JBOD Enclosure

TL-R1200PES-RP
TL-R1600PES-RP
TL-R2400PES-RP

User Guide

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Contents

1. Important Information
Safety information 3

2. Product Overview
About the TL-Rx00PES-RP JBOD series 5
Hardware specifications 5
Package contents 6
Components 6
Front panel 7
Rear panel 8
Drive numbering 10
Installation requirements 12
Setting up the JBOD enclosure 13

3. Hardware Installation
Installing drives 14
Installing 3.5-inch hard drives on the TL-R1200PES-RP or TL-R1600PES-RP 14
Installing 3.5-inch hard drives on the TL-R2400PES-RP 16
Installing 2.5-inch solid-state drives on the TL-R1200PES-RP or TL-R1600PES-RP 19
Installing 2.5-inch solid-state drives on the TL-R2400PES-RP 21
Connecting and disconnecting the JBOD enclosure 24
Hot-plugging the JBOD enclosure on a NAS 24
Connecting the JBOD enclosure to a NAS 24
Disconnecting the JBOD enclosure from a NAS 29
Hot-swapping redundant power supply units 29
Rail kits 30

4. Basic Operations
Power button 32
LEDs 32
Audio alert 33

5. Troubleshooting
Forcing Storage & Snapshots to recognize the JBOD enclosure 34
Hot-swapping failed drives 34
Support and other resources 35

6. Glossary
QTS 36
QuTS hero 36
Storage & Snapshots 36

7. Notices
Limited warranty 37
Disclaimer 37
Copyright and trademarks 37
GNU General Public License 38
CE notice 45
UKCA notice 45
FCC notice 45

VCCI notice.....46
BSMI notice.....46
SJ/T 11364-2006.....47

1. Important Information

Original Packaging

Please keep the original packaging and packaging materials. If you want to return the product or send it for repairs, please use the original packaging to avoid damage.

QNAP reserves the right not to provide a refund or warranty service for products that are damaged due to improper packaging.

Hardware Defects

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.

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.

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.

- The device is not suitable for use in locations where children are likely to be present.

2. Product Overview

This chapter provides basic information about your QNAP JBOD enclosure.

About the TL-Rx00PES-RP JBOD series

The QNAP TL-Rx00PES-RP JBOD enclosures are designed to increase the capacity and utility of your NAS, providing a wide range of storage applications. You can manage installed drives independently or configure them as software RAID groups using the host NAS.

The TL-R1200PES-RP, TL-R1600PES-RP, and TL-R2400PES-RP feature twelve, sixteen, and twenty-four 3.5-inch SATA drive bays, and two SFF-8644 1x2 ports.

Hardware specifications

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

Component	TL-R1200PES-RP	TL-R1600PES-RP	TL-R2400PES-RP
Storage			
Drive bays	12 x 3.5-inch SATA 6 Gbps	16 x 3.5-inch SATA 6 Gbps	24 x 3.5-inch SATA 6 Gbps
	Note You can purchase tray bases from QNAP or an authorized reseller. For details, go to https://shop.qnap.com/.		
Drive compatibility	3.5-inch bays: • 3.5-inch SATA hard disk drives • 2.5-inch SATA solid-state drives		
Hot-swapping	This device supports hot-swapping for all drives.		
External I/O Ports			
SFF ports	2 x SFF-8644 1x2		
Interface			
Buttons	Power		
LEDs			
System	• Status • Link • Fan error • Drive • Enclosure ID		
Ports	• Connector link • Connector access		
Dimensions			
Form factor	2U Rackmount	3U Rackmount	4U Rackmount

Component	TL-R1200PES-RP	TL-R1600PES-RP	TL-R2400PES-RP
Dimensions (H x W x D)	88.65 x 482.2 x 423.8 mm (3.49 x 18.98 x 16.68 in)	131.3 x 482.2 x 425.3 mm (5.17 x 18.98 x 16.74 in)	176.15 x 480.74 x 672.05 mm (6.94 x 18.93 x 26.46 in)
Net weight	9.22 kg (20.33 lbs)	11.56 kg (25.49 lbs)	18.67 kg (41.16 lbs)
Others			
Hot-plugging	This device supports hot-plugging on a QNAP NAS. For details, see Hot-plugging the JBOD enclosure on a NAS.		
Rail compatibility	Rail-B02	Rail-B02	Rail-A02-90
	Note • Rail kits are not included with the NAS and must be purchased separately. For details, contact an authorized reseller or go to https://shop.qnap.com. • Information on rail kit installation can be found in the installation guide included in the rail kit package. For details, go to https://www.qnap.com/go/product/rail-kit.		
Power supply unit	2 x 300W, 100-240V AC, 50/60 Hz	2 x 550W, 100-240V AC, 50/60 Hz	2 x 550W, 100-240V AC, 50/60 Hz
Fans	2 x 80 mm, 12V DC fan	3 x 80 mm, 12V DC fan	3 x 80 mm, 12V DC fan
Operating temperature	• Non-condensing relative humidity: 5% to 95% • Wet-bulb temperature: 27˚C (80.6˚F)		

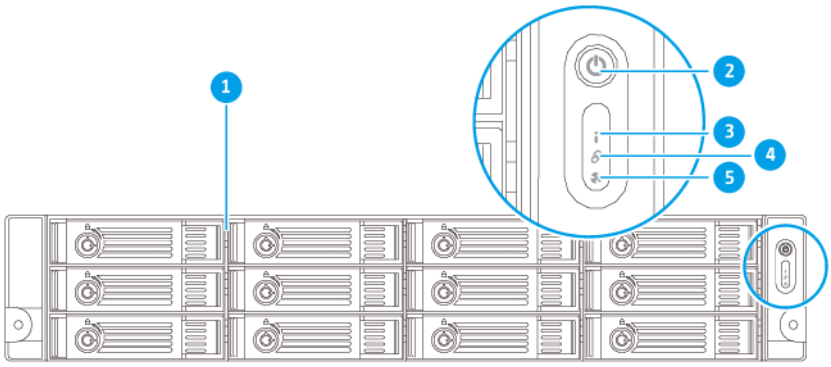
Tip
For the list of compatible drive models, go to https://www.qnap.com/compatibility.

Package contents

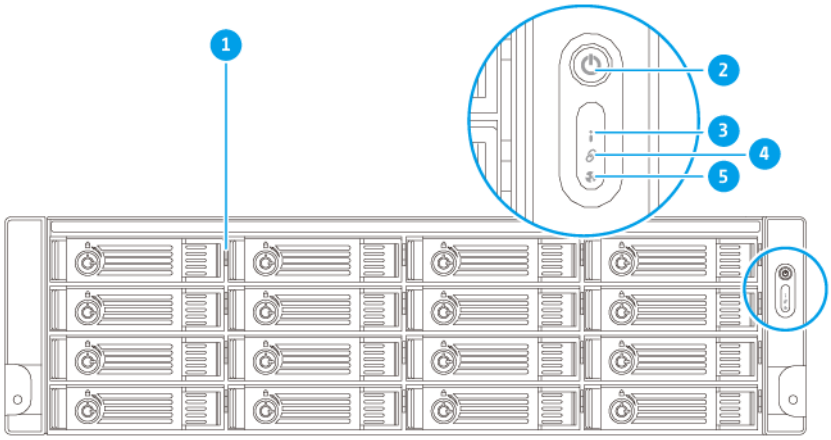
Item	Quantity
JBOD enclosure	1
Power cord	2
PCIe JBOD special cable (SFF-8644 1x2)	1 x CAB-PCIE10M-8644-8X
Screws for 3.5-inch drives	• TL-R1200PES-RP: 48 • TL-R1600PES-RP: 64 • TL-R2400PES-RP: 96
Screws for 2.5-inch drives	• TL-R1200PES-RP: 36 • TL-R1600PES-RP: 48 • TL-R2400PES-RP: 72
Quick Installation Guide (QIG)	1

