ETERNUS DX60 S2
Disk storage system

User's Guide
-Operation-

FUJITSU

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Preface

Fujitsu would like to thank you for purchasing our ETERNUS DX60 S2 Disk storage system.
The ETERNUS DX60 S2 Disk storage system is designed to be connected to a Fujitsu (PRIMEQUEST or PRIMERGY) or non-Fujitsu servers.
This guide describes operation management and maintenance for the ETERNUS DX60 S2 Disk storage system.
This guide is intended for use of ETERNUS DX60 S2 Disk storage system in regions other than Japan.
Please carefully review the information outlined in this manual.

Second Edition
September 2011

Organization

This document is composed of the following seven chapters and an appendix:

● Chapter 1   Components

This chapter describes the components of the ETERNUS DX60 S2 Disk storage system.

● Chapter 2   Standard Operations

This chapter explains how to turn on and off the ETERNUS DX60 S2 Disk storage system and how to operate the buttons on the operation panel.

● Chapter 3   Setup

This chapter describes the required settings and notes for operation of the ETERNUS DX60 S2 Disk storage system.

● Chapter 4   Operations

This chapter describes the LAN for operation management of the ETERNUS DX60 S2 Disk storage system and explains how to monitor the status of the ETERNUS DX60 S2 Disk storage system.

● Chapter 5   Installing Optional Products

This chapter describes how to install optional products.

● Chapter 6   Maintenance

This chapter describes maintenance for the ETERNUS DX60 S2 Disk storage system.

● Chapter 7   Troubleshooting

This chapter explains troubleshooting when errors occur in the ETERNUS DX60 S2 Disk storage system.

"Event Notification Message List" is described as an appendix.

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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 symbols, their levels of caution, and their meanings as used in this manual.

⚠ WARNING — This symbol indicates the possibility of serious or fatal injury if the ETERNUS DX60 S2 Disk storage system is not used properly.

⚠ CAUTION — This symbol indicates the possibility of minor or moderate personal injury, as well as damage to the ETERNUS DX60 S2 and/or to other users and their property, if the ETERNUS DX60 S2 Disk storage system is not used properly.

IMPORTANT — This symbol indicates IMPORTANT information for the user to note when using the ETERNUS DX60 S2 Disk storage system.

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..." disk indicates actions that must be taken. The required action is both illustrated inside the black disk and written above it (e.g. Unplug).

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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.

Warning Level Indicator

Example Warning

Warning Type Indicator

Warning Details

⚠CAUTION

Do

- To avoid damaging the ETERNUS DX60 S2 Disk storage system, pay attention to the following points when cleaning the ETERNUS DX60 S2 Disk storage system:
  - Make sure to disconnect the power when cleaning.
  - Be careful that no liquid seeps into the ETERNUS DX60 S2 Disk storage system when using cleaners, etc.
  - Do not use alcohol or other solvents to clean the ETERNUS DX60 S2 Disk storage system.

Warning Layout Ribbon

Additional Information

Symbols Used in This Manual

The following is an expression used throughout this manual:

Note	Functions and know how which can be useful when setting up or operating the ETERNUS DX60 S2 Disk storage system.

Abbreviations Used in This Manual

- "ETERNUS DX Disk storage system" refers to the ETERNUS DX60 S2 Disk storage system.
- "Host Bus Adapter (HBA)" refers to the interface module normally used by the server to connect to the ETERNUS DX Disk storage systems.
  "Interface module" may be referred to as "FC card", "LAN card", "Network Interface Card (NIC)", or "SAS card", depending on the type of server and interface that are used.
- Trademark symbols such as ™ and ® are omitted in this document.

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Chapter 1 Components

This chapter describes the components of the ETERNUS DX Disk storage system.

1.1 Controller Enclosure

An operation panel and disks are installed in the front of the controller enclosure. Controllers and power supply units are installed in the rear.

1.1.1 Front

■ 2.5" type
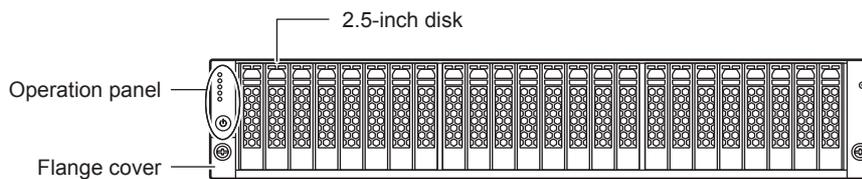
Figure 1.1   Front view of a 2.5" type controller enclosure

■ 3.5" type

● With front cover
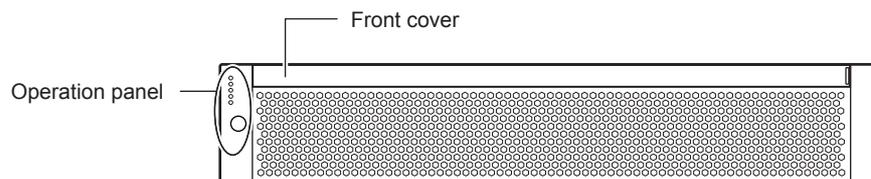
Figure 1.2   Front view of a 3.5" type controller enclosure (with front cover)

● Without front cover
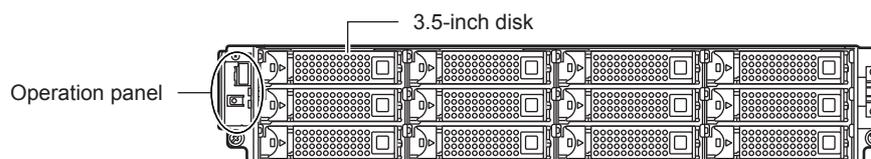
Figure 1.3   Front view of a 3.5" type controller enclosure (without front cover)

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1.1.2　Rear

■ Single controller type

Controller (CM#0) ——————　　　————— Cover

Power Supply Unit
(PSU#0)

