



ES1686dc

User Guide

Contents

1. Preface

About This Guide.....	3
Audience.....	3
Document Conventions.....	3

2. Product Overview

About the ES1686dc.....	4
Hardware Specifications.....	4
Package Contents.....	7
Components.....	7
Front Panel.....	7
Front Panel Buttons.....	8
Front Panel LEDs.....	8
Front Panel OLED Display.....	9
Rear Panel.....	12
Rear Panel LEDs.....	14
Storage Controller Power Button.....	16
Reset Button.....	16
System Board.....	17
Drive Numbering.....	17
M.2 Drive Numbering.....	18
Installation Requirements.....	18
Setting up the NAS.....	19

3. Installation and Configuration

Hardware Installation.....	20
Removing the Storage Controller.....	20
Installing the Storage Controller.....	21
Drive Installation.....	22
Installing Expansion Cards.....	28
Replacing Memory Modules.....	31
Replacing the Fan Module.....	33
Hot-swapping Redundant Power Supply Units.....	34
Replacing the Battery Backup Unit.....	36
Expansion Unit Installation.....	37
QES Installation.....	43
Installing QES Using Qfinder Pro.....	43
Service Port Configuration.....	45
Storage Controller Service Port.....	45
Expansion Unit Service Port.....	46
Management Port.....	47
Multipath I/O Network Configuration.....	47

4. Troubleshooting

Forcing Qfinder Pro to Locate the NAS.....	49
Hot-swapping Failed Drives.....	49
Support and Other Resources.....	50

5. Glossary

QES.....	51
----------	----

Qfinder Pro.....	51
------------------	----

6. Notices

Limited Warranty.....	52
Disclaimer.....	52
BSMI Notice.....	52
CE Notice.....	53
FCC Notice.....	53
SJ/T 11364-2006.....	53
VCCI Notice.....	54

1. Preface





About This Guide

This guide provides information on the QNAP ES1686dc NAS 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 storage administrators. This guide assumes that the user is knowledgeable and qualified to install, maintain, and troubleshoot issues involving servers, server components, and storage systems. This guide also assumes that the user is trained to recognize hazards, including the appropriate actions the user needs to take to prevent personal injury and damage to data and property.

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 ES1686dc NAS.

About the ES1686dc

The ES1686dc is designed to deliver a scalable platform for enterprise-level solutions. The chassis contains two storage controllers. The left and right controllers are respectively referred to as controller A and controller B. The system supports up to 16 storage drives. This number can be significantly increased by attaching multiple expansion units. The ES1686dc is equipped with a powerful multi-core processor, AES-NI hardware encryption engine, and both USB 3.0 and 10 GbE ports, allowing it to deliver optimal performance for enterprise users. M.2 drive support and redundant storage controllers and power supplies provide the necessary reliability, serviceability, and read/write speeds.

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](#).

Ordering P/N	CPU	Memory	Power supply
ES1686dc-2123IT-64G	Intel® Xeon™ D-2123IT	64 GB (32 GB per controller)	Redundant
ES1686dc-2145NT-96G	Intel® Xeon™ D-2145NT	96 GB (48 GB per controller)	Redundant
ES1686dc-2145NT-128G	Intel® Xeon™ D-2145NT	128 GB (64 GB per controller)	Redundant

Component	ES1686dc-2123IT-64G	ES1686dc-2145NT-96G ES1686dc-2145NT-128G
Processor		
CPU	Intel® Xeon™ D-2123IT	Intel® Xeon™ D-2145NT
Frequency	4-core/8-thread 2.2 GHz base/3.0 GHz turbo	8-core/16-thread 1.9 GHz base/3.0 GHz turbo
Architecture	x86 64-bit	
Encryption engine	AES-256	
Memory		

Component	ES1686dc-2123IT-64G	ES1686dc-2145NT-96G ES1686dc-2145NT-128G
Memory slots	8 x DDR4 RDIMM or LRDIMM slots per controller <div> Important Use only QNAP memory modules to maintain system performance and stability. For NAS devices with more than one memory slot, use QNAP modules with identical specifications. Using unsupported modules may degrade performance, cause errors, or prevent the operating system from starting. You can only use one type of dual in-line memory module (DIMM) at a time. Do not use registered DIMM (RDIMM) with load-reduction DIMM (LRDIMM) memory.</div>	
Maximum memory	512 GB RAM: 8 x 64 GB	
Flash memory	4 GB (dual boot OS protection)	
Cache for Copy to Flash	64 GB per controller	
Storage		
Drive bays	16 x 3.5-inch SAS 12 Gbps <div> Note The interface is backward compatible to SAS 6 Gbps.</div>	
Drive compatibility	<ul style="list-style-type: none">• 3.5-inch SATA hard disk drives• 3.5-inch SAS hard disk drives• 2.5-inch SATA hard disk drives• 2.5-inch SATA solid-state drives• 2.5-inch SAS hard disk drives• 2.5-inch SAS solid-state drives	
M.2 SSD slots	2 x M.2 SSD slots per controller <div> Note These slots support SATA 6 Gbps and PCIe Gen 3 x4 NVMe SSDs.</div>	
M.2 SSD form factor	2280	
SSD cache acceleration support	<ul style="list-style-type: none">• 3.5-inch drive bays 1 to 16• M.2 SSD slots 1 to 2• Optional: M.2 SSD slots on an M.2 SSD expansion card	
Network		
10 Gigabit Ethernet ports	4 x 10 GbE SFP+ ports per controller	
Gigabit Ethernet ports	3 x GbE RJ45 ports per controller	
External I/O Ports & Expansion Slots		

Component	ES1686dc-2123IT-64G	ES1686dc-2145NT-96G ES1686dc-2145NT-128G
PCIe slots	2 x PCIe 3.0 x8 slots per controller <div> Tip For the list of compatible expansion cards, go to https://www.qnap.com/compatibility.</div>	
USB ports	2 x USB 3.0 Type-A ports per controller	
Interface		
Buttons	NAS <ul style="list-style-type: none">• Power Storage Controllers <ul style="list-style-type: none">• Power• Reset	
Dimensions		
Form factor	3U Rackmount	
Dimensions (H x W x D)	132 x 483.05 x 630.62 mm (5.20 x 19.02 x 24.83 in)	
Net weight	25.83 kg (56.95 lbs)	
Others		
Rail compatibility	RAIL-E02 <div> Note Information on rail kit installation can be found in the installation guide included in the rail kit package.</div>	
Power supply unit	2 x 770W, 90-264V AC, 50/60 Hz	
System battery	CR2032 lithium battery (3V, 225 mAh) <div> Warning 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.</div> <div> Important Dispose of used batteries according to local regulations or the instructions of the battery manufacturer.</div>	
Hot-swappable battery backup unit	2 x 10.8V, 2200 mAh	
Sound level	55.8 db(A) <div> Note The sound level was tested at a bystander position, which is within one meter of the NAS. The test NAS operated at low speed with the maximum number of drives installed.</div>	

Component	ES1686dc-2123IT-64G	ES1686dc-2145NT-96G ES1686dc-2145NT-128G
Hot-swappable fan module	System: 60 x 60 x 38 mm, 12V DC <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"></div> <div> Warning To avoid potential injury or damage to components, do not touch the fans while the NAS is connected to a power source. To ensure proper cooling, replacement of the fan should be completed within 10 seconds. </div> </div>	
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) 	

**Tip**

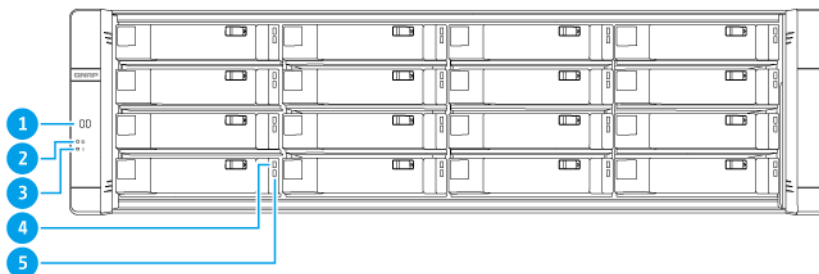
Model specifications are subject to change without prior notice. To see the latest specifications, go to <https://www.qnap.com>.

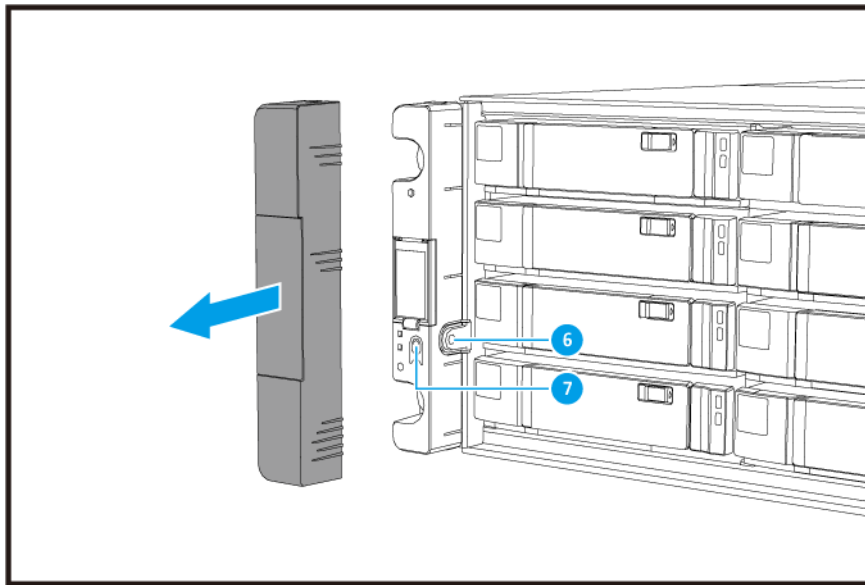
Package Contents

Item	Quantity
ES1686dc NAS	1
Power cord	2
Ethernet cable	6
Screws for 2.5-inch drives	64
Screws for 3.5-inch drives	64
Screws for M.2 SSDs	4
RAIL-E02 rail kit	1
Quick Installation Guide (QIG)	1

Components


Front Panel





No.	Component	No.	Component
1	OLED display	5	Drive activity LED
2	System power LED	6	OLED button
3	Status LED	7	Power button
4	Drive status LED	-	-

Front Panel Buttons

Operation	User Action	Result
Power on NAS	Press the power button.	Both storage controllers power on. <div>  Important This button can only be used to power on the two storage controllers. Use the respective rear panel storage controller power button to power off the storage controllers. </div>
Power on OLED display	Press the OLED button.	The OLED display powers on.
Power off OLED display	Press the OLED button.	The OLED display powers off.

Front Panel LEDs

The front panel LEDs indicate system status and related information when the NAS is powered on. The following LED information applies only when the drive is correctly installed and when the NAS is connected to the network.




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




LED	Status	Description
System power	Blue	System powered on
System status	Green	System operating correctly
	Red	<ul style="list-style-type: none"> There are system errors or warnings (e.g. degraded RAID mode, memory failure, fan/power supply failure, system/disk temperature too high, storage pool reaching threshold value) recorded in the system logs of the QES to notify the system administrator. The errors need to be corrected. The system is performing takeover. The dual active-active controller system enables a single controller to take over the pool disk resources owned by the other controller in the event of a controller failure. Takeovers can be initiated manually or be set up with the automatic system failover protection. For more information, refer to the QES user guide. Power supply unit unplugged
Drive status	Green	Drive can be accessed
	Flashing green slowly	The Locate command, which helps identify the drive, is being executed in the Storage Manager on QES.
	Red	Drive read/write error
	Off	Drive not installed
Drive activity	Flashing green continuously or slowly	No drive activity
	Flashing green	High activity on drive or drive being configured as part of an array







Front Panel OLED Display

The OLED display provides a quick understanding of the storage controllers and main component status.

For details on the location of the OLED display, see [Front Panel](#).