Components

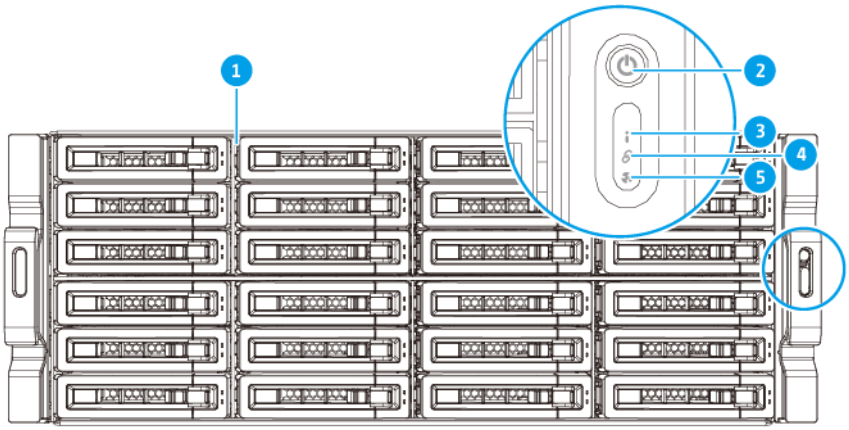
Front panel



TL-R1200PES-RP



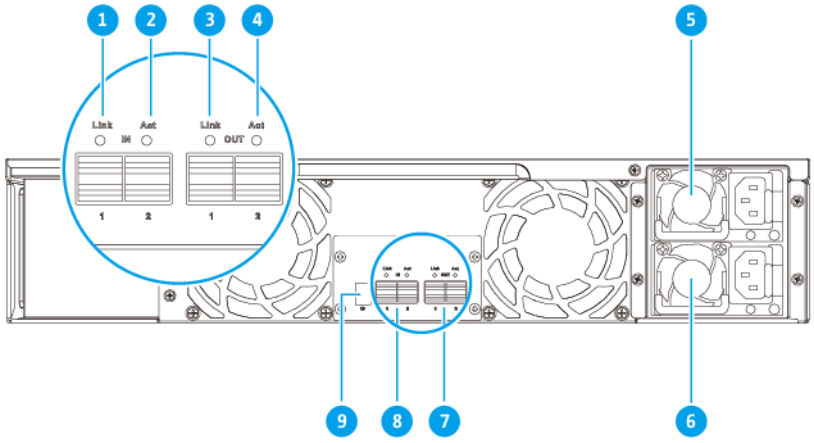
TL-R1600PES-RP



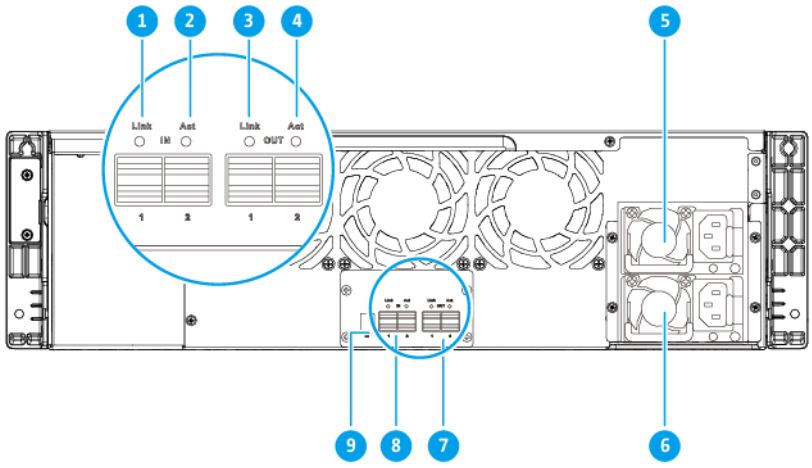
TL-R2400PES-RP

No.	Component	No.	Component
1	Drive LED	4	Link LED
2	Power button	5	Fan error LED
3	Status LED	-	-

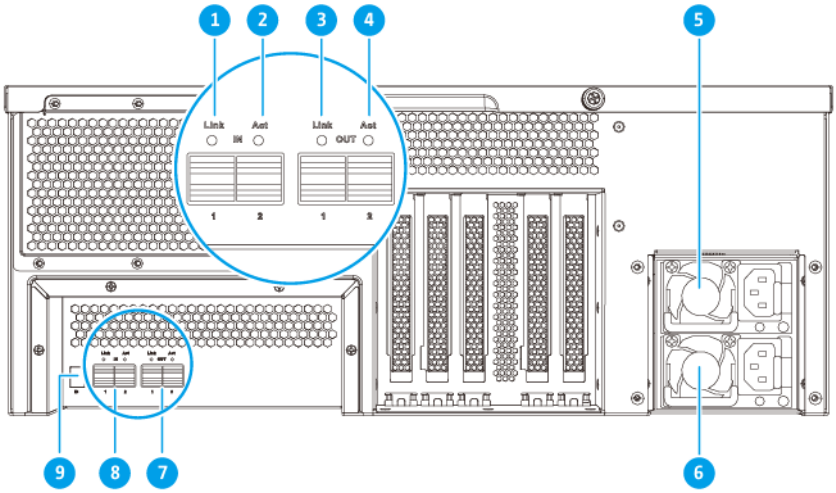
Rear panel



TL-R1200PES-RP



TL-R1600PES-RP

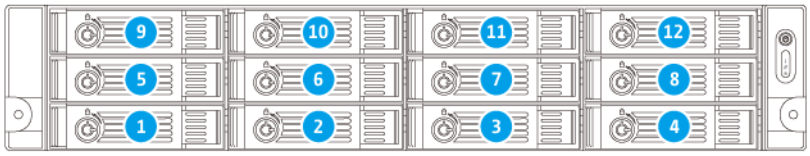


TL-R2400PES-RP

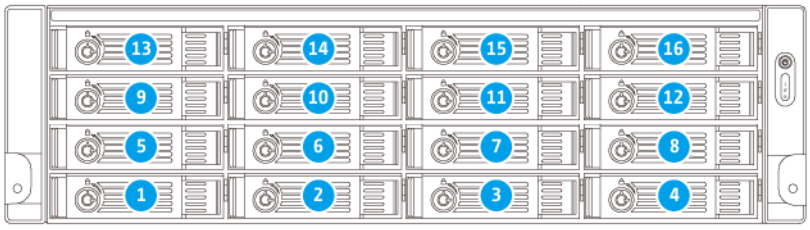
No.	Component	No.	Component
1	Connector link LED (upstream)	6	Power supply unit 2
2	Connector access LED (upstream)	7	SFF-8644 1x2 port (downstream) **Note** This port is for connecting to a downstream JBOD enclosure in a cascade connection.

No.	Component	No.	Component
3	Connector link LED (downstream)	8	SFF-8644 1x2 port (upstream) **Note** This port is for connecting to a host NAS or an upstream JBOD enclosure in a cascade connection.
4	Connector access LED (downstream)	9	Enclosure ID **Note** The NAS assigns an enclosure ID to each expansion enclosure connected to the NAS. The first nine enclosures are assigned numbers 1 to 9. Subsequent enclosures start with the letter A and continue in alphabetical order.
5	Power supply unit 1	-	-

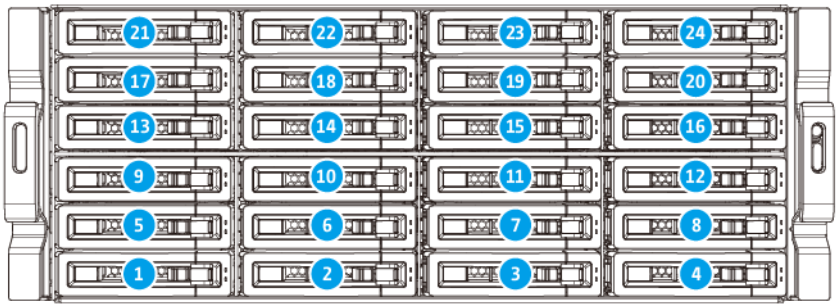
Drive numbering



TL-R1200PES-RP



TL-R1600PES-RP



TL-R2400PES-RP

Installation requirements

Category	Item
Environment	• 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 Restricted access • 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, trained, and authorized device administrators with knowledge of all restrictions, safety precautions, and installation and maintenance procedures should have physical access to the device.
Hardware and peripherals	• NAS **Note** • For details on compatible NAS models, maximum number of JBOD enclosures supported by each NAS model, and applicable PCIe slots, go to https://www.qnap.com/go/compatibility-expansion/. • The NAS must run QTS 5.1.2 (or later) or QuTS hero h5.1.2 (or later). • Storage drives **Note** For the list of compatible drive models, go to https://www.qnap.com/compatibility. • Host bus adapter **Note** The QXP-3X4PES or QXP-3X8PES host bus adapter must be installed on the NAS. Third-party host bus adapters may not be compatible with QNAP JBOD enclosures. • One or more SF-8644 connector cables **Note** • The QXP-3X4PES host bus adapter requires the CAB-PCIE10M-8644-4X cable. • The QXP-3X8PES host bus adapter requires the CAB-PCIE10M-8644-8X cable (one is included with the JBOD enclosure.)
Tools	• Phillips #1 or #2 screwdriver • Anti-static wrist strap

Setting up the JBOD enclosure

Important
Read all safety requirements and information in Safety information carefully before setting up the JBOD enclosure or installing JBOD enclosure components.

