QNAP External RAID Device

Software User Guide

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Contents

1. Overview
About QNAP External RAID Devices....2
QNAP External RAID Device Types....2
RAID Types....2

2. QNAP External RAID Manager
Home Screen....6
RAID Configuration....7
Creating a RAID Group on a RAID Enclosure....8
Removing a RAID Group on a RAID Enclosure....9
Disk Information....10
Firmware Information....10
Updating the Device Firmware in QNAP External RAID Manager....11
System Logs....12

3. QTS External RAID Management
Storage Modes....14
Storage Configuration....15
Creating a Storage Pool on a RAID Enclosure....15
Creating a Storage Pool on a Drive Adapter....16
Creating a Static Volume on a RAID Enclosure....17
Creating a Static Volume on a Drive Adapter....20
Configuring a RAID Enclosure as an External Storage Device....22
Storage Management....24
Configuring a Spare Disk....24
Migrating an External RAID Enclosure in NAS Storage Mode....24
External RAID Device Health....25
RAID Enclosure Health....25
Drive Adapter Health....26
Updating External RAID Device Firmware in QTS....26
The Autoplay Menu....27

1. Overview

About QNAP External RAID Devices

QNAP External RAID devices are a series of expansion units designed to increase the storage capacity of your NAS or computer. External RAID devices are different from other QNAP expansion units in that they feature hardware RAID. A host can either access the disks in an external RAID individually, or the external RAID device can combine the disks using hardware RAID so that the host accesses them as one large disk. Some external RAID devices have hardware switches for storage configuration, while other models can only be configured through a software interface.

QNAP External RAID Device Types

Device Type	Summary	Example Models
External RAID enclosure	An expansion unit featuring hardware RAID that connects to a NAS or computer using a connector cable.	TR-004, TR-002, TR-004U
Drive Adapter	A small enclosure featuring hardware RAID that allows you to install 1-2 smaller drives into a larger drive bay in a NAS or computer (e.g. two 2.5-inch SATA drives in a 3.5-inch bay).	QDA-A2AR, QDA-A2MAR

RAID Types

QNAP external RAID devices support the following RAID types.

Important

- Available RAID types vary depending on the device model. For a full list of supported RAID types, check your external RAID device's hardware user guide.
- When disks with different capacities are combined in one RAID group, all disks function according to the capacity of the smallest disk. For example, for a RAID group containing five 2 TB disks and one 1 TB disk, the total capacity is 6 TB.
- When disks with different access speeds (SSD, HDD, SAS) are combined in one RAID group, all disks function according to the capacity of the slowest disk.
- QNAP recommends creating separate RAID groups for each capacity and type of disk.

RAID Type	Number of Disks	Disk Failure Tolerance	Capacity	Overview
Individual	1	0	Total disk capacity	• The NAS or server identifies each disk installed in the RAID device as a separate disk. • Not a real RAID type. It provides no disk failure protection or performance benefits. • This configuration is also known as a port multiplier.
JBOD (just a bunch of disks)	≥ 2	0	Total combined disk capacity	• Combines disks together in a linear fashion. QTS writes data to a disk until it is full before writing to the next disk. • Uses the total capacity of all the disks. • Not a real RAID type. It provides no disk failure protection or performance benefits. • Unless you have a specific reason to use JBOD, you should use RAID 0 instead.
RAID 0	≥ 2	0	Total combined disk capacity	• Disks are combined together using striping. • RAID 0 offers the fastest read and write speeds, and uses the total capacity of all the disks. • Provides no disk failure protection. This RAID type must be paired with a data backup plan. • Recommended for high-performance applications such as video editing.
RAID 1	2	1	Half of the total combined disk capacity	• An identical copy of data is stored on each disk. • Half of the total disk capacity is lost, in return for a high level of data protection. • Recommended for NAS devices with two disks.

RAID Type	Number of Disks	Disk Failure Tolerance	Capacity	Overview
RAID 5	≥ 3	1	Total combined disk capacity minus 1 disk	• Data and parity information are striped across all disks. • The capacity of one disk is lost to store parity information. • Striping means read speeds are increased with each additional disk in the group. • Recommended for a good balance between data protection, capacity, and speed.
RAID 10	≥ 4 (Must be an even number)	1 per pair of disks	Half of the total combined disk capacity	• Every two disks are paired using RAID 1 for failure protection. Then all pairs are striped together using RAID 0. • Excellent random read and write speeds and high failure protection, but half the total disk capacity is lost. • Recommended for applications that require high random access performance and fault tolerance, such as databases.

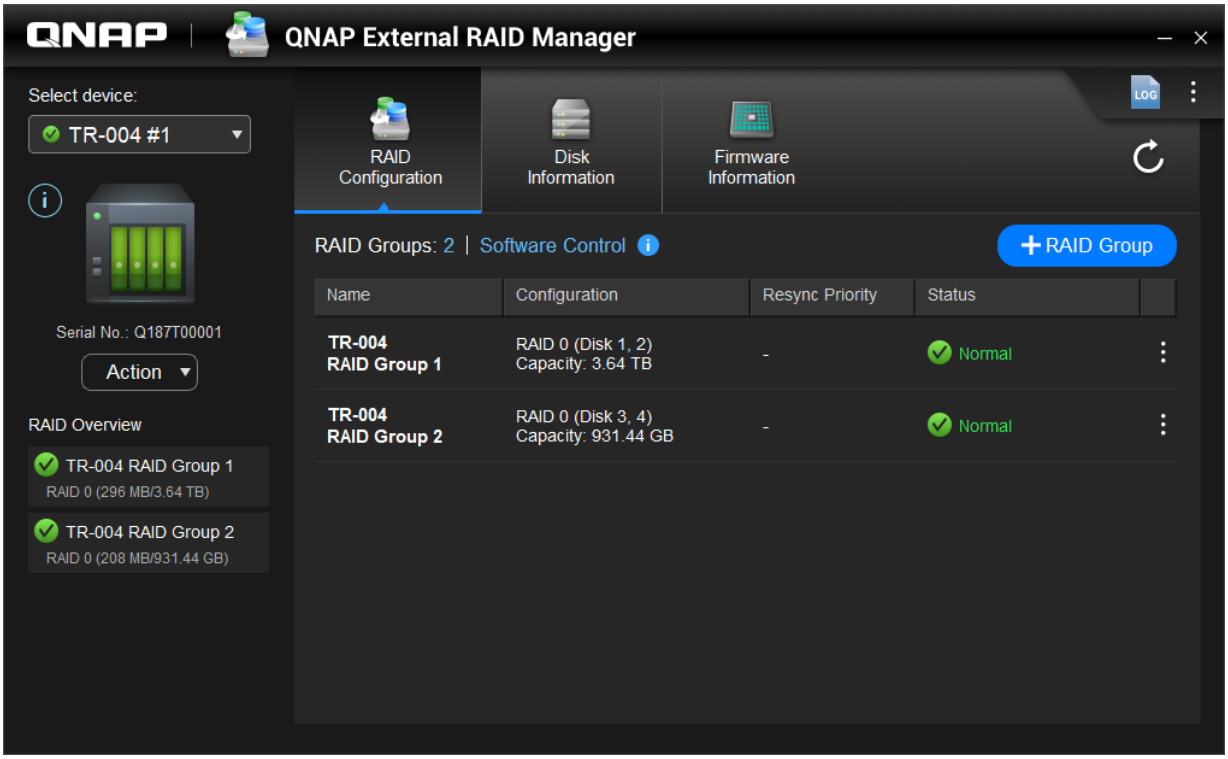
2. QNAP External RAID Manager

QNAP External RAID Manager is a utility for Windows and Mac computers that enables you to view and configure connected QNAP external RAID devices.

