

ETERNUS DX80 S2/DX90 S2 Disk storage system

User's Guide -Site Planning-

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Preface

Fujitsu would like to thank you for purchasing our ETERNUS DX80 S2/DX90 S2 Disk storage system. The ETERNUS DX80 S2/DX90 S2 Disk storage system is designed to be connected to Fujitsu (PRIMEQUEST or PRIMERGY) or non-Fujitsu servers.

This manual describes the environmental requirements that are necessary to install and use the ETERNUS DX80 S2/DX90 S2 Disk storage system.

This manual is intended for use of ETERNUS DX80 S2/DX90 S2 Disk storage system in regions other than Japan. Please carefully review the information outlined in this manual.

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About this Manual

Organization

This manual is composed of the following four chapters:

- Chapter 1 Hardware Configurations

This chapter describes the main components and the relative optional products that are installed in the ETERNUS DX80 S2/DX90 S2 Disk storage system.

- Chapter 2 ETERNUS DX Disk Storage System Installation

This chapter describes the installation specifications, the installation environment, and the power requirements.

- Chapter 3 Connections

This chapter describes the configuration for each interface to connect to the ETERNUS DX80 S2/DX90 S2 Disk storage system.

- Chapter 4 Rack and Optional Product Installation

This chapter describes the requirements for rack installation.

This chapter also describes the standard installation rules (installation locations and installation order) of the optional products before shipment from the factory when the optional products are purchased with the ETERNUS DX80 S2/DX90 S2 Disk storage system at the same time.

Naming Conventions

- Abbreviations used in this manual

- "ETERNUS DX Disk storage system" refers to the ETERNUS DX80 S2/DX90 S2 Disk storage system.
- "CA" refers to a host interface module that is used in an ETERNUS DX Disk storage system to connect to a server.
- "Host Bus Adapter (HBA)" refers to the interface module that is normally used by the server to connect to ETERNUS DX Disk storage systems.
An "FC card", "LAN card", "Network Interface Card (NIC)", "Converged Network Adapter (CNA)", or "SAS card" may be used instead, depending on the server and interface.
- Trademark symbols such as ™ and ® are omitted in this document.

Warning Notations

Warning signs are shown throughout this manual in order to prevent injury to the user and/or material damage. These signs are composed of a symbol and a message describing the recommended level of caution. The following explains the symbol, its level of caution, and its meaning as used in this manual.



This symbol indicates the possibility of minor or moderate personal injury, as well as damage to the ETERNUS DX Disk storage system and/or to other users and their property, if the ETERNUS DX Disk storage system is not used properly.

How Warnings are Presented in this Manual

A message is written beside the symbol indicating the caution level. This message is marked with a vertical ribbon in the left margin, to distinguish this warning from ordinary descriptions. An example is shown here.

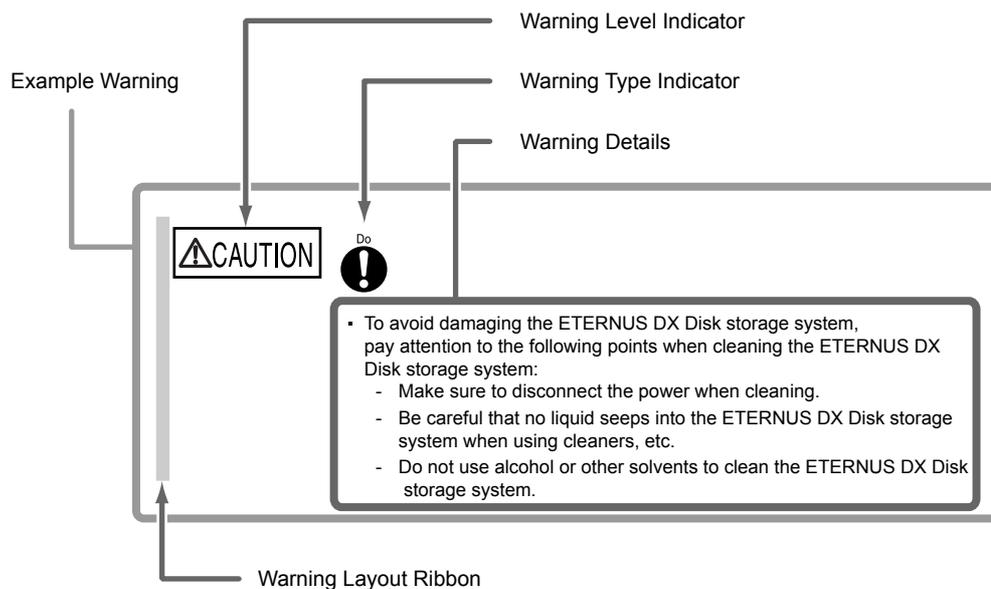


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Chapter 1

Hardware Configurations

This chapter explains hardware configurations for the ETERNUS DX Disk storage system.

1.1 Controller Enclosure

This section explains the main components in the controller enclosure.

The controller enclosure contains drives installed in the front, and controllers and power supply units in the rear.

Since the power supply units are redundant, operations can continue even if one of them fails. There are two models: a single-controller type and a dual-controller type. For a dual-controller type, operations can continue even if one of the controllers fails.

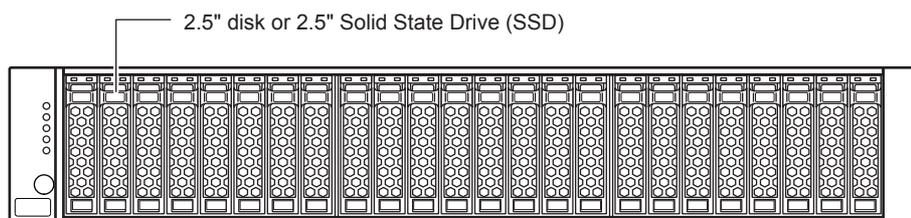
IMPORTANT

- The single-controller type differs from the dual-controller type by the following features:
 - The controller and I/O module are not duplicated.
 - Hot maintenance or swapping of the controller and I/O module is not possible.
 - Concurrent firmware loading or update of the controller firmware and I/O module firmware is not possible.
 - Multipath connection to a single server is not available.
 - The Thin Provisioning function cannot be used.
 - The Flexible Tier function cannot be used.
- Fujitsu recommends that the dual-controller types, in which the controller and I/O module are duplicated, be used in a system where a high level of reliability is required.

■ External views of a 2.5" type controller enclosure

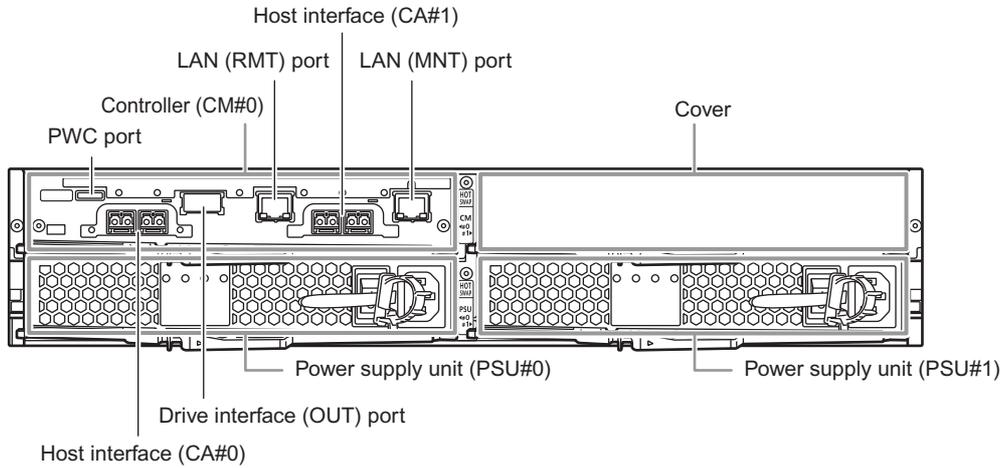
● Front view

Figure 1.1 Front view of a 2.5" type controller enclosure



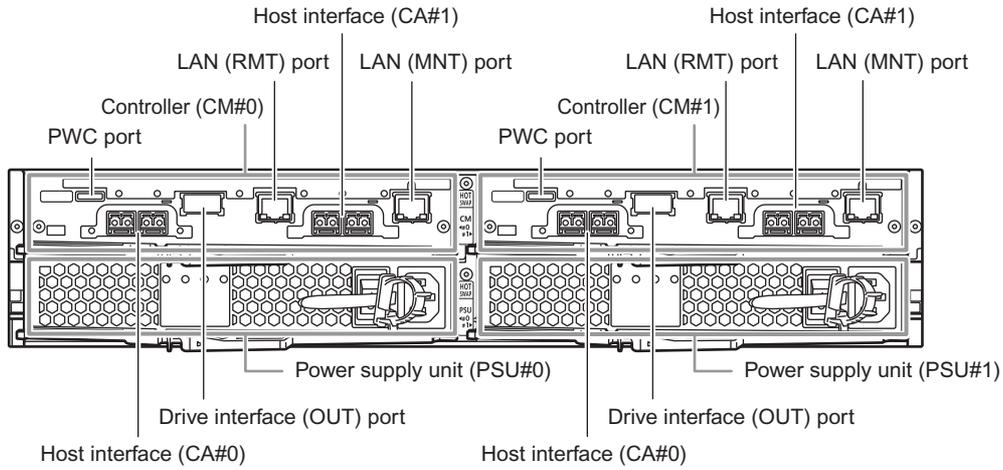
- Rear view
- Single-controller type

Figure 1.2 Rear view of a 2.5" type controller enclosure (single-controller type)



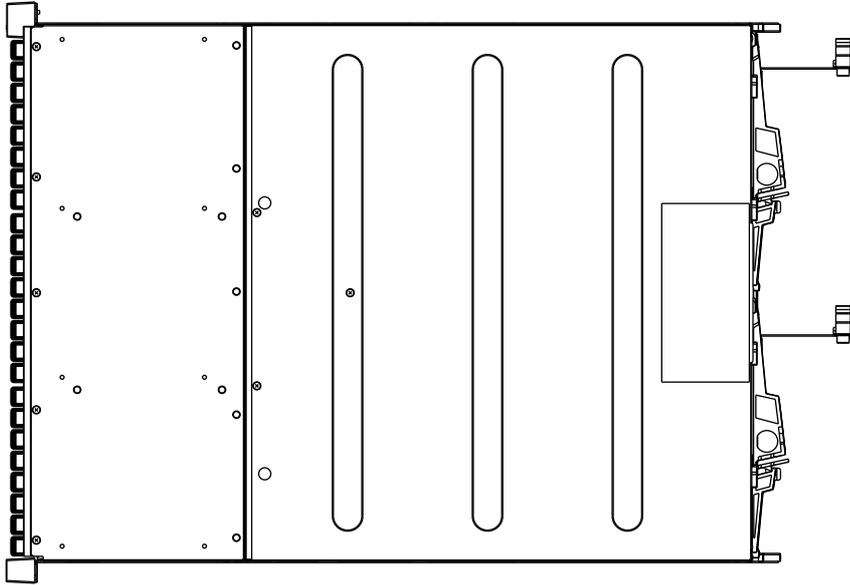
- Dual-controller type

Figure 1.3 Rear view of a 2.5" type controller enclosure (dual-controller type)



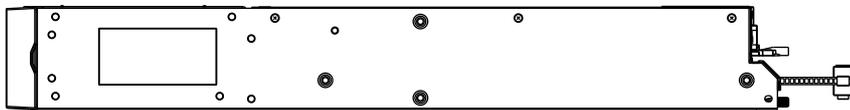
● Top view

Figure 1.4 Top view of a 2.5" type controller enclosure



● Side view

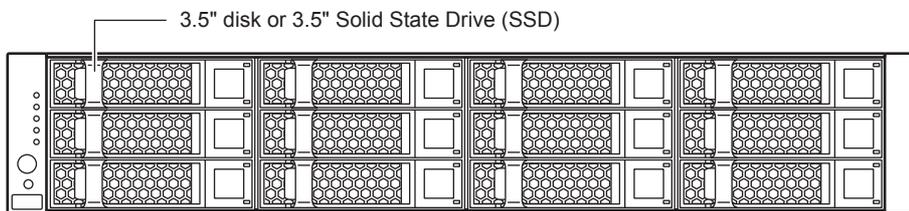
Figure 1.5 Side view of a 2.5" type controller enclosure



■ External views of a 3.5" type controller enclosure

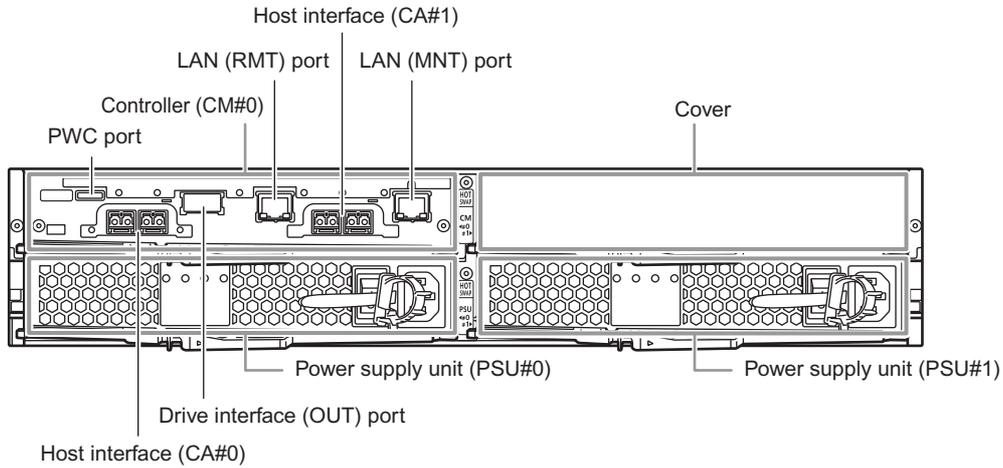
● Front view

Figure 1.6 Front view of a 3.5" type controller enclosure



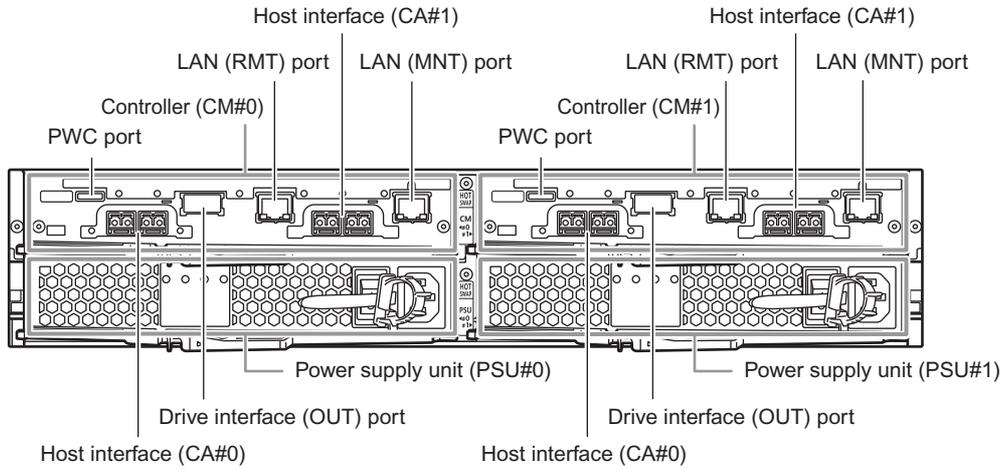
- Rear view
- Single-controller type

Figure 1.7 Rear view of a 3.5" type controller enclosure (single-controller type)



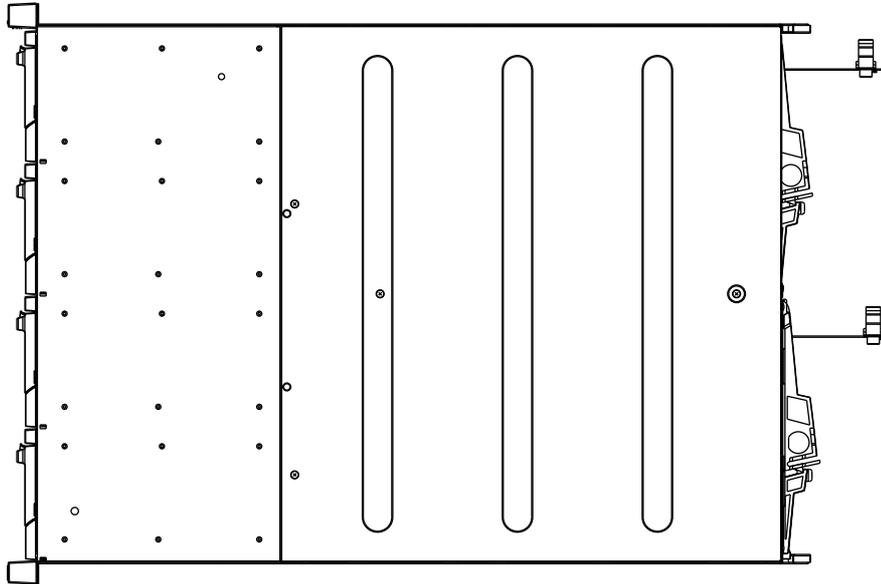
- Dual-controller type

Figure 1.8 Rear view of a 3.5" type controller enclosure (dual-controller type)



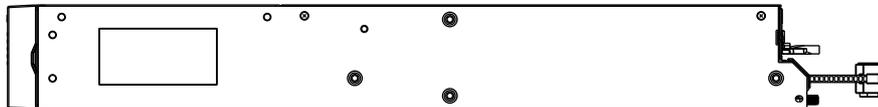
● Top view

Figure 1.9 Top view of a 3.5" type controller enclosure



● Side view

Figure 1.10 Side view of a 3.5" type controller enclosure



1.1.1 Controllers

The controller contains a CPU, cache memory, System Capacitor Unit (SCU), non-volatile memory, host interfaces, drive interface ports, and LAN ports. The controller controls all operations in the ETERNUS DX Disk storage system.

■ CPU

A single core processor is installed.

■ Cache memory

Cache memory enables high speed processing by storing frequently used data.

The cache memory capacity for each controller is 2GB for the ETERNUS DX80 S2 and 4GB for the ETERNUS DX90 S2.

■ Host interfaces

A host interface (CA) is a board that has interface ports to connect a controller to a server.

Up to two host interfaces can be installed in the controller of an ETERNUS DX Disk storage system. Different types of host interfaces can exist together in the same controller. For details about the installation rules, refer to ["4.3.1 Host Interfaces" \(page 70\)](#).

FC, iSCSI, FCoE, and SAS are available as host interface.

The following table shows the host interface specifications.