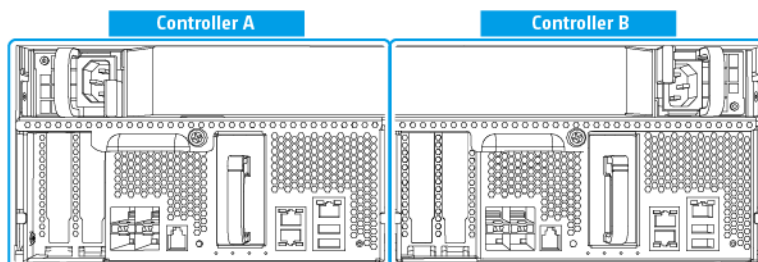
Icon name	Icon	Description
Controller power status		<ul style="list-style-type: none"> Icon lit: Both controllers powered on Icon flashing: Both controllers booting
		<ul style="list-style-type: none"> Icon lit: Only controller A powered on Icon flashing: Controller A booting
		<ul style="list-style-type: none"> Icon lit: Only controller B powered on Icon flashing: Controller B booting

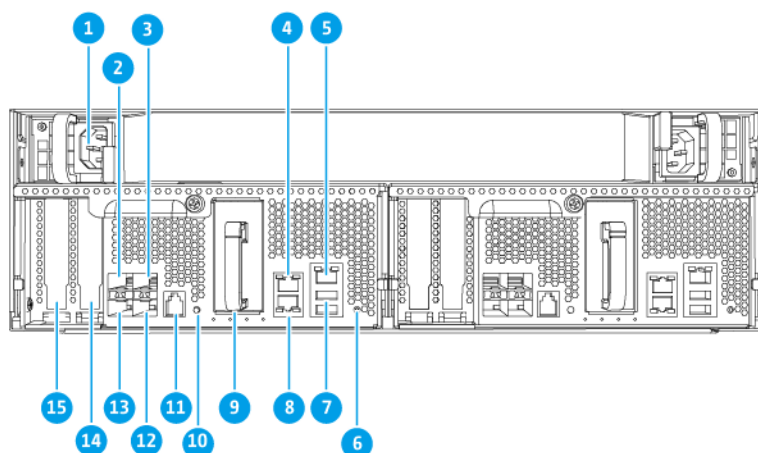
Icon name	Icon	Description
Controller fan status		<ul style="list-style-type: none"> Icon lit: Fan module in both controllers operating correctly Icon flashing: Fan module in both controllers operating incorrectly or not installed
		<p>If both controllers installed:</p> <ul style="list-style-type: none"> Icon flashing: Fan module in controller A operating incorrectly or not installed <p>If only controller A installed:</p> <ul style="list-style-type: none"> Icon lit: Fan module in controller A operating correctly Icon flashing: Fan module in controller A operating incorrectly or not installed
		<p>If both controllers installed:</p> <ul style="list-style-type: none"> Icon flashing: Fan module in controller B operating incorrectly or not installed <p>If only controller B installed:</p> <ul style="list-style-type: none"> Icon lit: Fan module in controller B operating correctly Flashing: Fan module in controller B operating incorrectly or not installed

Icon name	Icon	Description
Controller battery backup unit		<ul style="list-style-type: none"> • Icon lit: BBU in both controllers operating correctly • Icon flashing: BBU in both controllers operating incorrectly • Icon highlighted: BBU in both controllers charging • Icon unlit: BBU in both controllers not detected
		<p>If both controllers powered on:</p> <ul style="list-style-type: none"> • Icon flashing: BBU in controller A operating incorrectly or not detected • Icon highlighted: BBU in controller A charging <p>If only controller A powered on:</p> <ul style="list-style-type: none"> • Icon lit: BBU in controller A operating correctly • Icon flashing: BBU in controller A operating incorrectly or not detected • Icon highlighted: BBU in controller A charging
		<p>If both controllers powered on:</p> <ul style="list-style-type: none"> • Icon flashing: BBU in controller B operating incorrectly or not detected • Icon highlighted: BBU in controller B charging <p>If only controller B powered on:</p> <ul style="list-style-type: none"> • Icon lit: BBU in controller B operating correctly • Icon flashing: BBU in controller B operating incorrectly or not detected • Icon highlighted: BBU in controller B charging
High availability status		<ul style="list-style-type: none"> • Icon lit: Active state • Icon flashing: Performing take-over or undergoing give-back
		Icon highlighted: Controller A in take-over state
		Icon highlighted: Controller B in take-over state

Icon name	Icon	Description
Two-digit display	05	<p>The two-digit display shows the booting status of the storage controllers. The left digit is the status of controller A, and the right digit is the status of controller B. The following list explains the meaning of each digit. (Refer to the High Availability app of QES to view the components and their denoted names.)</p> <ul style="list-style-type: none"> • No Display: BIOS booting • 1: Device detecting • 2: Network settings • 3: System settings • 4: Service start • 5: System self-testing • 8: System initializing • 0: System ready

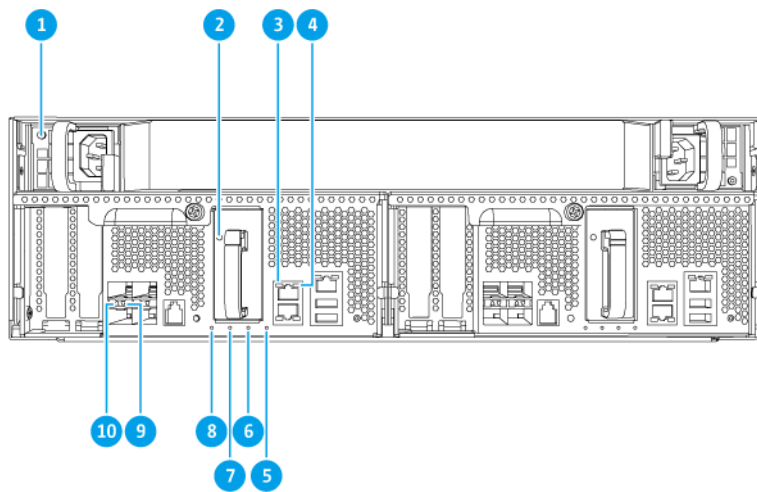
Rear Panel





No.	Component	No.	Component
1	Power supply unit	9	Battery backup unit
2	Ethernet port 6 (10 GbE SFP+)	10	Power button
3	Ethernet port 4 (10 GbE SFP+)	11	Service port
4	Ethernet port 2 (GbE RJ45)	12	Ethernet port 5 (10 GbE SFP+)
5	Ethernet port 1 (GbE RJ45, management port)	13	Ethernet port 7 (10 GbE SFP+)
6	Reset button	14	PCIe 3.0 slot 1 (x8)
7	USB 3.0 Type-A ports	15	PCIe 3.0 slot 2 (x8)
8	Ethernet port 3 (GbE RJ45)	-	-

Rear Panel LEDs




No.	Component	No.	Component
1	Power supply LED	6	Battery backup unit status LED
2	Battery backup unit LED	7	Fan status LED
3	Gigabit Ethernet LED (port speed)	8	Status LED
4	Gigabit Ethernet LED (port activity)	9	10 Gigabit Ethernet LED (port activity)
5	High availability LED	10	10 Gigabit Ethernet LED (port speed)

The following LED information applies only when the drive is correctly installed and when the NAS is connected to the network.

LED	Status	Description
Power supply unit	Green	<ul style="list-style-type: none"> Powered on Power supply functioning correctly
	Flashing green	System off
	Orange	AC power cord unplugged or abnormal
	No color	One or more of the following conditions exist: <ul style="list-style-type: none"> AC power unavailable Power supply failed
Battery backup unit	Green	Functioning normally
	Red	Malfunctioning
	Orange	Charging or learning
	No color	Not correctly attached to the ES1686dc
Status	Green	System operating correctly
	Flashing green	System booting
	No color	System powered off

LED	Status	Description
Fan	Green	Functioning correctly
	Orange	Malfunctioning
	No color	Fans not detected
Battery backup unit status	Green	Functioning correctly
	Orange	Writing buffer for Copy to Flash
	No color	One or more of the following conditions exist: <ul style="list-style-type: none"> Storage controller is powered off System cannot detect battery backup unit
High availability	Green	Active State
	Flashing orange	One of the following: <ul style="list-style-type: none"> Performing takeover: The dual active-active controller system enables a controller to take over the pool disk resources and access the data upon the failure of the other controller. Takeovers can be initiated manually or be set up with the automatic system failover protection. For more details, refer to the QES user guide. Undergoing giveback: One of the storage controllers has taken over the system. The other storage controller has resumed operations and is ready to resume data service. Giveback can be initiated manually or be set up with automatic failback after system recovers. For more details, refer to the QES user guide.
	Orange	Storage controller has taken over from the other storage controller
	No color	One or more of the following conditions exist: <ul style="list-style-type: none"> Storage controller failed Storage controller is powered off
10 Gigabit Ethernet port speed	Green	10 GbE connection
	Orange	1 GbE connection
	No color	100 Mbps connection
10 Gigabit Ethernet port activity	Green	Network link active
	Flashing green	Network link active
	No color	No network link
1 Gigabit Ethernet port activity	Green	Network link established
	Flashing green	Network link active
	No color	No network link
1 Gigabit Ethernet port speed	Green	1 GbE connection
	Orange	100 Mbps connection

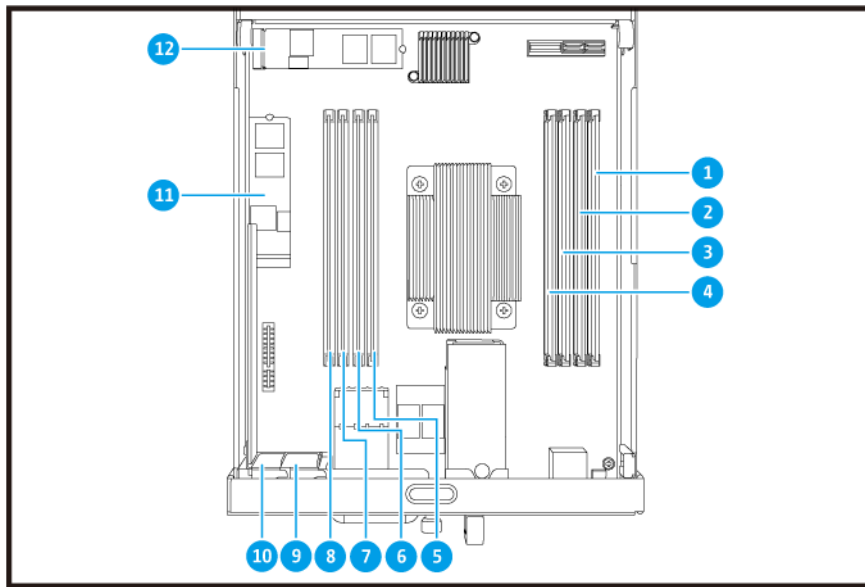
Storage Controller Power Button

Operation	User Action	Result
Power on	Press the button once.	The storage controller powers on.
Power off	Press and hold the button for 5 seconds.	The storage controller powers off.
Force power off	Press and hold the button for 10 seconds.	<p>The storage controller shuts down.</p> <div>  <p>Important Use this method only when the storage controller is unresponsive.</p> </div>

Reset Button

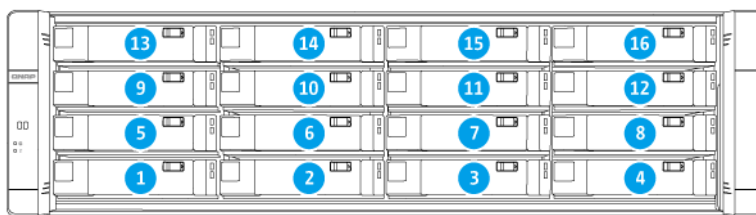
Operation	User Action	Result
Basic system reset	Press and hold the button for 3 seconds.	<p>The following settings are reset to default:</p> <ul style="list-style-type: none"> • System administrator password: admin • TCP/IP configuration: <ul style="list-style-type: none"> • Obtain IP address settings automatically via DHCP • Disable jumbo frames • If port trunking is enabled (multi-LAN models only), the port trunking mode is reset to “Active Backup (Failover)”. • System port: 8080 (system service port) • Security level: Low (Allow all connections) • LCD panel password: (blank) • VLAN: Disabled • Service binding: All NAS services can run on all available network interfaces.
Advanced system reset	Press and hold the button for 10 seconds.	<p>The default factory settings are restored. To retrieve old data after an advanced system reset, recreate the previous folder structure on the NAS.</p>

System Board

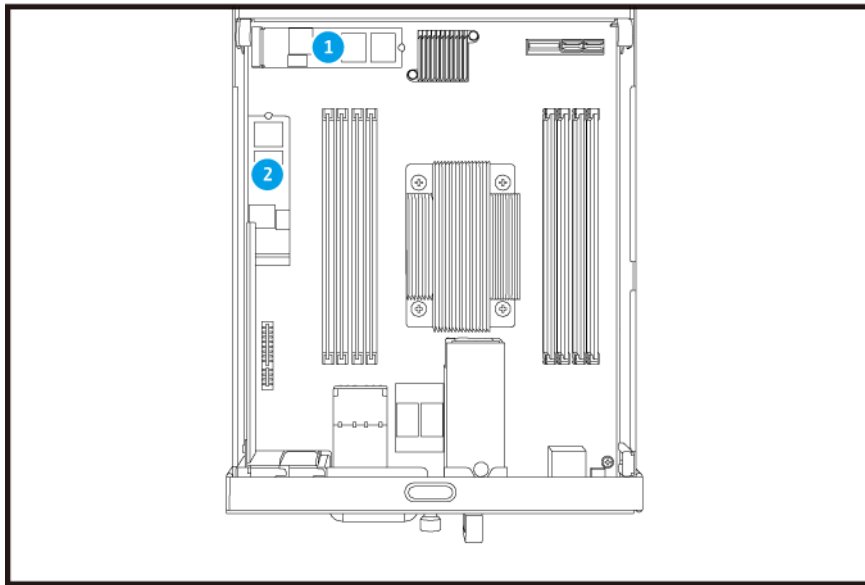


No.	Component	No.	Component
1	Memory slot 1	7	Memory slot 7
2	Memory slot 2	8	Memory slot 8
3	Memory slot 3	9	PCIe 3.0 slot 1 (x8)
4	Memory slot 4	10	PCIe 3.0 slot 2 (x8)
5	Memory slot 5	11	M.2 SSD slot 2
6	Memory slot 6	12	M.2 SSD slot 1

