



QNAP

RAID Enclosure

TR-104CT

TR-106CT

TR-108CT

User Guide

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1. Preface





About This Guide

This guide provides information on the QNAP TR-104CT, TR-106CT, and TR-108CT RAID enclosures and step-by-step instructions on installing the hardware. It also provides instructions on basic operations and troubleshooting information.

Audience

This document is intended for consumers and storage administrators. This guide assumes that the user has a basic understanding of storage and backup concepts.

Document Conventions

Symbol	Description
	Notes provide default configuration settings and other supplementary information.
	Important notes provide information on required configuration settings and other critical information.
	Tips provide recommendations or alternative methods of performing tasks or configuring settings.
	Warnings provide information that, when ignored, may result in potential loss, injury, or even death.

2. Product Overview

This chapter provides basic information about the QNAP TR-104CT, TR-106CT, and TR-108CT RAID enclosures.

About QNAP RAID Enclosures

QNAP RAID enclosures are designed to increase the capacity and utility of your NAS or computer. They provide RAID and JBOD support for added compatibility and security across multiple platforms. For quick and efficient data transfer, the TR-104CT, TR-106CT, and TR-108CT feature two Type-C ports that support USB 3.2 Gen 2 and Thunderbolt™ 3, and are compatible with Thunderbolt™ 4.

Hardware Specifications





Warning



- If your QNAP product has hardware defects, return the product to QNAP or a QNAP-authorized service center for maintenance or replacement. Any attempt to repair or perform maintenance procedures on the product by you or an unauthorized third party invalidates the warranty.
- QNAP is not responsible for any damage or data loss caused by unauthorized modifications and installation of unsupported third-party applications.
- For details, see the [QNAP Warranty Terms and Conditions](#).



Tip

Model specifications are subject to change without prior notice. To see the latest specifications, go to <https://www.qnap.com>.

Component	TR-104CT	TR-106CT	TR-108CT
Storage			
Drive bays	4 x 3.5-inch SATA 6 Gbps	6 x 3.5-inch SATA 6 Gbps	8 x 3.5-inch SATA 6 Gbps
	 Note The drive bays are backward compatible with SATA 3 Gbps drives.		
Drive compatibility	<ul style="list-style-type: none"> • 3.5-inch SATA hard disk drives • 2.5-inch SATA hard disk drives • 2.5-inch SATA solid-state drives  Note The RAID enclosure does not support the QNAP QDA-A2AR and QDA-A2MAR drive adapters.		
Hot-swapping	Supported		
External I/O Ports & Expansion Slots			


Component	TR-104CT	TR-106CT	TR-108CT
Type-C ports	2 x Thunderbolt™ 3 / USB 3.2 Gen 2		
	 Note <ul style="list-style-type: none"> • These ports are compatible with Thunderbolt 4. • Only port 1 (the top port) supports a connection to a host device with USB 3.2 Gen 1 or above. • These ports have a power delivery of 15W to compatible Thunderbolt and USB devices. 		
Interface			
Display panel	Monochrome backlit LCD display		
Buttons	<ul style="list-style-type: none"> • LCD enter • LCD select • Power 		
Dimensions			
Form factor	Tower		
Dimensions (H x W x D)	188.2 x 199.3 x 279.6 mm (7.4 x 7.8 x 11.0 in)	188.2 x 264.3 x 279.6 mm (7.4 x 10.4 x 11.0 in)	188.2 x 329.3 x 279.6 mm (7.4 x 12.9 x 11.0 in)
Net weight	4.59 kg (10.11 lbs)	5.35 kg (11.79 lbs)	6.32 kg (13.93 lbs)
Others			
Power supply unit	250W, 100-240V AC, 50/60 Hz		
Sound level	20 dB(A)	19.9 dB(A)	21.1 dB(A)
	 Note <p>The sound level was tested at a bystander position, which is within one meter of the device. The test device operated at low speed with the maximum number of drives installed.</p>		
Fans	System: 1 x 120 mm, 12V DC fan	System: 2 x 92 mm, 12V DC fan	System: 2 x 120 mm, 12V DC fan
Operating temperature	0°C to 40°C (32°F to 104°F)		
Relative humidity	<ul style="list-style-type: none"> • Non-condensing relative humidity: 5% to 95% • Wet-bulb temperature: 27°C (80.6°F) 		
Security slot	Kensington security slot		

**Tip**

For the list of compatible drive models, go to <https://www.qnap.com/compatibility>.

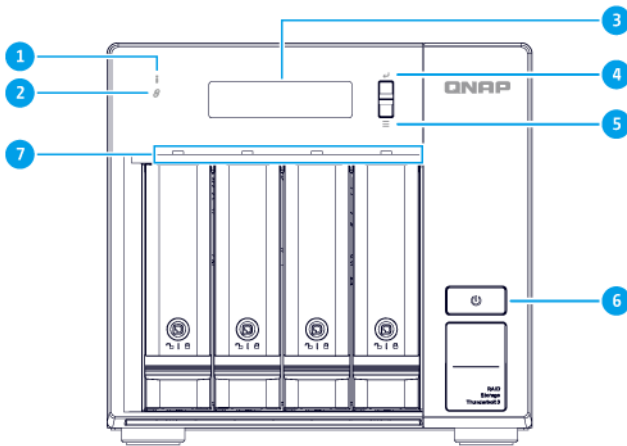
Package Contents

Item	Quantity
RAID enclosure	1
Power cord	1
USB 3.2 Gen 2 Type-C to Type-A connector cable	1

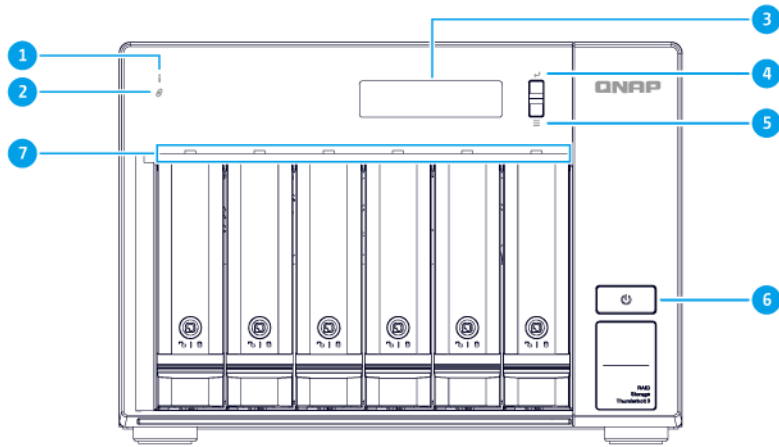
Item	Quantity
Thunderbolt™ 3 cable  Important The Thunderbolt 3 cable included in the package does not support a USB connection.	1
Drive tray keys	2
Cable clips	2
Screws for 2.5-inch drives	<ul style="list-style-type: none"> • TR-104CT: 12 • TR-106CT: 18 • TR-108CT: 24
Screws for 3.5-inch drives	<ul style="list-style-type: none"> • TR-104CT: 16 • TR-106CT: 24 • TR-108CT: 32
Quick Installation Guide (QIG)	1

Components

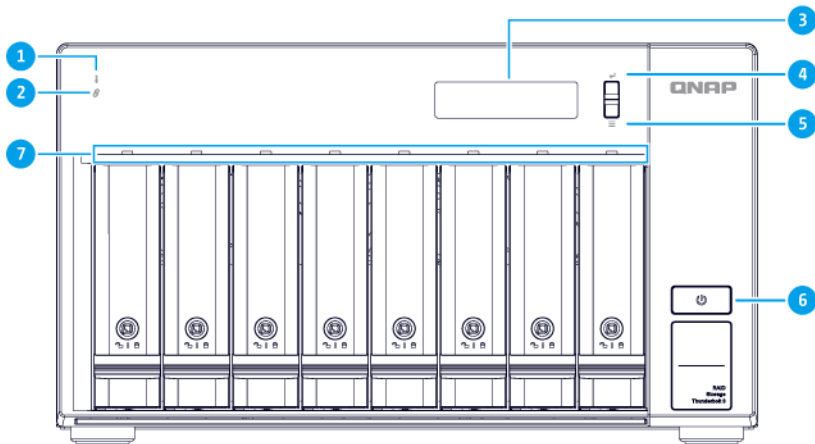
Front Panel



TR-104CT



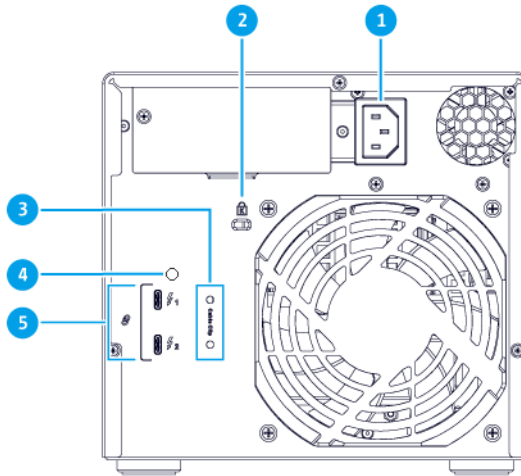
TR-106CT



TR-108CT

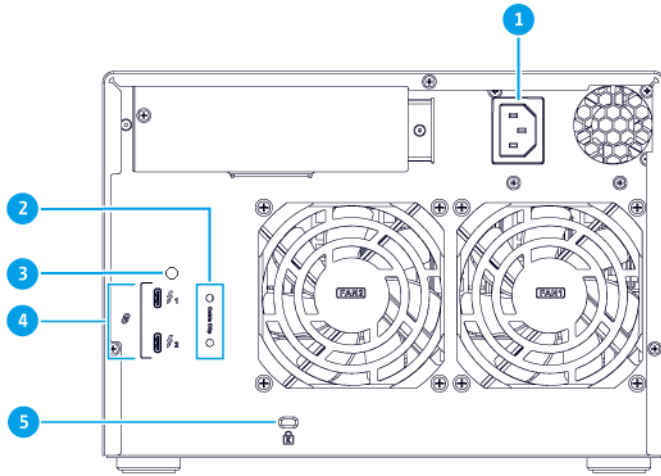
No.	Component	No.	Component
1	Status LED	5	LCD select button
2	Link LED	6	Power button
3	LCD panel	7	Drive LEDs
4	LCD enter button	-	-

