Fujitsu Storage
ETERNUS DX S6 series
Site Planning Guide

Requirements for transportation/installation
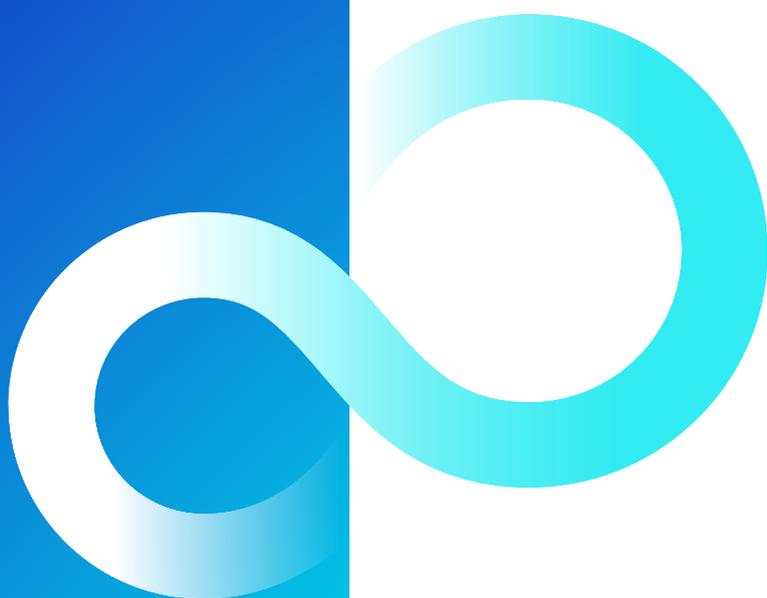
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Preface

Fujitsu would like to thank you for purchasing the Fujitsu Storage ETERNUS DX600 S6/DX900 S6, ETERNUS DX8900 S6 Hybrid Storage Systems (hereinafter referred to as ETERNUS DX).

The ETERNUS DX is designed to be connected to Fujitsu servers (Fujitsu SPARC Servers, PRIMEQUEST, PRIMERGY, and other servers) or non-Fujitsu servers.

This manual describes the environmental requirements that are necessary to install and use the ETERNUS DX.

This manual is intended for use of the ETERNUS DX in regions other than Japan.

Please carefully review the information outlined in this manual.

Trademarks

Third-party trademark information related to this product is available at:
https://www.fujitsu.com/global/products/computing/storage/eternus/trademarks.html

About This Manual

Intended Audience

This manual is intended for managers of facilities where the ETERNUS DX is installed.

Related Information and Documents

The latest information for your model is available at:
https://www.fujitsu.com/global/support/products/computing/storage/manuals-list.html

Document Conventions

■ Third-Party Product Names
   - Oracle Solaris may be referred to as "Solaris", "Solaris Operating System", or "Solaris OS".
   - Microsoft® Windows Server® may be referred to as "Windows Server".

■ Notice Symbols
   The following notice symbols are used in this manual:

| **Caution** | Indicates information that you need to observe when using the ETERNUS storage system. Make sure to read the information. |
| **Note** | Indicates information and suggestions that supplement the descriptions included in this manual. |

Warning Signs

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.

⚠ WARNING	This symbol indicates the possibility of serious or fatal injury if the ETERNUS DX is not used properly.
⚠ CAUTION	This symbol indicates the possibility of minor or moderate personal injury, as well as damage to the ETERNUS DX and/or to other users and their property, if the ETERNUS DX is not used properly.
Important	This symbol indicates IMPORTANT information for the user to note when using the ETERNUS DX.

The following symbols are used to indicate the type of warnings or cautions being described.

Electric Shock	The triangle emphasizes the urgency of the WARNING and CAUTION contents. Inside the triangle and above it are details concerning the symbol (e.g. Electrical Shock).
No Disassembly	The barred "Do Not..." circle warns against certain actions. The action which must be avoided is both illustrated inside the barred circle and written above it (e.g. No Disassembly).
Unplug	The black "Must Do..." circle indicates actions that must be taken. The required action is both illustrated inside the black disk and written above it (e.g. Unplug).

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 below.

Example warning

⚠ CAUTION ——————————————————————————— Warning level indicator

Do

❗ ——————————————————————————— Warning type indicator

• To avoid damaging the ETERNUS storage system, pay attention to the following points when cleaning the ETERNUS storage system:
   - Make sure to disconnect the power when cleaning. ——— Warning details
   - Be careful that no liquid seeps into the ETERNUS storage system when using cleaners, etc.

——————————————————————————— Warning layout ribbon

1.   ETERNUS DX Installation

This chapter provides the installation specification of the ETERNUS DX.

Installation Specifications

Table 1 shows the installation specifications of the ETERNUS DX, and Table 2 and Table 3 show the efficiency and the power factor of the power supply unit.

Table 1   Installation Specifications

Item			ETERNUS DX600 S6	ETERNUS DX900 S6	ETERNUS DX8900 S6
Dimensions (W × D × H)	Frontend enclosure		—	482 × 805 × 217 mm (5U)	
	Controller enclosure		482 × 785 × 132 mm (3U)		
	Drive enclosure	2.5" NVMe type	481 × 546 × 88 mm (2U)		
		2.5" SAS type	482 × 540 × 88 mm (2U)		
		3.5" SAS type	482 × 560 × 88 mm (2U)		
	Power distribution unit	1U	482 × 111 × 44 mm		—
		2U (*1)	(485 × 123 × 44 mm) × 2 (2U)		
Maximum weight	Frontend enclosure (*2)		—	58kg	
	Controller enclosure (*2)		55kg		
	Drive enclosure (*2)	2.5" NVMe type	33kg		
		2.5" SAS type	35kg		
		3.5" SAS type	35kg		
	Power distribution unit	1U	2.5kg		—
		2U (*1)	(3.0kg) × 2		
Power	Voltage		AC 200 – 240V		
	Phase		Single		
	Frequency		50Hz/60Hz		
Maximum power consumption	AC 200 – 240V	Frontend enclosure (*3)	—	580W (610VA)	760W (800VA)
		Controller enclosure (*3)	1,503W (1,505VA)	1,761W (1,763VA)	
		Drive enclosure (*3)	2.5" NVMe type	570W (580VA)	
		2.5" SAS type	430W (440VA)		
		3.5" SAS type	340W (350VA)		
Maximum heat generation	AC 200 – 240V	Frontend enclosure (*3)	—	2,090kJ/h	2,740kJ/h
		Controller enclosure (*3)	5,420kJ/h	6,340kJ/h	
		Drive enclosure (*3)	2.5" NVMe type	2,060kJ/h	
		2.5" SAS type	1,600kJ/h		
		3.5" SAS type	1,300kJ/h		

1. ETERNUS DX Installation
Installation Specifications

Item			ETERNUS DX600 S6	ETERNUS DX900 S6	ETERNUS DX8900 S6
Maximum amount of exhaust air	Frontend enclosure		—	7.0m^3/min	
	Controller enclosure		5.3m^3/min		
	Drive enclosure (*4)	2.5" NVMe type	3.9m^3/min		
		2.5" SAS type	4.0m^3/min		
		3.5" SAS type	4.0m^3/min		
Environmental conditions	Temperature	Operating	10 – 40°C	10 – 35°C	
		Not operating	0 – 50°C		
		During shipment	-25 – 60°C		
	Temperature gradient		15°C/Hr or less		
	Humidity	Operating	20 – 80%RH		
		Not operating	8 – 80%RH		
		During shipment	8 – 90%RH		
	Humidity gradient		30%/day or less		
	Maximum wet bulb temperature		29°C		
	Altitude above sea level		0 – 3,000m		
	Airborne dust		0.15mg/m^3 or less		
	Gas concentration tolerance level		Cl_2: 6.8ppb or less, H_2S: 7.1ppb or less, SO_2: 37.5ppb or less, NH_3: 423.5ppb or less, NO_2: 52.3ppb 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 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		1,000gal		
Noise emission	Sound power level		7.9B (*5)	8.1B (*6)	

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

*2: Maximum weight of an enclosure where all installable options are installed.

*3: The power consumed and heat generated under maximum load when all installable options are installed in the enclosure.

*4: This value is for each drive enclosure when the following are installed.
- For 2.5" NVMe type drive enclosures, 24 drives
- For 2.5" SAS type drive enclosures, 24 drives
- For 3.5" SAS type drive enclosures, 12 drives

*5: This value is measured when a single controller enclosure and three 2.5" NVMe type drive enclosures are configured in an environment in which the temperature is 23 ± 2°C at 0 meters above sea level.

*6: This value is measured when a single frontend enclosure, two controller enclosures and two 2.5" NVMe type drive enclosures are configured in an environment in which the temperature is 23 ± 2°C at 0 meters above sea level.

Table 2   Efficiency and Power Factor of the Power Supply Unit (ETERNUS DX600 S6)

Component name		80PLUS®	Efficiency			Power factor	Output
			20% (*1)	50% (*1)	100% (*1)	50% (*1)	
Controller enclosure		TITANIUM (*2)	94.9%	96.1%	94.9%	0.995	Single output
Drive enclosure	2.5" NVMe type	PLATINUM (*2)	91.1%	94.3%	93.2%	0.990	Multiple output
	2.5" SAS type		91.7%	94.4%	93.7%	0.974	
	3.5" SAS type						

*1: Indicates the load factor against the rated output of the PSU.

*2: The component uses power supply units equivalent to those that are certified as 80PLUS® PLATINUM or higher for the power saving program for electrical equipment promoted by the 80PLUS® program.

Table 3   Efficiency and Power Factor of the Power Supply Unit (ETERNUS DX900 S6)

Component name		80PLUS®	Efficiency			Power factor	Output
			20% (*1)	50% (*1)	100% (*1)	50% (*1)	
Frontend enclosure		TITANIUM (*2)	94.9%	96.1%	94.9%	0.995	Single output
Controller enclosure			94.9%	96.1%	94.9%	0.995	
Drive enclosure	2.5" NVMe type	PLATINUM (*2)	91.1%	94.3%	93.2%	0.990	Multiple output
	2.5" SAS type		91.7%	94.4%	93.7%	0.974	
	3.5" SAS type						

*1: Indicates the load factor against the rated output of the PSU.

*2: The component uses power supply units equivalent to those that are certified as 80PLUS® PLATINUM or higher for the power saving program for electrical equipment promoted by the 80PLUS® program.

19-inch Racks

The following table shows the installation specifications of the 19-inch racks.

Table 4   19-inch Rack Installation Specifications

Item	Specifications	
	Base rack	Expansion rack
Dimensions (W × D × H)	700 × 1,050 × 2,000mm	
	700 × 1,272 × 2,000mm (including anti-tipping stabilizer)	
Maximum weight	140kg	115kg
Service area	Front 850mm, rear 850mm, left 0mm, and right 50mm	
Number of units	42U	

ETERNUS DX Dimensions

■ Frontend Enclosure Dimensions (ETERNUS DX900 S6 and ETERNUS DX8900 S6)

The following diagrams show the dimensions of a frontend enclosure.

The dimensions are approximations and do not include protruding parts.

Figure 1   Frontend Enclosure Dimensions

Side

805mm

482mm

Top

217mm

Front
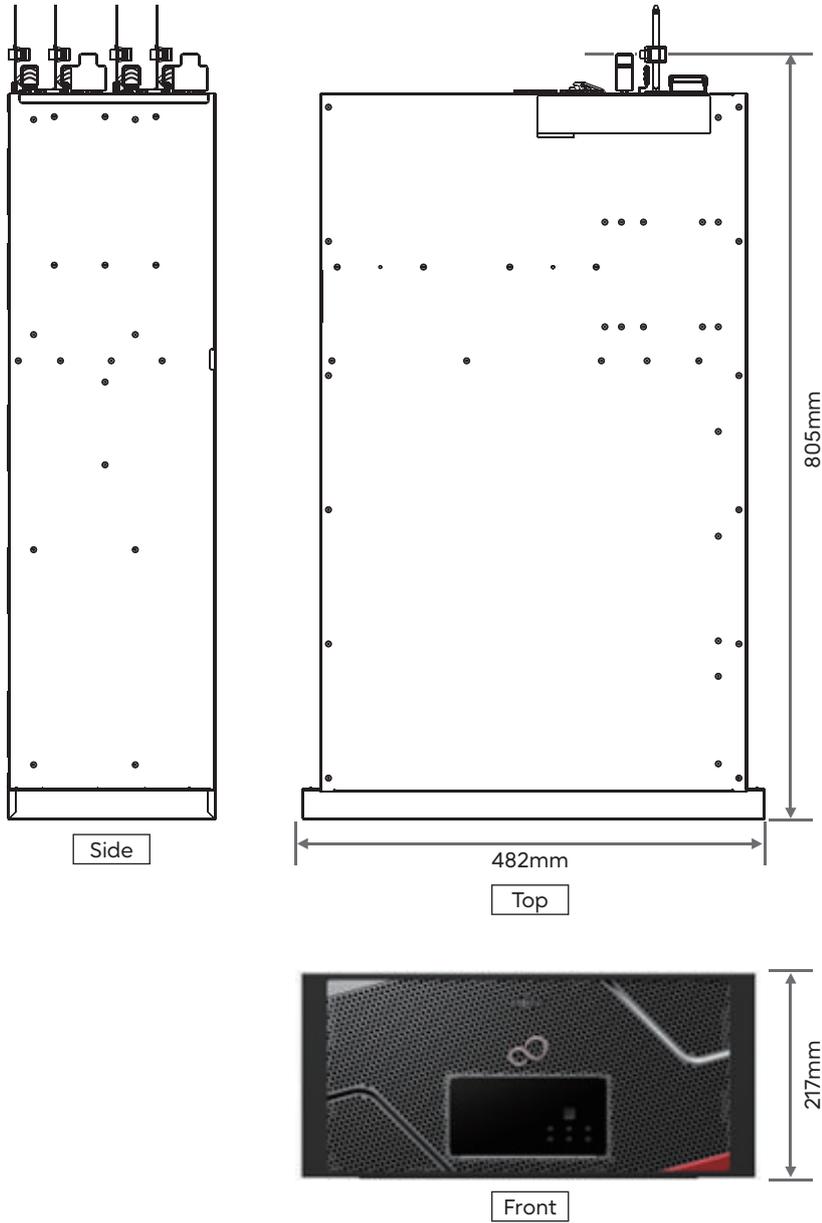
■ Controller Enclosure Dimensions

The following diagrams show the dimensions of a controller enclosure.

The dimensions are approximations and do not include protruding parts.

Figure 2   Controller Enclosure Dimensions

Side

482mm

785mm

Top

132mm

Front
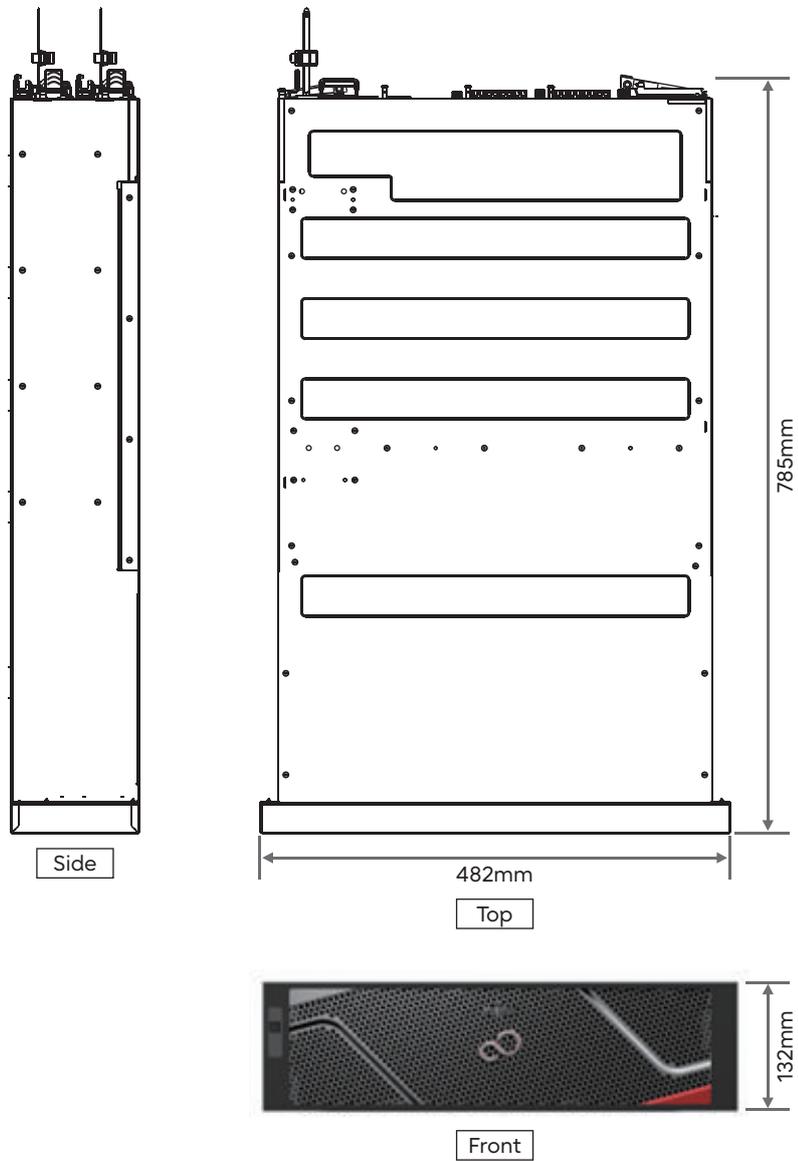
■ Drive Enclosure Dimensions

The diagrams below show the dimensions of a drive enclosure.