1. Place the JBOD enclosure in an environment that meets the requirements.
   For details, see Installation requirements.
2. Install the JBOD enclosure on a rack.
   For details, see Rail kits.
3. Install the drives.
   For details, see the following topics:
   - Installing 3.5-inch hard drives on the TL-R1200PES-RP or TL-R1600PES-RP
   - Installing 3.5-inch hard drives on the TL-R2400PES-RP
   - Installing 2.5-inch solid-state drives on the TL-R1200PES-RP or TL-R1600PES-RP
   - Installing 2.5-inch solid-state drives on the TL-R2400PES-RP
4. Connect the power cord.
5. Connect the JBOD enclosure to your NAS.
   For details, see Connecting the JBOD enclosure to a NAS.
6. Power on the JBOD enclosure.

3. Hardware Installation

This section provides information on installing drives, connecting and disconnecting the JBOD enclosure from a NAS, hot-swapping redundant power supply units, and rail kits.

Installing drives

The TL-Rx00PES-RP is compatible with 3.5-inch hard drives and 2.5-inch solid-state drives.

Installing 3.5-inch hard drives on the TL-R1200PES-RP or TL-R1600PES-RP

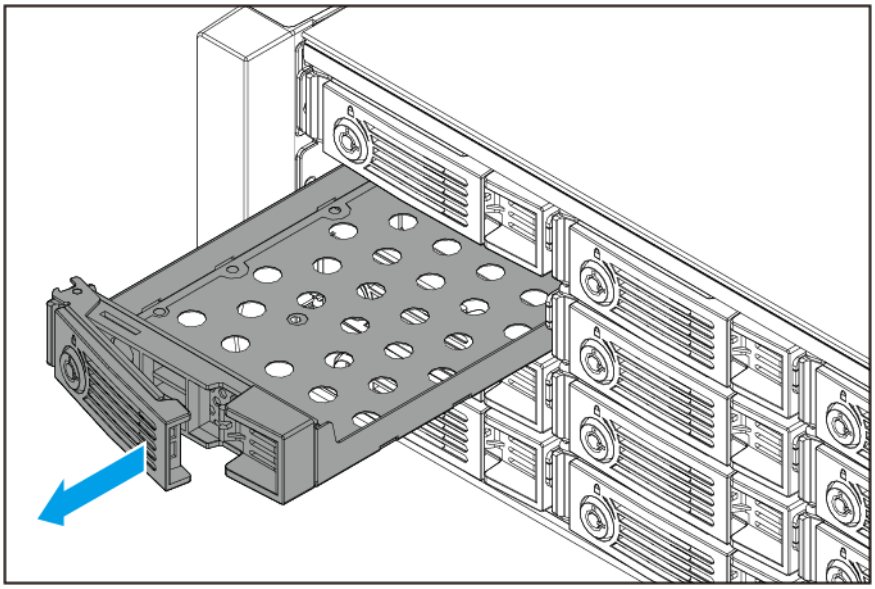
Warning

- Installing a drive deletes all data on the drive.
- 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.

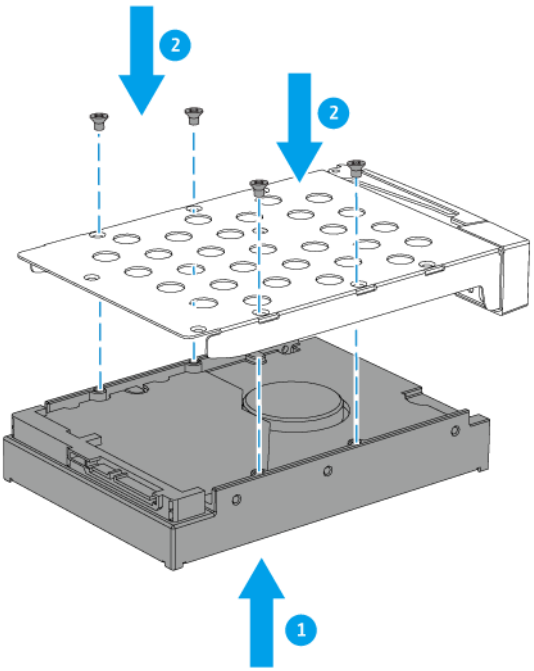
1. Power off the JBOD enclosure.
2. Remove the drive tray.
   a. Pull the handle to release the tray.
   b. Pull the tray out.



3. Install a drive on the tray.

   a. 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.

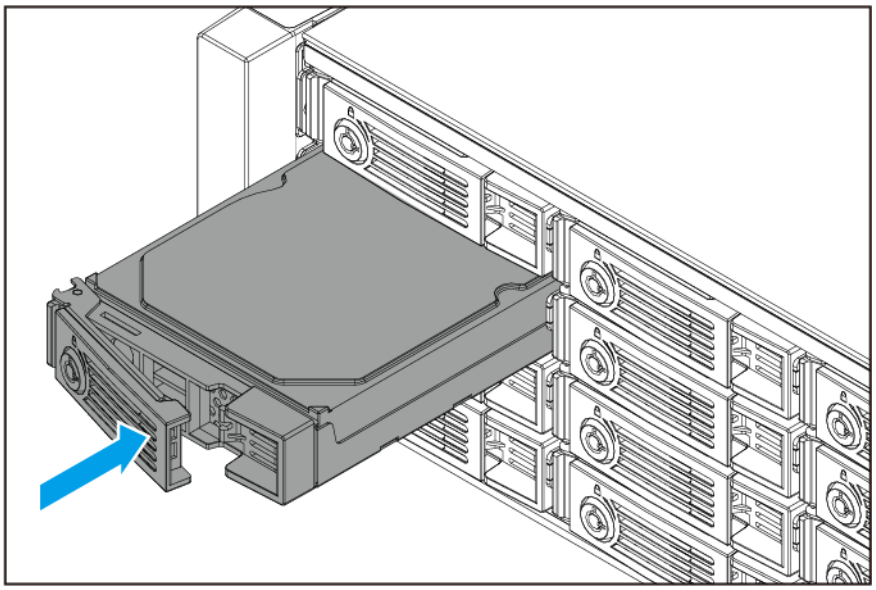
   b. Attach the screws.



4. Load the tray into the bay.

a. Insert the tray into the bay.

b. Push the handle.



5. Power on the JBOD enclosure.

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

Installing 3.5-inch hard drives on the TL-R2400PES-RP

Warning

- Installing a drive deletes all data on the drive.
- Observe electrostatic discharge (ESD) procedures to avoid damage to components.
-

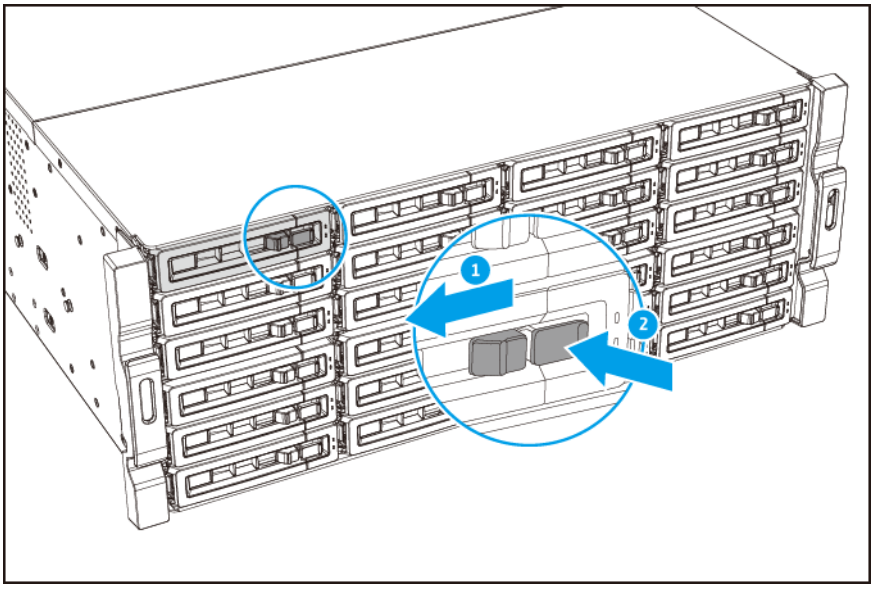
  Moving fan blades: Keep your hands and other body parts away from moving fan blades.
-