Power Supply Unit
(PSU#1)
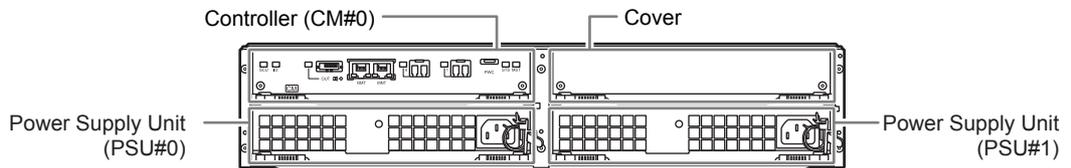
Figure 1.4　Rear view of a controller enclosure (single controller type)

■ Dual controller type

Controller (CM#0) ——————　　　————— Controller (CM#1)

Power Supply Unit
(PSU#0)

Power Supply Unit
(PSU#1)
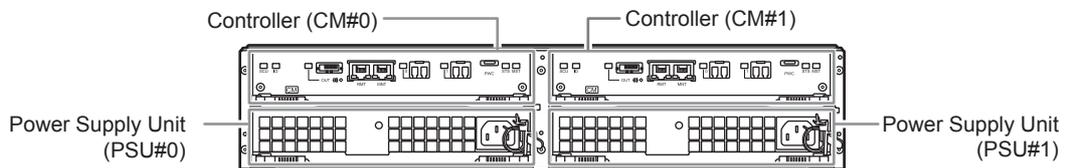
Figure 1.5　Rear view of a controller enclosure (dual controller type)

1.1.3　Components (Front)

This section describes the operation panel and the disks in the front of the controller enclosure.

■ Operation panel

An operation panel has LEDs, a power switch, an AUTO POWER switch, a MODE SELECT switch, and an IP RESET switch.

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● 2.5" type

With a flange cover Without a flange cover

POWER LED — POWER
READY LED — READY
FAULT —
FAULT LED — IDENTIFY
IDENTIFY LED — CACHE
CACHE LED —

Power switch —

AUTO POWER switch
MODE SELECT switch
IP RESET switch

PWR
RDY
FLT
ID
CACHE

IP RST
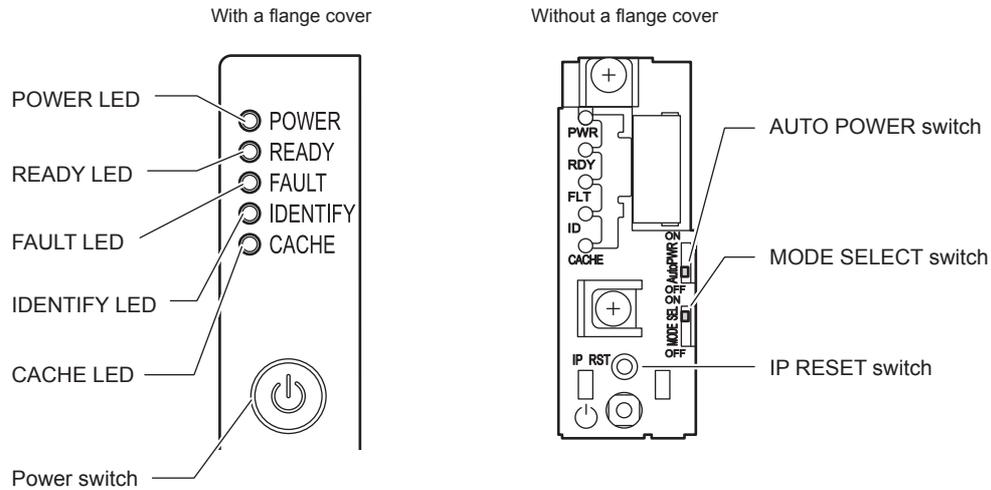
Figure 1.6   Operation panel (2.5" type controller enclosure)

● 3.5" type

With a front cover Without a front cover

POWER LED — POWER
READY LED — READY
FAULT — FAULT
FAULT LED — IDENTIFY
IDENTIFY LED — CACHE
CACHE LED —

Power switch —

AUTO POWER switch
MODE SELECT switch
IP RESET switch

PWR
RDY
FLT
ID
CACHE

IP RST
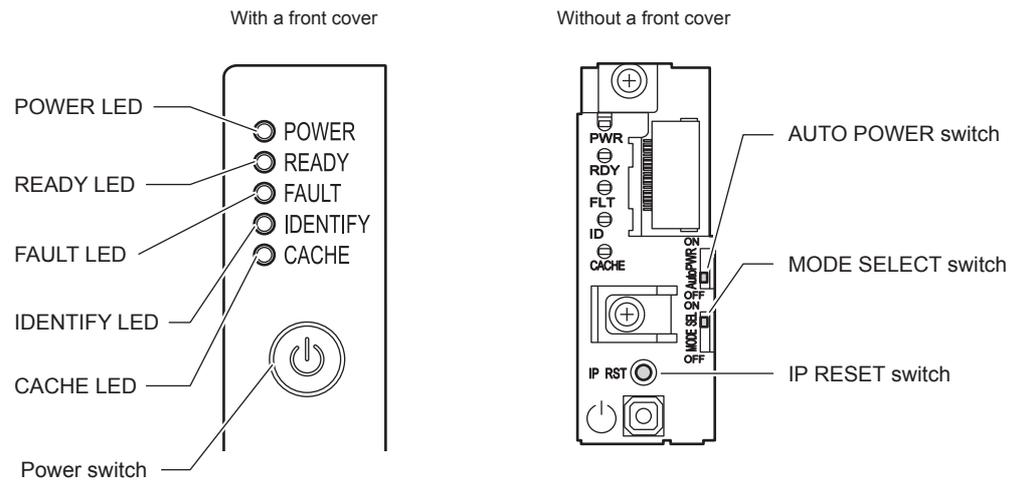
Figure 1.7   Operation panel (3.5" type controller enclosure)

● Part explanation

• Power switch
  This switch is used to turn on or off the ETERNUS DX Disk storage system.
• AUTO POWER switch
  Enables the AC Auto-Link Mode (This function automatically turns on the linked device once AC power is supplied).
  The Auto Power function is disabled for the factory default setting.
• MODE SELECT switch
  Enables the device power to be turned on via power linkage.
  The MODE SELECT switch is enabled for the factory default setting. Do not change to OFF.