The dimensions are approximations and do not include protruding parts.

● 2.5" NVMe Type Drive Enclosure

Figure 3   2.5" NVMe Type Drive Enclosure Dimensions

Side

481 mm

Top

546mm

88mm

Front
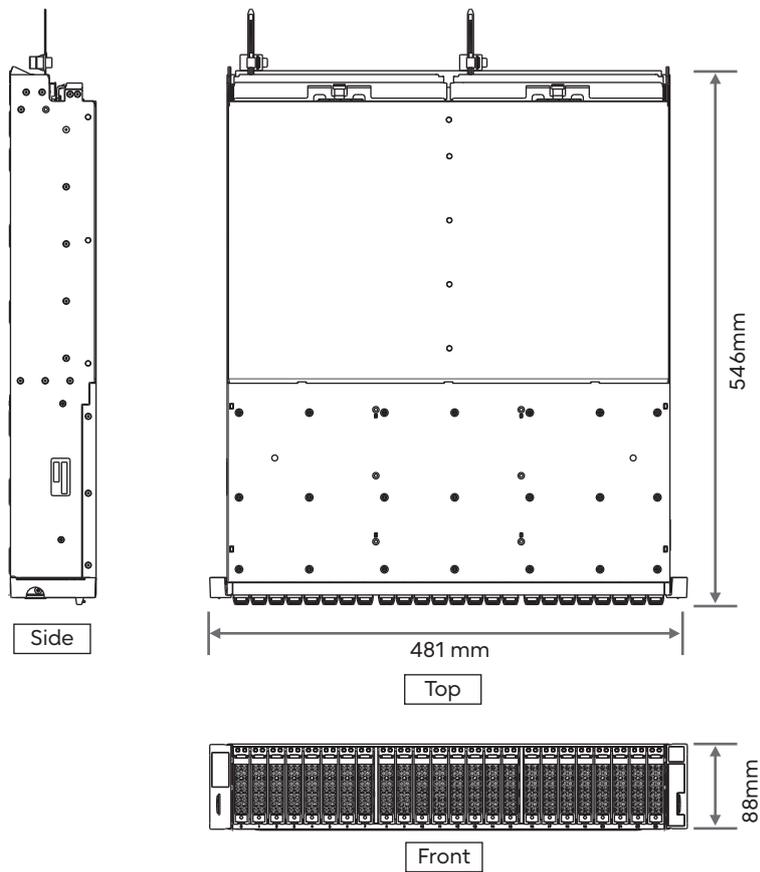
● 2.5" SAS Type Drive Enclosure

Figure 4   2.5" SAS Type Drive Enclosure Dimensions
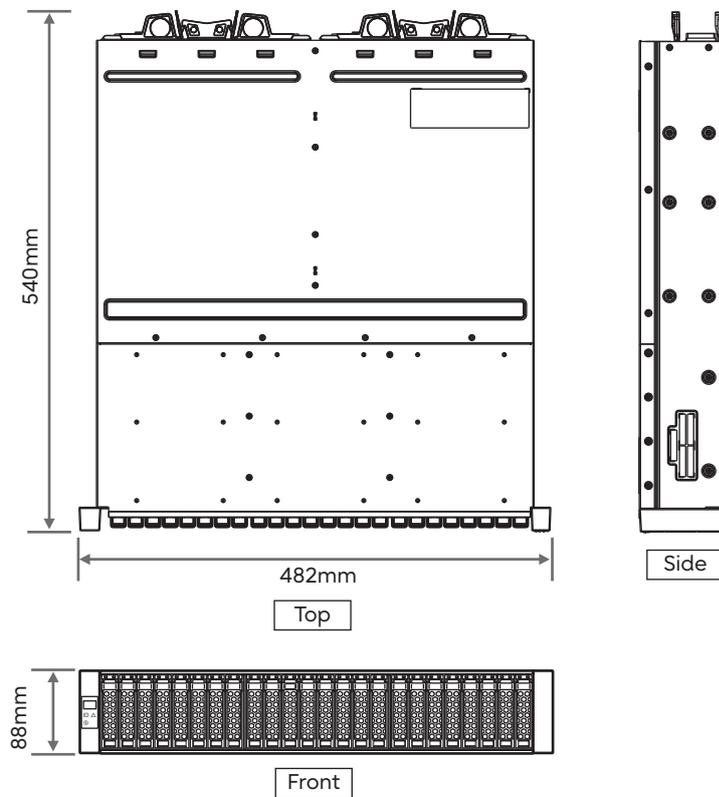
● 3.5" SAS Type Drive Enclosure

Figure 5   3.5" SAS Type Drive Enclosure Dimensions
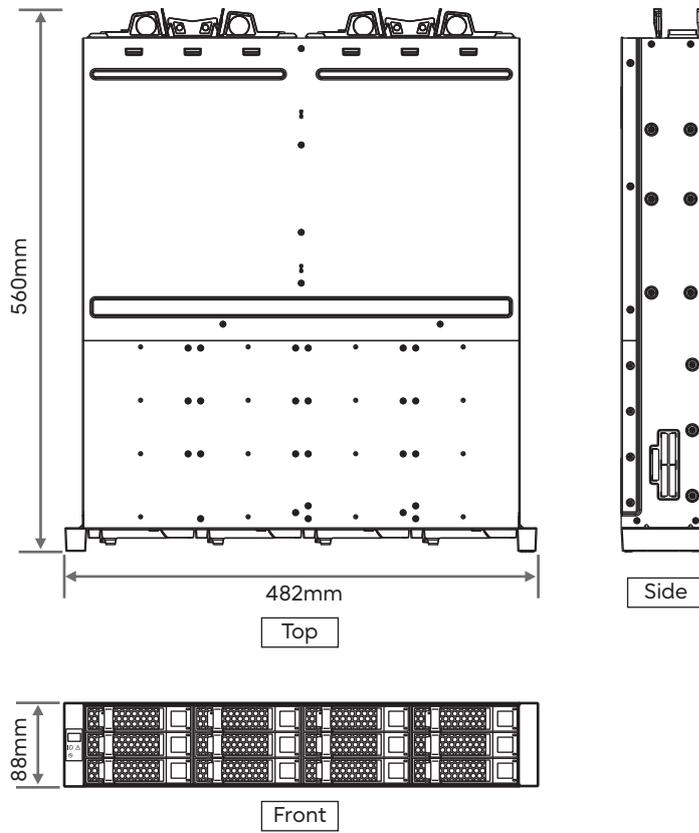
Rack Dimensions

The following diagrams show the dimensions of a 19-inch rack. The dimensions are approximations and do not include protruding parts.

For details on the specification information that is required for securing a rack, refer to Figure 8.

Figure 6   19-inch Rack (2000mm) Dimensions
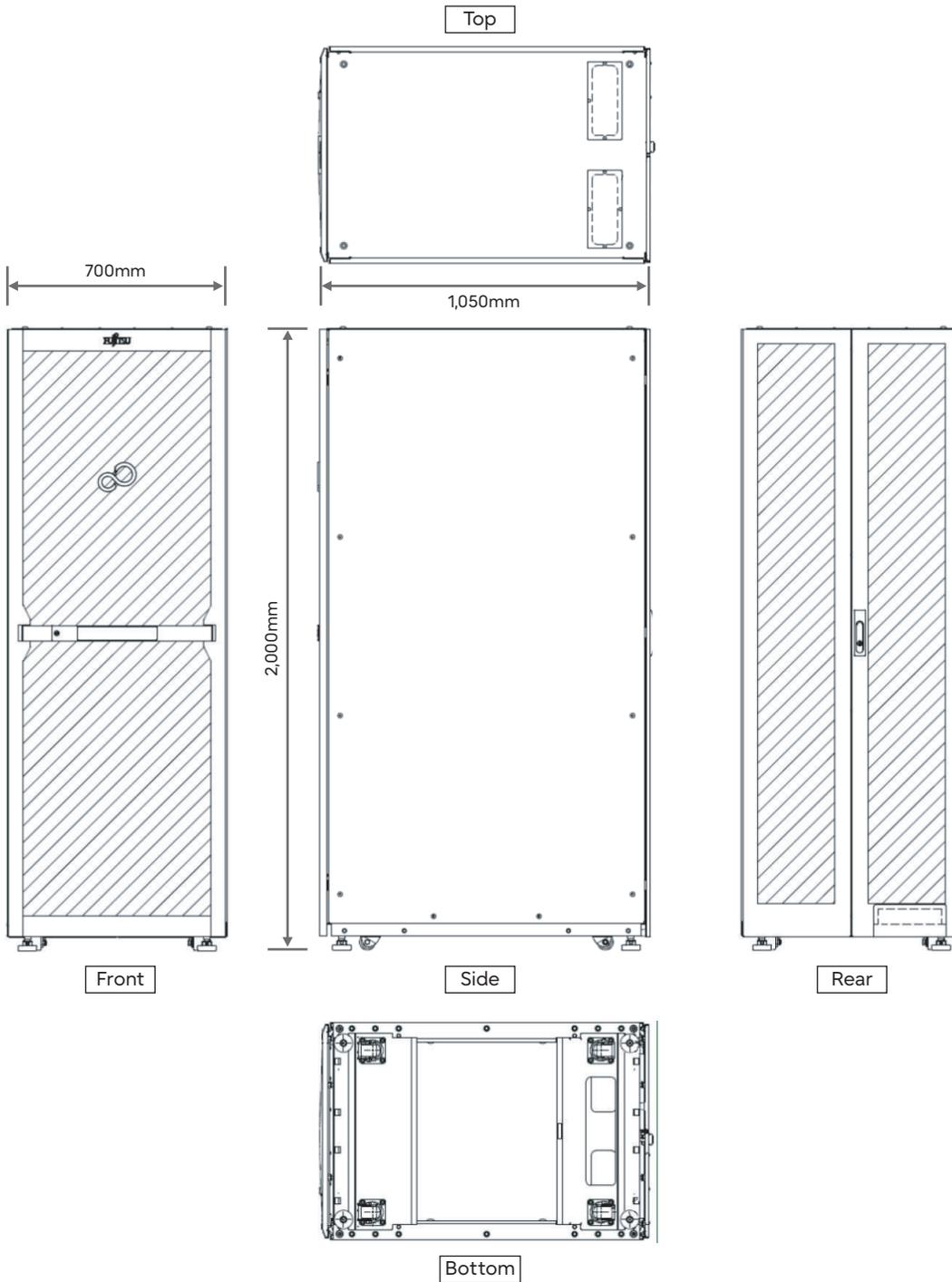
Compliance Standards

■ About Compliance Standards

- Product safety
  EN 62368-1:2014 + A11:2017
  IEC 62368-1:2014
  IEC 62368-1:2018
  ANSI/UL 62368-1, 3rd Edition
  CAN/CSA C22.2 No. 62368-1-19
  CNS 15598-1 (*1)

- CE marking
  2014/35/EU, Low Voltage Directive
  2014/30/EU, Electromagnetic Compatibility Directive
  2011/65/EU,(EU)2015/863 as amended, Restriction of Hazardous Substances (RoHS) Directive
  Regulation (EU) 2023/1542

- Electromagnetic Compatibility (EMC)
  EN 55032 Class A
  EN 55035
  EN 61000-3-2
  EN 61000-3-3
  FCC Part-15 Subpart B Class A
  ICES-003 Class A
  VCCI Class A
  JIS C 61000-3-2
  CNS 15936 (*1)
  AS/NZS CISPR 32 Class A
  KN32 Class A
  KN35

- Environmental compliance
  2011/65/EU,(EU)2015/863 as amended, Restriction of Hazardous Substances (RoHS) Directive
  WEEE-compliant (waste electrical and electronic equipment)

- Power conversion efficiency
  80PLUS® PLATINUM or TITANIUM (*2)

*1: The target ETERNUS DX is the ETERNUS DX8900 S6.

*2: The following products are the target.

  - PSUs for 2.5" NVMe type drive enclosures, 2.5" SAS type drive enclosures, and 3.5" SAS type drive enclosures are 80PLUS® PLATINUM.

  - PSUs for frontend enclosures and controller enclosures are 80PLUS® TITANIUM.

Package Size

The ETERNUS DX is shipped in cardboard boxes or in a rack. These boxes may not fit through some doorways or elevators. To make sure that the ETERNUS DX can be moved to the installation site, carefully check the transport route information.

The following table shows the package size and the maximum package weight of each component for regions other than the EMEIA, Central American, and Caribbean regions.

Table 5   Package Size (for Regions other than the EMEIA, Central American, and Caribbean Regions)

Component		Package size (W × D × H)	Maximum weight
19-inch rack (base/expansion rack)		780 × 1,130 × 2,000mm	Approximately 760kg (*1)
Frontend enclosure (ETERNUS DX900 S6 and ETERNUS DX8900 S6)		940 × 640 × 500mm	Approximately 75kg
Controller enclosure		1,000 × 620 × 470mm	Approximately 70kg
Drive enclosure	2.5" NVMe type	620 × 810 × 310mm	Approximately 40kg
	2.5" SAS type	600 × 660 × 240mm	Approximately 40kg
	3.5" SAS type	600 × 660 × 240mm	Approximately 40kg
Drive (*2)	2.5" NVMe type	160 × 278 × 106mm	Approximately 0.5kg
	2.5" SAS type		
	3.5" SAS type	189 × 300 × 116mm	Approximately 1.2kg
Power distribution unit	1U	540 × 380 × 310mm	Approximately 5kg
	2U	(540 × 380 × 310mm) × 2	(Approximately 10kg) × 2

***1:** This value is for when the maximum number of enclosures are installed in the rack.

***2:** 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.

Installation Area

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

Secure service areas in the front and rear of the ETERNUS DX.

Figure 7   Installation Area and Service Area
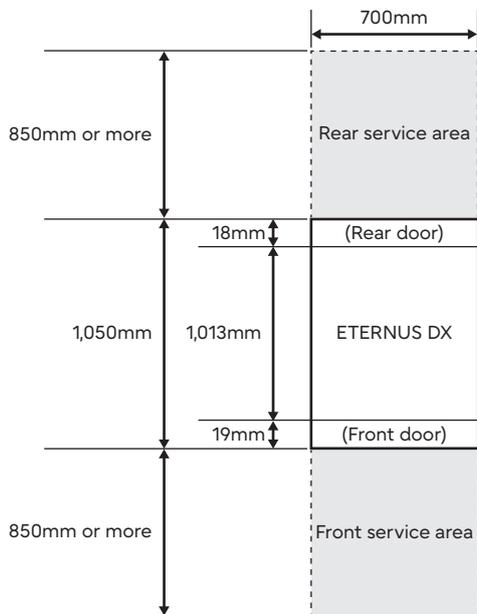
Installation Environment

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

Installation of the ETERNUS DX in High Altitude Locations

To install the ETERNUS DX in a high altitude location more than 900m above sea level, one of the following actions is required.

- Reduce the maximum ambient temperature (during operations) defined in the environmental conditions by 1°C per 300m (refer to "Installation Specifications" (page 10) for the maximum ambient temperature)
- Enable "Highland Mode" (the default value is "Disable")

> **Caution**
>
> - To set "Highland Mode", perform the subsystem parameter settings for each ETERNUS DX. The Maintenance Operation policy is required to perform this setting.
> - The "Highland Mode" setting cannot be changed during a host access.
> - After the setting is changed, the ETERNUS DX needs to be turned off and on again.

Air Conditioning

It is important to consider the flows of cooling air (intake air and exhaust air) for the installation location of the ETERNUS DX. The temperature in some ETERNUS DX storage systems may rise by taking in air exhausted from other storage systems depending on how they are installed near each other. In addition, check if the ambient temperature in the installation location always satisfies the usage environment temperature by taking into consideration the room size, whether other storage systems are installed, and how many people are present in the room.

