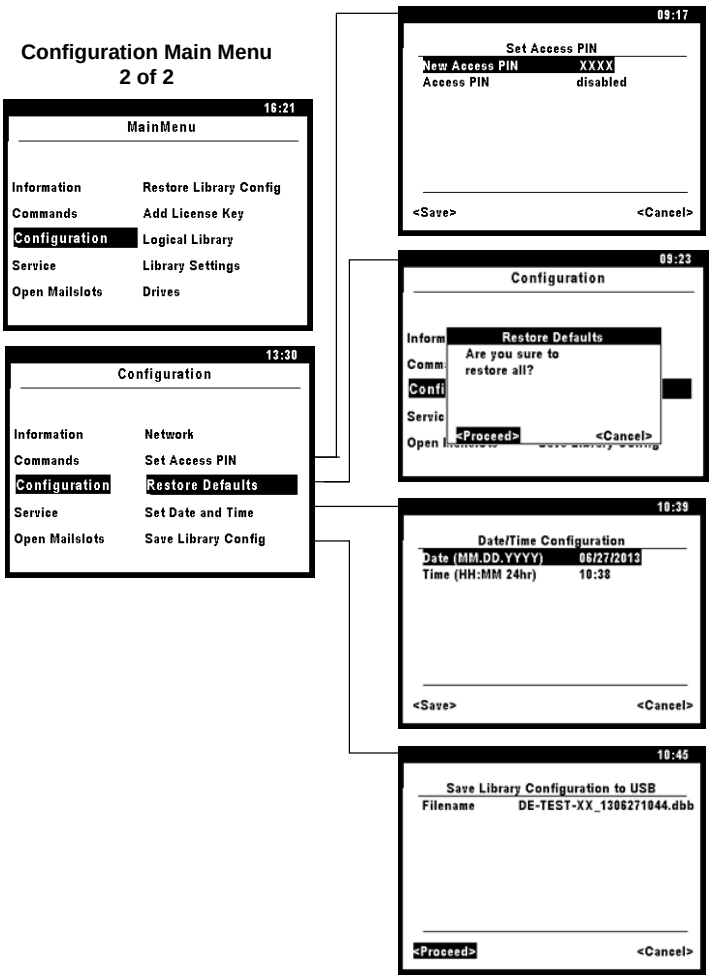


Figure 103 Configuration menu 2 of 2 (OCP - 8U)

8.4.6.5 Service menu

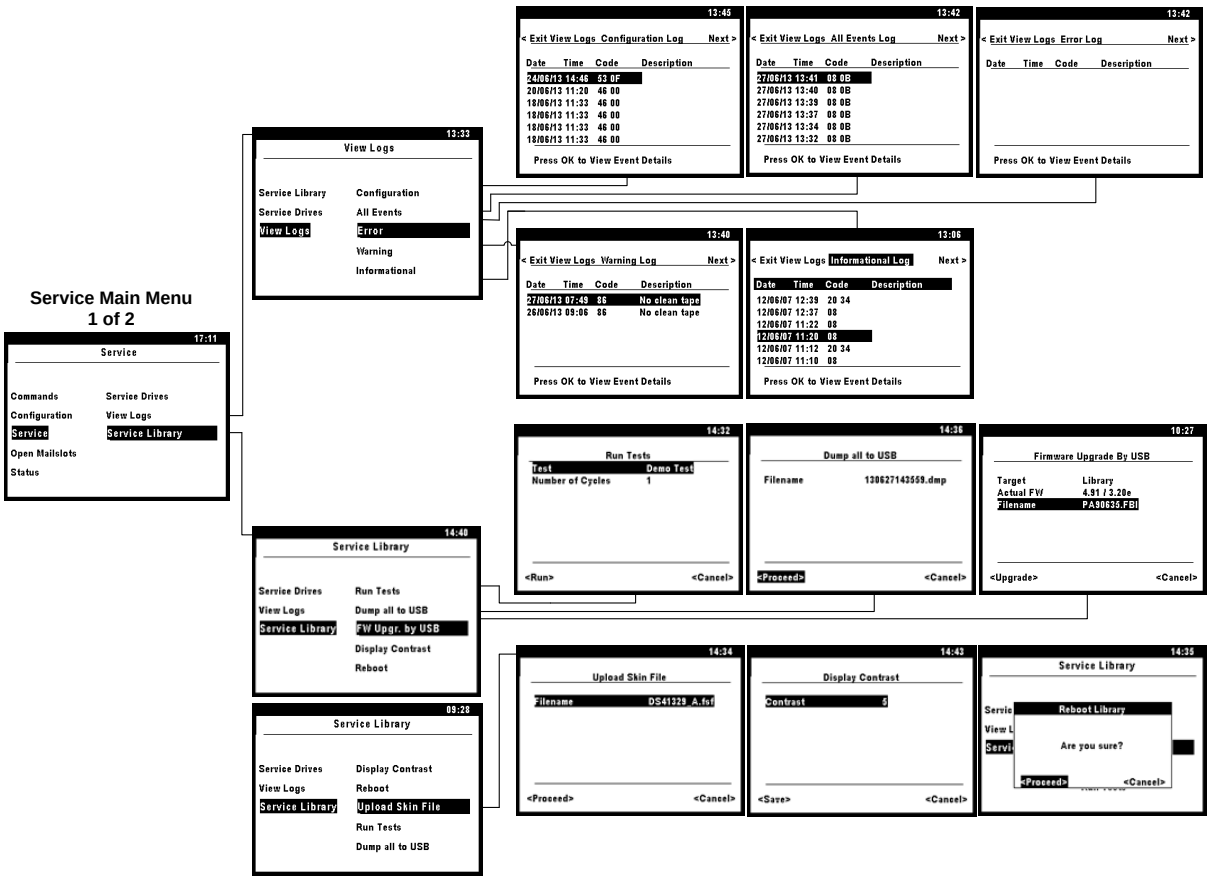


Figure 104 Service menu 1 of 2 (OCP - 8U)

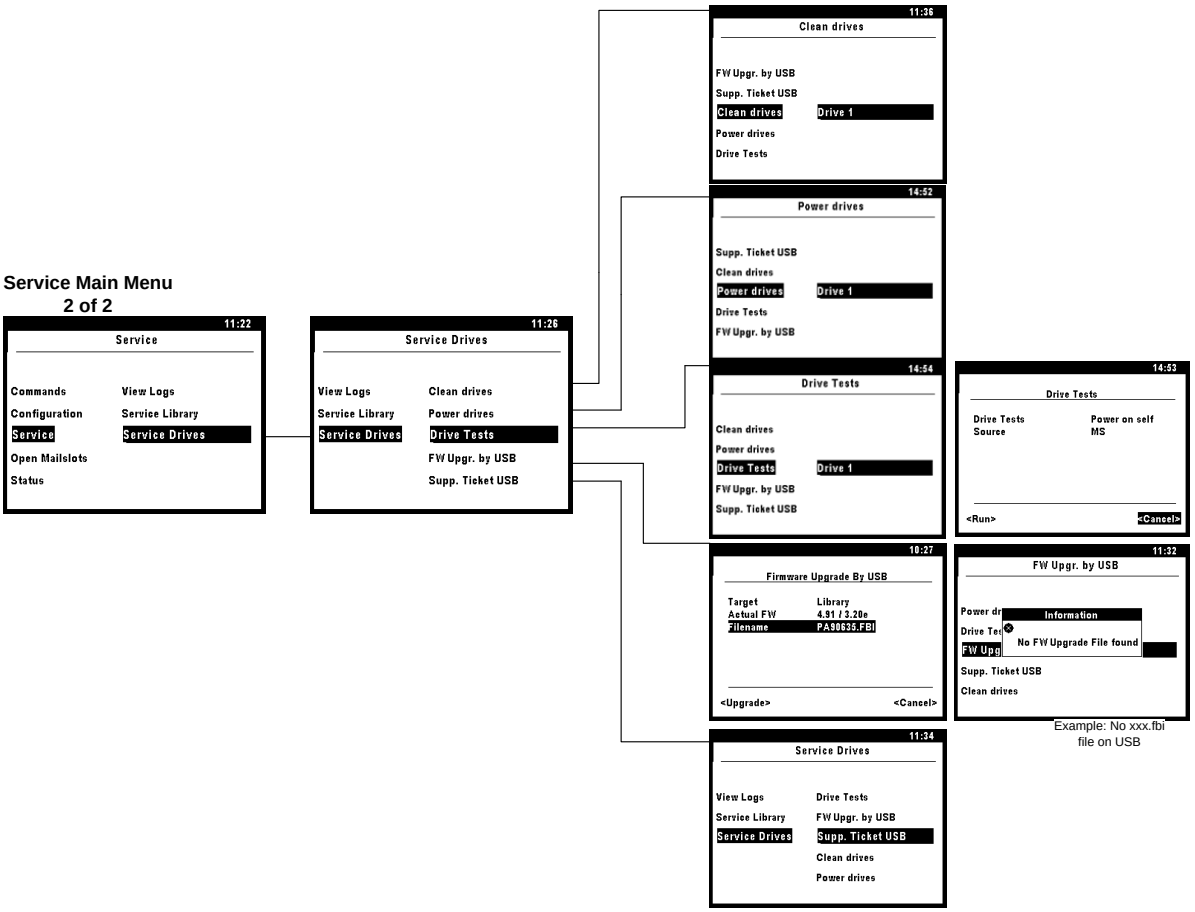


Figure 105 Service menu 2 of 2 (OCP - 8U)

8.5 Remote management unit (RMU)

8.5.1 Overview

Many of the same operations performed locally from the operator control panel can also be performed remotely using the network connected Remote Management Unit (RMU).

The RMU lets you monitor and control the library from any computer connected to your network or through the World Wide Web (WWW). The RMU hosts a dedicated, protected internet site that displays a graphical representation of the library.

After establishing a connection to the library, open any HTML browser and enter the IP address of the library.

To access the RMU, you must first set the desired static IP address at OCP or configure to use DHCP.

8.5.2 Operations through the RMU

The following operations are available through the remote management unit as explained below:

1. Identity
   - Viewing the static library identity, Page 108
   - Viewing the static drive identity, Page 108
   - Viewing the static drive identity, Page 108

2. Status
   - Viewing the dynamic library identity, Page 109
   - Viewing the dynamic drive identity, Page 110
   - Viewing the tape cartridge inventory, Page 111
3. Configuration
   - Changing the System Configuration, Page 112
   - Changing the Drive configuration, Page 114
   - Changing the Network configuration, Page 114
   - Changing the User password, Page 117
   - Setting Date/Time, Page 117
   - Setting error Log mode, Page 118
   - Setting event for Email Notification parameters, Page 119
   - Restoring factory , Page 119
4. Operations
   - Move Media within the library, Page 120
   - Determining current media , Page 120
   - Releasing and replacing , Page 121
5. Service
   - Performing General library , Page 121
   - Determining and updating firmware, Page 122
   - Reboot of the library, Page 122
   - Viewing Library , Page 123
   - Cleaning tape drive(s), Page 123

8.5.3 Status icons as shown by the RMU

Symbol	Description for the status icons
	The green check mark for status <Ok> indicates that the library is full operational and that no user intervention is required.
	The yellow exclamation point for status <Warning> indicates that user intervention is necessary, but that the library is still capable of performing operations.
	The red x for status <Error> indicates that user intervention is required and that the library is not capable of performing operations.

Table 24 Legend of status icons (RMU)

8.5.4 Login

NOTE

Some options of the RMU take the library offline. This inactive mode can interfere with host-based application software, causing data loss. Make sure the library is idle before attempting to perform any remote operations that will take the library offline.

To login, select the access type and enter the correct password. There are three levels of access:

- Guest
  (standard user level).
- Admin Password: adm001
  (administrator user level).
- Service
  (service user level,. Access by service personnel only).

Each level affects which areas you have access to and what actions you can initiate from those areas.

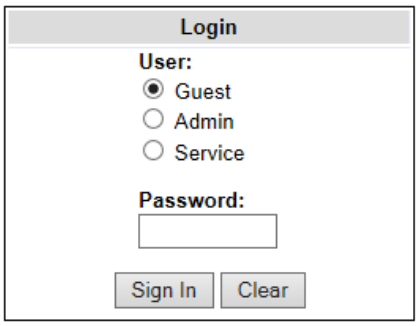


Figure 106 RMU Login

8.5.5 Identity

8.5.5.1 Viewing the static library identity

This page provides access to the static information about the system. No changes can be made from this page.

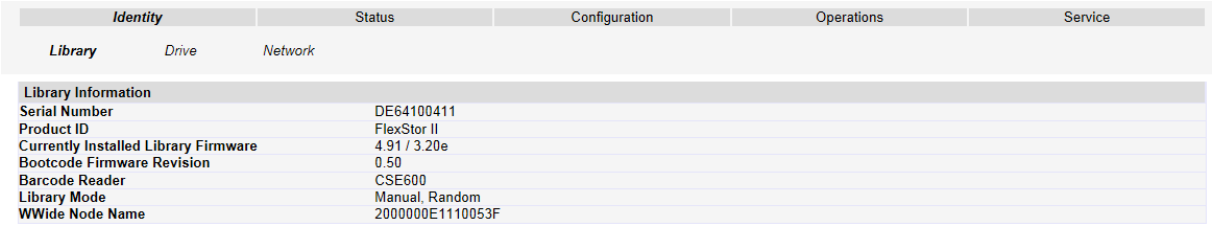


Figure 107 Library identity (RMU)

The following information is displayed:

1. Library information:
   - Serial Number
   - Product ID
   - Currently Installed Library Firmware
   - Boot code Firmware Revision
   - IP Address
   - MAC Address
   - WWide Node Name
2. Extended Logical Library information's

If the unit has more than one partition, the properties of all logical libraries are displayed similar to1.

8.5.5.2 Viewing the static drive identity

This page provides access to the static information about the drive(s). No changes can be made from this page.

If more tape drives are installed in the library, the information will be shown by selecting it from the pull down menu.

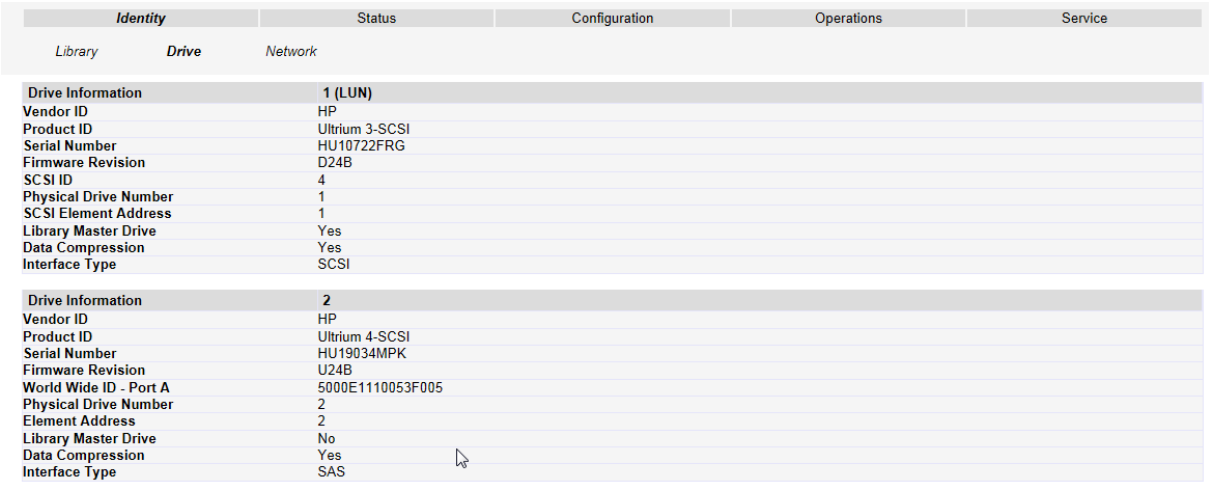


Figure 108 Drive identity (RMU)

The following information is displayed, see next Figure:

1. Drive information:
   - Vendor ID= Manufacturer identification of the drive
   - Product ID= Model identification of the drive
   - Serial Number= Serial number of the drive
   - Firmware Revision= Operating firmware level of the drive
   - World Wide ID (SCSI ID)= Unique unit identifier of the drive
   - Physical Drive Number= Number indicating drives physical position within the library
   - Element Address= Number indicating the logical identification of the drive
   - Library Master Drive= Indicates if library interface is hosted by drive
   - Data Compression= Indicates if drive hardware data compression is enabled
   - Interface Type (SAS; SCSI; FC) =Indicates drives physical interface connection style
2. Additional drive information (up to 4 full-high or 8 half-high tape drives)

8.5.5.3 Viewing the network identity

This page provides access to the network information about the connections of the library. No changes can be made from this page.

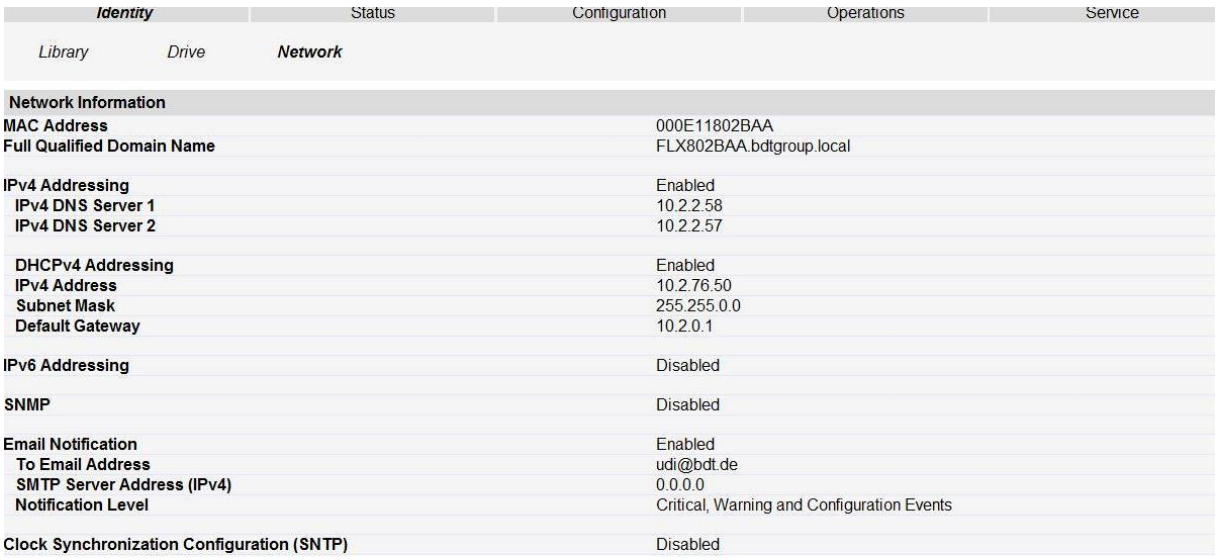


Figure 109 Network identity (RMU)

8.5.6 Status

8.5.6.1 Viewing the dynamic library identity

This page displays the dynamic information about the library, such as the current status of the components.