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• IP RESET switch
Click once to switch the Master CM LAN port from the current controller to the other controller. Click twice in succession within a two second interval to revert the LAN port settings of the ETERNUS DX Disk storage system to their factory settings.

• LEDs
The states of LEDs are listed below.

Table 1.1   Status and meanings of each LED (operation panel (controller enclosure))

LED name	LED status	ETERNUS DX Disk storage system status
POWER	(green)	DC power is supplied to the controller enclosure.
READY	(green)	The ETERNUS DX Disk storage system is available for use.
FAULT	(orange)	The ETERNUS DX Disk storage system is in error status.
	(blinks orange)	A part of the ETERNUS DX Disk storage system requires preventive maintenance.
IDENTIFY	(blinks blue)	As ordered via ETERNUS Web GUI, the installation location of the controller enclosure is identified.
CACHE	(green)	There is data in the ETERNUS DX Disk storage system cache memory.
	(blinks green)	Data in the cache memory is saved to a non-volatile memory.

■ Disk

● For 2.5" Disk

DISK READY LED   DISK FAULT LED
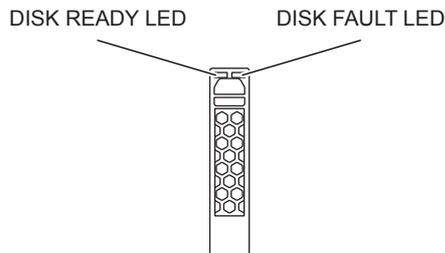
Figure 1.8   2.5" type disk

Figure 1.9 shows the slot number of each disk.

Slot#0 Slot#1 Slot#2 Slot#3 Slot#4 Slot#5 Slot#6 Slot#7 Slot#8 Slot#9 Slot#10 Slot#11 Slot#12 Slot#13 Slot#14 Slot#15 Slot#16 Slot#17 Slot#18 Slot#19 Slot#20 Slot#21 Slot#22 Slot#23
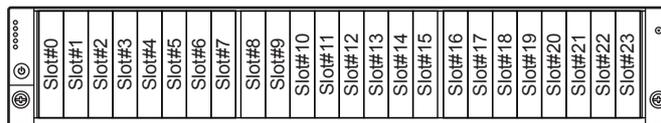
Figure 1.9   Disk slot numbers (2.5" type controller enclosure)

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⚠ WARNING

Do Not

🚫

- System disks are installed in Slot#0 and Slot#1. Never remove system disks. Doing so will render the ETERNUS DX Disk storage system unusable.

● Part explanation

- LEDs
  The states of LEDs are listed below.

Table 1.2   Status and meanings of each LED (2.5" disks)

LED name	LED status	Disk status
DISK READY	🟢 (green)	The disk is operating normally.
	🟢 (blinks green)	
DISK FAULT	🟠 (orange)	The disk is in error status.
	🟠 (blinks orange)	In response to commands from Microsoft Virtual Disk Service (VDS), the location of the disk is identified.

● For 3.5" Disks

DISK READY/FAULT LED

Figure 1.10 3.5" type disk

Figure 1.11 shows the slot number of each disk.

Slot#8	Slot#9	Slot#10	Slot#11
Slot#4	Slot#5	Slot#6	Slot#7
Slot#0	Slot#1	Slot#2	Slot#3
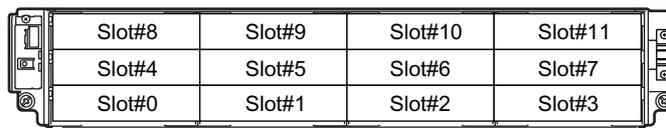
Figure 1.11 Disk slot numbers (3.5" type controller enclosure)

⚠ WARNING

Do Not

🚫

- System disks are installed in Slot#0 and Slot#1. Never remove system disks. Doing so will render the ETERNUS DX Disk storage system unusable.

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● Part explanation

- LEDs
  The states of LEDs are listed below.

Table 1.3   Status and meanings of each LED (3.5" disks)

LED name	LED status	Disk status
DISK READY/ FAULT	🟢 (green)	The disk is operating normally.
	🟢 (blinks green)	
	🟠 (orange)	The disk is in error status.
	🟠 (blinks orange)	In response to commands from Microsoft Virtual Disk Service (VDS), the location of the disk is identified.

1.1.4   Components (Rear)

This section describes the controllers and the power supply units in the rear of the controller enclosure.

1.1.4.1   Controllers

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

■ FC model

SCU STATUS LED
IDENTIFY LED
DI (OUT) LINKUP LED
LAN (RMT) port
LAN (MNT) port
FC LINKUP/FAULT LED
FC port (0 (Left), 1 (Right))
UNIT READY/FAULT LED
MASTER LED
PWC port
ACT LED
LINK LED
DI (OUT) port
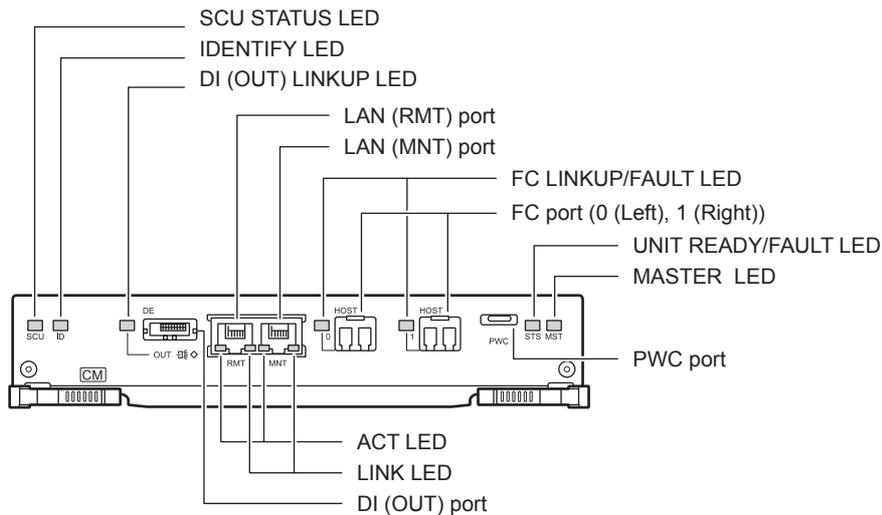
Figure 1.12 Controller (FC model)