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

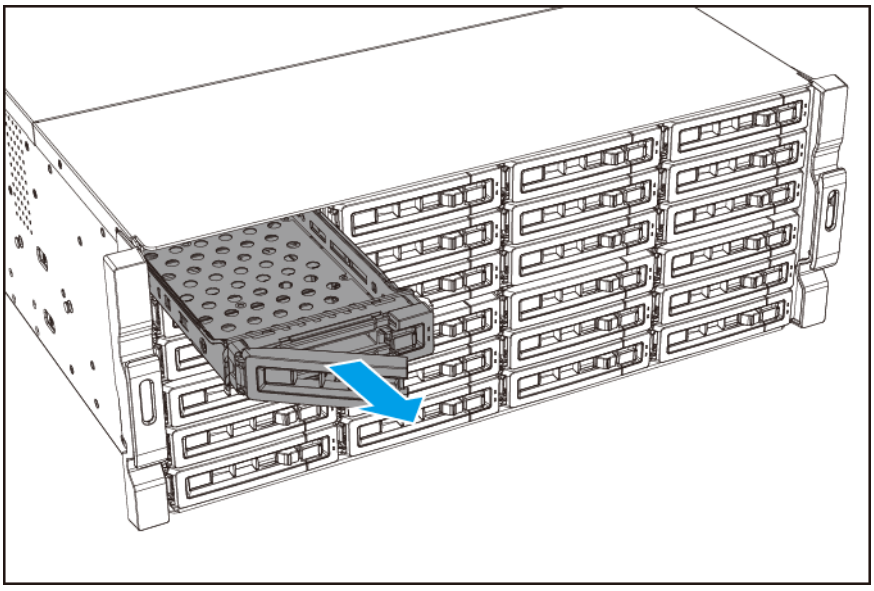
1. Power off the JBOD enclosure.
2. Remove the drive tray.

   a. Slide the lock to the left.

b. Push the button to release the tray handle.



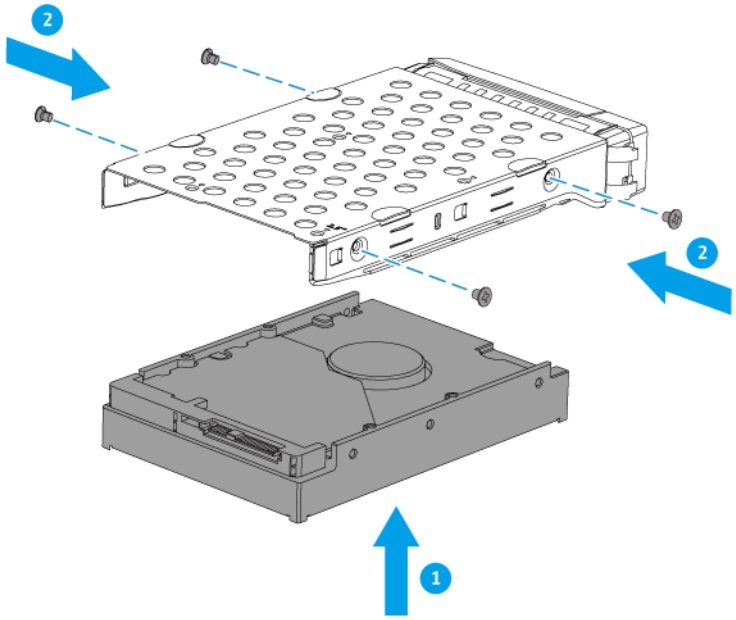
c. Pull the tray out.



3. Install a drive on the tray.

a. 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.

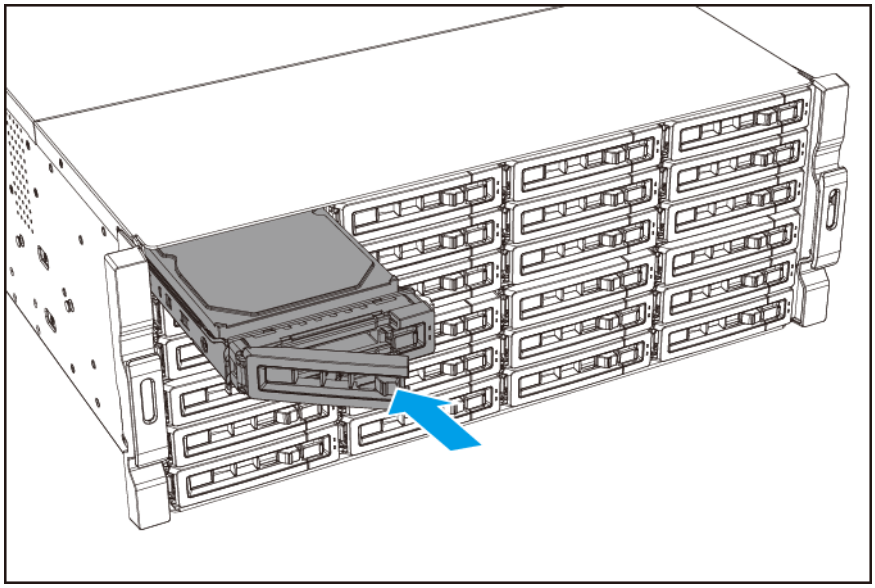
b. Attach the screws.



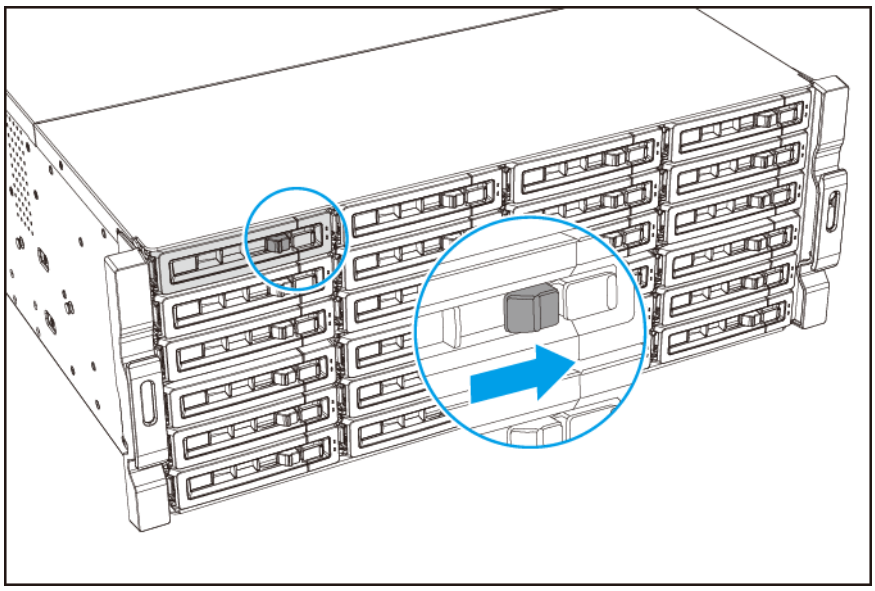
4. Load the tray into the bay.

   a. Insert the tray into the bay.

   b. Push the handle.



   c. Slide the lock to the right.



5. Power on the JBOD enclosure.

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

Installing 2.5-inch solid-state drives on the TL-R1200PES-RP or TL-R1600PES-RP

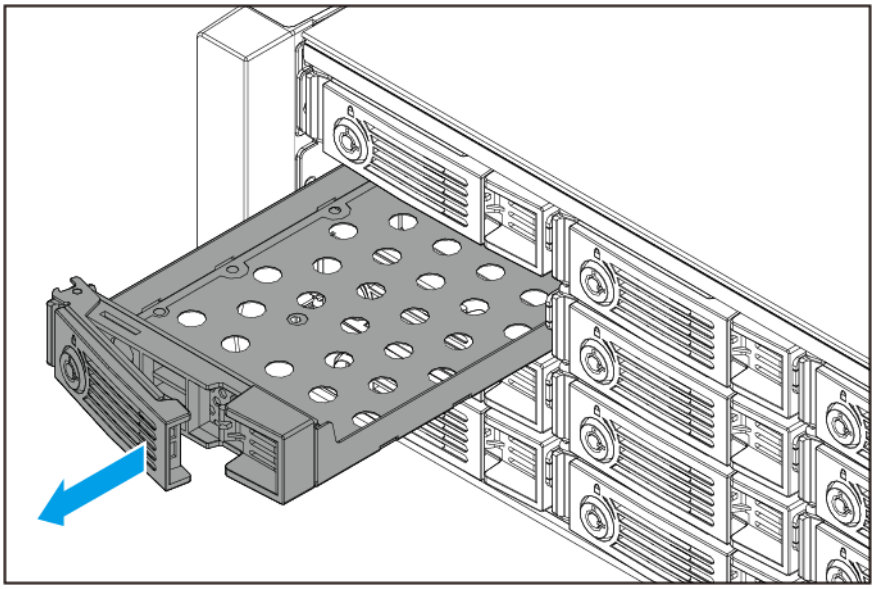
Warning

- Installing a drive deletes all data on the drive.
- 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.