Table 1.1 Host interface specifications

Interface	Transfer speed (max.)	Connector type	Number of ports for each CA
FC	16Gbit/s	LC	2
	8Gbit/s		
iSCSI	10Gbit/s	LC	2
		SFP+ (direct attach twinax copper)	
	1Gbit/s	RJ-45	2
FCoE	10Gbit/s	LC	2
		SFP+ (direct attach twinax copper)	
SAS	6Gbit/s	miniSAS (SFF-8088)	2

● Note

- FC and iSCSI host interfaces can be used as remote interfaces for remote connections by changing the port mode. The port mode can be set from ETERNUS Web GUI or ETERNUS CLI.
- There are two types of iSCSI 10Gbit/s and FCoE host interfaces; an interface type with SFP+ modules (LC connector for an FC cable connection) and an interface type without SFP+ modules (SFP+ connector for a Copper Twinax cable connection).
- For SFP+ modules, Short Wave Length (SWL) or Long Wave Length (LWL) types can be installed in 16Gbit/s FC interfaces. The default modules that are installed in 16Gbit/s FC interfaces are SWL type SFP+ modules. To install LWL type SFP+ modules, purchase the Long wave SFP+ modules for the DX80 S2/DX90 S2 separately.

■ Drive interface ports

A drive interface port is used to connect drive enclosures.

The following table shows the drive interface port specifications.

Table 1.2 Drive interface port specifications for controllers

Interface	Transfer speed (max.)	Connector type	Number of ports for each controller
SAS	6Gbit/s	QSFP	1

■ LAN ports

Two LAN ports (RJ-45) are installed in each controller. Each LAN port is used for operation management (MNT port) and for remote support function (RMT port) respectively.

The following table shows the LAN port specifications.

Table 1.3 LAN port specifications for controllers

Interface	Transfer speed (max.)	Connector type	Number of ports for each controller
Ethernet (1000Base-T/100Base-TX/10Base-T)	1Gbit/s	RJ-45	2

■ SCU

A System Capacitor Unit (SCU) is installed in a controller as a backup power source in case of power outage. The SCU is charged from an external power source while the ETERNUS DX Disk storage system is running normally. If a power failure is detected, data in the cache memory is saved to the non-volatile memory in the controller using the SCU. There is no limit to the post-failure data retention time.

■ PWC ports

A PWC port is installed in a controller. The PWC port is used to connect a power synchronized unit to perform power synchronization.

The following table shows the PWC port specifications.

Table 1.4 PWC port specifications

Interface	Connector type	Number of ports for each controller
RS232C	PWC	1

1.1.2 Power Supply Units

The power supply unit transforms input AC power from a power socket to DC power and supplies power to each component. Two power supply units are installed in each controller enclosure. Each power supply unit contains fans.

1.2 Drive Enclosures

This section explains the main components in the drive enclosure.

The drive enclosure contains drives installed in the front, and I/O modules and power supply units in the rear. Up to 24 drives can be installed in a 2.5" type drive enclosure. Up to 12 drives can be installed in a 3.5" type drive enclosure.

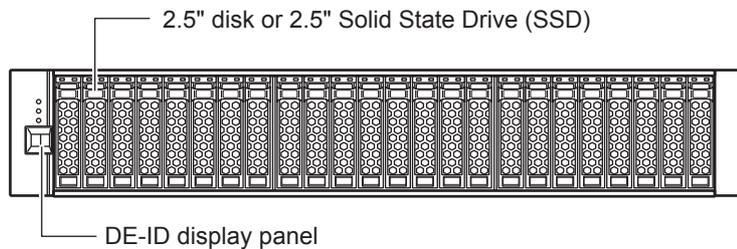
Since the power supply units are redundant, operations can continue even if one of them fails.

When a drive enclosure is connected, a DE-ID (drive enclosure number) is automatically allocated.

■ External views of a 2.5" type drive enclosure

● Front view

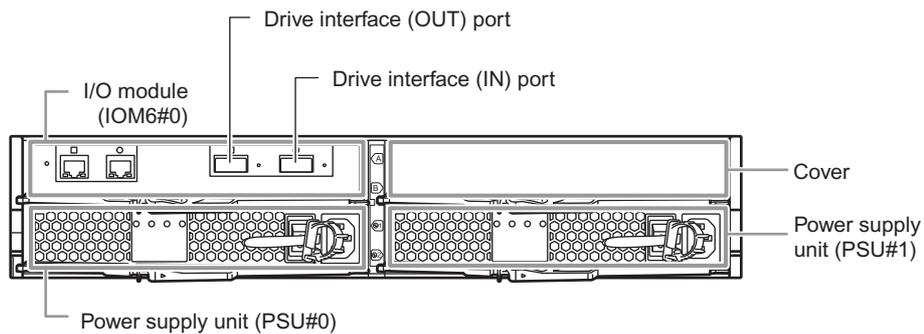
Figure 1.11 Front view of a 2.5" type drive enclosure



● Rear view

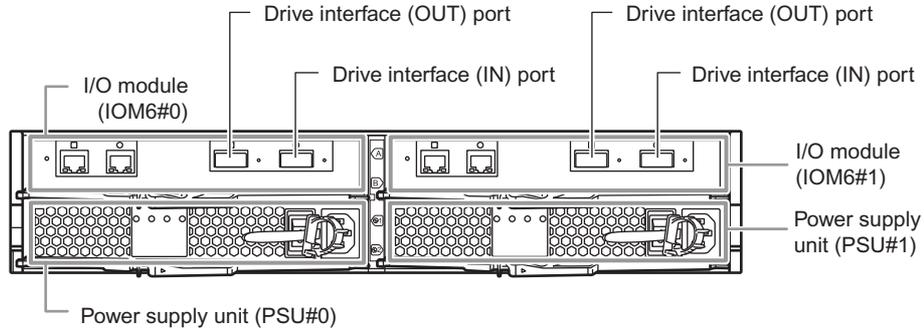
• Single-IOM type

Figure 1.12 Rear view of a drive enclosure (single-IOM type)



- Dual-IOM type

Figure 1.13 Rear view of a drive enclosure (dual-IOM type)



- Top view

Figure 1.14 Top view of a 2.5" type drive enclosure



- Side view

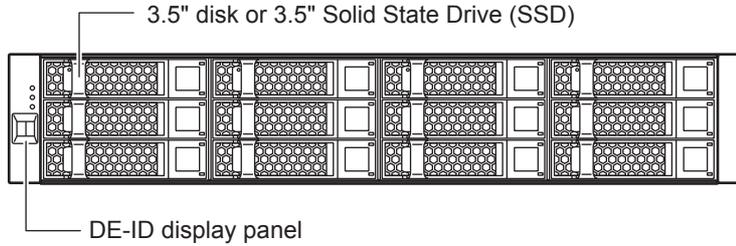
Figure 1.15 Side view of a 2.5" type drive enclosure



■ External views of a 3.5" type drive enclosure

● Front view

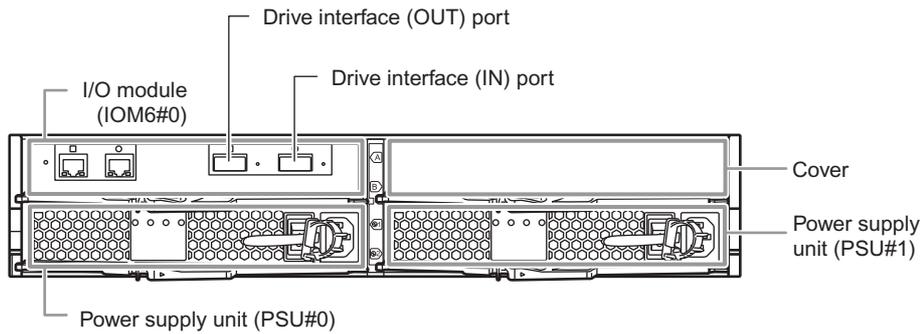
Figure 1.16 Front view of a 3.5" type drive enclosure



● Rear view

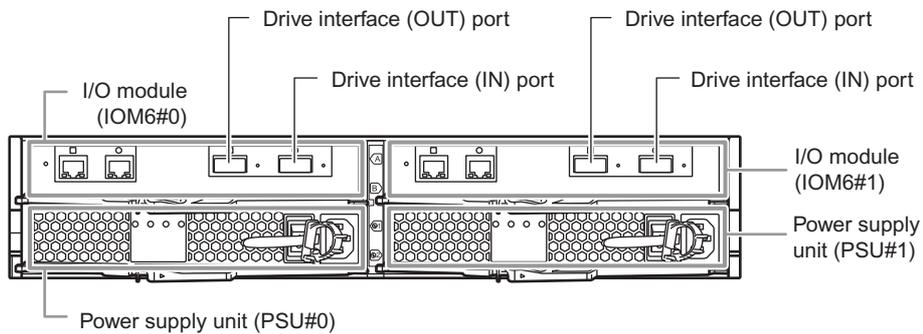
• Single-IOM type

Figure 1.17 Rear view of a drive enclosure (single-IOM type)



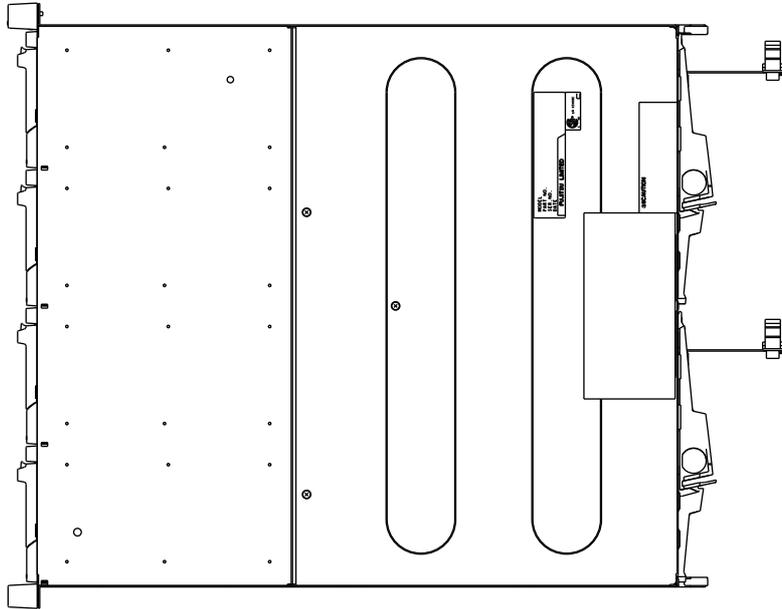
• Dual-IOM type

Figure 1.18 Rear view of a drive enclosure (dual-IOM type)



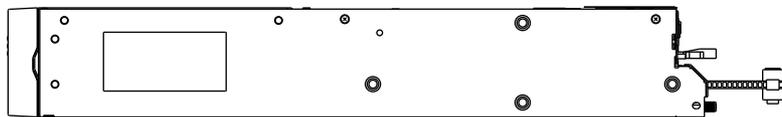
● Top view

Figure 1.19 Top view of a 3.5" type drive enclosure



● Side view

Figure 1.20 Side view of a 3.5" type drive enclosure



1.2.1 I/O Modules

The I/O module is a component that controls the interaction between the controller and the drives. The I/O module is connected to the controller or an I/O module on another drive enclosure.

■ Drive interface ports

A drive interface port is used to connect a controller enclosure or drive enclosures. The drive interface port has an IN port and an OUT port. The following table shows the drive interface port specifications.

Table 1.5 Drive interface port specifications for I/O modules

Interface	Transfer speed (max.)	Connector type	Number of ports for each I/O module
SAS	6Gbit/s	QSFP	1 (IN) 1 (OUT)

1.2.2 Power Supply Units

The power supply unit transforms input AC power from a power socket to DC power and supplies power to each component. Two power supply units are installed in each drive enclosure. Each power supply unit contains fans.

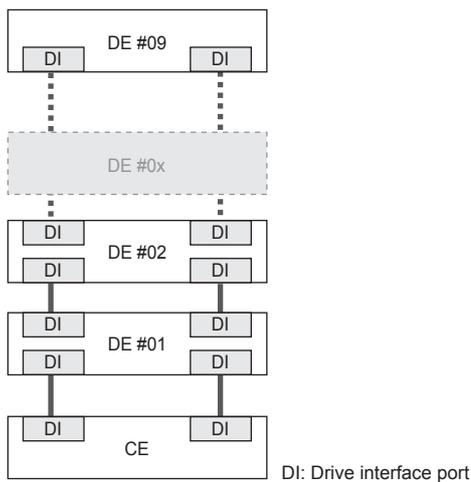
1.3 Enclosure Connection Path

For a dual-controller type, a controller enclosure (CE) is connected to drive enclosures (DE) with multiple paths.

A drive enclosure has two independent drive interface ports. Path redundancy is maintained by connecting the drive enclosure to two controllers directly. This configuration allows operation to continue even if one of the connection paths fails.

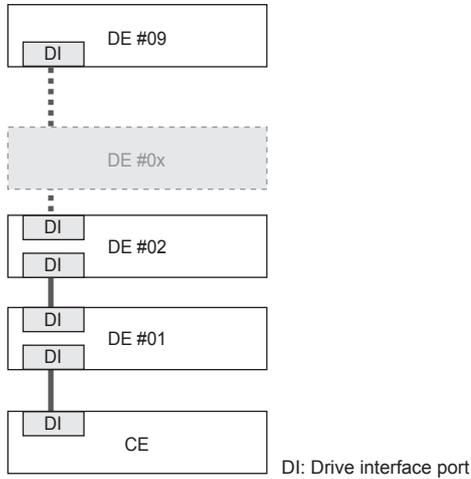
Up to nine drive enclosures can be connected to a controller enclosure as shown in the figures below.

Figure 1.21 Enclosure connection path (dual-controller type)



A connection path is not duplicated in a single-controller type.

Figure 1.22 Enclosure connection path (single-controller type)



1.4 Drives

The following drives can be installed in a controller enclosure and drive enclosure.

1.4.1 2.5" Drives

The following table shows the 2.5" drive specifications.

Table 1.6 2.5" drive specifications

Drive name	Drive interface	Storage media	Storage capacity	Speed
SAS disks	Serial Attached SCSI (6Gbit/s)	Hard disk	300GB	15,000rpm
			300GB, 450GB, 600GB, 900GB	10,000rpm
Hard disk		300GB, 450GB, 600GB, 900GB	10,000rpm	
Hard disk		1TB	7,200rpm	
SSDs		Flash memory	100GB, 200GB, 400GB, 800GB	-

1.4.2 3.5" Drives

The following table shows the 3.5" drive specifications.

Table 1.7 3.5" drive specifications

Drive name	Drive interface	Storage media	Storage capacity	Speed
SAS disks	Serial Attached SCSI (6Gbit/s)	Hard disk	300GB, 450GB, 600GB	15,000rpm
Nearline SAS disks		Hard disk	1TB, 2TB, 3TB, 4TB	7,200rpm
SSDs		Flash memory	100GB, 200GB, 400GB, 800GB	-

1.5 Power Distribution Units (Only for Regions Other than EMEA&I)

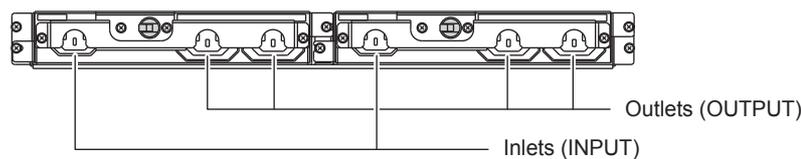
There are two sizes for power distribution units: 1U and 2U.

A power distribution unit is an option to connect power supply units to power outlets when power sockets are limited.

- Power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 1U, Max 2 enclosures connection)

There are four outlets and two inlets.

Figure 1.23 Power distribution unit (AC200-240V, 1U, Max 2 enclosures connection)



The following table shows the specifications of a power distribution unit and the AC cables that are provided.

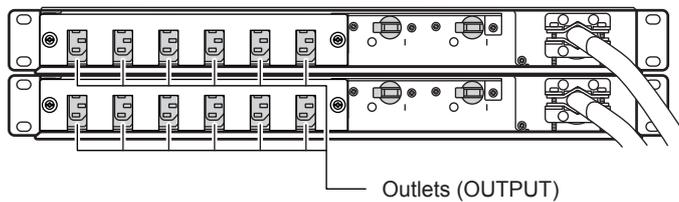
Table 1.8 Power distribution unit (AC200-240V, 1U, Max 2 enclosures connection) and provided AC cable specifications

Item		Specifications
Power	Voltage	AC200 - 240V
	Phase	Single
	Frequency	50Hz/60Hz
Input cable	Connection type	IEC60320-C13 ↔ NEMA L6-15P
	Length	4m
	Quantity	2
Output cable	Connection type	IEC60320-C13 ↔ IEC60320-C14
	Length	3m
	Quantity	4

■ Power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 2U, Max 6 enclosures connection)

There are 12 outlets.

Figure 1.24 Power distribution unit (AC200-240V, 2U, Max 6 enclosures connection)



The following table shows the specifications of a power distribution unit and the AC cables that are provided.

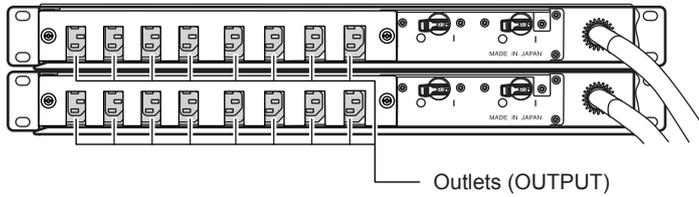
Table 1.9 Power distribution unit (AC200-240V, 2U, Max 6 enclosures connection) and provided AC cable specifications

Item		Specifications
Power	Voltage	AC200 - 240V
	Phase	Single
	Frequency	50Hz/60Hz
Input cable	Connection type	Straight-through ↔ NEMA L6-20P
	Length	4m
	Quantity	2
Output cable	Connection type	IEC60320-C13 ↔ IEC60320-C14
	Length	3m
	Quantity	12

■ Power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 2U, Max 8 enclosures connection)

There are 16 outlets.

Figure 1.25 Power distribution unit (AC200-240V, 2U, Max 8 enclosures connection)



The following table shows the specifications of a power distribution unit and the AC cables that are provided.

Table 1.10 Power distribution unit (AC200-240V, 2U, Max 8 enclosures connection) and provided AC cable specifications

Item		Specifications
Power	Voltage	AC200 - 240V
	Phase	Single
	Frequency	50Hz/60Hz
Input cable	Connection type	Straight-through ↔ NEMA L6-30P
	Length	4m
	Quantity	2
Output cable	Connection type	IEC60320-C13 ↔ IEC60320-C14
	Length	3m
	Quantity	16

Chapter 2

ETERNUS DX Disk Storage System Installation

This chapter explains the installation of the ETERNUS DX Disk storage system.