● Part explanation

• LAN (RMT) port, LAN (MNT) port
These are the RJ-45 connectors to connect LAN cables. LAN (RMT) port is not used in the EMEA&I region.
A single controller has one LAN (RMT) port and one LAN (MNT) port.

• FC port (0 (left), 1 (right))
These are the Dual LC connectors to connect FC cables.

• PWC port
This port is not used.

• DI (OUT) port
This port is used to connect a controller enclosure to a drive enclosure with a miniSAS cable.

• LEDs
The states of LEDs are listed below.

Table 1.4   Status and meanings of each LED (FC model controller)

LED name	LED status	Controller status
SCU STATUS	(green)	The SCU is in normal status.
	(blinks green)	SCU is charging.
IDENTIFY	(blinks blue)	As ordered via ETERNUS Web GUI, the installation location of the controller enclosure is identified.
	(off)	
DI (OUT) LINKUP	(green)	The link between the DI (OUT) port and the destination has been established.
FC LINKUP/ FAULT	(green)	The link between the FC port (host interface port) and the destination has been established.
	(orange)	The FC port (host interface port) is in error status.
UNIT READY/ FAULT	(green)	The controller is in normal status.
	(orange)	• The controller is performing the initial setup after the power is turned on. • The controller is in error status.
MASTER	(green)	The controller is set as a Master CM.
ACT	(green)	The controller is sending or receiving data via the LAN port (for operation management).
LINK	(green)	The link between the LAN port (for operation management) and the destination has been established.

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■ iSCSI model

Figure 1.13 Controller (iSCSI model)

● Part explanation

• LAN (RMT) port, LAN (MNT) port
  These are the RJ-45 connectors to connect LAN cables. LAN (RMT) port is not used in the EMEA&I region.
  A single controller has one LAN (RMT) port and one LAN (MNT) port.

• iSCSI port (0 (left), 1 (right))
  These ports are RJ45 connectors for LAN cables.

• PWC port
  This port is not used.

• DI (OUT) port
  This port is used to connect a controller enclosure to a drive enclosure with a miniSAS cable.

• LEDs
The states of LEDs are listed below.

Table 1.5   Status and meanings of each LED (iSCSI model controller)

LED name	LED status	Controller status
SCU STATUS	(green)	The SCU is in normal status.
	(blinks green)	SCU is charging.
IDENTIFY	(blinks blue)	As ordered via ETERNUS Web GUI, the installation location of the controller enclosure is identified.
	(off)	
DI (OUT) LINKUP	(green)	The link between the DI (OUT) port and the destination has been established.
UNIT READY/ FAULT	(green)	The controller is in normal status.
	(orange)	• The controller is performing the initial setup after the power is turned on. • The controller is in error status.
MASTER	(green)	The controller is set as a Master CM.
ACT	(green)	The controller is sending or receiving data via the LAN port (for operation management).
LINK	(green)	• The link between the LAN port (for operation management) and the destination has been established. • The link between the iSCSI port (host interface port) and the destination has been established.
FAULT	(orange)	• The controller is performing the initial setup after the power is turned on. • The iSCSI port (host interface port) is in error status.

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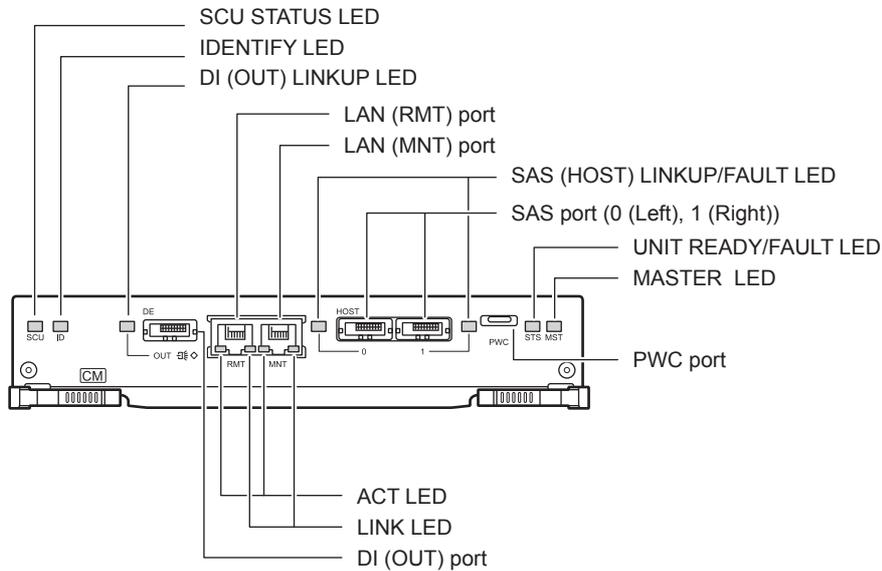
■ SAS model

Figure 1.14 Controller (SAS model)

● Part explanation

• LAN (RMT) port, LAN (MNT) port
These are the RJ-45 connectors to connect LAN cables. LAN (RMT) port is not used in the EMEA&I region.
A single controller has one LAN (RMT) port and one LAN (MNT) port.