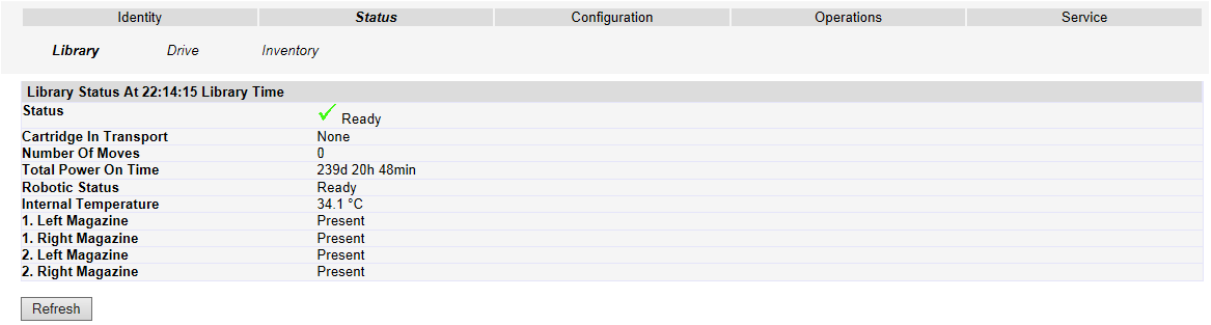


Figure 110 Library status (RMU)

Library status:

- Status =Indicates library is ready to accept commands
- Cartridge in Transport=Indicates robot has a cartridge
- Number Of Moves (Odometer)=Indicates total number of moves
- Total Power On Time= Indicates total library power on time
- Robotic Status=Indicates robot is ready to accept commands
- Internal Temperature= Indicates internal unit temperature in degrees centigrade
- Presence of Magazine(s)= Indicates presence of tape magazines

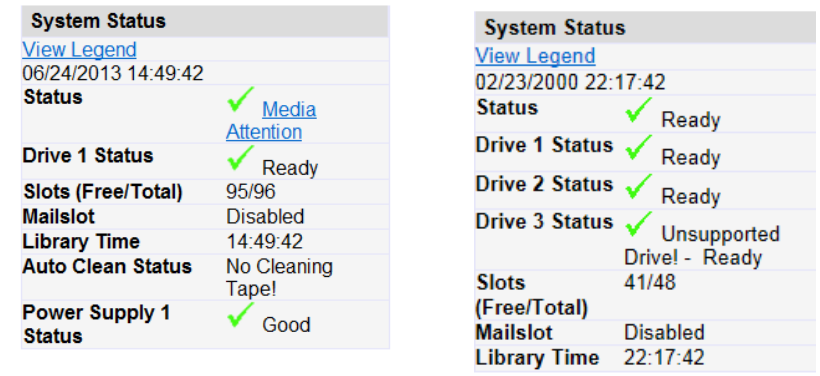


Figure 111 System status (RMU) - 2 examples depending on configuration

System status:

- Status= Overall library status
- Drive Status= Individual drive status (there will be one entry for each installed drive).
- Slots (Free/Total)= Total library slot capacity
- Mail slot= Indicates if an Import/Export mail slot is configured
- Library Time= Time stamp displayed in 24 hour format
- Auto Clean Status= If the Auto Clean Option is configured the status will be displayed here
- Power Supply Status= If optional redundant power supply is installed status will be displayed here

8.5.6.2 Viewing the dynamic drive identity

This page provides detailed information about all drives that are present in the library.

If multiple tape drives are installed in the library, the information will be shown by selecting it from the pull down menu.

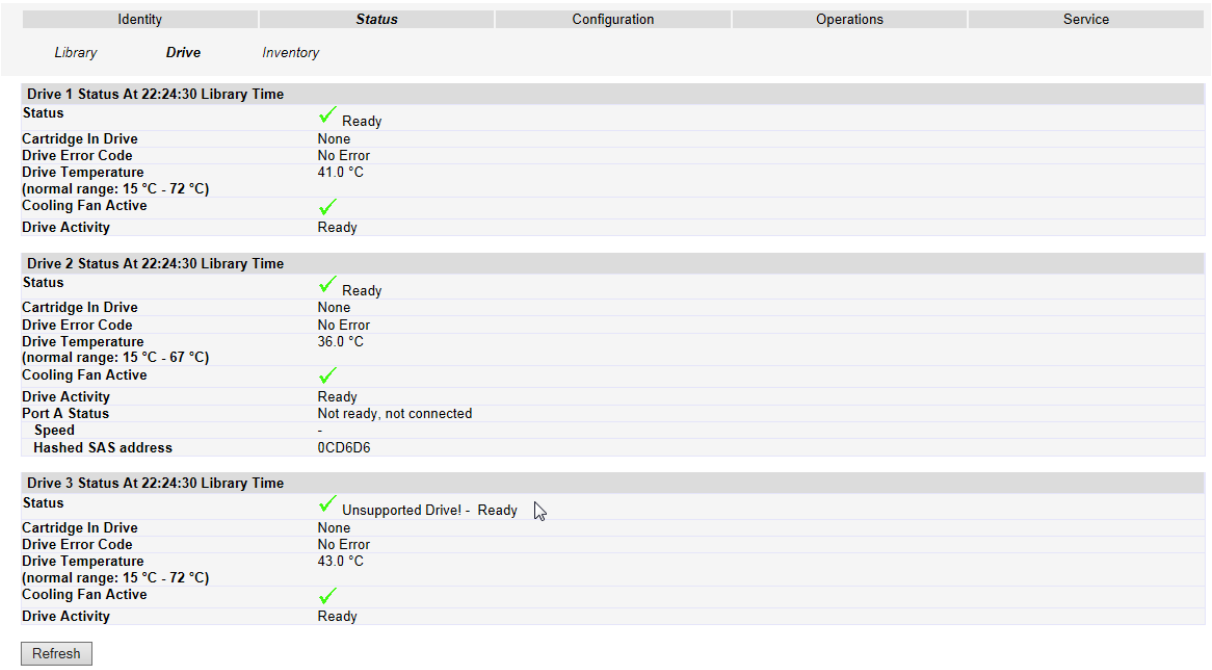


Figure 112 Drive status (RMU)

The following information is displayed:

1. Drive status:
   - Status
   - Cartridge in Drive
   - Drive Error Code
   - Drive Temperature
   - Cooling Fan Active
   - Drive Activity
   - Drive Port (if present)
2. Additional drive information (up to 4 full-high or 8 half-high tape drives)

8.5.6.3 Viewing the tape cartridge inventory

This page provides detailed information about the tape inventory in the library. A summary of each magazine is shown. To get detailed information, click on the <✚> button. This will expand the display for the specified magazine and provide detailed cartridge information.

If more magazines are installed in the library, the information will be shown by selecting it from the pull down menu.

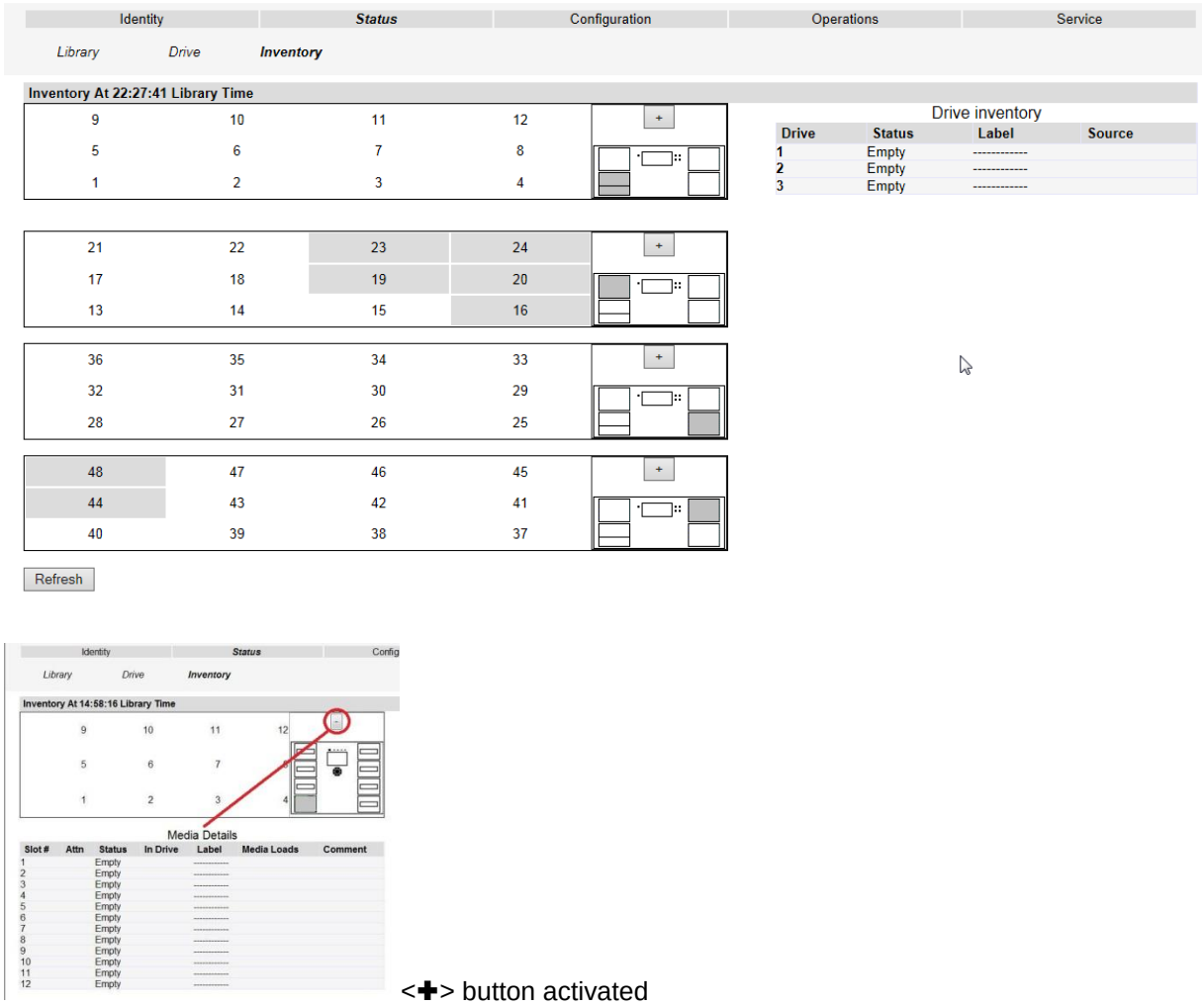


Figure 113 Tape cartridge inventory (RMU)

8.5.7 Configuration

8.5.7.1 Changing the System Configuration

This page allows the user to change the system configuration.

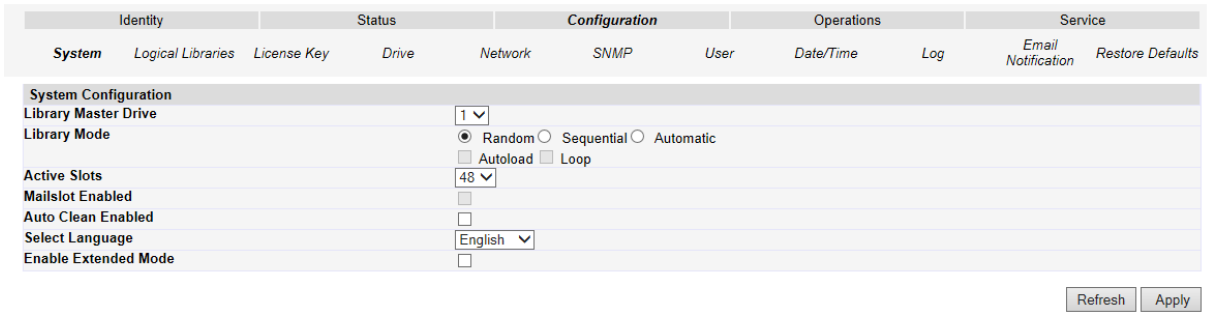


Figure 114 System Configuration (RMU)

The following information is displayed:

1 Library Master Drive = The drive number the library LUN will be hosted by (appear as a LUN of)

2 Library Mode
specifies the library mode for the library. The library supports three behaviour modes:
Random, Sequential, and Automatic.

- <Random> In random mode, the library does not automatically load tapes into the tape drives. The random mode is used with a full featured or a robotics-aware backup application and is the most common mode of operation.
- <Sequential> In sequential mode, the library automatically loads and unloads tapes from the tape drive. The sequential mode is used when the backup software is not robotics-aware or was designed for standalone drives only.
- <Automatic> This is the default mode. In automatic mode, the library switches from sequential mode into random mode when it receives library SCSI commands through its unique LUN ID.

  In sequential mode, the user can set the <Loop> and <Autoload> options. In the auto load mode, the library automatically loads the tapes from the lowest-numbered full slot into the tape drive. In loop mode, the original first tape in the sequence is reloaded after the library has cycled through all available tapes.

3 Active Slots
In this field the user can select the number of slots in the library that are available to the backup software.

4 Mail slot Enabled
Enabling the mail slot in the library will reduce the total number of storage slots.

5 Auto Clean Enabled
When auto clean is enabled, the library automatically loads a cleaning cartridge when a tape drive needs to be cleaned. The library identifies a tape as a cleaning tape if it has a bar code label that starting with CLN or after an unlabeled cleaning tape has been loaded into the tape drive.

6 Select Language:

The select language menu allows the user to specify the language displayed by the RMI interface. The default display language is English. Possible alternate language selections are German, Italian, Spanish, and French. In order for the selection to take affect the desired language must be selected in the drop down menu and the apply button pushed. The web screen must then be refreshed.

7 Enable Extended Mode.

Is for use with the hardware based library extender option, please see the documentation included with the library extender option for proper setting of this feature.

Changes will only be applied after the <Refresh> or the <Apply Selections> button is selected.

After selecting, a warning page will inform the user of the impact of their proposed change. In some cases, a pop-up screen will ask the operator to confirm their change. Many changes will also require a reboot.

8.5.7.2 Logical Libraries

The logical libraries drop down allows the user to partition one library into smaller “logical libraries”. Each logical library must contain at least one tape drive. For information on this feature please see section 8.6

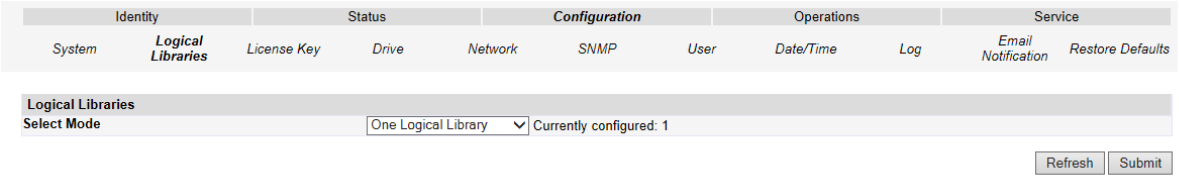


Figure 115 Logical Libraries (RMU)

8.5.7.3 Changing the License Key configuration

This page allows the user to add additional functionality to the unit by entering license key information. Please contact your supplier to see if this functionality is applicable in your model.

Note:

This item has no function in the actidata version of the Library.

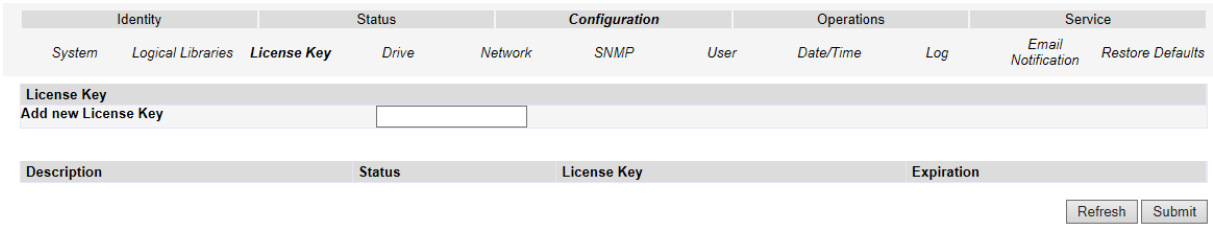


Figure 116 License key (RMU)

8.5.7.4 Changing the Drive configuration

This page shows the current configuration of all tape drives in the library and allows modification to the configuration. The user is also able to select the <Power On> check box through this page that activates the drive. In the following figure example tape drive are shown. Drive ID can be changed by using the drop down menu and selection of another ID. By pressing <Submit> the id is changed.

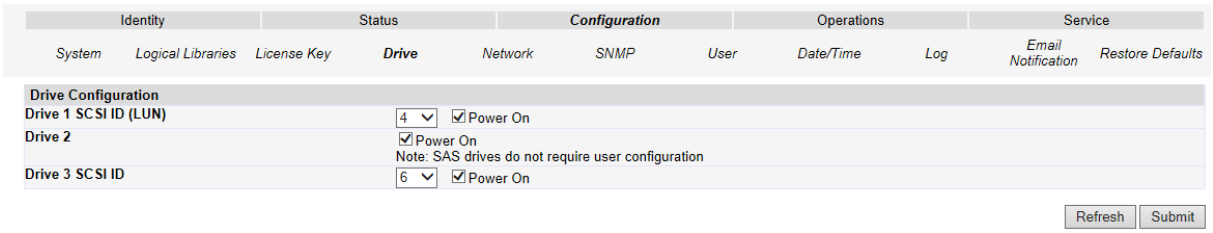


Figure 117 Drive configuration (RMU)

8.5.7.5 Changing the Network configuration

This page shows the current network configuration of the library related to the RMU access and allows modification to the configuration. When a change is requested, a pop-up window will ask to confirm the changes. Changes in this menu may affect the ability to access the RMU interface unless the correct IP address is resolved.