Rear Panel

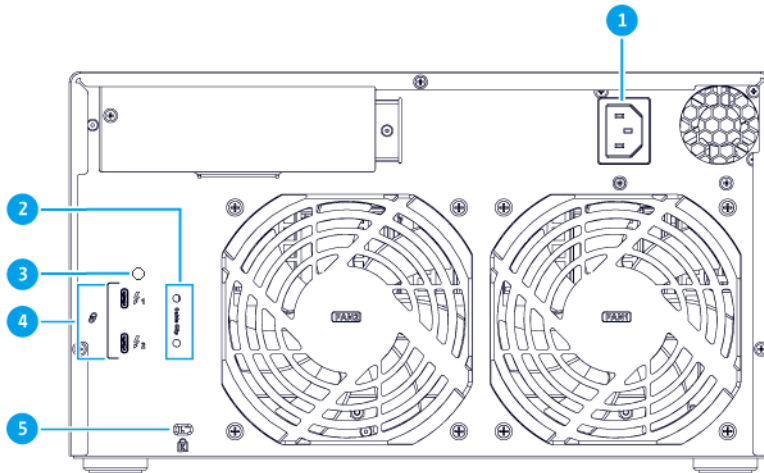


TR-104CT

No.	Component	No.	Component
1	Power port	4	Console port <div style="display: inline-block; vertical-align: middle;"> </div> Note This port is only for engineering purposes and may not be present.
2	Kensington security slot	5	Type-C ports <div style="display: inline-block; vertical-align: middle;"> </div> Note <ul style="list-style-type: none"> • These ports support USB 3.2 Gen 2 and Thunderbolt 3, and are compatible with Thunderbolt 4. Each port has a power delivery of 15W. • Only port 1 (the top port) supports a connection to a host device with USB 3.2 Gen 1 or above. • Port 1 is the upstream port. • Port 2 is the downstream port.
3	Cable clip slots	-	-



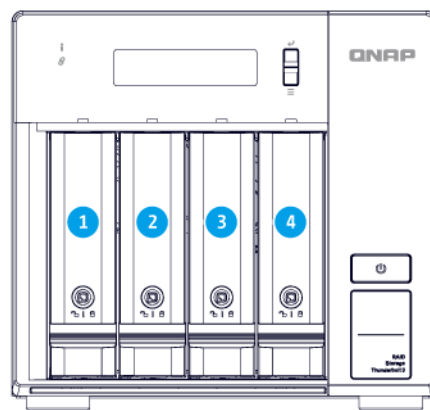
TR-106CT



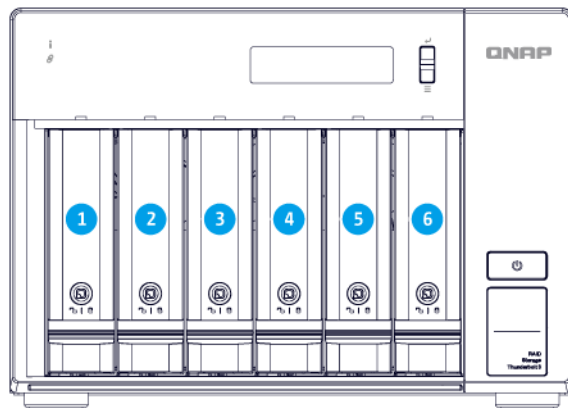
TR-108CT

No.	Component	No.	Component
1	Power port	4	Type-C ports <div style="border-left: 2px solid #0070C0; padding-left: 10px; margin-top: 10px;"> <p>Note</p> <ul style="list-style-type: none"> These ports support USB 3.2 Gen 2 and Thunderbolt 3, and are compatible with Thunderbolt 4. Each port has a power delivery of 15W. Only port 1 (the top port) supports a connection to a host device with USB 3.2 Gen 1 or above. Port 1 is the upstream port. Port 2 is the downstream port. </div>
2	Cable clip slots	5	Kensington security slot
3	Console port <div style="border-left: 2px solid #0070C0; padding-left: 10px; margin-top: 10px;"> <p>Note</p> <p>This port is only for engineering purposes.</p> </div>	-	-

Drive Numbering



TR-104CT

**TR-106CT****TR-108CT**

Safety Information

The following instructions help ensure personal safety and environmental safety. Read these instructions carefully before performing any operation.

General Instructions

- The device should be stored in a secure location with restricted access, controlled through the use of a tool, lock and key, or any means of security.
- Only qualified, skilled, and authorized persons with knowledge of all restrictions, safety precautions, and installation and maintenance procedures should have physical access to the device.

- To avoid potential injury or damage to components, ensure that the drives and other internal system components have cooled before touching them.
- Observe electrostatic discharge (ESD) procedures to avoid potential injury or damage to components.

Power

- To reduce the risk of fire or electric shock, ensure that you only connect the power cord to a properly grounded electrical outlet.



Devices with redundant power supply may have one or more power supply unit (PSU) cords. To avoid serious injuries, a trained service technician must disconnect all PSU cords from the device before installing or replacing system components.

System Battery

- To avoid potential battery explosion, causing injury or damage to components, ensure that you replace the existing battery with a battery of the same type.
- Dispose of used batteries properly according to local regulations or the instructions of the battery manufacturer.

Moving Parts




Moving fan blades: Keep your body parts away from moving fan blades while the device is connected to a power source.



Moving components: Keep your body parts away from other moving components.

Installation Requirements

Category	Item
Environment	<ul style="list-style-type: none"> • Room temperature: 0°C to 40°C (32°F to 104°F) • Non-condensing relative humidity: 5% to 95% • Wet-bulb temperature: 27°C (80.6°F) • Flat, anti-static surface without exposure to direct sunlight, liquids, or chemicals

Category	Item
Hardware and peripherals	<ul style="list-style-type: none"> • NAS or computer • Storage drives <p> Tip For the list of compatible drive models, go to https://www.qnap.com/compatibility.</p> <ul style="list-style-type: none"> • Network cable
Tools	<ul style="list-style-type: none"> • Phillips #1 or #2 screwdriver • Anti-static wrist strap

Setting Up the RAID Enclosure



Note

Read all safety requirements and information in [Safety Information](#) carefully before setting up the RAID enclosure or installing RAID components.

1. Place the RAID enclosure in an environment that meets the requirements.
For details, see [Installation Requirements](#).
2. Install the drives.
For details, see the following topics:
 - [Installing 3.5-inch Drives on 3.5-inch Trays](#)
 - [Installing 2.5-inch Drives on 3.5-inch Trays](#)
3. Connect the power cord.
4. Connect the RAID enclosure to your NAS or computer.
For details, see the following topics:
 - [Connecting the RAID Enclosure to a NAS](#)
 - [Connecting the RAID Enclosure to a Thunderbolt™ 3 NAS](#)
 - [Connecting the RAID Enclosure to a Computer](#)
 - [Connecting the RAID Enclosure to a Thunderbolt™ 3 Computer](#)
5. Power on the RAID enclosure.



Note

The RAID enclosure automatically powers on when the Thunderbolt host is also on.

6. Optional: Configure the RAID settings.
For details, see [RAID Configuration and Management](#).

3. Hardware Installation

This section provides information on installing drives, connecting the RAID enclosure to a NAS or computer, and attaching the USB cable clip.

Drive Installation

QNAP RAID enclosures are compatible with 3.5-inch and 2.5-inch hard drives and 2.5-inch solid-state drives.

Installing 3.5-inch Drives on 3.5-inch Trays



Warning

- Observe electrostatic discharge (ESD) procedures to avoid damage to components.

-



Moving fan blades: Keep your hands and other body parts away from moving fan blades.