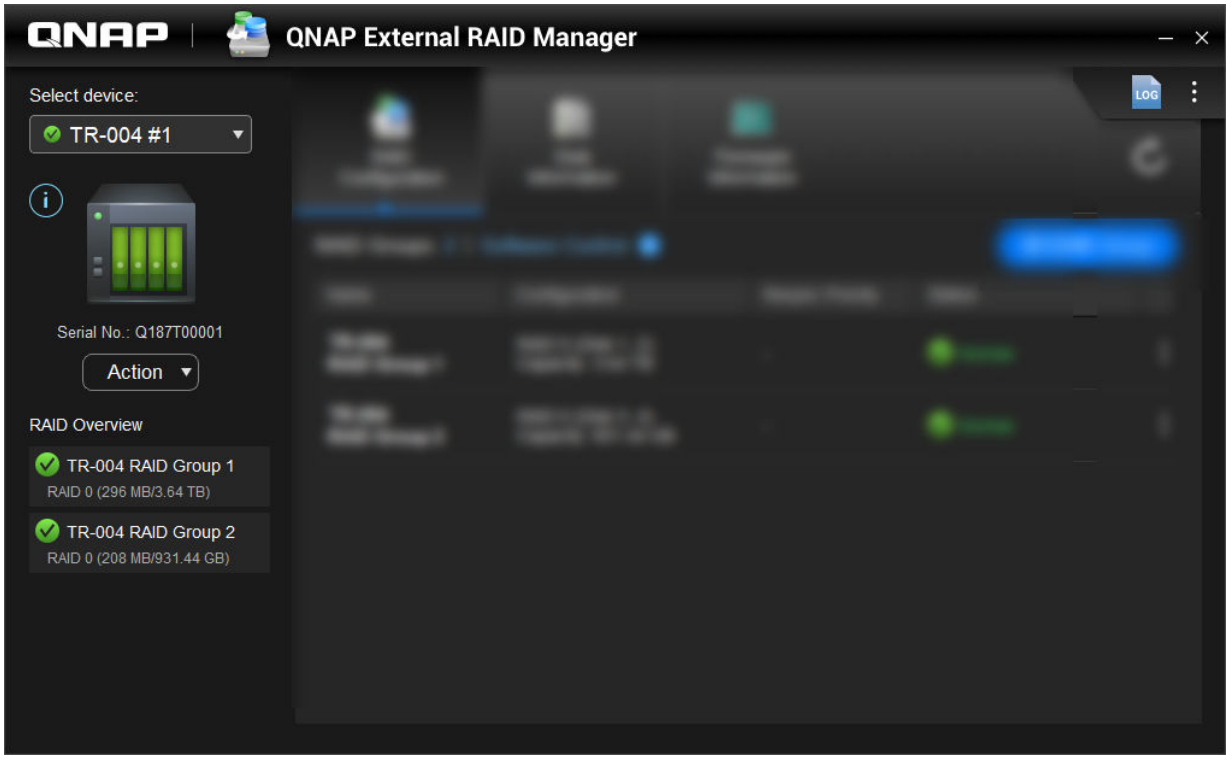
Important

- To configure RAID groups and RAID settings on a QNAP external RAID device, the device's Mode switch must be set to Software Control mode.
- If an external RAID device's Mode switch is not set to Software Control mode, or if the device does not support Software Control mode, QNAP External RAID Manager can only be used to view hardware and RAID group information and to update the device's firmware.

Tip
To download QNAP External RAID Manager, go to https://www.qnap.com/utilities.

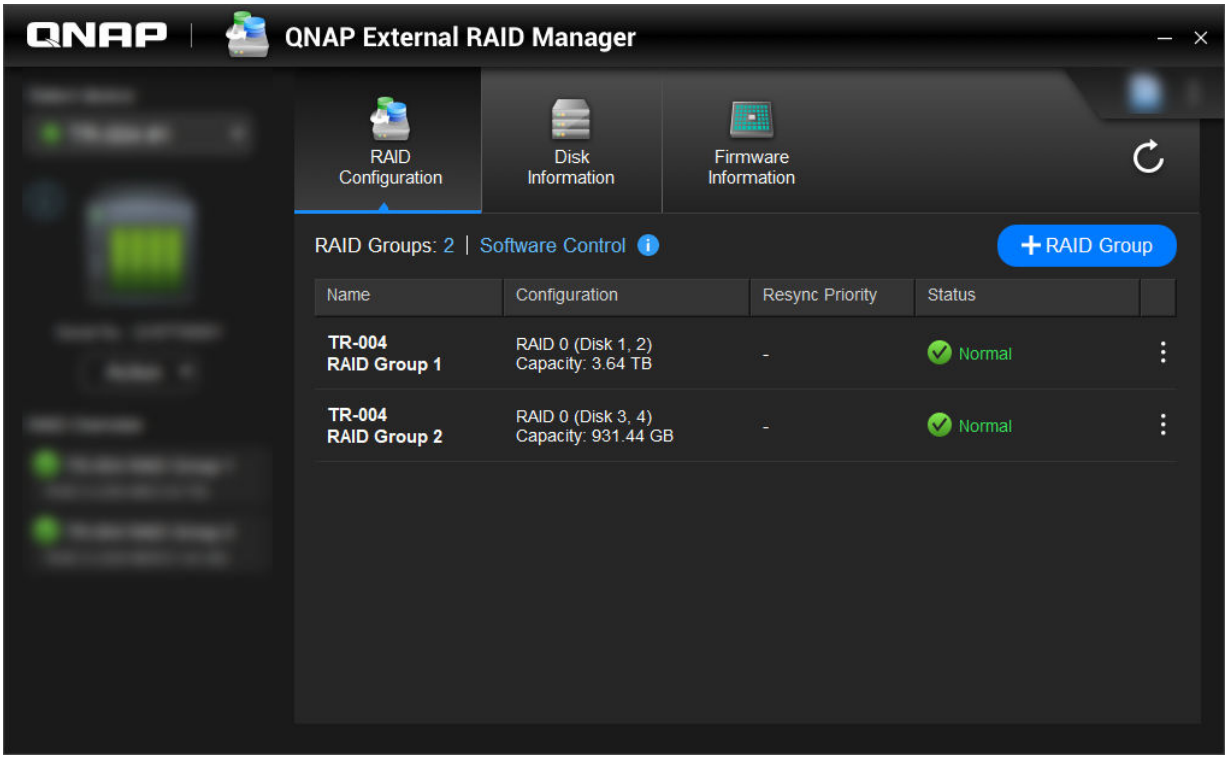


Home Screen



UI Element	Description
Select Device	Select the external RAID device that you want to manage.
	View the following device information: • Device health • Device model • Serial number • Firmware version • Bus type • System temperature • System fan speed
Action > **Locate**	Prompt the drive LEDs to blink and the device to beep to help locate the device.
Action > **Eject**	Disconnect the device from the host computer.
	View the system logs. For more information, see System Logs.
	Check for QNAP External RAID Manager updates, view help, and change the interface language or region settings.