Take the following points into consideration when installing the air-conditioning system:

■ Ambient Temperature

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

- Front intake air temperature

  Make sure that the front intake air temperature is between 10 and 35°C (or between 10 and 40°C for the ETERNUS DX600 S6).

- Rear exhaust air temperature

  For example, when the intake air temperature is 35°C (or 40°C for the ETERNUS DX600 S6), the exhaust air temperature is 45°C or higher (or 50°C or higher for the ETERNUS DX600 S6).

  The necessary cooling capacity of air conditioning must be determined by taking the exhaust air cooling into consideration.

  Estimate the amount of heat in the exhaust air from the ETERNUS DX by using the heat generation amount and exhaust air amount that are listed in "Installation Specifications" (page 10).

Installation Methods

- Perform one of the following rack installation methods to ensure the safe use of an ETERNUS DX that is installed in a rack:
    - To secure a rack, use a rack without stabilizers and secure it to the building with the leveling feet.
    - If a rack is not to be secured, make sure to use a rack with stabilizers and use these stabilizers to prevent the rack from toppling over.
- Which installation method should be used depends on the installation location, the floor conditions, and the type of racks that are to be used. Contact your installation contractor for more details regarding installation and how the installation should actually be performed.

An installation diagram when installing a rack (or the floor dimensions of the rack) is shown below.

Figure 8   Floor Dimensions of the Rack
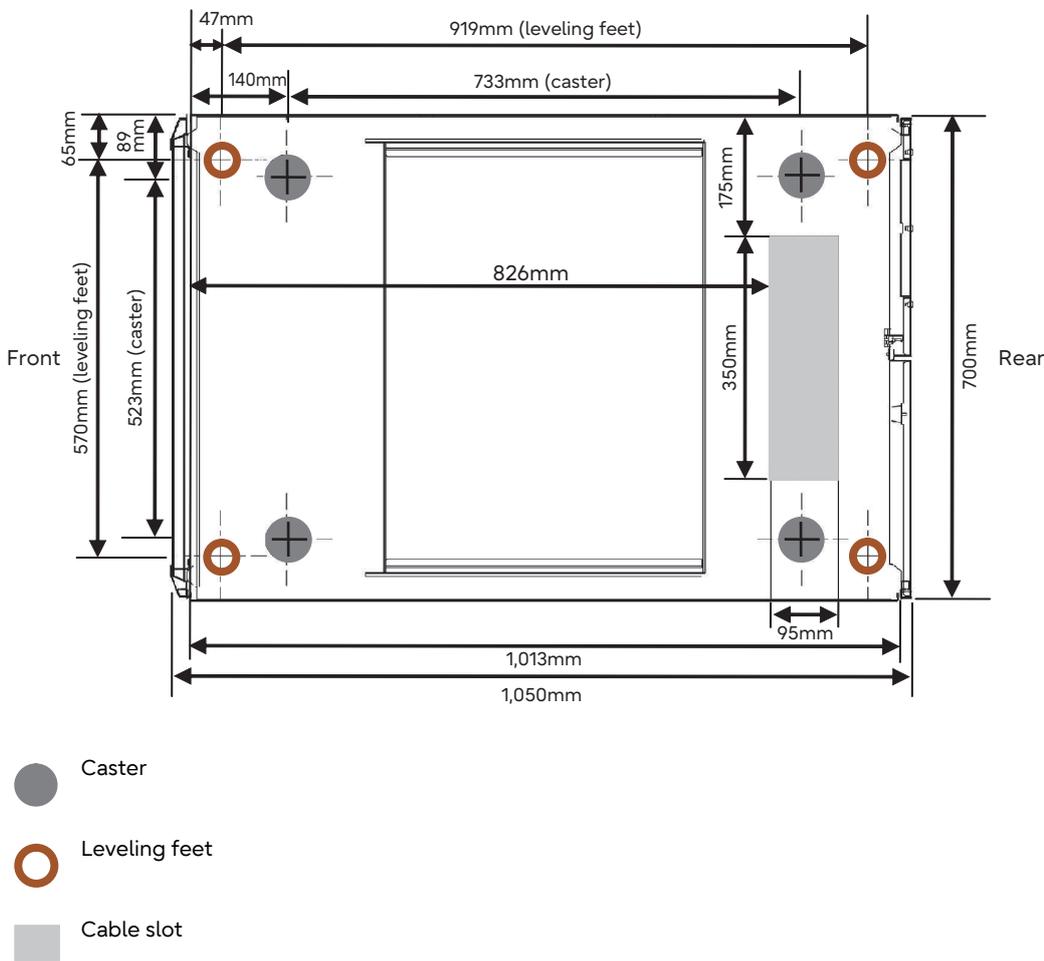
Load Bearing Capacity for Floors

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

(Load bearing capacity of the floor) > (ETERNUS DX weight ÷ 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.

Conditions for Using Mobile Phones

Stay at least 1.0m away from the storage system (*1) when using a mobile phone.

Fujitsu recommends keeping mobile phones switched off near the storage system.

***1:** Keep the storage system covers and rack doors closed.

Outlet/Socket Specifications (AC Power Type)

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

■ Power Supply Units

The ETERNUS DX has multiple power supply units in each of its enclosure.

Using the same power requirements for all the power supply units is recommended so that the power requirements (use of power distribution units and input voltage) do not vary in the ETERNUS DX.

● Frontend Enclosures

Power can be supplied from four power sources because each enclosure has four power supply units.

During normal operation, each power source supplies a quarter of the necessary power.

If any of the power supply lines fails, all of the necessary power is supplied from the other power sources. Power is supplied from two of the four power sources for each frontend enclosure: FPSU#0 and FPSU#1 for FE#0, FPSU#2 and FPSU#3 for FE#1. The necessary power can be supplied even if one of the paired power supply units fails.

● Controller Enclosures, 2.5" NVMe Type Drive Enclosures, 2.5" SAS Type Drive Enclosures, and 3.5" SAS Type Drive Enclosures

Power can be supplied 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.

If either of the power supply lines fails, all of the necessary power is supplied from the other power source.

■ Current Consumption

The following table shows the current consumption (guideline) of each power cord that is used for ETERNUS DX connections.

Table 6   Current Consumption of Each Power Cord

Component name		Voltage
		AC200V
Frontend enclosure	ETERNUS DX900 S6	1.6A
	ETERNUS DX8900 S6	2.0A
Controller enclosure	ETERNUS DX600 S6	7.5A
	ETERNUS DX900 S6	8.8A
	ETERNUS DX8900 S6	
Drive enclosure	2.5" NVMe type	2.9A
	2.5" SAS type	2.2A
	3.5" SAS type	1.8A

When power distribution units are used, make sure that the current capacity totaling the current consumption value of power cords that connect to the enclosures does not exceed the actual usage rating of the power distribution unit.

For details, refer to "Power Cord Connection" (page 42).

Specifications for Optional Power Supply Products

This section explains the specifications of optional power cords and power related optional products. For the supported power cord options of each model, refer to "Product List".

When using power distribution units, take the number of outlets required to connect each enclosure into consideration to select the most appropriate power distribution units.

When an existing power socket is used, make sure that the plug type of the power distribution unit fits the existing power socket and that the power supply facility is able to provide sufficient power to the system. If the plug type does not fit the power socket, electrical work to change the power socket is required. This electrical work must be performed in compliance with the electrical codes of the nation, the municipality, or the region.

■ AC200V Power Cords

AC200V power cords are used to connect devices to the NEMA L6-15R power socket type. These power cords can be used if the specifications of the connection device allow AC200V.

Table 7   Specifications for AC200V Power Cords

Usage	Plug type	Socket type (Socket)	Power cord length	Voltage rating/current rating
Used for connection between the ETERNUS DX and the socket (IEC60320 C13 ↔ NEMA L6-15P)	NEMA L6-15P	NEMA L6-15R	4.0m	Rating: 250V 10A (Normal usage rating: 8A)

■ AC100V Power Cords

AC100V power cords are used to connect devices to the NEMA 5-15R power socket type. These power cords can be used if the specifications of the connection device allow AC100V.

Table 8   Specifications for AC100V Power Cords

Usage	Plug type	Socket type (Socket)	Power cord length	Voltage rating/current rating
Used for connection between the ETERNUS DX and the socket (IEC60320 C13 ↔ NEMA 5-15P)	NEMA 5-15P	NEMA 5-15R	3.0m	Rating: 125V 13A (Normal usage rating: 10A)
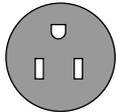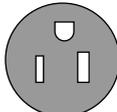
■ AC100V/200V Power Cords

AC100V/200V power cords are used to connect devices to the IEC60320 C13 power socket type. Note that the ETERNUS DX supports AC200V power supplies only.

Table 9   Specifications for AC100V/200V Power Cords

Usage	Plug type	Socket type (Socket)	Power cord length	Voltage rating/current rating
Used for connection between the ETERNUS DX and the socket (IEC60320 C13 ↔ IEC60320 C14)	IEC60320 C14	IEC60320 C13	3.0m	Rating: 250V 10A (Normal usage rating: 8A)
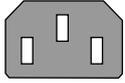
■ Power Distribution Units (1U)

• Power distribution unit (AC8A/200-240V, 1U, 4 Outlets, 2 Inlets)
There are four outlets and two inlets.

Figure 9   Power Distribution Units (AC8A/200-240V, 1U, 4 Outlets, 2 Inlets)
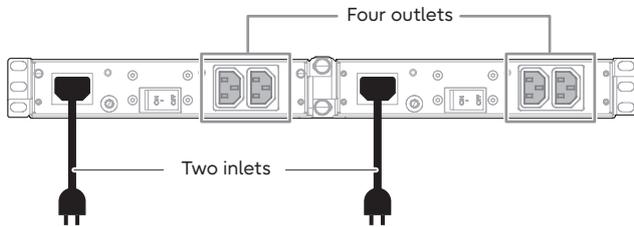
Table 10   Specifications for Power Distribution Units (AC8A/200-240V, 1U, 4 Outlets, 2 Inlets)

| Outlet | Inlet | | | Voltage rating/current rating |
Socket type (Socket)	Plug type	Socket type (Socket)	Power cord length	
IEC60320 C13	NEMA L6-15P	NEMA L6-15R	4.0m	Rating: 250V 10A (Normal usage rating: 8A)

■ Power Distribution Units (2U)

Figure 10   Power Distribution Units (2U)

Two inlets

Sixteen outlets
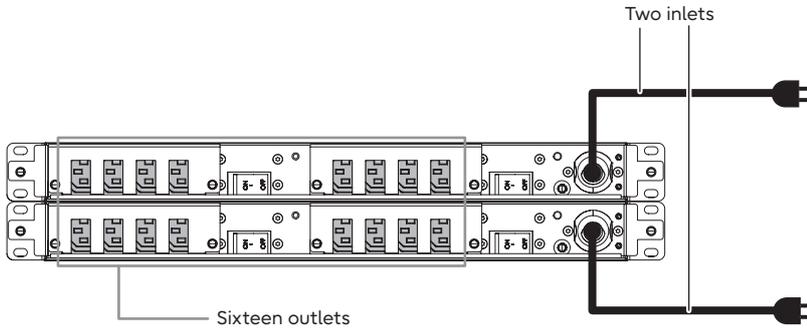
- Power distribution unit (AC16A/200-240V, 2U, 16 Outlets)
  There are 16 outlets and two inlets.

Table 11   Specifications for Power Distribution Units (AC16A/200-240V, 2U, 16 Outlets)

Outlet	Inlet			Voltage rating/current rating
Socket type (Socket)	Plug type	Socket type (Socket)	Power cord length	
IEC60320 C13	NEMA L6-20P	NEMA L6-20R	4.0m	Rating: 250V 20A (Normal usage rating: 16A)

- Specification for Power distribution unit (AC24A/200-240V, 2U, 16 outlets)
  There are 16 outlets and two inlets.

Table 12   Specifications for Power Distribution Units (AC24A/200-240V, 2U, 16 Outlets)

Outlet	Inlet			Voltage rating/current rating
Socket type (Socket)	Plug type	Socket type (Socket)	Power cord length	
IEC60320 C13	NEMA L6-30P	NEMA L6-30R	4.0m	Rating: 250V 30A (Normal usage rating: 24A)

Required Number of Outlets/Sockets

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

It is recommended that the power cords 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.

■ Without Power Distribution Units

Four power sockets are required for each frontend enclosure.

Two power sockets are required for each controller enclosure, 2.5" NVMe type drive enclosure, 2.5" SAS type drive enclosure, and 3.5" SAS type drive enclosure.

■ With Power Distribution Units

Two power sockets are required for each power distribution unit.

Circuit Protectors

Protection coordination must be secured between the distribution board circuit protectors and the ETERNUS DX or power distribution units to protect the ETERNUS DX 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 below.

Table 13   Required Conditions for Distribution Board Circuit Protectors

Connected device	Power supply voltage	Current capacity	
		Regions other than the EMEIA, Central American, and Caribbean regions	The EMEIA, Central American, and Caribbean regions
Power distribution unit for DX600/DX900 S6 (AC8A/ 200-240V, 1U, 4 Outlets)	AC 200 – 240V	15A	—
Power distribution unit for the DX600/DX900 S6 (AC16A/ 200-240V, 2U, 16 Outlets)	AC 200 – 240V	20A	—
Power distribution unit for DX600/DX900 S6 (AC24A/ 200-240V, 2U, 16 Outlets)	AC 200 – 240V	30A	—
Power distribution unit for DX8900 S6 (AC24A/200-240V, 2U, horizontal type, 16 outlets)	AC 200 – 240V	30A	—
ETERNUS DX (without power distribution units)	AC 200 – 240V	15A	16A

■ Breaking Characteristics

> **Caution**
>
> The breaking characteristics (*1) of the distribution board circuit protectors must be the long-time delay type and must be equivalent to or slower than the D (IEC/EN60898-1) shown in Figure 11.
>
> If the distribution board's circuit protectors have a breaking characteristic that is faster than D, the breaker may trip when a power supply unit in the storage system fails. When the breaker trips, a shutoff occurs on multiple power supply units connected to the same connection line as the failed power supply unit.
>
> ***1:** Relationship between the size of excess current and operation time
>
> Figure 11   Breaking Characteristics of Distribution Board Circuit Protectors
>
>
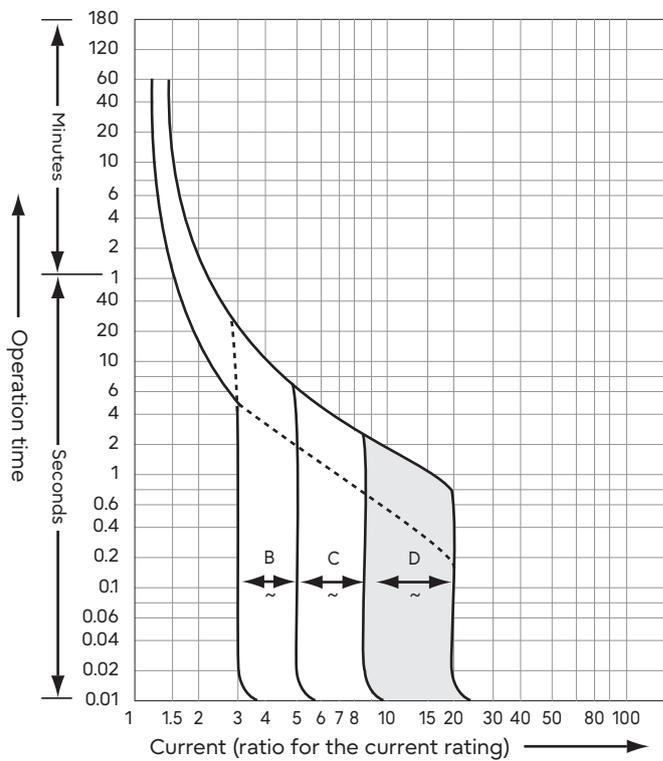
■ Connection Diagrams

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

> **Caution**
>
> Do not connect just one power distribution unit to multiple ETERNUS storage systems.

- **For Power Distribution Unit (1U) Connections**

  The following diagram shows an example of a power supply connection when a power distribution unit (1U) is used.