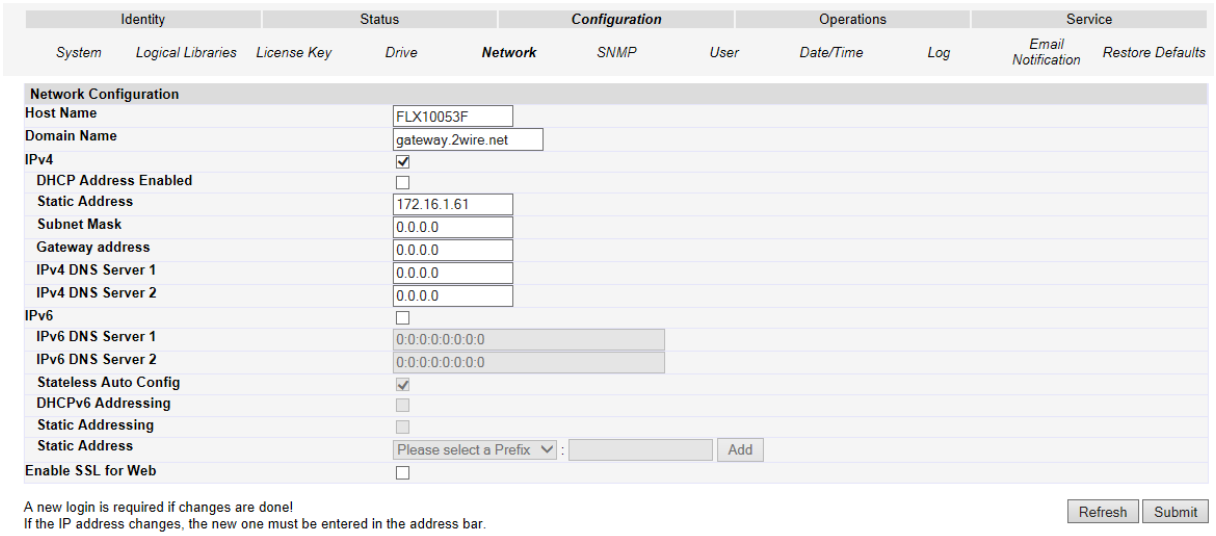


Figure 118 Network configuration (RMU)

Changes that can be made are:

- Host Name: In this box enter the name you wish to use to use to address this library in the future. It is recommended that you use a name that is relevant to its location and or its purpose.

  The Host Name may be up to 15 characters long.
  allowed characters are: [A-Z], [a-z], [0-9], hyphen [-] and period [.]
  not allowed characters are: hyphen [-] as the first character, blanks or consecutive hyphens [-]

- Domain Name: In this box is the domain the library is registered in and may be updated by editing the name and submitting the changes.

  The Domain Name may be up to 39 characters long.
  - allowed characters are: [A-Z], [a-z], [0-9], hyphen [-] and period [.]
  - not allowed characters are: hyphen [-] as the first character, blanks or consecutive hyphens [-], blanks or consecutive hyphens [-] as the first or last character of a label (A period [.] is the delimiter of domain name labels!)

  The sum of characters of the Host Name and the Domain Name may not exceed 15+39=54 characters.

- IPv4
  - DHCP Address Enabled-Used to set the RMU to seek an assigned IP address from the network's DHCP server.
  - Static Address-This field is only active with DHCP address off (unchecked), a static IP address may be programmed in this field.
  - Subnet Mask-Used to set the Network Mask, contact your Network administrator to receive this setting address if required.
  - Gateway address- Used to set the Gateway Address, contact your Network administrator to receive this setting address if required (used when an IP address does not match any other routes in the routing table)
  - IPv4 DNS Server 1 This is the IP address of your name server (DNS server). A DNS server allows the library to communicate with other network clients via their host name. If you have a DNS Server on your network, enter the IP address in this field.
  - IPv4 DNS Server 2 This is the alternate IP address of your name server (DNS server). A DNS server allows the library to communicate with other network clients via their host name. If you have a DNS server on your network, enter the IP address in this field.

- IPv6
  - IPv6 DNS Server 1 This is the IP address of your name server (DNS server). A DNS server allows the library to communicate with other network clients via their host name. If you have a DNS Server on your network, enter the IP address in this field.
  - IPv6 DNS Server 2 IPv4 DNS Server 2 This is the alternate IP address of your name server (DNS server). A DNS server allows the library to communicate with other network clients via their host name. If you have a DNS server on your network, enter the IP address in this field.
  - Stateless Auto Config
  - DHCPv6 Addressing- Used to enable DHCP addressing assignment from network name server
  - Static Addressing-Used to enable a static IP address for the RMU access
  - Static Address- Setting of the static IP address for the RMU
- Enable SSL for Web

8.5.7.6 Changing the SNMP settings

If a host and domain name are entered instead of an address, the IPv4 or IPv6 address will be resolved from the DNS using that name. That address will be stored in the library rather than the name. Therefore, if the address changes, then the name or a new address will have to be entered.

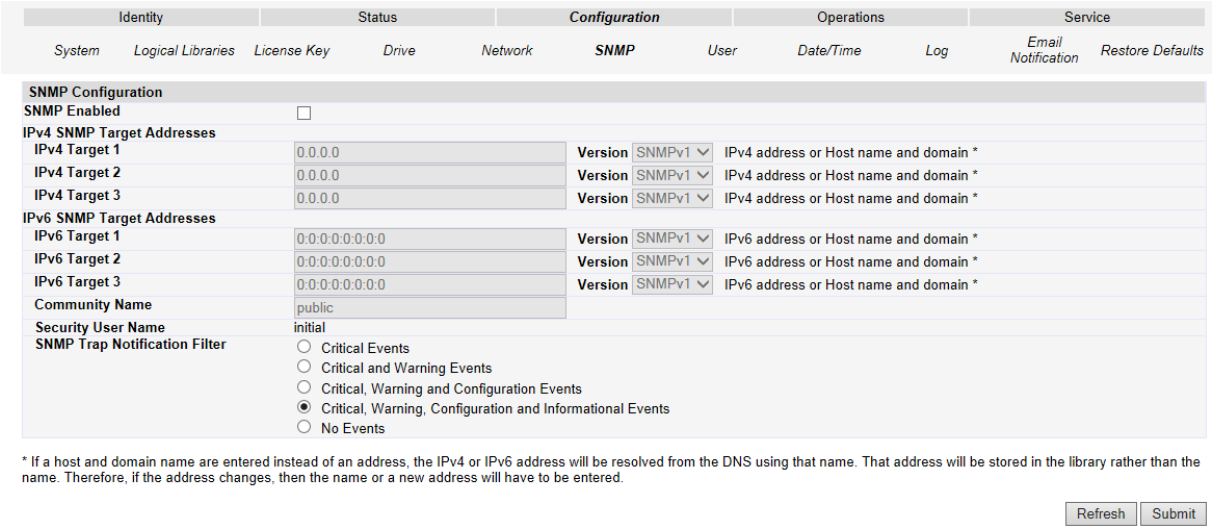


Figure 119 SNMP (RMU)

Changes that can be made are:

- SNMP
- SNMP Enabled
- IPv4 SNMP Target Addresses
  - IPv4 Target 1
  - IPv4 Target 2
  - IPv4 Target 3
- IPv6 SNMP Target Addresses
  - IPv6 Target 1
  - IPv6 Target 2

- IPv6 Target 3

- Community name
- Security User Name
- SNMP Notification Filter
  - Critical Events
  - Critical and Warning Events
  - Critical, Warning and Configuration Events
  - Critical, Warning Configuration and Information Events
  - No Events

8.5.7.7 Changing the User password

This page allows the user to add and modify user accounts.

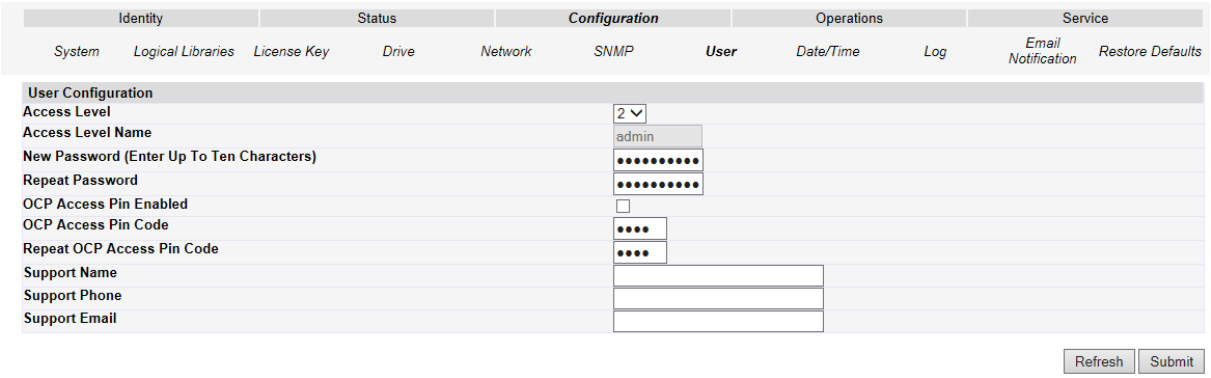


Figure 120 User settings (RMU)

Changes that can be made are:

- Access Level: Choose from 1 (Standard), 2 (Admin), or 3 (Service).
- Access Level Name: The name associated with the chosen access level.
- New Password: The password can be a maximum of ten characters.
- Repeat Password: Enter the new password again.
- OCP Access PIN Enabled: Select this item, if you would like the Operator Control Panel display to be password protected.
- OCP Access PIN Code: The password for accessing the OCP when the OCP Access PIN is enabled; max 4 characters
- Repeat OCP Access PIN Code: Enter the OCP Access PIN Code again.
- Support Name: The name of the individual within your company to contact for RMU or library support; max 30 characters
- Support Phone: The phone number of the individual within your company to contact for RMU or library support; max 30 characters
- Support Email: The email address of the individual within your company to contact for RMU or library support; max 30 characters

8.5.7.8 Setting Date/Time

This page allows the user to set the time and date, and how it will be displayed.

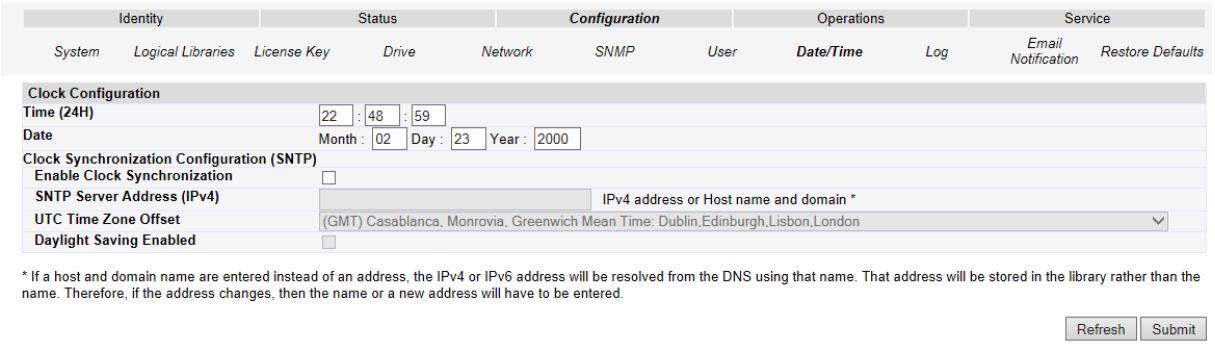


Figure 121 Date/time (RMU)

Changes that can be made are:

Clock Configuration

- Time (24 hour format) : hh:mm:ss
- Date: MM:DD:YYYY

- Clock Synchronization Configuration (SNTP):
  - Enable Clock Synchronization: check box=checked status means enabled and the unit will attempt to synchronize its clock with an external time source, the following apply;
  - SNTP Server Address (IPv4): This is the IP address of the network SNTP time server, the address may be a maximum of 40 characters
  - UTC Time Zone Offset: This drop down menu allows the administrator to select the appropriate time zone offset from so the time is displayed in the actual local time.
  - Daylight Saving Enabled: Provides for automatic offset of daylight savings time

8.5.7.9 Setting error Log mode

NOTE Service personnel can only set the log configuration.

The Log menu can be used to set behaviour of the error log collection. Your service personal may ask you to alter settings in this field during the diagnostic process. Default setting of logs is for continuous collection of logs with the most recent events overwriting the oldest events (circular buffer).

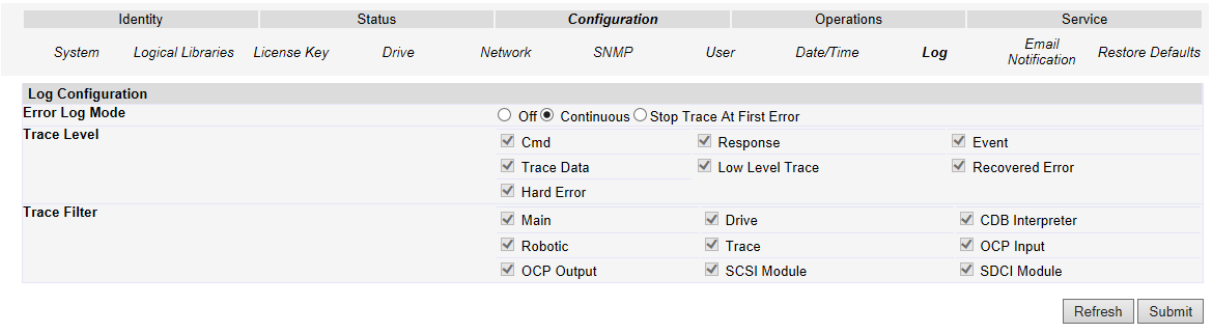


Figure 122 Error Log mode (RMU)

Selections that can be made are:

- Error Log Mode
- Trace Level
- Trace Filter

8.5.7.10 Setting event for Email Notification parameters

This page allows the user to modify the event notification parameters.

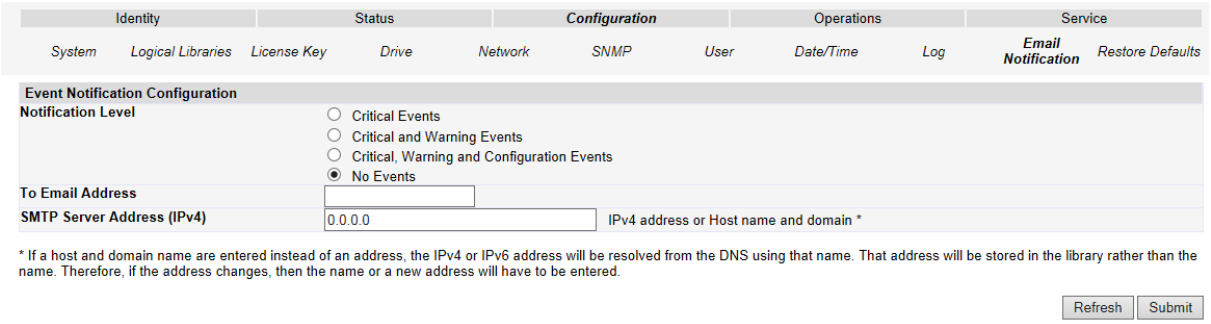


Figure 123 Event for Email Notification (RMU)

Changes that can be made are:

- Notification Level: Critical / Warning / Configuration events
- To Email Address: max 40 characters
- SMTP Server Address: IPv4 address or Host name and domain

8.5.7.11 Restoring factory Defaults

This page allows the user to reset the configuration to the factory defaults, restore vital product data, and save vital product data.

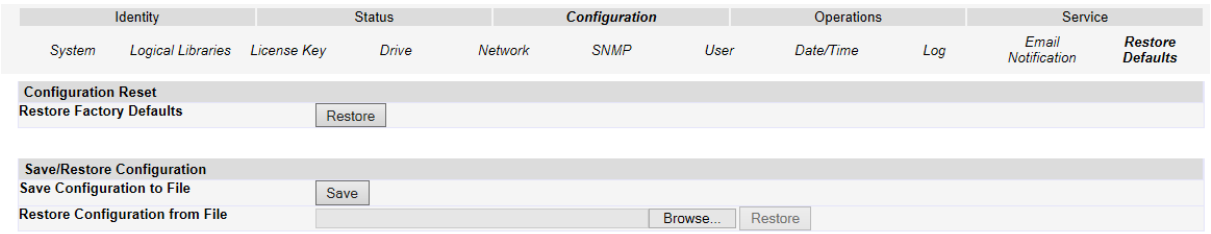


Figure 124 Factory defaults (RMU)

Selections that can be made are:

Configuration Reset

- Restore factory defaults: Selection of this button will restore all factory default settings as outlined in section 8.7. Please note that OEM library applications may require operational settings which differ from the factory default settings. Please consult your system vendor to verify proper operational settings of the unit after a restore to factory defaults.

Save/Restore Configuration

- Save Configuration to File: The save configuration button will save the current library settings to a file which can later be uploaded back to the library to restore the settings. Library configuration files have a ".dbb" file extension with a file name format structure consisting of the unique 10 character library unit serial number followed by a space, followed by a date time stamp formatted "YYMMDDTTTT" (YY= last two digits of current year, MM = month number, DD = date, TTTT= Hour/minute time stamp (24 hour time format)).
- Restore Configuration from File: The restore configuration allows the administrator to use the browse button to select a path to a previously generated configuration file. Once the correct file is located the restore button is used to upload the file back to the library.

8.5.8 Operations

8.5.8.1 Move Media within the library

This page allows the user to move tape cartridges within the library.

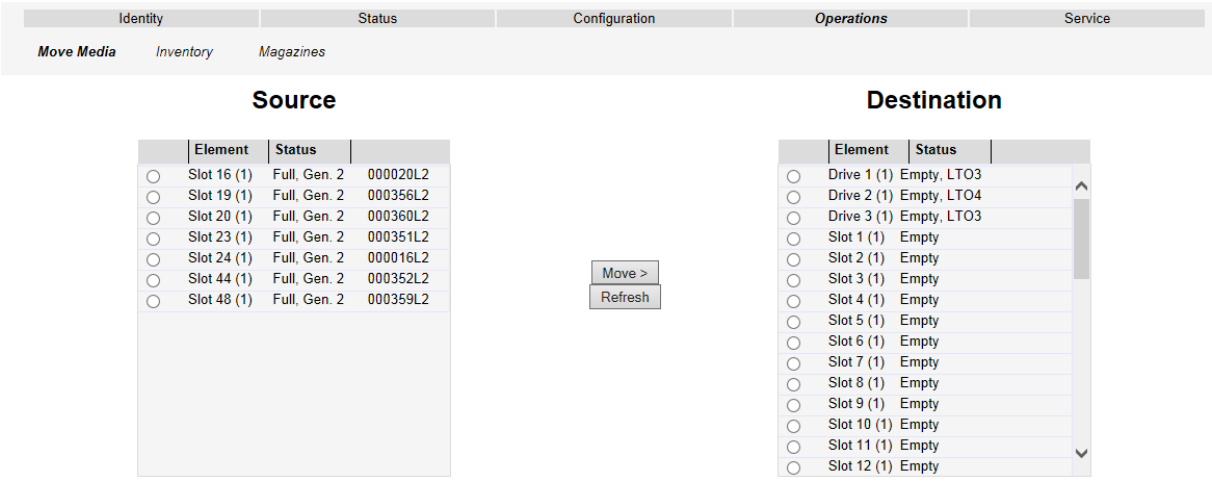


Figure 125 Move media (RMU)

Select the source and destination and then click the <Move> button to move a tape cartridge.