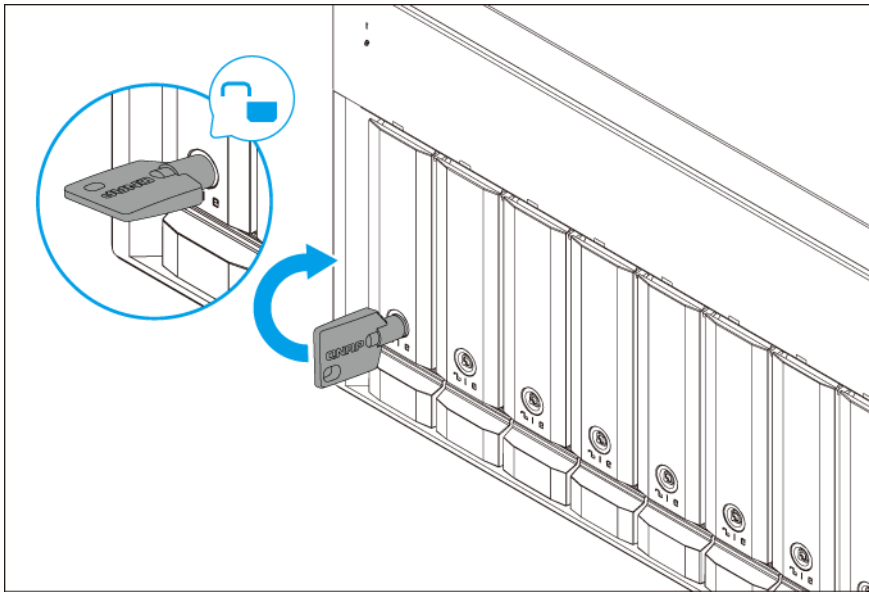
-



Other moving components: Keep your hands and other body parts away from other moving components.

- Installing a drive deletes all data on the drive.

1. Power off the RAID enclosure.
2. Remove the drive tray.
 - a. Optional: Unlock the tray.

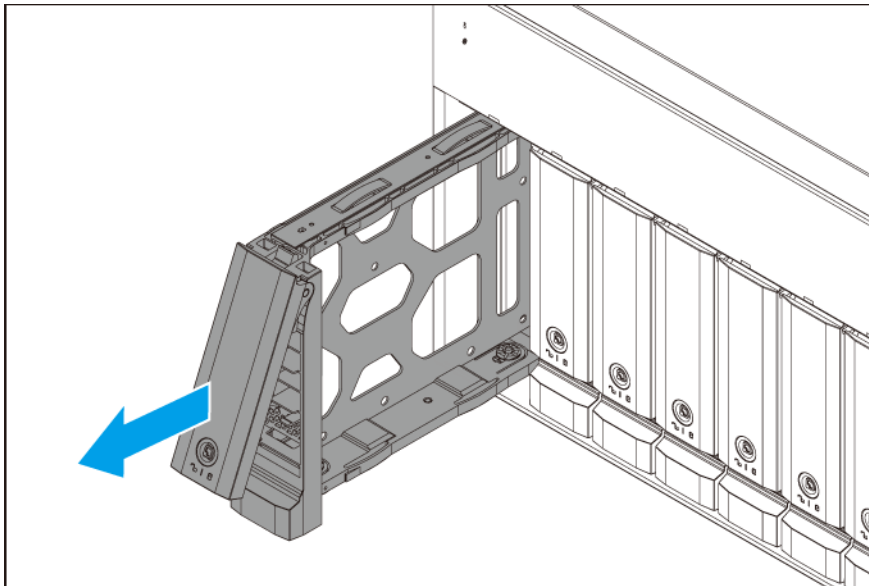
**Note**

The preinstalled drive trays come unlocked.

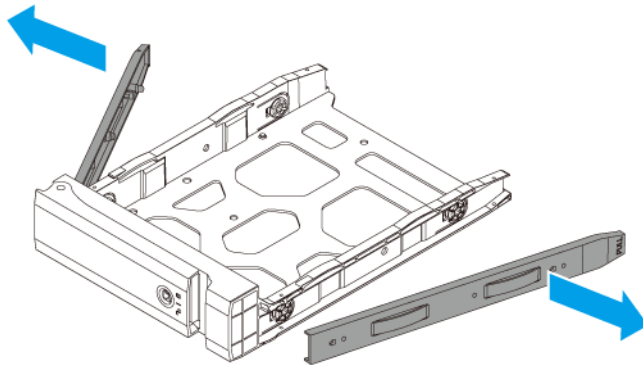
**Important**

Ensure the drive tray keys are stored in a safe place.

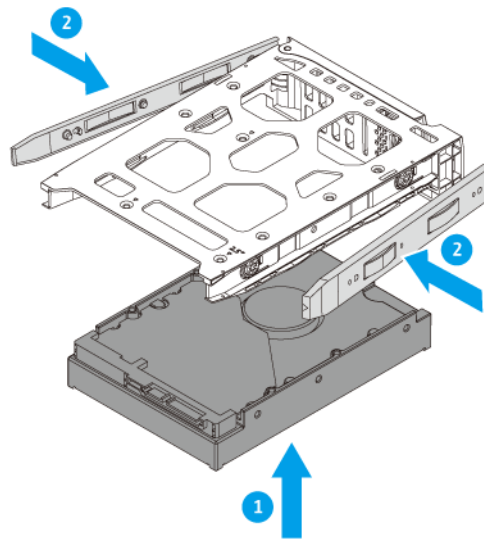
- b. Pull the handle to release the tray.
- c. Pull the tray out.

**3. Install a drive on the tray.**

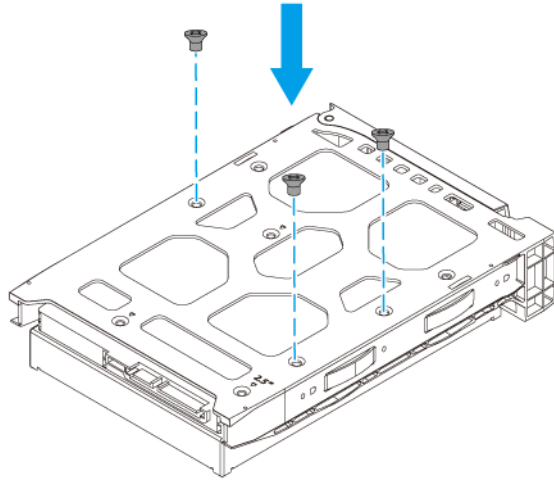
- a. Remove the fastening panels from the sides of the drive tray.



- b. Place the drive on the tray so that the holes on the sides of the drive are aligned with the holes on the sides of the tray.
- c. Attach the fastening panels to lock the drive to the tray.

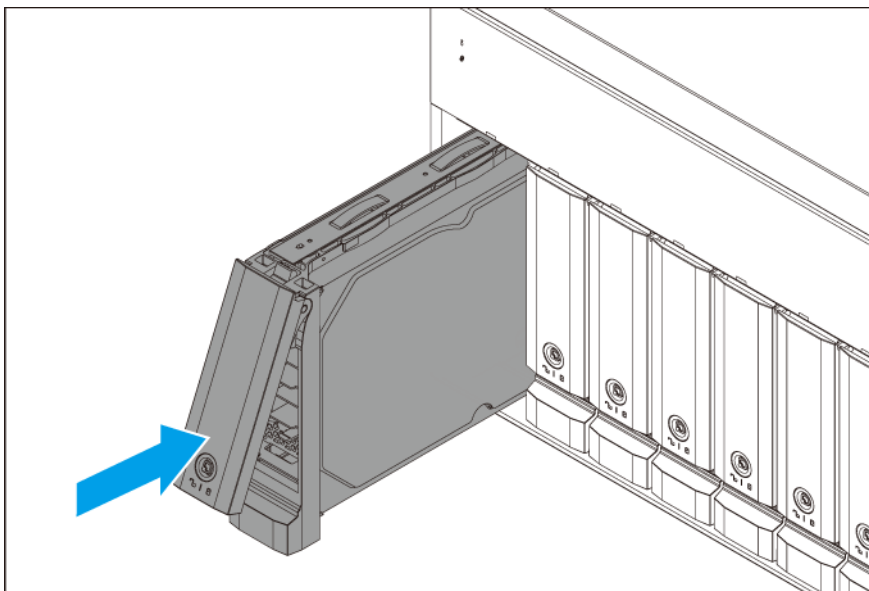


- d. Optional: Attach the screws to further secure the drive.

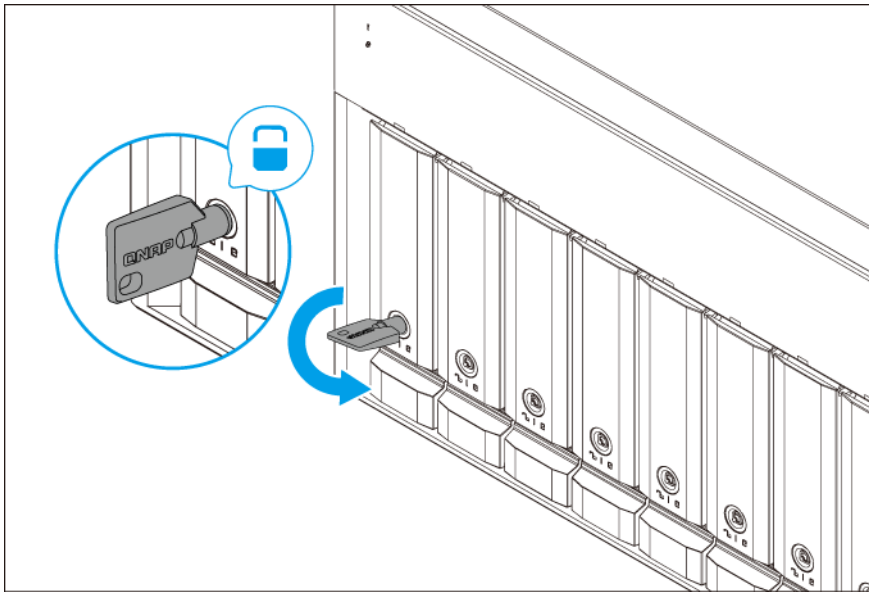
**Important**

QNAP recommends attaching the screws to the drive trays during transport.