  Figure 12   Example of a Power Supply Connection When a Power Distribution Unit (1U) Is Used
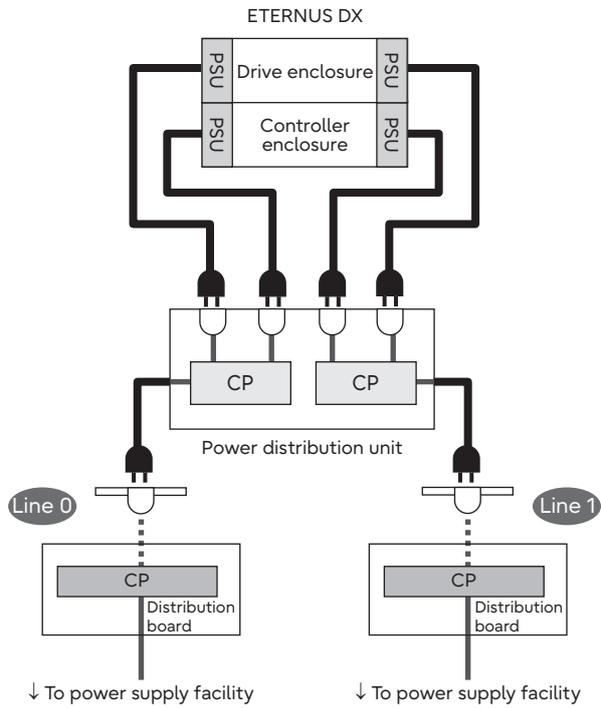
PSU: Power Supply Unit

CP: Circuit Protector

● For Power Distribution Unit (2U) Connections

The following diagram shows an example of a power supply connection when a power distribution unit (2U) is used.

Figure 13　Example of a Power Supply Connection When a Power Distribution Unit (2U) Is Used
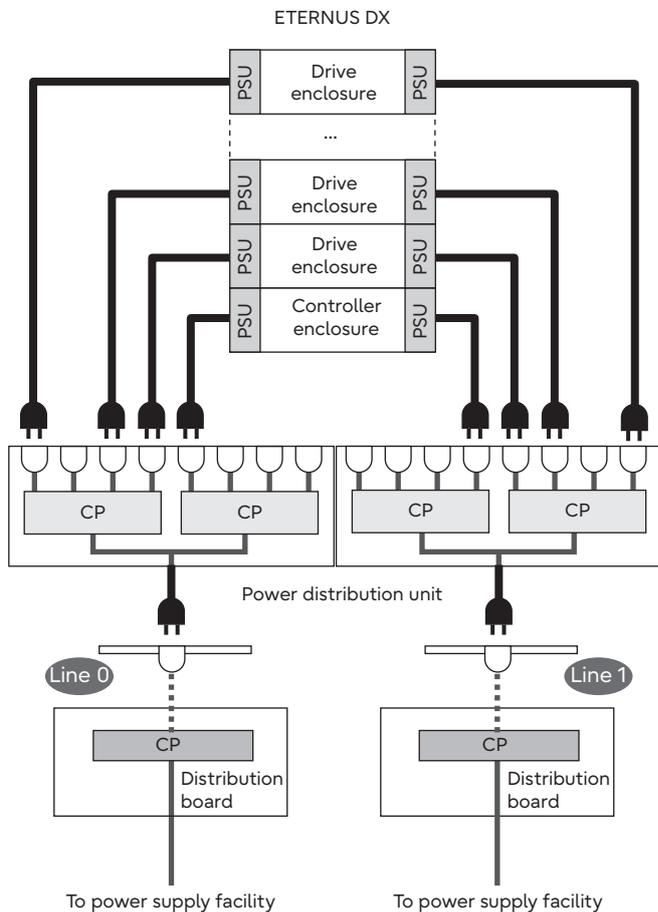
PSU:　　　　Power Supply Unit

CP:　　　　Circuit Protector

Note

When power cords are connected to a single power supply line, the connections are more secure if each power cord is connected to a different circuit breaker.
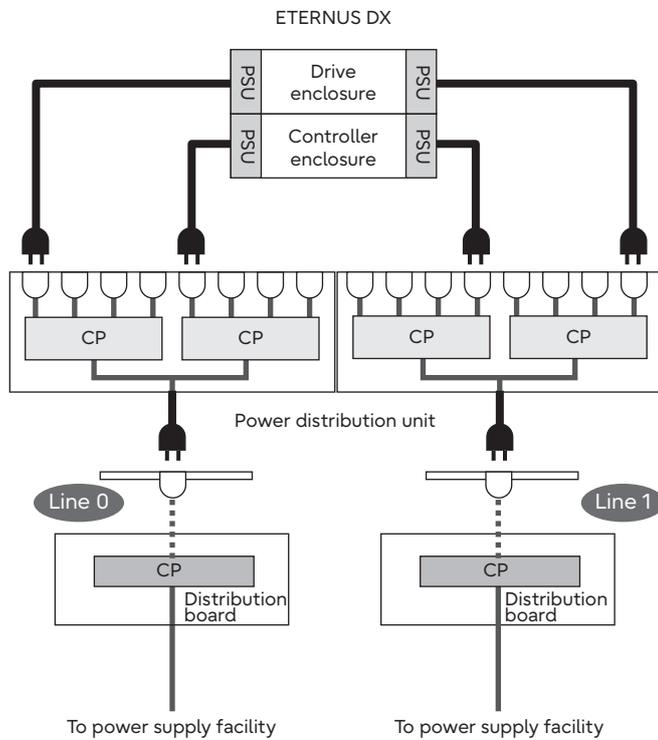
ETERNUS DX

The following diagram shows an example of a power supply connection when a power distribution unit (2U) is used in the ETERNUS DX900 S6 or the ETERNUS DX8900 S6.

Figure 14   Example of a Power Supply Connection When a Power Distribution Unit (2U) Is Used in the ETERNUS DX900 S6 or the ETERNUS DX8900 S6

PSU: Power Supply Unit

CP: Circuit Protector

Note

When power cords are connected to a single power supply line, the connections are more secure if each power cord is connected to a different circuit breaker.

ETERNUS DX

PSU	Drive enclosure	PSU
PSU	Controller enclosure	PSU
PSU	Frontend enclosure	PSU
PSU		PSU

| CP | CP | CP | CP | CP | CP | CP | CP |

Power distribution unit

Power distribution unit

Line 0

Line 1

| CP | | CP |
| Distribution board | | Distribution board |

To power supply facility

To power supply facility
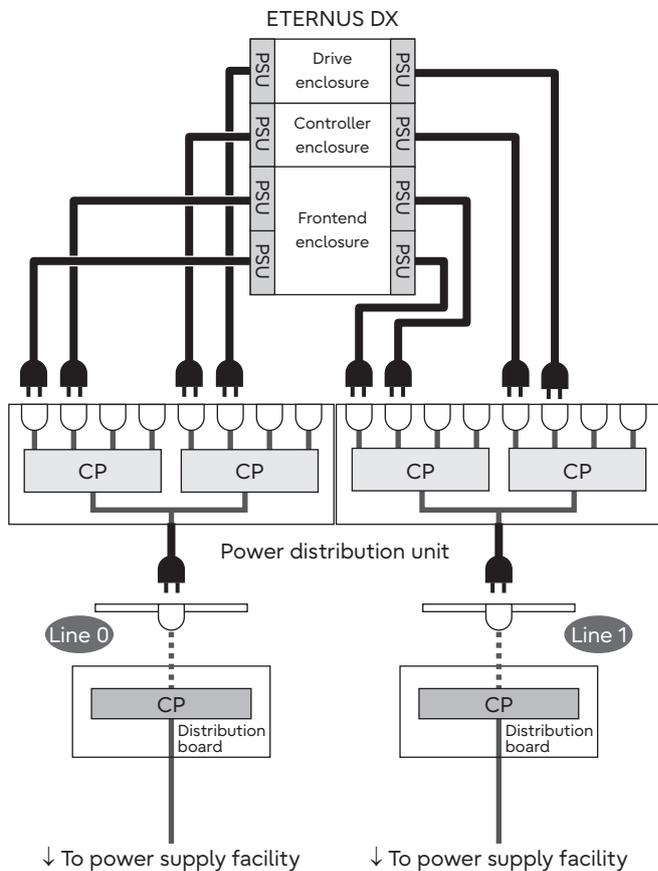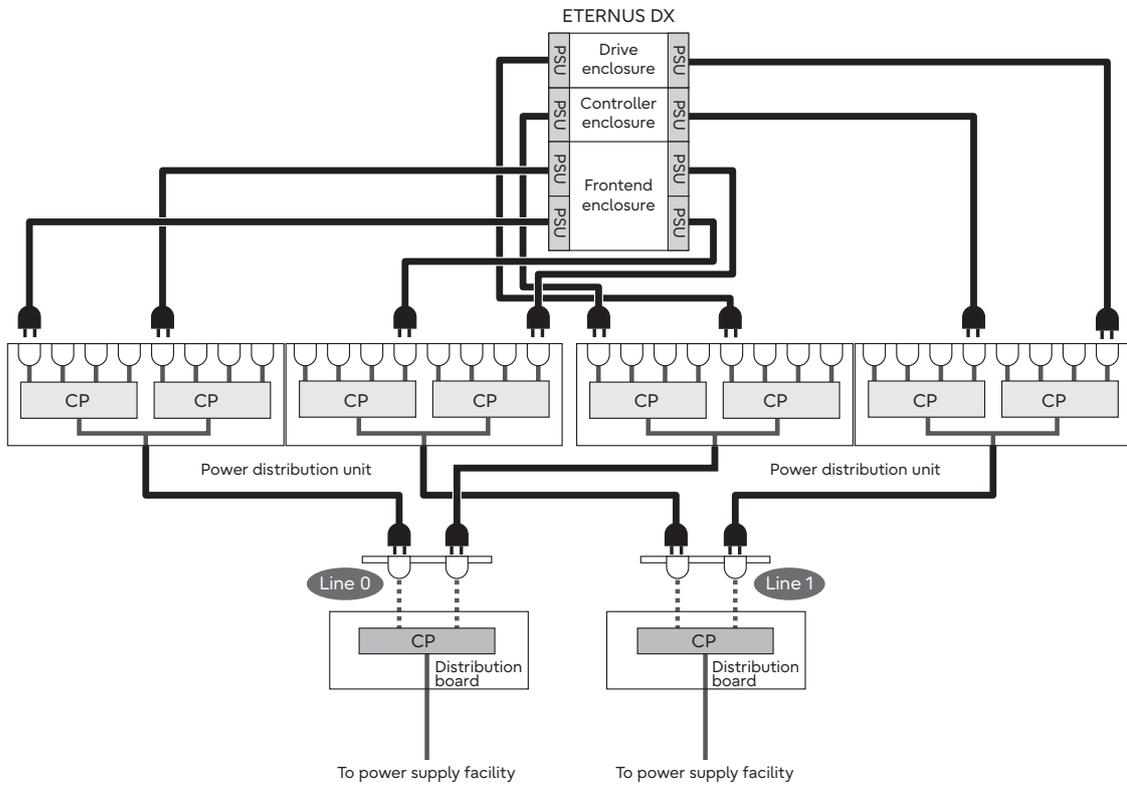
● For Direct (No Power Distribution Unit) Connections

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

Figure 15   Example of a Power Supply Connection When a Power Distribution Unit Is Not Used

PSU: Power Supply Unit

CP: Circuit Protector

⚠ CAUTION
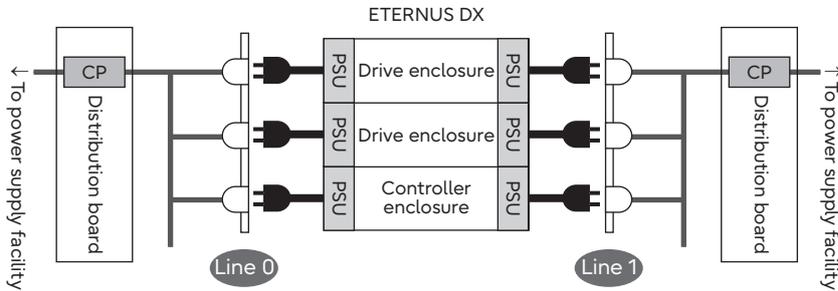
• Only connect the ETERNUS DX to circuit protectors.

Input Power Supply Lines

Use multiple power supply facilities in the building or multiple UPS units for power supply redundancy, and divide the AC input system for the ETERNUS DX into a dual system (line 0 and line 1).

Because the power supply of the ETERNUS DX is configured redundantly, business can continue even if one of the power supply lines fails.

However, a single power supply facility configuration is also allowed for the entire system optimization (including the server). When selecting a single configuration, take into consideration the availability of the system.

Figure 16   Dual-Line Power Supply (When Connecting to Power Sockets)
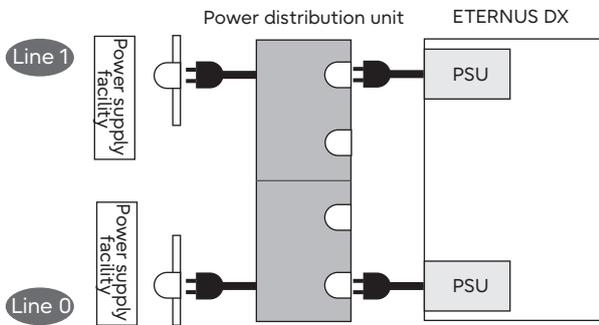
Figure 17   Dual-Line Power Supply (When Connecting to a UPS Unit)
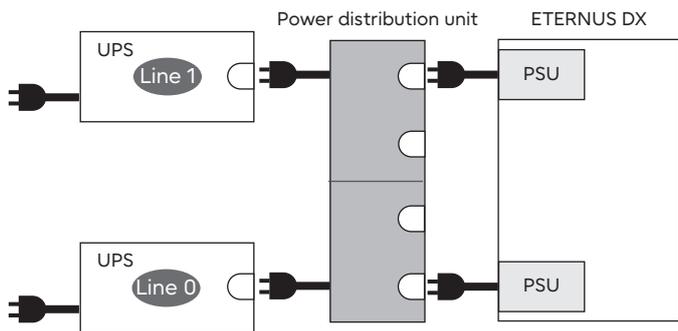
Figure 18   Single-Line Power Supply (When Connecting to Power Sockets)
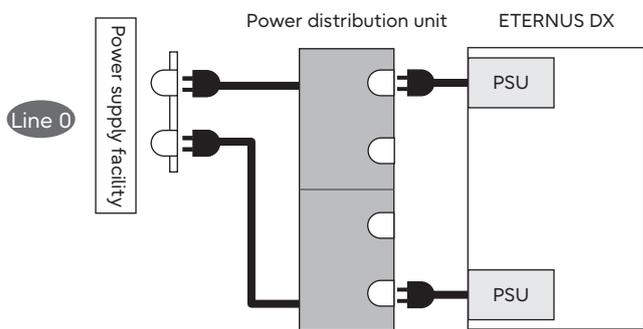
Figure 19   Single-Line Power Supply (When Connecting to a UPS Unit)
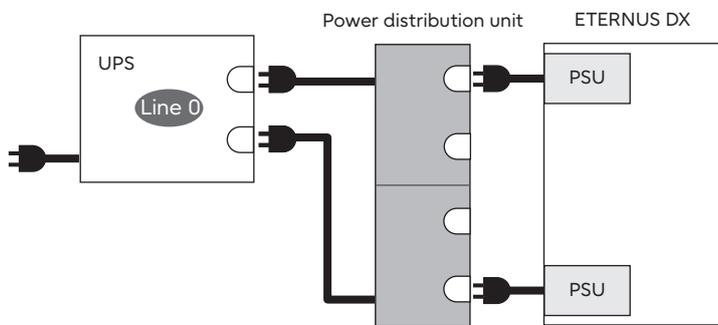
Figure 20   Single-Line Power Supply (When Connecting to a Power Socket and a UPS Unit)
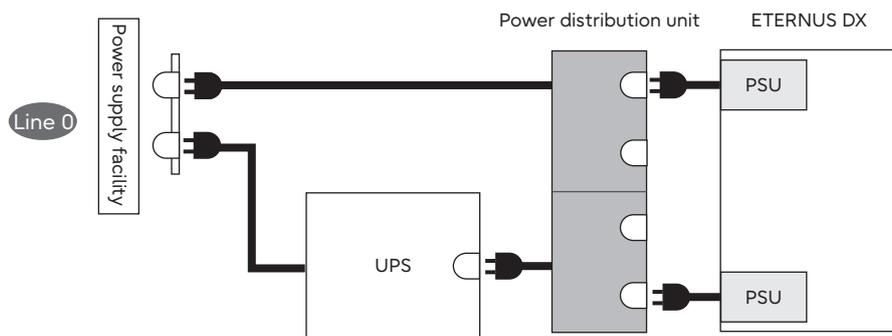
> **Note**
>
> When the power distribution units are separately connected to line 0 (PSU#0) and line 1 (PSU#1), the availability of the power supply facilities is improved.
>
>
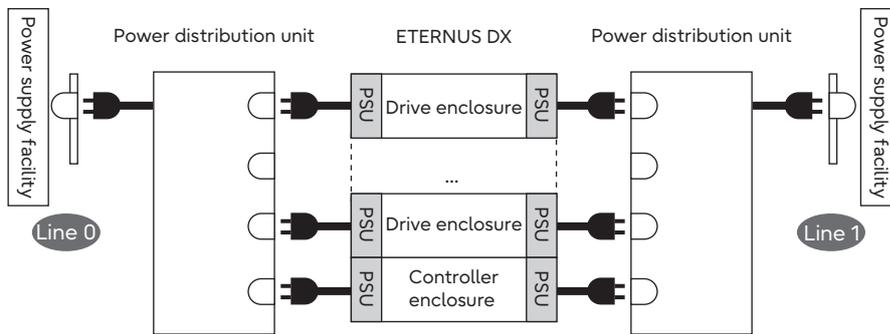
2. Rack Installation Specifications

This chapter provides the rack installation specification of the ETERNUS DX.