8.5.8.2 Determining current media Inventory

This page allows the user to rescan the library to determine the current media inventory.

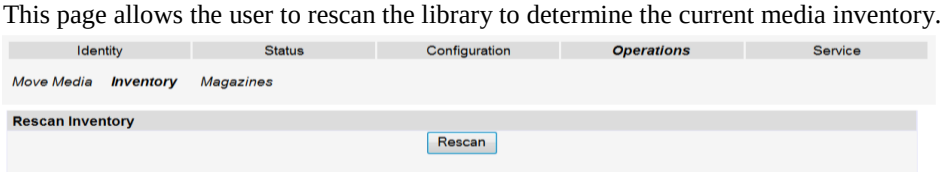


Figure 126 Media Inventory (RMU)

Changes will only be applied after the <Rescan> button is selected.

8.5.8.3 Releasing and replacing Magazines

This page allows the user to release the right or left magazine(s) from the library. All magazines will be released for the side selected.

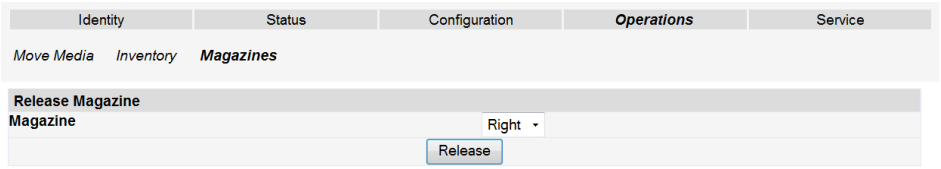


Figure 127 Release magazines (RMU)

Select the magazine in the pull down menu and then click the <Release> button.

NOTE

To release a magazine manually, see **Chapter Emergency release, Page 137**.

This manual process should only be used if the magazine cannot be released using the OCP or the RMU.

8.5.9 Service

8.5.9.1 Performing General library Diagnostics

This page provides the system administrator with general tests to verify the usability and reliability of the library.

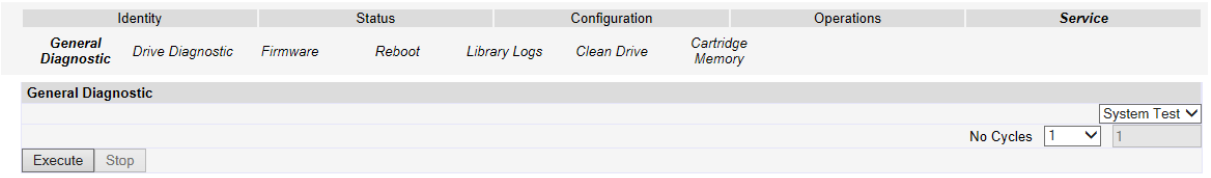


Figure 128 Library diagnostics (RMU)

Selections that can be made are:

- System Test
- Slot To Slot Test

Selects the number of test cycles (No Cycles) before starting the test. To cancel the test before it completes the cycles, select the <Stop> button.

8.5.9.2 Performing Drive Diagnostics

This page provides the system administrator with general tests to verify the usability and reliability of the drive(s).

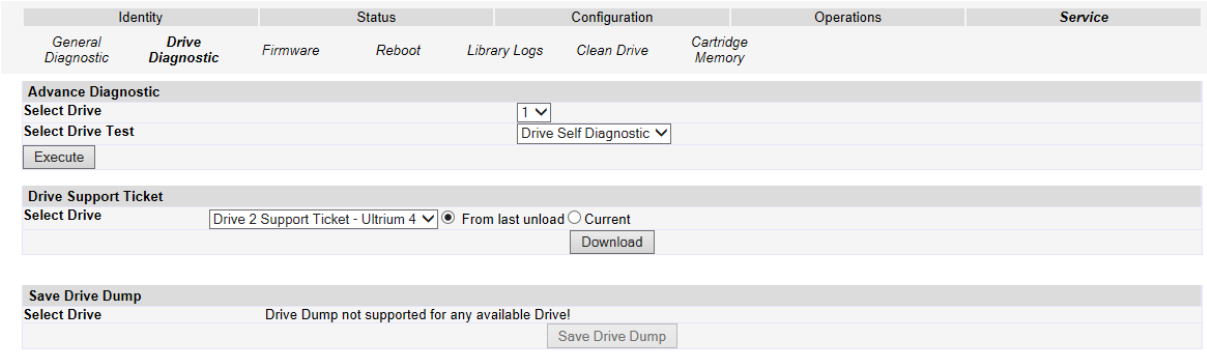


Figure 129 Drive diagnostics (RMU)

Selections that can be made are:

- Advance Diagnostic: Select Drive# and Select Drive Test possible
- Drive Support Ticket: Select Drive# and choose last / current unload
- Save Drive Dump: Select Drive (once defined)

8.5.9.3 Determining and updating firmware

NOTE

After a firmware upgrade, the system restarts automatically.

This page displays the current library and for all drives the firmware versions. Firmware can be downloaded to the host then uploaded to the drive in the library by using this page. Once a FW is selected by browsing it can be loaded by the update button.

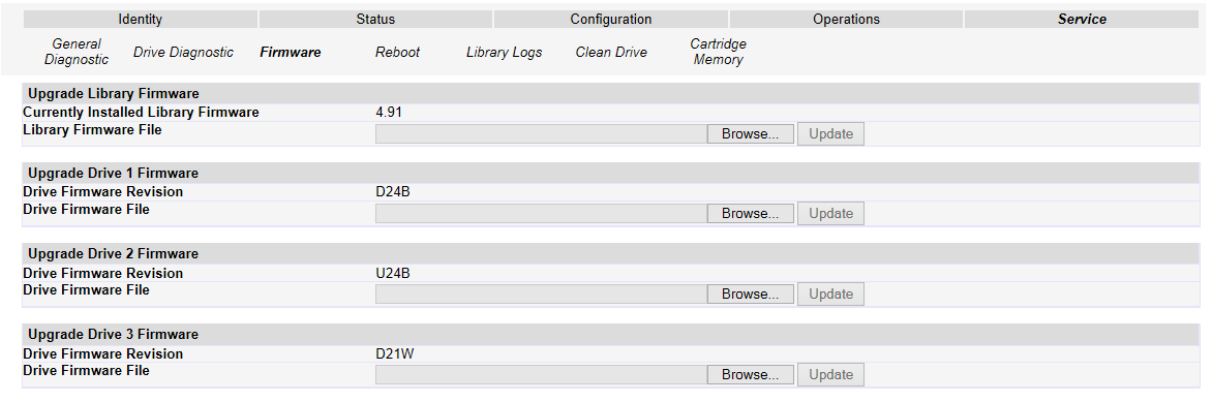


Figure 130 Firmware (RMU)

8.5.9.4 Reboot of the library

NOTE

Ensure that the library is idle before attempting to perform any remote operations that will take the library offline.

Some options of the RMU take the library offline. This inactive mode can interfere with host-based application software, causing

data loss.

This page is used to perform a library reboot. There is a default time delay when the web page refreshes itself. This time should be sufficient to reload the page. During a reboot, the connection to the library may be lost. If the connection is lost, the user will have to reload the page manually.

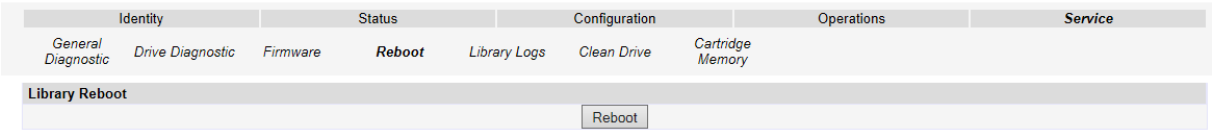


Figure 131 Reboot the library (RMU)

8.5.9.5 Viewing Library Logs

This page allows the user to view the library logs.

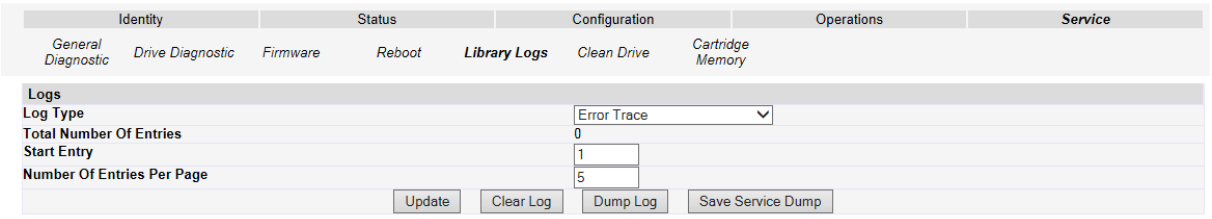


Figure 132 Library logs (RMU)

Select the appropriate logs for:

- Log Type:
  - Error Trace
  - Informational Trace
  - Warning Trace
  - Configuration Change Trace
  - Standard Trace
- Total Number Of Entries
- Start Entry
- Number Of Entries Per Page

Changes will only be applied after the <Update> or <Clear Log> button is selected.

<Dump log> creates the log and <Save Service Dump> allows the direct viewing or saving of the file.

8.5.9.6 Cleaning tape drive(s)

This page allows the user to manually clean the tape drive.

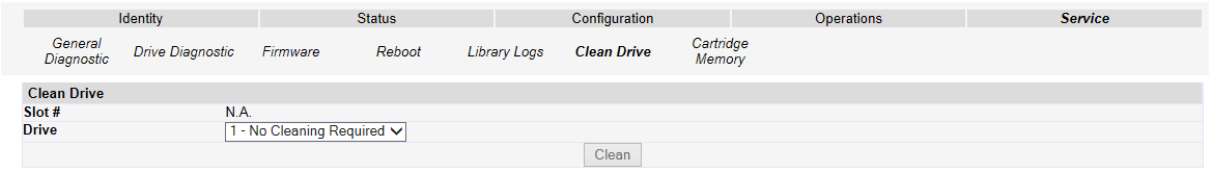
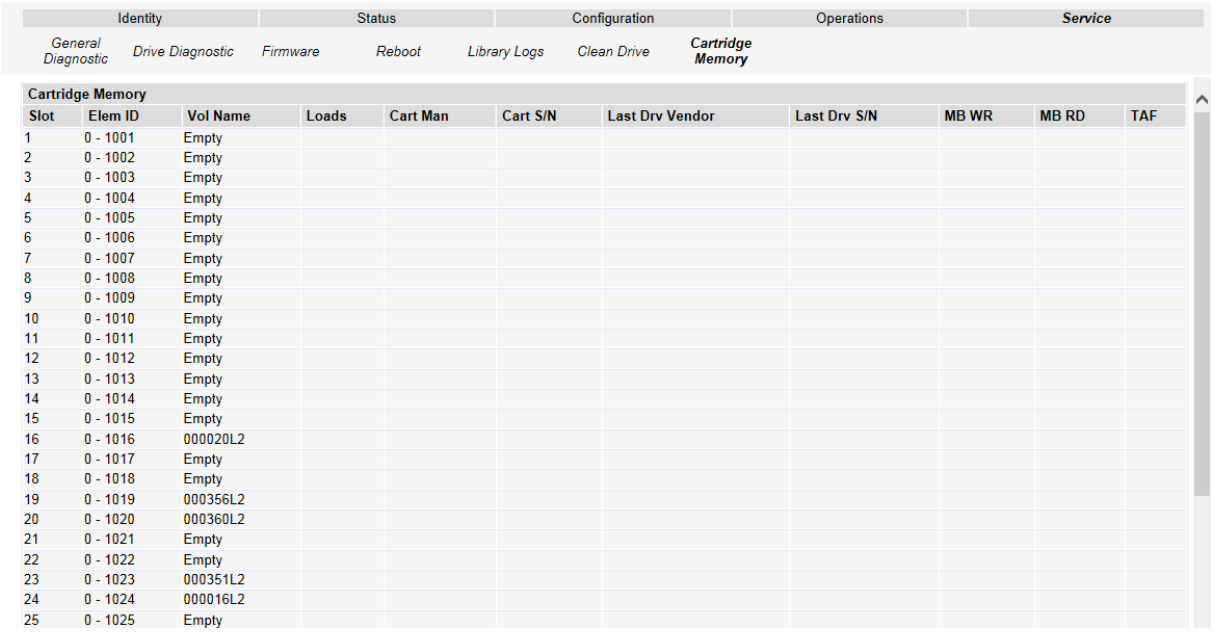


Figure 133 Clean a tape drive (RMU)

Select the magazine slot number and the tape drive in the appropriate pull down menu and then click the <Clean> button.

8.5.9.7 Cartridge Memory

Provides details of up to 96 tapes stored in the library.



Slot	Elem ID	Vol Name	Loads	Cart Man	Cart S/N	Last Drv Vendor	Last Drv S/N	MB WR	MB RD	TAF
1	0 - 1001	Empty								
2	0 - 1002	Empty								
3	0 - 1003	Empty								
4	0 - 1004	Empty								
5	0 - 1005	Empty								
6	0 - 1006	Empty								
7	0 - 1007	Empty								
8	0 - 1008	Empty								
9	0 - 1009	Empty								
10	0 - 1010	Empty								
11	0 - 1011	Empty								
12	0 - 1012	Empty								
13	0 - 1013	Empty								
14	0 - 1014	Empty								
15	0 - 1015	Empty								
16	0 - 1016	000020L2								
17	0 - 1017	Empty								
18	0 - 1018	Empty								
19	0 - 1019	000356L2								
20	0 - 1020	000360L2								
21	0 - 1021	Empty								
22	0 - 1022	Empty								
23	0 - 1023	000351L2								
24	0 - 1024	000016L2								
25	0 - 1025	Empty								

Figure 134 Cartridge Memory (RMU)

8.6 Partitioning the library

Depending on the unit form factor, the number of drives present in the library and the utilized drive types it is possible to create up to 4 logical libraries (partitions). The logical libraries resource allocation is magazine related; this means the number of available slots correlates to the magazine borders (12 slots per magazine).

When two half-high drives are installed in a 2U library, the library firmware will support partitioning in the same way that the 4U supports partitioning with two full-high drives today. The first partition will contain the first magazine and the first drive. The second partition will contain the second magazine and the second drive. The mail slot (if configured as I/O) will be shared between the logical libraries.

8.6.1 Drive naming

When one or more half-high drives are added to a 4U library, the drive naming will change. Currently, the first full-high drive is "Drive 1" and the second full-high drive is "Drive 2".

When you consider that each full-high drive slot may contain one or two half-high drives, there are four potential drives in the space that used to occupy two.

The first half-high drive position, or the first full-high drive position, will be called "Drive 1".

The second half-high drive position will be called "Drive 2".

The third half-high drive position, or the second full-high drive position, will be called "Drive 3".

The fourth half-high drive position will be called "Drive 4".

8.6.2 Mixing of drives

The 4U library will support a mix of full-height and half-height drives in the same physical library and the same logical library. They will support a mix of drives from different LTO generations in the same physical library and the same logical library. They will also support a mix of SCSI, SAS, and FC interfaces in the same physical library and the same logical library.

Configuration of a 1-Partition-System

Contains any drives present in any drive position, and it will contain all four magazines.

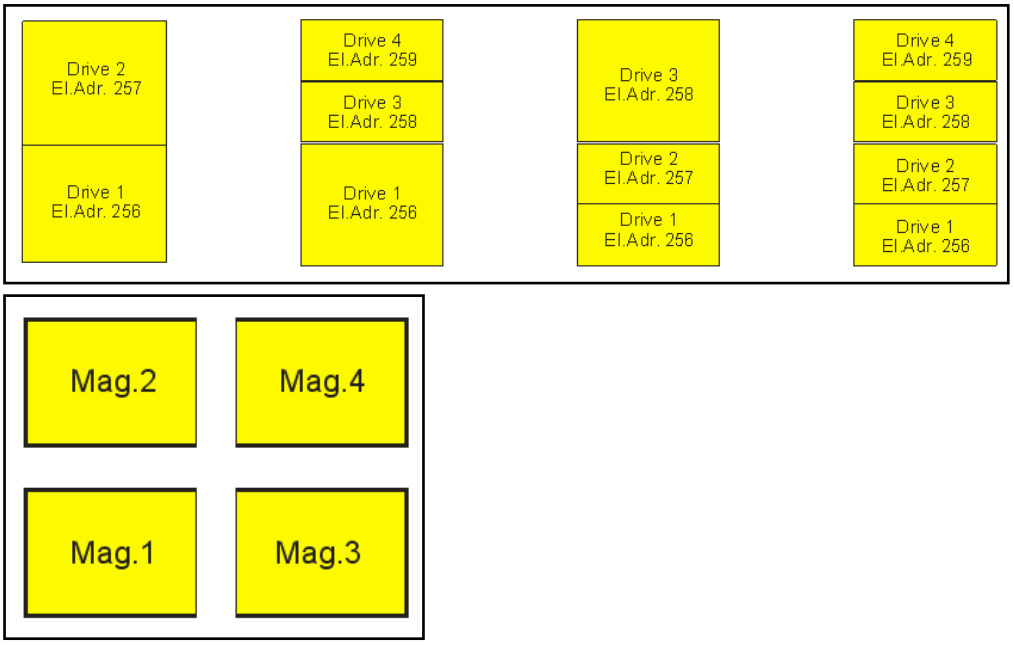


Figure 135 1-Partition-System (drives and correlated magazines)

Configuration of a 2-Partiton-System

The library must have at least two drives installed. One drive must be installed in either drive position 1 or drive position 2, and another drive must be installed in either drive position 3 or drive position 4.

Partition 1 will contain any drives in drive position 1 and drive position 2. Partition 1 will also contain magazine 1 and magazine 2.