• SAS port (0 (left), 1 (right))
These are the miniSAS (SFF8088) connectors to connect miniSAS cables.

• PWC port
This port is not used.

• DI (OUT) port
This port is used to connect a controller enclosure to a drive enclosure with a miniSAS cable.

• LEDs
The states of LEDs are listed below.

Table 1.6   Status and meanings of each LED (SAS model controller)

LED name	LED status	Controller status
SCU STATUS	(green)	The SCU is in normal status.
	(blinks green)	SCU is charging.
IDENTIFY	(blinks blue)	As ordered via ETERNUS Web GUI, the installation location of the controller enclosure is identified.
	(off)	
DI (OUT) LINKUP	(green)	The link between the DI (OUT) port and the destination has been established.

LED name	LED status	Controller status
SAS (HOST) LINKUP/FAULT	(green)	The link between the SAS port (host interface port) and the destination has been established.
	(orange)	The SAS port (host interface port) is in error status.
UNIT READY/ FAULT	(green)	The controller is in normal status.
	(orange)	• The controller is performing the initial setup after the power is turned on. • The controller is in error status.
MASTER	(green)	The controller is set as a Master CM.
ACT	(green)	The controller is sending or receiving data via the LAN port (for operation management).
LINK	(green)	The link between the LAN port (for operation management) and the destination has been established.

■ System Capacitor Unit (SCU)

A 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 outage is detected, data in the cache memory is saved to a non-volatile memory in the controller using the SCU. The saved data is retained in the non-volatile memory indefinitely.

1.1.4.2   Power Supply Units

The power supply unit transforms input AC power from a power socket to DC power and supplies power to each component.
Each power supply unit contains fans.
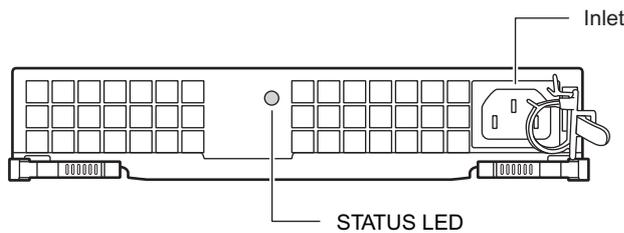
Figure 1.15 Power supply unit

● Part explanation

• Inlet
This inlet is used to connect a power cord.

- LEDs
The states of LEDs are listed below.

Table 1.7   Status and meanings of each LED (power supply unit)

LED name	LED status	Power supply unit status
STATUS	🟢 (green)	AC power is supplied to the power supply unit and the ETERNUS DX Disk storage system (DC power) is turned on.
	🟢 (blinks green)	AC power is supplied to the power supply unit but the ETERNUS DX Disk storage system (DC power) is not turned on.
	🟠 (orange)	The power supply unit or the fan in the power supply unit is in error status.

1.2   Drive Enclosures

3.5" disks and LEDs are installed in the front of a 3.5" drive enclosure. Expanders and power supply units are installed in the rear.

1.2.1   Front

● With front cover
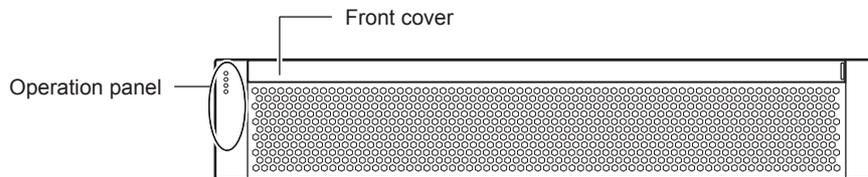
Figure 1.16 Front view of a drive enclosure (with front cover)

● Without front cover
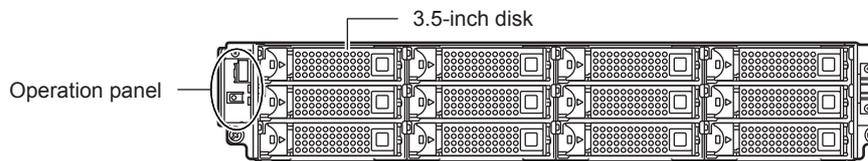
Figure 1.17 Front view of a drive enclosure (without front cover)

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1.2.2   Rear

■ Single expander type
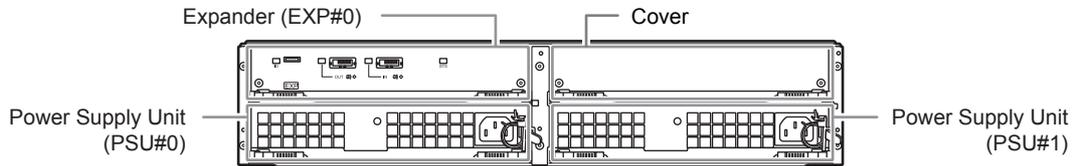
Figure 1.18 Rear view of drive enclosure (single expander model)

■ Dual expander type
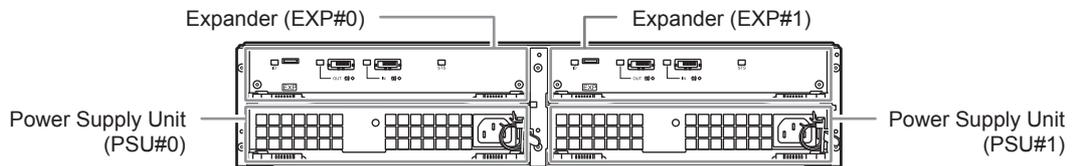
Figure 1.19 Rear view of drive enclosure (dual expander model)

1.2.3   Components (Front)

This section describes the operation panel and the disks in the front of the drive enclosure.

