



## **Install hardware (SG5600)**

### **StorageGRID**

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# Install hardware (SG5600)

Hardware installation includes several major tasks, including installing hardware components, cabling those components, and configuring ports.

## Register hardware

Registering the appliance hardware provides support benefits.

### Steps

1. Locate the chassis serial number.

You can find the number on the packing slip, in your confirmation email, or on the appliance after you unpack it.



2. Go to the NetApp Support Site at [mysupport.netapp.com](https://mysupport.netapp.com).
3. Determine whether you need to register the hardware:

| If you are a...          | Follow these steps...  |
|--------------------------|--|
| Existing NetApp customer | <ol style="list-style-type: none"><li>a. Sign in with your username and password.</li><li>b. Select <b>Products &gt; My Products</b>.</li><li>c. Confirm that the new serial number is listed.</li><li>d. If it is not, follow the instructions for new NetApp customers.</li></ol>  |
| New NetApp customer      | <ol style="list-style-type: none"><li>a. Click <b>Register Now</b>, and create an account.</li><li>b. Select <b>Products &gt; Register Products</b>.</li><li>c. Enter the product serial number and requested details.</li></ol> <p>After your registration is approved, you can download any required software. The approval process might take up to 24 hours.</p> |

## Install appliance in cabinet or rack (SG5600)

You must install rails in your cabinet or rack and then slide the appliance onto the rails. If you have an SG5660, you must also install the drives after installing the appliance.

### What you'll need

- You have reviewed the Safety Notices document included in the box, and understand the precautions for moving and installing hardware.

- You have the E-Series installation instructions for the hardware.



Install hardware from the bottom of the rack or cabinet or rack up to prevent the equipment from tipping over.



The SG5612 weighs approximately 60 lb (27 kg) when fully loaded with drives. Two people or a mechanized lift are required to safely move the SG5612.



The SG5660 weighs approximately 132 lb (60 kg) with no drives installed. Four people or a mechanized lift are required to safely move an empty SG5660.



To avoid damaging the hardware, never move an SG5660 if drives are installed. You must remove all drives before moving the appliance.

### About this task

Complete the following tasks to install the SG5660 appliance in a cabinet or rack.

- **Install the mounting rails**

Install the mounting rails in the cabinet or rack.

See the E-Series installation instructions for the E2700 or the E5600.

- **Install the appliance in the cabinet or rack**

Slide the appliance into the cabinet or rack, and secure it.



If you are lifting the SG5660 by hand, attach the four handles to the sides of the chassis. You remove these handles as you slide the appliance onto the rails.

- **Install the drives**

If you have an SG5660, install 12 drives in each of the 5 drive drawers.

You must install all 60 drives to ensure correct operation.

- a. Put on the ESD wristband, and remove the drives from their packaging.
- b. Release the levers on the top drive drawer, and slide the drawer out using the levers.
- c. Raise the drive handle to vertical, and align the buttons on the drive with the notches on the drawer.



- d. Pressing gently on the top of the drive, rotate the drive handle down until the drive snaps into place.
- e. After installing the first 12 drives, slide the drawer back in by pushing on the center and closing both levers gently.
- f. Repeat these steps for the other four drawers.

- **Attach the front bezel**

**SG5612:** Attach the left and right end caps to the front.

**SG5660:** Attach the bezel to the front.

#### Related information

[E2700 Controller-Drive Tray and Related Drive Trays Installation Guide](#)

[E5600 Controller-Drive Tray and Related Drive Trays Installation Guide](#)

## Cable appliance (SG5600)

You must connect the two controllers to each other with SAS interconnect cables, connect the management ports to the appropriate management network, and connect the 10 GbE ports on the E5600SG controller to the Grid Network and optional Client Network for StorageGRID.