Drive Numbering



M.2 Drive Numbering



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 Free from objects that may obstruct NAS ventilation or apply pressure to the NAS or power cord Restricted access <ul style="list-style-type: none"> The NAS 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 NAS administrators with knowledge of all restrictions, safety precautions, and installation and maintenance procedures should have physical access to the NAS.
Hardware and peripherals	<ul style="list-style-type: none"> Storage drives For details on compatible drives, go to https://www.qnap.com/compatibility/. Network cable
Tools	<ul style="list-style-type: none"> Phillips #1 or #2 screwdriver Anti-static wrist strap

Setting up the NAS

1. Place your NAS device 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 Hard Drives on 3.5-inch Trays](#)
 - [Installing 2.5-inch Hard Drives or Solid State Drives on 3.5-inch Trays](#)
 - [Installing M.2 Solid State Drives on the System Board](#)
 - [Installing Expansion Cards](#)
3. Connect the power cord and all applicable cables.
4. Power on the NAS.
5. Install QES.
For details, see [QES Installation](#).
6. Log on to QES.

3. Installation and Configuration

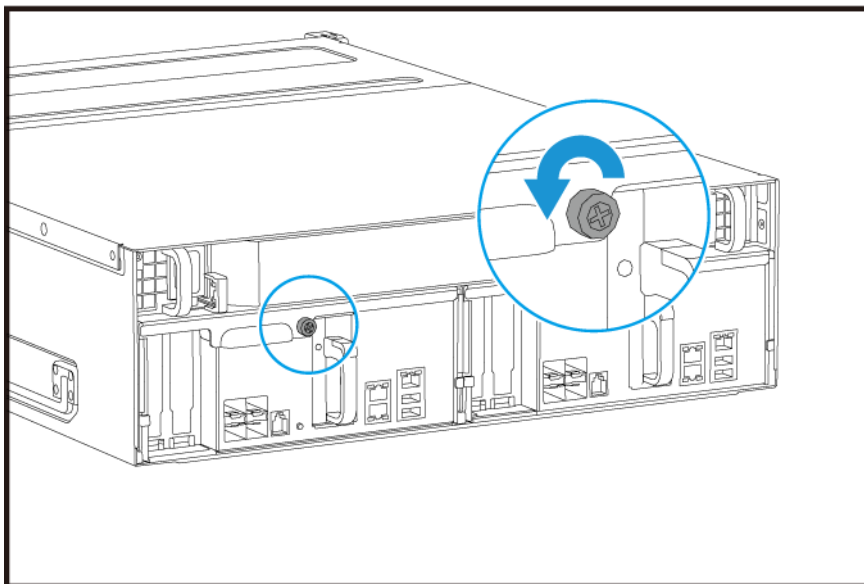
This chapter provides specific hardware and firmware installation and configuration steps.

Hardware Installation

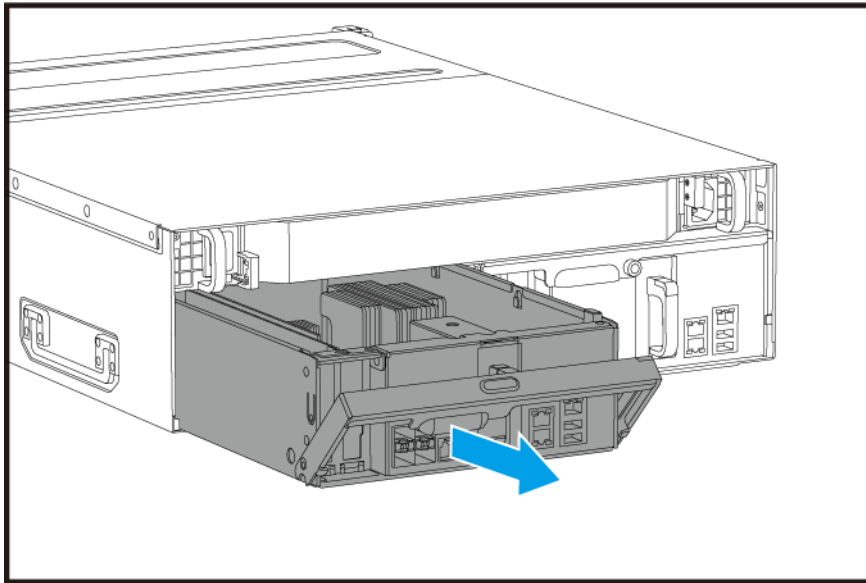
This section provides information on removing or installing the storage controller, drives, expansion cards, power supply units, fan modules, memory modules, and battery backup units.

Removing the Storage Controller

1. Power off the NAS.
2. Disconnect the power cord from the electrical outlet.
3. Disconnect all cables and external attachments.
4. Remove the storage controller.
 - a. Loosen the screw.

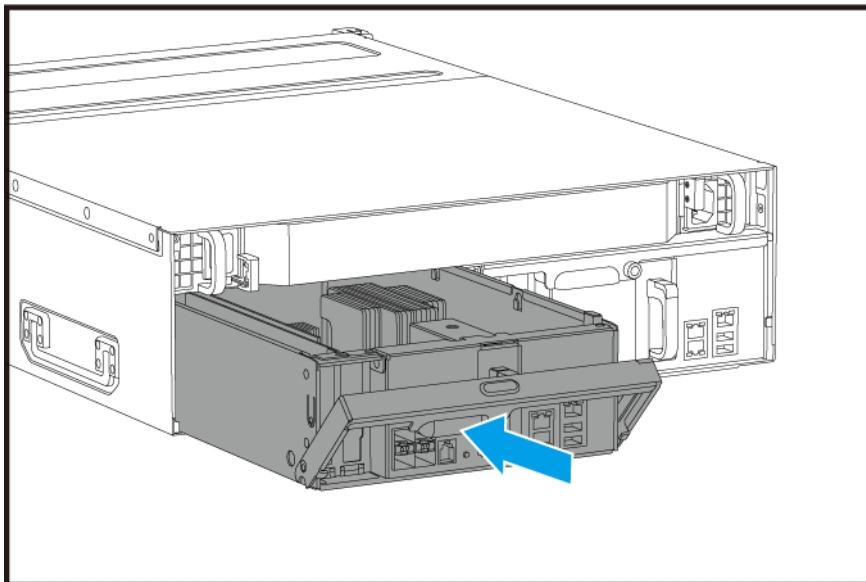


- b. Pull the handle to pull out the storage controller.

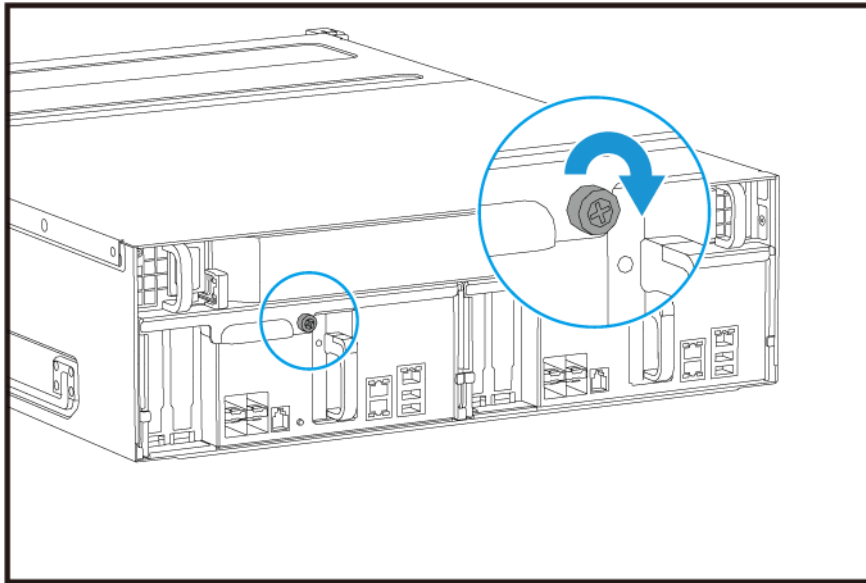


Installing the Storage Controller

1. Load the controller into the NAS.
 - a. Insert the controller into the chassis.
 - b. Push the handle up.



2. Tighten the screw.



3. Connect all cables and external attachments.
4. Connect the power cord to the electrical outlet.
5. Power on the NAS.

Drive Installation

The ES1686dc is compatible with 3.5-inch and 2.5-inch hard drives, and 2.5-inch and M.2 solid state drives.

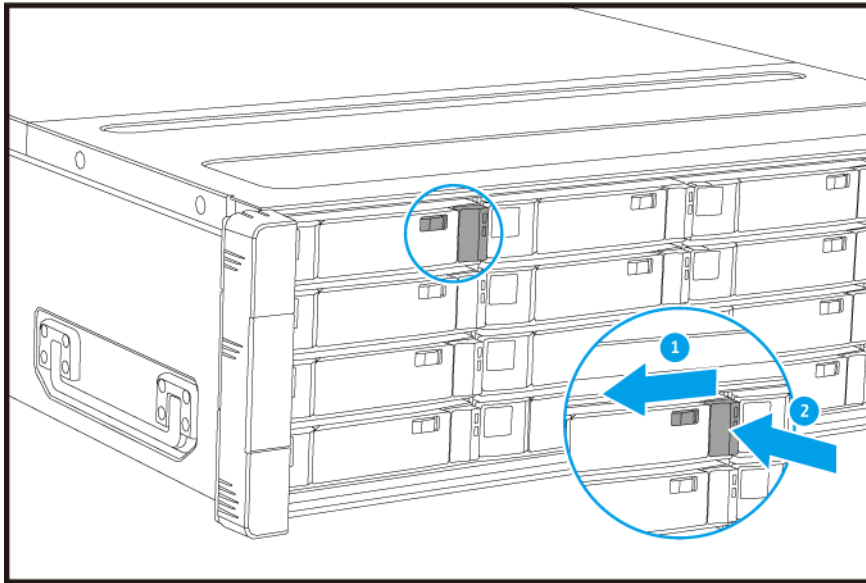
Installing 3.5-inch Hard Drives on 3.5-inch Trays



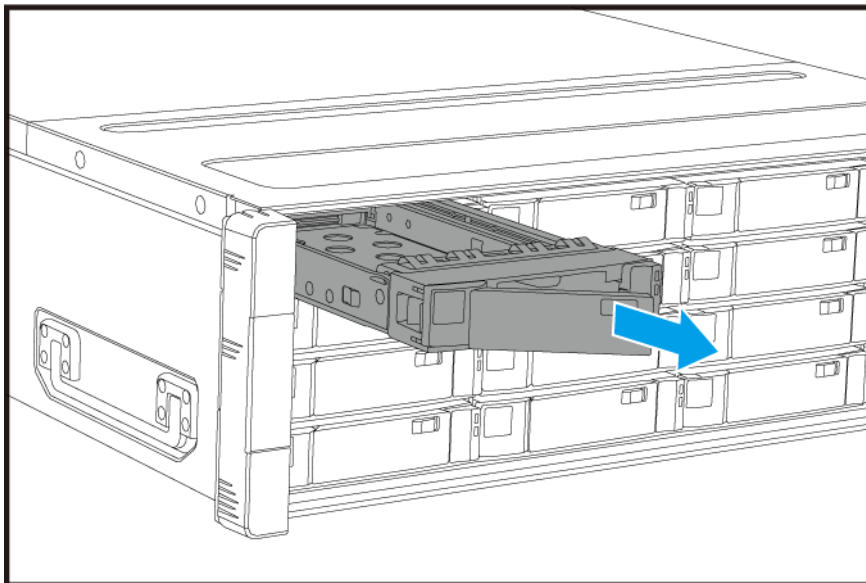
Warning

- Installing a drive deletes all data on the drive.
- Observe electrostatic discharge (ESD) procedures to avoid damage to components.
- Do not replace a drive without first bringing the storage pool offline in QES. You may replace a drive online only when it is part of an array that has been configured for fault tolerance and a predictive failure alert is received from QES. For more information, refer to the QES user guide.