RAID Configuration



UI Element	Description
	Refresh RAID group information and statuses.
Control Mode	• Software Control: The device's Mode switch is set to Software Control mode. You can configure RAID settings in the QNAP External RAID Manager utility. • Hardware Control: The device's Mode switch is set to a RAID mode or individual mode. You cannot configure RAID settings in the QNAP External RAID Manager utility.
+ RAID Group	Create a new RAID group. For details, see Creating a RAID Group on a RAID Enclosure.

UI Element	Description
> **Edit Resync Priority**	This setting determines the minimum speed of RAID operations such as rebuild and sync. You can select one of the following priorities. • Service First: The external RAID device performs RAID operations at lower speeds in order to maintain storage access speeds. • Default: The external RAID device performs RAID operations at the default speed. • Resync First: The external RAID device performs RAID operations at higher speeds. Users may notice a decrease in storage performance while RAID operations are in progress.
> **Remove RAID Group**	Delete the RAID group. For details, see Removing a RAID Group on a RAID Enclosure.

Creating a RAID Group on a RAID Enclosure

Warning
Creating a RAID group causes the RAID enclosure to temporarily disconnect then reconnect. To prevent data loss, stop all read and write access to the enclosure before performing this task.

1. Ensure the RAID enclosure's Mode switch is set to Software Control mode.
   For details, see the device's hardware user guide.
2. Connect the enclosure to the host PC or Mac.
3. On the host, open **QNAP External RAID Manager**.
4. Go to **RAID Configuration** .
5. Click **+ RAID Group**.
   The **Create RAID Group** window opens.
6. Select a RAID type.
   For more information, see RAID Types.
7. Select two or more disks.

Warning
All data on the selected disks will be deleted.

   a. Under **Disks**, click the drop-down list.
   b. Select the disks.
   c. Click **Select**.
8. Optional: Specify the RAID resync priority.
   This setting determines the minimum speed of RAID operations such as rebuild and sync. You can select one of the following priorities.

RAID Rebuild Priority	Description
Service First (Low speed)	The RAID enclosure performs RAID operations at a lower speed than default in order to maintain storage access performance.
Default	The RAID enclosure performs RAID operations at its default speed.
Resync First (High speed)	The RAID enclosure performs RAID operations at a higher speed than default in order to finish them faster. You may notice a decrease in storage performance while RAID operations are in progress.

Important

- You cannot set RAID priority for groups of type: RAID 0, JBOD.
- This setting only affects RAID operation speeds when the RAID enclosure is in use. When the enclosure is idle, all RAID operations are performed at the highest possible speed.
- On some models, RAID rebuilding pauses when the enclosure enters standby mode and resumes when the enclosure exits standby mode. The enclosure enters standby mode when the USB cable is disconnected or when the connected client enters hibernation, standby, or sleep mode.

9. Click **Create**.
   A confirmation message appears.
10. Click **Yes**.

Removing a RAID Group on a RAID Enclosure

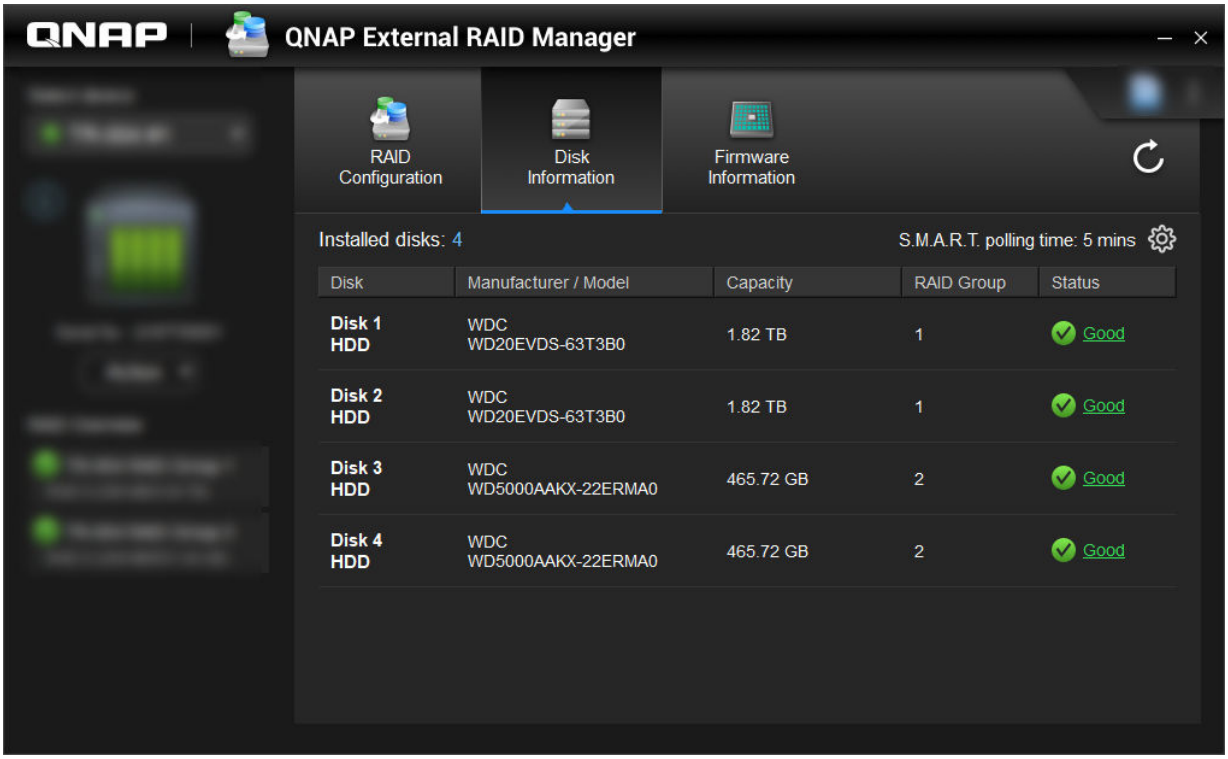
Warning
Removing a RAID group will cause the external RAID enclosure to temporarily disconnect then reconnect. To prevent data loss, stop all read and write access to the enclosure before performing this task.

1. Open **QNAP External RAID Manager**.
2. Go to **RAID Configuration** .
3. Locate the RAID group that you want to remove.
4. Click and then select **Remove RAID Group**.
   A confirmation message appears.

Warning
All data in the RAID groups will be deleted.

5. Confirm that you have understood that all data will be deleted.
6. Click **Yes**.

Disk Information



UI Element	Description
	Refresh disk information and statuses.
	Specify how often (in minutes) the device checks disks for S.M.A.R.T. errors. • Allowed values: 1 to 60 • Default value: 5 **Warning** High polling frequency may affect disk performance.

Firmware Information

On this screen you can update the firmware of an external RAID device. Click to refresh the firmware information and check for a newer firmware version online.

Updating the Device Firmware in QNAP External RAID Manager

1. Go to **QNAP External RAID Manager** > **Firmware Information** .
2. Select a firmware update method.

Firmware Update Method	Description
Automatically install the latest firmware version	Download and install the latest version of the device firmware. **Note** You can only select this option if QNAP External RAID Manager has checked online and found a newer firmware version than the one currently installed on the device.
Select a local firmware file	Update the firmware using a local firmware IMG file on your computer. Click **Browse** to select the file. **Tip** You can download firmware updates at https://download.qnap.com.