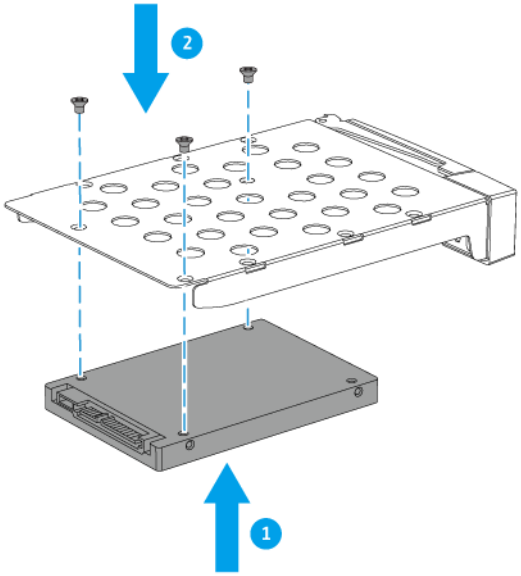
1. Power off the JBOD enclosure.
2. Remove the drive tray.
   a. Pull the handle to release the tray.
   b. Pull the tray out.



3. Install a drive on the tray.

   a. 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.

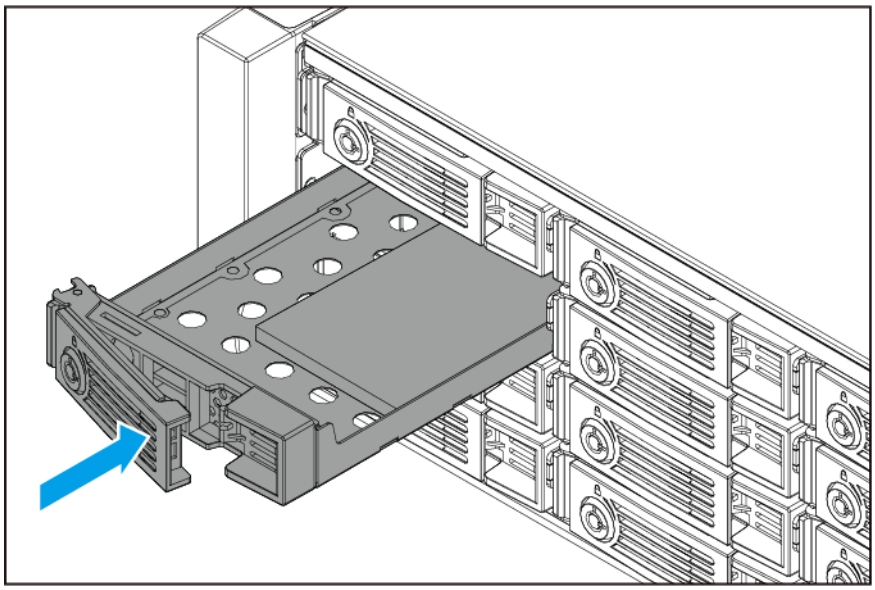
   b. Attach the screws.



4. Load the tray into the bay.

a. Insert the tray into the bay.

b. Push the handle.



5. Power on the JBOD enclosure.

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

Installing 2.5-inch solid-state drives on the TL-R2400PES-RP

Warning

- Installing a drive deletes all data on the drive.
- Observe electrostatic discharge (ESD) procedures to avoid damage to components.
-

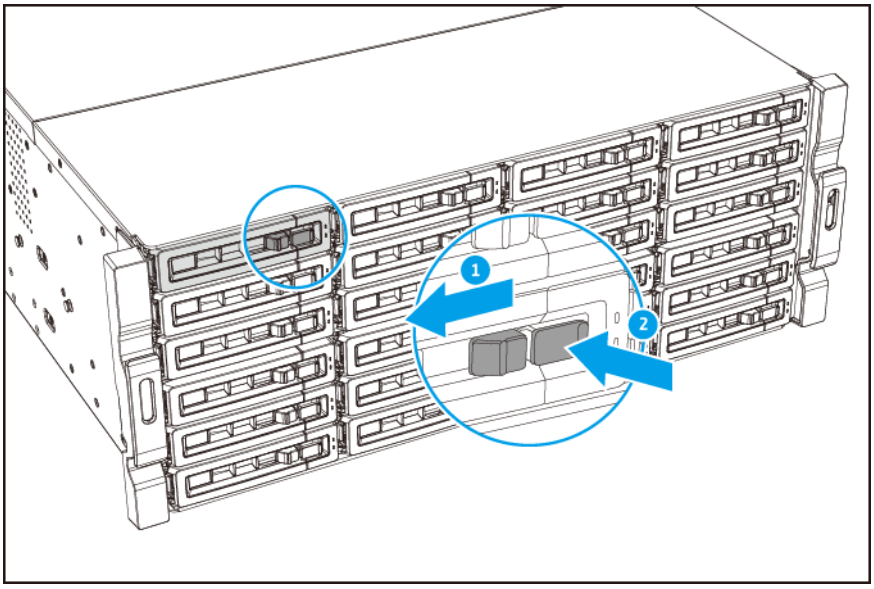
  Moving fan blades: Keep your hands and other body parts away from moving fan blades.
-

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

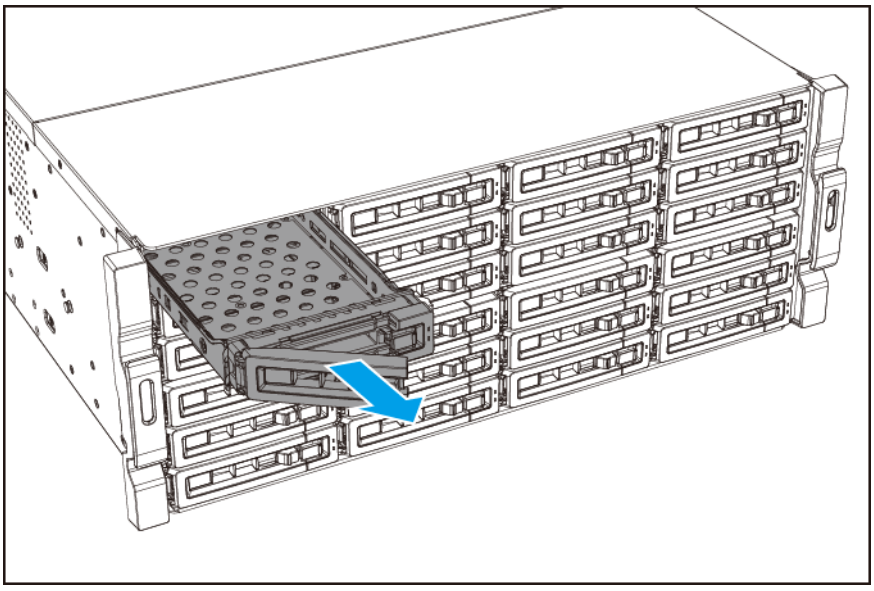
1. Power off the JBOD enclosure.
2. Remove the drive tray.

   a. Slide the lock to the left.

b. Push the button to release the tray handle.



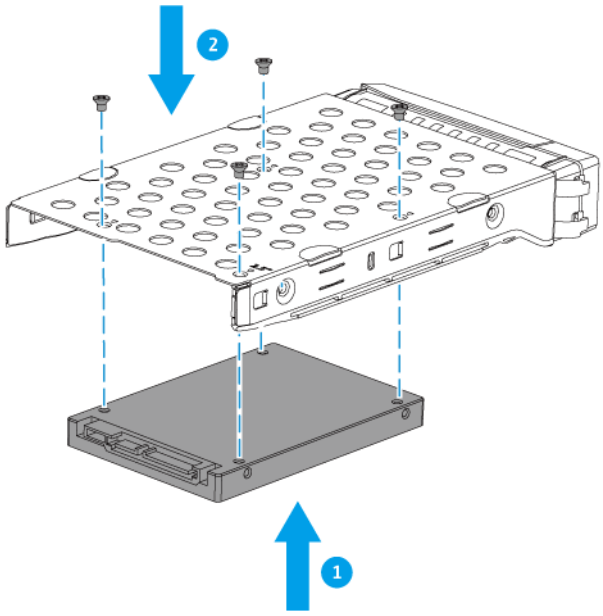
c. Pull the tray out.