4. Load the tray into the bay.
 - a. Insert the tray into the bay.
 - b. Push the handle.



- c. Optional: Lock the tray.



5. Power on the RAID enclosure.



Important

The RAID enclosure may take up to 30 seconds to detect the new device.

Installing 2.5-inch Drives on 3.5-inch Trays



Warning

- Observe electrostatic discharge (ESD) procedures to avoid damage to components.

-



Moving fan blades: Keep your hands and other body parts away from moving fan blades.

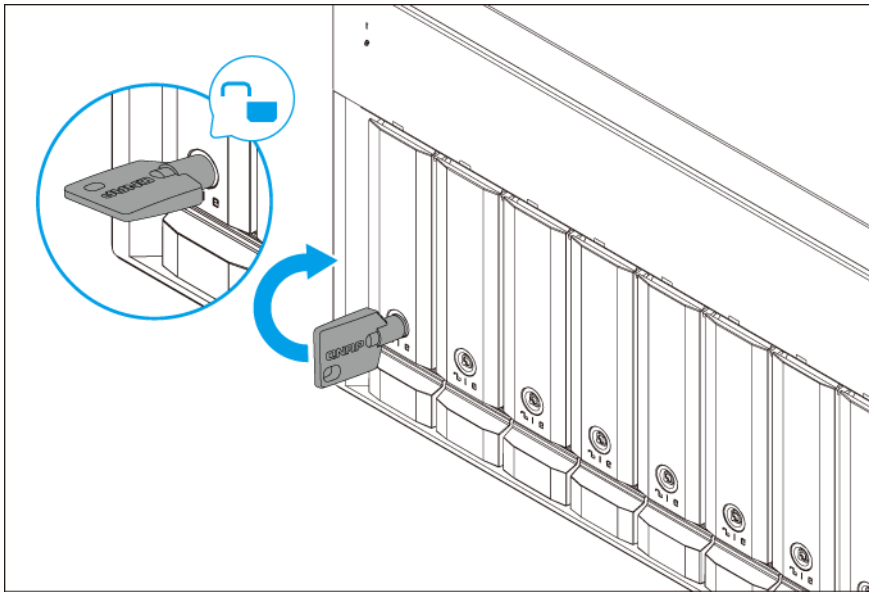
-



Other moving components: Keep your hands and other body parts away from other moving components.

- Installing a drive deletes all data on the drive.

1. Power off the RAID enclosure.
2. Remove the drive tray.
 - a. Optional: Unlock the tray.

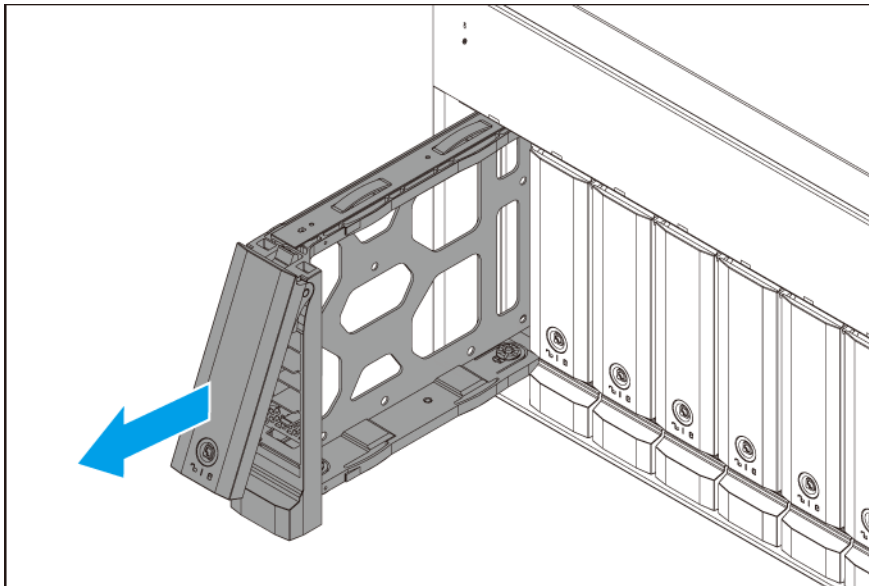
**Note**

The preinstalled drive trays come unlocked.

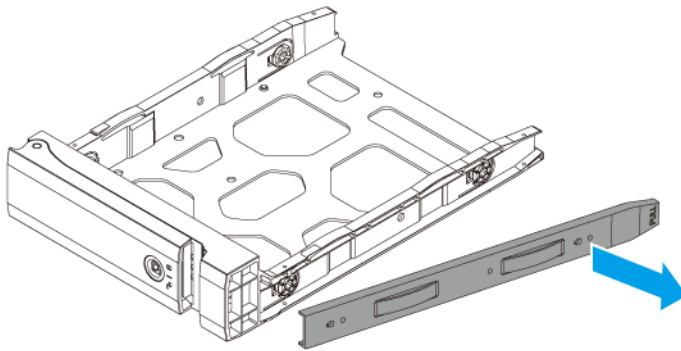
**Important**

Ensure the drive tray keys are stored in a safe place.

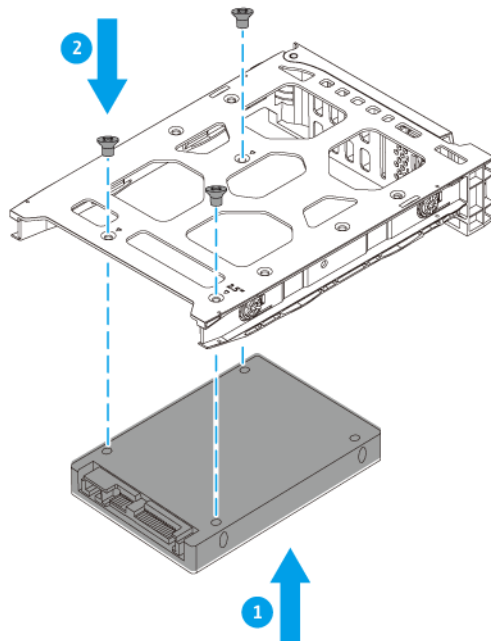
- b. Pull the handle to release the tray.
- c. Pull the tray out.

**3. Install a drive on the tray.**

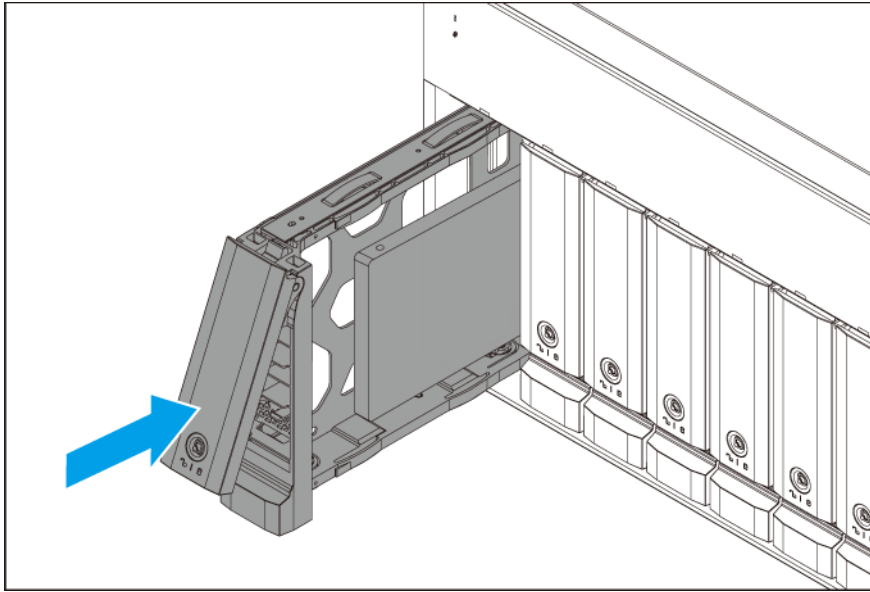
- a. Remove the right fastening panel from the drive tray.