3. Click **Update Firmware**.

Warning
Do not power off the enclosure, disconnect any cables, or force-close QNAP External RAID Manager unless prompted.

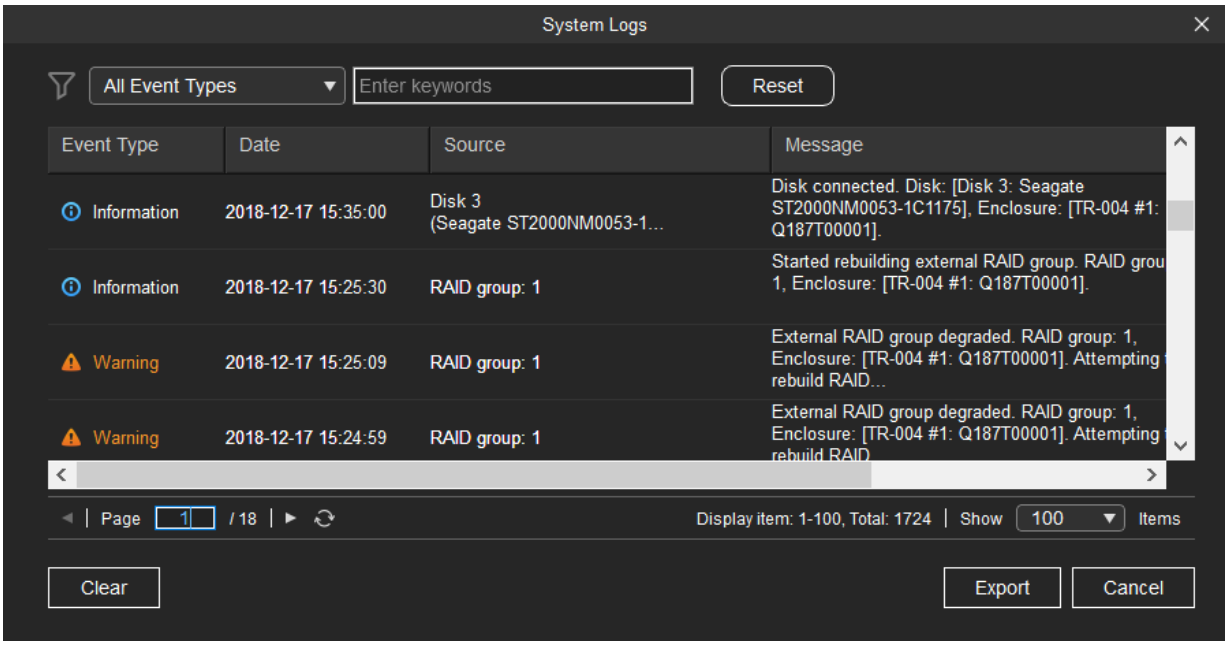
An **Updating Firmware** message appears.

4. Follow the instructions to finish the firmware update.
   Depending on the model you may be asked to power off then power on the device, or disconnect then reconnect the device.
   QTS re-detects the device.

QNAP External RAID Manager > **Firmware Information** will show the new firmware version.

System Logs

Click to open the **System Logs** window.

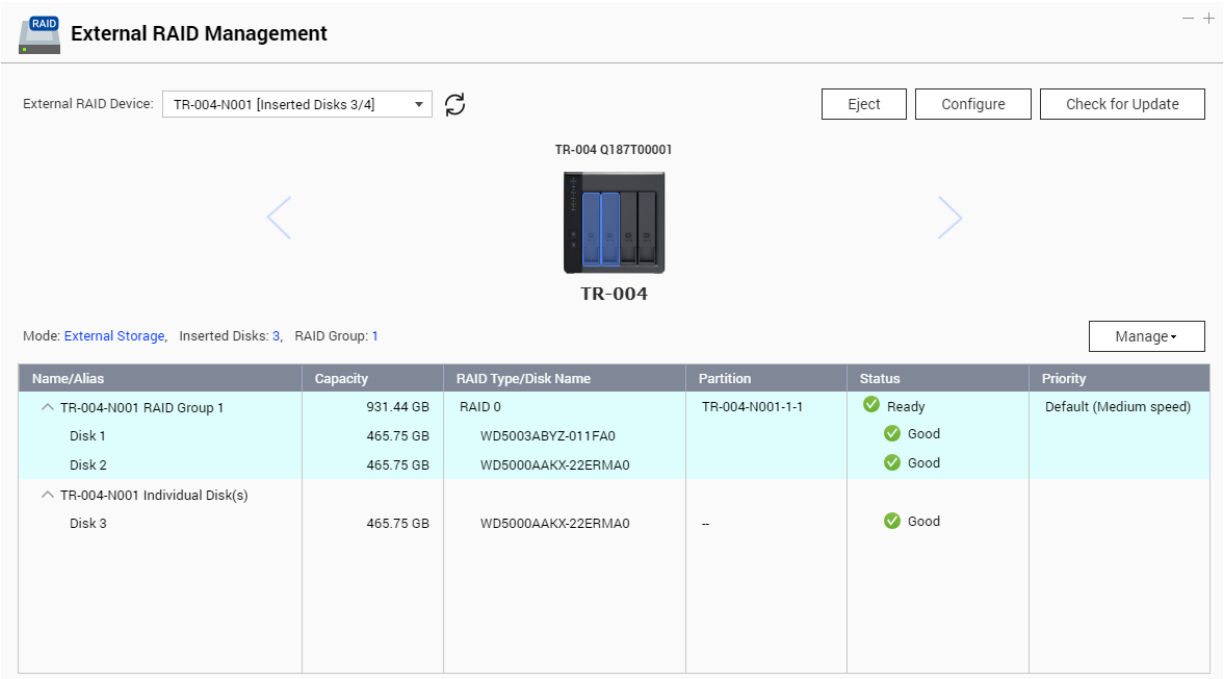


UI Element	Description
	Filter the log messages by event type or keyword. Select one of the following event types: • All Event Types • Information • Warning • Error
Reset	Remove the filter and show all log messages.
Clear	Delete all log messages.
Export	Export all log messages to a CSV file. If a filter is applied, only the filtered logs are exported.
Cancel	Close the **System Logs** window.

3. QTS External RAID Management

Open **Storage & Snapshots**, click **External RAID device**, and then select **External RAID Management** to view, manage, and configure RAID devices connected to the NAS.

Warning
To prevent errors or data loss, do not change an RAID device's Mode switch from Software Control to any other mode while the device is connected to the NAS.



UI Element	Description
External RAID Device	Select a RAID device to manage.
Safely Detach	Disconnect a RAID device from the NAS when the device is in NAS Storage mode. QTS will stop and then safely remove all storage pools, volumes, and LUNs stored on the device, without deleting any data. You can then connect it to another NAS or computer. **Tip** To access the storage pools, volumes, and LUNs on another QNAP NAS, connect the RAID device to the target NAS, go to **Storage & Snapshots** > **Disks/VJBOD** then select **Recover** > **Scan all Free Disks** . **Important** This button only appears when the device is in NAS Storage mode.