■ Operation panel

An operation panel has LEDs, an AUTO POWER switch, a MODE SELECT switch, and an IP RESET switch.
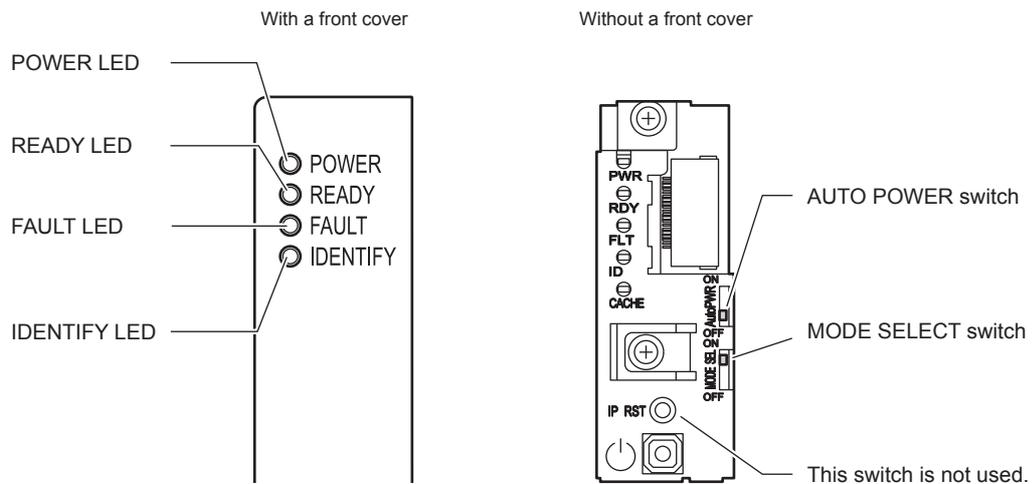
Figure 1.20 LEDs on the front side of the drive enclosure

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● Part explanation

- AUTO POWER switch
  The AUTO POWER switch of the drive enclosure is turned to "OFF" as the factory setting, and should not be turned to "ON".

- MODE SELECT switch
  Enables the device power to be turned on via power linkage.
  The MODE SELECT switch is enabled for the factory default setting. Do not change to OFF.

- LEDs
  The states of LEDs are listed below.

Table 1.8   Status and meanings of each LED (in front of drive enclosure)

LED name	LED status	Drive enclosure status
POWER	(green)	DC power is supplied to the drive enclosure.
READY	(green)	The ETERNUS DX Disk storage system is available for use.
FAULT	(orange)	The drive enclosure is in error status.
	(blinks orange)	A part of the drive enclosure requires preventive maintenance.
IDENTIFY	(blinks blue)	As ordered via ETERNUS Web GUI, the installation location of the drive enclosure is identified.
	(off)	

■ Disk

DISK READY/FAULT LED

Figure 1.21 3.5" disk

Figure 1.22 shows the slot number of each disk.

Slot#8	Slot#9	Slot#10	Slot#11
Slot#4	Slot#5	Slot#6	Slot#7
Slot#0	Slot#1	Slot#2	Slot#3
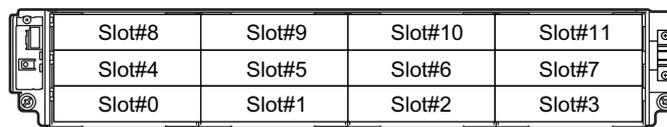
Figure 1.22 Disk slot numbers (drive enclosure)

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● Part explanation

• LEDs
The states of LEDs are listed below.

Table 1.9   Status and meanings of each LED (3.5" disks)

LED name	LED status	Disk status
DISK READY/ FAULT	● (green)	The disk is operating normally.
	◉ (blinks green)	
	● (orange)	The disk is in error status.
	◉ (blinks orange)	In response to commands from Microsoft Virtual Disk Service (VDS), the location of the disk is identified.

1.2.4   Components (Rear)

This section describes the expanders and the power supply units in the rear of the drive enclosure.

■ Expander

The expander is a component that controls how the controller and the disks interact.
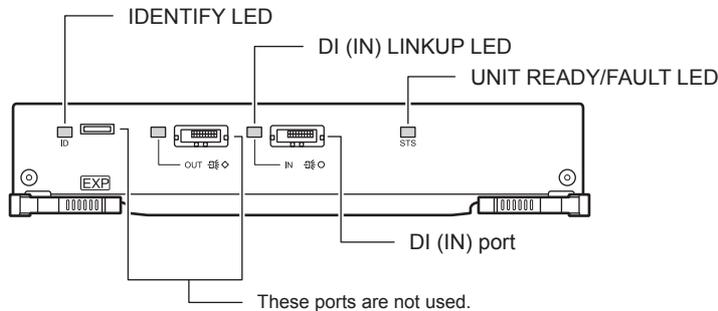
Figure 1.23 Expander

● Part explanation

• DI (IN) port
These ports are connectors for miniSAS cables.

- LEDs
The states of LEDs are listed below.

Table 1.10   Status and meanings of each LED (expander)

LED name	LED status	Expander status
IDENTIFY	(blinks blue)	As ordered via ETERNUS Web GUI, the installation location of the drive enclosure is identified.
	(off)	
DI (IN) LINKUP LED	(green)	The link between the DI (IN) port and the destination has been established.
	(orange)	The DI (IN) port is in error status.
UNIT READY/ FAULT	(green)	The expander is in normal status.
	(orange)	• The controller is performing the initial setup after the power is turned on. • The expander is in error status.

■ Power Supply Units

The power supply unit transforms input AC power from a power socket to DC power and supplies power to each component.
Each power supply unit contains fans.
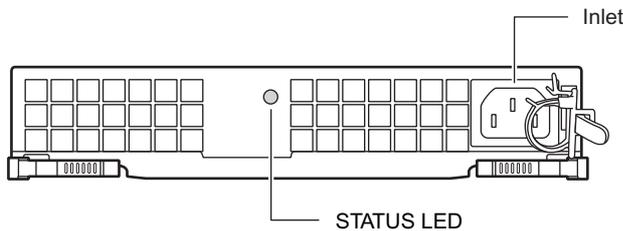
Figure 1.24 Power supply units

● Part explanation

- Inlet
This inlet is used to connect a power cord.