3. Install a drive on the tray.

a. 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.

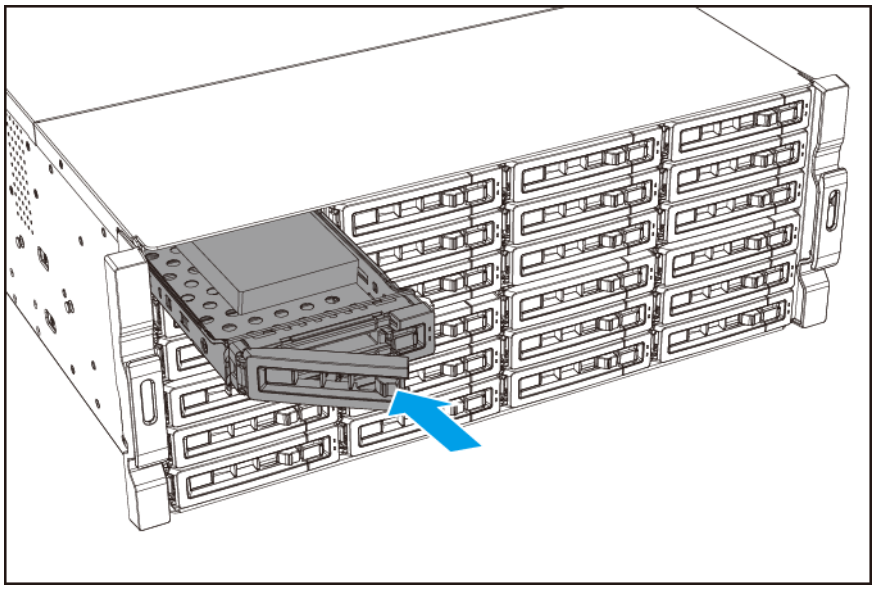
b. Attach the screws.



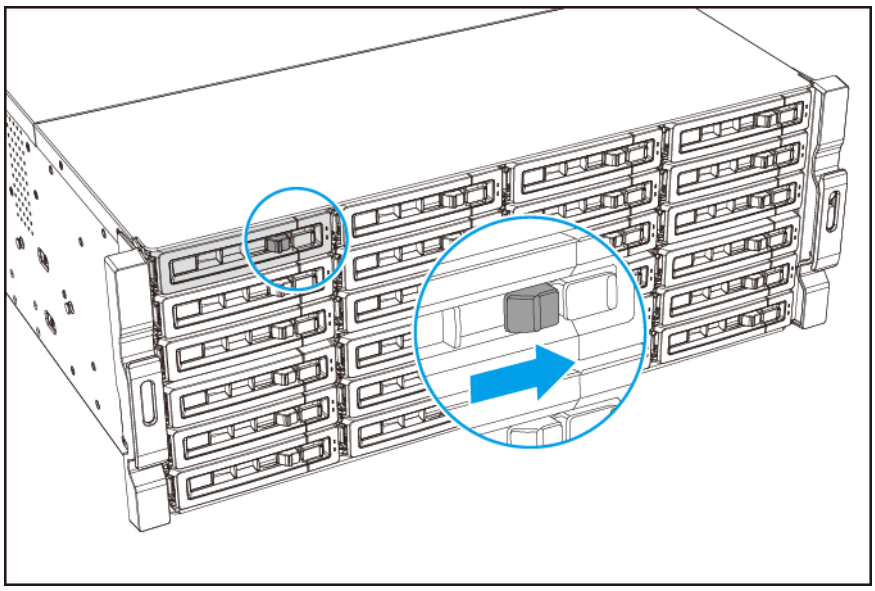
4. Load the tray into the bay.

   a. Insert the tray into the bay.

   b. Push the handle.



   c. Slide the lock to the right.



5. Power on the JBOD enclosure.

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

Connecting and disconnecting the JBOD enclosure

The TL-Rx00PES-RP supports connecting to a QNAP NAS for storage expansion. Additionally, the JBOD enclosure supports hot-plugging and cascade configuration.

Hot-plugging the JBOD enclosure on a NAS

The TL-Rx00PES-RP supports hot-plugging on a QNAP NAS. You can connect or disconnect the JBOD enclosure from a NAS while the NAS is powered on, with the following restrictions and precautions:

- Hot-plugging is only supported when creating a storage pool on the JBOD enclosure using only disks installed on the JBOD enclosure.
- Hot-plugging is not supported when expanding a storage pool on the NAS with disks on the JBOD enclosure.
- To prevent data loss or other damages, do not hot-disconnect the JBOD enclosure if a storage pool or RAID group has been created on the JBOD enclosure. If you must disconnect the JBOD enclosure under this circumstance, contact an authorized administrator to perform this action.
- When disconnecting the JBOD enclosure from a NAS, always safely detach the JBOD enclosure from the NAS operating system before disconnecting any cables.
  For details, see Disconnecting the JBOD enclosure from a NAS.

Connecting the JBOD enclosure to a NAS

To connect the JBOD enclosure to a NAS, you must use a compatible NAS model with a recommended QNAP operating system version and the latest BIOS firmware version. Depending on the PCIe slot on the NAS, you must also install a compatible host bus adapter on the NAS and use a compatible connector cable.

NAS Requirements

Requirement	Description
NAS model	Ensure your QNAP NAS is compatible with the JBOD enclosure. For the list of compatible NAS models, go to https://www.qnap.com/go/compatibility-expansion/.
NAS operating system	• QTS 5.1.2 or later • QuTS hero h5.1.2 or later For the latest QNAP operating system for your NAS model, go to https://download.qnap.com/.
NAS BIOS	The NAS must be installed with the latest BIOS firmware version. For the latest BIOS firmware for your NAS model, go to https://download.qnap.com/.

NAS memory and JBOD storage	• QTS
	  • Largest storage pool size on JBOD enclosure: 304 TB
	• QuTS hero
	  • Minimum NAS memory: 16 GB
	  • Recommended NAS memory for 1–2 PB JBOD storage: ≥ 128 GB
	  • Recommended NAS memory for 3–5 PB JBOD storage: ≥ 256 GB

Host Bus Adapter and Cable Requirements

NAS PCIe slot	Host Bus Adapter and Cable
PCIe x4 slot	• Host bus adapter: QXP-3X4PES • Cable: CAB-PCIE10M-8644-4X • Up to 32 Gbps (with PCIe Gen 3 or higher) **Important** The CAB-PCIE10M-8644-8X cable included in the package cannot be used with the QXP-3X4PES host bus adapter.
PCIe x8 slot	• Host bus adapter: QXP-3X8PES • Cable: CAB-PCIE10M-8644-8X (included in the package) • Up to 64 Gbps (with PCIe Gen 3 or higher) **Note** You can use a CAB-PCIE10M-8644-4X cable with the QXP-3X8PES. However the connection speed will be limited to a maximum of 32 Gbps.

Note

- The QXP-3X4PES and QXP-3X8PES host bus adapters each have two ports supporting up to two JBOD connections. You can connect additional JBOD enclosures using a cascade configuration.

- For the maximum number of expansion cards and JBOD enclosures supported by your NAS model, go to https://www.qnap.com/go/compatibility-expansion/.
- You can purchase QNAP expansion cards and cables from https://shop.qnap.com/ or an authorized reseller.

1. Ensure the NAS is powered off.
   Skip this step if you are hot-connecting the JBOD enclosure to the NAS. For details, see Hot-plugging the JBOD enclosure on a NAS.
2. Install the QXP-3X4PES or QXP-3X8PES host bus adapter on the NAS.
   Refer to the hardware installation section of the NAS user guide for instructions on installing expansion cards.
3. Prepare SFF-8644 connector cables.
   Use a compatible cable for the host bus adapter:

Host Bus Adapter	Cable
QXP-3X4PES	CAB-PCIE10M-8644-4X (32 Gbps connection speed)
QXP-3X8PES	CAB-PCIE10M-8644-8X (64 Gbps connection speed) **Note** You can also use the CAB-PCIE10M-8644-4X cable with the QXP-3X8PES. However, the connection speed will be limited to a maximum of 32 Gbps.

4. Connect the JBOD enclosure to the NAS.

Important

- When connecting the CAB-PCIE10M-8644-8X cable, ensure you insert the cable plug into the port in one quick action. Do not wiggle the plug or insert too slowly, otherwise protection mode will be activated and the connection speed will be reduced.
- When protection mode is activated, the connector link LEDs on both ends of the connection flash orange. To reestablish a normal connection, safely detach the JBOD enclosure from QTS or QuTS hero, disconnect the connector cable, restart the NAS, and then reconnect the JBOD enclosure.

a. Connect a SFF-8644 connector cable to the SFF-8644 port on the host bus adapter (HBA) installed on the NAS.