UI Element	Description
Eject	Safely disconnect a RAID device from the NAS when the device is in External Storage mode. You can then connect it to another NAS or computer. **Important** This button only appears when the device is in External Storage mode.
Configure	Create a RAID group on the RAID device and configure the storage mode. **Important** The RAID device's Mode switch must be set to Software Control mode.
Check for Update	Update the RAID device's firmware, either over the internet or from a local file. For details, see Updating External RAID Device Firmware in QTS.
Manage > **Configure Spare Disk**	Configure a global hot spare disk for the RAID device. If a disk in any RAID group on the device fails, the hot spare disk will automatically replace the faulty disk. For details, see Configuring a Spare Disk.
Manage > **Remove**	Delete the RAID group. The member disks will be automatically assigned as global spare disks if the device contains any other RAID groups. **Warning** All data on the selected disks will be deleted.
Manage > **View Disks**	View the information about the disks installed in the RAID device, including their status and health information. **Note** Selecting this option takes you to the **Disks/VJBOD** screen.

Storage Modes

QNAP RAID enclosures support two different storage modes.

Important
QNAP drive adapters only support NAS storage mode.

Storage Mode	Description	Supported RAID Types	Supported Hosts
NAS Storage	Use the RAID enclosure's storage capacity to create a new storage pool or static volume on a QNAP NAS.	• JBOD • RAID 0 • RAID 1 • RAID 5 • RAID 10	QNAP NAS running QTS 4.3.6 or later
External Storage	Use the RAID enclosure as an external USB disk. This mode supports multiple RAID groups. Each RAID group appears as a separate disk when the enclosure is connected to a host.	• Individual • JBOD • RAID 0 • RAID 1 • RAID 5 • RAID 10	• Windows • macOS • Linux • QNAP NAS • Other NAS devices

Storage Configuration

Creating a Storage Pool on a RAID Enclosure

Important

- The Mode switch on the RAID enclosure must be set to Software Control mode. For details, see the enclosure's hardware user guide.
- The RAID enclosure must not contain any existing RAID groups.

Warning
To prevent errors or data loss, do not change the enclosure Mode switch from Software Control to any other mode while the enclosure is connected to the NAS.

1. Open **Main Menu** > **Storage & Snapshots** .
2. Click **External RAID Device**, and then select **External RAID Management**.
   The **External RAID Management** window opens.
3. Click **Configure**.
   The **External RAID Device Configuration Wizard** opens.
4. Click **Next**.
5. Select two or more disks.

Warning

- All data on the selected disks will be deleted.
- All unselected disks will be automatically assigned as spare disks, and cannot be used until the RAID group has been deleted.

6. Select a RAID type.
   QTS displays all available RAID types and automatically selects the most optimized RAID type.

Number of disks	Supported RAID Types	Default RAID Type
Two	JBOD, RAID 0, RAID 1	RAID 1
Three	JBOD, RAID 0, RAID 5	RAID 5
Four	JBOD, RAID 0, RAID 5, RAID 10	RAID 5

Tip
Use the default RAID type if you are unsure of which option to select.
For details on RAID types, see RAID Types.

7. Click **Next**.
8. Select **Create Storage Pool**.
9. Click **Create**.
   A confirmation message appears.
10. Click **OK**.
    - The RAID enclosure creates the RAID group.
    - The **Create Storage Pool Wizard** opens on the **Select Disks** screen.
    - The RAID group you created is automatically selected and the RAID type is set to `Single`.
11. Click **Next**.
12. Configure the alert threshold.
    QTS issues a warning notification when the percentage of used pool space is equal to or above the specified threshold.
13. Click **Next**.
14. Click **Create**.
    A confirmation message appears.
15. Click **OK**.

QTS creates the storage pool and then displays the information on the **Storage/Snapshots** screen.

Creating a Storage Pool on a Drive Adapter

1. Set the drive adapter to the RAID mode that you want using the device's hardware Mode switch.
2. Install the drive adapter in the NAS.
   For details, see the drive adapter's hardware user guide.
3. Go to **Main Menu** > **Storage & Snapshots** > **Storage** > **Storage/Snapshots** .
4. Perform one of the following actions.

NAS State	Action
No volumes or storage pools	Click **New Storage Pool**.
One or more volumes or storage pools	Click **Create** > **New Storage Pool** .

   The **Create Storage Pool Wizard** window opens.

5. Click **Next**.

6. Under **Enclosure Unit**, select **NAS Host**.
7. In the list of disks, select the drive adapter.
8. Under **RAID Type**, select **Single**.
9. Click **Next**.
10. Optional: Configure SSD over-provisioning.
    Over-provisioning reserves a percentage of SSD storage space on each disk in the RAID group to improve write performance and extend the disk's lifespan. You can decrease the amount of space reserved for over-provisioning after QTS has created the RAID group.

Tip
To determine the optimal amount of over-provisioning for your SSDs, download and run SSD Profiling Tool from App Center.

11. Optional: Configure the alert threshold.
    QTS issues a warning notification when the percentage of used pool space is equal to or above the specified threshold.
12. Click **Next**.
13. Click **OK**.
    - The **Create Storage Pool Wizard** opens on the **Select Disks** screen.
    - The RAID group created in steps 3-5 is selected as the disk for the storage pool.
    - The RAID type is set to `Single`.
14. Click **Next**.
15. Configure the alert threshold.
    QTS issues a warning notification when the percentage of used pool space is equal to or above the specified threshold.
16. Click **Next**.
17. Click **Create**.
    A confirmation message appears.
18. Click **OK**.

QTS creates the storage pool and then displays the information on the **Storage/Snapshots** screen.

Creating a Static Volume on a RAID Enclosure

Important
- The Mode switch on the RAID enclosure must be set to Software Control mode. For details, see the enclosure's hardware user guide.
- The RAID enclosure must not contain any existing RAID groups.

Warning
To prevent errors or data loss, do not change the enclosure Mode switch from Software Control to any other mode while the enclosure is connected to the NAS.

1. Open **Main Menu** > **Storage & Snapshots** .
2. Click **External RAID Device**, and then select **External RAID Management**.
   The **External RAID Management** window opens.
3. Click **Configure**.
   The **External RAID Device Configuration Wizard** opens.
4. Click **Next**.
5. Select two or more disks.

Warning

- All data on the selected disks will be deleted.
- All unselected disks will be automatically assigned as spare disks, and cannot be used until the RAID group has been deleted.

6. Select a RAID type.
   QTS displays all available RAID types and automatically selects the most optimized RAID type.

Number of disks	Supported RAID Types	Default RAID Type
Two	JBOD, RAID 0, RAID 1	RAID 1
Three	JBOD, RAID 0, RAID 5	RAID 5
Four	JBOD, RAID 0, RAID 5, RAID 10	RAID 5

Tip
Use the default RAID type if you are unsure of which option to select.
For details on RAID types, see RAID Types.

7. Click **Next**.
8. Select **Create Volume**.
9. Click **Create**.
   A confirmation message appears.
10. Click **OK**.
    - The RAID enclosure creates the RAID group.
    - The **Volume Creation Wizard** opens on the **Select Disks** screen.
    - The RAID group you created is automatically selected and the RAID type is set to `Single`.
11. Click **Next**.
12. Optional: Specify an alias for the volume.
    The alias must consist of 1 to 64 characters from any of the following groups:
    - Letters: A to Z, a to z
    - Numbers: 0 to 9
    - Special characters: Hyphen (-), underscore (_)
13. Specify the number of bytes per inode.