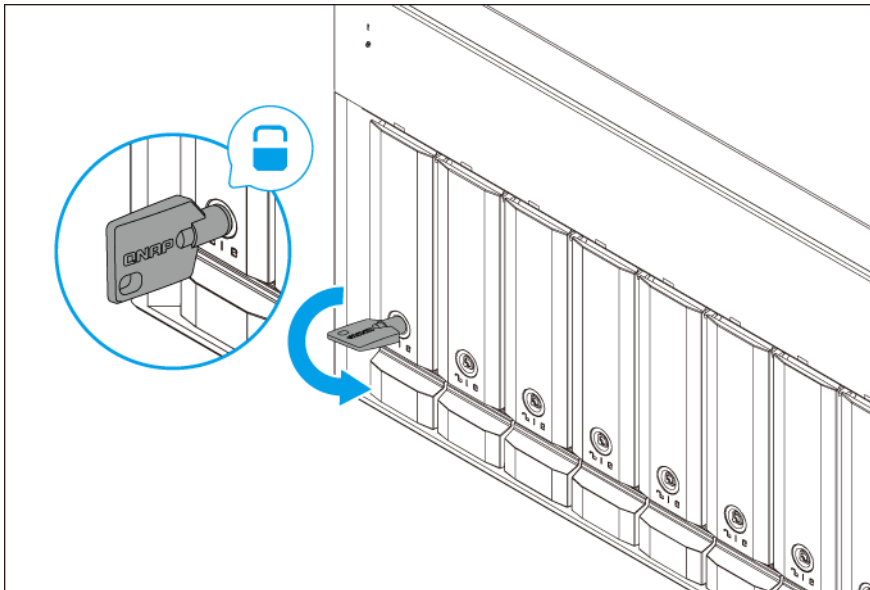
- b.** Place the drive on the tray so that the holes on the bottom of the drive are aligned with the holes on the bottom of the tray.
- c.** Attach the screws.



- 4.** Load the tray into the bay.
 - a.** Insert the tray into the bay.
 - b.** Push the handle.



c. Optional: Lock the tray.



5. Power on the RAID enclosure.



Important

The RAID enclosure may take up to 30 seconds to detect the new device.

RAID Enclosure Connections

The TR-104CT, TR-106CT, and TR-108CT can connect to a NAS or a computer using a USB, Thunderbolt™ 3, or Thunderbolt™ 4 cable.



Important

- USB ports on computers or PCIe expansion cards using the ASMedia ASM3142 USB controller (such as the QNAP QXP-10G2U3A expansion card) are not compatible with the enclosures.
- Only port one supports a connection to a host device with a USB 3.2 Gen 1 or above. If you connect a USB host device to port two on the RAID enclosure, the connection to port one will not work. To transfer data through port one, disconnect the unsupported USB connection in port two. If the host cannot detect the RAID enclosure, reboot the host device and the RAID enclosure.
- The topology allows only one host to transfer data through one interface at a time. To transfer data through the second connection, disconnect the first connection.
- If the RAID enclosure has a power outage while it is on and using a USB connection, the device will not automatically turn on after recovering power. To turn on the RAID enclosure, press the power button.

Connecting the RAID Enclosure to a NAS

The NAS must run QTS 4.5.3 (or later) or QuTS hero h5.0.0 (or later).

For details on the maximum number of supported devices, go to <https://www.qnap.com/go/compatibility-expansion>.



Important

Before starting this task, ensure that the RAID enclosure is off. For details, see [Power Button](#).

1. Connect the RAID enclosure to the NAS.
 - a. Connect a USB cable to the USB 3.2 Type-C port (port one) on the RAID enclosure.
 - b. Connect the USB cable to a USB port on the NAS.



Note

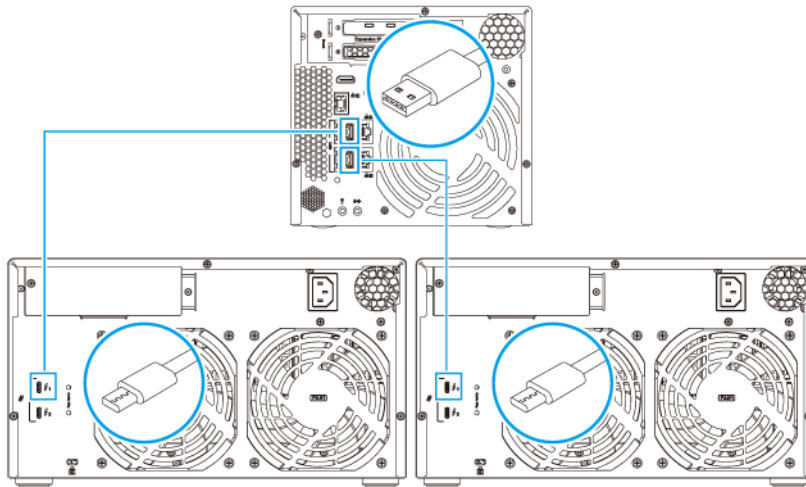
QNAP recommends connecting to a USB port on the rear panel of the NAS to ensure an optimal connection.

- c. Optional: Connect a second RAID enclosure to the NAS.
- d. Optional: Connect a USB device to the RAID enclosure.



Note

The maximum transfer rate of the USB device connected to port two is 480 Mbps.



2. Power on the RAID enclosure.
3. Verify that the RAID enclosure is recognized by the NAS.
 - a. Log on to QTS or QuTS hero as administrator.
 - b. Go to **Main Menu > Storage & Snapshots > Overview > Storage** .
 - c. Verify that the RAID enclosure is listed.

Connecting the RAID Enclosure to a Thunderbolt™ 3 NAS

The NAS must run QTS 4.5.3 (or later) or QuTS hero h5.0.0 (or later).

For details on the maximum number of supported devices, go to <https://www.qnap.com/go/compatibility-expansion>.



Important

- Before starting this task, ensure that the RAID enclosure is off. For details, see [Power Button](#).
- If the RAID enclosure is off and connects to two Thunderbolt hosts, the port two connection is identified first when powering on the system.

1. Connect the RAID enclosure to the NAS.
 - a. Connect the Thunderbolt 3 cable to the Thunderbolt port on the RAID enclosure.
 - b. Connect the Thunderbolt 3 cable to a Thunderbolt port on the NAS.



Note

QNAP recommends connecting to a Thunderbolt port on the rear panel of the NAS to ensure an optimal connection.

- c. Optional: Connect additional Thunderbolt devices to the RAID enclosure.

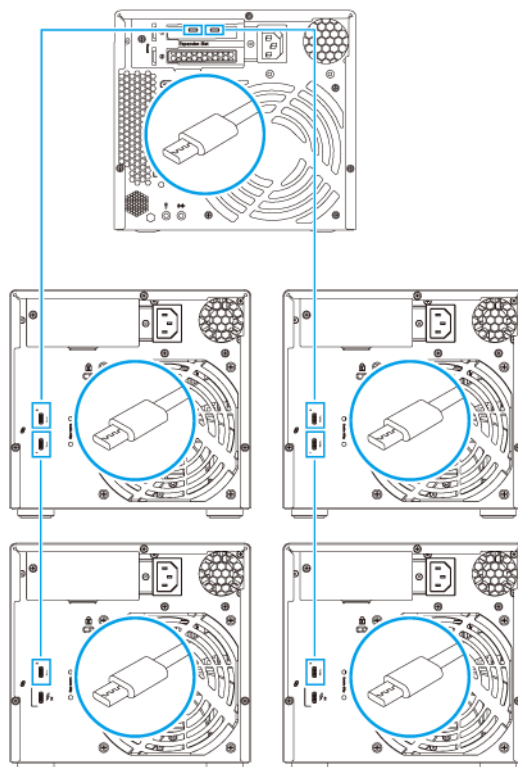
**Tip**

One Thunderbolt port supports up to seven Thunderbolt devices, including the host.

- d. Optional: Connect additional Thunderbolt devices to the NAS.
- e. Optional: Connect a USB device.

**Note**

- A USB-C device must be the last device because it automatically terminates this topology.
- The maximum transfer rate of the USB device connected to port two is 480 Mbps.



2. Optional: Power on the RAID enclosure.

**Note**

The RAID enclosure automatically powers on when the host device is also on.

3. Verify that the RAID enclosure is recognized by the NAS.
 - a. Log on to QTS or QuTS hero as administrator.
 - b. Go to **Main Menu > Storage & Snapshots > Overview > Storage** .
 - c. Verify that the RAID enclosure is listed.

Connecting the RAID Enclosure to a Computer



Important

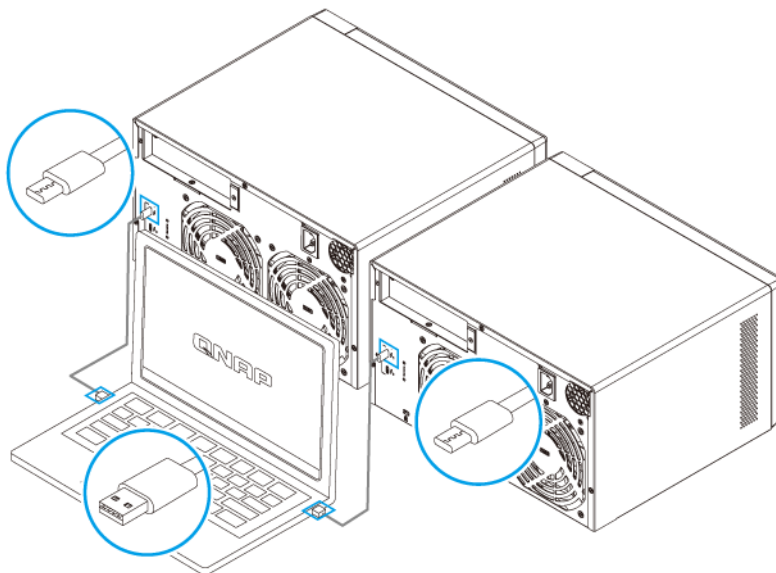
Before starting this task, ensure that the RAID enclosure is off. For details, see [Power Button](#).