2.1 Installation Specifications

2.1.1 ETERNUS DX80 S2

The following table shows the specifications of the ETERNUS DX80 S2.

Table 2.1 ETERNUS DX80 S2 installation specifications

Item		ETERNUS DX80 S2		
		2.5" drive configuration	3.5" drive configuration	
Dimensions (W × D × H)	Controller enclosure		482 × 645 × 88mm (2U)	482 × 670 × 88mm (2U)
	Drive enclosure		482 × 540 × 88mm (2U)	482 × 555 × 88mm (2U)
	Power distribution unit	1U	435 × 148 × 38mm	
2U		(485 × 280 × 43mm) × 2 (*1)		
Maximum weight (*2)	Controller enclosure		35kg	
	Drive enclosure		35kg	
	Power distribution unit	1U	2kg	
2U		(6kg) × 2 (*1)		
Service area		Front: 800mm, Rear: 800mm		
Power	Voltage		AC 100 – 120V, AC 200 – 240V	
	Phase		Single	
	Frequency		50Hz/60Hz	
	Number of power supply units		2 (for each enclosure)	
	Plug type	EMEA&I region	For AC200V connections: IEC60320-C14G (supplied as standard)	
Regions other than EMEA&I		For AC200V connections: NEMA L6-15P (supplied as standard) For AC100V/AC200V connections: IEC60320-C14 (optional)		
Maximum power requirements (*2)	Controller enclosure	AC 100 – 120V	630W (640VA)	620W (630VA)
		AC 200 – 240V	630W (640VA)	610W (620VA)
	Drive enclosure	AC 100 – 120V	570W (580VA)	550W (560VA)
		AC 200 – 240V	570W (580VA)	550W (560VA)

Item			ETERNUS DX80 S2	
			2.5" drive configuration	3.5" drive configuration
Maximum heat generation (*2)	Controller enclosure	AC 100 – 120V	2300kj/h	2300kj/h
		AC 200 – 240V	2300kj/h	2200kj/h
	Drive enclosure	AC 100 – 120V	2100kj/h	2000kj/h
		AC 200 – 240V	2100kj/h	2000kj/h
Maximum amount of exhaust air	Controller enclosure		4.0m ³ /min	
	Drive enclosure		4.0m ³ /min	
Environmental conditions	Temperature	Operating	10 – 40°C	
		Not operating	0 – 50°C	
		Shipping	-40 – 60°C	
	Temperature gradient		15°C/Hr or less	
	Humidity	Operating	20 – 80%RH	
		Not operating	8 – 80%RH	
		Shipping	8 – 90%RH	
	Humidity gradient		30%/day or less	
	Maximum wet bulb temperature		29°C	
	Altitude above sea level		0 – 3000m	
	Airborne dust		0.15mg/m ³ or less	
	Gas concentration tolerance level		Cl ₂ : 3.4ppb or less, H ₂ S: 7.1ppb or less SO ₂ : 37ppb or less, NH ₃ : 420ppb or less NO ₂ : 52ppb or less, O ₃ : 5ppb or less HCl: 6.6ppb or less, HF: 3.6ppb or less	
	Oil vapor		0.2mg/m ³ or less	
Seawater (salt corrosion)		If the ETERNUS DX Disk storage system is installed on the ocean or premises within 0.5km from the coast, necessary measures must be taken to prevent salt corrosion.		
Vibration limit	Operating		400gal	
	Not operating		1000gal	
Noise emission (*3)	Sound Pressure Level (LpAm)		49dB (A)	
	Sound Power Level (LWAd)		6.6B	

*1: A 2U power distribution unit is composed of two 1U power distribution units.

*2: These values are for when each enclosure has twenty-four drives in a 2.5" drive configuration or when each enclosure has twelve drives in a 3.5" drive configuration.

*3: These values are measured when a single controller enclosure and drive enclosure are configured in an environment in which the temperature is 23 ± 2°C.

2.1.2 ETERNUS DX90 S2

The following table shows the specifications of the ETERNUS DX90 S2.

Table 2.2 ETERNUS DX90 S2 installation specifications

Item			ETERNUS DX90 S2	
			2.5" drive configuration	3.5" drive configuration
Dimensions (W × D × H)	Controller enclosure		482 × 645 × 88mm (2U)	482 × 670 × 88mm (2U)
	Drive enclosure		482 × 540 × 88mm (2U)	482 × 555 × 88mm (2U)
	Power distribution unit	1U	435 × 148 × 38mm	
2U		(485 × 280 × 43mm) × 2 (*1)		
Maximum weight (*2)	Controller enclosure		35kg	
	Drive enclosure		35kg	
	Power distribution unit	1U	2kg	
		2U	(6kg) × 2 (*1)	
Service area			Front: 800mm, Rear: 800mm	
Power	Voltage		AC 100 – 120V, AC 200 – 240V	
	Phase		Single	
	Frequency		50Hz/60Hz	
	Number of power supply units		2 (for each enclosure)	
	Plug type	EMEA&I region	For AC200V connections: IEC60320-C14G (supplied as standard)	
Regions other than EMEA&I		For AC200V connections: NEMA L6-15P (supplied as standard) For AC100V/AC200V connections: IEC60320-C14 (optional)		
Maximum power requirements (*2)	Controller enclosure	AC 100 – 120V	630W (640VA)	620W (630VA)
		AC 200 – 240V	630W (640VA)	610W (620VA)
	Drive enclosure	AC 100 – 120V	570W (580VA)	550W (560VA)
		AC 200 – 240V	570W (580VA)	550W (560VA)
Maximum heat generation (*2)	Controller enclosure	AC 100 – 120V	2300kJ/h	2300kJ/h
		AC 200 – 240V	2300kJ/h	2200kJ/h
	Drive enclosure	AC 100 – 120V	2100kJ/h	2000kJ/h
		AC 200 – 240V	2100kJ/h	2000kJ/h
Maximum amount of exhaust air	Controller enclosure		4.0m ³ /min	
	Drive enclosure		4.0m ³ /min	

Item		ETERNUS DX90 S2		
		2.5" drive configuration	3.5" drive configuration	
Environmental conditions	Temperature	Operating	10 – 40°C	
		Not operating	0 – 50°C	
		Shipping	-40 – 60°C	
	Temperature gradient		15°C/Hr or less	
	Humidity	Operating	20 – 80%RH	
		Not operating	8 – 80%RH	
		Shipping	8 – 90%RH	
	Humidity gradient		30%/day or less	
	Maximum wet bulb temperature		29°C	
	Altitude above sea level		0 – 3000m	
	Airborne dust		0.15mg/m ³ or less	
	Gas concentration tolerance level		Cl ₂ : 3.4ppb or less, H ₂ S: 7.1ppb or less SO ₂ : 37ppb or less, NH ₃ : 420ppb or less NO ₂ : 52ppb or less, O ₃ : 5ppb or less HCl: 6.6ppb or less, HF: 3.6ppb or less	
	Oil vapor		0.2mg/m ³ or less	
Seawater (salt corrosion)		If the ETERNUS DX Disk storage system is installed on the ocean or premises within 0.5km from the coast, necessary measures must be taken to prevent salt corrosion.		
Vibration limit	Operating	400gal		
	Not operating	1000gal		
Noise emission (*3)	Sound Pressure Level (LpAm)	49dB (A)		
	Sound Power Level (LWAd)	6.6B		

*1: A 2U power distribution unit is composed of two 1U power distribution units.

*2: These values are for when each enclosure has twenty-four drives in a 2.5" drive configuration or when each enclosure has twelve drives in a 3.5" drive configuration.

*3: These values are measured when a single controller enclosure and drive enclosure are configured in an environment in which the temperature is 23 ± 2°C.

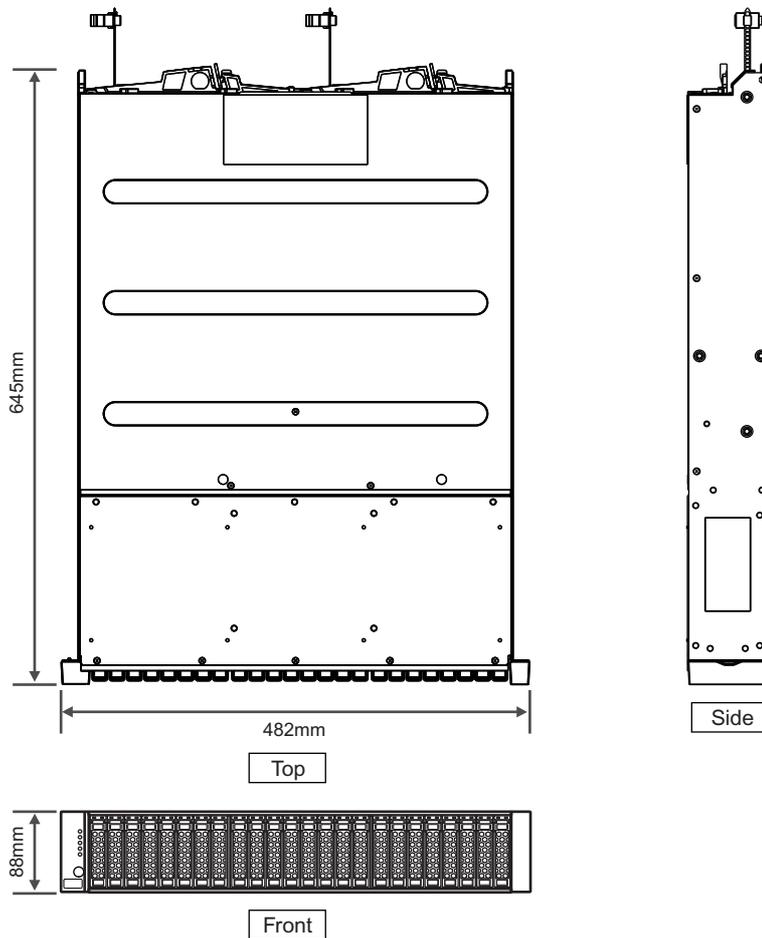
2.2 Storage System Dimensions

2.2.1 Controller Enclosure Dimensions

■ 2.5" type controller enclosure

The following diagrams show the dimensions of a 2.5" type controller enclosure. The dimension values do not include any protruding parts (approximation).

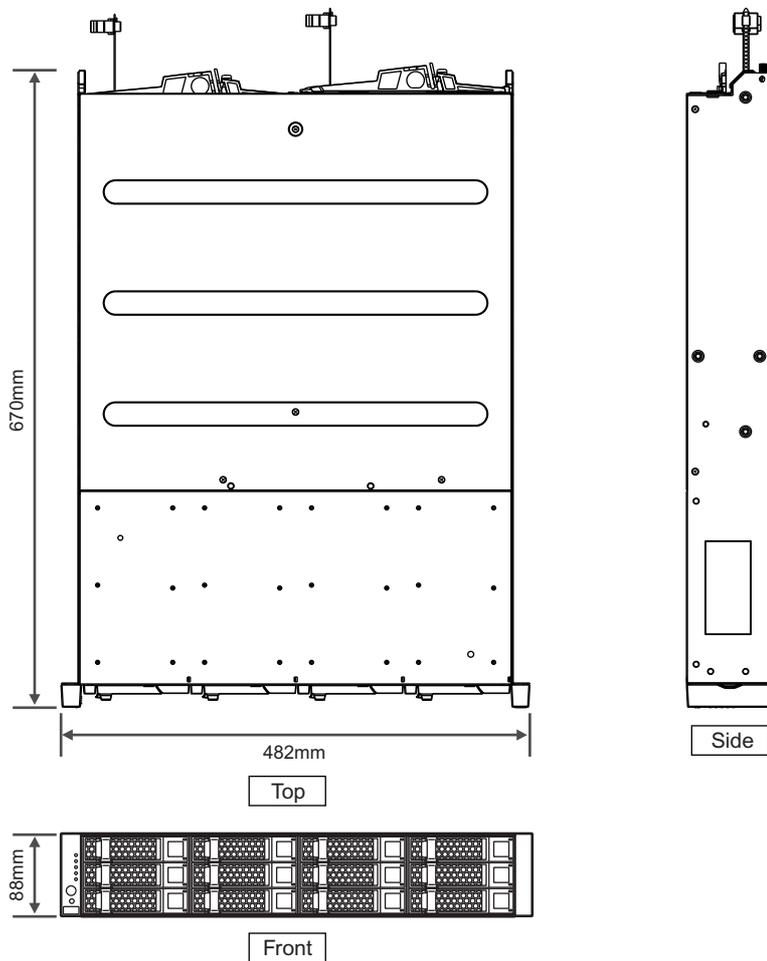
Figure 2.1 2.5" type controller enclosure dimensions



■ 3.5" type controller enclosure

The following diagrams show the dimensions of a 3.5" type controller enclosure. The dimension values do not include any protruding parts (approximation).

Figure 2.2 3.5" type controller enclosure dimensions

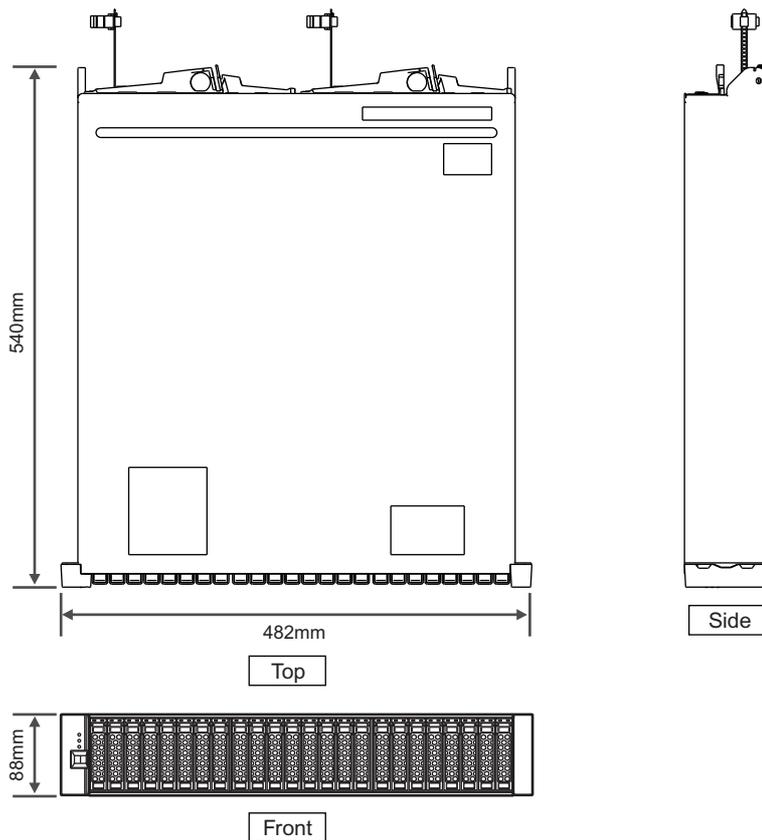


2.2.2 Drive Enclosure Dimensions

■ 2.5" type drive enclosure

The following diagrams show the dimensions of a 2.5" type drive enclosure. The dimension values do not include any protruding parts (approximation).

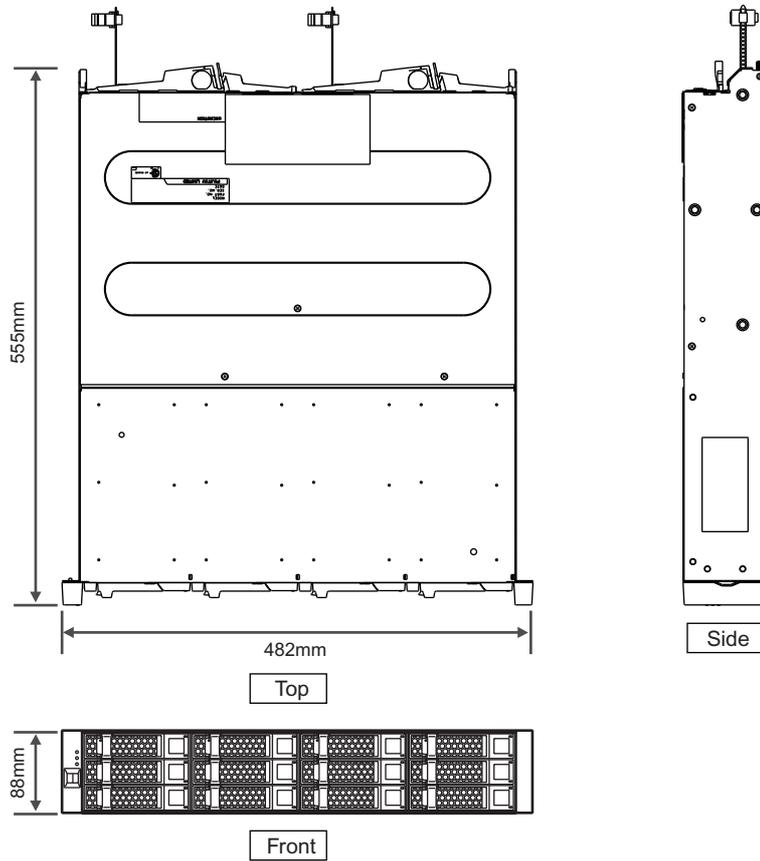
Figure 2.3 2.5" type drive enclosure dimensions



■ 3.5" type drive enclosure

The following diagrams show the dimensions of a 3.5" type drive enclosure. The dimension values do not include any protruding parts (approximation).

Figure 2.4 3.5" type drive enclosure dimensions



2.3 Package Size

The ETERNUS DX Disk storage system is shipped in cardboard boxes. These boxes may not fit through some doorways or elevators. To make sure that the ETERNUS DX Disk storage system can be moved to the installation site, carefully check the transport route information. Refer to ["2.1 Installation Specifications" \(page 27\)](#) for the maximum weight of each enclosure.

The following table shows the package size and the maximum package weight of each component for regions other than EMEA&I.