The number of bytes per inode determines the maximum volume size, and the number of files and folders that the volume can store. Increasing the number of bytes per inode results in a larger maximum volume size, but a lower maximum number of files and folders.

14. Optional: Configure advanced settings.

Setting	Description	User Actions
Alert threshold	QTS issues a warning notification when the percentage of used volume space is equal to or above the specified threshold.	Specify a value.
Encryption	QTS encrypts all data on the volume with 256-bit AES encryption.	**a.** Specify an encryption password containing 8 to 32 characters, with any combination of letters, numbers and special characters. Spaces are not allowed. **b.** Select **Save encryption key** to save a local copy of the encryption key on the NAS. This enables QTS to automatically unlock and mount the encrypted volume when the NAS starts up. If the encryption key is not saved, you must specify the encryption password each time the NAS restarts. **Warning** • Saving the encryption key on the NAS can result in unauthorized data access if unauthorized personnel are able to physically access the NAS. • If you forget the encryption password, the volume will become inaccessible and all data will be lost.
Accelerate performance with SSD cache	QTS adds data from this volume to the SSD cache to improve read or write performance.	No actions
Create a shared folder on the volume	QTS automatically creates the shared folder when the volume is ready. Only the NAS admin account can access the new folder.	**a.** Specify a folder name. **b.** Select **Create this folder as a snapshot shared folder**. A snapshot shared folder enables faster snapshot creation and restoration.

15. Click **Next**.

16. Click **Finish**.
    A confirmation message appears.

17. Click **OK**.

QTS creates and initializes the volume, and then creates the optional shared folder.

Creating a Static Volume on a Drive Adapter

1. Set the drive adapter to the RAID mode that you want using the device's hardware Mode switch.
2. Install the drive adapter in the NAS.
   For details, see the drive adapter's hardware user guide.
3. Go to **Main Menu** > **Storage & Snapshots** > **Storage** > **Storage/Snapshots** .
4. Perform one of the following actions.

NAS State	Action
No volumes or storage pools	Click **New Volume**.
One or more volumes or storage pools	Click **Create** > **New Volume** .

   The **Volume Creation Wizard** window opens.

5. Select **Static Volume**.
6. Click **Next**.
7. Under **Enclosure Unit**, select **NAS Host**.
8. In the list of disks, select the drive adapter.
9. Under **RAID Type**, select **Single**.
10. Click **Next**.
11. Optional: Specify an alias for the volume.
    The alias must consist of 1 to 64 characters from any of the following groups:
    - Letters: A to Z, a to z
    - Numbers: 0 to 9
    - Special characters: Hyphen (-), underscore (_)
12. Optional: Configure SSD over-provisioning.
    Over-provisioning reserves a percentage of SSD storage space on each disk in the RAID group to improve write performance and extend the disk's lifespan. You can decrease the amount of space reserved for over-provisioning after QTS has created the RAID group.

> **Tip**
> To determine the optimal amount of over-provisioning for your SSDs, download and run SSD Profiling Tool from App Center.

13. Optional: Specify the number of bytes per inode.
    The number of bytes per inode determines the maximum volume size, and the number of files and folders that the volume can store. Increasing the number of bytes per inode results in a larger maximum volume size, but a lower maximum number of files and folders.
14. Optional: Configure advanced settings.

Setting	Description	User Actions
Alert threshold	QTS issues a warning notification when the percentage of used volume space is equal to or above the specified threshold.	Specify a value.
Encryption	QTS encrypts all data on the volume with 256-bit AES encryption.	**a.** Specify an encryption password containing 8 to 32 characters, with any combination of letters, numbers and special characters. Spaces are not allowed. **b.** Select **Save encryption key** to save a local copy of the encryption key on the NAS. This enables QTS to automatically unlock and mount the encrypted volume when the NAS starts up. If the encryption key is not saved, you must specify the encryption password each time the NAS restarts. **Warning** • Saving the encryption key on the NAS can result in unauthorized data access if unauthorized personnel are able to physically access the NAS. • If you forget the encryption password, the volume will become inaccessible and all data will be lost.
Accelerate performance with SSD cache	QTS adds data from this volume to the SSD cache to improve read or write performance.	No actions
Create a shared folder on the volume	QTS automatically creates the shared folder when the volume is ready. Only the NAS admin account can access the new folder.	**a.** Specify a folder name. **b.** Select **Create this folder as a snapshot shared folder**. A snapshot shared folder enables faster snapshot creation and restoration.

15. Click **Next**.
16. Click **Finish**.
    A confirmation message appears.
17. Click **OK**.

QTS creates and initializes the volume, and then creates the optional shared folder.

Configuring a RAID Enclosure as an External Storage Device

Important

- The Mode switch on the RAID enclosure must be set to Software Control mode. For details, see the enclosure's hardware user guide.
- The RAID enclosure must not contain any existing RAID groups.

Warning
To prevent errors or data loss, do not change the enclosure Mode switch from Software Control to any other mode while the enclosure is connected to the NAS.

1. Open **Main Menu** > **Storage & Snapshots** .
2. Click **External RAID Device**, and then select **External RAID Management**.
   The **External RAID Management** window opens.
3. Click **Configure**.
   The **External RAID Device Configuration Wizard** opens.
4. Click **Next**.
5. Select two or more disks.

Warning

- All data on the selected disks will be deleted.
- All unselected disks will be automatically assigned as spare disks, and cannot be used until the RAID group has been deleted.

6. Select a RAID type.
   QTS displays all available RAID types and automatically selects the most optimized RAID type.

Number of disks	Supported RAID Types	Default RAID Type
Two	JBOD, RAID 0, RAID 1	RAID 1
Three	JBOD, RAID 0, RAID 5	RAID 5
Four	JBOD, RAID 0, RAID 5, RAID 10	RAID 5

Tip
Use the default RAID type if you are unsure of which option to choose.
For details on RAID types, see RAID Types.

7. Click **Next**.
8. Select **Create External Storage Space**.
9. Click **Create**.
   A confirmation message appears.
10. Click **OK**.
11. Go to **Main Menu** > **Storage & Snapshots** > **Storage** > **External Storage** .
12. Select the uninitialized partition on the RAID enclosure.

Tip
Double-click on the RAID enclosure to see all of its partitions.

13. Click **Actions**, and then select **Format**.
The **Format Partition** window opens.

14. Select a file system.

File System	Recommended Operating Systems and Devices
NTFS	Windows
HTS+	macOS
FAT32	Windows, macOS, NAS devices, most cameras, mobile phones, video game consoles, tablets **Important** The maximum file size is 4 GB.
exFAT	Windows, macOS, some cameras, mobile phones, video game consoles, tablets **Important** • Using exFAT on QTS requires an exFAT driver license. You can purchase the license in License Center. • Verify that your device is compatible with exFAT before selecting this option.
EXT3	Linux, NAS devices
EXT4	Linux, NAS devices

15. Specify a disk label.
The label must consist of 1 to 16 characters from any of the following groups:
    - Letters: A to Z, a to z
    - Numbers: 0 to 9
    - Special characters: Hyphen "-"

16. Optional: Enable encryption.
    a. Select an encryption type.
    Select one of the following options:
        - AES 128 bits
        - AES 192 bits
        - AES 256 bits
    b. Specify an encryption password.
    The password must consist of 8 to 16 characters from any of the following groups:
        - Letters: A to Z, a to z

- Numbers: 0 to 9
- All special characters (excluding spaces)

c. Confirm the encryption password.

d. Optional: Select **Save encryption key**.
Select this option to save a local copy of the encryption key on the NAS. This enables QTS to automatically unlock and mount the encrypted volume when the NAS starts up. If the encryption key is not saved, you must specify the encryption password each time the NAS restarts.