#### What you'll need

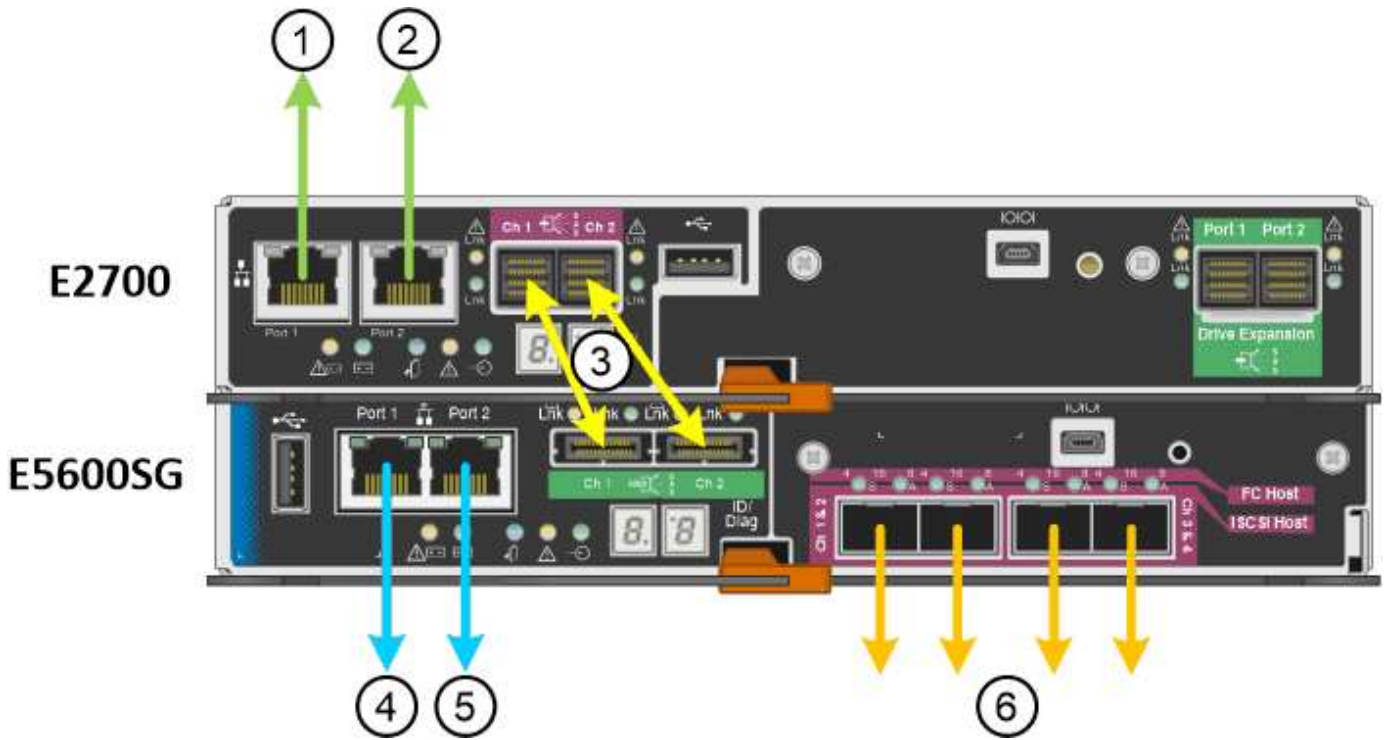
- You have Ethernet cables for connecting the management ports.
- You have optical cables for connecting the four 10-GbE ports (these are not provided with the appliance).



**Risk of exposure to laser radiation** — Do not disassemble or remove any part of an SFP transceiver. You might be exposed to laser radiation.

#### About this task

When connecting the cables, refer to the following diagram, which shows the E2700 controller on the top and the E5600SG controller on the bottom. The diagram shows the SG5660 model; the controllers in the SG5612 model are side by side instead of stacked.



| Item | Port  | Type of port  | Function  |
|------|---|---|---|
| 1    | Management port 1 on the E2700 controller                             | 1-Gb (RJ-45) Ethernet   | Connects the E2700 controller to the network where SANtricity Storage Manager is installed. |
| 2    | Management port 2 on the E2700 controller                             | 1-Gb (RJ-45) Ethernet   | Connects the E2700 controller to a service laptop during installation.                      |
| 3    | Two SAS interconnect ports on each controller, labelled Ch 1 and Ch 2 | E2700 controller: mini-SAS-HD<br>E5600SG controller: mini-SAS | Connect the two controllers to each other.  |
| 4    | Management port 1 on the E5600SG controller                           | 1-Gb (RJ-45) Ethernet   | Connects the E5600SG controller to the Admin Network for StorageGRID.                       |