Partition 2 will contain any drives in drive position 3 and drive position 4. Partition 2 will also contain magazine 3 and magazine 4.

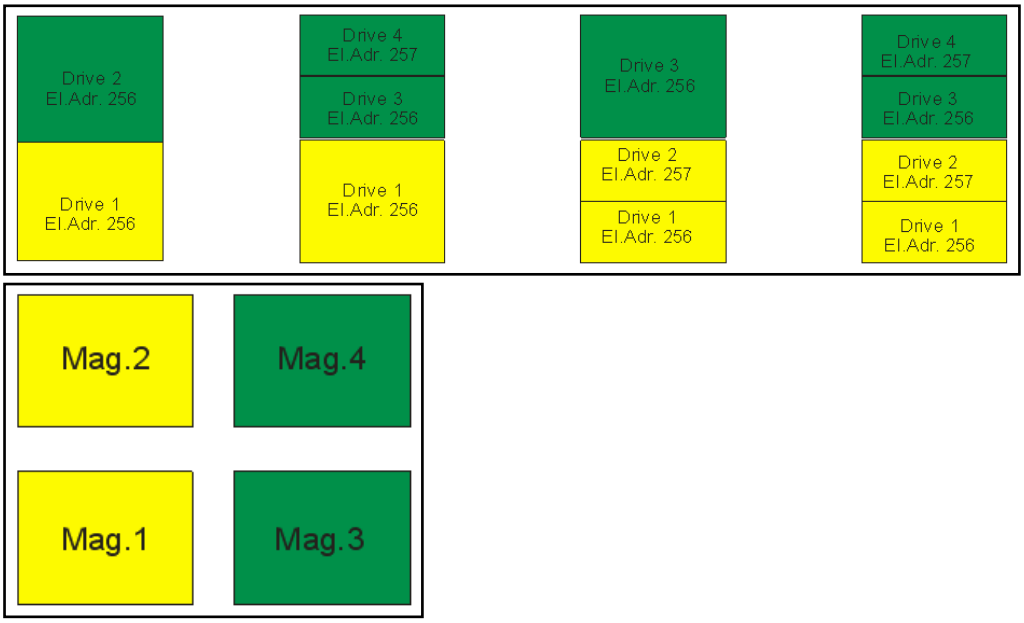


Figure 136 2-Partition-System (drives and correlated magazines)

Configuration of a 3-Partition-System

Must have at least three drives installed. A drive must be installed in drive position 1, another drive must be installed in drive position 2, and another drive must be installed in either drive position 3 or drive position 4.

Partition 1 will contain the first drive and the first magazine.

Partition 2 will contain the second drive and the second magazine.

Partition 3 will contain any drives in drive position 3 and drive position 4. Partition 3 will also contain magazine 3 and magazine 4.

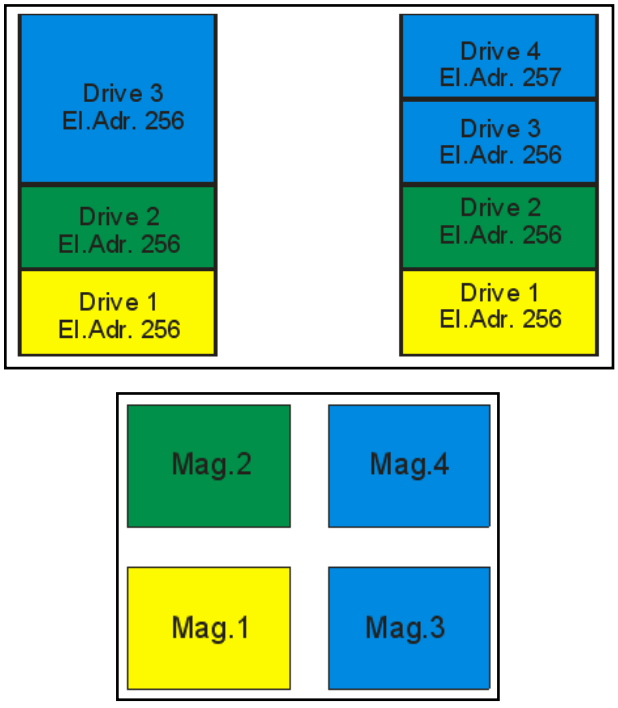


Figure 137 3-Partition-System (drives and correlated magazines)

Configuration of a 4-Partition-System

Must have four drives installed. Each partition will contain one drive and one magazine.

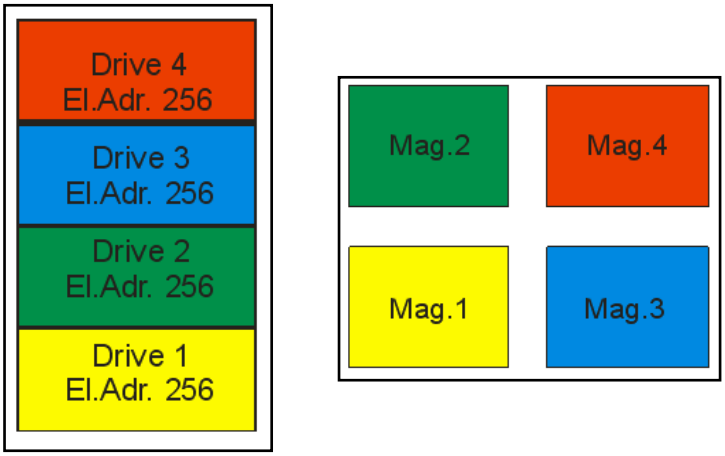


Figure 138 4-Partition-System (drives and correlated magazines)

8.6.3 SCSI element addressing

General Addressing Scheme

Every logical library starts at the first drive slot with the current assigned element start address (default value 256). It will be incremented from bottom to the top slots for every drive slot.

NOTE

The addresses used in the samples are the default addresses which are valid after manufacturing or after a “Reset to Default”. The described behaviour and algorithms are also valid for different SCSI base addresses which can be changed by SCSI SMC command.

4U Unit with only FH drives (1 logical library)

SCSI Element	Slot
2	4
	3
1	2
	1

4U Unit with FH & HH drives (1 logical library)

SCSI Element	Slot
3	4
	3
2	2
1	1

8.6.4 Element reporting

The SCSI specification does not allow gaps in the SCSI element addressing. There is a special handling needed for drive slots, which are empty to fulfill the specification. Also drives which are temporary removed needs to be handled correct to not confuse the attached host and host application.

8.6.4.1 General Reporting

Generally, only drives are reported which are currently physically available or “temporary” removed. Empty slots, which are located at an edge, should not be reported, with an exception in case of a “removed” condition.

4U Unit with 3 HH drives

SCSI Element	Slot
	4
3	3
2	2
1	1

8.6.4.2 Gaps

A drive slot, which does not contain a drive and has a position between used slots, will not be reported.

4U Unit with 3 HH drives

SCSI Element	Slot
3	4
	3
2	2
1	1

In case of installing a drive in a gap, the SCSI elements will be renumbered in contiguous order without a gap.

4U Unit with 3 HH drives

SCSI Element	Slot
4	4
3	3
2	2
1	1

8.6.4.3 Removed Drives

Removed drives have to been reported as an SCSI element, which is not accessible until one of the following conditions occurs:

- A drive is inserted again in the drive slot

After this happens, the SCSI element will be reported again as accessible

- A “Reset to Default” from any UI occurs
- The logical library configuration changes (adding / removing of libraries)

After these conditions the slots will be handled as empty slots all data of removed drives are cleared.

8.7 Default settings

Setting	Default for the library
Initial admin password	**adm001**
Host name	Test88
Domain name	Testactidata.de
IPv4	Enabled
IPv6	Disabled
DHCP	Disabled
Mail slot configuration	Disabled
Configure reserved slots	Reserved slots = 0
SCSI master drive	The lowest physical drive is initially the LUN master drive.
OCP contrast setting	10
Library Mode	Automatic
Auto load	Disabled
Loop	Disabled
Drive power <ON/OFF>	All drives are powered <ON>
Auto clean	Disabled
SNMP	Disabled
FC tape drives	Automatic speed, auto topology
Log Tracing Configuration	All selected
Email notification	No events
Partitioning	Partitioning is turned <OFF>

Table 25 Default settings

9 Troubleshooting

This chapter provides information for verifying correct installation and troubleshooting the library.

9.1 Installation problems

Problems encountered during the installation of the library are usually caused by improper SCSI bus configuration, application software configuration errors, or an incorrectly configured operating system.

If the used application software is not communicating with the library after installation, check the following:

9.1.1 SCSI ID

The library uses a single SCSI ID. Depending on other devices attached to the same SCSI bus and their SCSI IDs, change the SCSI ID of the library or tape drive before use the library.

Review the manuals for the other devices on the SCSI bus or the operating system to determine which SCSI IDs are currently in use.

9.1.2 SCSI host adapter installation

1. Verify that the SCSI host adapter is installed correctly.
   Refer to the manual that came with the SCSI host adapter for installation and troubleshooting instructions.
2. Pay particular attention to any steps describing the settings of various jumpers and/or switches on the host adapter, if applicable.
3. Make sure that the host adapter is properly seated in the motherboard slot and the operating system correctly detects the host adapter.
4. Make sure that the proper device driver is installed for the SCSI host adapter.

9.1.3 LUN scanning

Use dual LUNs to control the tape drive (LUN 0) and library robotic (LUN 1). These models require an HBA that supports LUN scanning and LUN scanning must be enabled.

9.1.4 SCSI cabling

1. Verify that all SCSI cables are securely connected at both ends.
2. Check the length and integrity of the SCSI cabling.
3. Check the SCSI connector for bent pins.

The length of the internal SCSI cabling inside the library is 2 feet (60 cm). This length must be included in any calculations of cable length.

- For LVD SCSI the maximum length for a single device is 82 feet (25 meters).
- For multiple devices, the maximum combined internal/external length is 40 feet (12 meters).
- If you have a combination of LVD and SE devices on the bus, the maximum cable length reverts to the SE specification, which for ultra devices is 10 feet (3 meters) for four or fewer devices, and 5 feet (1.5 meters) for more than four devices.

9.1.5 Termination

If the library is the only SCSI device — other than the SCSI host adapter — on the selected SCSI bus, it must be terminated. Likewise, if the library is physically the last SCSI device on the SCSI bus, it must be terminated.

Only the devices physically located at the beginning and end of the SCSI bus should be terminated.

Refer to the manuals supplied with other devices on the SCSI bus for information on enabling or disabling termination on those devices.

If available, take the terminator from the accessories bag. The supplied terminator is “dual mode” and will work on both Low-Voltage Differential (LVD) and Single Ended (SE) SCSI buses.

To terminate the library, see **Chapter Connecting the parallel SCSI cable, Page 39.**

Check all SCSI and power connections and confirm that the library is attached to a valid SCSI SE or LVDS bus.

9.1.6 Compatibility

Ensure that the library is compatible with the SCSI host adapter and backup application you plan to use. For a list of compatible SCSI adapters and application software, check with your SCSI host adapter manufacturer or backup application vendor.

NOTE

The host bus adapter for the library should be SCSI-3 LVDs. A single-ended SCSI host bus adapter will severely degrade performance. Also, if there is any SE devices on the same SCSI bus, the entire SCSI bus will negotiate down to SE speed and severely degrade performance

9.1.7 Backup application installation

Refer to the documentation included with your backup application for instructions on how to verify proper installation. Some backup software packages require an additional module to communicate with the library robotics.

9.1.8 Device driver installation

Make sure that the proper device driver, if applicable, is installed for the library. Contact your support representative for more information

NOTE

Many backup applications use their own drivers for the library and tape drive. Before installing a driver, make sure it will not be in conflict with the software.

9.2 Troubleshooting table

Problem	Solution
Poor throughput performance	
	• Try a new tape. A marginal tape can cause performance problems due to bad spots on the tape requiring retries. • Backing up data that compresses poorly or is already compressed will lower performance. • Check the size of the files. Small file size can impact performance. • Confirm that the backup application is utilizing block sizes of at least 32KB, preferably 64KB. Refer to the backup application documentation for details. • Check the network bandwidth from the host computer. If you are backing up data over a network, consider comparing to a local-only backup. • Make sure the backup server has enough memory to handle the bandwidth of the backup or restore. • Clean the tape drive with: OCP, see **Chapter Cleaning tape drives, Page 50**. RMU, see **Chapter Cleaning tape drive(s), Page 123**.
Cleaning	
Cannot load the cleaning cartridge	• Make sure you are using an Ultrium universal cleaning cartridge. See **Chapter Tape cartridge type, Page 42**. • Contact your service representative.
Device Not Detected on SCSI Bus	
Connected to a high voltage differential SCSI bus/host adapter	• Attach device to a LVDS SCSI host adapter/bus. • SCSI cable length exceeded, use shorter cable, or removes other devices from the bus. • Check for conflicting SCSI IDs. • Check that the HBA supports LUN scanning and this feature is enabled. • Device not properly terminated. See **Chapter Termination, Page 131**. • Power up device before powering up the host computer. • Check that the device has been powered up and is not in an error state. • Check the SCSI connector for bent pins.

Problem	Solution
Errors Displayed on Operator Control Panel	
"!" in library operator panel inventory display	Export the tape cartridge marked with an "!" in the inventory. The tape cartridge is either damaged, incompatible with the tape drive, or the wrong type for the attempted operation. To find the compatible tape cartridges for your library: See **Chapter Tape cartridge type, Page 42**.
There is an error code on the LCD	Look up the error code, try to resolve the failure, and power cycle. See **Chapter Error codes, Page 139.**
Media	
Cleaning or data tape incompatible with drive.	• Make sure you are using data and cleaning tapes that are compatible with the drive and model of your library. The library automatically unloads incompatible tapes, the <Media Attention> LED flashes, and an exclamation mark (!) is displayed in the inventory display for the indicated slot number. • Export the media in order to clean the state.
Cannot write to or read from tape.	• Make sure that the tape is write enabled (move the write-protect switch to the enabled position). • Make sure you have the appropriate data tape for your library model. • Make sure you are using an ultrium tape that has not been degaussed. Do not degauss ultrium tapes. • Make sure that the tape has not been exposed to harsh environmental or electrical conditions and is not physically damaged in any way. • Many backup applications do not read or write to tapes that were created using a different backup application. In this case, perform an erase, format, or label operation on the tape. • Make sure you understand any data protection or overwrite protection schemes that your backup application may be using, which could prevent you from writing to a given tape. • Retry the operation with a different, known good tape. • Clean the tape drive with: OCP, see **Chapter Cleaning tape drives, Page 50**. RMU, see **Chapter Cleaning tape drive(s), Page 123**.

Problem	Solution

<Media Attention> LED issues	
Contamination by loose debris.	Avoid contamination by ensuring that the library is installed in a clean, contamination-free environment. Tapes should be stored vertically in their plastic cases. Continue cleaning the tape drive as needed.
Non-acclimated media.	A tape should be acclimated for at least 24 hours before being used, particularly if it has been stored at a substantially different temperature or level of humidity than the library.
Tape cartridge is incompatible.	Use only tapes that are compatible with the tape drive type. See **Chapter Tape cartridge type, Page 42.**
Expired cleaning cartridge.	Make sure you are using an ultrium universal cleaning tape. (max. 50 cleans)
Bad/defective/contaminated media.	If the <Media Attention> LED is cleared and –although the tape drive has been cleaned – immediately re-displays each time a particular tape is reloaded that tape should be suspected as being defective. • Export the tape and load a known good tape. In some cases, a tape can be worn out, have a defective tape memory, or have been formatted as a Firmware Upgrade Cartridge. • Any tape that is suspected of being defective or contaminated should NOT be reused in any drive.

Power	
Library does not power up.	• Check all power cord connections. • Make sure the power switch on the front panel is in the <ON> position. • Make sure there is power to the outlet. Try another working outlet. • Replace the power cord. • Contact your service representative.
No display messages appear.	• Make sure the power cord is connected. • Make sure the power switch is on. • Power cycle the library. • Download the library firmware. • Contact your service representative.

Problem	Solution
SCSI ID	
Changed drive SCSI ID, but the host server does not recognize the new ID.	• Make sure that all SCSI devices on the same bus have unique ID numbers. If the SCSI bus is narrow, (50-pin) only SCSI IDs 0 through 7 are available. • Make sure that you cycle power on the library after changing the SCSI ID. • Reboot the host server. Tape library performance. The library is not efficiently backing up data. • Make sure the library and tape drive are on their own SCSI bus and not daisy-chained to another tape drive or to the hard drive being backed up. • Make sure the library is connected to a LVDs SCSI bus and there are no SE devices on the same bus, because this will cause the entire bus to negotiate down to SE speed. • Use an Ultra320 SCSI bus and high quality cabling with the library. • Do not connect the library to a narrow SCSI bus.
Tape cartridge movement	
Tape cartridge stuck in tape drive.	• Power cycle the library, allow it to complete initialization, which in rare cases can take as long as 10 minutes, and then retry unloading the tape using the library operator control panel. • Allow the tape drive to complete all operations. This may take as long as ten minutes if you reset or cycle power up the library while the cartridge is positioned at the physical end of the media. • Make sure that the backup software is not reserving the slot or preventing the tape drive from ejecting the tape. The backup software needs to cancel the reservation and any hold it has on the tape drive. Temporarily disconnecting the library from the host server and power cycling eliminates the host and its software as a problem source. • Contact your service representative.
Tape stuck in storage slot.	See **Chapter Removing tape cartridges, Page 136.**

Table 26 Troubleshooting table

9.3 Removing tape cartridges from the library

WARNING

Stuck tape cartridges in the actiLib Tape Library
Risk of damage devices

- When the library is moved, any tape cartridge can become dislodged from the magazines and damage the tape cartridges left in the library and library robotic.
- To avoid damaging the libraries, remove the tape cartridges before moving the libraries.

To remove a stuck tape cartridge, adhere the following steps:

1. Unlock the magazine use the:
   - OCP, see **Chapter Releasing and replacing magazines, Page 50**
     RMU, see **Chapter Releasing and replacing , Page 121**
   - Emergency release, if you are not able to unlock the magazine with the OCR or RMU, see **Chapter Emergency release, Page 137**
2. Pull the mail slot magazine out to access the tape cartridge.
3. To remove the tape cartridge, see **Figure 139:**
   - Use the finger holes to push the tape out of the mail slot.
   - If required insert a new tape cartridge.
   - Repeat this process until all stuck tape cartridges are removed.

   In the following figures, an 8U library is shown as an example.