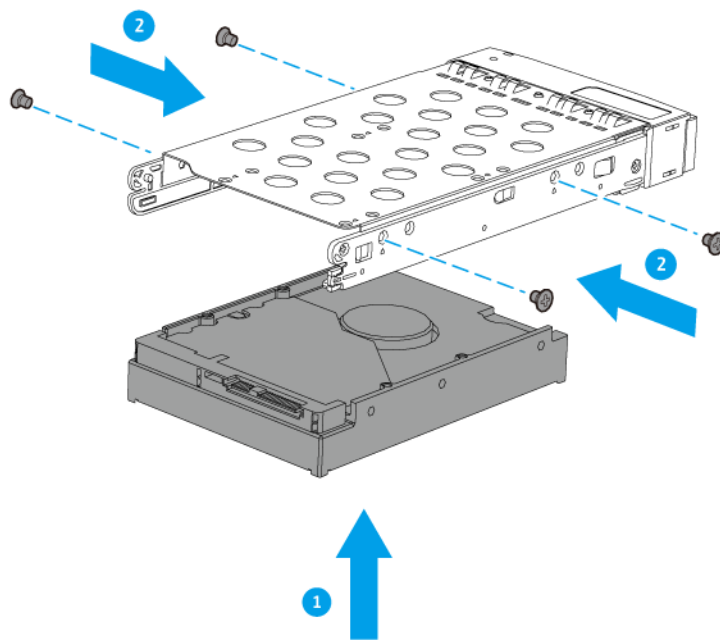
1. Power off the NAS.
2. Remove the drive tray.
 - a. Slide the lock to the left.



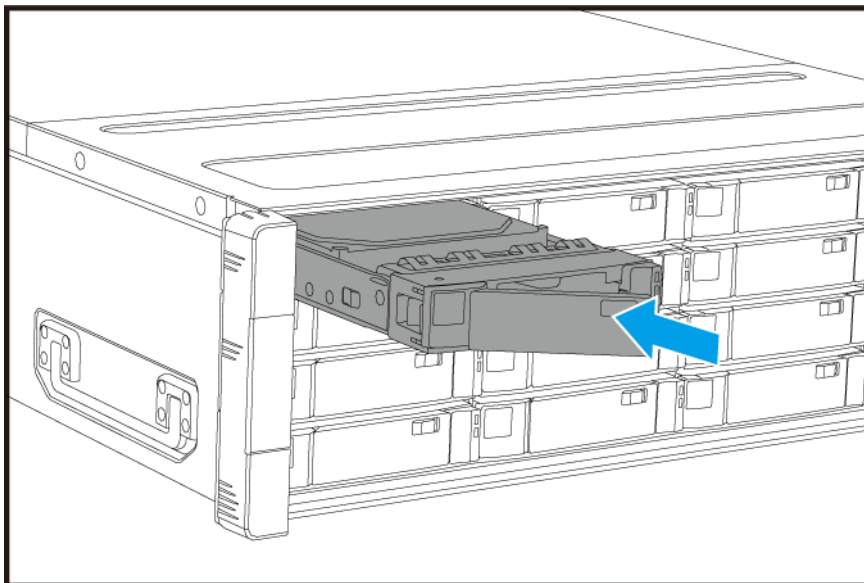
- b.** Push the button to release the handle.
- c.** Pull the tray out.



- 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 NAS.

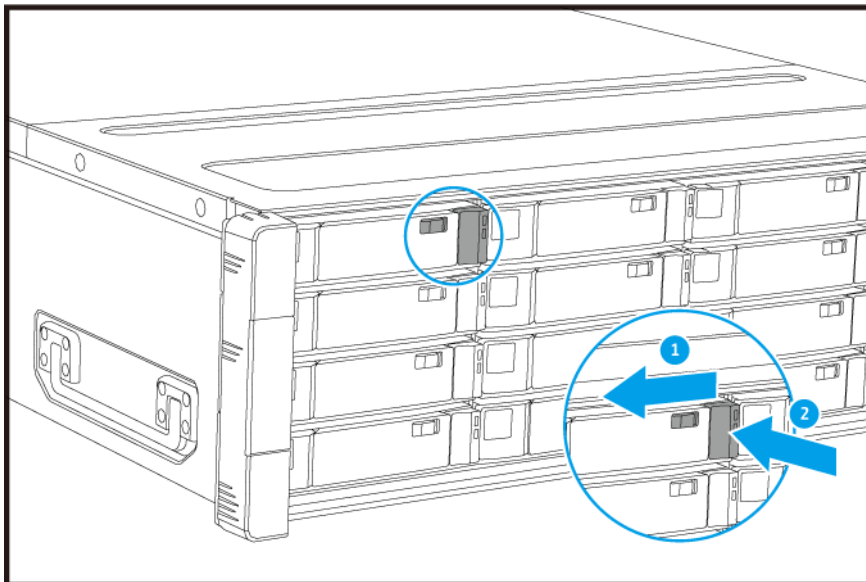
Installing 2.5-inch Hard Drives or Solid State Drives on 3.5-inch Trays



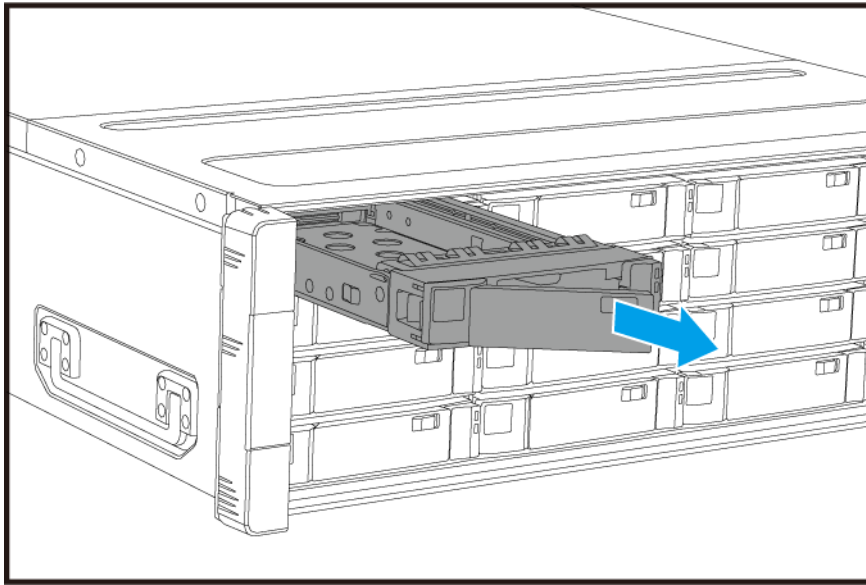
Warning

- Installing a drive deletes all data on the drive.
- Observe electrostatic discharge (ESD) procedures to avoid damage to components.
- Do not replace a drive without first bringing the storage pool offline in QES. You may replace a drive online only when it is part of an array that has been configured for fault tolerance and a predictive failure alert is received from QES. For more information, refer to the QES user guide.

1. Power off the NAS.
2. Remove the drive tray.
 - a. Slide the lock to the left.

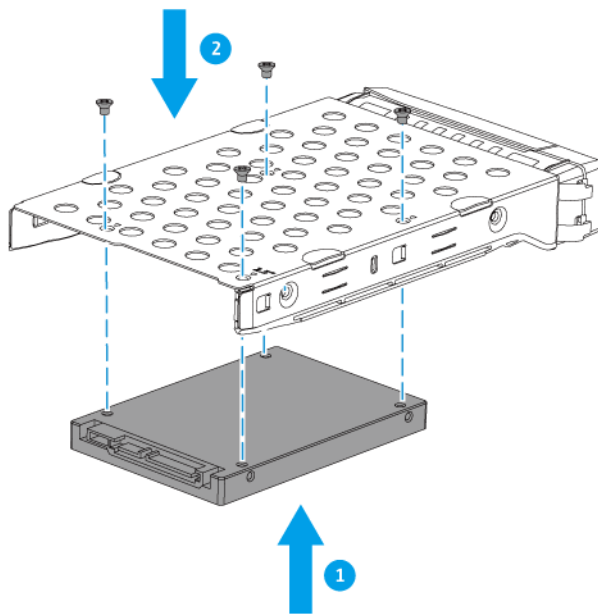


- b. Push the button to release the handle.
- c. Pull the tray out.



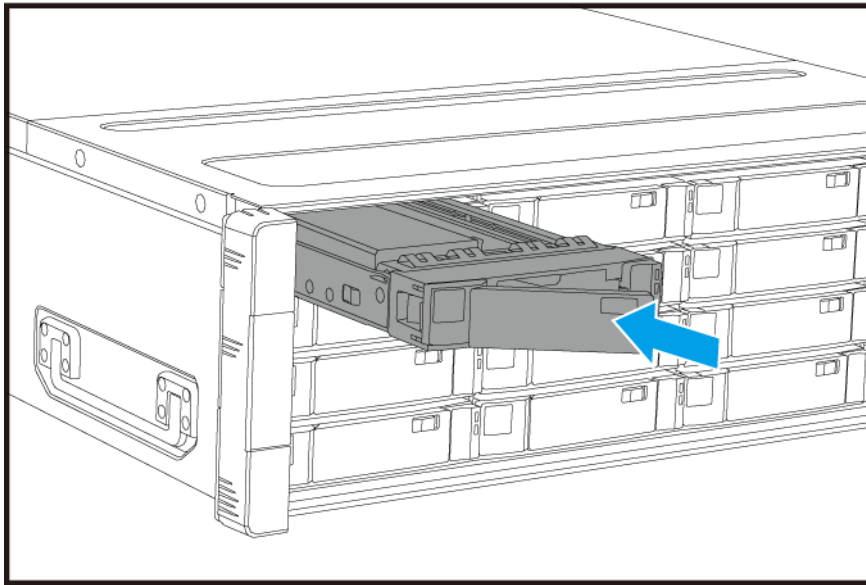
3. Install a drive on the tray.

- 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 NAS.

Installing M.2 Solid State Drives on the System Board

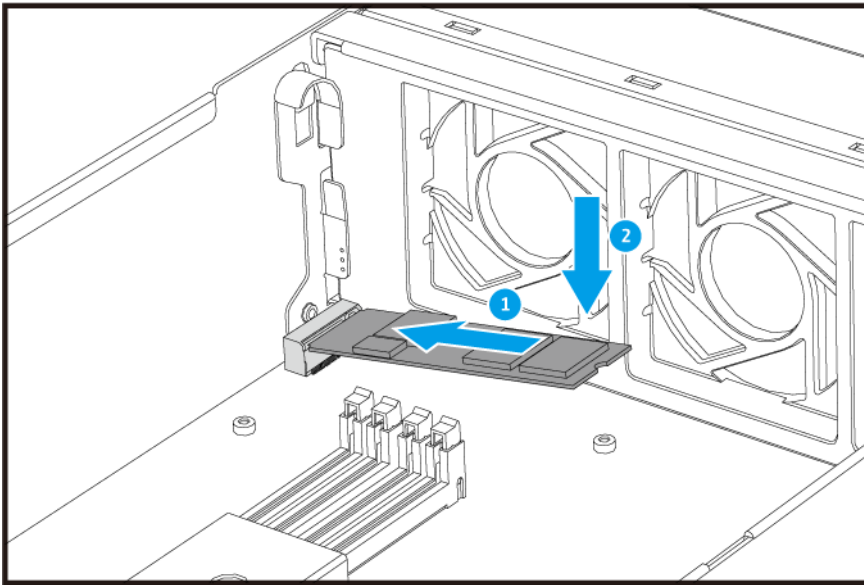
The ES1686dc has two M.2 SSD slots on the system board. For a list of compatible M.2 SSDs, go to <http://www.qnap.com/compatibility>



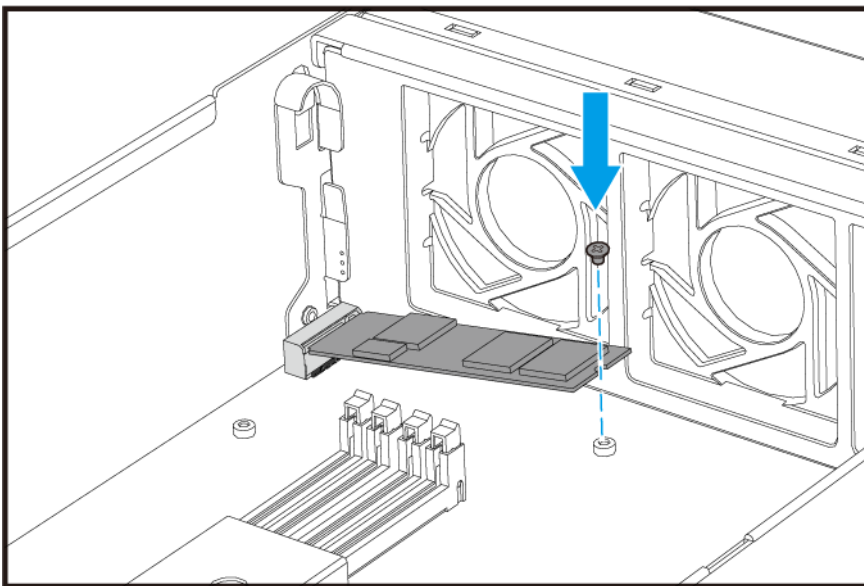
Warning

- Only qualified personnel should perform the following steps. Failure to follow instructions can result in serious injury or death.
- Observe electrostatic discharge (ESD) procedures to avoid damage to components.