Table 2.3 Package size (for regions other than EMEA&I)

Component		Package size (W × D × H)	Maximum weight (approx.)
Controller enclosure	2.5" type	600 × 760 × 240mm	40kg
	3.5" type	600 × 780 × 240mm	40kg
Drive enclosure	2.5" type	600 × 660 × 240mm	40kg
	3.5" type	600 × 670 × 240mm	40kg
Drive (*1)	2.5"	160 × 278 × 106mm	0.5kg
	3.5"	189 × 300 × 116mm	1.0kg
Power distribution unit	1U	570 × 710 × 160mm	4kg
	2U	(390 × 590 × 180mm) × 2	(7kg) × 2

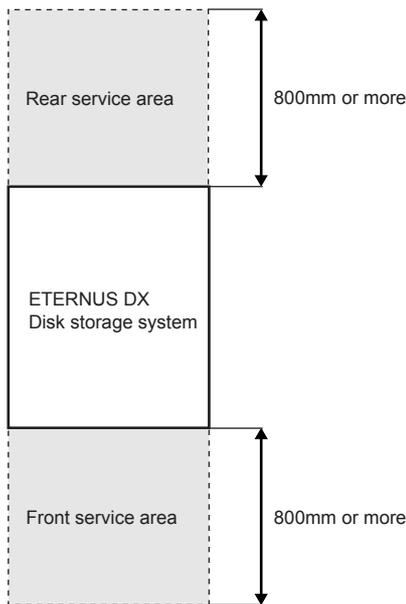
*1: When an order for optional drives to be installed in the factory is placed, enclosures are shipped with the drives preinstalled. When optional drives are ordered without preinstallation, each drive is shipped in an individual package.

2.4 Installation Area

This section explains the installation area and the service area that are required for an ETERNUS DX Disk storage system that is installed in a Fujitsu 19-inch rack.

Secure service areas that are 800mm or more in the front and rear of the ETERNUS DX Disk storage system. The size of the side areas varies depending on the rack specifications.

Figure 2.5 Installation area and service area



2.5 Installation Environment

Sufficient consideration of the installation environment should be taken to ensure proper use of the ETERNUS DX Disk storage system. Using the ETERNUS DX Disk storage system in an environment that does not satisfy the installation environment requirements may cause a failure to occur with the ETERNUS DX Disk storage system.

2.5.1 Air Conditioning

It is important to consider the flows of cooling air (intake air) and exhaust air for the installation location. The temperature in some ETERNUS DX Disk storage systems may rise when exhaust air is taken in from other ETERNUS DX Disk storage systems. In addition, check other factors that might affect the usage environment temperature, such as the room size, whether other ETERNUS DX Disk storage systems are installed, and how many people are present in the room.

When installing air conditioning, the ambient temperature should be considered.

● Ambient temperature

An ETERNUS DX Disk storage system is cooled by taking in air through the front intakes and pushing out the exhaust air through the rear of the ETERNUS DX Disk storage system. If the intake air temperature does not meet the ambient environment conditions, a temperature error occurs and the power of the ETERNUS DX Disk storage system is shut down.

- Front intake air temperature

Make sure that the front intake air temperature is between 10 and 40°C.

- Rear exhaust air temperature

For example, when the intake air temperature is 40°C, the exhaust air temperature is 50°C or higher.

The necessary cooling capacity of air conditioning must be checked.

Check the heat generation amount and the exhaust air amount that are listed in "[2.1 Installation Specifications](#)" ([page 27](#)) to cool the exhaust air from the ETERNUS DX Disk storage system.

2.5.2 Earthquake Resistance

Take the necessary measures (e.g. secure the rack to the floor or wall) to prevent a rack in which an ETERNUS DX Disk storage system is installed from falling down when earthquakes occur.

Earthquake countermeasures vary depending on the installation location, the floor conditions, and the type of rack that is used. Contact your installation contractor for more details regarding earthquake countermeasure methods and how work should be conducted.

2.5.3 Load Bearing Capacity for Floors

Make sure that the following relationship between the load bearing capacity of the floor and the weight of the ETERNUS DX Disk storage system is maintained.

$(\text{Load bearing capacity of the floor}) > (\text{ETERNUS DX Disk storage system weight} \div \text{Installation area that includes service areas})$
--

If the condition above is not satisfied, additional measures are required to ensure sufficient load bearing capacity. Contact your installation contractor for details about the necessary measures that must be taken.

2.6 Outlet/Socket Specifications

Power can be supplied to the ETERNUS DX Disk storage system from two power sources because each enclosure has two power supply units.

During normal operation, each of the power sources supplies half of the necessary power.

When one of the power supply lines fails, all of the necessary power is supplied from only one power source.

Using the same power supply condition for all of the power supply units is recommended so that different power supply conditions (such as whether power distribution units are used or not and input voltage) are not used for the ETERNUS DX Disk storage system.

This section explains the power connection specifications of the ETERNUS DX Disk storage systems.

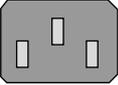
2.6.1 Specifications for Optional Power Supply Products

This section explains the specifications of optional power cords and power related optional products. When using power distribution units, the number of outlets that are required to connect the controller enclosure and drive enclosures should be taken into consideration. In addition, make sure that the plug type of the power distribution unit fits the power socket when using an existing power socket. If the plug type does not fit the power socket, replace the socket.

■ Power cords

- Power cords supplied with the ETERNUS DX Disk storage system (for the EMEA&I region)

Table 2.4 Specifications for power cords supplied with the ETERNUS DX Disk storage system (for the EMEA&I region)

Usage	Plug type	Socket type	Cable length	Remarks
Used for connection between the ETERNUS DX Disk storage system and the socket (IEC60320-C13 ↔ IEC60320-C14G)	IEC60320-C14G 	IEC60320-C13 	2.5m	250V 10A

- Power cords supplied with the ETERNUS DX Disk storage system (for regions other than EMEA&I)

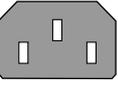
Table 2.5 Specifications for power cords supplied with the ETERNUS DX Disk storage system (for regions other than EMEA&I)

Usage	Plug type	Socket type	Cable length	Remarks
Used for connection between the ETERNUS DX Disk storage system and the socket (IEC60320-C13 ↔ NEMA L6-15P)	NEMA L6-15P 	NEMA L6-15R 	4.0m	250V 15A (Normal usage <12A)

- Optional AC100V and AC200V power cords (for regions other than EMEA&I)

Optional power cords are used to connect devices with the IEC60320-C13 power socket type. These power cords can be used to connect devices with the AC100V and AC200V specifications.

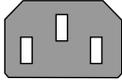
Table 2.6 Specifications for optional power cords (for regions other than EMEA&I)

Usage	Plug type	Socket type	Cable length	Remarks
Used for connection between the ETERNUS DX Disk storage system and the socket (IEC60320-C13 ↔ IEC 60320-C14)	IEC60320-C14 	IEC60320-C13 	3.0m	250V 10A (Normal usage <8A)

■ Power distribution units (only for regions other than EMEA&I)

- Power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 1U, Max 2 enclosures connection)

Table 2.7 Specifications for power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 1U, Max 2 enclosures connection)

Output	Input			Remarks
Outlet type	Plug type	Socket type	Cable length	
IEC60320-C13 	NEMA L6-15P 	NEMA L6-15R 	4.0m	250V 15A (Normal usage <12A)

- Power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 2U, Max 6 enclosures connection)

Table 2.8 Specifications for power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 2U, Max 6 enclosures connection)

Output	Input			Remarks
Outlet type	Plug type	Socket type	Cable length	
IEC60320-C13 	NEMA L6-20P 	NEMA L6-20R 	4.0m	250V 20A (Normal usage <16A)

- Power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 2U, Max 8 enclosures connection)

Table 2.9 Specifications for power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 2U, Max 8 enclosures connection)

Output	Input			Remarks
Outlet type	Plug type	Socket type	Cable length	
IEC60320-C13 	NEMA L6-30P 	NEMA L6-30R 	4.0m	250V 30A (Normal usage <24A)

2.6.2 Required Number of Outlets/sockets

The number of power outlets/sockets required to install the ETERNUS DX Disk storage system depends on the number of drive enclosures and power distribution units.

It is recommended that the power cords of the drive enclosures are connected to the power distribution units that are installed in the same rack. Secure the necessary number of power outlets within the same rack to avoid connecting power cords to power outlets in different racks. It may be necessary to purchase additional power distribution units depending on the installation locations of enclosures.

- Without power distribution units

Two power sockets are required for each enclosure (controller enclosure and drive enclosure).

- With power distribution units

Two power sockets are required for each power distribution unit. There are three types of power distribution units. The size and number of outlets are different for each type.

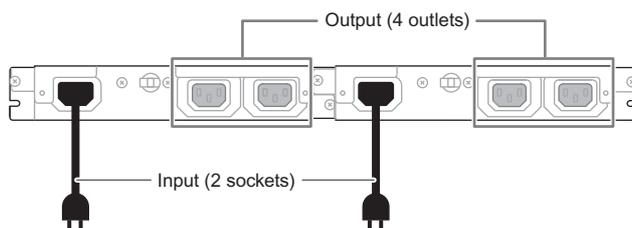
Table 2.10 Required number of outlets and sockets to install power distribution units

Product name	Number of outlets	Number of sockets
Power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 1U, Max 2 enclosures connection)	4	2
Power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 2U, Max 6 enclosures connection)	12	2
Power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 2U, Max 8 enclosures connection)	16	2

- Power distribution unit (1U)

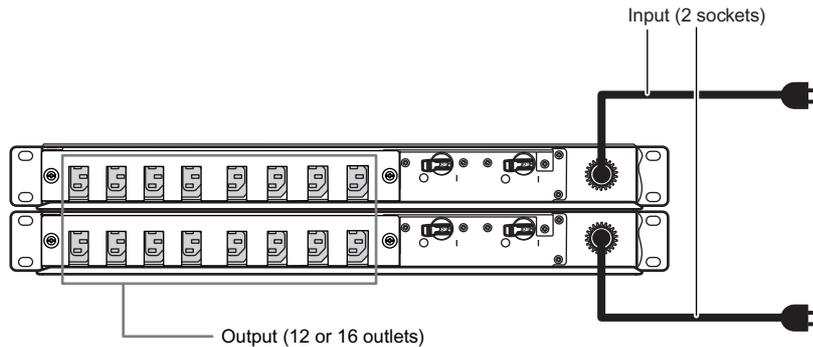
Up to two enclosures can be connected to a single power distribution unit (1U).

Figure 2.6 Power distribution unit (1U)



- Power distribution unit (2U)
 - Power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 2U, Max 6 enclosures connection)
Up to six enclosures can be connected.
 - Power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 2U, Max 8 enclosures connection)
Up to eight enclosures can be connected.

Figure 2.7 Power distribution unit (2U)



2.7 Circuit Protectors

Protection coordination must be secured between the distribution board circuit protectors and the ETERNUS DX Disk storage system or power distribution units to protect the ETERNUS DX Disk storage system by blocking the failed circuit immediately when a power supply input error occurs.

Distribution board circuit protectors must satisfy the following required conditions and breaking characteristics.

■ Required conditions

The distribution board circuit protectors must satisfy the required conditions that are listed in [Table 2.11](#).

Table 2.11 Required conditions for distribution board circuit protectors

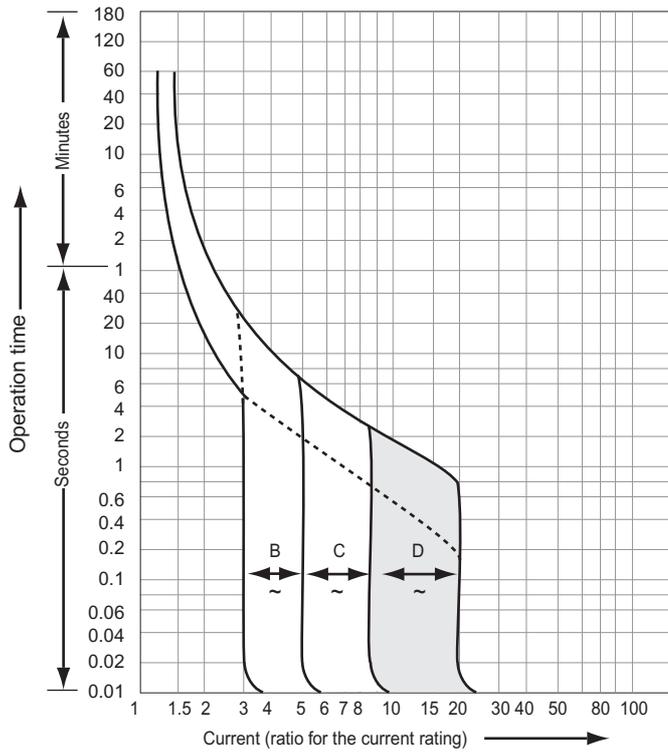
Connected device	Power supply voltage	Current capacity	
		Regions other than EMEA&I	EMEA&I region
Power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 1U, Max 2 enclosures connection)	AC200 – 240V	15A	–
Power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 2U, Max 6 enclosures connection)	AC200 – 240V	20A	–
Power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 2U, Max 8 enclosures connection)	AC200 – 240V	30A	–
ETERNUS DX Disk storage system (without power distribution units)	AC100 – 120V AC200 – 240V	15A	16A

■ Breaking characteristics

The breaking characteristics (*1) of distribution board circuit protectors must be equivalent to or slower than D (IEC898), which is shown in [Figure 2.8](#).

*1: Relationship between the size of excess current and operation time

Figure 2.8 Breaking characteristics of distribution board circuit protectors



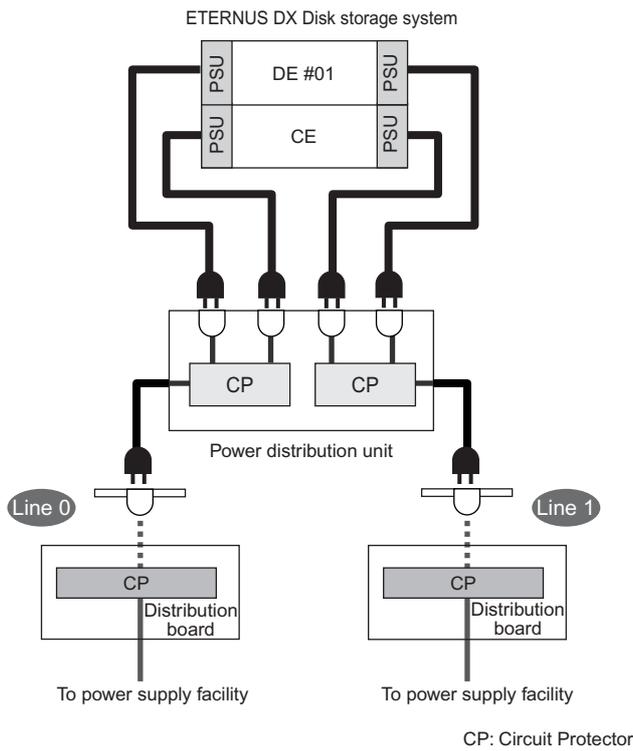
■ Connection diagrams

The following diagrams show connections between the power distribution units, the ETERNUS DX Disk storage system, and the power sockets of the distribution boards.

● For power distribution unit (1U) connection

The following diagram shows a power supply connection example when a power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 1U, Max 2 enclosures connection) is used.

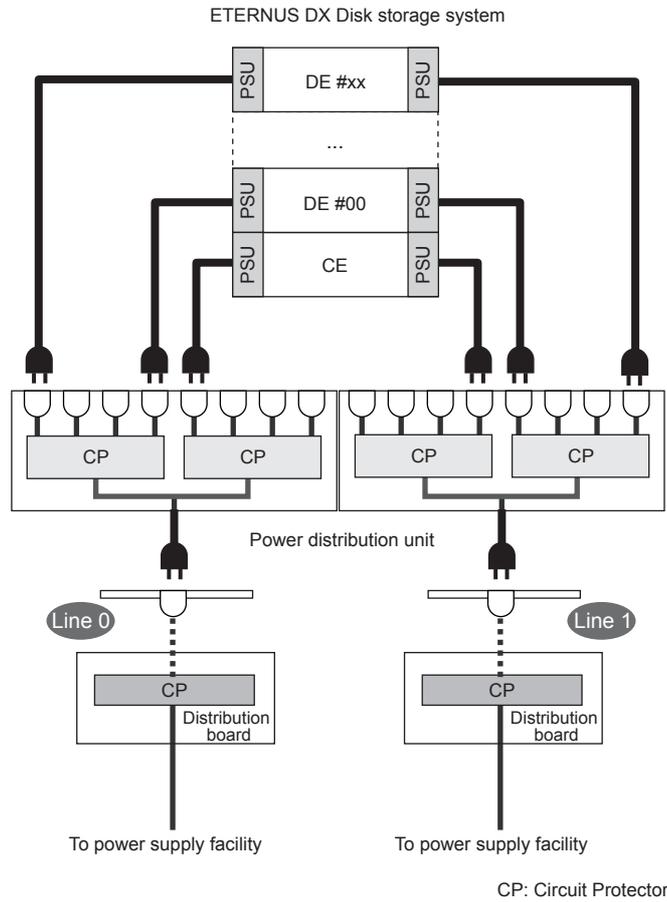
Figure 2.9 Example of a power supply connection using a power distribution unit (1U)



- For power distribution unit (2U) connection

The following diagram shows a power supply connection example when a power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 2U, Max 6 enclosures connection) or a power distribution unit for DX80 S2/DX90 S2 (AC200-240V, 2U, Max 8 enclosures connection) is used.

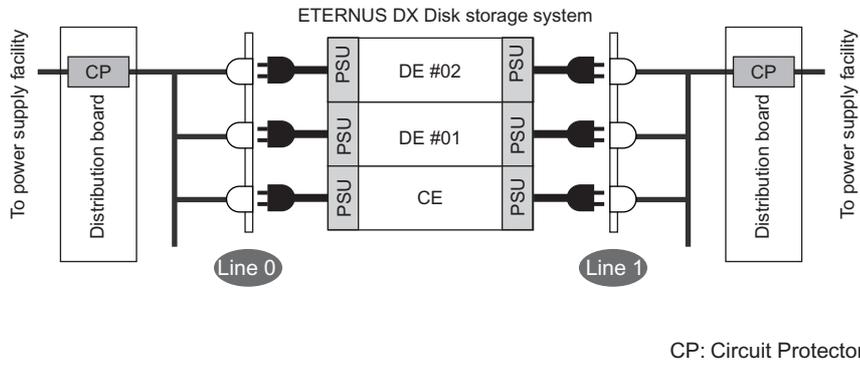
Figure 2.10 Example of a power supply connection using a power distribution unit (2U)



- For direct (no power distribution unit) connection

The following diagram shows a power supply connection example when no power distribution units are used.

Figure 2.11 Example of a power supply connection without power distribution units



- Only connect the ETERNUS DX Disk storage system to circuit protectors.

Chapter 3

Connections

This chapter explains connections for the ETERNUS DX Disk storage system.

3.1 Host Connections

FC, iSCSI, FCoE, and SAS are available as host interfaces. The server and the ETERNUS DX Disk storage system can be connected directly or via a switch.

