



## **Shelf FAQs**

### **SANtricity software**

NetApp  
June 16, 2025

This PDF was generated from <https://docs.netapp.com/us-en/e-series-santricity/sm-hardware/what-is-shelf-loss-protection-and-drawer-loss-protection.html> on June 16, 2025. Always check docs.netapp.com for the latest.

# Table of Contents

- Shelf FAQs ..... 1
  - What is shelf loss protection and drawer loss protection? ..... 1
    - Shelf loss protection ..... 1
    - Drawer loss protection ..... 2
  - What are battery learn cycles? ..... 2

# Shelf FAQs

## What is shelf loss protection and drawer loss protection?

Shelf loss protection and drawer loss protection are attributes of pools and volume groups that allow you to maintain data access in the event of a single shelf or drawer failure.

### Shelf loss protection

A shelf is the enclosure that contains either the drives or the drives and the controller. Shelf loss protection guarantees accessibility to the data on the volumes in a pool or volume group if a total loss of communication occurs with a single drive shelf. An example of total loss of communication might be loss of power to the drive shelf or failure of both I/O modules (IOMs).



Shelf loss protection is not guaranteed if a drive has already failed in the pool or volume group. In this situation, losing access to a drive shelf and consequently another drive in the pool or volume group causes loss of data.

The criteria for shelf loss protection depends on the protection method, as described in the following table:

Level	Criteria for Shelf Loss Protection	Minimum number of shelves required
Pool	The pool must include drives from at least five shelves and there must be an equal number of drives in each shelf. Shelf loss protection is not applicable to high-capacity shelves; if your system contains high-capacity shelves, refer to Drawer Loss Protection.	5
RAID 6	The volume group contains no more than two drives in a single shelf.	3
RAID 3 or RAID 5	Each drive in the volume group is located in a separate shelf.	3
RAID 1	Each drive in a RAID 1 pair must be located in a separate shelf.	2
RAID 0	Cannot achieve Shelf Loss Protection.	Not applicable

## Drawer loss protection

A drawer is one of the compartments of a shelf that you pull out to access the drives. Only the high-capacity shelves have drawers. Drawer loss protection guarantees accessibility to the data on the volumes in a pool or volume group if a total loss of communication occurs with a single drawer. An example of total loss of communication might be loss of power to the drawer or failure of an internal component within the drawer.



Drawer loss protection is not guaranteed if a drive has already failed in the pool or volume group. In this situation, losing access to a drawer (and consequently another drive in the pool or volume group) causes loss of data.

The criteria for drawer loss protection depends on the protection method, as described in the following table:

Level	Criteria for drawer loss protection	Minimum number of drawers required
Pool	<p>Pool candidates must include drives from all drawers, and there must be an equal number of drives in each drawer.</p> <p>The pool must include drives from at least five drawers and there must be an equal number of drives in each drawer.</p> <p>A 60-drive shelf can achieve Drawer Loss Protection when the pool contains 15, 20, 25, 30, 35, 40, 45, 50, 55, or 60 drives. Increments in multiples of 5 can be added to the pool after initial creation.</p>	5
RAID 6	The volume group contains no more than two drives in a single drawer.	3
RAID 3 or RAID 5	Each drive in the volume group is located in a separate drawer.	3
RAID 1	Each drive in a mirrored pair must be located in a separate drawer.	2
RAID 0	Cannot achieve Drawer Loss Protection.	Not applicable

## What are battery learn cycles?

A learn cycle is an automatic cycle for calibrating the smart battery gauge.

A learn cycle consists of these phases:

- Controlled battery discharge
- Rest period
- Charge

The batteries are discharged to a predetermined threshold. During this phase, the battery gauge is calibrated.

A learn cycle requires these parameters:

- Fully charged batteries
- No overheated batteries

Learn cycles for duplex controller systems occur simultaneously. For controllers having backup power from more than one battery or set of battery cells, learn cycles occur sequentially.

Learn cycles are scheduled to start automatically at regular intervals, at the same time and on the same day of the week. The interval between cycles is described in weeks.



A learn cycle might take several hours to complete.

## Copyright information

Copyright © 2025 NetApp, Inc. All Rights Reserved. Printed in the U.S. No part of this document covered by copyright may be reproduced in any form or by any means—graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system—without prior written permission of the copyright owner.

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

THIS SOFTWARE IS PROVIDED BY NETAPP “AS IS” AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

LIMITED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (b)(3) of the Rights in Technical Data -Noncommercial Items at DFARS 252.227-7013 (FEB 2014) and FAR 52.227-19 (DEC 2007).

Data contained herein pertains to a commercial product and/or commercial service (as defined in FAR 2.101) and is proprietary to NetApp, Inc. All NetApp technical data and computer software provided under this Agreement is commercial in nature and developed solely at private expense. The U.S. Government has a non-exclusive, non-transferrable, nonsublicensable, worldwide, limited irrevocable license to use the Data only in connection with and in support of the U.S. Government contract under which the Data was delivered. Except as provided herein, the Data may not be used, disclosed, reproduced, modified, performed, or displayed without the prior written approval of NetApp, Inc. United States Government license rights for the Department of Defense are limited to those rights identified in DFARS clause 252.227-7015(b) (FEB 2014).

## Trademark information

NETAPP, the NETAPP logo, and the marks listed at <http://www.netapp.com/TM> are trademarks of NetApp, Inc. Other company and product names may be trademarks of their respective owners.