- LEDs
The states of LEDs are listed below.

Table 1.11   Status and meanings of each LED (power supply unit)

LED name	LED status	Power supply unit status
STATUS	(green)	AC power is supplied to the power supply unit and the ETERNUS DX Disk storage system (DC power) is turned on.
	(blinks green)	AC power is supplied to the power supply unit but the ETERNUS DX Disk storage system (DC power) is not turned on.
	(orange)	The power supply unit or the fan in the power supply unit is in error status.

1.3 Power Distribution Units (for Regions other than EMEA&I)

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

1.3.1 Power Distribution Units (1U)

The 1U power distribution unit has four outlets and two inlets.

■ Power Distribution Units (1U)
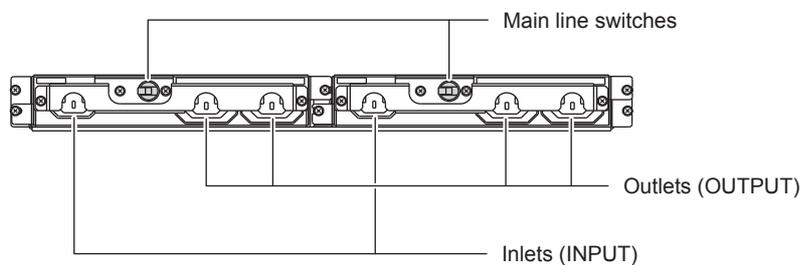
Figure 1.25 Power distribution unit (1U)

● Part explanation

• Main line switch
  This turns on and off the power distribution unit.

• Inlet (INPUT)
  This is a socket (IEC60320-C13) for incoming power supply. This socket is used to connect a power cord (AC input cable).

• Outlet (OUTPUT)
  This is a socket (IEC60320-C13) for outgoing power supply. This socket is used to connect a power cord (AC output cable).

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1.3.2   Power Distribution Units (2U)

There are two types of 2U power distribution units: 2U power distribution units that can connect up to six enclosures and 2U power distribution units that can connect up to eight enclosures.

■ Power Distribution Units (2U, Max 6 enclosures connection)

There are 12 outlets.
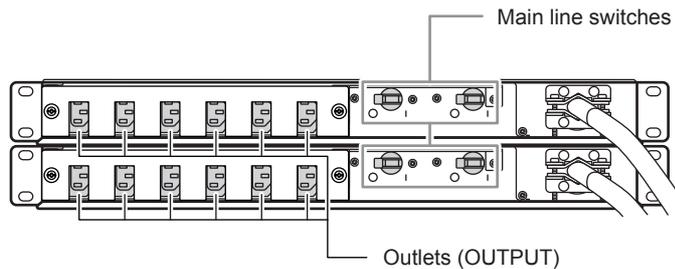
Figure 1.26 Power Distribution Units (2U, Max 6 enclosures connection)

● Part explanation

• Main line switch
This turns on and off the power distribution unit.

• Outlet (OUTPUT)
This is a socket (IEC60320-C13) for outgoing power supply. This socket is used to connect a power cord (AC output cable).

■ Power Distribution Units (2U, Max 8 enclosures connection)

There are 16 outlets.
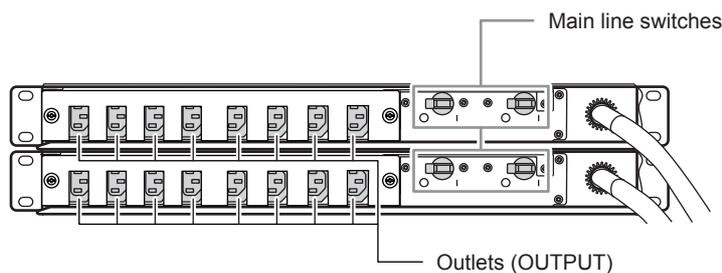
Figure 1.27 Power Distribution Units (2U, Max 8 enclosures connection)

● Part explanation

• Main line switch
This turns on and off the power distribution unit.

• Outlet (OUTPUT)
This is a socket (IEC60320-C13) for outgoing power supply. This socket is used to connect a power cord (AC output cable).

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Chapter 2 Standard Operations

This chapter explains how to turn on and off the ETERNUS DX Disk storage system and how to operate buttons on the operation panel.

2.1 Powering On and Off

This section explains how to turn on the ETERNUS DX Disk storage system.

2.1.1 Switching On and Off the Main Line Switch on the Power Distribution Unit (for Regions Other than EMEA&I)

This section explains how to switch the main line switch of the power distribution unit to ON and OFF.

■ To switch to ON

Turn the main line switch of the power distribution unit to the "On" position (marked "I").

IMPORTANT	Make sure all of the main line switches are in the ON position.

● For 1U power distribution unit
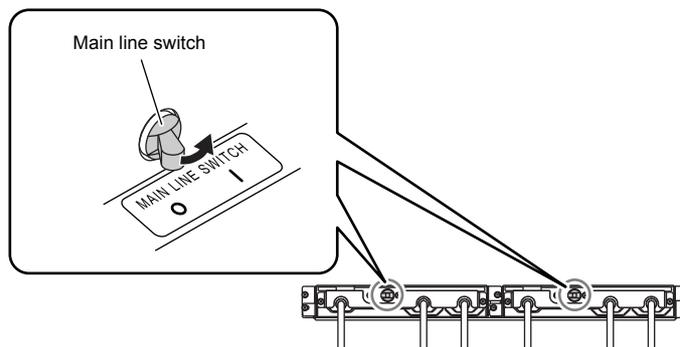
Figure 2.1   ON position (marked "|") of the main line switches on a 1U power distribution unit