Warning

- Saving the encryption key on the NAS can result in unauthorized data access if unauthorized personnel are able to physically access the NAS.
- If you forget the encryption password, the volume will become inaccessible and all data will be lost.

17. Click **Format**.
A warning message appears.
18. Click **OK**.

QTS formats the RAID group on the external RAID enclosure as an external disk. You can view and manage it at **Main Menu** > **Storage & Snapshots** > **Storage** > **External Storage** .

Storage Management

Configuring a Spare Disk

1. Go to **Main Menu** > **Storage & Snapshots** .
2. Click **External RAID Device** and then select **External RAID Management**.
The **External RAID Management** window opens.
3. Click **Manage**, and then select **Configure Spare Disk**.
The **Configure Spare Disk** window opens.
4. Select one or more free disks.
5. Click **Apply**.

The selected disks are assigned as spare disks for the RAID group on the external RAID device.

Migrating an External RAID Enclosure in NAS Storage Mode

Follow these steps to move a RAID enclosure containing a storage pool or static volume from a QNAP NAS to a different QNAP NAS (which we will call the target NAS).

1. Go to **Main Menu** > **Storage & Snapshots** > **Storage** > **Disks/VJBOD** .
2. Select an enclosure.
3. Select **Action** > **Safely Detach** .
The **Safely Detaching Enclosure** window opens.
4. Click **Apply**.

Warning
Do not disconnect or power off the RAID enclosure until the enclosure has been detached.

A confirmation message appears.

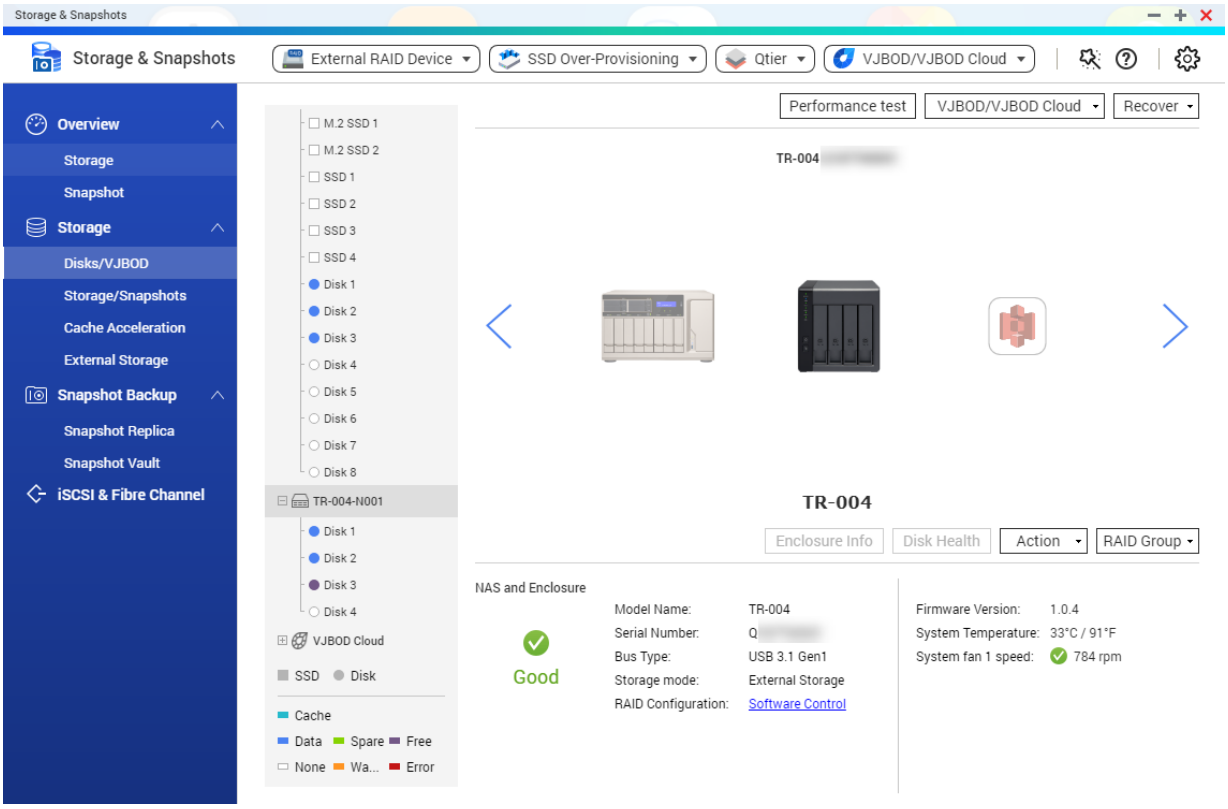
5. Disconnect the RAID enclosure from the NAS.
6. Connect the RAID enclosure to the target QNAP NAS.
7. On the target NAS, go to **Main Menu** > **Storage & Snapshots** > **Storage** > **Disks/VJBOD** .
8. Select **Recover** > **Scan and Recover Storage Space** .
   A confirmation message appears.
9. Click **OK**.
   QTS scans the RAID enclosure for storage pools and static volumes, and then displays them on the **Recover Wizard** window.
10. Click **Apply**.

QTS makes all storage pools, volumes, and LUNs on the RAID enclosure available on the target NAS at **Storage & Snapshots** > **Storage** > **Storage/Snapshots.** .