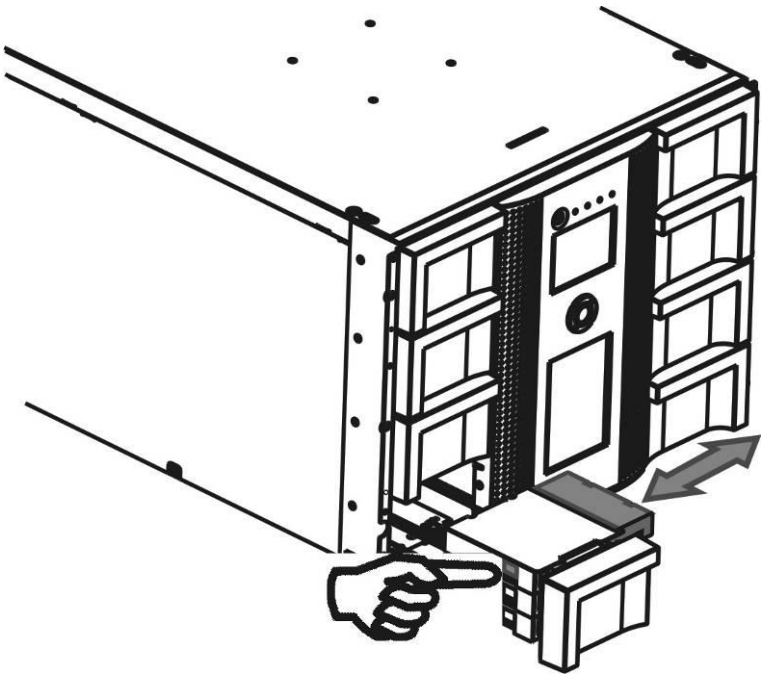


Figure 139 Removing a stuck tape (8U)

4. Push the mail slot magazine back into the library.

9.4 Emergency release

NOTE

Use only in emergency fall

The emergency release is similar for all library unit highs.

If you cannot remove the magazines via the OCP or RMU, do the following:

1. Press the power button on the front bezel to power down the library.
2. Unplug the power cord from the library.
3. From the rear panel of the library, find the access holes for the right and left magazines.

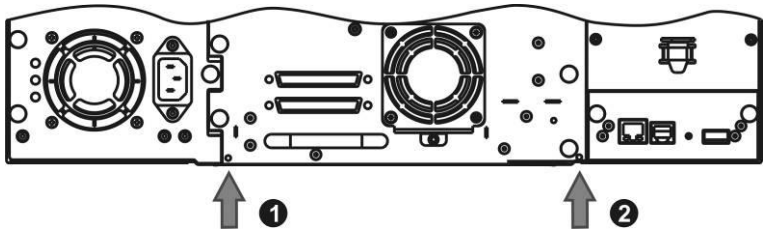


Figure 140 Rear panel (access holes)

1 - Access hole for the right magazines
2 - Access hole for the left magazines

4. Push the end of a small metal pin or straightened paper clip into the magazine access hole at the back of the device. While holding the pin or clip, have a second person attempt to pull the magazine out of the front of the unit.

   For the 4U and 8U, all magazines on a side are released and should be removed at the same time.

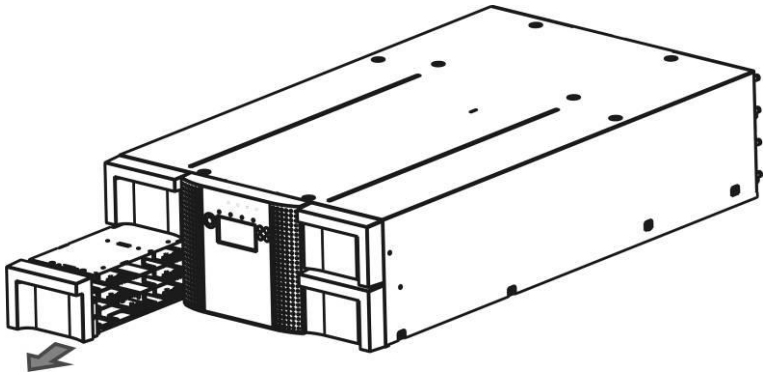


Figure 141 4U Front panel (magazine remove)

5. If necessary, repeat the steps 3 and 4 for the other magazine.
6. If other tape cartridges are still in the library, or if you were unable to manually remove the magazines and tape drive, contact the service for further instructions. See **Chapter Contacting actidata, Page 3**.

9.5 Upgrade the library firmware

The firmware version for the libraries must be compatible with all implemented devices. Verify that the library has the latest released version of firmware loaded.

NOTE

After upgrading the library firmware, the library system restarts automatically.

To upgrade the library firmware, navigate with RMU or OCP:
RMU screen: > Service > Firmware > Upgrade Library Firmware > Upload
OCP screen: > Main Menu > Service > Service Library > Library FW Upgrade by USB

The actual library FW must be loaded on an USB stick to be connected on the backside of the unit. From there the FW file name will be displayed and can be selected for updating.

9.6 General diagnostic

9.6.1 System test

The System Test: is a general test to verify the usability and reliability of the library. The duration is depending on the test cycles defined.

To run the system test, navigate with RMU or OCP:
RMU screen: > Service > General Diagnostic > System Test
OCP screen: > Main Menu > Service > Service Library > Run Tests > System Test

9.6.2 Slot-to-Slot test

The Slot-to-Slot test shuffles the tapes between the slots to exercise the robotic. At the end of the test the tapes are not returned to their original slots.

To run the Slot-to-Slot test, navigate with RMU or OCP:
RMU screen: > Service > General Diagnostic > Slot to Slot
OCP screen: > Main Menu > Service > Service Library > Run Tests > Slot to Slot Test

9.6.3 Library verify test

NOTE

The library will remove any tape from the tape drives and go offline when running the test. Verify that any applications using the library have completed before starting the test.

The Library verify test is a diagnostic routine called Library Health Check (LHC).

This routine allows:

- to functionally test all library and drive hardware with the exception of external interfaces (SCSI).
- to verify a newly installed machine.
- to verify repair actions.

To run Library verify test, navigate with OCP:

OCP screen: > Main Menu > Service > Service Library > Library Verify

Operations during the Library Health Check (LHC):

1. The user starts the test from the master library OCP. The administrator password is required. The test requires user interaction and can only be run from the OCP.
2. The master library performs a self-test, verifies that it can communicate with the tape drives and the library extender, and then the lower library performs a self-test.
3. The library returns any tapes from the tape drives to their home slots. If the home slot for a tape is unknown, the library will move the tape to the mail slot and prompt the user to remove it.
4. The library prompts the user to enter the number of cycles to run the test. The library runs up to 10 cycles.
5. The library opens the mail slot in the extended library, which will generally be in the lower library, and prompts the user to insert a scratch tape. In the 8U actiLib Tape Library, the 12-slot mail slot does not pop out; the user must open it.
6. The user inserts a scratch tape into the lowest-numbered mail slot. If no mail slots are enabled or the user closes the mail slot without inserting a tape into the lowest-numbered mail slot, the library will perform a shortened version of the test, skipping step 7.
7. The library loads the scratch tape into the first tape drive, unloads the scratch tape from the tape drive, and returns the scratch tape to the mail slot. If the user selected to test all of the tape drives, the library will load the scratch tape into each tape drive before returning it to the mail slot.
8. The library moves the tape from the four top-row corner slots of both libraries to the tape drive load point and then returns the tape to its slot. If none of the top-row corner slot positions of either library contains a tape, the test stops and the library displays an error message.
9. If additional cycles remain to be run, the test will return to step 7 if there is a tape in the mail slot or step 8 if there is not a tape in the mail slot.
10. At the conclusion of the test, the library pops open the mail slot and waits for the user to remove the scratch tape. In the 8U actiLib Tape Library, if only the 12-slot mail slot is configured, the library will prompt the user to open the mail slot and remove the scratch tape.
11. The library displays the test completion status, including any recoveries or errors that may have occurred.

9.7 Error codes

9.7.1 Error messaging

The internal error messaging between the different modules and tasks contain the following information:

- Error code
- Sub error code
- Affected source element
- Affected target element
- Affected library in stacked mode (Master/Slave)
- Additional information depending on context and error code

9.7.2 Error structure

The error messaging is a fixed 4-byte structure with the following content:

- Error type
- Error code
- Sub error code
- Internal code (active command code)

9.7.3 OCP error reporting

In case of an error or a warning, a popup message appears on the OCP. The information is shown in 3 different message displays, like shown in the following example:

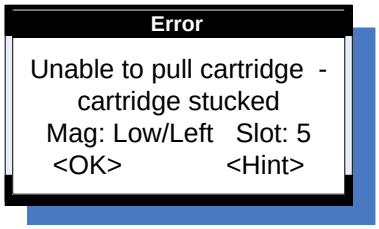
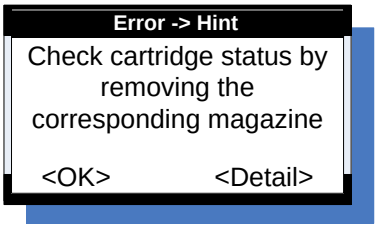
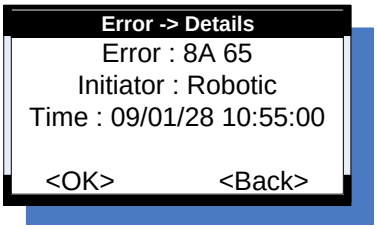
1. General <Error> display	2. <Hint> display	3. Detail display
Select the <Hint> button to show the <Hint> display.	Select the <Detail> button to show the<Detail> display	
		

Figure 142 4U OCP Error display

9.7.4 RMU error reporting

In case of an error or a warning, the following popup message appears on the RMU. All information will be available in one message box, like shown in the following example:

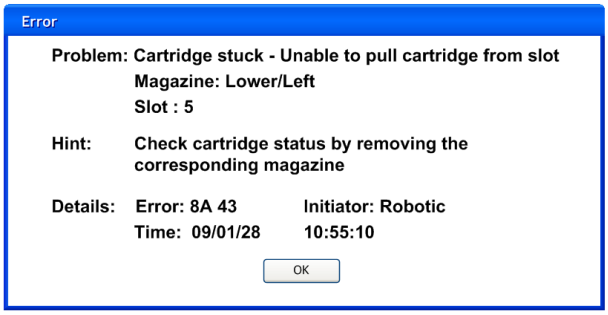


Figure 143 RMU Error display

9.7.5 Main error codes

Error Code	Description	User Action	Critical Component Status
80	Barcode Reader Error, cannot initialize BCR	Retry operation; after several occurrences contact technical support	Robotic probably defect • Flexi cable to BCR not properly connected. • Flexi cable to BCR damaged. • Barcode engine defect.
81	Barcode Reader Error, no response from BCR	Retry operation; after several occurrences contact technical support	Robotic probably defect • Flexi cable to BCR not properly connected. • Flexi cable to BCR damaged. • Barcode engine defect.
82	EEPROM Error, no response from EEPROM (located on robotic controller)	Retry operation; after several occurrences contact technical support	Robotic probably defect • Robotic controller not working (hardware problem, EEPROM defect).
83	Robotic controller generic problem	Reset the unit and retry operation. After several occurrences contact technical support	Robotic probably defect • Robotic hardware not working (cables, distribution boards, robotics controller).
84	Setting of gripper motor parameters failed	Reset the unit and retry operation. After several occurrences contact technical support	Robotic probably defect • Elevator distribution board defect. • Cabling incorrect.
85	Setting of slider motor parameters failed	Reset the unit and retry operation. After several occurrences contact technical support	Robotic probably defect • Elevator distribution board defect. • Cabling incorrect.
86	Setting of elevator motor parameters failed	Reset the unit and retry operation. After several occurrences contact technical support	Robotic probably defect • Elevator distribution board defect. • Cabling incorrect.
87	Setting of rotation motor parameters failed	Reset the unit and retry operation. After several occurrences contact technical support	Robotic probably defect • Robotics controller defect.
88	Setting of sled motor parameters failed	Reset the unit and retry operation. After several occurrences contact technical support	Robotic probably defect • Robotics controller defect.

Error Code	Description	User Action	Critical Component Status
89	Gripper blocked	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Gripper motor not connected or defect. • Gripper motor voltage to low. • Robotics controller or distribution boards defect. • Check gripper mechanism according stiffness in movement.
8A	Slider blocked	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Slider Motor not connected or defect. • Slider motor voltage to low. • Robotics controller or distribution boards defect. • Check slider mechanism according stiffness in movement.
8B	Elevator blocked	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Elevator motor not connected or defect. • Elevator motor voltage to low. • Robotics controller or distribution boards defect. • Check elevator mechanism according stiffness in movement
8C	Rotation blocked	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Rotation motor not connected or defect. • Rotation motor voltage to low. • Rotation home sensor defect. • Rotation sensor connecting cable damaged. • Robotics controller or distribution boards defect.
8D	Sled blocked	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Sled motor not connected or defect. • Sled motor voltage to low. • Sled home sensor defect. • Sled sensor connecting cable damaged. • Robotics controller or distribution boards defect. • Check sled mechanism (guide rail, ducktail) according stiffness in movement.

Error Code	Description	User Action	Critical Component Status
8E	Cannot find gripper block within the expected range	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Elevator distribution board defect. • Cabling incorrect. • Check gripper gears.
8F	Cannot find slider block within the expected range	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Elevator distribution board defect. • Cabling incorrect. • Check slider gears.
90	Cannot find elevator block within the expected range	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Elevator distribution board defect. • Cabling incorrect. • Check elevator gears.
91	Cannot find rotation block within the expected range	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Cabling incorrect. • Check rotation gears.
92	Cannot find sled block within the expected range	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Cabling incorrect. • Check sled gears.
93	Gripper outside range, Gripper has reached a position beyond the expected range	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Elevator distribution board defect. • Cabling incorrect. • Check gripper gears.
94	Slider outside range, Slider has reached a position beyond the expected range	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Elevator distribution board defect. • Cabling incorrect. • Check slider gears.
95	Elevator outside range, Elevator has reached a position beyond the expected range	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Elevator distribution board defect. • Cabling incorrect. • Check elevator gears.
96	Rotation outside range, Rotation has reached a position beyond the expected range	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Cabling incorrect. • Check rotation gears.
97	Sled outside range, Sled has reached a position beyond the expected range	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Cabling incorrect. • Check sled gears.

Error Code	Description	User Action	Critical Component Status
98	Cartridge present sensor not found	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Robotics controller defect. • Cartridge present sensor defect (mechanics, electronics). • Cabling incorrect.
99	Sled home sensor not found	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Robotics controller defect. • Slider home sensor defect (mechanics, electronics). • Cabling incorrect.
9A	Rotation home sensor not found	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Robotics controller defect. • Rotation home sensor defect (mechanics, electronics). • Cabling incorrect.
9B	Sled position sensor (prism sensor) not found,	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Robotics controller defect. • Sled home sensor defect (mechanics, electronics). • Cabling incorrect.
9C	Gripper range out of specification	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Gripper motor not connected or defect. • Robotics controller or distribution boards defect. • Check gripper mechanism according stiffness in movement
9D	Slider range out of specification	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Slider motor not connected or defect. • Robotics controller or distribution boards defect. • Check slider mechanism according stiffness in movement.
9E	Elevator range out of specification	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Elevator motor not connected or defect. • Robotics controller or distribution boards defect. • Check elevator mechanism according stiffness in movement.

Error Code	Description	User Action	Critical Component Status
9F	Rotation range out of specification	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Rotation motor not connected or defect. • Robotics controller or distribution boards defect. • Check rotation mechanism according stiffness in movement.
A0	Sled range out of specification	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Sled motor not connected or defect. • Robotics controller or distribution boards defect. • Check sled mechanism according stiffness in movement.
A1	Open Mail Slot (Import/Export Element) failed	Retry operation, after several occurrences contact technical support	Mail Slot release mechanism defect
A3	Sled motor #2 blocked (Note: only relevant for 8U)	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Sled motor #2 not connected or defect. • Sled motor #2 voltage too low. • Sled home sensor #2 defect. • Sled sensor #2 connecting cable damaged. • Robotics controller or distribution boards defect. • Check top sled mechanism (gears, sheet guide locking) according stiffness in movement.
A4	Cannot find sled #2 block within the expected range (Note: only relevant for 8U)	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Cabling incorrect. • Check top sled mechanism (gears, sheet guide locking).
A5	Sled home sensor #2 not found (Note: only relevant for 8U)	Run 'Library Verify Test', after several occurrences contact technical support	Robotic probably defect • Robotics controller defect. • Sled home sensor #2 defect (mechanics, electronics). • Cabling incorrect.