1. Connect the RAID enclosure to a computer.
 - a. Connect a USB cable to the USB 3.2 Gen 2 Type-C port (port one) on the RAID enclosure.
 - b. Connect the USB cable to a USB port on the computer.
 - c. Optional: Connect additional RAID enclosures to the computer.
 - d. Optional: Connect a USB or Thunderbolt device to the RAID enclosure.



Note

The maximum transfer rate of the USB device connected to port two is 480 Mbps.



2. Power on the RAID enclosures.
3. Verify that the RAID enclosures are recognized by the computer.
 - a. Go to your computer's disk management utility or open QNAP External RAID Manager in Windows or macOS.
 - b. Verify that the RAID enclosures are listed.

Connecting the RAID Enclosure to a Thunderbolt™ 3 Computer



Important

- Before starting this task, ensure that the RAID enclosure is off. For details, see [Power Button](#).

- If the RAID enclosure is off and connects to two Thunderbolt hosts, the port two connection is identified first when powering on the system.
- If you use a Thunderbolt connection and both the host and the RAID enclosure are off, you have to wait at least 40 seconds to turn on the host device.

1. Connect the RAID enclosure to a computer.

- a. Connect the Thunderbolt 3 cable to the Thunderbolt port on the RAID enclosure.
- b. Connect the Thunderbolt 3 cable to a Thunderbolt port on the computer.
- c. Optional: Connect additional Thunderbolt devices to the RAID enclosure.



Tip

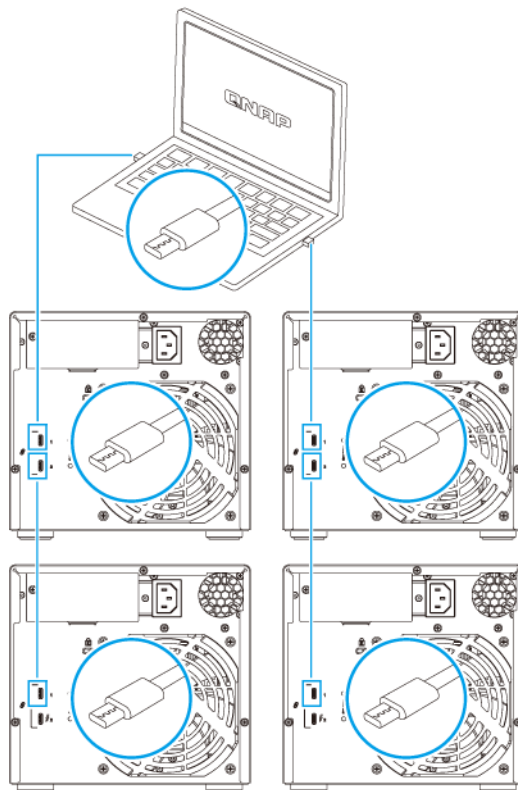
One Thunderbolt port supports up to seven Thunderbolt devices, including the host.

- d. Optional: Connect additional Thunderbolt devices to the computer.
- e. Optional: Connect a USB device.



Note

- A USB-C device must be the last device because it automatically terminates this topology.
- The maximum transfer rate of the USB device connected to port two is 480 Mbps.



**Note**

One Thunderbolt port supports up to seven Thunderbolt devices, including the host.

2. Optional: Power on the RAID enclosure.

**Note**

The RAID enclosure automatically powers on when the host device is also on.

3. Verify that the RAID enclosures are recognized by the computer.
 - a. Go to your computer's disk management utility or open QNAP External RAID Manager in Windows or macOS.
 - b. Verify that the RAID enclosures are listed.

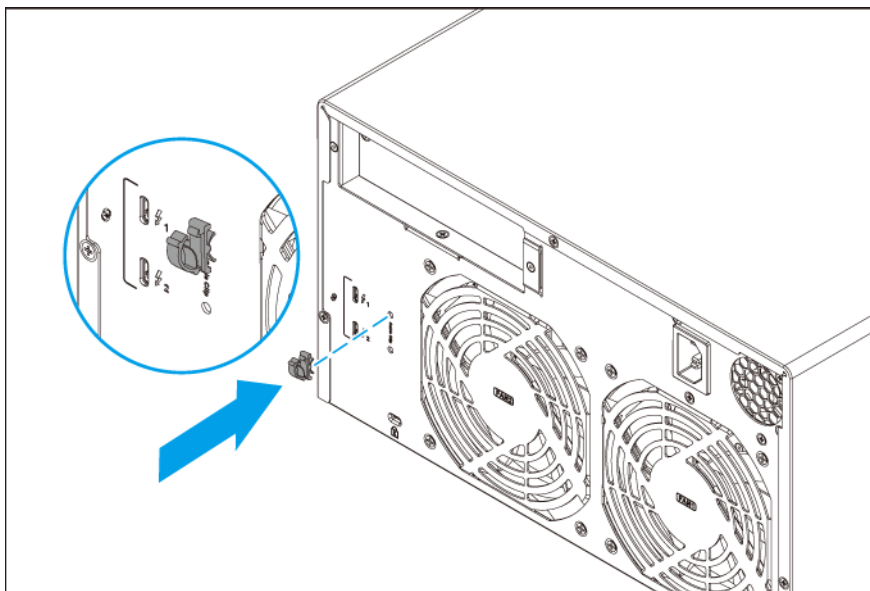
Attaching the Cable Clip

This task is optional.

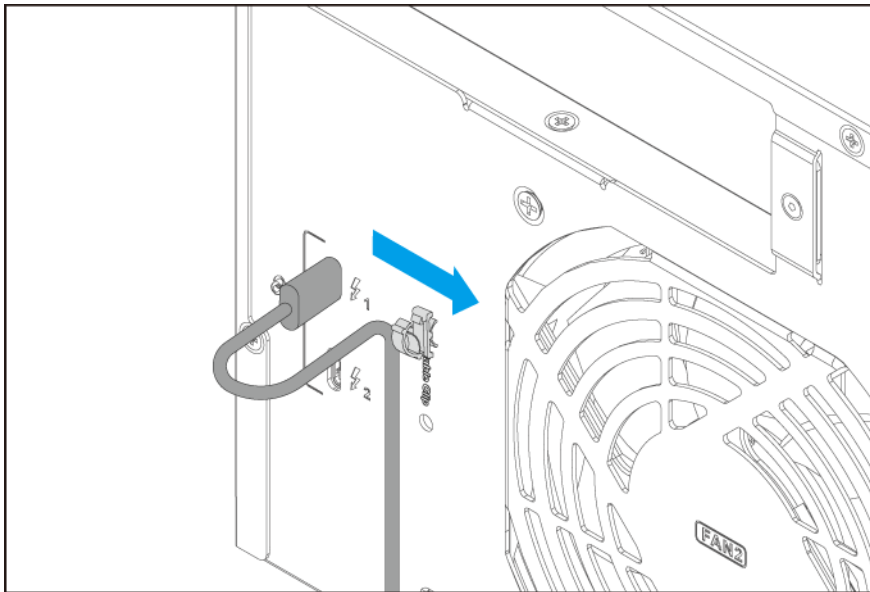
**Important**

- The cable clip keeps the cable near the enclosure to avoid potential damage to the cable or any nearby components.
- The clip is not intended to be removed after attaching it to the RAID enclosure.

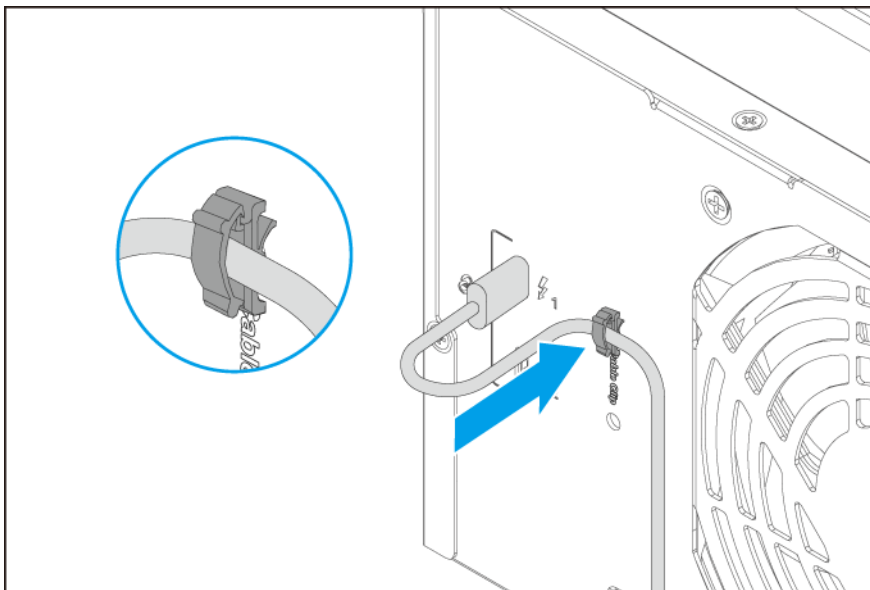
1. Disconnect the cables.
2. Power off the RAID enclosure.
 - a. Press the power button for four seconds.
3. Insert the cable clip into the cable clip slot.