3.1.1 Host Interfaces

This section describes each host interface.

■ FC (Fibre Channel)

FC supports two connection topologies: Fibre Channel Arbitrated Loop (FC-AL) and Fabric. Direct connections and switch connections to servers are available.

Two types of host interfaces with a maximum transfer speed of either 16Gbit/s or 8Gbit/s are available.

▶ Caution

When FC switches are used, zoning should be set for the FC switches to ensure the security of data.

■ iSCSI

Direct connections and switch connections to servers are available. Two types of host interfaces with a maximum transfer speed of either 10Gbit/s or 1Gbit/s are available.

In order to maintain iSCSI performance, the iSCSI network should be physically separated from other types of networks (such as networks for Internet access and file transfers).

- CHAP

CHAP authentication can prevent unauthorized access. The following CHAP authentication methods are supported:

- Unidirectional CHAP
- Bidirectional CHAP

- Virtual Local Area Network (VLAN tagging)
The VLAN tagging function is supported. A tag (VLAN ID) can be used for each port.

Caution

When the ETERNUS DX Disk storage system is connected to multiple servers, use a LAN switch that has the VLAN function and allocate a separate segment to each server so that security can be maintained.

- Jumbo Frame
Enabling Jumbo Frame makes data transfer more efficient by increasing the amount of data that can be transferred for each Frame.

Table 3.1 Ethernet frame capacity (Jumbo Frame settings)

Jumbo Frame settings	Ethernet frame capacity
Enabled	Up to 9000 bytes
Disabled	Up to 1500 bytes

Caution

- Confirm that the connected device supports Jumbo Frame before enabling Jumbo Frame.
- Server-side CPU load can be reduced by using Jumbo Frame. However, I/O performance may be reduced by 10% to 30%.

- Security Architecture for Internet Protocol (IPsec)
The IPsec function is not supported. Connect the server using a LAN switch that has the IPsec function as required.
- Internet Protocol
IPv4 and IPv6 are supported.

Note

IPv6 is supported in firmware version V10L35 or later.

■ FCoE

Fabric is supported as a connection topology. The maximum transfer speed is 10Gbit/s. When using an FCoE interface, connect the ETERNUS DX Disk storage system to the FCoE switch. Direct connections to servers are not supported.

Caution

- Perform zoning settings for FCoE switches.
- When an FCoE interface is used for the HBA of the server, use FCoE for the host interface of the ETERNUS DX Disk storage system.

■ SAS

Simple, cost effective, and high performance network storage environment can be configured. Direct connections and switch connections to servers are available. The maximum transfer speed is 6Gbit/s.

Caution

When SAS switches are used, zoning should be set for the SAS switches to ensure the security of data.

3.1.2 Host Connection Path

This section explains the connection configuration between server Host Bus Adapters (HBAs) and ETERNUS DX Disk storage system host interface ports.

■ Single path configuration

A single path configuration connects the ETERNUS DX Disk storage system to a server via a single path. The server cannot access an ETERNUS DX Disk storage system when a component (such as a controller, HBA, switch, or cable) on the path has a problem. The system must be stopped during the replacement of failed components and controller firmware.

In a single path connection configuration, the path failover and load balancing functions are not supported. A multipath connection configuration is recommended to maintain availability when a problem occurs.

Figure 3.1 Single path connection (direct connection)

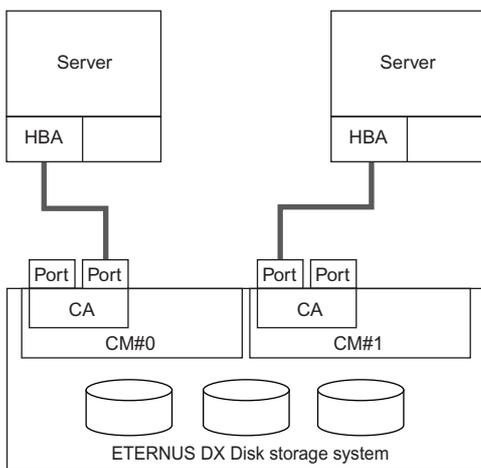
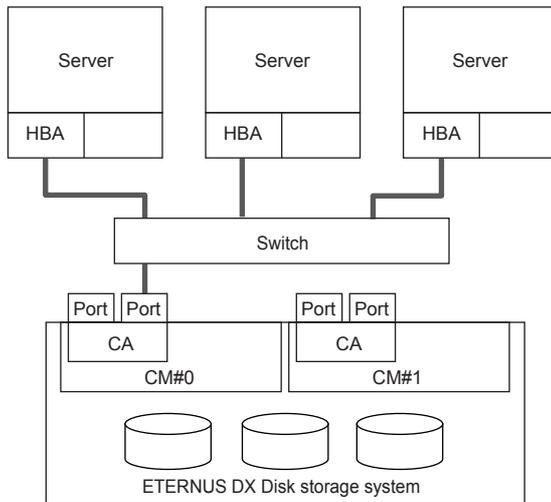


Figure 3.2 Single path connection (switch connection)



■ Multipath configuration

A multipath configuration connects the ETERNUS DX Disk storage system to a server via multiple paths (multipath). System reliability is improved due to the path redundancy. For multipath connections, driver software to control multipathing is required.

If a path fails, access can continue by using the path failover function that switches access from the failed path to another path. The performance of the system can be improved by using the load balancing function to spread the access load over multiple paths.

Figure 3.3 Multipath connection (direct connection)

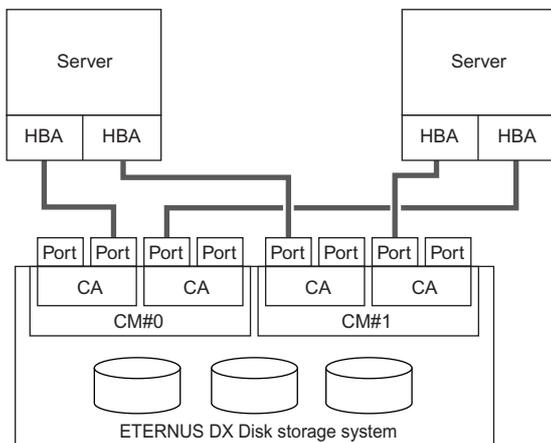
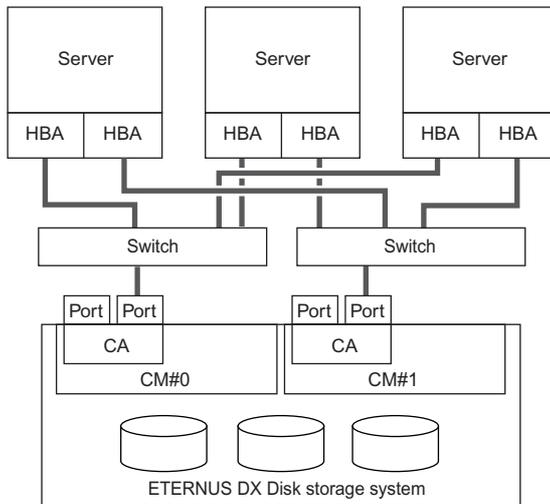


Figure 3.4 Multipath connection (switch connection)



Caution

- When configuring multipathing for reliability, make sure to configure a redundant connection for the controllers of the ETERNUS DX Disk storage system. Configure paths to connect to different controllers (CM#0 and CM#1). Combinations of host interface numbers (CA#0 and CA#1) in controllers do not need to be taken into consideration.
- Paths from a single server should be separately connected to a different host interface in case of host interface failure.

Cluster configuration

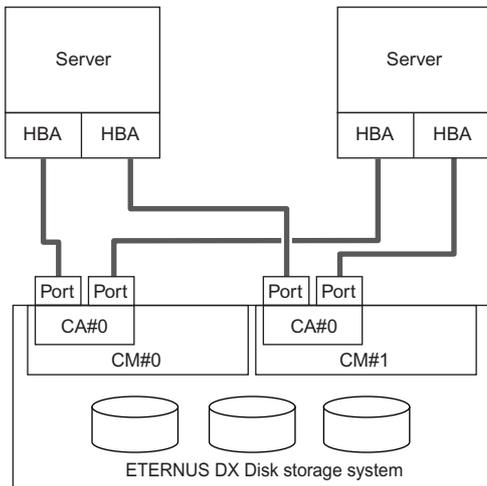
When a server is duplicated in a cluster configuration and the ETERNUS DX Disk storage system is shared by multiple servers, software to control the cluster configuration is required.

■ Configurations that satisfy the system requirements

System requirements should be taken into consideration for a connection configuration between the HBAs on the server and the host interface ports on the ETERNUS DX Disk storage system.

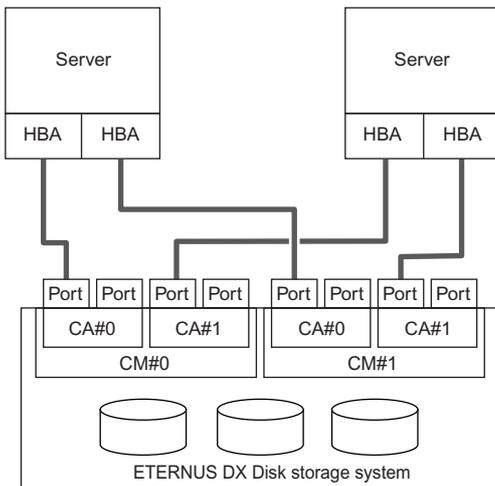
The following figure shows a connection configuration for availability:

Figure 3.5 Connection that satisfies the system requirements (for availability)



The following figure shows a connection configuration for enhanced performance:

Figure 3.6 Connection that satisfies the system requirements (for enhanced performance)



When the ETERNUS DX Disk storage system is accessed from both of the servers, performance can be secured by connecting to the ETERNUS DX Disk storage system using one host interface port on each of the four host interfaces.

3.2 Remote Connections

An FC or iSCSI interface is available for a remote connection.

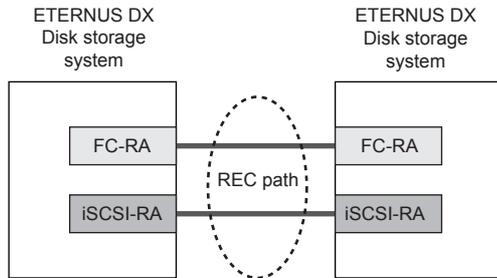
Caution

For remote connections, different types of interfaces (FC, iSCSI 10Gbit/s, iSCSI 1Gbit/s) cannot exist together on a REC path (connection between a local ETERNUS DX Disk storage system and a remote ETERNUS DX Disk storage system).

When different types of remote interfaces exist in the same ETERNUS DX Disk storage system, make sure to use the same type of interface for each REC path.

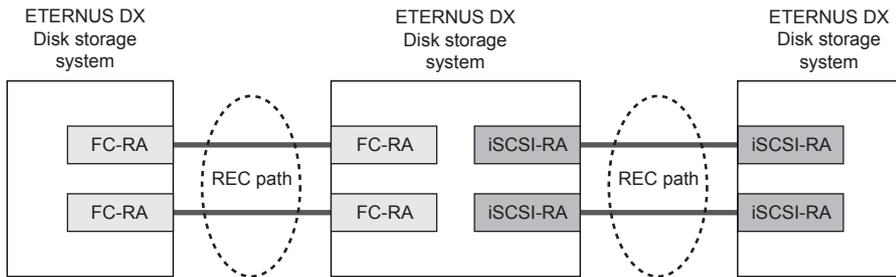
For example, the following configuration is not supported because different types of interfaces (FC/iSCSI) exist together on a REC path.

Figure 3.7 Example of non-supported connection configuration (when multiple types of remote interfaces are installed in the same ETERNUS DX Disk storage system)



The following configuration is supported because the same type of interface is used for each REC path.

Figure 3.8 Example of supported connection configuration (when multiple types of remote interfaces are installed in the same ETERNUS DX Disk storage system)



3.2.1 Remote Interfaces

This section describes each remote interface.

■ FC (Fibre Channel)

Data is transferred between multiple ETERNUS DX Disk storage systems by using host interfaces. The ETERNUS DX Disk storage system can be connected to the destination storage system directly or via switch. A digital service unit is required for a remote connection that is using a line. Two types of host interfaces with a maximum transfer speed of either 16Gbit/s or 8Gbit/s are available.

Figure 3.9 FC connection for remote copy (redundant path)

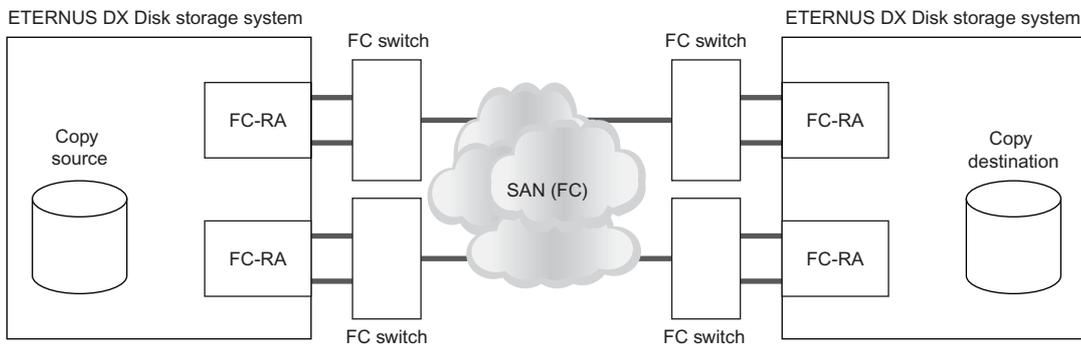
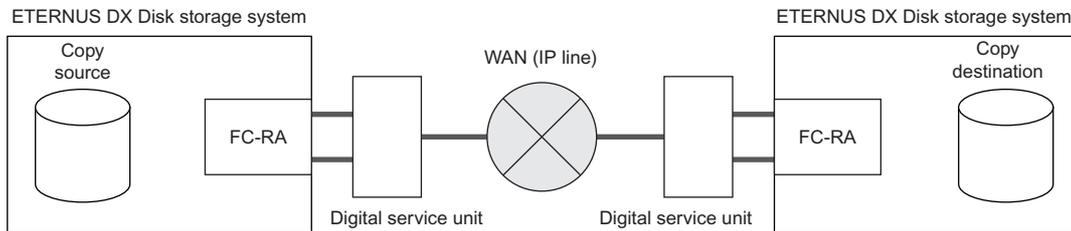


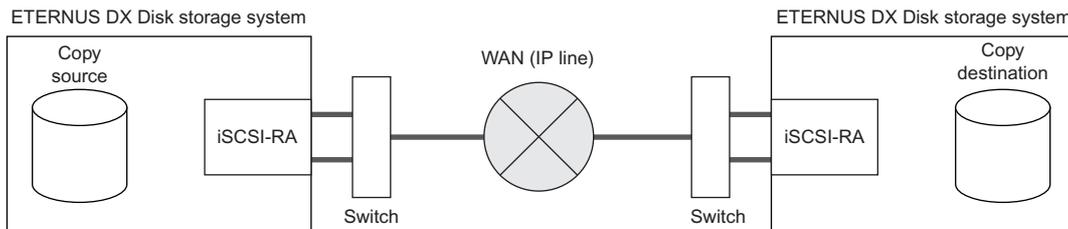
Figure 3.10 FC connection for remote copy (using lines)



■ iSCSI

Data is transferred between multiple ETERNUS DX Disk storage systems by using host interfaces. Direct connection to a WAN is possible. Two types of host interfaces with a maximum transfer speed of either 10Gbit/s or 1Gbit/s are available.

Figure 3.11 iSCSI connection for remote copy (using lines)



Caution

The IPsec function is not supported for iSCSI interfaces. To use the IPsec function when performing a remote copy with the ETERNUS DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2/DX8700 S2, use a LAN switch that has the IPsec function.

3.2.2 Connectable Models

Remote copy is available for the ETERNUS DX90 S2. The ETERNUS DX90 S2 can be connected to not only the same model, it can also be connected to the ETERNUS DX410 S2/DX440 S2, the ETERNUS DX8100 S2/DX8700 S2, and older ETERNUS Disk storage system models. The following table shows the models that can be connected and the interfaces that are available.

Table 3.2 Connectable models and available remote interfaces

Connectable model (*1)	Remote interface			
	FC 16Gbit/s	FC 8Gbit/s	iSCSI 10Gbit/s	iSCSI 1Gbit/s
ETERNUS DX90 S2	Available	Available	Available	Available
ETERNUS DX410 S2/DX440 S2	Available	Available	Available	Available
ETERNUS DX8100 S2/DX8700 S2	Available	Available	Available	Available
ETERNUS DX90	Available (*2)	Available	—	—
ETERNUS DX410/DX440 ETERNUS DX8100/DX8400/DX8700	Available (*2)	Available	—	—
ETERNUS4000 models 400, 600 ETERNUS8000 models 800, 1200, 2200	Available (*2)	Available	—	—
ETERNUS4000 models 300, 500 ETERNUS8000 models 700, 900, 1100, 2100	Available (*3)	Available (*4)	—	—
ETERNUS6000	Available (*5) (*6)	Available (*6)	—	—

- *1: Firmware upgrade may be required to connect to the ETERNUS DX90 S2. For information about firmware versions, contact your sales representative.
- *2: The transfer speed is 8Gbit/s or 4Gbit/s.
- *3: The transfer speed is 4Gbit/s.
- *4: The transfer speed is 4Gbit/s or 2Gbit/s.
- *5: Connections are available via switches. Direct connections are not supported.
- *6: The transfer speed is FC 2Gbit/s. Remote connections are available only when data is migrated. Stack mode or Through mode can be used as the transfer mode.

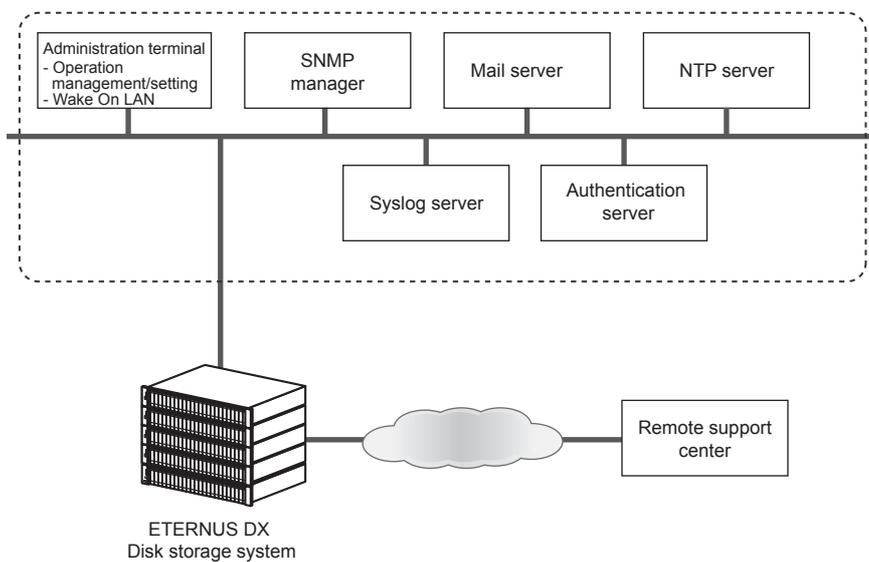
3.3 LAN Connection

The ETERNUS DX Disk storage system requires a LAN connection for operation management. In addition, information such as ETERNUS DX Disk storage system failures is notified to the remote support center.