Error Code	Description	User Action	Critical Component Status
A6	Elevator sensor not found (Note: only relevant for 8U)	Run 'Wellness Test', after several occurrences contact technical support	Robotic probably defect • Robotics controller or distribution boards defect. • Elevator sensor defect (mechanics, electronics). • Cabling incorrect. • Elevator motor not connected or defect. • Elevator motor voltage to low. • Check elevator mechanism according stiffness in movement.
B0	Robotic controller response timeout. A command did not complete in the required amount of time.	Reset the unit and retry operation. After several occurrences contact technical support	Robotic probably defect • No communication from library controller to robotic controller. • Robotic hardware not working (cables, distribution boards, robotics controller). • Download robotic firmware fails.
B1	NACK received from robotic controller	Reset the unit and retry operation. After several occurrences contact technical support	Robotic probably defect • Communication from library controller to robotic controller disturbed. • Robotic hardware not working (cables, distribution boards, robotics controller). • Download robotic firmware fails.
B2	Robotic controller communication failed	Reset the unit and retry operation. After several occurrences contact technical support	Robotic probably defect • No communication from library controller to robotic controller. • Robotic hardware not working (cables, distribution boards, robotics controller). • Download robotic firmware fails.
B3	Robotic controller urgent stop due to a released magazine	Check if magazine are completely inserted and retry operation. After several occurrences contact technical support	Magazines released • Magazine present sensor defect.
B4	Cartridge did not transport completely Gripper could not pick cartridge and CP sensor not present After pushing the cart CP sensor still present		CP sensor defect Cartridge sticks in slot/drive

Error Code	Description	User Action	Critical Component Status
B5	Robotic controller doesn't respond on command	Reset the unit and retry operation. After several occurrences contact technical support	Robotic probably defect • No communication from library controller to robotic controller. • Robotic hardware not working (cables, distribution boards, robotics controller). • Download robotic firmware fails.
C0	Network initialization failed	Check network cable and network configuration. If the error recurs, contact technical support	Library controller probably defect probably a hardware problem, check library controller
C1	Telnet Interface initialization failed	Check network cable and network configuration. If the error recurs, contact technical support	Library controller probably defect probably a hardware problem, check library controller
C2	Web server initialization failed	Check network cable and network configuration. If the error recurs, contact technical support	Library controller probably defect probably a hardware problem, check library controller
C6	Ping command did not reached target	Check network cable and network configuration. If the error recurs, contact technical support	Library controller probably defect probably a hardware problem, check library controller
C7	Cannot Upgrade from USB	Retry of Firmware upgrade, if not successful contact technical support	Library controller probably defect probably a hardware problem, check library controller
C8	Cannot Upgrade from FTP	Retry of Firmware upgrade, if not successful contact technical support	Library controller probably defect probably a hardware problem, check library controller
C9	Cannot Upgrade Robotic from Flash	Retry of Firmware upgrade, if not successful contact technical support	Library controller probably defect probably a hardware problem, check library controller
D0	ROM error. ROM checksum incorrect	Retry of Firmware upgrade, if not successful contact technical support	Library controller probably defect probably a hardware problem, check library controller
D1	RAM error. Power on Self Test (POST) has failed,	Retry operation; after several occurrences contact technical support	Library controller probably defect RAM defect, check library controller
D2	NVRAM error. R/W operation to NVRAM has failed	Retry operation; after several occurrences contact technical support	Library controller probably defect probably a hardware problem, check library controller
D3	CTC Error. Timer unit has failed during POST.	Retry operation; after several occurrences contact technical support	Library controller probably defect probably a hardware problem, check library controller
D4	UART Error. Frame overrun or Parity Error on serial Interface.	Retry operation; after several occurrences contact technical support	Check library and robotics controller

Error Code	Description	User Action	Critical Component Status
D5	Display Error Communication to display failed	Retry operation; after several occurrences contact technical support	Check library controller and OCP
D6	Memory Error, Stack and heap overflow.	Retry operation; after several occurrences contact technical support	Library controller probably defect
D7	Fatal system error	Retry operation; after several occurrences contact technical support	Library controller probably defect probably hardware problem, check library controller
D8	Data base error	Retry operation; after several occurrences contact technical support	Library controller probably defect probably hardware problem, check library controller
D9	No SCSI IC detected	Retry operation; after several occurrences contact technical support	SCSI controller probably defect Check SCSI controller and library controller
DA	In Library Verify Test the barcode reader has read different barcode data for the same cartridge label	Check barcode label on scratch cartridge and run Library Verify Test again. If the error recurs, contact technical support	
DB	Warning event! See section below		
DC	I²C Bus Failure	Retry operation; after several occurrences contact technical support	Failure in I²C bus communication. • Check library controller and connections to OCP and backplane. • Check OCP. • Check backplane. • Check drive sleds.
DD	Warning event! See section below		
DE	Warning event! See section below		
DF	Warning event! See section below		
E0	Incompatible magazine detected	Check type of lowest left magazine	Magazine type not supported
E2	Unsupported hardware (Library Extender) detected – Library firmware upgrade required	Library Extender was installed without upgrading the library firmware. Upgrade library code to revision which supports this feature	
EB	Power supply health check failed due to a power supply failure. Please contact service.	Contact technical support	Power supply probably defect

Error Code	Description	User Action	Critical Component Status
F0	Drive Over temperature Condition The sub code indicates which drive is affected Example: Sub code 01: drive #1	Check ambient temperature conditions and check all fans, after several occurrences contact technical support	Drive probably defect
F1	Drive Communication Error, Library controller has lost communication to drive The sub code indicates which drive is affected Example: Sub code 01: drive #1	Retry operation; if not successful contact technical support	Communication cable between drive and drive sled controller defect. Drive sled controller defect Check cabling drive sled controller-backplane Check cabling backplane library controller Drive defect / check drive
F2	Drive sled not present The sub code indicates which drive sled is affected Example: Sub code 01: drive sled #1	Retry operation; if not successful contact technical support	Drive probably defect • Check if drive sled is completely inserted • Drive sled controller defect. • Drive defect.
F3	Drive Hardware Error The sub code indicates which drive is affected Example: Sub code 01: drive #1	Cycle Power, after several occurrences contact technical support	Drive probably defect
F4	Drive Load Timeout Drive has run in a timeout while loading a tape The sub code indicates which drive is affected	Retry operation; if not successful contact technical support	Drive probably defect • Drive leader bent. • Drive initialize repeatedly. • Drive defect (no function).
F5	Drive Unload Timeout Drive has run in a timeout while unloading a tape The sub code indicates which drive is affected	Retry operation; if not successful contact technical support	Drive probably defect • Drive leader bent. • Drive initialize repeatedly. • Drive defect (no function).
F8	Invalid drive command	Retry operation; if not successful contact technical support	Drive probably defect
F9	Invalid drive parameter	Retry operation; if not successful contact technical support	Drive probably defect
FA	SDCI microcode error	Retry operation; if not successful contact technical support	Drive probably defect
FB	Drive logged out	Retry operation; if not successful contact technical support	Drive probably defect

Error Code	Description	User Action	Critical Component Status
FC	Internal SCSI command failed with check condition	Retry operation; if not successful contact technical support	Drive probably defect
FD	Internal SCSI command timeout	Retry operation; if not successful contact technical support	Drive probably defect

Table 27 Error codes

9.7.6 Sub error codes related to the robotic

01	Mechanical initialization failure
02	Connection to slave robotic failed
03	Error motor initialization
04	Error during gripper close
05	Error slider home positioning
06	Error elevator home movement
07	Error during sled movement to rotation position
08	Error during rotation initialization, get range failed
09	Error elevator init
0A	Error during rotation to far position
0B	Error first sled init, move to sensor failed
0C	Error during sled movement to rotation position
0D	Error during rotation to drive position
0E	Error slider init, get range failed
0F	Error during slider forward movement
10	Error gripper init, get range failed
11	Error during slider home movement
12	Error during rotation to FAR position
13	Error sled init, move to sensor failed
14	Error during sled move – check shipping lock
20	Error Inventory scan
21	Error during gripper close
22	Error slider home movement
23	Error during move gripper to scan pos
24	Error reading barcode label
25	Error during move sled to scan position
26	Error during move elevator to scan position
27	Error during sled preposition movement
29	Error during closing gripper
2A	Error slider preposition movement
2B	Error during opening gripper
2C	Error during sled movement up to sensor
2D	Error slider preposition backwards movement
30	Error slot preposition
31	Error during sled movement in <FLMoveRotation> function
32	Command sending to robotic failed
33	Error during elevator movement in <FLMoveRotation> function
34	Error during rotation in <FLMoveRotation> function
35	Error during elevator movement in <FLMoveSled> function
36	Error during sled movement in <FLMoveSled> function
37	Error during sled positioning to sensor in <FLMoveSled> function
38	Error during sled positioning to mail slot in <FLMoveSled> function
39	Error during sled positioning without sensor
3A	Error during elevator movement without sensor
3B	Error slot position sensor not found

40	Movement to/from slot failed
41	Error during first slider movement
42	Error during first gripper movement
43	Error during second slider movement
44	Error during second gripper movement, get range failed
45	Error during third slider movement, move home failed
46	Error during set hold current to avoid torsion
50	Preposition to drive failed
51	Elevator movement to home sensor failed
52	Sled movement to home sensor failed
53	Error during sled movement to drive position
54	Error during rotation to drive position
55	Error during elevator movement in drive position
56	Error during sled movement to rotation position
57	Error during rotation to end position
60	Move from/to drive failed
61	Error during first slider movement
62	Error during first gripper movement
63	Error during second slider movement
64	Error during second gripper movement, get range failed
65	Error during third slider movement, move home failed
70	Release magazine failed
71	Error during sled movement to rotation position
72	Error during rotation to unlock position
73	Error during move sled to block
80	Opening mail slot failed
81	Error during movement to mail slot open position
82	Error during moving back - sensor was found
90	Movement to home position failed
91	Elevator movement to home position failed
92	Error during sled movement to rotation position
93	Error during rotation to home or far position
94	Sled movement to home sensor position failed
95	Sled movement to transport position failed
99	Error during rotation movement to rotation min position
A0	Movement to mail slot failed
A1	Sled movement to sensor failed
A2	Sled movement to rotation position failed
A3	Elevator movement to home position failed
A4	Error during rotation to far position
A5´	Sled movement to mail slot position failed
A6	Error during elevator movement to position
A7	Error during mail slot detection

B0 EEPROM on robotics controller not accessible or error during r/w operation
B1 Save/restore configuration settings: not enough internal memory available for creating the file and restoring the file respectively
B2 Save/restore configuration settings: restore buffer corrupted, checksum calculation failed
B3 Save/restore configuration settings: data base field corrupted
B4 Save/restore configuration settings: invalid personality
B5 Save/restore configuration settings: invalid file

9.7.7 Sub error codes related to the library

All libraries

81 Tape drive wake up failed
88 Error accessing slot status
90 Robotic load not reached tape present sensor
91 No activity after <Load> command
92 Timeout while loading tape
93 No activity after <Load> command
94 Timeout drive unload
95 Tape drive terminated unsuccessfully
96 Tape not ejected at robot unload
97 Slot not free at robot unload
98 Tape not seated in <Load> phase 1

1U library

C0 Check magazine failed
C1 Error during rotation movement
C2 Error during elevator movement
C3 Error during sled movement
C4 Error during sled movement to sensor

8U library

D0 Release mail slot magazine failed
D1 Error during elevator movement to home position
D2 Error during sled movement to rotation position
D3 Error during rotation to home or far position
D4 Error during sled movement to home position
D5 Error during sled movement
D6 Error during rotation movement
D7 Error during elevator movement
D8 Error during move slider prepositioning
D9 Error during open gripper

10 Servicing

This chapter provides instructions for servicing the actiLib Library.

10.1 Possible tools needed

To service a library you may need one or more of the following tools:

- Flat-blade screwdrivers (large and small)
- #2 and #3 Phillips screwdriver
- Ground strap

10.2 Electrostatic discharge

CAUTION

Static sensitive
Risk of damage devices

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

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

To prevent electrostatic damage, observe the following precautions:

- Transport products in static-safe containers such as conductive tubes, bags, or boxes.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Cover the library with approved static-dissipating material.
- Provide a wrist strap connected to the work surface and properly grounded tools and equipment.
- Place parts on a grounded surface before removing them from their containers.
- Keep the work area free of non-conducting materials, such as ordinary plastic assembly aids and foam packing.
- Make sure you are always properly grounded when touching a static-sensitive component or assembly.
- Avoid touching pins, leads, or circuitry.
- Use conductive field service tools
- If you do not have any of the suggested equipment for proper grounding, have an authorized reseller install the part.

10.3 Removing a tape drive

NOTE

A tape drive is hot pluggable. It is not mandatory to power down the library to replace a drive.

Adhere strictly the following steps to remove a tape drive:

1. Unload the tape cartridge(s) from the tape drive; with

   OCP, see **Chapter Moving media within the library, Page 50**
   RMU, see **Chapter Move Media within the library, Page 120**

2. Remove all affected tape drive cables on the rear panel.
3. Loosen the blue thumbscrews 2x located on the rear of the tape drive with your fingers.
4. Slightly pull out and push down the pullout tab for the product ID label so it does not interfere with the tape drive as shown in **Figure 144, Step 1.**
5. Pull the tape drive on the handle straight out of the library as shown in **Figure 144, Step 2.**

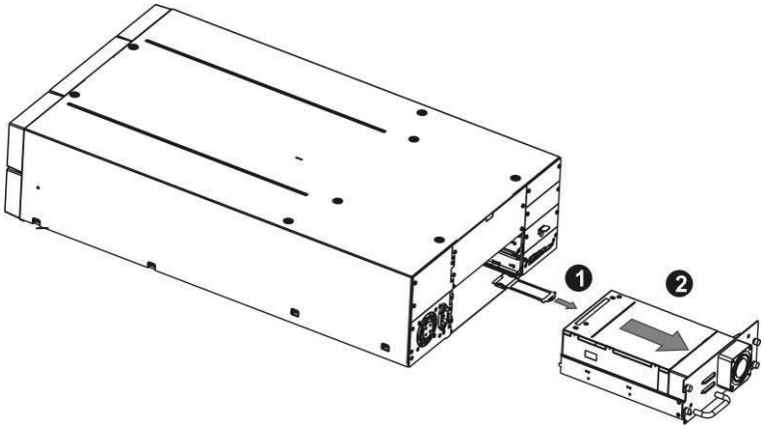


Figure 144 Remove a tape drive

6. To store or ship the removed tape drive, repackage it in the original or replacement device packaging materials.

10.4 Replacing a tape drive

Use this procedure to replace the tape drive with another tape drive:

1. To remove the tape drive from the library,
   see Chapter Removing a tape drive, Page 155.
2. **To install the new tape drive, see Chapter Installing a tape drive, Page 35**.

10.5 Removing the library controller

Adhere strictly the following steps to remove a power supply:

1. Power down the library by pressing the power button on the front panel.
2. Remove the power cord on the rear panel of the library.
3. Remove all affected library controller cables and if available the USB device on the rear panel of the library.
4. Loosen the blue thumbscrews located on the rear of the library controller with your fingers.
5. Pull the library controller straight out of the library as shown in **Figure 145.**

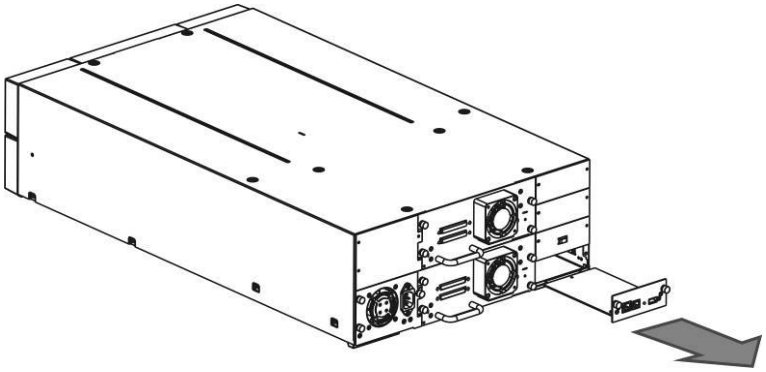


Figure 145 Remove the library controller

6. To store or ship the removed library controller, repackage it in the original or replacement device packaging materials.

10.6 Replacing the library controller

Use this procedure to replace the library controller with another library controller:

1. To remove the library controller from the library,
   see **Chapter Removing the library controller 7.10**
2. To install the new library controller:

   - Remove the library controller from the library as described in Removing the library controller 7.10
   - Install the new library controller as described in Installing the library controller 7.10.
   - Reconnect the power cord to the power supply at the back of the library.
   - Power on the library using the power button on the front panel.
   - After power is restored to the library controller card, the library will display "VPD Selection" on the OCP.

     Note: Use care when selecting the appropriate VPD from which or to which to restore. An error in selection here could cause a long downtime.

   - Verify the serial number, firmware versions, and configurations.
   - Package the failed library controller card in the same packaging that was used to ship the controller card to you and return it to your OEM.

10.7 Removing a power supply

Adhere strictly the following steps to remove a power supply:

1. Power down the library by pressing the power button on the front panel.
2. Remove the power cord on the rear panel of the library.
3. Loosen the blue thumbscrews 2x located on the rear of the power supply with your fingers.
4. Pull the power supply straight out of the library as shown in **Figure 146.**

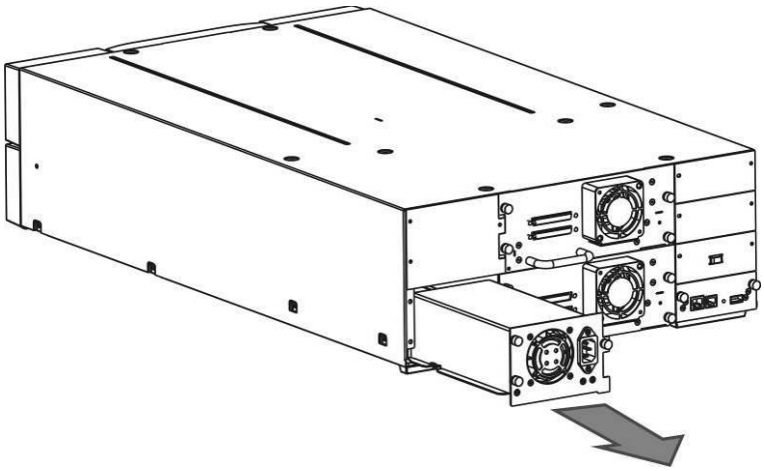


Figure 146 Remove the power supply

5. To store or ship the removed power supply, repackage it in the original or replacement device packaging materials.

10.8 Replacing the power supply

Use this procedure to replace the power supply with another power supply:

1. To remove a power supply from the library,
see Chapter Removing a power supply, Page 157.
2. To install the new power supply, see **Chapter Installing a power supply, Page 38.**

NOTE

A second power supply can be installed without powering down the library.

10.9 Servicing a magazine

1. To remove a magazine, adhere the following steps:
   - Unlock the appropriate magazine, with:

     OCP, see **Chapter Releasing and replacing magazines, Page 50**
     RMU, see **Chapter Releasing and replacing , Page 121**
   - Emergency release, if you are not able to unlock the magazine with the OCR or RMU, see **Chapter Emergency release, Page 137.**
2. Pull the released magazine out of the library.
3. Remove all tape cartridges from the magazine.
4. To store or ship the removed magazine, repackage it in the replacement device packaging materials.
5. Insert an appropriate magazine into the empty magazine slot of the library.
6. Slide the magazine completely into the library. The magazine will lock into place once it is correctly installed.

10.10 Removing the base chassis

WARNING

Weight of actiLib Tape Library
Risk of personal injury
Before lifting a library:

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

10.10.1 Preparing to remove the base chassis

Adhere strictly the following steps:

1. If the OCP or RMU works:
   - Write down the system, drive, and network configuration settings.
     You will need these settings to re-configure the library after replacing the base chassis.
   - Remove all tape cartridges to reduce the weight, see **Chapter Removing tape cartridges, Page 136.**
   - Remove the magazines from the library, with:

     OCP, see **Chapter Releasing and replacing magazines, Page 50**
     RMU, see **Chapter Releasing and replacing , Page 121.**
2. If the OCP or RMU does not work:
   - Remove the magazines manually from the library; see **Chapter Emergency release, Page 137.**
3. Power down the library by pressing the power button on the front panel.