| Item | Port   | Type of port          | Function  |
|------|--|-----------------------|---|
| 5    | Management port 2 on the E5600SG controller  | 1-Gb (RJ-45) Ethernet | <ul style="list-style-type: none"> <li>• Can be bonded with management port 1 if you want a redundant connection to the Admin Network.</li> <li>• Can be left unwired and available for temporary local access (IP 169.254.0.1).</li> <li>• Can be used to connect the E5600SG controller to a service laptop during installation if DHCP-assigned IP addresses are not available.</li> </ul> |
| 6    | Four network ports on the E5600SG controller | 10-GbE (optical)      | Connect the E5600SG controller to the Grid Network and to the Client Network (if used) for StorageGRID. The ports can be bonded together to provide redundant paths to the controller.  |

## Steps

1. Connect the E2700 controller to the E5600SG controller, using the two SAS interconnect cables.

| Connect this port...   | To this port...  |
|--|--|
| SAS interconnect port 1 (labeled Ch 1) on the E2700 controller | SAS interconnect port 1 (labeled Ch 1) on the E5600SG controller |
| SAS interconnect port 2 (labeled Ch 2) on the E2700 controller | SAS interconnect port 2 (labeled Ch 2) on the E5600SG controller |

Use the square connector (mini-SAS HD) for the E2700 controller, and use the rectangular connector (mini-SAS) for the E5600SG controller.



Make sure the pull tabs on the SAS connectors are at the bottom, and carefully insert each connector until it clicks into place. Do not push on the connector if there is any resistance. Verify the position of the pull tab before continuing.

2. Connect the E2700 controller to the management network where SANtricity Storage Manager software is installed, using an Ethernet cable.

| Connect this port...  | To this port...   |
|---|---|
| Port 1 on the E2700 controller (the RJ-45 port on the left) | Switch port on the management network used for SANtricity Storage Manager |
| Port 2 on the E2700 controller                              | Service laptop, if not using DHCP   |

3. If you plan to use the Admin Network for StorageGRID, connect the E5600SG controller, using an Ethernet cable.

| Connect this port...  | To this port...                                  |
|---|--|
| Port 1 on the E5600SG controller (the RJ-45 port on the left) | Switch port on the Admin Network for StorageGRID |
| Port 2 on the E5600SG controller                              | Service laptop, if not using DHCP                |

4. Connect the 10-GbE ports on the E5600SG controller to the appropriate network switches, using optical cables and SFP+ transceivers.
- If you plan to use Fixed port bond mode (default), connect the ports to the StorageGRID Grid and Client Networks, as shown in the table.

| Port   | Connects to...            |
|--------|---------------------------|
| Port 1 | Client Network (optional) |
| Port 2 | Grid Network              |
| Port 3 | Client Network (optional) |
| Port 4 | Grid Network              |

- If you plan to use the Aggregate port bond mode, connect one or more of the network ports to one or more switches. You should connect at least two of the four ports to avoid having a single point of failure. If you use more than one switch for a single LACP bond, the switches must support MLAG or equivalent.

#### Related information

[Port bond modes for the E5600SG controller ports](#)

[Access StorageGRID Appliance Installer](#)

## Connect AC power cords (SG5600)

You must connect the AC power cords to the external power source and to the AC power connector on each controller. After you have connected the power cords, you can turn the power on.



## What you'll need

Both appliance power switches must be off before connecting power.



**Risk of electrical shock** — Before connecting the power cords, make sure that the two power switches on the appliance are off.

## About this task

- You should use separate power sources for each power supply.

Connecting to independent power sources maintains power redundancy.

- You can use the power cords shipped with the controller with typical outlets used in the destination country, such as wall receptacles of an uninterrupted power supply (UPS).

However, these power cords are not intended for use in most EIA-compliant cabinets.

## Steps

1. Turn off the power switches in the enclosure or chassis.
2. Turn off the power switches on the controllers.
3. Connect the primary power cords from the cabinet to the external power sources.
4. Connect the power cords to the AC power connector on each controller.

# Turn power on (SG5600)

Powering on the enclosure provides power to both controllers.

## Steps

1. Turn on the two power supply switches at the rear of the enclosure.

While the power is being applied, the LEDs on the controllers go on and off intermittently.

The power-on process can take up to ten minutes to complete. The controllers reboot several times during the initial startup sequence, which causes the fans to ramp up and down and the LEDs to flash.