4. Insert the cable into the clip.

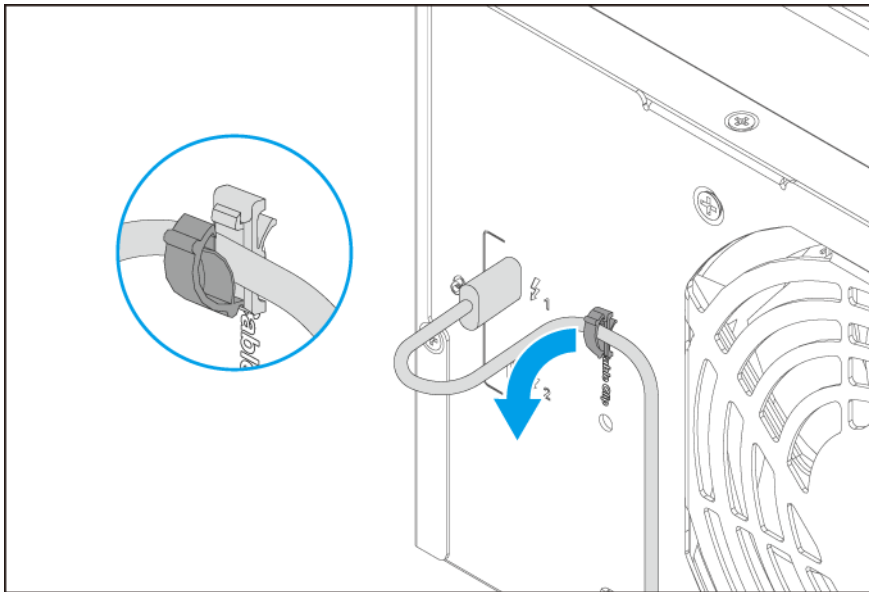


5. Fasten the clip to secure the cable.

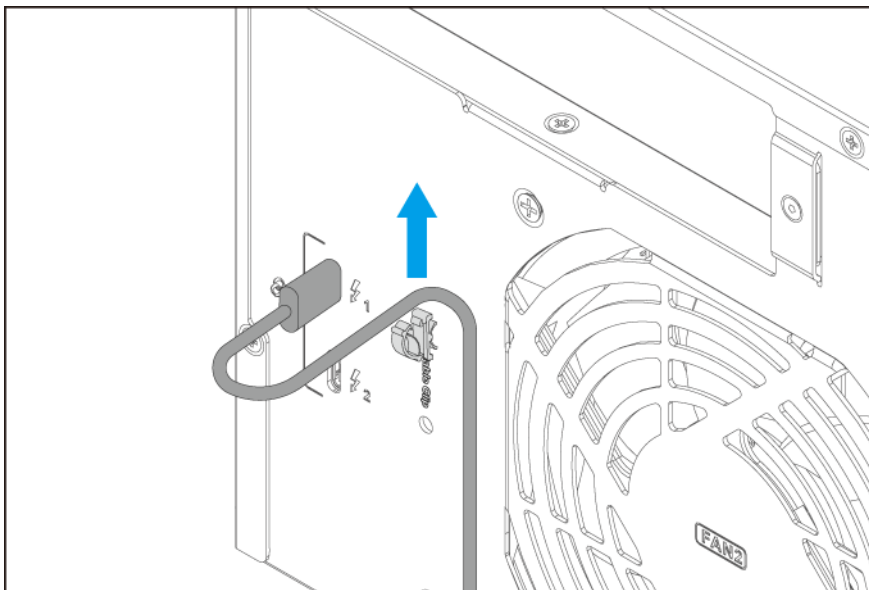


Removing a Cable from the Cable Clip

1. Release the cable clip.



2. Remove the cable from the clip.



4. RAID Configuration and Management

This section provides information on RAID configuration, RAID capacity expansion, and RAID migration.



Important

The following situations will interrupt the connection to the RAID enclosure, causing data being written to the drives to be lost.

- Creating or deleting a RAID group while another RAID group or disk is in use
- RAID group failure (excluding degraded mode), or adding or removing a RAID group while another RAID group is in use

Supported RAID Types


QNAP external RAID enclosures support several RAID types.



Important

- When disks with different capacities are combined in one RAID group, all disks function according to the capacity of the smallest disk. For example, if a RAID group contains five 2 TB disks and one 1 TB disk, the total capacity will be 6 TB.
- You can only use one disk type (HDD or SSD) in a RAID group. Combining different types of disks in one RAID group is not supported.
- QNAP recommends creating separate RAID groups for each capacity and type of disk.


RAID Type	Number of Disks	Description	Compatibility
JBOD (Just a Bunch of Disks)	2 or more	<ul style="list-style-type: none"> • JBOD combines disks together in a linear fashion. The system writes data to a disk until it is full, and then writes to the next disk. • JBOD allows all of the disks capacity to be used, but does not provide any disk failure protection or performance benefits. • Unless you have a specific reason to use JBOD, use RAID 0 instead. 	<ul style="list-style-type: none"> • TR-104CT • TR-106CT • TR-108CT
RAID 0	2 or more	<ul style="list-style-type: none"> • Disks are combined together using striping. • RAID 0 offers the fastest read/write speeds and uses the total capacity of all the disks. • RAID 0 provides no disk failure protection. This RAID type must be paired with a data backup plan. • RAID 0 is recommended for high performance applications such as video editing. 	<ul style="list-style-type: none"> • TR-104CT • TR-106CT • TR-108CT

RAID Type	Number of Disks	Description	Compatibility
RAID 1	2	<ul style="list-style-type: none"> • An identical copy of data is stored on two disks. If either disk fails, data can still be read from the other disk. • Half of the total disk capacity is lost, in return for a high level of data protection. • RAID 1 is recommended if you have two disks. <p> Important Deleting a RAID 1 group does not format the drives.</p>	<ul style="list-style-type: none"> • TR-104CT • TR-106CT • TR-108CT
RAID 5	3 or more	<ul style="list-style-type: none"> • Data and parity information are striped across all disks. • The capacity of one disk is lost for parity. This means that if any one disk fails, it can be replaced and the data on it can be restored. • Striping means read speeds are increased with each additional disk. • RAID 5 is recommended for a good balance between data protection and speed. 	<ul style="list-style-type: none"> • TR-104CT • TR-106CT • TR-108CT
RAID 6	4 or more	<ul style="list-style-type: none"> • Data and parity information are striped to two drives. • RAID 6 provides better data redundancy and increased performance than RAID 5. • RAID 6 is recommended for a standard web server as the read speed is as fast as RAID 5. 	<ul style="list-style-type: none"> • TR-104CT • TR-106CT • TR-108CT
RAID 10	4	<ul style="list-style-type: none"> • Every two disks are paired using RAID 1 for failure protection. Then the pairs are striped together using RAID 0. • RAID 10 provides excellent random read/write speeds and high failure protection, but half the total disk capacity is lost. • RAID 10 is recommended for application or database storage. 	<ul style="list-style-type: none"> • TR-104CT • TR-106CT • TR-108CT

Storage Modes and Platform Support

QNAP RAID enclosures support different storage modes for NAS devices and computers.

Storage Modes

Storage Mode	Description
NAS Storage	<p>Add storage capacity to a QNAP NAS by creating a storage pool or static volume.</p> <p> Important When using NAS expansion mode, the RAID enclosure cannot be used to expand an existing storage pool or static volume on the NAS.</p>
External Storage (for NAS)	Use the RAID enclosure as an external hardware RAID device with a NAS.
External Storage (for PC)	Use the RAID enclosure as an external hardware RAID device with a Windows or macOS computer.

Storage Modes and Platform Support

Configuration	NAS Storage Mode	PC Storage Mode	External Storage Mode
JBOD	Yes	Yes	Yes
RAID 0/1/5/6/10	Yes	Yes	Yes
Multiple RAID Groups	Yes	No	No

RAID Capacity Expansion

The TR-104CT, TR-106CT, and TR-108CT support RAID capacity expansion. The maximum storage capacity of a RAID group can be increased by adding new disks or replacing existing disks one by one, and can be performed while the RAID group is online and accessible to users.

This operation is supported in QTS, QuTS hero, and QNAP External RAID Manager. For details, see the respective operating system or software documentation.

RAID Migration

The TR-104CT, TR-106CT, and TR-108CT support RAID migration. The RAID type of an existing RAID group can be changed by adding new disks, and can be performed while the RAID group is online and accessible to users. The following migrations are possible:

Original RAID Type	New RAID Type	Additional Disks Required
Single	RAID 1	One
RAID 1	RAID 5	One or more
RAID 5	RAID 6	One or more



Tip




Migration from a single disk to RAID 6 is performed in stages. First migrate the group to RAID 1, then to RAID 5, and then finally to RAID 6.