4. Remove the cables on the rear panel of the library.
5. Remove the power supply; see Chapter Removing a power supply, Page 157.
6. Remove the tape drive(s); see Chapter Removing a tape drive, Page 155.
7. Remove the library controller; see **Chapter Removing the library controller, Page 156.**

10.10.2 Removing the base chassis from the rack

To remove the base chassis from the rack, adhere strictly the following steps:

1. Using a 3# Phillips screwdriver placed through the small holes in the mounting bracket to loosen the M5 screw(s) on each side of the library.
2. Remove the library from the rack rails.
3. Remove the mounting brackets of the library.
4. If available:
   - Remove the shipping lock and the yellow label on the rear panel.
   - Replace the shipping lock on the top of the library.
   - Replace yellow label to securing the shipping lock on the top of the library
5. To store or ship the removed base chassis, repackage it in the original packaging materials, see **Chapter Packaging, Page 160.**

10.11 Replacing the base chassis

Use this procedure to replace the base chassis with another base chassis:

1. To remove the base chassis from the rack, see **Chapter Removing the base chassis, Page 158.**
2. To install the new base chassis and its components, see **Chapter Installing, Page 25.**

11 Packaging before transportation

WARNING

Weight of actiLib Tape Library
Risk of personal injury

Before lifting a library:

- Observe local health and safety requirements and guidelines for manual material handling.
- Obtain adequate assistance to lift and stabilize the library during packaging.

NOTE

Only for 1U, 2U and 4U libraries:

Before transport the library, it is recommended that the shipping lock and the yellow label is replaced from the rear panel on the top cover of the library (see also chapter 7.8).

Before packaging the library as shown in the figures below:

1. Before sending back the defect library**:**
   - Pull out the pull-out tab with the product ID label; see **Figure 147, Step 1**.
   - Note the part and serial number; see Figure 147, Step 2.

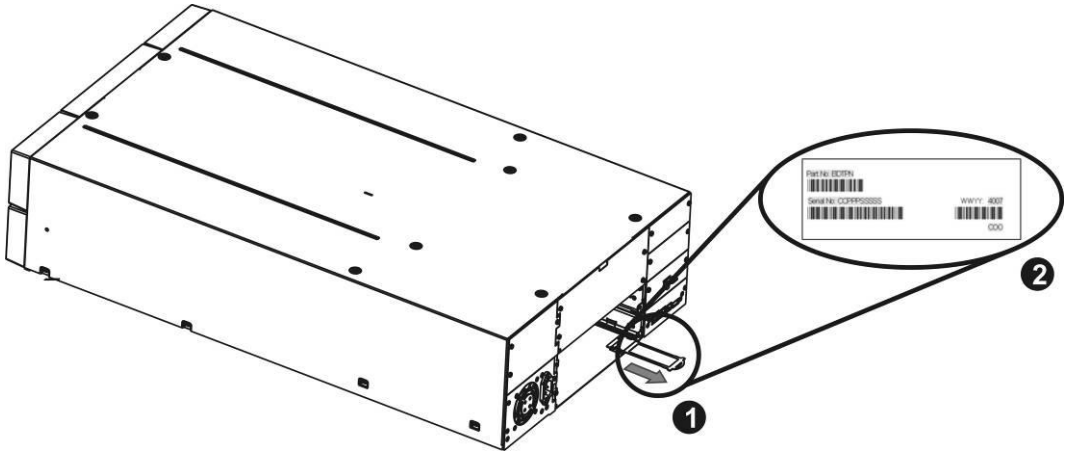


Figure 147 Product ID label

- Contact the service. See **Chapter Contacting actidata, Page 3**.

2. Use the appropriate figure and table for your library and follow the packaging steps.
   - For 1U and 2U libraries, see **Figure 148** below**, Table 28 on Page 162.**
   - For 4U libraries, see **Figure 149** below**, Table 28 on Page 162.**
   - For 8U libraries, see **Figure 150 and Table 29, Page 162.**

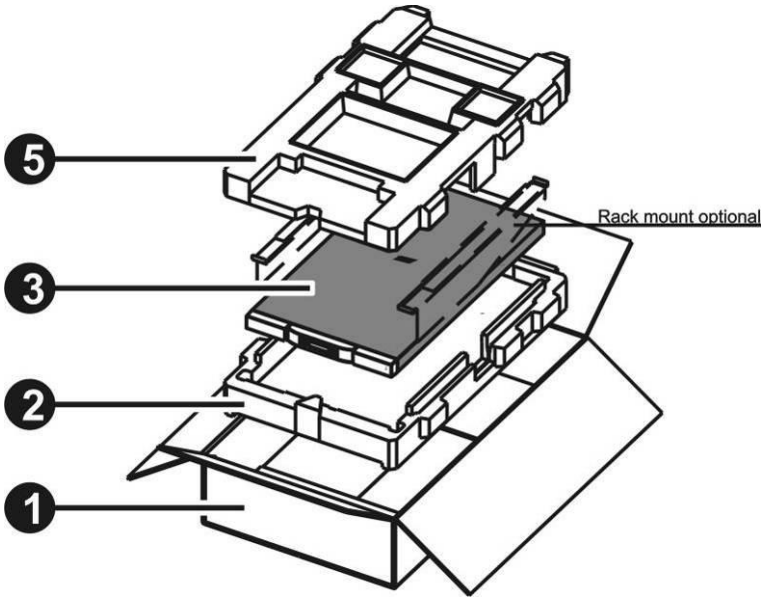


Figure 148 Packaging the library (1U and 2U)

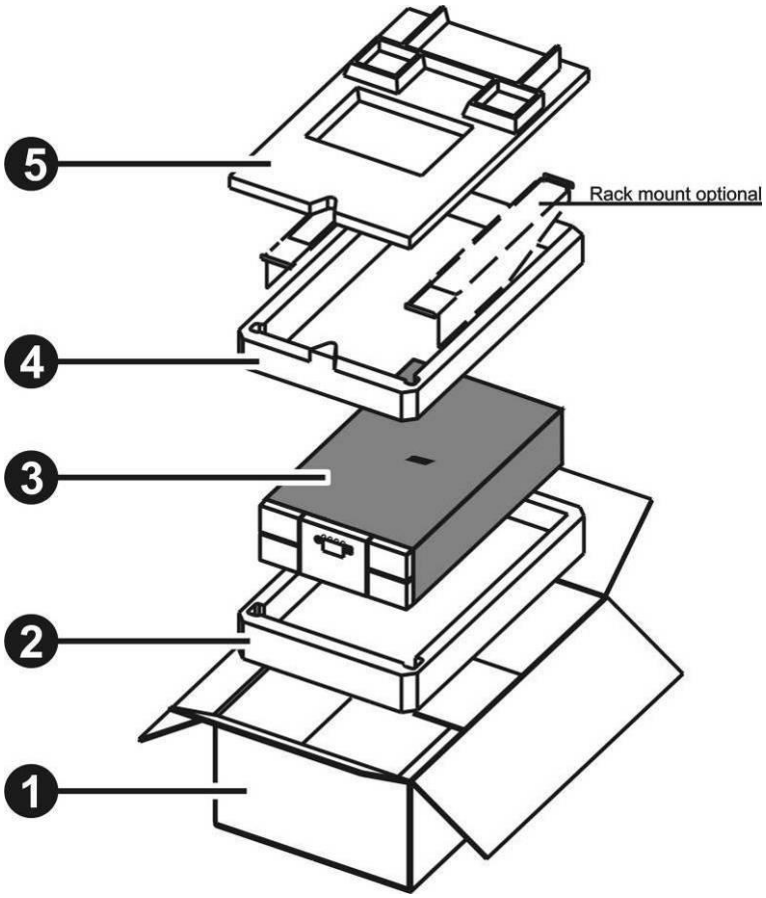


Figure 149 Packaging the library (4U)

Step	Description
1	Packaging box
2	Bottom shell
3	Library
4	Middle shell
5	Top shell

Table 28 Packaging the library (1U, 2U and 4U)

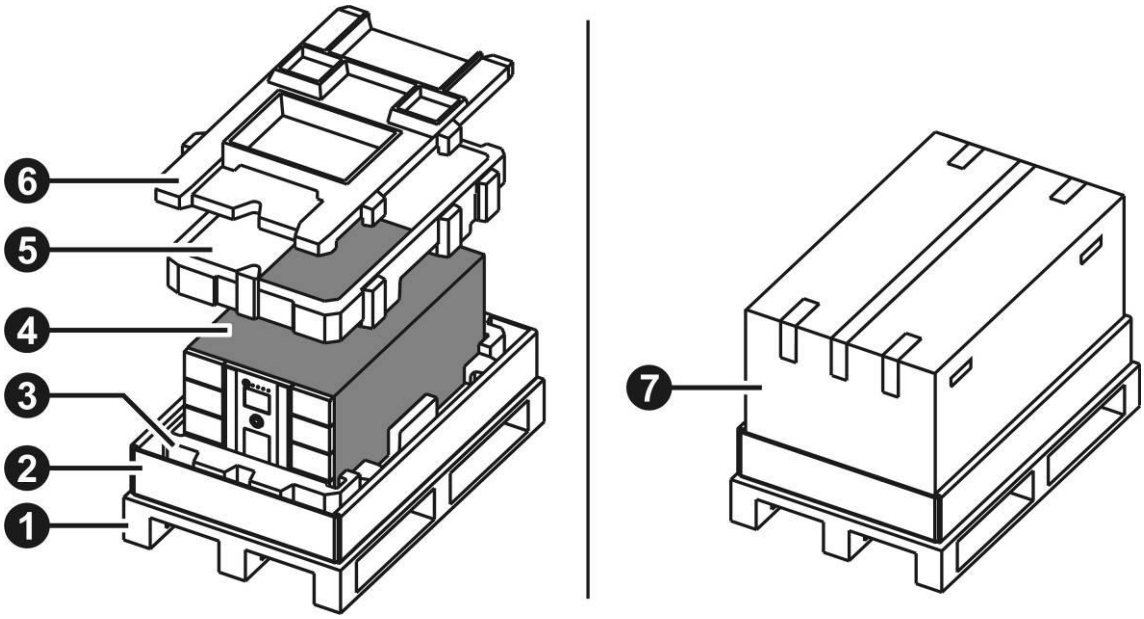


Figure 150 Packaging the library (8U)

Step	Description
1	Pallet
2	Bottom packaging box
3	Bottom shell
4	Library
5	Middle shell
6	Top shell
7	Top packaging box

Table 29 Packaging the library (8U)

12 Technical specifications

12.1 Hardware specifications

Form factor	1U	2U	4U	8U
Height	Product alone: 45.6 mm Packaged: 235 mm	Product alone: 87.6 mm Packaged: 248 mm	Product alone: 175,2 mm Packaged: 330 mm	Product alone: 352.0 mm Packaged: 533.0 mm
Width	Product alone: 444.5 mm Packaged: 589 mm	Product alone: 447.5 mm Packaged: 598 mm	Product alone: 447.5 mm Packaged: 585 mm	Product alone: 480.0 mm Packaged: 589.0 mm
Depth	Product alone: 789.5 mm Packaged: 989 mm	Product alone: 740 mm Packaged: 993 mm	Product alone: 740 mm Packaged: 990 mm	Product alone: 806.00 mm Packaged: 987.0 mm
Weight without media	1 HH drive unit: 11.4 kg	1 FH drive unit: 14.7 kg 2 HH drive unit: 15.6 kg	1 FH drive unit: 21,3 kg 2 FH drive unit: 24,3 kg 1 HH drive unit: 22,2 kg 4 HH drive unit 26,1 kg	1 FH drive unit: 43 kg 2 FH drive unit: 46 kg 2 HH drive unit: 44 kg 4 FH drive unit 52 kg
Weight with media	1 HH drive unit: 13.1 kg	1 FH drive unit: 20.2 kg 2 HH drive unit: 21.1 kg	1 FH drive unit: 30,6 kg 2 FH drive unit: 33,6 kg 2 HH drive unit: 31,4 kg 4 FH drive unit: 35,3 kg	1 FH drive unit: 64 kg 2 FH drive unit: 67 kg 2 HH drive unit: 65 kg 4 FH drive unit: 73 kg

Table 30 Hardware specifications

12.2 Operating environment

Operating	Temperature	10°C to 35°C
	Max. temperature rise	10 °C / hour
	Humidity	15 % RH to 85 % R.H. (non condensing)
	Maximum wet bulb	26 °C
	Max. humidity rise	10% / hour
	Altitude operating	0 to 13.000 ft (4200 m) at 25 °C ambient
Non Operating Storage and Shipping	Temperature	-40 °C to +60 °C
	Max. temperature rise	20°C / hour
	Humidity	5 % RH to 90% RH (non condensing)
	Altitude	-7 m to 10668 m (-22 to 35000 feet)

Table 31 Operating environment

12.3 Maximum storage capacity and data transfer rate

Characteristics	Specification

actiLib Tape Library with LTO3 drive(s)	
Maximum storage capacity (8/24/48/96 data cartridges)	Native: 3,2/9,6/19,2/38,4 TB Compressed: 6,4/19,2/38,4/76,8 TB (assuming 2:1 compression)
Maximum data transfer rate (single drive)	Native: 80 MB/s (288 GB/h) Compressed:160 MB/s (576 GB/h) (assuming 2:1 compression)
Interface (drive dependent)	Ultra320 SCSI LVD 3 GB/s SAS 2 GB/s or 4 GB/s FC

actiLib tape library with LTO4 drive(s)	
Maximum storage capacity (8/24/48/96 data cartridges)	Native: 6,4/19,2/38,4/76,8 TB Compressed: 12,8/38,4/76,8/153,6 TB (assuming 2:1 compression)
Maximum data transfer rate (single drive)	Native: 120 MB/s (432 GB/h) Compressed: 240 MB/s (864 GB/h) (assuming 2:1 compression)
Interface (drive dependent)	Ultra320 SCSI LVD 3 GB/s SAS 4 GB/s FC

Characteristics	Specification
actiLib tape library with LTO5 drive(s)	
Maximum storage capacity (8/24/48/96 data cartridges)	Native 12/36/72/144 TB Compressed: 24/72/144/288 TB (assuming 2:1 compression)
Maximum data transfer rate (single drive)	Native: 140 MB/s (504 GB/h) Compressed: 280 MB/s (1,0 TB/h) (assuming 2:1 compression)
Interface (drive dependent)	6 GB/s SAS 8 GB/s FC
actiLib tape library with LTO6 drive(s)	
Maximum storage capacity (8/24/48/96 data cartridges)	Native 20/60/120/240 TB Compressed: 50/150/300/600 TB (assuming 2,5:1 compression)
Maximum data transfer rate (single drive)	Native: 160 MB/s (576 GB/h) Compressed: 300 MB/s (1,08 TB/h) (assuming 2,5:1 compression)
Interface (drive dependent)	6 GB/s SAS 8 GB/s FC

Table 32 Maximum storage capacity and data transfer rate

For additional information, see:

1. Supported configurations, Table 1, Page 15
2. Tape cartridge type, Table 9, Page 43
3. Backward compatibility (tape cartridge), Table 9, Page 43

13 Agency certifications

NOTE

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

13.1 Recycling and disposal

NOTE

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

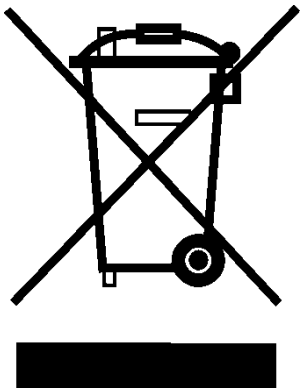


Figure 151 WEEE symbol

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

13.2 Device standards

- ANSI Small Computer System Interface-2 (SCSI-2), X3.131 – 1994
- ANSI SCSI-3 Primary Commands, X3.301 - 1997
- ANSI Information and Technology. SCSI-3 Medium Changer Commands (SMC), NCITS.314:1998
- ANSI SCSI Parallel Interface-2 (SIP-2), X3.302:1998
- IEC 60297 Rack Standards

Standard Countries	European Community	CE scheme according to EN/IEC 60950
	USA/Canada	FCC, ETL according to UL 60950
	Germany	GS

Table 33 Device standards

13.3 CE mark

Figure 152 CE mark

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

13.4 ETL mark

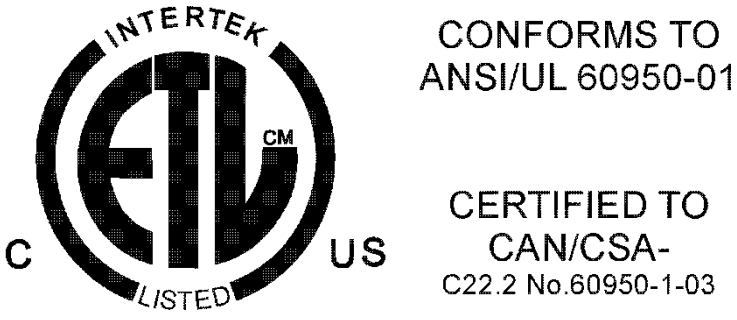


Figure 153 ETL mark

The ETL mark is alternative to the UL and CSA marks in the USA. This mark is issued by Intertek. This mark shows that your product meets all the appropriate safety and performance specifications for your market of sale (generally identical to the standards set by UL and CSA).

13.5 GS mark

Figure 154 GS mark

The Geprüfte Sicherheit ("Tested Safety") or GS mark is a voluntary certification mark for technical equipment. It indicates that the equipment meets German and, if available, European safety requirements for such devices.

13.6 FCC (United States)

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

Tested To Comply
With FCC Standards
For Home or Office Use

Figure 155 FCC mark

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

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

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

13.7 Canadian verification

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

14 Glossary

FC	Fibre channel
FH	Full-high
HBA	Host bus adapter Connects a host system to other network and storage devices
HH	Half-high
LED	Light Emitting Diode
LTO	Linear Tape-Open Magnetic tape data storage technology
LVD	Low-voltage differential Electrical signaling system that can run at very high speeds over inexpensive twisted-pair copper cables
OCP	Operator Control Panel Includes display, buttons and LED's and enables the user to operate the unit from the front
PCB	Printed Circuit Board Example: Library controller
RMU	Remote Management Unit Provides the capability to operate the unit through a web based remote management interface
SAN	Storage area network Architecture to attach remote computer storage devices
SAS	Serial Attached SCSI Computer bus, which moves data to and from computer storage devices such as hard drives and tape drives
SCSI	Small Computer System Interface Communication interface to the host system
USB	Universal Serial Bus

15 Index