2. Check the Power LED and the Host Link Active LEDs on each controller to verify that the power was turned on.
3. Wait for all drives to show a persistent green LED, indicating that they have come online.
4. Check for green LEDs on the front and rear of the enclosure.

If you see any amber LEDs, make a note of their locations.

5. Look at the seven-segment display for the E5600SG controller.

This display shows **HO**, followed by a repeating sequence of two digits.

```
HO -- IP address for Admin Network -- IP address for Grid Network HO
```

In the sequence, the first set of numbers is the DHCP-assigned IP address for the controller's management

port 1. This address is used to connect the controller to the Admin Network for StorageGRID. The second set of numbers is the DHCP-assigned IP address used to connect the appliance to the Grid Network for StorageGRID.



If an IP address could not be assigned using DHCP, 0.0.0.0 is displayed.

## View boot-up status and reviewing error codes on SG5600 controllers

The seven-segment display on each controller shows status and error codes when the appliance powers up, while the hardware is initializing, and when the hardware fails and must back out of the initialization. If you are monitoring the progress or troubleshooting, you should watch the sequence of the codes as they appear.

### About this task

The status and error codes for the E5600SG controller are not the same as those for the E2700 controller.

### Steps

1. During boot-up, view the codes shown on the seven-segment displays to monitor progress.
2. To review error codes for the E5600SG controller, see the seven-segment display status and error code information.
3. To review error codes for the E2700 controller, see the E2700 controller documentation on the Support Site.

### Related information

[E5600SG controller seven-segment display codes](#)

[NetApp Documentation: E2700 Series](#)

## E5600SG controller seven-segment display codes

The seven-segment display on the E5600SG controller shows status and error codes while the appliance powers up and while the hardware is initializing. You can use these codes to determine status and troubleshoot errors.

When reviewing status and error codes on the E5600SG controller, you should look at the following types of codes:

- **General boot-up codes**

Represent the standard boot-up events.

- **Normal boot-up codes**

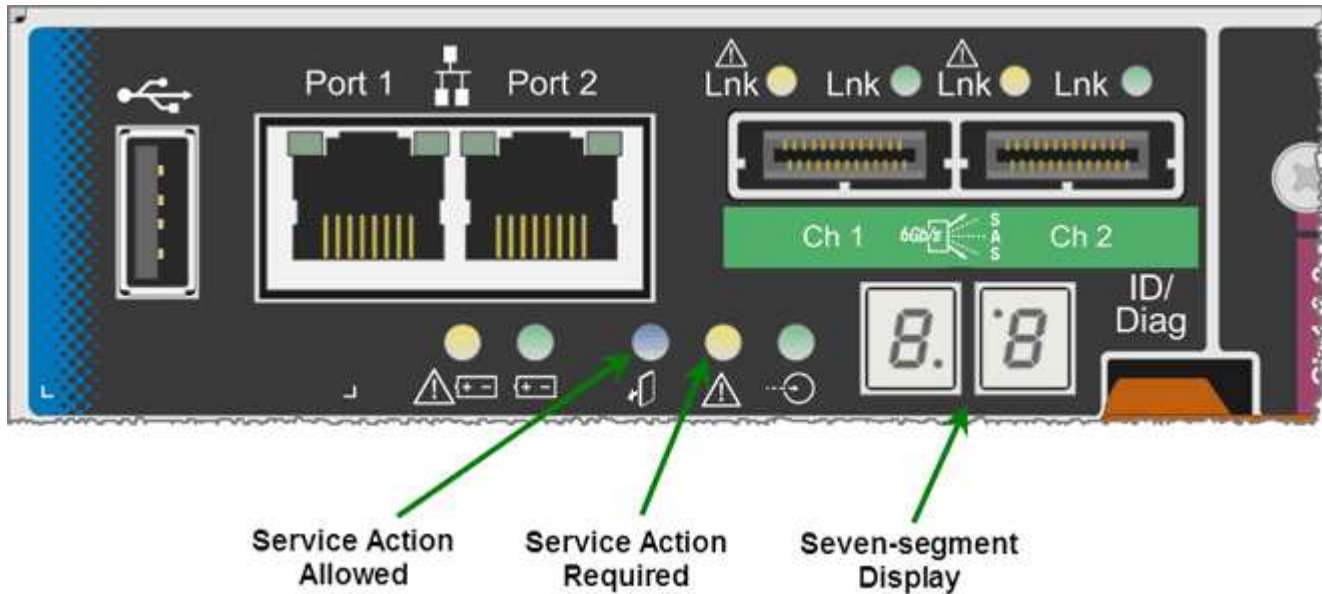
Represent the normal boot-up events that occur in the appliance.