Rack Installation Requirements

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

Placement in the Rack

Note the following when installing the ETERNUS DX 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 14   Enclosure Installation Order

Installation order	Enclosure	Size (height)
5-3	3.5" SAS type drive enclosure	2U
5-2	2.5" SAS type drive enclosure	2U
5-1	2.5" NVMe type drive enclosure	2U
3	Controller enclosure	3U
3	Frontend enclosure (ETERNUS DX900 S6 and ETERNUS DX8900 S6)	5U
2	Power distribution unit	1U × 2
1	UPS (*1)	—

***1:** This is an Uninterruptible Power Supply.

> **Note**
>
> - When determining the rack-mounting layout of each enclosure and power distribution unit, consider the length of each cord. For example, if the ETERNUS DX is installed at the top of a 2000mm rack and a 4m power cord is used, the surplus length of the power cord at the bottom of a rack should be about 2m.
>
> - If the ETERNUS DX is installed at the bottom of a rack, a space for the surplus of cables may not be available in some racks, preventing the ETERNUS DX from being pulled out when maintenance work is required.
>   Secure a space of 1U or more at the bottom when installing an ETERNUS DX.
>
> - Install each enclosure starting from 8U.
>
> - 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.
>
> - For 19-inch racks, install the power distribution unit (AC200V) in the lower part of the rack.
>
> - For the ETERNUS DX8900 S6, install the power distribution unit in the front of the rack in 2U to 3U, and install the second and subsequent units in the back of the rack in 2U to 7U.

■ Installation Example (ETERNUS DX8900 S6)

The ETERNUS DX8900 S6 can be connected with multiple controller enclosures and multiple drive enclosures. A single controller enclosure and the drive enclosures that are connected directly are handled as one group, and this group is called a node.

When following the standard installation rules, install the frontend enclosure at the lowest position of the enclosures to be installed in the base rack. Then install an enclosure for each node above the frontend enclosure in order from the controller enclosure, and then the drive enclosures starting from the bottom up. The following examples show an installation to a 19-inch rack.

- A single frontend enclosure is installed in a base rack.

- Controller enclosures and drive enclosures are installed in the order of each node.

Figure 21   Example of an Installation in 19-inch Racks (with Standard Door, 2000mm) (When One Drive Enclosure Is Installed for Each Node)

Figure 22   Example of an Installation in 19-inch Racks (with Standard Door, 2000mm) (When 15 Drive Enclosures Are Installed for Each Node)
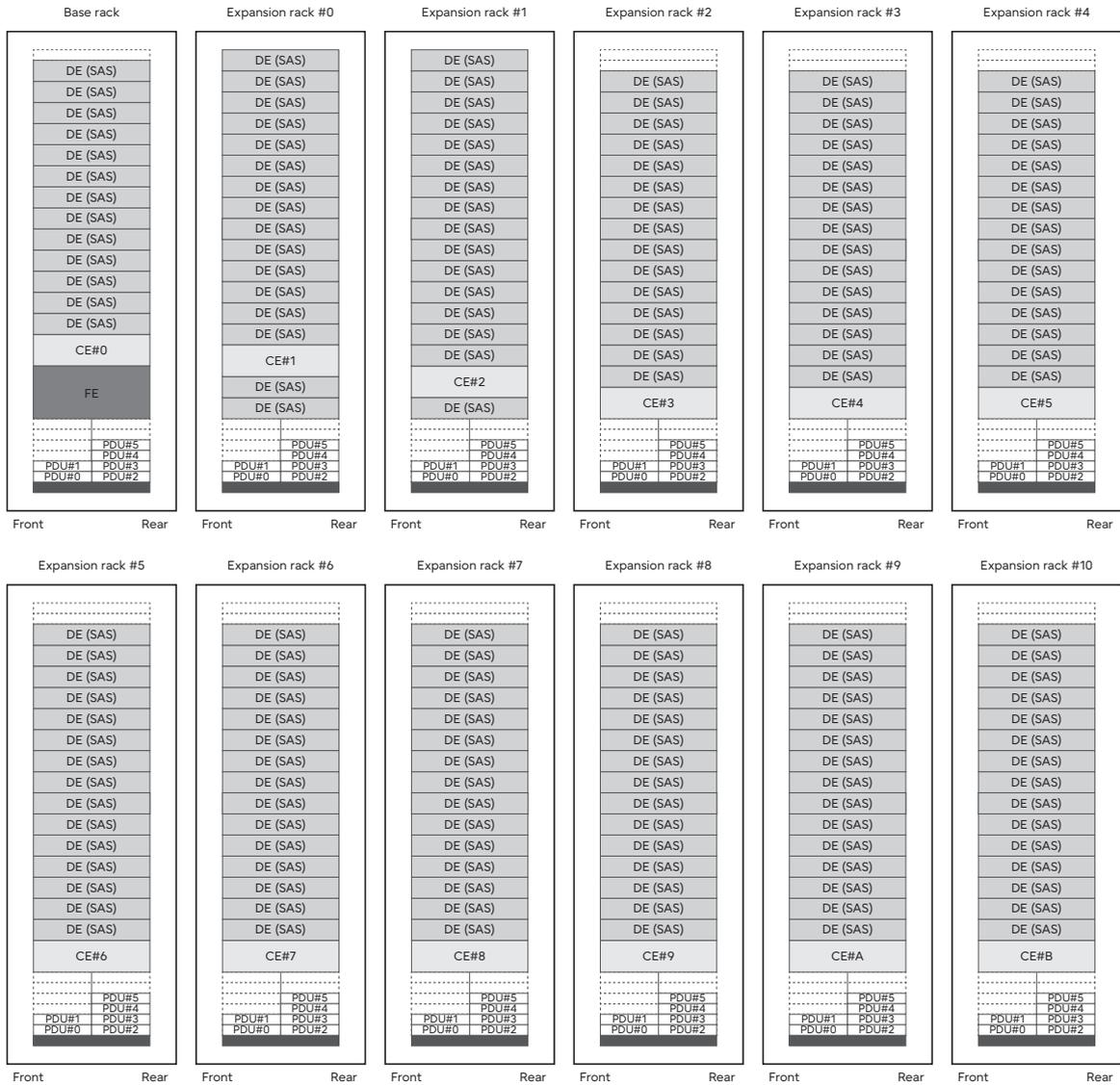
Power Cord Connection

This section describes the power cord connection with the ETERNUS DX.

■ Connection Method When Multiple Racks Are Installed

When connecting the power cords of the enclosures to the power distribution units, be sure to secure the necessary number of power outlets within the same rack. Avoid exceeding the power cord length and connecting power cords to different racks.

Figure 23   Power Cord Connection (For the ETERNUS DX600 S6)
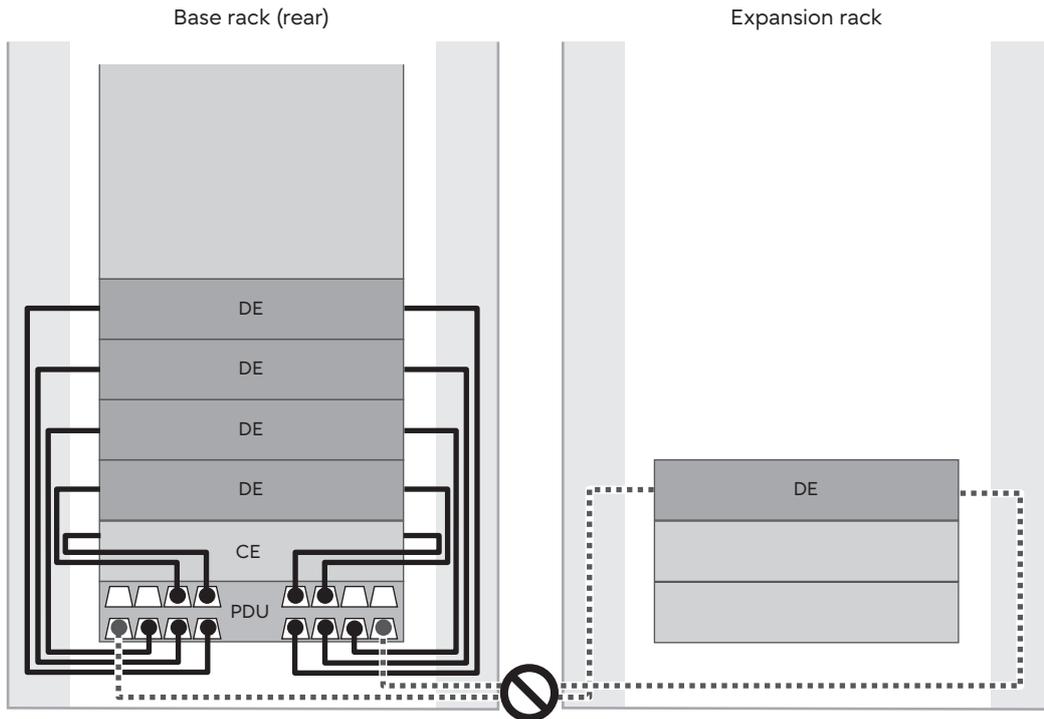
Figure 24   Power Cord Connection (For the ETERNUS DX900 S6 and the ETERNUS DX8900 S6)
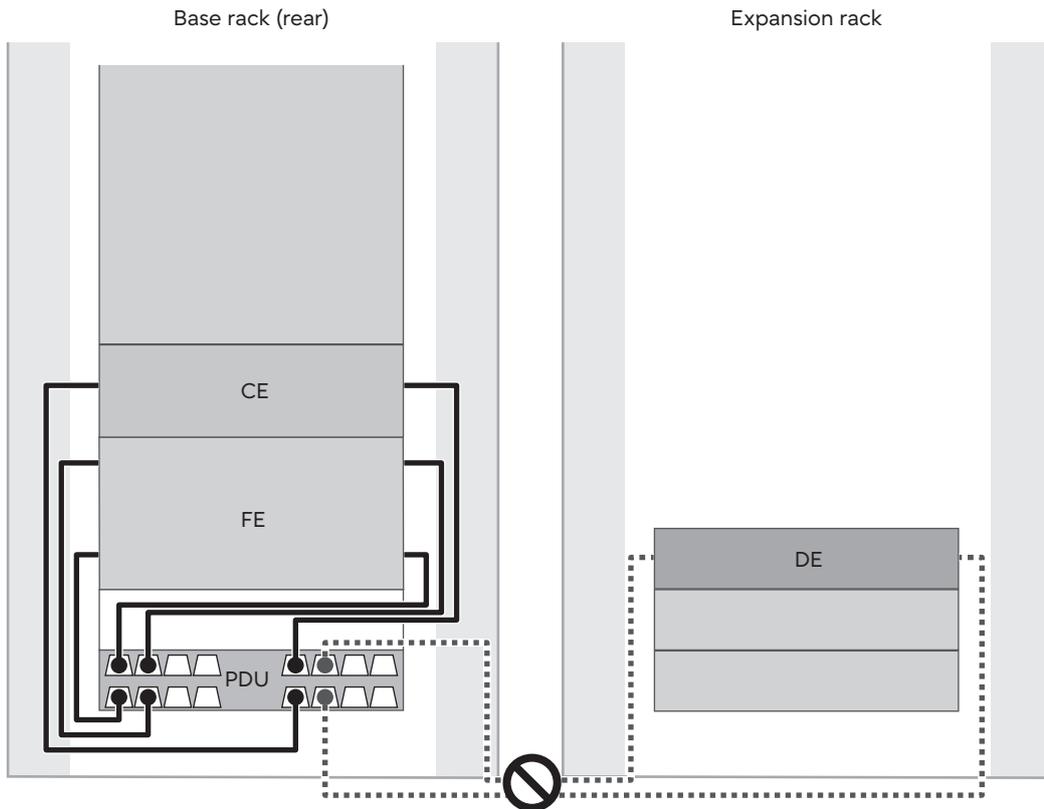
●━━ :	Power cord
FE:	Frontend enclosure
CE:	Controller enclosure
DE:	Drive enclosure
PDU:	Power distribution unit

This section explains the requirements for connecting a power distribution unit with the ETERNUS DX.

■ Power Distribution Units (2U, 16 Outlets, 24A)

- For each power distribution unit, the total current capacity of the current consumption value of the power cords that connect from outlets OUT1 to OUT4 and total current capacity of the current consumption value of the power cords that connect from outlets OUT5 to OUT8 must be 12A or less.

- Connect to the outlets using the connection order to the power distribution units which is the same as the installation order in the rack.

- Connect a new enclosure to OUT5 if the total current capacity of the current consumption value of the power cords that connect from outlets OUT1 to OUT4 exceeds 12A.

  Connect a new enclosure to the next power distribution unit if the total current capacity of the current consumption value of the power cords that connect from outlets OUT5 to OUT8 exceeds 12A.

  For details on the current consumption of each power cord for each type of enclosure, refer to "Outlet/Socket Specifications (AC Power Type)" (page 24).

- The following is a connection configuration example of the power distribution unit for the ETERNUS DX900 S6 and the ETERNUS DX8900 S6.

Table 15   Current Consumption of Each Power Cord (Guideline)

FE	ETERNUS DX900 S6	1.6A
	ETERNUS DX8900 S6	2.0A
CE		8.8A
NVMe 2.5DE (NDE)		2.9A
SAS 2.5DE (2.5SDE)		2.2A
SAS 3.5DE (3.5SDE)		1.8A

Table 16   Connection Configuration Example of Power Distribution Units (AC200V) (ETERNUS DX900 S6)

OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	OUT7	OUT8	OUT1 — OUT4 < 12A	OUT5 — OUT8 < 12A	Configuration
1.6	1.6	8.8		8.8				12	8.8	FE × 1 + CE × 2
1.6	1.6	8.8		2.9	8.8			12	11.7	FE × 1 + CE × 2 + NDE × 1
1.6	1.6	8.8		2.9	2.9	2.9	2.9	12	11.6	FE × 1 + CE × 1 + NDE × 4
1.6	1.6	8.8		2.2	8.8			12	11	FE × 1 + CE × 2 + 2.5SDE × 1
1.6	1.6	8.8		2.2	2.2	2.2	2.2	12	8.8	FE × 1 + CE × 1 + 2.5SDE × 4
1.6	1.6	8.8		1.8	8.8			12	10.6	FE × 1 + CE × 2 + 3.5SDE × 1
1.6	1.6	8.8		1.8	1.8	1.8	1.8	12	7.2	FE × 1 + CE × 1 + 3.5SDE × 4
8.8	2.9			2.9	2.9	2.9	2.9	11.7	11.6	CE × 1 + NDE × 5
8.8	2.2			2.2	2.2	2.2	2.2	11	8.8	CE × 1 + 2.5SDE × 5
8.8	1.8			1.8	1.8	1.8	1.8	10.6	7.2	CE × 1 + 3.5SDE × 5
8.8				8.8				8.8	8.8	CE × 2
8.8	2.2			8.8	2.2			11	11	CE × 2 + 2.5SDE × 2
8.8	1.8			8.8	1.8			10.6	10.6	CE × 2 + 3.5SDE × 2
2.9	2.9	2.9	2.9	2.9	2.9	2.9		11.6	8.7	NDE × 7
2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	8.8	8.8	2.5SDE × 8
1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	7.2	7.2	3.5SDE × 8
2.9	2.2	2.2	2.9	2.2	2.2	2.2	2.2	10.2	8.8	NDE × 2 + 2.5SDE × 6
2.9	2.2	2.2	2.9	2.9	2.2	2.2	2.2	10.2	9.5	NDE × 3 + 2.5SDE × 5
2.9	1.8	1.8	2.9	1.8	1.8	1.8	1.8	9.4	7.2	NDE × 2 + 3.5SDE × 6
2.9	1.8	1.8	2.9	2.9	1.8	1.8	1.8	9.4	8.3	NDE × 3 + 3.5SDE × 5
2.2	1.8	1.8	1.8	1.8	1.8	1.8	1.8	7.6	7.2	2.5SDE × 1 + 3.5SDE × 7
2.2	2.2	1.8	1.8	1.8	1.8	1.8	1.8	8	7.2	2.5SDE × 2 + 3.5SDE × 6
2.2	2.2	2.2	1.8	1.8	1.8	1.8	1.8	8.4	7.2	2.5SDE × 3 + 3.5SDE × 5

OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	OUT7	OUT8	OUT1 — OUT4 < 12A	OUT5 — OUT8 < 12A	Configuration
2.2	2.2	2.2	2.2	1.8	1.8	1.8	1.8	8.8	7.2	2.5SDE × 4 + 3.5SDE × 4
2.2	2.2	2.2	2.2	2.2	1.8	1.8	1.8	8.8	7.6	2.5SDE × 5 + 3.5SDE × 3
2.2	2.2	2.2	2.2	2.2	2.2	1.8	1.8	8.8	8	2.5SDE × 6 + 3.5SDE × 2
2.2	2.2	2.2	2.2	2.2	2.2	2.2	1.8	8.8	8.4	2.5SDE × 7 + 3.5SDE × 1

NDE: 2.5" NVMe type drive enclosure
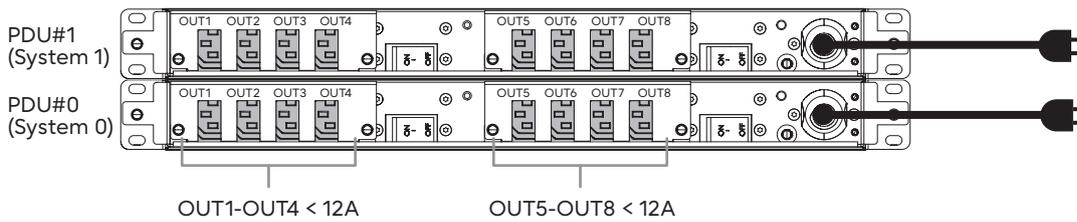2.5SDE: 2.5" SAS type drive enclosure
3.5SDE: 3.5" SAS type drive enclosure

Table 17 Connection Configuration Example of Power Distribution Units (AC200V) (ETERNUS DX8900 S6)

OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	OUT7	OUT8	OUT1 — OUT4 < 12A	OUT5 — OUT8 < 12A	Configuration
2	2			8.8				4	8.8	FE × 1 + CE × 1
2	2			8.8	2.9			4	11.7	FE × 1 + CE × 1 + NDE × 1
2	2			8.8	2.2			4	11	FE × 1 + CE × 1 + 2.5SDE × 1
2	2			8.8	1.8			4	10.6	FE × 1 + CE × 1 + 3.5SDE × 1
8.8	2.9			2.9	2.9	2.9	2.9	11.7	11.6	CE × 1 + NDE × 5
8.8	2.2			2.2	2.2	2.2	2.2	11	8.8	CE × 1 + 2.5SDE × 5
8.8	1.8			1.8	1.8	1.8	1.8	10.6	7.2	CE × 1 + 3.5SDE × 5
8.8				8.8				8.8	8.8	CE × 2
8.8	2.2			8.8	2.2			11	11	CE × 2 + 2.5SDE × 2
8.8	1.8			8.8	1.8			10.6	10.6	CE × 2 + 3.5SDE × 2
2.9	2.9	2.9	2.9	2.9	2.9	2.9		11.6	8.7	NDE × 7
2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	8.8	8.8	2.5SDE × 8
1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	7.2	7.2	3.5SDE × 8
2.9	2.2	2.2	2.9	2.2	2.2	2.2	2.2	10.2	8.8	NDE × 2 + 2.5SDE × 6
2.9	2.2	2.2	2.9	2.9	2.2	2.2	2.2	10.2	9.5	NDE × 3 + 2.5SDE × 5
2.9	1.8	1.8	2.9	1.8	1.8	1.8	1.8	9.4	7.2	NDE × 2 + 3.5SDE × 6
2.9	1.8	1.8	2.9	2.9	1.8	1.8	1.8	9.4	8.3	NDE × 3 + 3.5SDE × 5
2.2	1.8	1.8	1.8	1.8	1.8	1.8	1.8	7.6	7.2	2.5SDE × 1 + 3.5SDE × 7
2.2	2.2	1.8	1.8	1.8	1.8	1.8	1.8	8	7.2	2.5SDE × 2 + 3.5SDE × 6
2.2	2.2	2.2	1.8	1.8	1.8	1.8	1.8	8.4	7.2	2.5SDE × 3 + 3.5SDE × 5
2.2	2.2	2.2	2.2	1.8	1.8	1.8	1.8	8.8	7.2	2.5SDE × 4 + 3.5SDE × 4
2.2	2.2	2.2	2.2	2.2	1.8	1.8	1.8	8.8	7.6	2.5SDE × 5 + 3.5SDE × 3
2.2	2.2	2.2	2.2	2.2	2.2	1.8	1.8	8.8	8	2.5SDE × 6 + 3.5SDE × 2
2.2	2.2	2.2	2.2	2.2	2.2	2.2	1.8	8.8	8.4	2.5SDE × 7 + 3.5SDE × 1

NDE: 2.5" NVMe type drive enclosure
2.5SDE: 2.5" SAS type drive enclosure
3.5SDE: 3.5" SAS type drive enclosure

■ Power Distribution Units (2U, 16 Outlets, 16A)

- For each power distribution unit, the total current capacity of the current consumption value of the power cords that connect from outlets OUT1 to OUT8 must be 16A or less.

- For each power distribution unit, the total current capacity of the current consumption value of the power cords that connect from outlets OUT1 to OUT4 and total current capacity of the current consumption value of the power cords that connect from outlets OUT5 to OUT8 must be 8A or less.

- Connect a new enclosure to OUT5 if the total current capacity of the current consumption value of the power cords that connect from outlets OUT1 to OUT4 exceeds 8A.

  Connect a new enclosure to the next power distribution unit if the total current capacity of the current consumption value of the power cords that connect from outlets OUT5 to OUT8 exceeds 8A.

Frontend Cable Connection

In the ETERNUS DX900 S6 and the ETERNUS DX8900 S6, a frontend enclosure is included as a basic configuration. Connections between this frontend enclosure and controller enclosures are called frontend cable connections.

In frontend cable connections, two types of cables connect between the single frontend enclosure and all controller enclosures. Controllers and Front End Routers (FRT) are connected with MiniSAS HD cables or active optical cables (AOC), and controllers and Service Controllers (SVC) are connected with management cables.

These cables are collectively referred to as "frontend cables".

Figure 25   Frontend Cable Connection
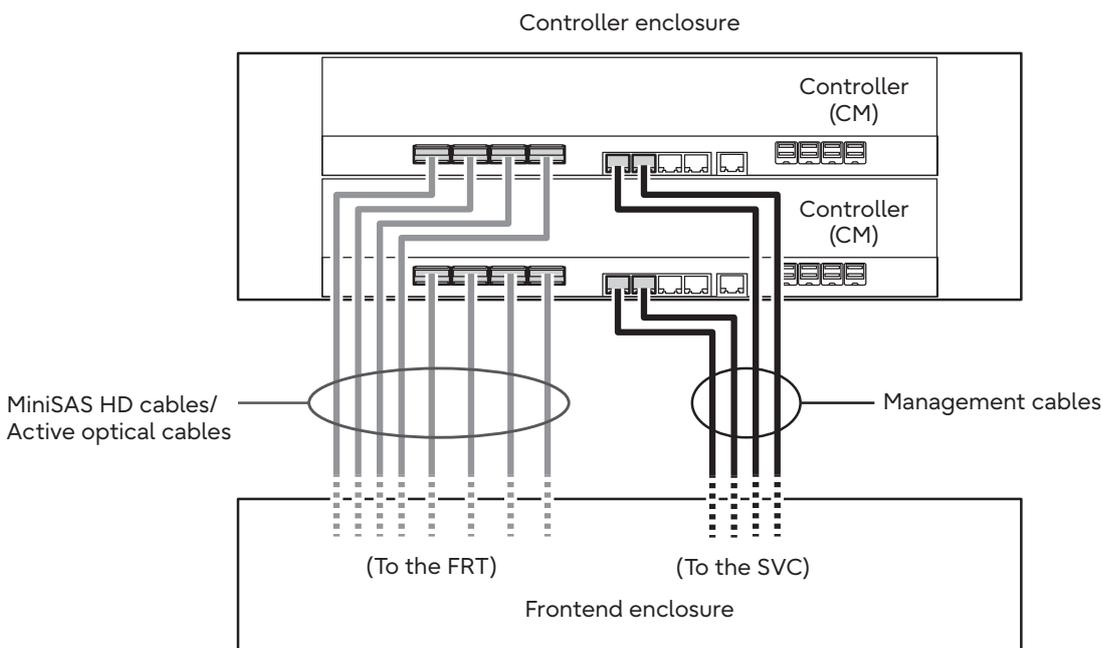
The available MiniSAS HD cables are the 1.1m MiniSAS HD cable used for connections between the frontend enclosure and the controller enclosure (CE#0), the 3.5m MiniSAS HD cable used for connections between the frontend enclosure and the controller enclosures (CE#1) which are installed in the same rack or in an adjacent rack, and the 15m or 30m active optical cable.

There are no operational issues even if different types of cables exist in the ETERNUS DX.

> **Caution**
> - Frontend cables are not provided with the base unit. Be sure to order a 1.1m or 3m frontend cable for connections between the frontend enclosure and the controller enclosure (CE#0). Do not use cables other than the 1.1m cable for connections between the frontend enclosure and the controller enclosure (CE#0).
> - Be sure to use the active optical cables for connections between the frontend enclosure and the controller enclosures (CE#4 to CE#B). Do not use the MiniSAS HD cables.

The management cable lengths that are available for connections between the frontend enclosure and the controller enclosure are 3m, 5m, 15m, and 30m.

Select the most appropriate frontend cable depending on the distance between the frontend enclosure and the controller enclosure.

For 19-inch Racks

This section explains how the frontend cables should be used and how many frontend cables are required according to the cable length.

> **Caution**
> This section describes the connection application when a rack for an ETERNUS DX is used.
> The required cables may differ depending on the racks that are used.

The installation location for each enclosure differs depending on the number of controller enclosures, and the number of drive enclosures on a single node. The required cable length changes since the distance between the frontend enclosure and the controller enclosure is proportional to the number of controller enclosures, and the number of drive enclosures on a single node.

In this section, the frontend enclosure is referred to as "FE", the controller enclosure is referred to as "CE", and the drive enclosure is referred to as "DE".

Table 18   Frontend Cable Connection Usage (19-inch Racks)

Cable length	Usage
(For connections between the FE and CE#0) 1.1m (MiniSAS HD cable) 3m (management cable)	The cable used to connect with CE#0 is not provided with the base unit. Be sure to order a 1.1m or 3m frontend cable for connections between the FE and CE#0.
3.5m (MiniSAS HD cable) 3m (management cable)	Used for connections between the FE and CE#1 to CE#3 in the same rack.
3.5m (MiniSAS HD cable) 5m (management cable)	Used for connections between the FE and CE#1 to CE#3 in the adjacent rack.
15m (active optical cable) 15m (management cable)	Used for connections between the FE and CE#1 to CE#3 in two or more racks.
30m (active optical cable) 30m (management cable)	Used when racks are apart from each other.

■ ETERNUS DX900 S6

● Installing One DE for Each Node

This section describes a rough indication of the required length of cable for one DE for each node and two CEs.

- Be sure to use a 1.1m cable to connect between the FE and CE#0.

- A 3.5m or longer cable is required between the FE and CE#1 that are installed in the same rack.

Table 19　Required Cable Length/Quantity (for the ETERNUS DX900 S6 When One DE Is Connected for Each Node)

Cable length	Quantity	Connection destination
Frontend cables (1.1m/3m)	One set	For CE#0
Frontend cables (3.5m/3m)	One set	For CE#1

Figure 26　Example of a Frontend Cable Connection (for the ETERNUS DX900 S6 When One DE Is Connected for Each Node in a 19-inch Rack)

Base rack

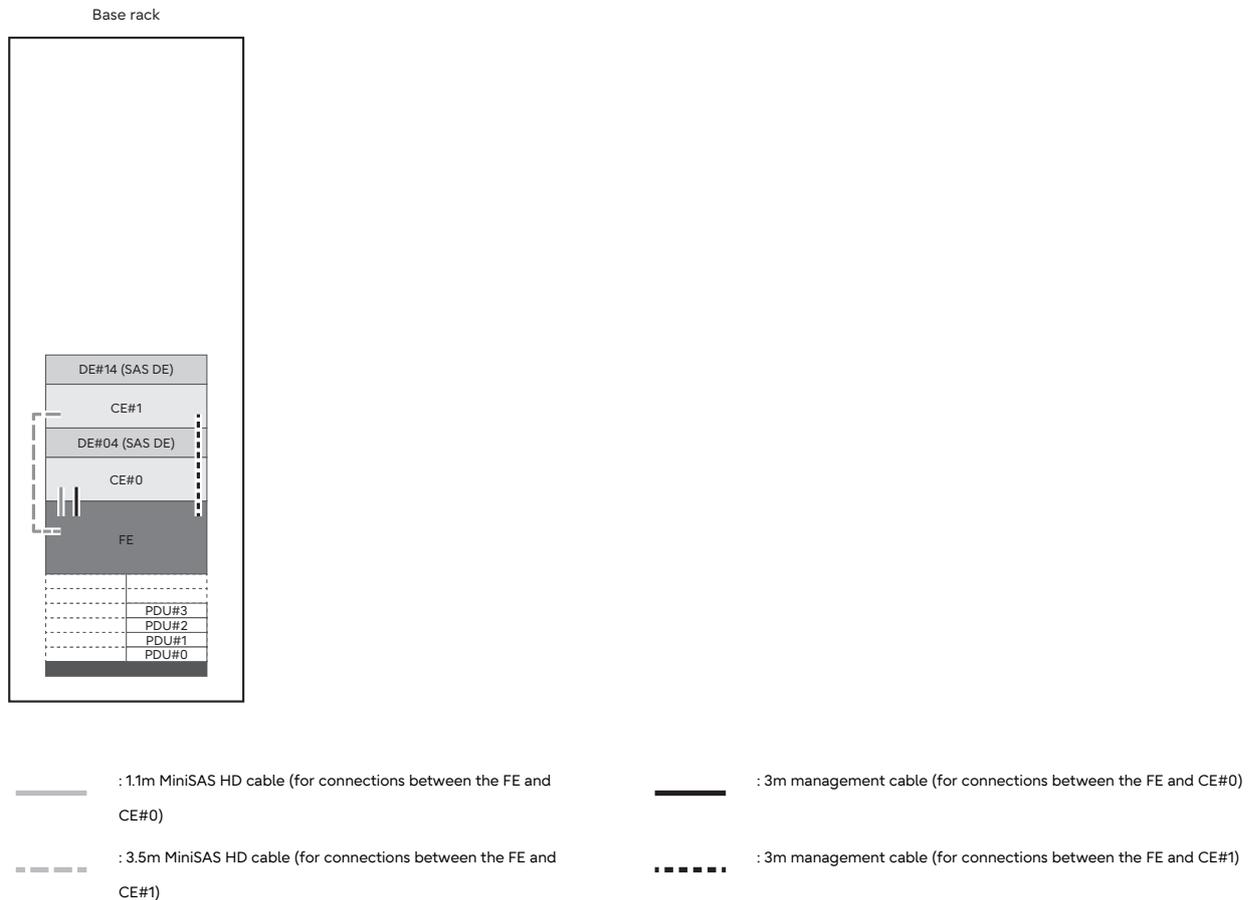|	
━━━ : 1.1m MiniSAS HD cable (for connections between the FE and CE#0)	━━━ : 3m management cable (for connections between the FE and CE#0)
- - - - : 3.5m MiniSAS HD cable (for connections between the FE and CE#1)	▪▪▪▪▪▪ : 3m management cable (for connections between the FE and CE#1)