RAID migration is supported in QTS, QuTS hero, and QNAP External RAID Manager. For details, see the respective operating system or software documentation.

5. Basic Operations

This chapter describes basic operations of the RAID enclosure.

Power Button

Operation	User Action	Result
Power on	Press the button once.	The device powers on.
Power off	<ol style="list-style-type: none"> Eject the RAID enclosure through the operating system. <p> Note This ensures that you do not lose data when powering off the RAID enclosure.</p> <ol style="list-style-type: none"> Disconnect the USB or Thunderbolt cable. Press the button for 4 seconds. 	The device powers off.
Force power off	<p> Tip Use this method only when the device is unresponsive.</p> <ol style="list-style-type: none"> Eject the RAID enclosure through the operating system. <p> Note This ensures that you do not lose data when powering off the RAID enclosure.</p> <ol style="list-style-type: none"> Disconnect the USB or Thunderbolt cable. Press the button for 15 seconds. 	The device powers off.

LCD Panel




This device has an LCD panel that allows you to view status information.



Tip

- Press **Enter** to view the JBOD enclosure name and firmware version.
- Press **Select** to browse status messages.


Message Type	System Message	Description
System Status	System Booting	The RAID enclosure is booting.
	Initializing	The RAID enclosure is initializing.
	Uninitialized	The RAID enclosure has uninitialized.
	Device Name {1}	{1}: RAID enclosure customized name
	{1} To {2}	A cable connects to a host. {1}: The Thunderbolt or USB cable {2}: Host server name
	{1} To Unknown Host	A cable connects to an unknown host. {1}: The Thunderbolt or USB cable
	Model Name {1}	{1}: RAID enclosure model name
	Fan Speed {1}	The fan speed setting has changed. {1}: Fan speed setting: <ul style="list-style-type: none"> • Auto • High • Medium • Low
	Group {1} (RAID {2}) {3}	A RAID group and the RAID group type are performing an action. <ul style="list-style-type: none"> • {1}: RAID group number • {2}: RAID type • {3}: RAID status

Message Type	System Message	Description
Event	{1} Connected To {2}	A TBT or USB cable is connected to a host. {1}: TBT/USB cable {2}: Host server name
	Fan Speed Set To {1}	The fan speed setting has changed. {1}: Fan speed setting <ul style="list-style-type: none"> • Auto • High • Medium • Low
	RAID Group {1} Rebuilding	A RAID group is rebuilding. {1}: RAID group number
	RAID Group {1} Migrating	A RAID group is migrating. {1}: RAID group number
	RAID Group {1} Scrubbing	A RAID group is scrubbing. {1}: RAID group number
	RAID Group {1} Synchronizing	A RAID group is synchronizing. {1}: RAID group number
	RAID Group {1} Read Only	A RAID group is set to read only. {1}: RAID group number
Error	Fan {1} Error	The fan is not functioning normally. {1}: Fan ID
	Temp. Warning	The RAID enclosure is overheated. <div style="display: flex; align-items: center;">  <div> <p>Note</p> <p>The default temperature warning threshold is 65°C.</p> </div> </div>
	Temp. Critical	The RAID enclosure is critically overheated. <div style="display: flex; align-items: center;">  <div> <p>Note</p> <p>The temperature critical threshold is 70°C.</p> </div> </div>
	RAID Group {1} Degraded	A RAID group has degraded. {1}: RAID group number
	RAID Group {1} Not active	A RAID group is not active. {1}: RAID group number
Confirmation	Clear messages?	Clear event and error messages. <div style="display: flex; align-items: center;">  <div> <p>Note</p> <ul style="list-style-type: none"> • Press Select to toggle between Yes and No. • Press Enter to confirm. </div> </div>

LEDs

LEDs indicate system status and related information when the RAID enclosure is powered on. The following LED information applies only when the drive is correctly installed and when the RAID enclosure is connected.

For details on the location of the LEDs, see [Components](#).

LED	Status	Description
System Status	Flashes green and red alternately every 0.5 seconds	<ul style="list-style-type: none"> RAID rebuilding is in progress. Online RAID Capacity Expansion is in progress. Online RAID Level Migration is in progress. The firmware is being updated. <div style="display: flex; align-items: center; margin-top: 10px;">  <div> <p>Important</p> <p>When updating the firmware, do not remove the power cord or USB cable, and do not force-exit the application.</p> </div> </div> <ul style="list-style-type: none"> The drive is being formatted.
	Red	<ul style="list-style-type: none"> The drive is invalid. The system fan is not functioning. The device is in degraded read-only mode (two member drives failed in RAID 5 or RAID 6 but the data can still be read). The device temperature is above 65°C.
	Flashes green every 0.5 seconds	The device is starting up.
	Green	The device is ready.
	Flashes green or red every 2 seconds.	The device is in standby mode.
	Off	The device is powered off.
Link	Green	<ul style="list-style-type: none"> Data is being accessed. The device is connected to the host.
	Off	The device is not connected to the host.
Drive	Red	A drive read/write error occurred.
	Flashes green	Data is being accessed.
	Green	The drive is ready.
	Off	No drive was detected.

Audio Alert

Duration	Frequency	Description
Short beep (0.5 seconds)	1	<ul style="list-style-type: none"> The RAID enclosure is starting up. The RAID enclosure has completed a firmware update.
Long beep (2 seconds)	3 (every 5 minutes)	<ul style="list-style-type: none"> The system fan is not functioning. The fan module has been removed. The system or drives are overheating.
Long beep (1.5 seconds)	1	<ul style="list-style-type: none"> The RAID enclosure was powered on successfully and is ready. The RAID enclosure was powered off by force shutdown (hardware shutdown).
	Every 5 minutes	<ul style="list-style-type: none"> The RAID enclosure is undergoing a rebuild process. The RAID enclosure is in degraded mode.

6. Troubleshooting

This chapter describes basic troubleshooting information.

Forcing Storage & Snapshots or QNAP External RAID Manager to Recognize the RAID Enclosure

If Storage & Snapshots or QNAP External RAID Manager is unable to locate the RAID enclosure, the drives or data may be faulty.

1. Power off the RAID enclosure.
2. Remove all drives.
3. Power on the RAID enclosure.
4. Locate the RAID enclosure using Storage & Snapshots or QNAP External RAID Manager.
5. Reinsert the drives.
6. Continue with RAID configuration.

Hot-swapping Failed Drives

The RAID enclosure supports hot-swapping of drives in the following situations:

RAID Type	Number of Disks	Situation
RAID 1	2	One member drive fails.
RAID 5	≥ 3	One member drive fails.
RAID 6	≥ 4	One or two member drives fail.
RAID 10	≥ 4 (Must be an even number)	One or two member drives in two different pairs fail.

1. Locate the failed drive on your NAS or computer.

NAS	Computer
<ol style="list-style-type: none"> a. Log on to QTS or QuTS hero. b. Go to Storage & Snapshots > Storage > Disks/VJBOD . c. Select the failed drive. 	<ol style="list-style-type: none"> a. Open QNAP External RAID Manager. b. Go to RAID Configuration. c. Locate the RAID group and click Degraded. A message window appears indicating the failed drive information.

2. Prepare a new hard drive with a capacity that is the same as or larger than the failed hard drive.
3. Remove the failed drive from the RAID enclosure.
4. Wait for 30 seconds or until the RAID enclosure beeps twice.
5. Remove the failed drive from the drive tray.
6. Insert the new drive into the drive tray.
7. Install the new drive.
The RAID enclosure beeps twice.

8. Wait for 30 seconds or until the RAID enclosure beeps twice.
9. On your NAS or computer, verify the status of the new drive or RAID group is `Rebuilding`.

Support and Other Resources

QNAP provides the following resources:

Resource	URL
Documentation	https://download.qnap.com
Compatibility List	https://www.qnap.com/compatibility
NAS Migration Compatibility	https://www.qnap.com/go/nas-migration
Expansion Unit Compatibility	https://www.qnap.com/go/compatibility-expansion
Service Portal	https://service.qnap.com
Product Support Status	https://www.qnap.com/go/product/eol.php
Downloads	https://download.qnap.com
Community Forum	https://forum.qnap.com
QNAP Accessories Store	https://shop.qnap.com

7. Glossary

QNAP External RAID Manager

Windows and macOS utility that allows you to view and configure QNAP RAID enclosures

QTS

QNAP NAS operating system

QuTS hero

QNAP NAS operating system featuring ZFS file system

Storage & Snapshots

QTS and QuTS hero utility that allows you to view and configure QNAP external RAID enclosures connected to a QNAP NAS

8. Notices

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Version 3, 29 June 2007

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END OF TERMS AND CONDITIONS

FCC Notice

FCC Class B Notice



This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.



Note

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.



Important

Any modifications made to this device that are not approved by QNAP Systems, Inc. may void the authority granted to the user by the FCC to operate this equipment.

CE Notice



This device complies with CE Compliance Class B.

SJ/T 11364-2006



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显示	0	0	0	0	0	0
印刷电路板	0	0	0	0	0	0
金属螺帽	0	0	0	0	0	0
电缆组装	0	0	0	0	0	0
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