- **Error codes**

Indicate issues during the boot-up events.

StorageGRID controls only the following LEDs on the E5600SG controller and only after the StorageGRID Appliance Installer has started:

- Service Action Allowed LED
- Service Action Required LED
- Seven-segment display



The decimal points on the seven-segment display are not used by the StorageGRID appliance:

- The upper decimal point adjacent to the least significant digit is the platform diagnostic LED.  
This is turned on during reset and initial hardware configuration. Otherwise, it is turned off.
- The lower decimal point adjacent to the most significant digit is turned off.

To diagnose other issues, you might want to look at these resources:

- To see all other hardware and environmental diagnostic information, see the E-Series operating system hardware diagnostics.

This includes looking for hardware issues such as power, temperature, and disk drives. The appliance relies on the E-Series operating system to monitor all platform environmental statuses.

- To determine firmware and driver issues, look at the link lights on the SAS and network ports.

For details, see the E-Series E5600 documentation.

## General boot-up codes

During boot-up or after a hard reset of the hardware, the Service Action Allowed and the Service Action Required LEDs come on while the hardware is initializing. The seven-segment display shows a sequence of codes that are the same for E-Series hardware and not specific to the E5600SG controller.

During boot-up, the Field Programmable Gate Array (FPGA) controls the functions and initialization on the hardware.

| Code | Indication  |
|------|---|
| 19   | FPGA initialization.  |
| 68   | FPGA initialization.  |
| ...  | FPGA initialization. This is a quick succession of codes.   |
| AA   | Platform BIOS booting.  |
| FF   | Bios boot-up complete. This is an intermediate state before E5600SG controller initializes and manages LEDs to indicate status. |

After the AA and FF codes appear, either the normal boot-up codes appear or error codes appear. Additionally, the Service Action Allowed and the Service Action Required LEDs are turned off.

### Normal boot-up codes

These codes represent the normal boot-up events that occur in the appliance, in chronological order.

| Code | Indication  |
|------|---|
| HI   | The master boot script has started.   |
| PP   | The platform FPGA firmware is checking for updates.   |
| HP   | The host interface card (HIC) is checking for updates.  |
| RB   | After firmware updates, the system is rebooting, if necessary.  |
| FP   | The firmware update checks have been completed. Starting the process (utmagent) to communicate with and manage the E2700 controller. This process facilitates appliance provisioning. |
| HE   | The system is synchronizing with the E-Series operating system.   |
| HC   | The StorageGRID installation is being checked.  |
| HO   | Installation management and active interfacing are occurring.   |
| HA   | The Linux operating system and StorageGRID are running.   |

## E5600SG controller error codes

These codes represent error conditions that might be shown on the E5600SG controller as the appliance boots up. Additional two-digit hexadecimal codes are displayed if specific low-level hardware errors occur. If any of these codes persists for more than a second or two, or if you are unable to resolve the error by following one of the prescribed troubleshooting procedures, contact technical support.

| Code     | Indication  |
|----------|---|
| 22       | No master boot record found on any boot device.   |
| 23       | No SATA drive installed.  |
| 2A, 2B   | Stuck bus, unable to read DIMM SPD data.  |
| 40       | Invalid DIMMs.  |
| 41       | Invalid DIMMs.  |
| 42       | Memory test failed.   |
| 51       | SPD reading failure.  |
| 92 to 96 | PCI bus initialization.   |
| A0 to A3 | SATA drive initialization.  |
| AB       | Alternate boot code.  |
| AE       | Booting OS.   |
| EA       | DDR3 training failed.   |
| E8       | No memory installed.  |
| EU       | The installation script was not found.  |
| EP       | "ManageSGA" code indicates that pregrid communication with the E2700 controller failed. |

### Related information

[Troubleshoot hardware installation \(SG5600\)](#)

[NetApp Support](#)

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