● Installing 27 DEs for Each Node

This section describes a rough indication of the required length of cable for 27 DEs for each node and two CEs.
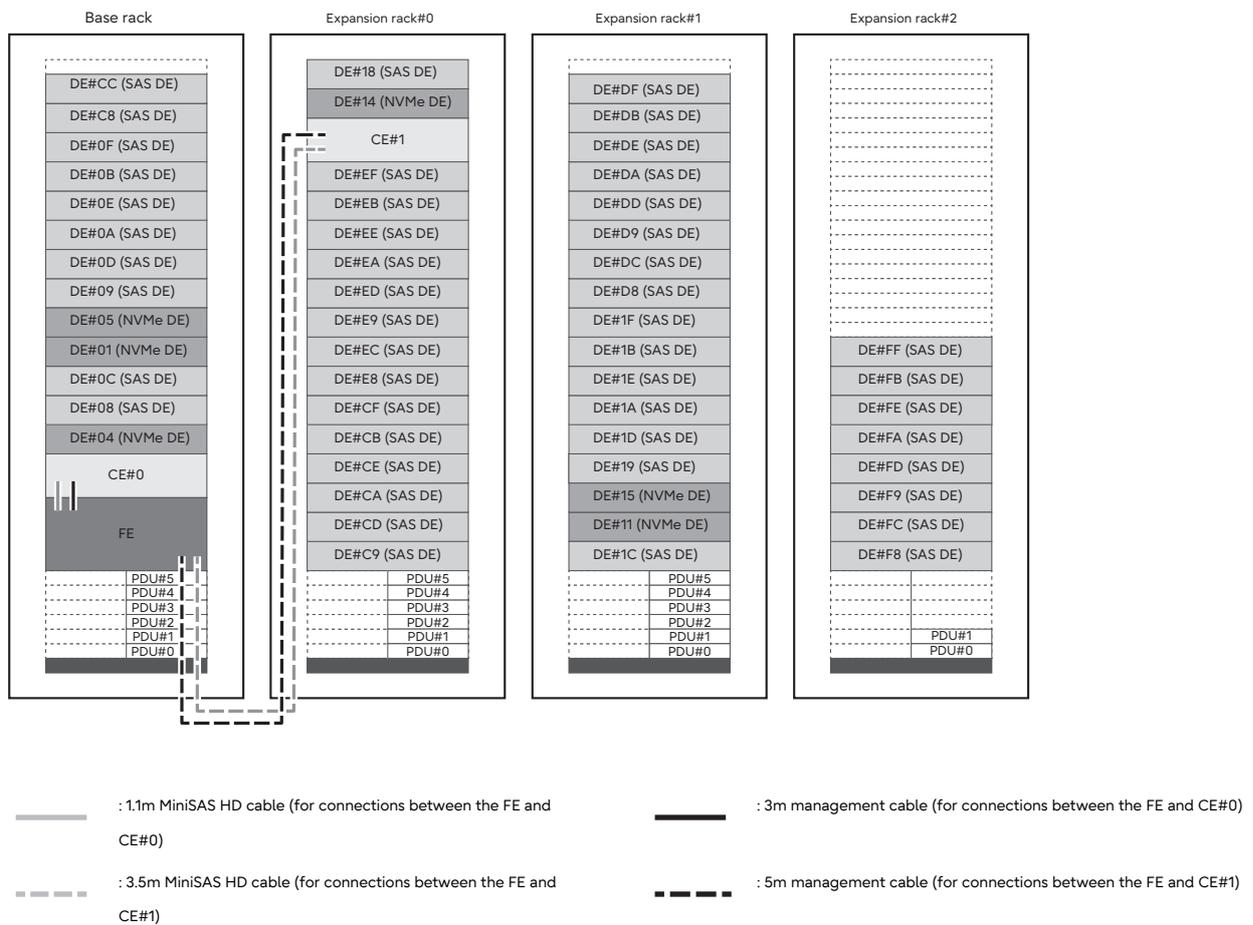
- Be sure to use a 1.1m cable to connect between the FE and CE#0.

- A 3.5m or longer MiniSAS HD cable and a 5m or longer management cable are required between the FE and CE#1 in the first expansion rack (or Expansion Rack#0).

Table 20   Required Cable Length/Quantity (for the ETERNUS DX900 S6 When 27 DEs Are Installed for Each Node)

Cable length	Quantity	Connection destination
Frontend cables (1.1m/3m)	One set	For CE#0
Frontend cables (3.5m/5m) (*1)	One set	For CE#1

*1: This cable is required when racks are placed next to each other. Use a cable with the required length according to the rack arrangement and the cabling.

Figure 27   Example of a Frontend Cable Connection (for the ETERNUS DX900 S6 When 27 DEs Are Connected for Each Node in a 19-inch Rack)

● Installing 47 DEs for Each Node

This section describes a rough indication of the required length of cable for 47 DEs for each node and two CEs.
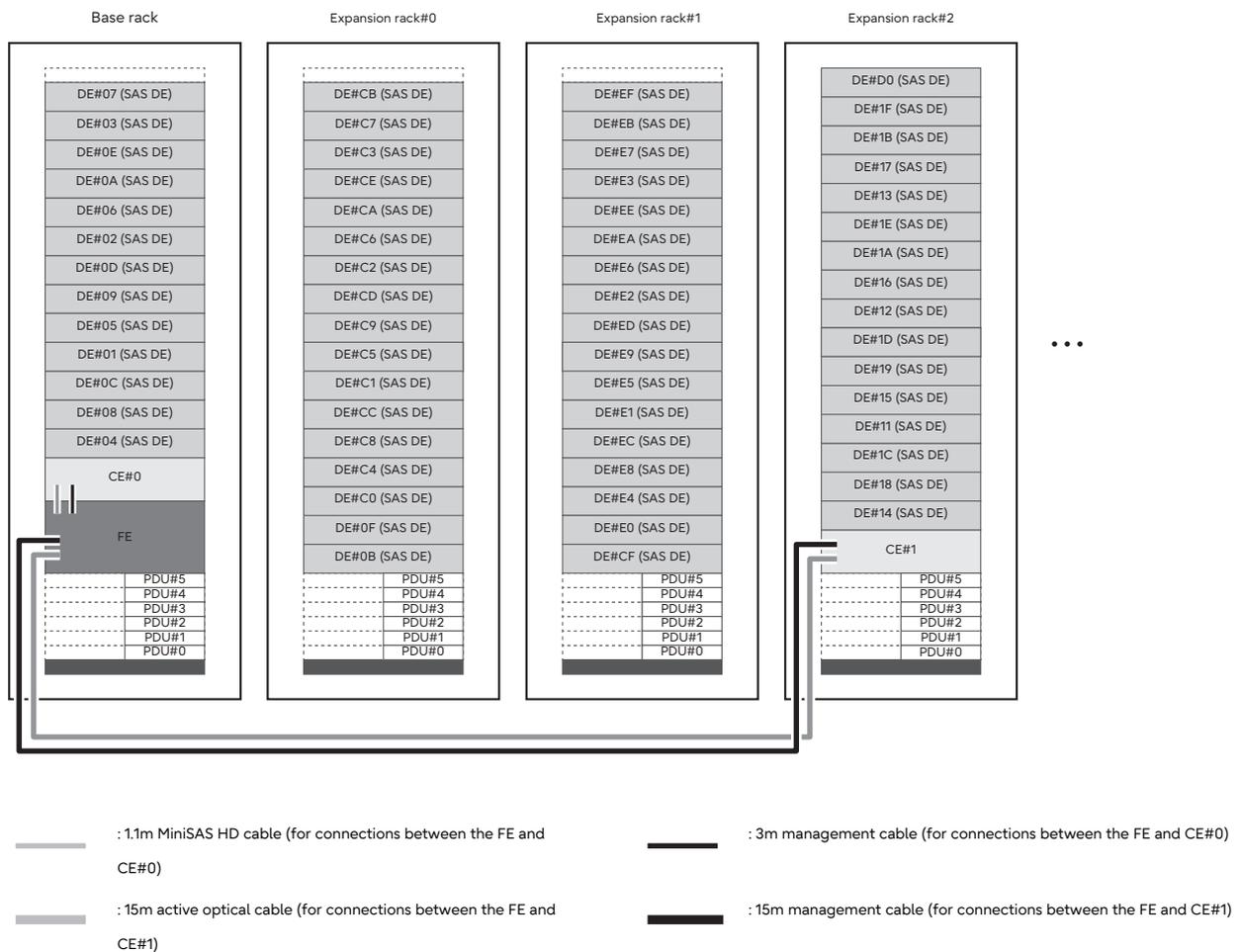
- Be sure to use a 1.1m cable to connect between the FE and CE#0.
- A 15m or longer active optical cable and a 15m or longer management cable are required between the FE installed in the base rack and CE#1 in the Expansion Rack#2.

Table 21   Required Cable Length/Quantity (for the ETERNUS DX900 S6 When 47 DEs Are Installed for Each Node)

Cable length	Quantity	Connection destination
Frontend cables (1.1m/3m)	One set	For CE#0
Frontend cables (15m/15m) (*1)	One set	For CE#1

***1:** This cable is required when racks are placed next to each other. Use a cable with the required length according to the rack arrangement and the cabling.

Figure 28   Example of a Frontend Cable Connection (for the ETERNUS DX900 S6 When 47 DEs Are Connected for Each Node in a 19-inch Rack)

■ ETERNUS DX8900 S6

● **Installing One DE for Each Node**

This section describes a rough indication of the required length of cable for one DE for each node and 12 CEs.

- Be sure to use a 1.1m cable to connect between the FE and CE#0.

- A 3.5m or longer cable is required between the FE and CE#1 to CE#3 that are installed in the same rack.

- A 15m or longer cable is required between the FE and CE#4 to CE#5 that are installed in the same rack or between the FE and CE#6 to CE#B in the expansion rack (or Expansion Rack#0).

Table 22 Required Cable Length/Quantity (for the ETERNUS DX8900 S6 When One DE Is Connected for Each Node)

Cable length	Quantity (*1)	Connection destination
Frontend cables (1.1m/3m)	One set	For CE#0
Frontend cables (3.5m/3m)	Three sets	For CE#1 to CE#3
Frontend cables (15m/15m) (*2)	Eight sets	For CE#4 to CE#B

*1: The required quantity varies depending on the number of CEs that are to be connected.

*2: This cable is required when racks are placed next to each other. Use a cable with the required length according to the rack arrangement and the cabling.

Figure 29 Example of a Frontend Cable Connection (for the ETERNUS DX8900 S6 When One DE Is Connected for Each Node in a 19-inch Rack [2000mm])
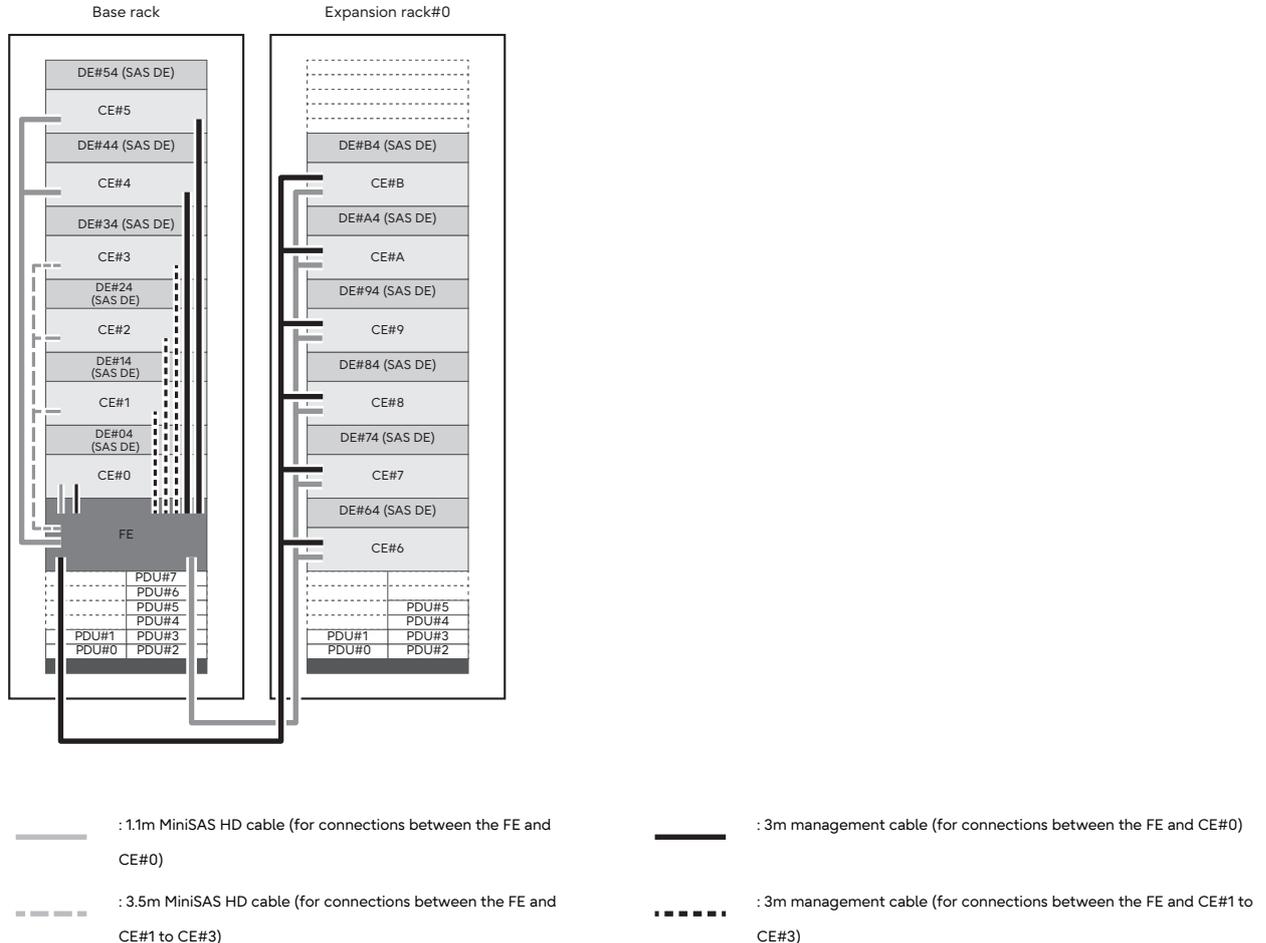
: 15m active optical cable (for connections between the FE and CE#4 to CE#B)

: 15m management cable (for connections between the FE and CE#4 to CE#B)

- Installing 15 DEs for Each Node

This section describes a rough indication of the required length of cable for 15 DEs for each node and 12 CEs.

- Be sure to use a 1.1m cable to connect between the FE and CE#0.
- A 3.5m or longer cable is required between the FE and CE#1 that is installed in the rack (Expansion Rack#0) that is adjacent to the one where the FE is installed.
- A 15m or longer cable is required between the FE and CE#2 to CE#B in the expansion rack (or Expansion Rack#1 to 10).

Table 23   Required Cable Length/Quantity (for the ETERNUS DX8900 S6 When 15 DEs Are Connected for Each Node)

Cable length	Quantity (*1)	Connection destination
Frontend cables (1.1m/3m)	One set	For CE#0
Frontend cables (3.5m/5m) (*2)	One set	For CE#1
Frontend cables (15m/15m) (*2)	Ten sets	For CE#2 to CE#B connections

*1: The required quantity varies depending on the number of CEs that are to be connected.

*2: This cable is required when racks are placed next to each other. Use a cable with the required length according to the rack arrangement and the cabling.