Note

Make sure to connect each controller to the LAN for operation management.

Figure 3.12 Example of a LAN connection



When using ETERNUS Web GUI to manage operations, prepare a Web browser in the administration terminal. The following table shows the supported Web browsers.

Table 3.3 ETERNUS Web GUI operating environment

Software	Guaranteed operating environment
Web browser	Microsoft Internet Explorer 7.0, 8.0, 9.0, 10.0 (desktop version) Mozilla Firefox 3.6.x, ESR 10.0.x, ESR 17.0.x

When using ETERNUS Web GUI to connect the ETERNUS DX Disk storage system, the default port number is 80 for http.

The LAN port for operation management on the ETERNUS DX Disk storage system uses Ethernet (1000Base-T / 100Base-TX / 10Base-T) for the interface. IPv4 and IPv6 are supported as Internet Protocols.

Note

The following items are supported in firmware version V10L30 or later:

- Internet Explorer 9.0
- Firefox ESR 10.0.x
- IPv6

The following item is supported in firmware version V10L40 or later:

- Internet Explorer 10.0 (desktop version)

The following item is supported in firmware version V10L45 or later:

- Firefox ESR 17.0.x

■ LAN for operation management

In an ETERNUS DX Disk storage system, the system administrator logs on to the ETERNUS DX Disk storage system via a LAN to set the RAID configuration, manage operations, and perform maintenance. The computer for operation management that is used for accessing the ETERNUS DX Disk storage system via ETERNUS Web GUI or ETERNUS CLI is called an administration terminal.

In addition, the functions that are provided by the management/monitoring server on the LAN can be used. These functions include SNMP (device monitoring), SMTP (e-mail sending), NTP (time correction), syslog (event notification and audit log sending), RADIUS (user authentication), and KMIP(key management).

■ LAN for remote support

Various failures that occur in the ETERNUS DX Disk storage system are notified to the remote support center. Remote support connection can be separated from the LAN for operation management.

3.4 Power Supply Connection

Connect the power cords (AC cables) of the ETERNUS DX Disk storage system to the power sockets, the UPS sockets, or the power control unit sockets.

Refer to "[2.6 Outlet/Socket Specifications](#)" (page 37) for details about the types and the number of power outlets/sockets.

Note

Two power supply units (PSU#0 and PSU#1) are installed in each enclosure. Make sure that power cords are connected to both of the power supply units.

3.4.1 Input Power Supply Lines

Multiple power supply facilities in the building or UPS units are recommended for power supply redundancy. When the ETERNUS DX Disk storage system power supply is redundantly configured, business can continue even if one of the power lines fails. Alternatively, optimal system design (including the server) may instead lead to the ETERNUS DX Disk storage system being configured with only a single power supply facility or UPS unit. Which configuration is selected will depend on system availability requirement considerations.

Figure 3.13 Dual-line power supply when connecting to power sockets

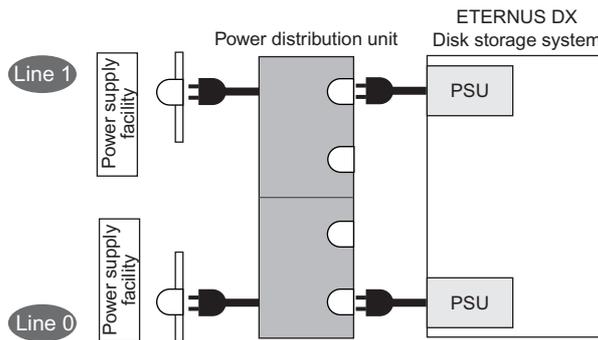


Figure 3.14 Dual-line power supply when connecting to UPS units

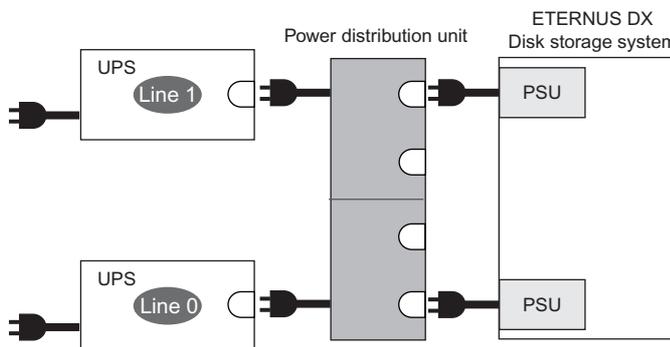


Figure 3.15 Single-line power supply when connecting to power sockets

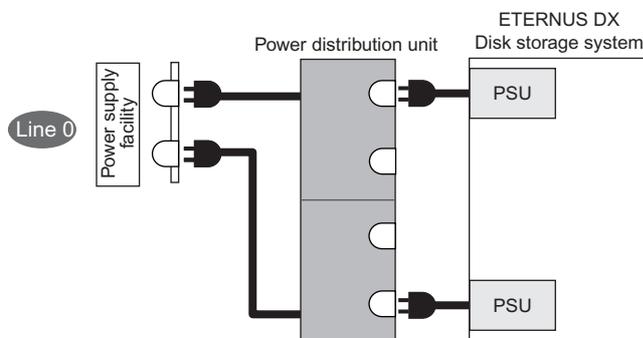


Figure 3.16 Single-line power supply when connecting to a UPS unit

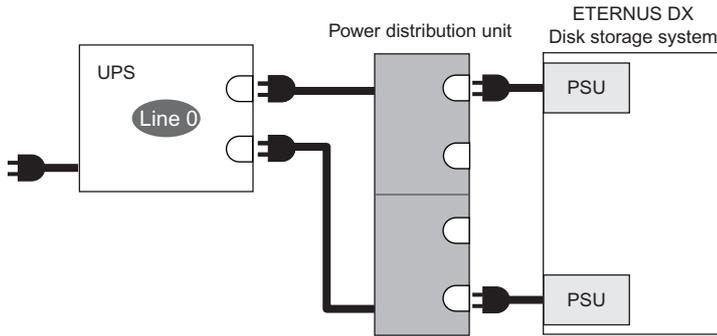
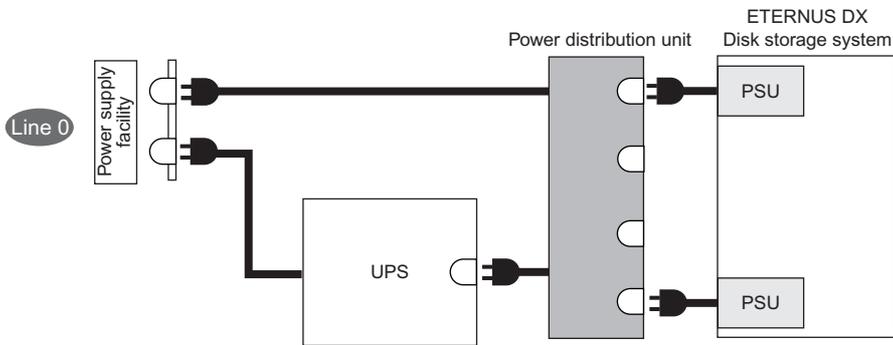
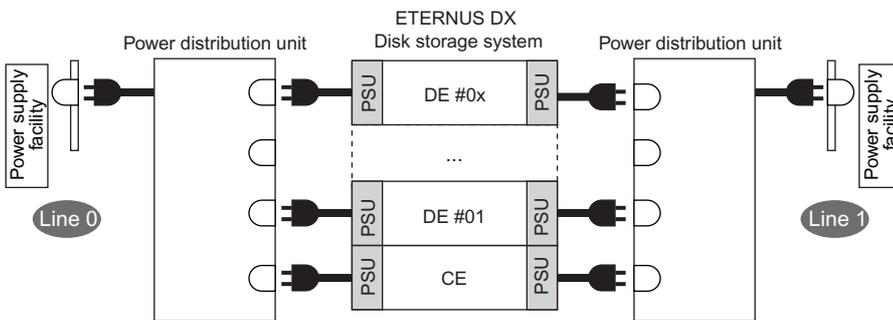


Figure 3.17 Single-line power supply when connecting to a power socket and a UPS unit



Note

When the power distribution units are separately connected to line 0 (PSU#0) and line 1 (PSU#1), the availability of the power supply facilities is improved.



3.4.2 UPS Connection

It is recommended that an Uninterruptible Power Supply System (UPS) be used as the power supply source for the ETERNUS DX Disk storage system to cope with power outages and momentary voltage drops in the normal power supply.

Note that when connecting an ETERNUS DX Disk storage system to a UPS with one power supply line, the total value of the power requirements for all the enclosures must not exceed the UPS output capacity.

When one of the power supply lines fails for redundantly configured UPS units with two power supply lines, all of the power for the ETERNUS DX Disk storage system must be supplied from the other line. Select a UPS that can supply sufficient power so that the total value of the power requirements does not exceed the UPS output capacity in case only one power supply line is available.

For details about the necessary UPS output capacity, refer to the specifications of the UPS that is used.

A UPS must satisfy the following conditions:

- **Rating capacity**

Secure a sufficient rating capacity for the total value of the maximum power requirements for the enclosures that are to be installed.
For the maximum power requirements of each enclosure, refer to ["2.1 Installation Specifications" \(page 27\)](#).
- **Supply time**

The total time for the server to shut down and for the ETERNUS DX Disk storage system to power off (maximum of six minutes) must be taken into consideration for the power supply time of the battery.
- **Switching time during power failure**

The normal power supply must be switched to UPS output within 11ms after a power failure occurs.
- **Socket type**

If the power plug type and the socket type of the UPS do not match, it is necessary to equip the UPS (AC output) with an appropriate type of socket. Request a qualified electrician to perform the necessary work to make terminal block connections available.
- **Power supply configuration**

If a UPS is used, make sure that it supplies power to all the enclosures.
Configurations where the controller enclosure is powered by the UPS while the drive enclosures are powered directly from AC are not supported.

3.5 Power Synchronized Connections

This section describes connections to automatically control powering the ETERNUS DX Disk storage system on and off with a server.



- In order to control powering the ETERNUS DX Disk storage system on and off with servers, the power control of the ETERNUS DX Disk storage system must be linked with all of the connected servers. If some of the servers are not linked, data errors may occur in these servers when the ETERNUS DX Disk storage system is turned off by using power control from the other linked servers.

■ Power synchronized unit

A power synchronized unit enables the ETERNUS DX Disk storage system to be powered on and off with a server. The power synchronized unit detects changes in the AC power output of a UPS unit that is connected to a server (server UPS unit) and automatically turns on and off the ETERNUS DX Disk storage system. In addition to server UPS units, units that control the AC socket power output can also be connected. When three or more servers are connected, power can be synchronized by adding an AC sensor unit.

The power synchronized unit detects the AC power output of the target devices for power synchronization and commands the ETERNUS DX Disk storage system to synchronize the power with the target devices.

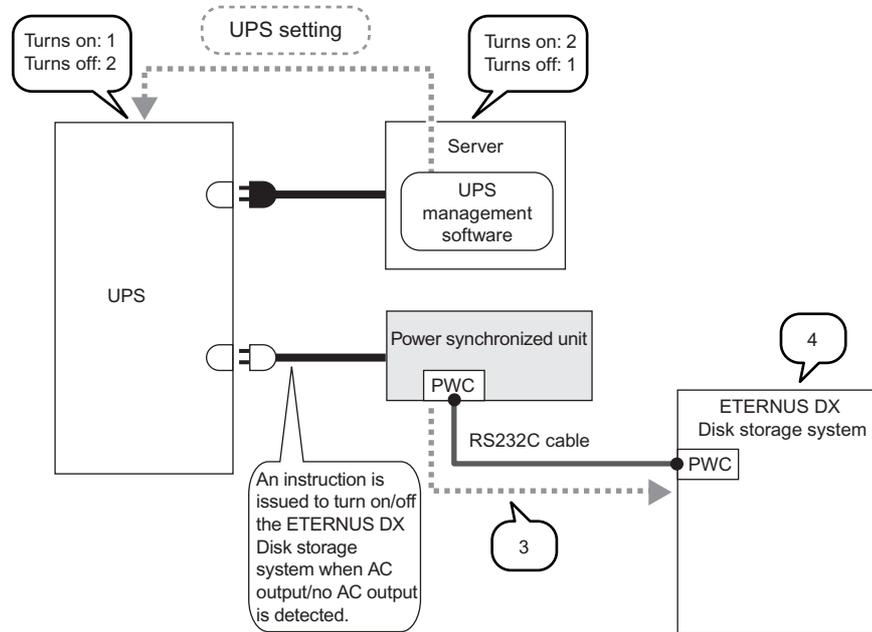
When the power synchronized unit detects the AC power output of any server UPS unit, the power synchronized unit commands the ETERNUS DX Disk storage system to turn on.

When the power synchronized unit does not detect AC power output in any of the server UPS units, the power synchronized unit commands the ETERNUS DX Disk storage system to turn off.

The server UPS unit must have a function in the management software that controls the AC power output according to when the server powers on and off. The server UPS unit must have one unused outlet to connect to the power synchronized unit.

- When connecting one or two servers

Figure 3.18 Power control using a power synchronized unit (when connecting one or two servers)



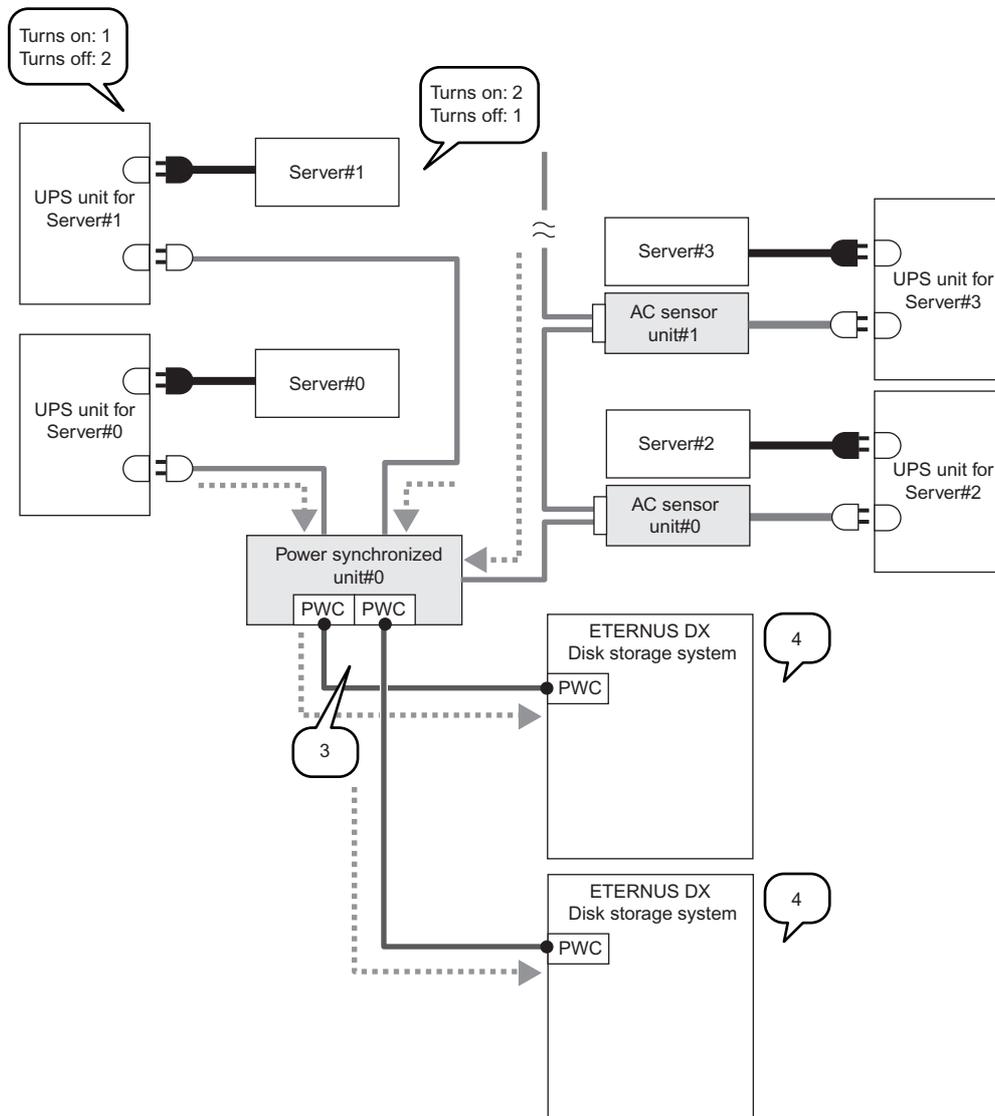
- Powering on sequence

- 1 Power on of all the server UPS units
- 2 Server startup
The server OS startup is suspended until the ETERNUS DX Disk storage system startup is complete (*1).
- 3 Issuance of command to turn on the ETERNUS DX Disk storage system from the power synchronized unit
- 4 ETERNUS DX Disk storage system startup

*1: The server must be set to suspend server OS startup until the ETERNUS DX Disk storage system startup is complete.

- Powering off sequence
 - 1 Shutdown of all the servers
 - 2 Shutdown of all the server UPS units
 - 3 Issuance of command to turn off the ETERNUS DX Disk storage system from the power synchronized unit
 - 4 ETERNUS DX Disk storage system shutdown
- When connecting three or more servers

Figure 3.19 Power control using a power synchronized unit (when connecting three or more servers)



- Powering on sequence

- 1 Power on of all the server UPS units
- 2 Server startup
The server OS startup is suspended until the ETERNUS DX Disk storage system startup is complete (*1).
- 3 Issuance of command to turn on the ETERNUS DX Disk storage system from the power synchronized unit
- 4 ETERNUS DX Disk storage system startup
*1: The server must be set to suspend server OS startup until the ETERNUS DX Disk storage system startup is complete.