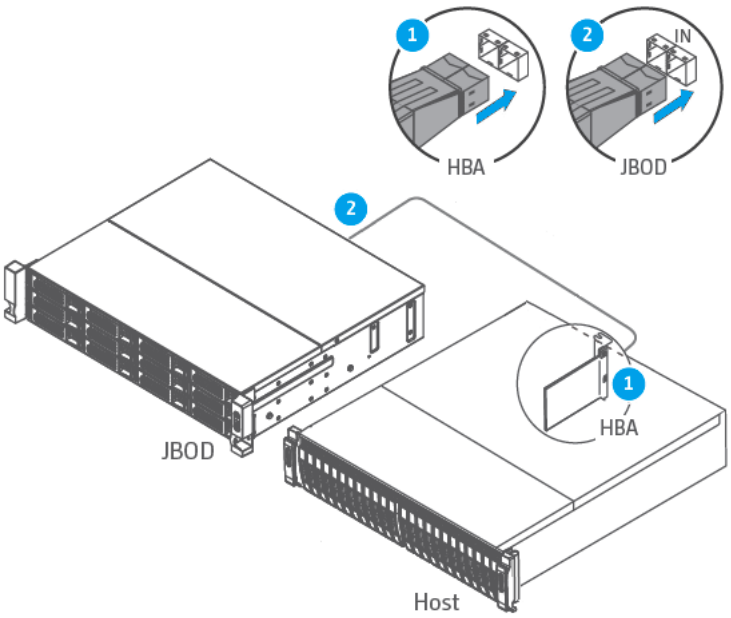
Note
To connect a CAB-PCIE10M-8644-4X cable to a QXP-3X8PES host bus adapter, you must insert the cable plug into the A1 port or B1 port of the adapter, and the connection speed will be limited to a maximum of 32 Gbps. Do not insert the cable plug into the A2 port or B2 port of the adapter.
For the location of the adapter ports, check the labels on the adapter.

b. Connect a SFF-8644 connector cable to the upstream SFF-8644 port on the JBOD enclosure.

Note

- When using the CAB-PCIE10M-8644-4X cable, connect to the left side of the port.

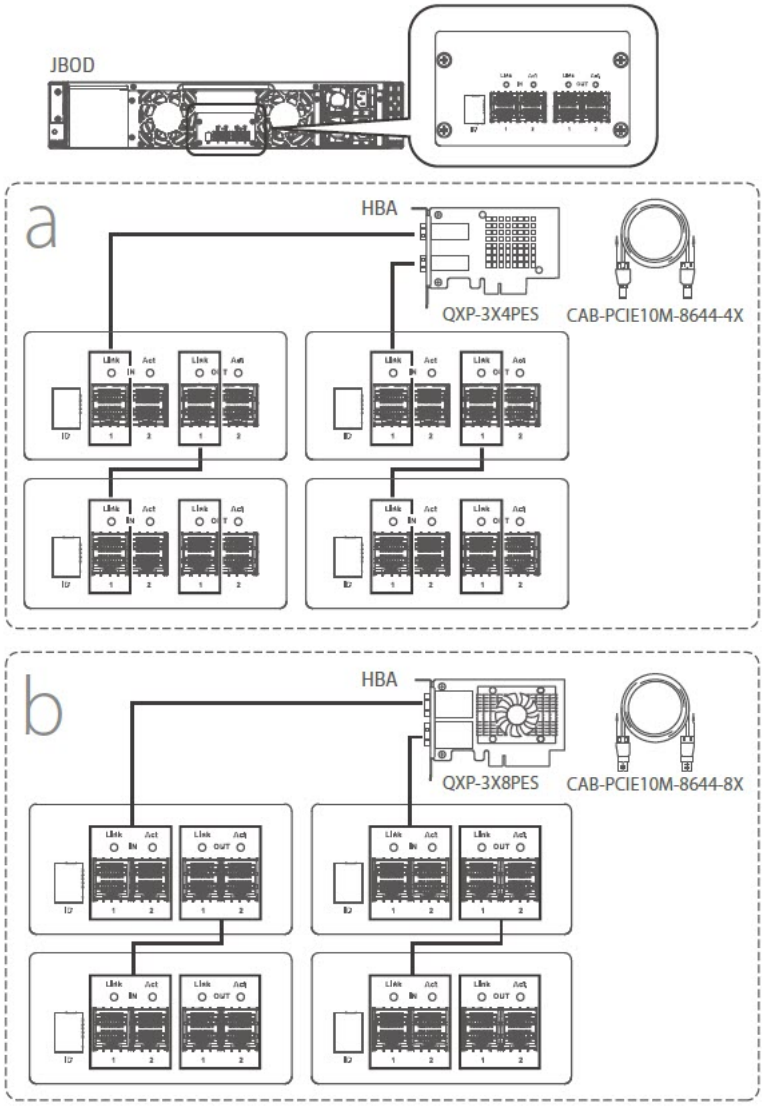
- For the location of the upstream ports, see Rear panel.



5. Optional: Connect additional JBOD enclosures to the NAS.

Important
When connecting multiple JBOD enclosures, make sure both the power cable and CAB-PCIE10M-8644-4X cables are properly connected to the first JBOD, and then make your way down the rest of the JBOD enclosures.

Depending on the host bus adapter, use one of the following topologies when connecting multiple JBOD enclosures to the NAS.



Note

- When using the CAB-PCIE10M-8644-4X cable, always connect to the left side of the port for both upstream and downstream ports.
- When both ports of the host bus adapter are connected, the total bandwidth of the PCIe slot on the NAS is shared between the two connections.
- Use the upstream port only when connecting to the NAS or to an upstream JBOD enclosure in a cascade configuration.
- Use the downstream port only when connecting to a downstream JBOD enclosure in a cascade configuration.
- For the location of the upstream and downstream ports, see Rear panel.

6. Power on the JBOD enclosures.
7. Power on the NAS.

Skip this step if the NAS is already powered on and you are hot-connecting the JBOD enclosure.

8. Verify that the JBOD enclosures are recognized by the NAS.
   a. Log on to QTS or QuTS hero as an administrator.
   b. Go to **Main Menu** > **Storage & Snapshots** > **Overview** > **Storage** .
   c. Verify that the JBOD enclosures are listed.

Note

- The NAS may take up to 30 seconds to detect the JBOD enclosures and the installed drives.
- The higher the number of connected enclosures and installed drives, the longer it may take the NAS to detect them.
- Before the NAS detects a JBOD enclosure, the status LED on the JBOD enclosure displays orange, indicating standby mode. When the JBOD enclosure is in standby mode, the fans and drive LEDs on the enclosure remain turned off.

Disconnecting the JBOD enclosure from a NAS

When disconnecting (including hot-disconnecting) the JBOD enclosure from a NAS, always safely detach the JBOD enclosure from the NAS operating system before disconnecting any cables.

Disconnecting the cables without safely detaching the JBOD enclosure can cause data loss or other damages.

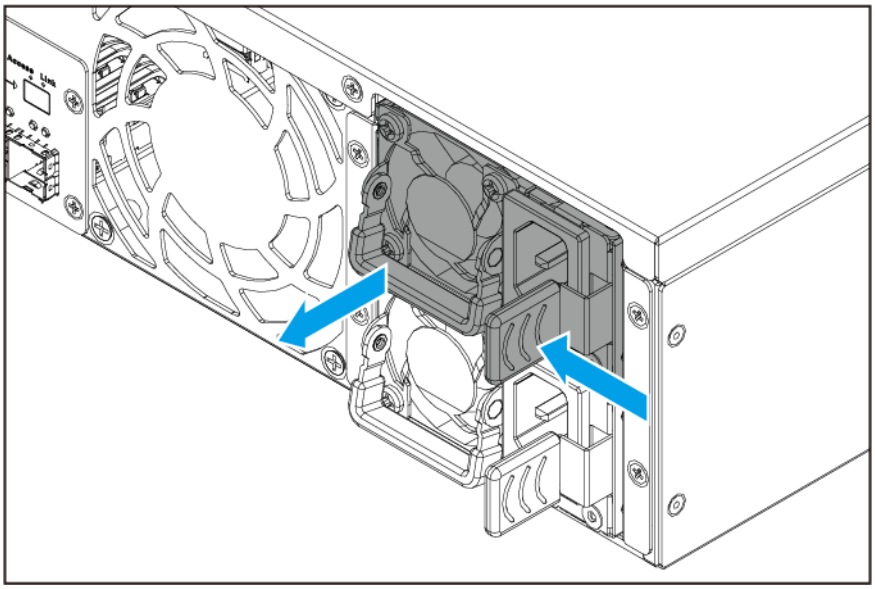
Warning
Do not hot-disconnect the JBOD enclosure if a storage pool or RAID group has been created on the JBOD enclosure. If you must disconnect the JBOD enclosure under this circumstance, contact an authorized administrator to perform this action.