Figure 30   Example of a Frontend Cable Connection (for the ETERNUS DX8900 S6 When 15 DEs Are Connected for Each Node in a 19-inch Rack [2000mm])

: 1.1m MiniSAS HD cable (for connections between the FE and CE#0)	: 3m management cable (for connections between the FE and CE#0)
: 3.5m MiniSAS HD cable (for connections between the FE and CE#1)	: 5m management cable (for connections between the FE and CE#1)
: 15m active optical cable (for connections between the FE and CE#2 to CE#B)	: 15m management cable (for connections between the FE and CE#2 to CE#B)
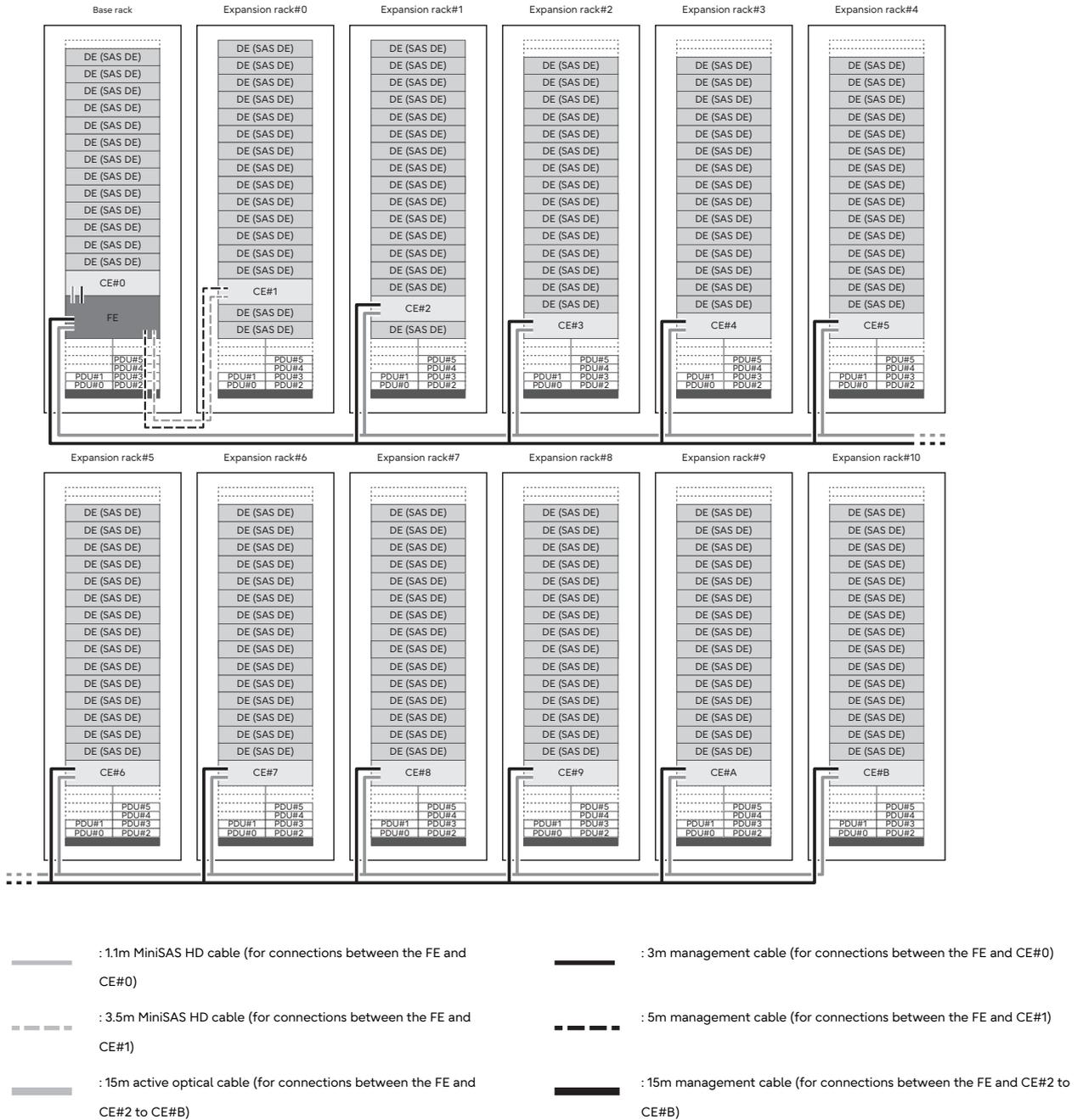
Backend Cable Connection

Reverse cabling can be used to connect enclosures in the ETERNUS DX.

For reverse cabling, the length of the provided cable between controller 1 (CM#1) and the last drive enclosure (connection destination) may not be enough. Longer cables may also be required according to the installation location of the enclosures in the same rack or the installation location of the enclosures in multiple racks.

The lengths of the backend cables should be taken into consideration when enclosure installation locations are being determined.

Two backend cables are provided as standard with each drive enclosure. For 2.5" NVMe type drive enclosures, 2.5" SAS type drive enclosures, and 3.5" SAS type drive enclosures, the length of the provided backend cable is 1.1m.

For extended connections, 3.5m, 6m, 15m, and 30m cables are available.

The type of backend cable differs depending on the cable length.

For connections between controller enclosures and 2.5" NVMe type drive enclosures, the cables with a length of 1.1m and 3.5m are Mini SAS HD copper cables, and the cables with a length of 6m, 15m and 30m are active optical cables. These cables are all used for NVMe drive enclosure connections.

For connections between controller enclosures and 2.5" SAS type/3.5" SAS type drive enclosures, the cables with a length of 1.1m, 3.5m, and 6m are Mini SAS HD copper cables, and the cables with a length of 15m and 30m are active optical cables. These cables are all used for SAS drive enclosure connections.

There are no operational issues even if different types of cables exist in the ETERNUS DX.

The following guideline shows how the backend cables should be used according to their cable length.

Table 24   Backend Cable Connection Usage

| Cable length	Usage
1.1 m	Used when connecting drive enclosures in the same rack and the distance from the top board of the lower enclosure is 8U or less. Supplied with drive enclosures as standard.
3.5 m	Used when connecting controller enclosures with drive enclosures in the same rack, or when connecting drive enclosures in the same rack and the distance from the top board of the lower enclosure is 9U or more.
6m	Used when connecting to the enclosures in the adjacent rack.
15m	Used when connecting to the enclosures in racks that are not adjacent to each other.
30m	Used when connecting to the enclosures in racks that are far from each other.

■ Connection Example

● Installing in the Same Rack (ETERNUS DX600 S6 Dual-Controller Type)

This section describes a connection configuration in which all of the enclosures are installed in the same rack.

The following figure shows an example when one controller enclosure and ten or more drive enclosures are installed in a rack.

For this type of configuration, the length of cables that are provided with the drive enclosures is not enough to connect the enclosures. Obtaining extra extension cables for reverse cabling to connect the controller enclosure to the last drive enclosure is required.

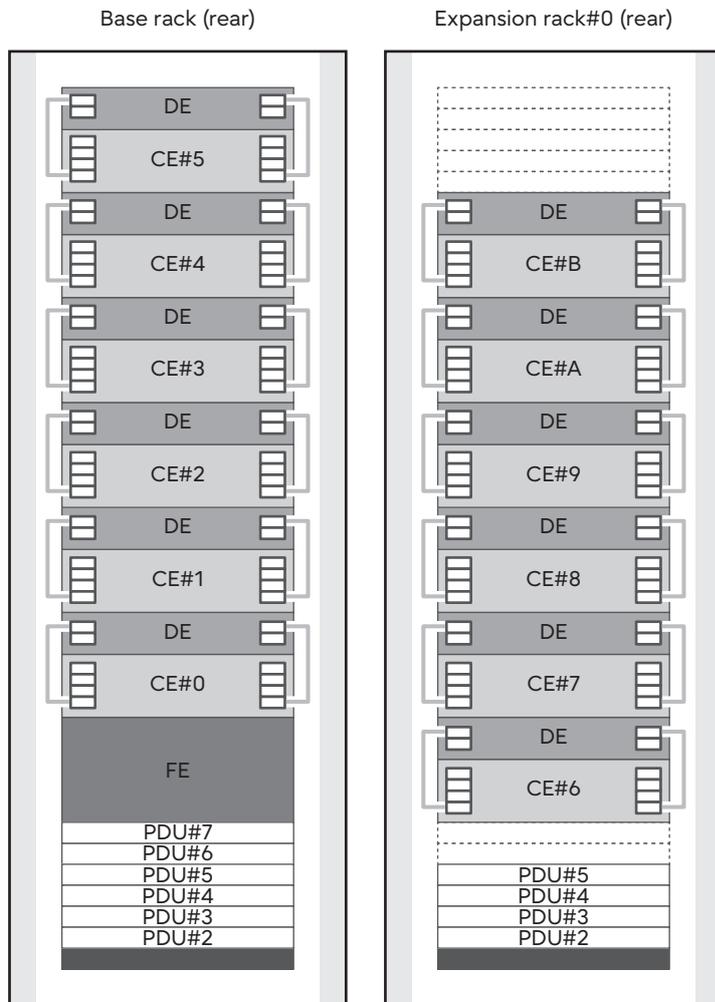Figure 31   Backend Cable Connection Example 1
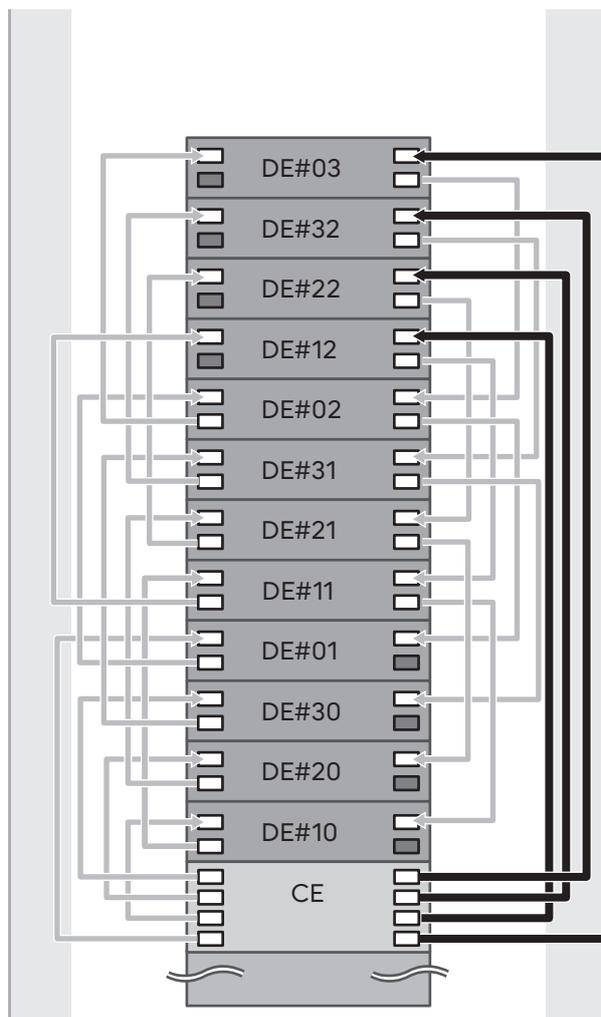
ETERNUS DX600 S6

——— : 1.1m cables that are supplied as standard

——— : 3.5m extension cables

● Installing in the Same Rack (ETERNUS DX8900 S6)

This section describes a connection configuration where enclosures on a single node are installed in the same rack.

The following figure shows an example of when one drive enclosure is installed for each controller enclosure.

Figure 32   Backend Cable Connection Example 2 (When Enclosures Are Connected in the Same Rack and One DE Is Installed for Each Node)

Base rack (rear)   Expansion rack#0 (rear)

| DE |
| CE#5 |
| DE |
| CE#4 |
| DE |
| CE#3 |
| DE |
| CE#2 |
| DE |
| CE#1 |
| DE |
| CE#0 |
| FE |
| PDU#7 |
| PDU#6 |
| PDU#5 |
| PDU#4 |
| PDU#3 |
| PDU#2 |

| DE |
| CE#B |
| DE |
| CE#A |
| DE |
| CE#9 |
| DE |
| CE#8 |
| DE |
| CE#7 |
| DE |
| CE#6 |
| PDU#5 |
| PDU#4 |
| PDU#3 |
| PDU#2 |

───── : 1.1m cables that are supplied as standard

● Installing Enclosures in Multiple Racks (When Two Controllers Are Installed)

This section describes a connection configuration in which the enclosures are installed in multiple racks.

The following figure shows an example when one controller enclosure and eight or more drive enclosures are distributed between two racks. Obtaining extra extension cables for these connections between the racks is required.

Figure 33   Backend Cable Connection Example 3 (When Enclosures Are Connected between Multiple Racks and 47 DEs Are Installed for Each Node in the ETERNUS DX900 S6)

_____   : 1.1m cables that are supplied as standard

_____   : 6m / 15m extension cables
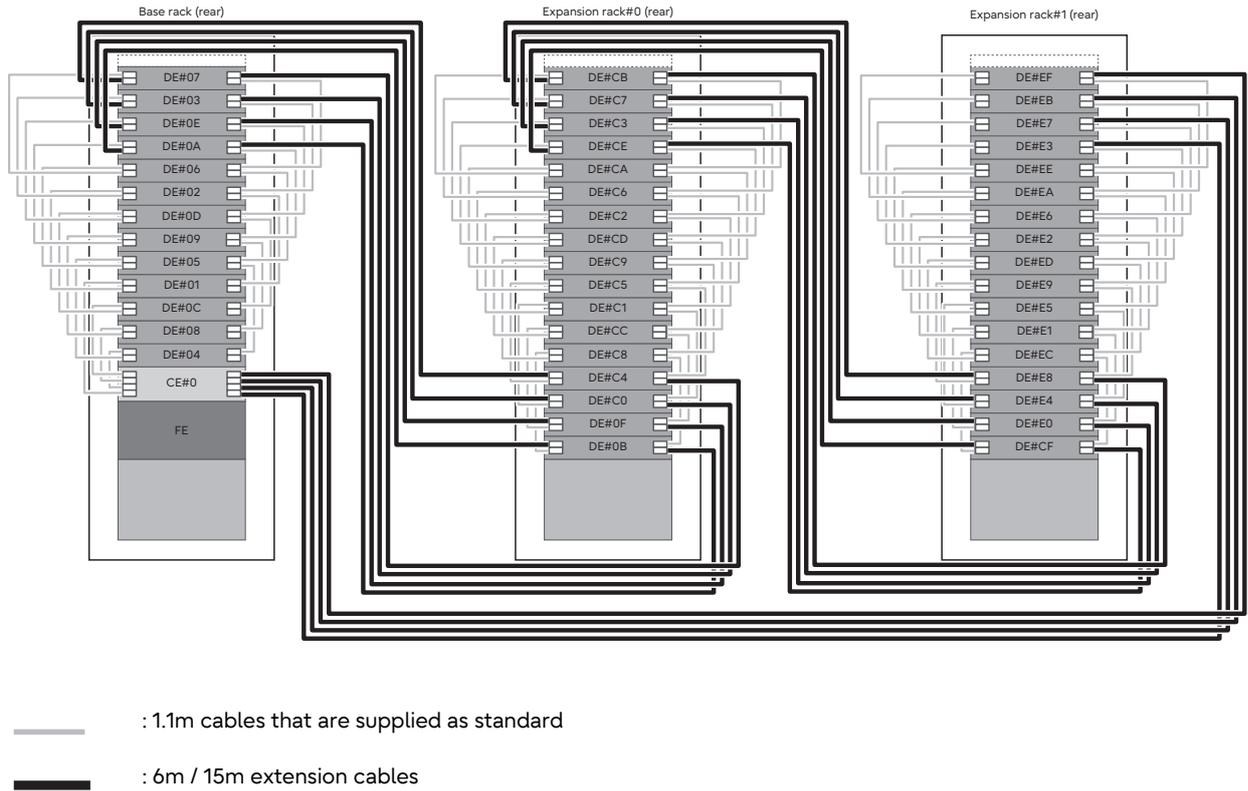
Installable Racks

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

Fujitsu Racks

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

Non-Fujitsu Racks

The ETERNUS DX 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 cannot be tested (for cooling and strength) in non-Fujitsu 19-inch racks, the operations of ETERNUS DX storage systems cannot be guaranteed. Any problem that may occur by installing the ETERNUS DX in non-Fujitsu racks is not covered by the warranty.

If the ETERNUS DX 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 in the rack. The rack specifications must satisfy the conditions listed below. For rack specifications, refer to the manual for the rack that is used.

- Pitch for mounting holes
  EIA Standard Universal pitch

- Size for mounting holes
  The size of the square holes must be 9.5mm or more.

- Load bearing capacity
  The load bearing capacity must be equal to or larger than the total weight of the ETERNUS DX.

- Unit Installation Area
  The dimensions of the area shown in Figure 34 must match the conditions described in Table 25.

Figure 34   Unit Installation Area
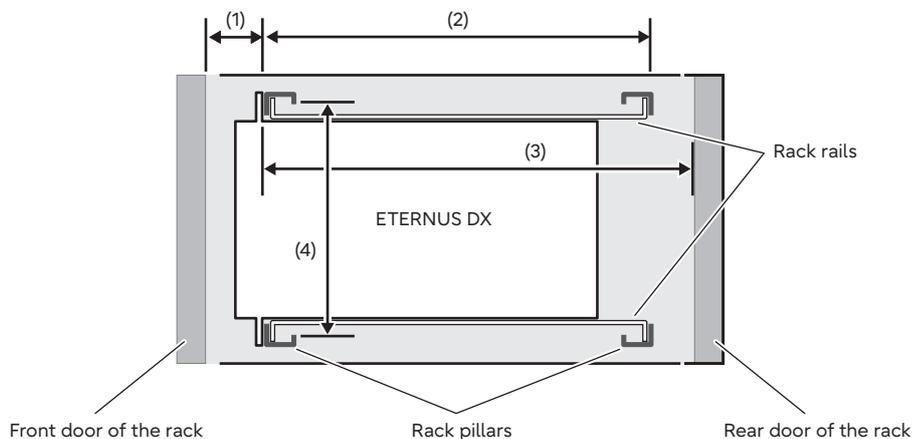
Table 25   Specifications for the Unit Installation Area

Specification		Condition
(1)	Rack front space (Space between the fixed part of the ETERNUS DX 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 or more 750mm or less
(3)	Rack space (Space between the fixed part of the ETERNUS DX on the front side and the rear of the rack)	890mm or more
(4)	Rack mount kit installation area	482mm or more

■ Installation Requirements

When determining service areas, refer to the manual of the rack that is to be used.

Be sure to perform the installation according to the requirements described in "Installation Specifications" (page 10) and "Installation Environment" (page 22).

Fujitsu Storage
ETERNUS DX S6 series
Site Planning Guide

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