- Powering off sequence

- 1 Shutdown of all the servers
- 2 Shutdown of all the server UPS units
- 3 Issuance of command to turn off the ETERNUS DX Disk storage system from the power synchronized unit
- 4 ETERNUS DX Disk storage system shutdown

Refer to the manual that is provided with a power synchronized unit for details about connection configurations with power synchronized units and required settings.

Chapter 4

Rack and Optional Product Installation

This chapter explains the requirements for installation of racks and the optional products for an ETERNUS DX Disk storage system.

4.1 Rack Installation Requirements

This section explains the requirements for installing the ETERNUS DX Disk storage system in a 19-inch rack.

4.1.1 Placement in the Rack

Note the following when installing the ETERNUS DX Disk storage system in the rack.

- The center of gravity must be taken into consideration to prevent a rack from toppling over. Enclosures should generally be installed from bottom to top to lower the center of gravity and to ensure the safe use of racks.
- Enclosures are installed in the following order (from bottom to top).

Table 4.1 Enclosure installation order

Order	Enclosure	Size (height)
1	Power distribution unit (PDU)	1U/2U
2	Controller enclosure (CE)	2U
3	Drive enclosure (DE)	2U

Install drive enclosures in order of DE-IDs (drive enclosure numbers)

Note

- When determining the rack-mounting layout, consider the placement of each enclosure and the power distribution unit in the rack and the length of each cable. For example, if the ETERNUS DX Disk storage system is installed at the top of a 1800mm rack, the surplus length of the power cord at the bottom of a rack should be about 2m.
- If the storage system is installed at the bottom of a rack, a space for the surplus of cables may not be available in some racks, preventing the storage system from being pulled out when maintenance work is required.
In this case, secure a space of 1U or more at the bottom when installing the storage system.
- If drive enclosures are to be added in the future, securing sufficient space for power distribution units in the bottom of the rack is recommended.

4.1.2 Cable Connection

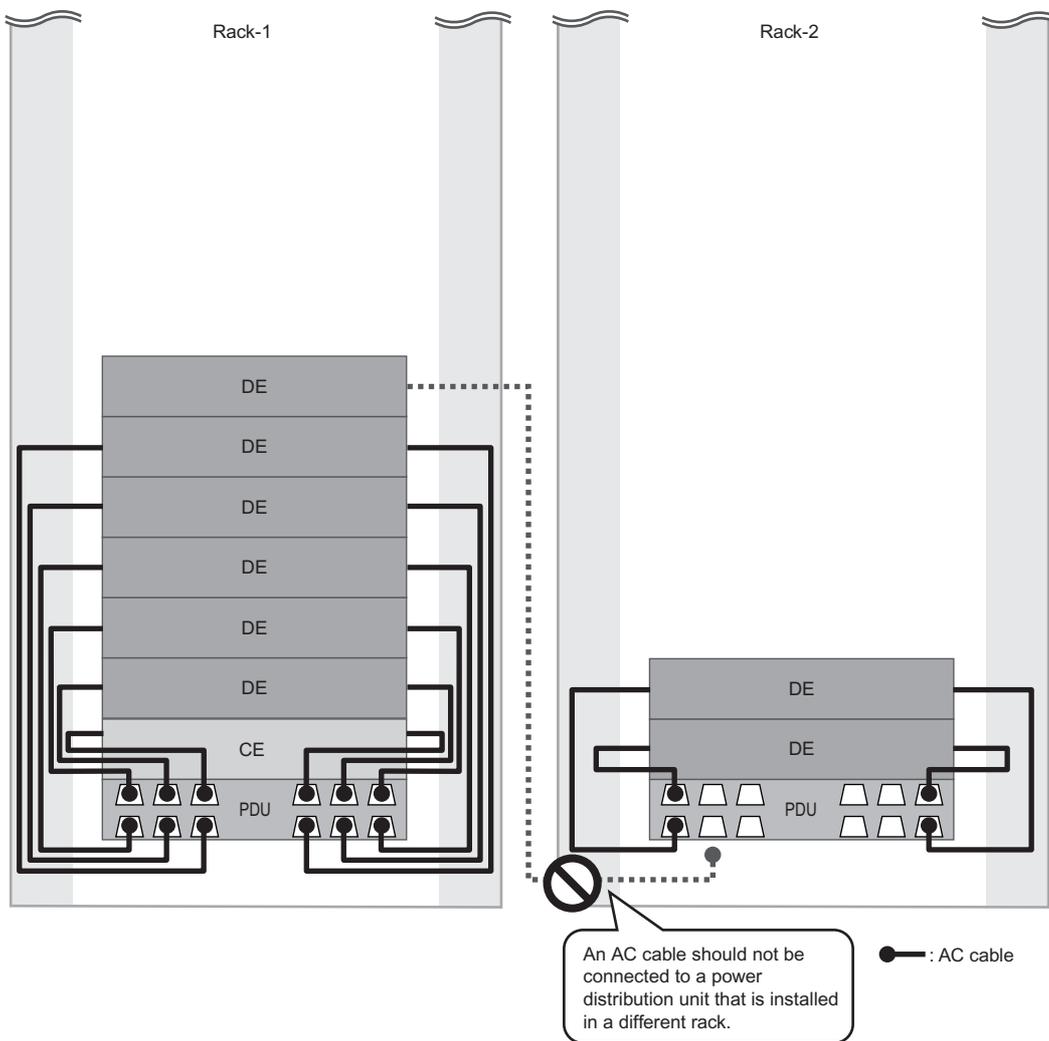
■ Power supply connection

It is recommended that the power cords (AC cables) of the enclosures are connected to the power distribution units that are installed in the same rack. Secure the necessary number of power outlets within the same rack to avoid connecting power cords to power outlets in different racks.

It may be necessary to purchase additional power distribution units depending on the installation locations of enclosures.

The length of the AC output cable that is supplied with the power distribution unit is 3m.

Figure 4.1 AC cable connection



■ Connections between enclosures

If enclosures are installed in multiple racks or are installed with space in the same rack, the QSFP cables (0.75m) that are included with the ETERNUS DX Disk storage system may be too short for connections between enclosures.

In this case, use the Extension cable between enclosures. The length of the Extension cable between enclosures that is provided is 3m or 6m. Enclosures in different racks can be installed within this length.

Figure 4.2 QSFP cable connection (single-controller type)

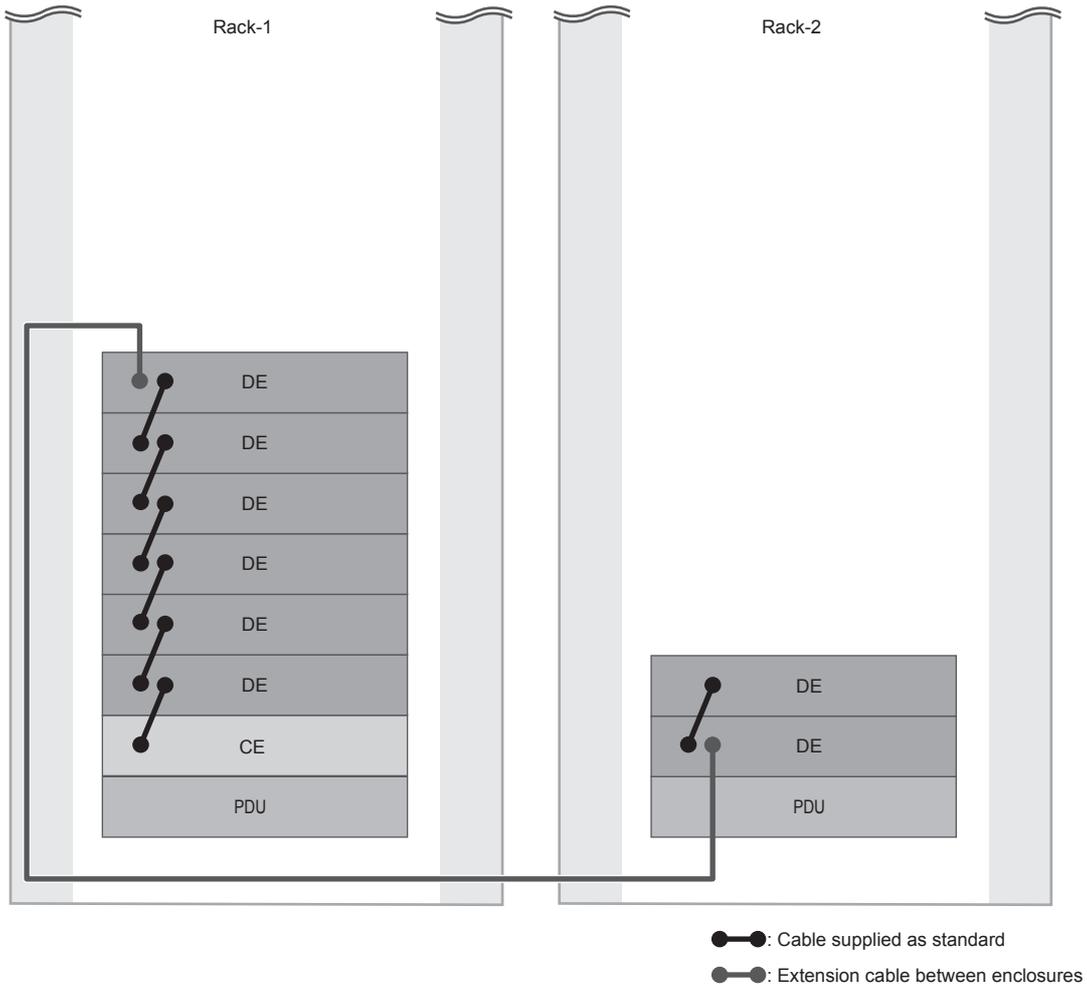
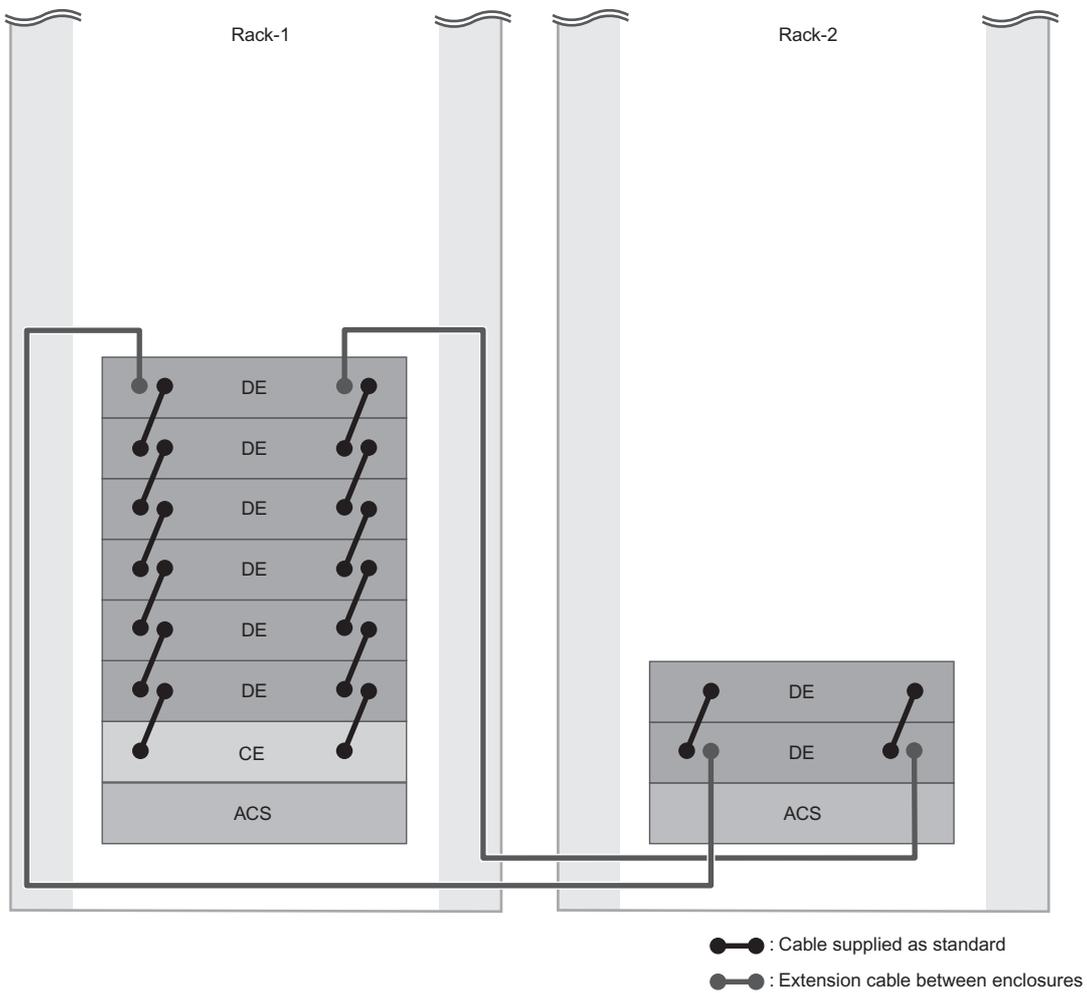


Figure 4.3 QSFP cable connection (dual-controller type)



4.2 Installable Racks

This section explains the racks in which the ETERNUS DX Disk storage system can be installed.

4.2.1 Fujitsu Racks

The ETERNUS DX Disk storage system can be installed in a Fujitsu 19-inch rack. For information about whether the ETERNUS DX Disk storage system can be installed in an EOled rack or not, contact your sales representative.

4.2.2 Non-Fujitsu Racks

ETERNUS DX Disk storage systems are developed and their operation is guaranteed on the assumption that they are installed in Fujitsu 19-inch racks. Since the ETERNUS DX Disk storage system cannot be tested (for cooling and strength) in non-Fujitsu 19-inch racks, the operations of ETERNUS DX Disk storage systems cannot be guaranteed. Any problem that may occur by installing the ETERNUS DX Disk storage system in non-Fujitsu racks is not covered by the warranty.

If the ETERNUS DX Disk storage system needs to be installed in a non-Fujitsu rack, the following conditions must be satisfied.

■ Rack specifications

Use the rack mount kit supplied with the product to install the ETERNUS DX Disk storage system in the rack. The rack specifications must satisfy the conditions listed below. For rack specifications, refer to the manual that is supplied with the rack that is used.

- Pitch for mounting holes
EIA Standard Universal pitch
- Size for mounting holes
The size must be 9mm or more.
- Load bearing capacity
The load bearing capacity must be equal to or larger than the total weight of the ETERNUS DX Disk storage system.
- Unit installation area
The dimensions of the area shown in [Figure 4.4](#) must match the conditions described in [Table 4.2](#).

Figure 4.4 Unit installation area

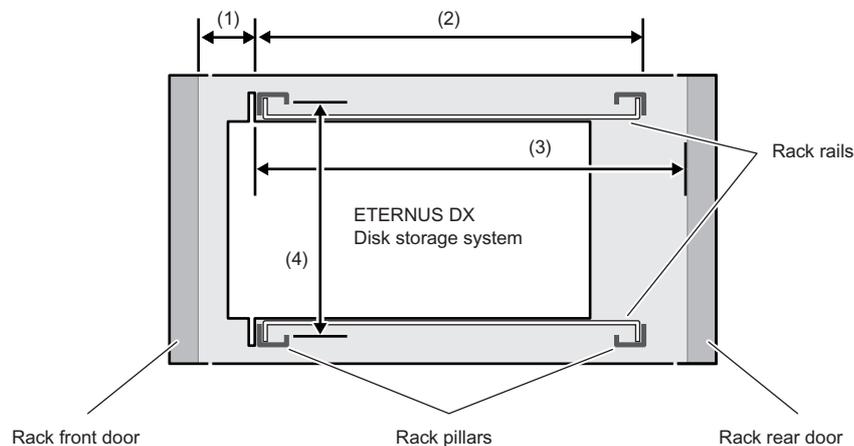


Table 4.2 Specifications for the unit installation area

Specification		Condition
(1)	Rack front space (Space between the fixed part of the ETERNUS DX Disk storage system on the front side and the front of the rack)	40mm or more
(2)	Mount bracket length (Size between each end of the front and rear rack pillars)	685mm to 775mm
(3)	Rack space (Space between the fixed part of the ETERNUS DX Disk storage system on the front side and the rear of the rack)	830mm or more
(4)	Rack mount kit installation area	482mm or more (recommended)

■ Placement conditions

When determining service areas, refer to the installation document of the rack to be used. Install air conditioning in order to ensure that the interior temperature of the rack satisfies the temperature conditions listed in ["2.1 Installation Specifications" \(page 27\)](#) and ["2.5.1 Air Conditioning" \(page 36\)](#).

4.3 Standard Installation Rules Before Shipment (Only for Regions Other than EMEA&I)

This section explains the rules for combining the following optional products and standard installation rules that apply before shipment from the factory.

- Host interfaces
- Drive enclosures
- Drives

4.3.1 Host Interfaces

This section explains the installation rules for host interfaces.

The following types of host interfaces (CA) are available:

- FC 16Gbit/s (dual port type)
- FC 8Gbit/s (dual port type)
- iSCSI 10Gbit/s (dual port type)
- iSCSI 10Gbit/s (dual port type, without SFP+ modules)
- iSCSI 1Gbit/s (dual port type)
- FCoE 10Gbit/s (dual port type)
- FCoE 10Gbit/s (dual port type, without SFP+ modules)
- SAS 6Gbit/s (dual port type)

Different types of interfaces can be mixed for the same ETERNUS DX Disk storage system.

Install the host interfaces for CA#0 first, and then CA#1 according to [Table 4.3](#).

For a dual-controller type, the configuration is the same for Controller 0 (CM#0) and Controller 1 (CM#1).

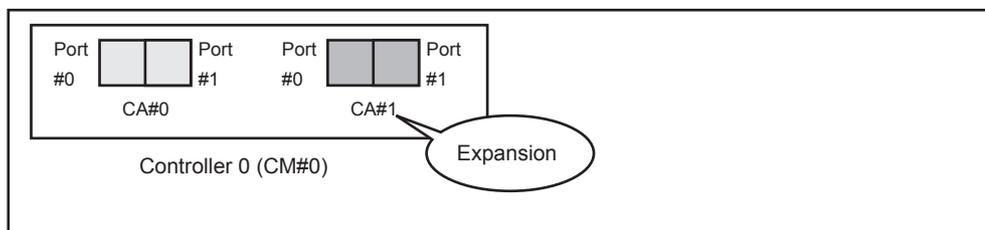
The following table shows the priority order of host interface installation.