External RAID Device Health

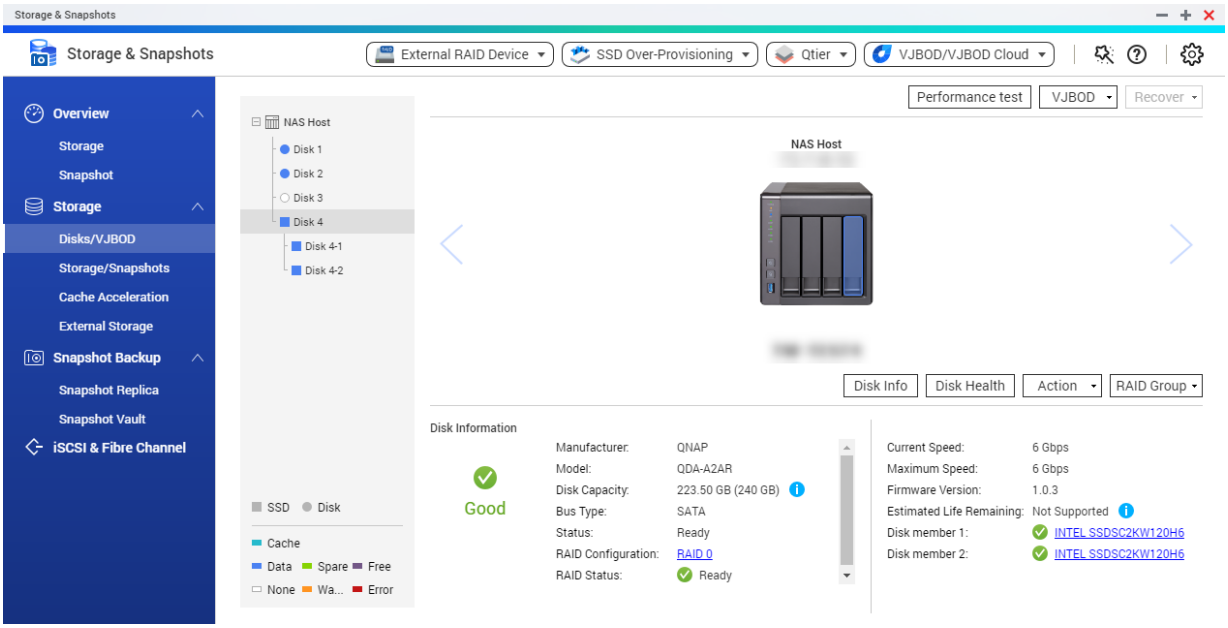
RAID Enclosure Health

To view the status and heath of RAID enclosures connected to the NAS, go to **Main Menu** > **Storage & Snapshots** > **Storage** > **Disks/VJBOD** .



Drive Adapter Health

To view the status and heath of drive adapters and the disks installed in it, go to **Main Menu** > **Storage & Snapshots** > **Storage** > **Disks/VJBOD** .



Updating External RAID Device Firmware in QTS

1. Go to **Main Menu** > **Storage & Snapshots** .
2. Click **External RAID Device** and then select **External RAID Management**.
   The **External RAID Management** window opens.
3. Select a RAID device.
4. Click **Check for Update**.
   The **Firmware Management** window opens. QTS checks online for the latest device firmware.
5. Select a firmware update method.

Firmware Update Method	Description
Install the latest firmware version	Download and install the latest version of the device firmware. **Note** You can only select this option if QTS has checked online and found a newer firmware version than the one currently installed on the device.
Select a local firmware file	Update the firmware using a local firmware IMG file on your computer. Click **Browse** to select the file. **Tip** You can download firmware updates at https://download.qnap.com.

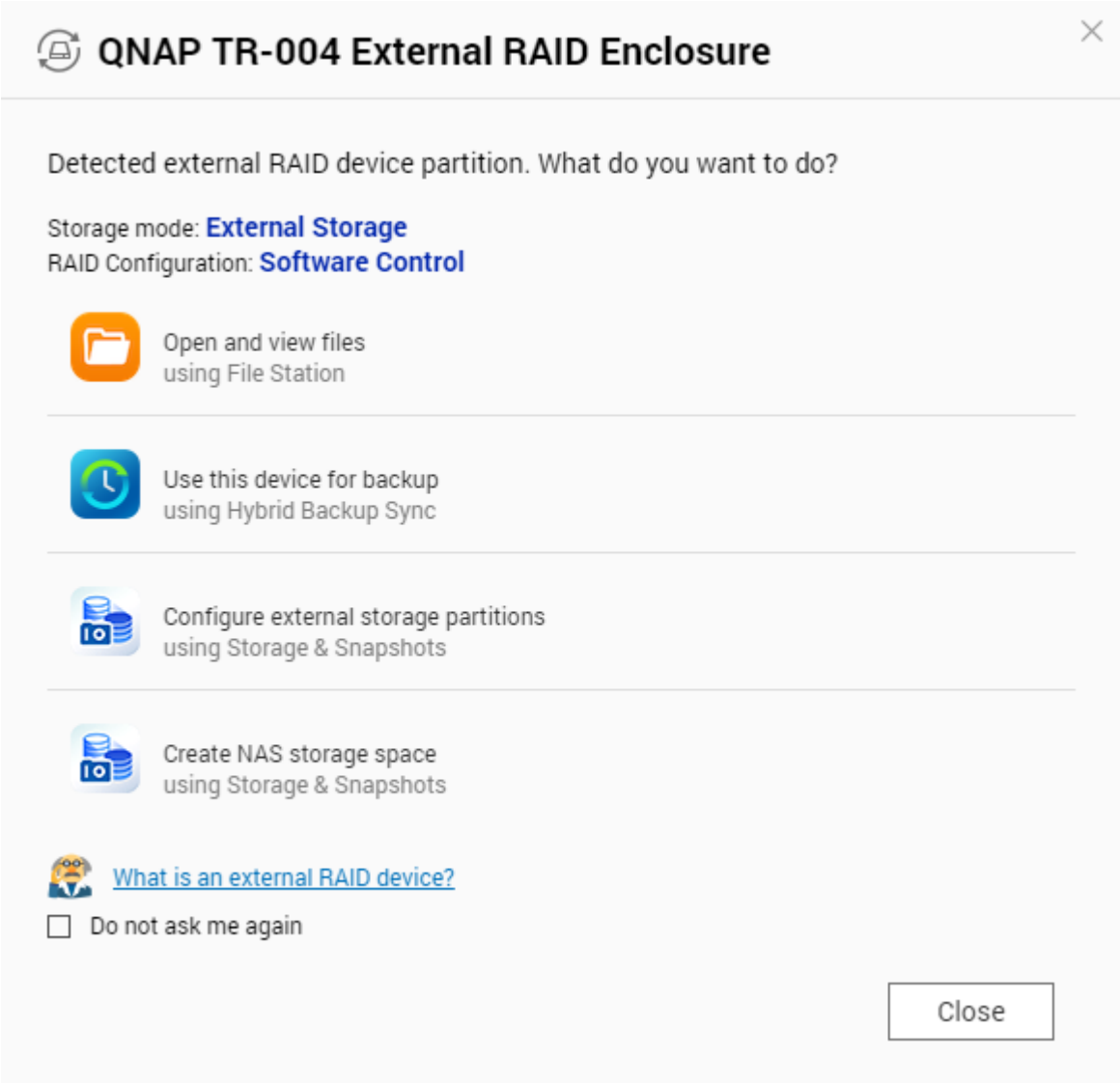
6. Click **Update**.

Warning
Do not power off or disconnect the RAID device unless prompted.

7. Follow the instructions to finish the firmware update.
   Depending on the model you may be asked to power off then power on the device, or disconnect then reconnect the device.
   QTS re-detects the device and displays a notification message.
8. Wait for confirmation that the firmware update has finished.
9. Go to **Storage & Snapshots** > **Storage** > **Disks/VJBOD** .
10. Click **Recover**, and then select **Scan and Recover Storage Space**.

The Autoplay Menu

The Autoplay menu opens when you connect a RAID enclosure to a NAS. The actions available in this menu vary depending on the enclosure's current storage mode and RAID configuration.



Action	Description
Open and view files	Opens the enclosure in **File Station**.
Use this device for backup	Opens **HBS**.
Configure external storage partitions	Opens **Storage & Snapshots** > **Storage** > **External Storage** . For more information, see Configuring a RAID Enclosure as an External Storage Device.
Create NAS storage space	Opens **Storage & Snapshots** > **Storage** > **Storage/Snapshots** . For more information, see: • Creating a Storage Pool on a RAID Enclosure • Creating a Static Volume on a RAID Enclosure
Edit access permissions	Opens the **Edit Shared Folder Permissions** window to edit access permissions for this device.