1. Log in to QTS or QuTS hero on the NAS.
2. Go to **Storage & Snapshots** > **Storage** > **Disks/VJBOD** > **NAS and Enclosure** .
3. Select the JBOD enclosure.
4. Click **Action**, and then select **Safely Detach**.
   The JBOD enclosure is safely detached.
5. Disconnect the connector cable from the NAS.

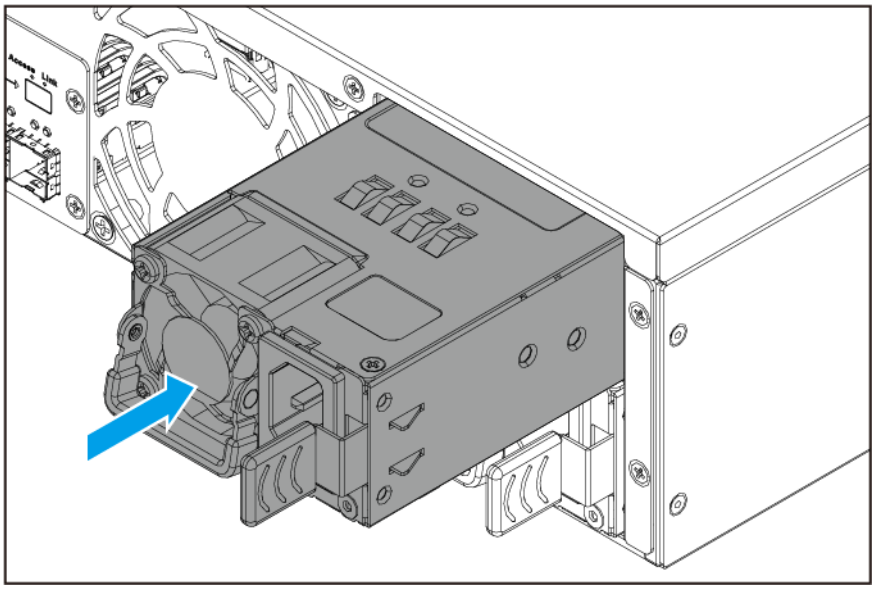
Important
When disconnecting multiple JBOD enclosures, make sure to start from the last JBOD and properly disconnect both the power cable and CAB-PCIE10M-8644-4X, and then make your way up the rest of the JBOD enclosures.

Hot-swapping redundant power supply units

1. Disconnect the power cord from the electrical outlet and the power supply unit (PSU) that you are replacing.
2. Firmly press the latch toward the handle and then pull the PSU out.



3. Insert the new PSU.



4. Connect the power cord to the PSU and the electrical outlet.

Rail kits

Rail kits are not included with the device and must be purchased separately. For details, contact an authorized reseller or go to http://shop.qnap.com.

Model	Compatible Rail Kit
TL-R1200PES-RP	RAIL-B02
TL-R1600PES-RP	
TL-R2400PES-RP	RAIL-A02-90

You can find installation information in the rail kit package.

4. Basic Operations

This chapter describes basic operations of the JBOD enclosure.

Power button

Operation	User Action	Result
Power on	Press the button once.	The device powers on or wakes up from standby mode.
Standby mode	Press and hold the button for 1.5 seconds.	The drives and fans turn off and the device goes into standby mode.
Force power off	Press and hold the button for 5 seconds.	The device powers off. **Note** • Use this method only when the device is unresponsive. • When the device is powered off, the host NAS cannot control the power status of the device.

LEDs

System Status LED

Status	Description
Red	• A system fan is not functioning. • The system temperature is over 65°C. • One or more power supply units are abnormal.
Green	The device is ready.
Orange	The device is in standby mode.
Off	• All drives are in standby mode. • The device is powered off.

Drive LED

Status	Description
Green	• The device is powered on. • The drive can be accessed.
Flashes green	Data is being accessed.
Red	A drive read/write error occurred.
Flashes amber at 4 Hz	The drive is being located in the operating system.
All drive LEDs flash green and red at 1 Hz	The device is being located in the operating system.
Off	No drive was detected.

Link LED

Status	Description
Green	The connected ports are fully connected.
Off	No cable is connected.

Connector Link LED

Status	Description
Green	The device is fully connected.
Orange	The device is not fully connected.
Off	• The device is not connected. • The device has no cable connection.

Connector Access LED

Status	Description
Green	Data is being accessed.
Off	• Data is not being accessed. • No drive was detected.

Fan Error LED

Status	Description
Red	The system fan is not functioning.
Off	The system fan is functioning normally.

Audio alert

Duration	Frequency	Description
Short beep (0.5 seconds)	1	• The JBOD drive tray link is connected. • The JBOD drive tray link is disconnected. • Host to JBOD connected. • JBOD to JBOD cascade connected.
Long beep (2 seconds)	3 (every 5 minutes)	• A system fan is not functioning. • The system temperature is over the threshold. **Note** The default temperature warning threshold is 65°C. You can set the threshold to a temperature between 55°C and 69°C using QNAP JBOD Manager.
Long beep	1 Hz	The device is being located or dislocated.

5. Troubleshooting

This chapter describes basic troubleshooting information.

Forcing Storage & Snapshots to recognize the JBOD enclosure

If Storage & Snapshots is unable to locate the JBOD enclosure during operation, the drives or data on the JBOD enclosure may be faulty.

1. Power off the JBOD enclosure.
2. Disconnect the JBOD enclosure from the NAS.
3. Remove all drives from the JBOD enclosure.
4. Reconnect the JBOD enclosure to the NAS.
5. Power on the JBOD enclosure.
6. Locate the JBOD enclosure using Storage & Snapshots.
7. Reinsert the drives.
8. Continue with operation.

Hot-swapping failed drives

When connected to a QTS or a QuTS hero NAS, the JBOD enclosure supports hot-swapping drives in the following situations:

RAID Type	Number of Disks	Situation
QTS and QuTS hero		
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. • One member drive fails. • Two member drives in two different pairs fail.
RAID 50	≥ 6	One disk per subgroup fails.
RAID 60	≥ 8	Two disks per subgroup fail.
QuTS hero only		
Triple Mirror	Multiple of 3. (For example, 3, 6, 9, 12 disks and so forth.)	One or two member drives fail.
RAID-TP	≥ 5	One, two, or three member drives fail.

1. Log on to QTS or QuTS hero.
2. Go to **Main Menu** > **Storage & Snapshots** > **Storage** > **Disks/VJBOD** .
3. Locate the failed drive.
4. Prepare a new drive with a capacity that is the same as or larger than the failed drive.

5. Remove the failed drive from the JBOD enclosure.
6. Wait for 30 seconds or until the JBOD enclosure beeps twice.
7. Remove the failed drive from the drive tray.
8. Insert the new drive into the drive tray.
9. Install the new drive.
   The JBOD enclosure beeps twice.
10. Wait for 30 seconds or until the JBOD enclosure beeps twice.
11. Go to **Main Menu** > **Storage & Snapshots** > **Storage** > **Storage/Snapshots** .
12. Locate the storage pool that contains the new drive and then verify that the status 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

6. Glossary

QTS

QNAP NAS operating system

QuTS hero

QNAP NAS operating system featuring ZFS file system

Storage & Snapshots

QTS utility that allows you to view and configure QNAP JBOD enclosures connected to a QNAP NAS

7. Notices

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Version 3, 29 June 2007

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A "Standard Interface" means an interface that either is an official standard defined by a recognized standards body, or, in the case of interfaces specified for a particular programming language, one that is widely used among developers working in that language.
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d. Convey the object code by offering access from a designated place (gratis or for a charge), and offer equivalent access to the Corresponding Source in the same way through the same place at no further charge. You need not require recipients to copy the Corresponding Source along with the object code. If the place to copy the object code is a network server, the Corresponding Source may be on a different server (operated by you or a third party) that supports equivalent copying facilities, provided you maintain clear directions next to the object code saying where to find the Corresponding Source. Regardless of what server hosts the Corresponding Source, you remain obligated to ensure that it is available for as long as needed to satisfy these requirements.

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印刷电路板	0	0	0	0	0	0
金属螺帽	0	0	0	0	0	0
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