Table 4.3 Priority order of host interface installation

Priority order	Type	Interface
1	Host interface (2port)	FC 16Gbit/s
2		FC 8Gbit/s
3		iSCSI 10Gbit/s
4		iSCSI 10Gbit/s (without SFP+ modules)
5		iSCSI 1Gbit/s
6		FCoE 10Gbit/s
7		FCoE 10Gbit/s (without SFP+ modules)
8		SAS 6Gbit/s

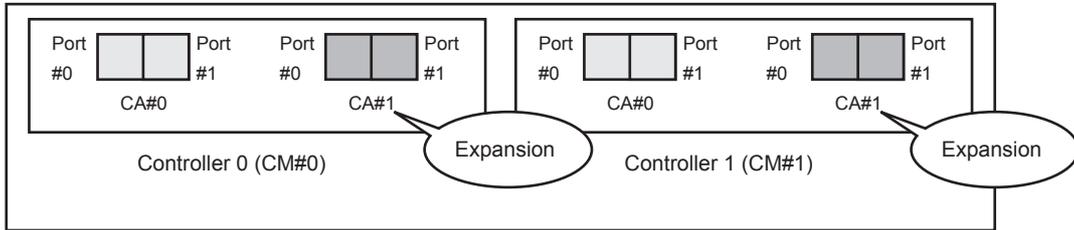
■ For a single-controller type

Figure 4.5 Installation diagram for a host interface (single-controller type)



■ For a dual-controller type

Figure 4.6 Installation diagram for host interfaces (dual-controller type)



4.3.2 Drive Enclosures

This section explains the installation rules for drive enclosures. 2.5" type and 3.5" type drive enclosures can be installed together in the ETERNUS DX Disk storage system. The priority order of drive enclosure installation varies depending on the controller enclosure type.

■ 2.5" type controller enclosure

Table 4.4 Priority order of drive enclosure installation (for 2.5" type controller enclosure)

Priority order	Type
1	Drive enclosure (2.5inch)
2	Drive enclosure (3.5inch)

■ 3.5" type controller enclosure

Table 4.5 Priority order of drive enclosure installation (for 3.5" type controller enclosure)

Priority order	Type
1	Drive enclosure (3.5inch)
2	Drive enclosure (2.5inch)

For the ETERNUS DX80 S2/DX90 S2, up to nine drive enclosures can be installed. When only 2.5" type enclosures are used for the ETERNUS DX80 S2, up to four drive enclosures can be installed. DE-IDs are automatically assigned for a drive enclosure based on the installation order.

4.3.3 Drives

This section explains the installation rules for drives.

■ 2.5" drives

The following table shows the priority order of 2.5" drive installation.

Table 4.6 Priority order of 2.5" drive installation

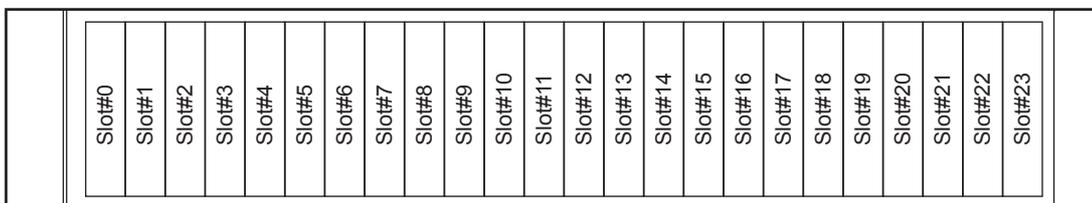
Priority order	Type	Drive capacity/quantity	RAID level
1	SSD (2.5inch)	100GB (SLC) x 2	RAID1
2		100GB (SLC) x 6	RAID1+0
3		100GB (SLC) x 4	RAID5
4		100GB (SLC) x 1	Hot spare
5		200GB (SLC) x 2	RAID1
6		200GB (SLC) x 6	RAID1+0
7		200GB (SLC) x 4	RAID5
8		200GB (SLC) x 1	Hot spare
9		400GB (SLC) x 2	RAID1
10		400GB (SLC) x 6	RAID1+0
11		400GB (SLC) x 4	RAID5
12		400GB (SLC) x 1	Hot spare
13		400GB (MLC) x 6	RAID1+0
14		400GB (MLC) x 4	RAID5
15		400GB (MLC) x 1	Hot spare
16		800GB (MLC) x 2	RAID1
17		800GB (MLC) x 6	RAID1+0
18		800GB (MLC) x 4	RAID5
19		800GB (MLC) x 1	Hot spare

Priority order	Type	Drive capacity/quantity	RAID level
20	Disk Drive (2.5inch)	300GB/15krpm x 2	RAID1
21		300GB/15krpm x 6	RAID1+0
22		300GB/15krpm x 6	RAID5
23		300GB/15krpm x 6	RAID6
24		300GB/15krpm x 1	Hot spare
25		300GB/10krpm x 2	RAID1
26		300GB/10krpm x 6	RAID1+0
27		300GB/10krpm x 6	RAID5
28		300GB/10krpm x 6	RAID6
29		300GB/10krpm x 1	Hot spare
30		450GB/10krpm x 2	RAID1
31		450GB/10krpm x 6	RAID1+0
32		450GB/10krpm x 6	RAID5
33		450GB/10krpm x 6	RAID6
34		450GB/10krpm x 1	Hot spare
35		600GB/10krpm x 2	RAID1
36		Disk Drive (2.5inch)	600GB/10krpm x 6
37	600GB/10krpm x 6		RAID5
38	600GB/10krpm x 6		RAID6
39	600GB/10krpm x 1		Hot spare
40	900GB/10krpm x 2		RAID1
41	900GB/10krpm x 6		RAID1+0
42	900GB/10krpm x 6		RAID5
43	900GB/10krpm x 6		RAID6
44	900GB/10krpm x 1		Hot spare

Priority order	Type	Drive capacity/quantity	RAID level
45	Self Encrypting Disk Drive (2.5inch)	300GB/10krpm x 2	RAID1
46		300GB/10krpm x 6	RAID1+0
47		300GB/10krpm x 6	RAID5
48		300GB/10krpm x 6	RAID6
49		300GB/10krpm x 1	Hot spare
50		450GB/10krpm x 2	RAID1
51		450GB/10krpm x 6	RAID1+0
52		450GB/10krpm x 6	RAID5
53		450GB/10krpm x 6	RAID6
54		450GB/10krpm x 1	Hot spare
55		600GB/10krpm x 2	RAID1
56		600GB/10krpm x 6	RAID1+0
57		600GB/10krpm x 6	RAID5
58		600GB/10krpm x 6	RAID6
59		600GB/10krpm x 1	Hot spare
60		900GB/10krpm x 2	RAID1
61		900GB/10krpm x 6	RAID1+0
62		900GB/10krpm x 6	RAID5
63		900GB/10krpm x 6	RAID6
64		900GB/10krpm x 1	Hot spare
65	Disk Drive (2.5inch)	1TB/7.2krpm x 2	RAID1
66		1TB/7.2krpm x 6	RAID1+0
67		1TB/7.2krpm x 6	RAID5
68		1TB/7.2krpm x 6	RAID6
69		1TB/7.2krpm x 1	Hot spare

Up to twenty-four 2.5" drives can be installed in a controller enclosure or a drive enclosure (2.5" type). Drives with different types can be installed in a single enclosure. Install drives in the slots of a controller enclosure from Slot#0 to Slot#23 in ascending order according to the installation order in [Table 4.6](#). Then, install drives in the slots of a drive enclosure from Slot#0 to Slot#23 in ascending order.

Figure 4.7 Installation diagram for 2.5" drives



■ 3.5" drives

The following table shows the priority order of 3.5" drive installation.

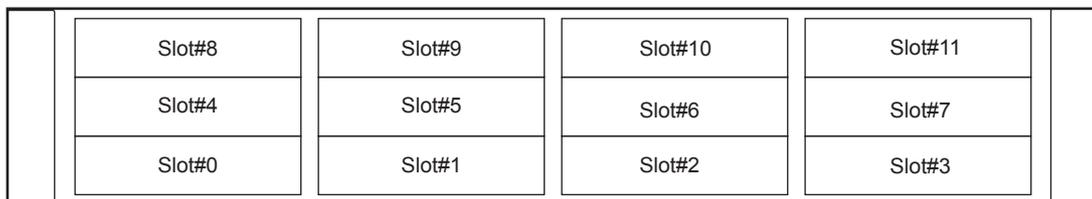
Table 4.7 Priority order of 3.5" drive installation

Priority order	Type	Drive capacity/quantity	RAID level
1	SSD (3.5inch)	100GB (SLC) x 2	RAID1
2		100GB (SLC) x 6	RAID1+0
3		100GB (SLC) x 4	RAID5
4		100GB (SLC) x 1	Hot spare
5		200GB (SLC) x 2	RAID1
6		200GB (SLC) x 6	RAID1+0
7		200GB (SLC) x 4	RAID5
8		200GB (SLC) x 1	Hot spare
9		400GB (SLC) x 2	RAID1
10		400GB (SLC) x 6	RAID1+0
11		400GB (SLC) x 4	RAID5
12		400GB (SLC) x 1	Hot spare
13		400GB (MLC) x 6	RAID1+0
14		400GB (MLC) x 4	RAID5
15		400GB (MLC) x 1	Hot spare
16		800GB (MLC) x 2	RAID1
17		800GB (MLC) x 6	RAID1+0
18		800GB (MLC) x 4	RAID5
19		800GB (MLC) x 1	Hot spare
20	Disk Drive (3.5inch)	300GB/15krpm x 2	RAID1
21		300GB/15krpm x 6	RAID1+0
22		300GB/15krpm x 6	RAID5
23		300GB/15krpm x 6	RAID6
24		300GB/15krpm x 1	Hot spare
25		450GB/15krpm x 2	RAID1
26		450GB/15krpm x 6	RAID1+0
27		450GB/15krpm x 6	RAID5
28		450GB/15krpm x 6	RAID6
29		450GB/15krpm x 1	Hot spare

Priority order	Type	Drive capacity/quantity	RAID level
30	Disk Drive (3.5inch)	600GB/15krpm x 2	RAID1
31		600GB/15krpm x 6	RAID1+0
32		600GB/15krpm x 6	RAID5
33		600GB/15krpm x 6	RAID6
34		600GB/15krpm x 1	Hot spare
35		1TB/7.2krpm x 2	RAID1
36		1TB/7.2krpm x 6	RAID1+0
37		1TB/7.2krpm x 6	RAID5
38		1TB/7.2krpm x 6	RAID6
39		1TB/7.2krpm x 1	Hot spare
40		2TB/7.2krpm x 2	RAID1
41		2TB/7.2krpm x 6	RAID1+0
42		2TB/7.2krpm x 6	RAID5
43		2TB/7.2krpm x 6	RAID6
44		2TB/7.2krpm x 1	Hot spare
45		3TB/7.2krpm x 2	RAID1
46		3TB/7.2krpm x 6	RAID1+0
47		3TB/7.2krpm x 6	RAID5
48		3TB/7.2krpm x 6	RAID6
49		3TB/7.2krpm x 1	Hot spare
50		4TB/7.2krpm x 2	RAID1
51		4TB/7.2krpm x 6	RAID1+0
52		4TB/7.2krpm x 6	RAID5
53		4TB/7.2krpm x 6	RAID6
54	4TB/7.2krpm x 1	Hot spare	

Up to twelve 3.5" drives can be installed in a controller enclosure or a drive enclosure (3.5" type). Drives with different types can be installed in a single enclosure. Install drives in the slots of a controller enclosure from Slot#0 to Slot#11 in ascending order according to the installation order in [Table 4.7](#). Then, install drives in the slots of a drive enclosure from Slot#0 to Slot#11 in ascending order.

Figure 4.8 Installation diagram for 3.5" drives



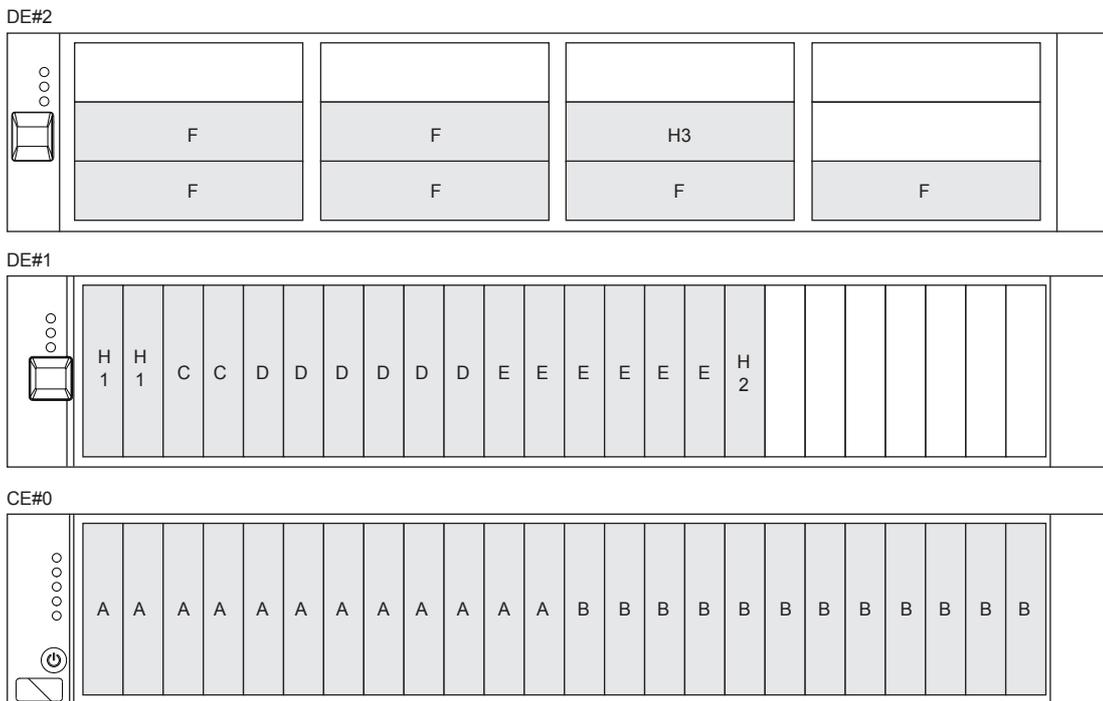
4.3.4 Drive Installation Examples

This section provides examples of drive installation at shipment.

■ 2.5" type controller enclosure

For a 2.5" type controller enclosure, 2.5" type drive enclosures are installed before 3.5" type drive enclosures. 2.5" drives are installed in the 2.5" type controller enclosure and drive enclosures, and 3.5" drives are installed in the 3.5" type drive enclosures.

Figure 4.9 Drive installation example at shipment (2.5" type controller enclosure)

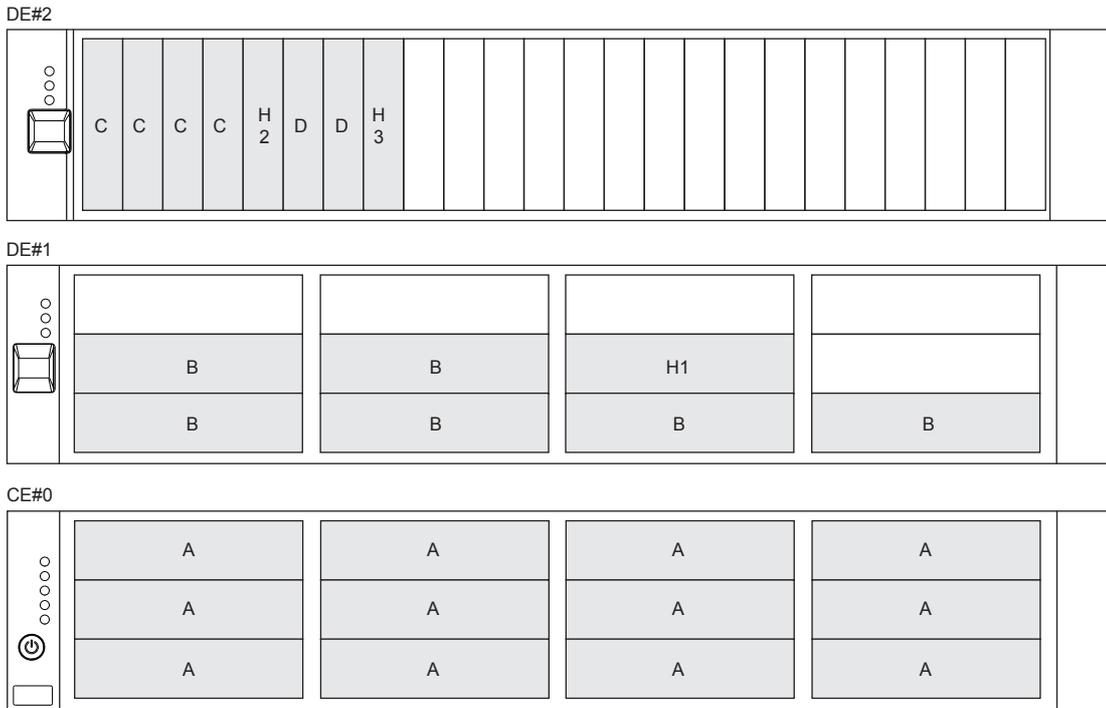


- Installation order
- A: 2.5" SSD (100GB, RAID5) x 3
 - B: 2.5" SSD (200GB, RAID1+0) x 2
 - H1: 2.5" SSD (200GB, hot spare) x 2
 - C: 2.5" SAS (450GB, RAID1)
 - D: 2.5" SAS (450GB, RAID6)
 - E: 2.5" SAS (600GB, RAID5)
 - H2: 2.5" SAS (600GB, hot spare)
 - F: 3.5" Nearline SAS (2TB, RAID5)
 - H3: 3.5" Nearline SAS (2TB, hot spare)

■ 3.5" type controller enclosure

For a 3.5" type controller enclosure, 3.5" type drive enclosures are installed before 2.5" type drive enclosures. 3.5" drives are installed in the 3.5" type controller enclosure and drive enclosures, and 2.5" drives are installed in the 2.5" type drive enclosures.

Figure 4.10 Drive installation example at shipment (3.5" type controller enclosure)



- Installation order
- A: 3.5" Nearline SAS (1TB, RAID1+0) x 2
 - B: 3.5" Nearline SAS (2TB, RAID5)
 - H1: 3.5" Nearline SAS (2TB, hot spare)
 - C: 2.5" SSD (200GB, RAID5)
 - H2: 2.5" SSD (200GB, hot spare)
 - D: 2.5" SAS (300GB, RAID1)
 - H3: 2.5" SAS (300GB, hot spare)

ETERNUS DX80 S2/DX90 S2 Disk storage system
User's Guide -Site Planning-

P3AM-4822-12ENZO

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