1. Remove the storage controller.
For details, see [Removing the Storage Controller](#).
2. Install the M.2 SSD.
 - a. Insert the M.2 SSD into the slot.



b. Attach the screw.



3. Install the storage controller.
For details, see [Installing the Storage Controller](#).

Installing Expansion Cards

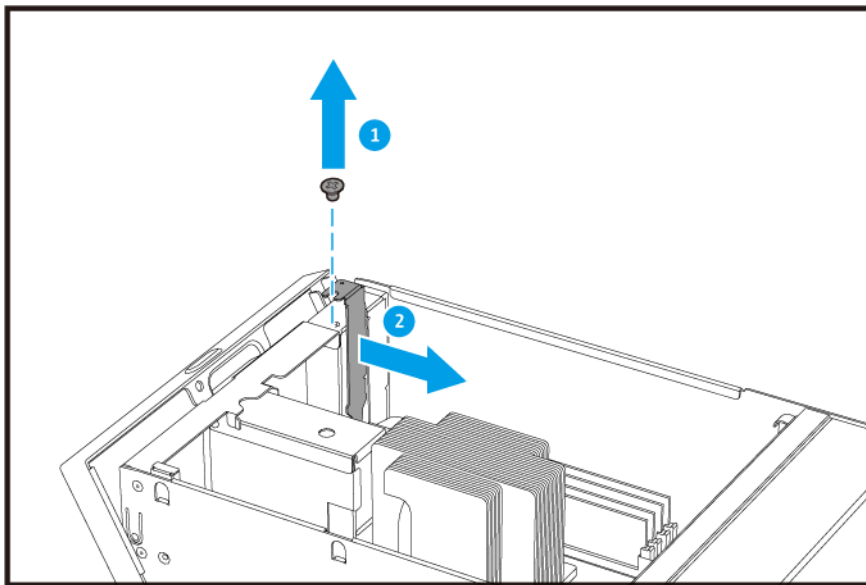
The ES1686dc supports selected expansion cards, some of which require QNAP PCIe brackets. QNAP-branded expansion cards purchased from the company website are shipped with the brackets necessary to fit the ES1686dc.



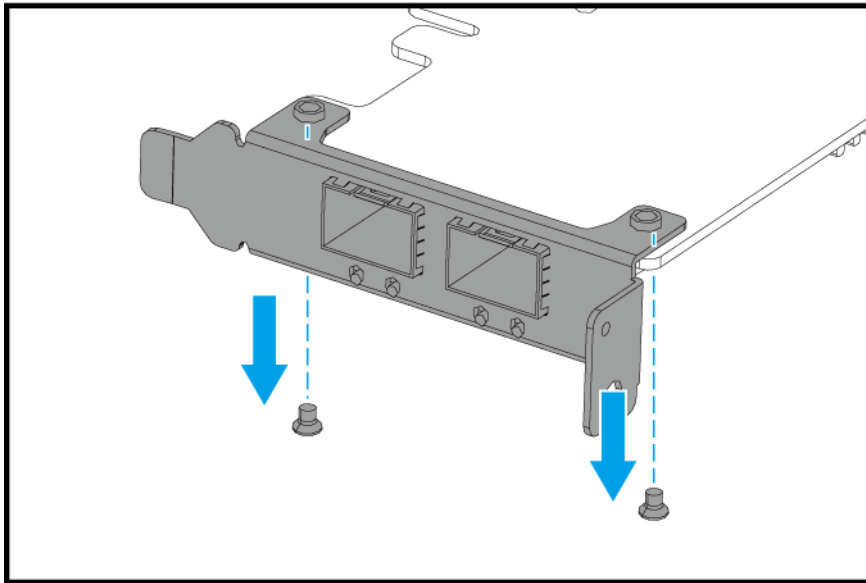
Warning

- Only qualified personnel should perform the following steps. Failure to follow instructions can result in serious injury or death.

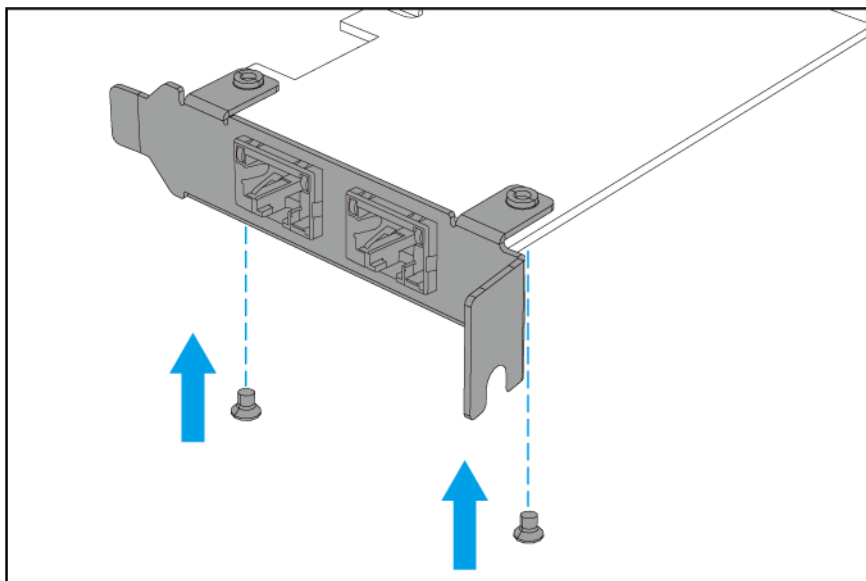
- Observe electrostatic discharge (ESD) procedures to avoid damage to components.
1. Check the expansion cards and brackets supported by your model on the QNAP website.
 - a. Go to www.qnap.com/compatibility.
 - b. Click **Search by NAS**.
 - c. Specify the number of bays and the specific model of your NAS.
 - d. Under **Category**, select the component or device type.
 - e. Locate a specific component or device model in the list.
 - f. Optional: Click the corresponding **Note** icon to view more information.
 2. Remove the storage controller.
For details, see [Removing the Storage Controller](#).
 3. Remove the PCIe cover.
 - a. Remove the screw that secures the cover to the bracket.
 - b. Pull the cover away from the slot.



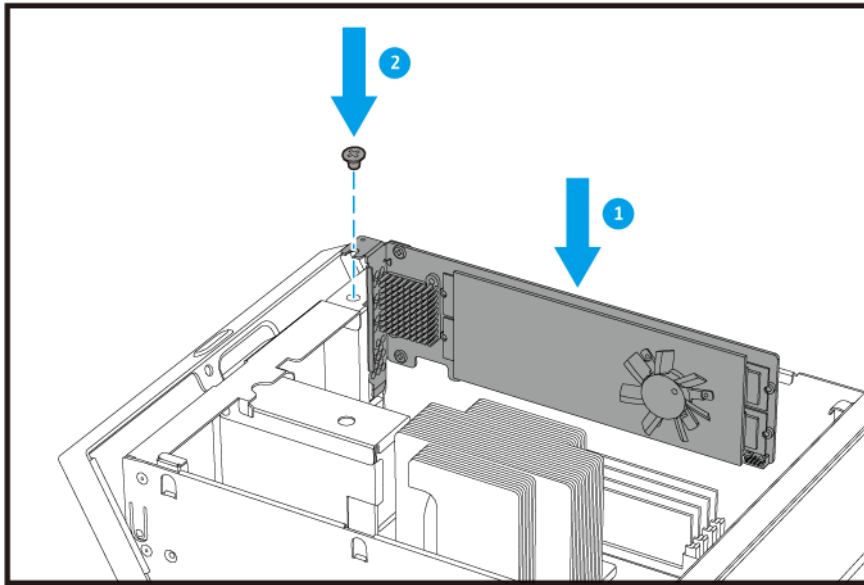
4. Optional: Attach the QNAP bracket to the expansion card.
 - a. Remove all screws of the existing bracket.



- b. Carefully pull the bracket away from the card.
- c. Attach the QNAP bracket to the card using the same screws.



- d. Verify that the bracket does not move.
5. Install the expansion card.
- a. Hold the card by the edges.
 - b. Insert the card into the slot.
 - c. Attach the screw.



6. Install the storage controller.
For details, see [Installing the Storage Controller](#).

Replacing Memory Modules

Each storage controller has eight memory slots. You can increase the memory capacity of the NAS by upgrading the memory module.

Use only QNAP modules of the same type and capacity to maintain system performance and stability. You can purchase QNAP memory modules from authorized resellers.



Important

For best results, QNAP recommends installing modules in pairs.

- Ensure that each pair uses identical modules.
- Install the pairs in sequence and follow the assigned slots for each pair.
- The ES1686dc has eight memory slots. For optimal quad-channel performance, install memory modules on either four or eight of the slots. When installing four memory modules, install the memory in slots 1, 3, 6, and 8.

For details on slot numbering, see [System Board](#).

Module Pair	Slot Number
First pair	Slots 1 and 8
Second pair	Slots 3 and 6
Third pair	Slots 2 and 7
Fourth pair	Slots 4 and 5



Warning

- Only qualified personnel should perform the following steps. Failure to follow instructions can result in serious injury or death.

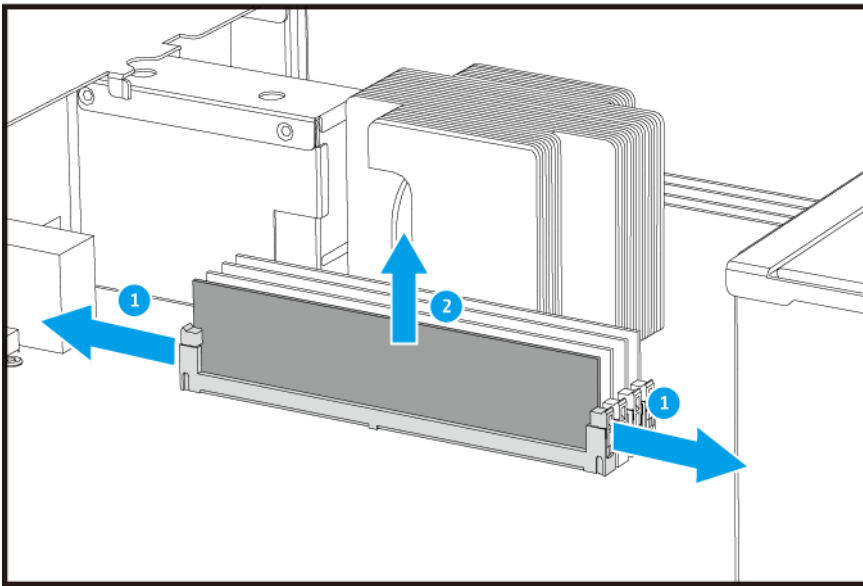
- Observe electrostatic discharge (ESD) procedures to avoid damage to components.

1. Remove the storage controller.
For details, see [Removing the Storage Controller](#).
2. Remove an existing module.
 - a. Push the retention clips outward simultaneously to release the module.

**Warning**

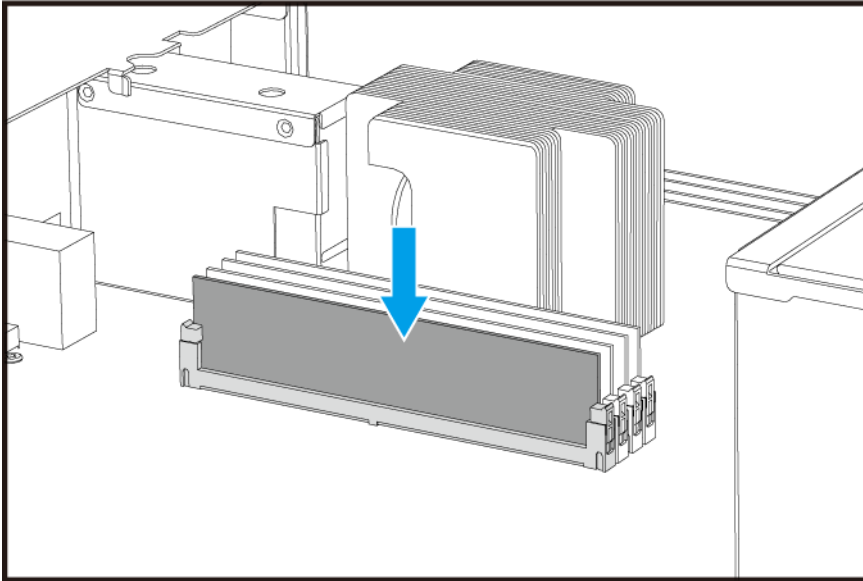
Attempting to remove a module that is not completely released may damage the module and the motherboard.

- b. Hold the module by the edges and then carefully slide it out of the slot.



3. Install a new module.
 - a. Align the notch with the ridge in the slot.
 - b. Insert the module into the slot.
 - c. Verify that the metal connectors are completely inserted into the slot.

- d. Carefully press down on the module until the retention clips lock the module into place.



4. Install the storage controller.
For details, see [Installing the Storage Controller](#).
5. Verify that the module is recognized by the NAS.
 - a. Log on to QES as administrator.
 - b. Go to **Control Panel > System > System Status > Hardware Information**.
 - c. Check the values for each memory slot.

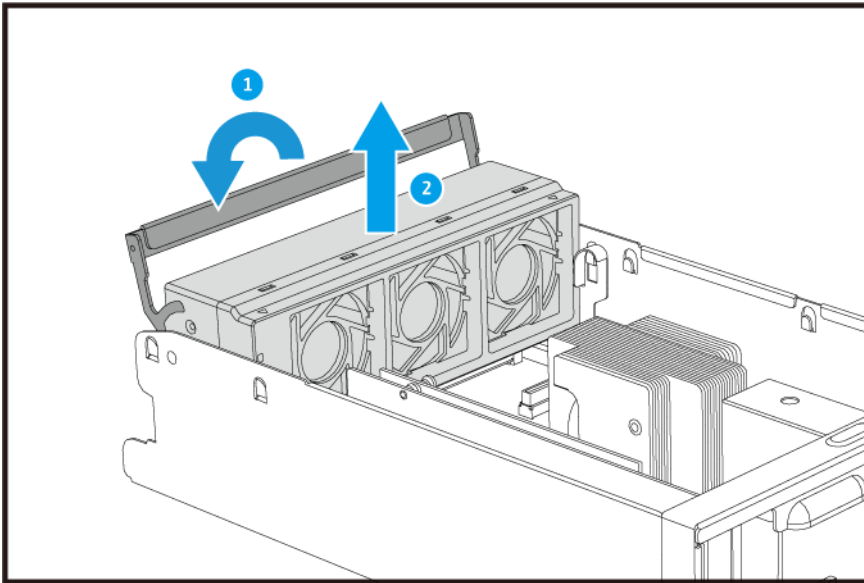
Replacing the Fan Module

The fan module of the ES1686dc contains three fans to ensure adequate cooling.

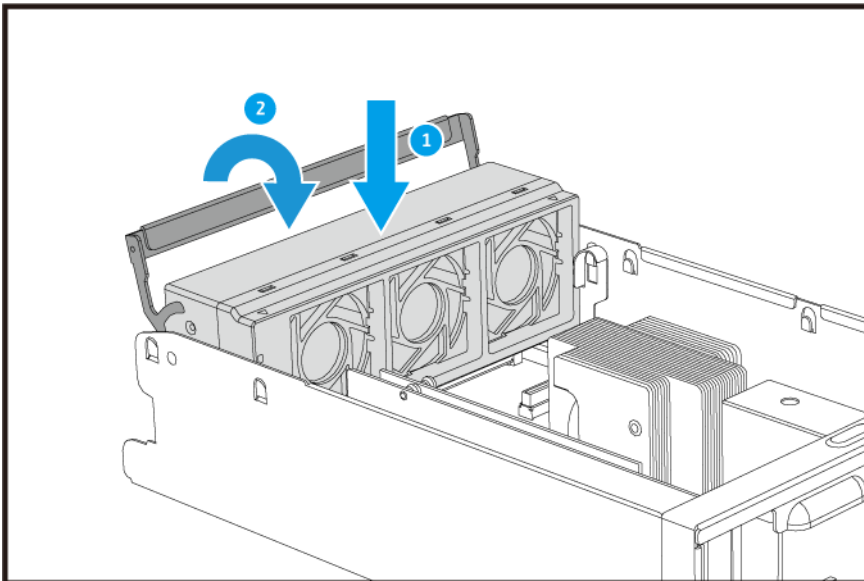


Warning

- To avoid potential injury or damage to components, do not touch the fans while the NAS is connected to a power source.
 - Only qualified personnel should perform the following steps. Failure to follow instructions can result in serious injury or death.
 - Observe electrostatic discharge (ESD) procedures to avoid damage to components.
1. Remove the storage controller.
For details, see [Removing the Storage Controller](#).
 2. Remove the fan module.
 - a. Pull the handle to release the fan module.
 - b. Pull the module out.



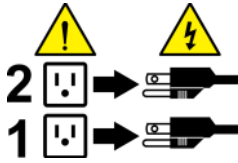
3. Install a new fan module.
 - a. Insert the module into the chassis.
 - b. Push the handle down to lock the module in place.



4. Install the storage controller.
For details, see [Installing the Storage Controller](#).

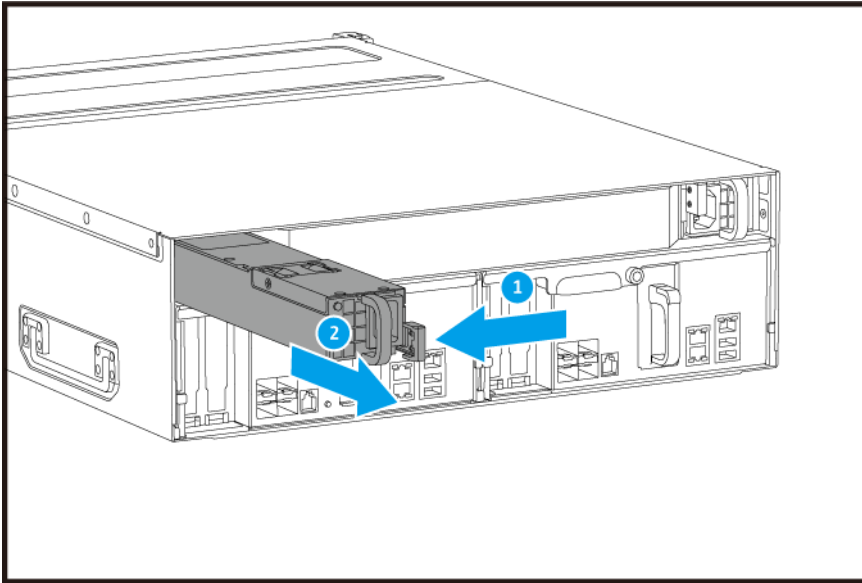
Hot-swapping Redundant Power Supply Units

1. Power off the storage controller.
2. Disconnect the power cord from the electrical outlet and the PSU that you are replacing.

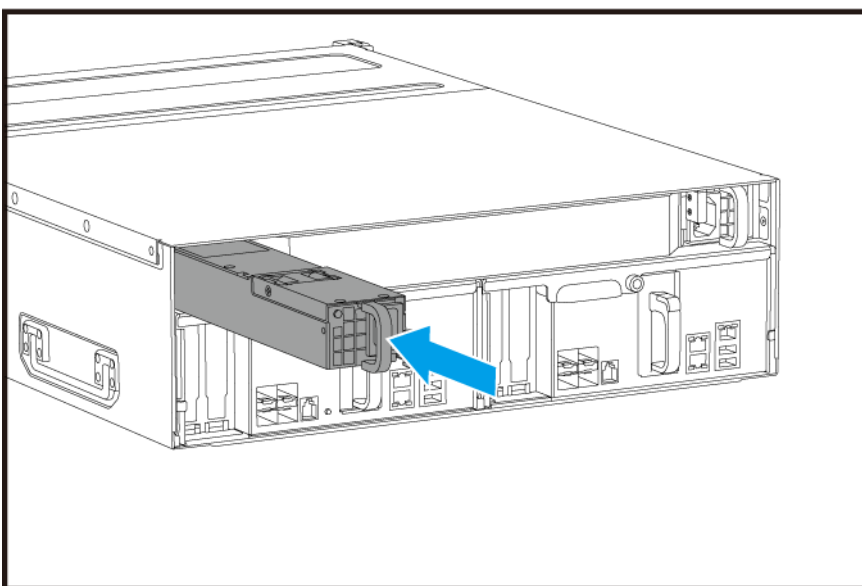
**Warning**

The NAS may have one or more power supply unit (PSU) cords. To avoid serious injuries, a trained service technician must disconnect all PSU cords before installing or replacing system components.

3. Firmly press the latch toward the handle and then pull the PSU out.



4. Insert the new PSU.

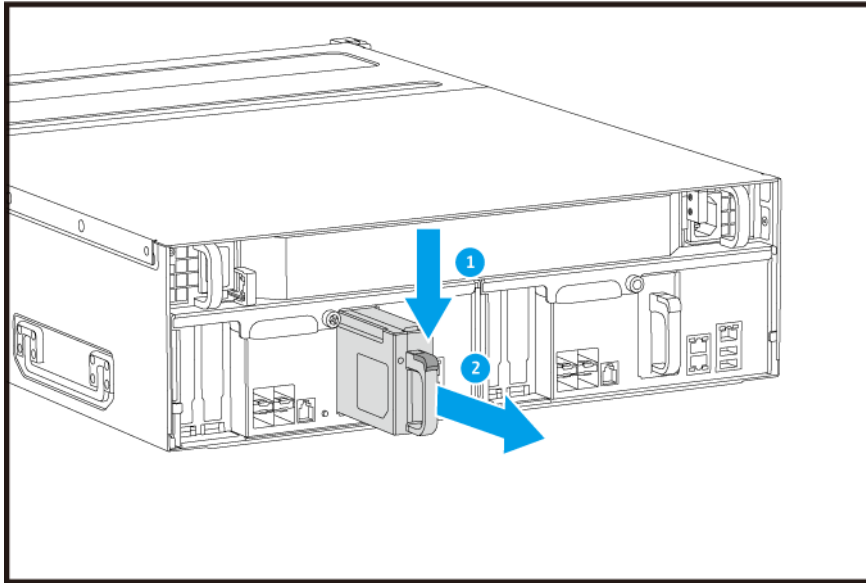


5. Connect the power cord to the PSU and the electrical outlet.
6. Power on the storage controller.

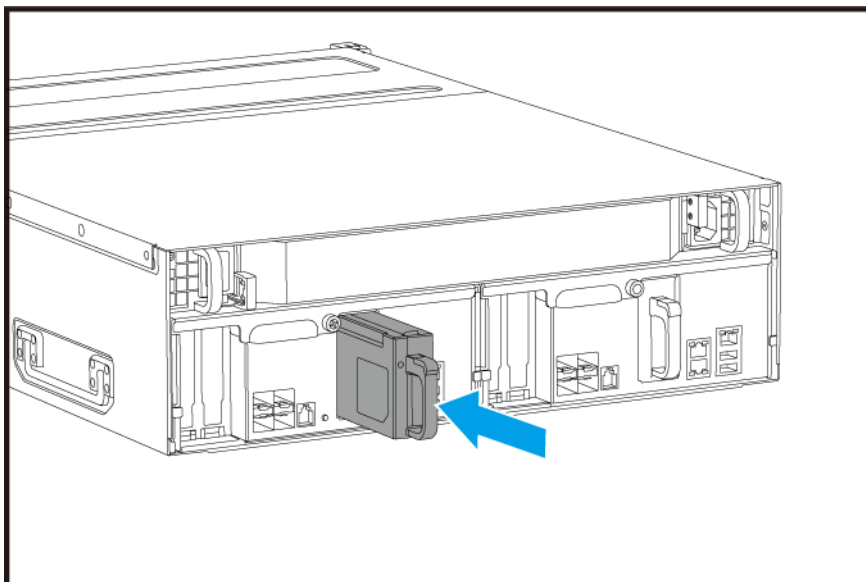
Replacing the Battery Backup Unit

If the power supply unit of the storage controller fails, the system will switch to the battery backup unit (BBU) for power.

1. Press the button and pull the BBU out.



2. Insert the new BBU into the slot until it locks in place.



Expansion Unit Installation

The ES1686dc supports SAS expansion units and is compatible with the EJ1600 v2. When connecting to the EJ1600 v2, some storage expansion accessories are required. Refer to the following table for details.

Expansion Unit Type	Description	Required Accessories	Maximum Expansion Units Supported
EJ1600 v2	<ul style="list-style-type: none"> • Uses a SAS 12 Gbps interface • Supports SAS HDD/SSD 	<ul style="list-style-type: none"> • SAS-12G2E storage expansion card • Mini-SAS SFF-8644 cable • RAIL-E02 rail kit 	7

You can purchase storage expansion accessories from QNAP or an authorized reseller.

For details, go to <https://shop.qnap.com/>.

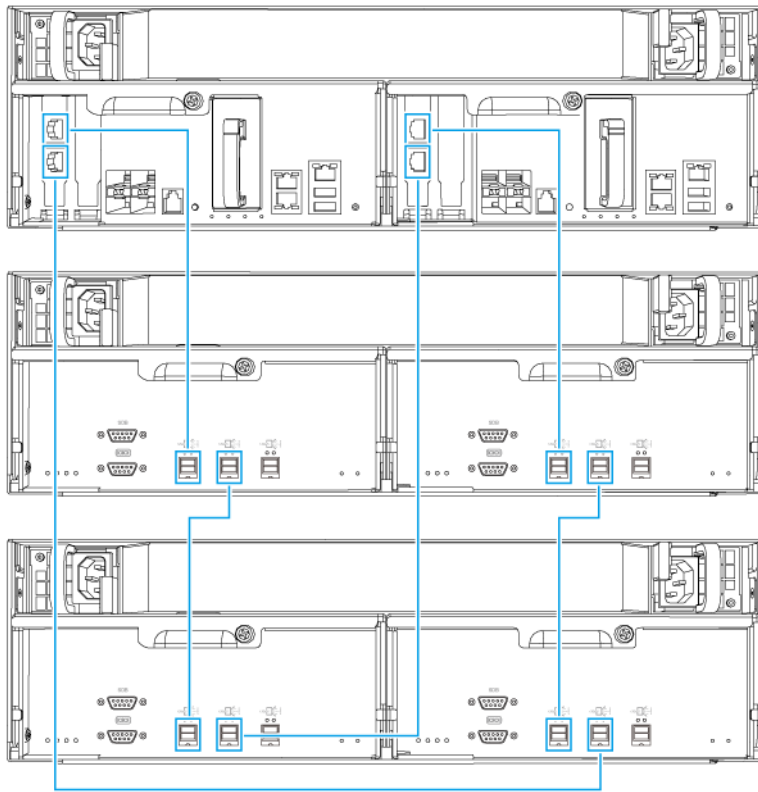
Connecting SAS Expansion Units

1. Install a storage expansion card on the PCIe slot.
For details, see [Installing Expansion Cards](#).
2. Connect the expansion units to the NAS using one of the following topologies.

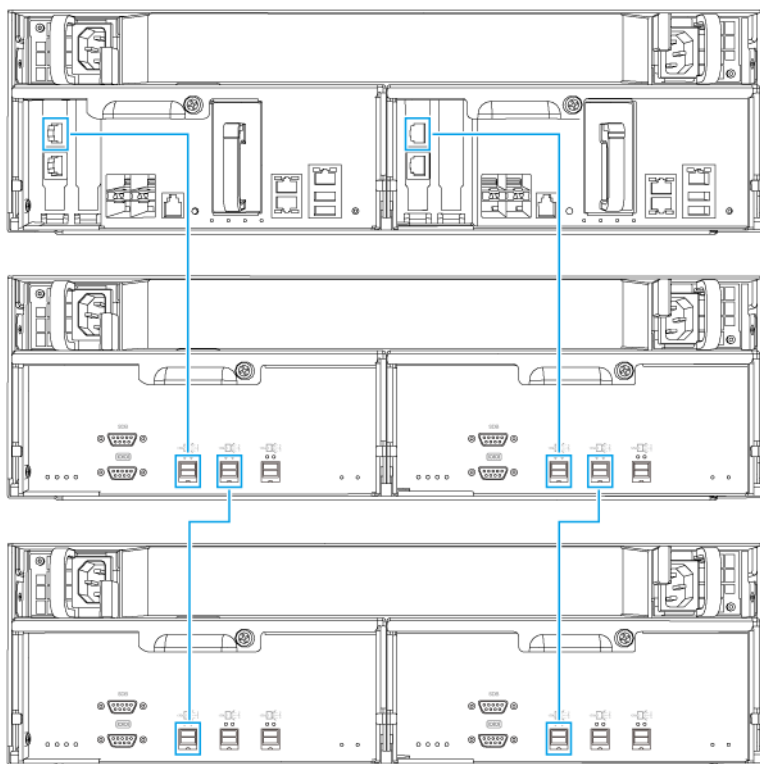


Important

QNAP recommend always using dual-path configuration, to prevent storage downtime due to expansion unit failure or cable disconnection. Single-path configuration should be used only in a situation where it is not possible to use dual-path configuration.



Dual-path configuration



Single-path configuration

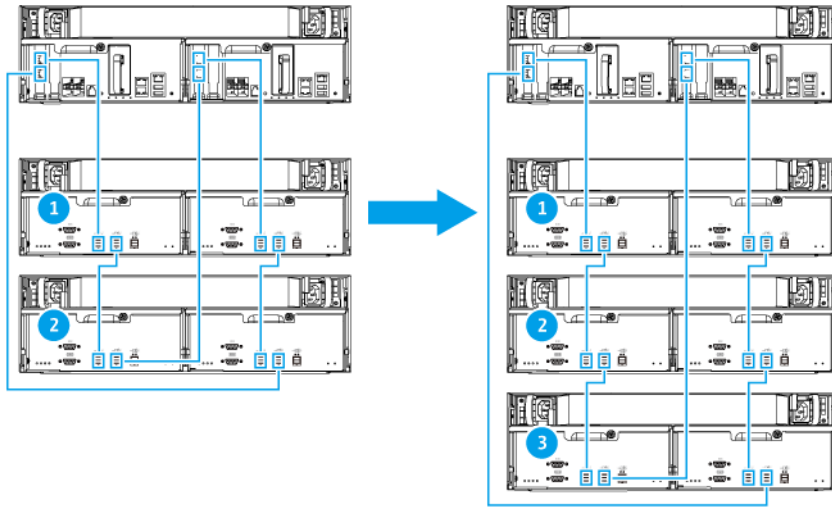
3. Power on the expansion units.
4. Verify that the expansion units are recognized by the NAS.
 - a. Log on to QES as administrator.
 - b. Go to **Main Menu > Storage Manager > Overview > System**.
 - c. Verify that the expansion units are listed.

Adding an SAS Expansion Unit

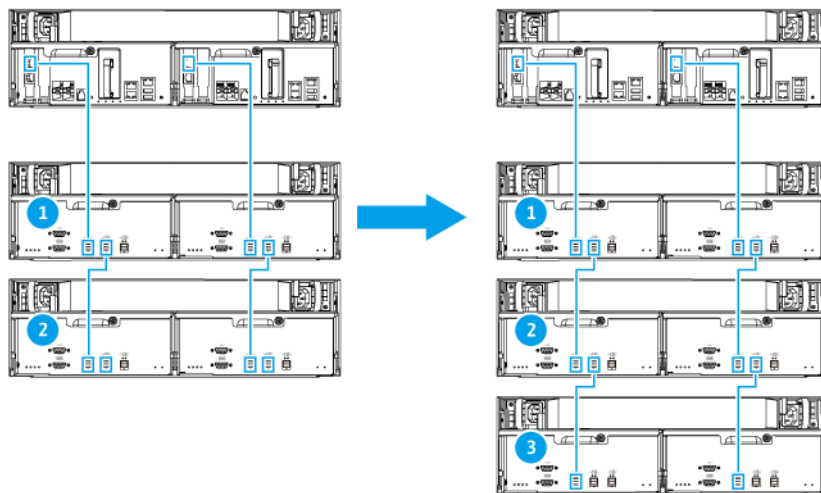


Important

- When adding an expansion unit to an existing NAS topology, the new expansion must be added last. For example, if there are 2 existing expansion units, then you must add the new unit in sequence as expansion unit 3.
- If you are using a dual-path configuration, you must prepare 2 new SAS cables.



Dual-path configuration



Single-path configuration

1. Mount the new expansion unit on the rack.
2. Install the drives in the new expansion unit.
3. If you are using a dual-path configuration, disconnect the loop cables from the SAS ports on the last expansion unit.
Loop cables are the SAS cables that you use to connect the last expansion unit back to the NAS.
4. Using the two new SAS cables, connect the last expansion unit to the new expansion unit.
5. If you are using a dual-path configuration, connect the loop cables to the new expansion unit.
6. Connect the power cables to the new expansion unit.
7. Power on the new expansion unit.

8. Log on to QES as administrator.
9. Go to **Main Menu > Storage Manager > Storage > Disks**.
10. Click **Recover**, and then select **Reinitialize enclosure ID**.

QES scans for and detects the new expansion unit and installed disks.

Replacing an SAS Expansion Unit

1. Take all storage pools on the old expansion unit offline.



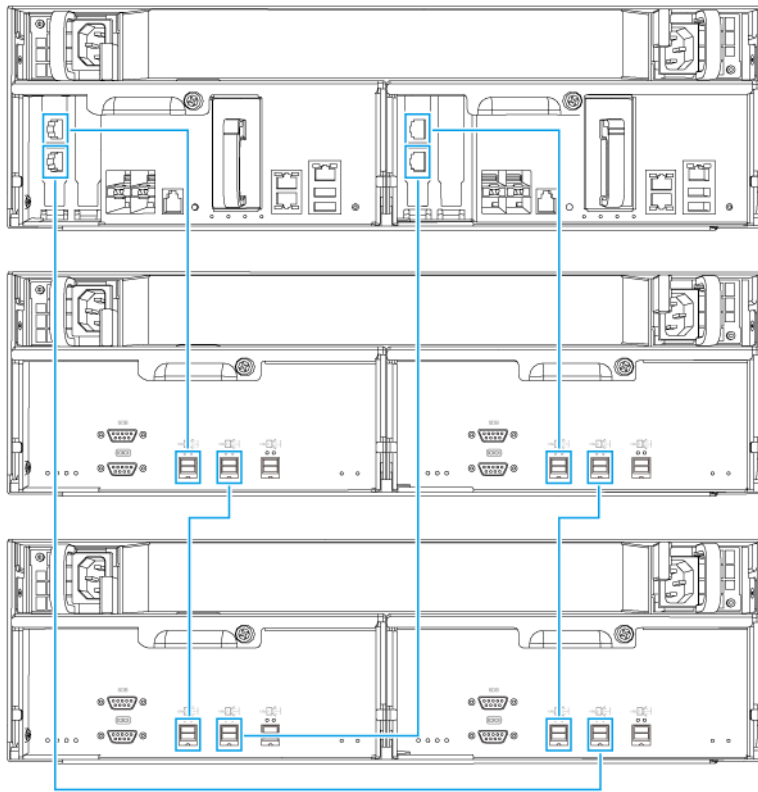
Warning

Disconnecting an expansion unit containing online storage pools may result in data loss.

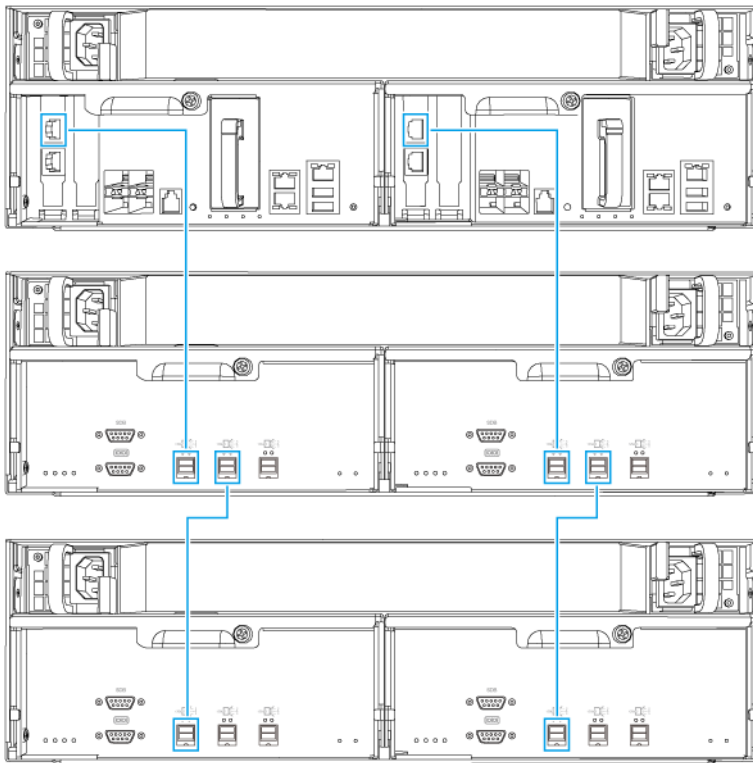
Configuration	Description
Single-path configuration	If you disconnect a SAS expansion unit, all succeeding units in the connection will also be disconnected. For example, if you are replacing expansion unit 2, then you must take the storage pools on expansion units 3 and 4 offline.
Dual-path configuration	If you disconnect an old expansion unit, only its storage pools will be taken offline.

For more information, refer to the QES User Guide.

2. Press and hold the power button on the old expansion unit for 5 seconds.
The old expansion unit powers off.
3. Disconnect all SAS cables from the old expansion unit.
4. Disconnect all power cables from the old expansion unit.
5. Unmount and remove the old expansion unit from the rack.
6. Remove the drives from the old expansion unit.
7. Mount the new expansion unit on the rack.
8. Install the drives in the new expansion unit.
9. Connect the SAS cables to the new expansion unit.
Use one of the following cabling topologies, depending on your current cabling layout. For more information, see [Connecting SAS Expansion Units](#).



Dual-path configuration



Single-path configuration

10. Connect the power cables to the new expansion unit.
11. Power on the new expansion unit.
12. Log on to QES as administrator.
13. Go to **Main Menu > Storage Manager > Storage > Disks**.
14. Click **Recover**, and then select **Reinitialize enclosure ID**.
QES scans for and detects the new expansion unit and installed disks.
15. Bring all offline storage pools back online.

QES Installation

The ES1686dc uses the QNAP QES operating system. You can install QES using the following method.

Installing QES Using Qfinder Pro



Warning

Installing QES deletes all data on the drives. Back up your data before proceeding.

1. Power on the NAS.
2. Connect the NAS to your local area network.

3. Run Qfinder Pro on a computer that is connected to the same local area network.

**Tip**

To download Qfinder Pro, go to <https://www.qnap.com/utilities>.

4. Locate the NAS in the list, and then double-click the name or IP address.
The **QES Installation Wizard** loads in the default web browser.
5. Click **Manual Setup**.
The **Enter the NAS name and administrator's password** screen appears.
6. Specify the following information.
 - **NAS name:** Specify a name with 1 to 14 characters. The name supports letters (A to Z, a to z), numbers (0 to 9), and hyphens (-), but cannot end with a hyphen.
 - **Password:** Specify an administrator password with 5 to 64 characters. The password supports all ASCII characters.
7. Click **Next**.
The **Set the date and time** screen appears.
8. Specify the time zone, date, and time.

**Tip**

QNAP recommends connecting to an NTP server to ensure that the NAS follows the Coordinated Universal Time (UTC) standard.

9. Click **Next**.
The **Configure the network settings** screen appears.
10. Select **Obtain an IP address automatically (DHCP)**.
11. Click **Next**.
The **Cross-platform file transfer service** screen appears.
12. Select the types of devices that you will use to access shared folders on the NAS.
13. Click **Next**.
The **Check system disk status** screen appears.
14. Select a storage pool to install QES on.

**Important**

Once the installation process starts, the selected storage pool cannot be modified. Reinitialize the NAS before selecting a different disk group.

15. Click **Next**.
The **Summary** screen appears.
16. Review the settings.
17. Click **Apply**.
A confirmation message appears.

**Warning**

Clicking **Confirm** deletes all data on the drive before installing QES.

18. Click **Confirm**.

QES is installed.

Service Port Configuration

The service port is the main point for hardware installation, configuration, and maintenance activities.

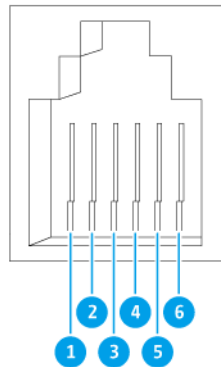


Important

The service port should only be used by QNAP technical support personnel or when you are instructed by QNAP technical support.

Storage Controller Service Port

The storage controller service port is a RS-232 port with an RJ-11 connector. Use the appropriate cable/ adapter (i.e. RJ-11 to DB9/DB9 to USB or RJ-11 to USB) to connect this port with your computer. The pin-outs are defined as follows:



Pin Number	Signal	Description
1	Rx1	Receive Data of UART1
2	Tx1	Transmit Data of UART1
3	GND	Ground
4	Rx2	Receive Data of UART2
5	Tx2	Transmit Data of UART2
6	GND	Ground

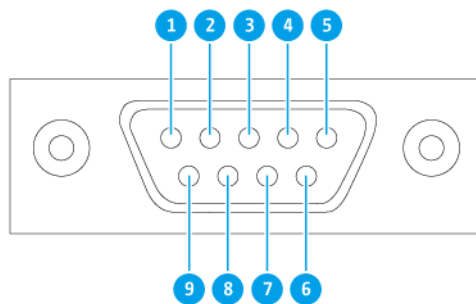
Configure the baud rate and character format of the PC or terminal to match these console port default characteristics:

- 115200 baud rate
- 8 data bits
- 1 stop bit

- No parity
- Flow control: XON/XOFF
- Default username/password: `admin/admin`

Expansion Unit Service Port

The expansion unit service port is a RS-232 port with an DB-9 (or DE-9) connector. The pin-outs are defined as the following:



Pin Number	Signal	Description
1	NC	No Connection
2	Rx	Receive Data
3	Tx	Transmit Data
4	NC	No Connection
5	GND	Ground
6	NC	No Connection
7	NC	No Connection
8	NC	No Connection
9	NC	No Connection

Configure the baud rate and character format of the PC or terminal to match these console port default characteristics:

- 115200 baud rate
- 8 data bits
- 1 stop bit
- No parity

- Flow control: XON/XOFF
- Default username/password: admin/admin

Management Port

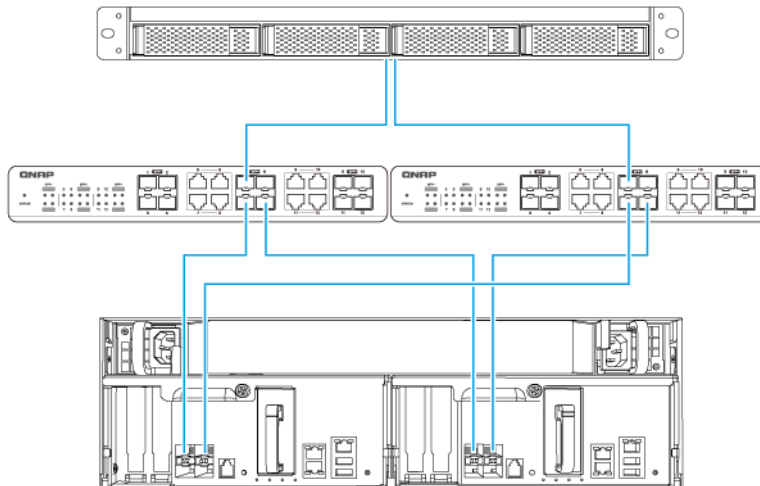
Management is provided by the Intel® i210 Gigabit Ethernet controller. The management port allows you to connect to the QES desktop of the ES1686dc. The default ES1686dc management website is 169.254.100.100:8080. If the NAS has been configured to use DHCP, you can use the QNAP Qfinder Pro to check the IP address of the NAS. Make sure the NAS and the computer that runs the QNAP Qfinder Pro are connected to the same subnet.

The system requires that the management IP addresses are configured on both controllers and that the controllers' management ports are connected to the management network. This should be a separate LAN or a VLAN because you should not use the production LAN or VLAN for management network traffic. To configure the management port IP Address, refer to the QES User Guide. If one storage controller fails, you can enable takeover function from the High Availability app in QES to manage the system through the management port of the other storage controller with the same IP address. For more information, see the QES User Guide.

Multipath I/O Network Configuration

Multipath I/O (MPIO) is a fault-tolerance technique where more than one physical network path is created between a server and a storage device such as a NAS. If any one network path goes down due to the failure of a switch, cable, or network card, the server can route I/O through the remaining network paths with no storage downtime. The ES1686dc supports MPIO on iSCSI connections using standard Ethernet infrastructure.

The following diagram is an example of how the multipath I/O should be implemented:



Important Requirements:

- Each QES data port must be configured with a static IP address.

- Each sever and storage controller must be connected to at least two different physical switches on different subnets.

Recommendations:

- iSCSI network traffic should be separated from other network traffic, by using either dedicated switches or VLANs.

Platform	QNAP Application Note Name
Windows	Configuring Microsoft iSCSI Storage with QNAP Enterprise-Class ES NAS
Linux	Configuring Linux iSCSI Storage with QNAP ES NAS

For further information, see the following user guide: <https://download.qnap.com/Storage/TechnicalDocument/ES1640dc-v2/ESNAS-UG1102-20180103-en.pdf>

4. Troubleshooting

This chapter describes basic troubleshooting information.

Forcing Qfinder Pro to Locate the NAS

If Qfinder Pro is unable to locate the NAS during QES installation, the drives or data may be faulty.

1. Power off the NAS.
2. Remove all drives.
3. Power on the NAS.
4. Locate the NAS using Qfinder Pro.
5. Reinsert the drives.
6. Continue with the QES installation.

Hot-swapping Failed Drives

The NAS supports hot-swapping of drives in the following situations.

RAID Type	Situation
RAID 1	One member drive fails
RAID 5	One member drive fails
RAID 6	One or two member drives fail
RAID 10	One or two member drives in two different pairs fail.
RAID 50	One disk per subgroup fails.
RAID 60	Two disks per subgroup fail.
Triple Mirror	One or two member drives fail.
RAID-TP	One, two, or three member drives fail.

1. Log on to QES as administrator.
2. Go to **Main Menu > Storage Manager > Storage > Disks** .
3. Locate the failed drive.
4. Prepare a new hard drive with a capacity that is the same as or larger than the failed hard drive.
5. Remove the failed drive from the NAS.
6. Wait for 20 seconds or until the NAS 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 NAS beeps twice.
10. Go to **Main Menu > Storage Manager > Storage Space** .

11. Locate the volume 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://docs.qnap.com
Helpdesk	https://helpdesk.qnap.com
Downloads	https://download.qnap.com
Community Forum	https://forum.qnap.com

5. Glossary

QES

QNAP NAS operating system

Qfinder Pro

Enables you to locate and access the QNAP NAS devices in your local area network

6. Notices

This chapter provides information about warranty, disclaimers, licensing, and federal regulations.

Limited Warranty

QNAP offers limited warranty service on our products. Your QNAP-branded hardware product is warranted against defects in materials and workmanship for a period of one (1) year or more from the date printed on the invoice. ("Warranty Period"). Please review your statutory rights at www.qnap.com/warranty, which may be amended from time to time by QNAP in its discretion.

Disclaimer

Information in this document is provided in connection with products of QNAP Systems, Inc. (the "QNAP"). No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in QNAP's terms and conditions of sale for such products, QNAP assumes no liability whatsoever, and QNAP disclaims any express or implied warranty, relating to sale and/or use of QNAP products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright or other intellectual property right.

QNAP products are not intended for use in medical, life saving, life sustaining, critical control or safety systems, or in nuclear facility applications.

In no event shall QNAP's liability exceed the price paid for the product from direct, indirect, special, incidental, or consequential damages resulting from the use of the product, its accompanying software, or its documentation. QNAP makes no warranty or representation, expressed, implied, or statutory, with respect to its products or the contents or use of this documentation and all accompanying software, and specifically disclaims its quality, performance, merchantability, or fitness for any particular purpose. QNAP reserves the right to revise or update its products, software, or documentation without obligation to notify any individual or entity.

Back up the system periodically to avoid any potential data loss is recommended. QNAP disclaims any responsibility of all sorts of data loss or recovery.

Should you return any components of the package of QNAP products such as NAS (Network Attached Storage) for refund or maintenance, make sure they are carefully packed for shipping. Any form of damages due to improper packaging will not be compensated.

All the features, functionality, and other product specifications are subject to change without prior notice or obligation. Information contained herein is subject to change without notice.

Further, the ® or ™ symbols are not used in the text.

BSMI Notice



警告使用者：這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

CE Notice



This QNAP NAS complies with CE Compliance Class A.

FCC Notice

FCC Class A 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 A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.



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.

SJ/T 11364-2006



本产品符合中国 RoHS 标准。以下表格标示此产品中某有毒物质的含量符合中国 RoHS 标准规定的限量要求。

本产品上会附有“环境友好使用期限”的标签，此期限是估算这些物质“不会有泄漏或突变”的年限。本产品可能包含有较短的环境友好使用期限的可替换元件，像是电池或灯管，这些元件将会单独标示出来。

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
壳体	0	0	0	0	0	0
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
风扇组装	0	0	0	0	0	0
电力供应组装	0	0	0	0	0	0
电池	0	0	0	0	0	0
O: 表示该有毒有害物质在该部件所有物质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。						
X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。						

VCCI Notice



この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

VCCI-A