● For 2U power distribution unit
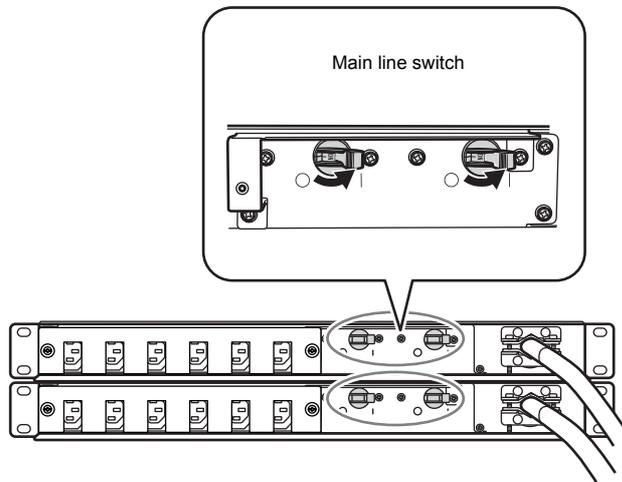
Main line switch

Figure 2.2   ON position (marked "|") of the main line switches on a 2U power distribution unit

■ To switch to OFF

Turn the main line switch of the power distribution unit to the "Off" position (marked "O").

> **N o t e**
>
> For normal operation, there is no need to the turn the main line switch to the "Off" position. If the ETERNUS DX Disk storage system must be turned off, such as before any inspections of power supply devices are performed, turn off the ETERNUS DX Disk storage system by using the procedure described in "2.1.3 Powering Off" (page 33) and turn the main line to the "Off" position.

● For 1U power distribution unit

Main line switch
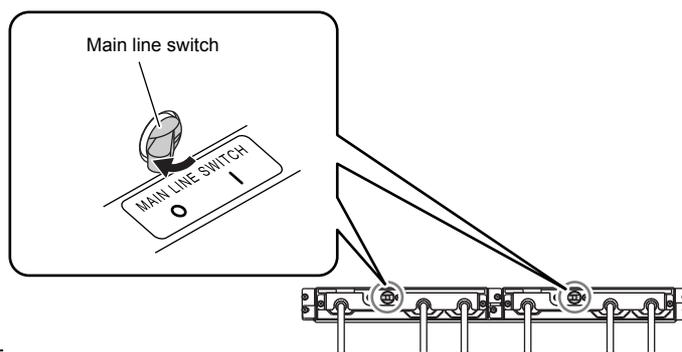
MAIN LINE SWITCH

Figure 2.3   OFF position (marked "O") of the main line switches on a 1U power distribution unit

● For 2U power distribution unit
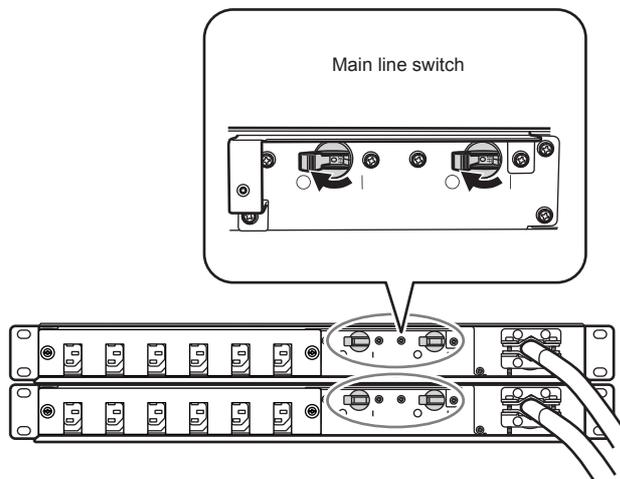
Figure 2.4　OFF position (marked "O") of the main line switches on a 2U power distribution
            unit

IMPORTANT	When turning the main line switch to "On" (marked "I") right after turning the main line switch to "Off" (marked "O"), turn it back to "On" (marked "I") after the POWER LED of the power supply unit has turned off completely.

2.1.2　Powering On

This section explains how to turn on the ETERNUS DX Disk storage system.

Note	Before turning on the ETERNUS DX Disk storage system, make sure that the main line switches of the power distribution units are "ON". Do not turn the main line switches of the power distribution units to the OFF position.

IMPORTANT
- After turning the power on, it takes about three minutes for the ETERNUS DX Disk storage system to become READY (i.e. the READY LED turns on). If an error is detected during the initial power-on diagnostic phase, a longer time (up to ten minutes) may be required before the READY LED turns on.
- Before turning the server on, check that the ETERNUS DX Disk storage system and the network devices that connect the ETERNUS DX Disk storage system and the server are all in READY status. If the server is turned on while any of these devices are not in READY status, the server may not be able to recognize the ETERNUS DX Disk storage system.
- When the AUTO POWER switch of the controller enclosure is turned to "ON", supplying power to the ETERNUS DX Disk storage system will cause the ETERNUS DX Disk storage system to turn on automatically in cases such as when the power cord is connected or the power is recovered after power failure.

Procedure

1 Press the power switch (⏻) of the controller enclosure.

Controller enclosure POWER LED turns on.

N o t e When drive enclosures are installed, the power turns on automatically.

Power switch

Drive Enclosure

Controller Enclosure
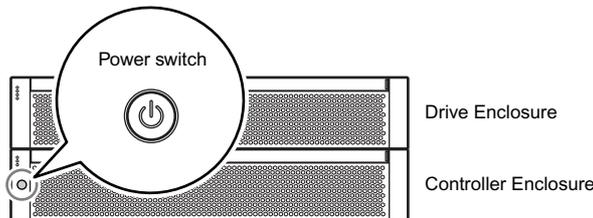
2 After three minutes, check that the READY LED on the controller enclosure are lit up.

3   Check that all enclosure's POWER LED and READY LED are lit up.

LED for drive enclosure

- ● POWER
- ● READY
- ○ FAULT
- ○ IDENTIFY

Drive enclosure

Controller enclosure

LED for controller enclosure

- ● POWER
- ● READY
- ○ FAULT
- ○ IDENTIFY
- ○ CACHE
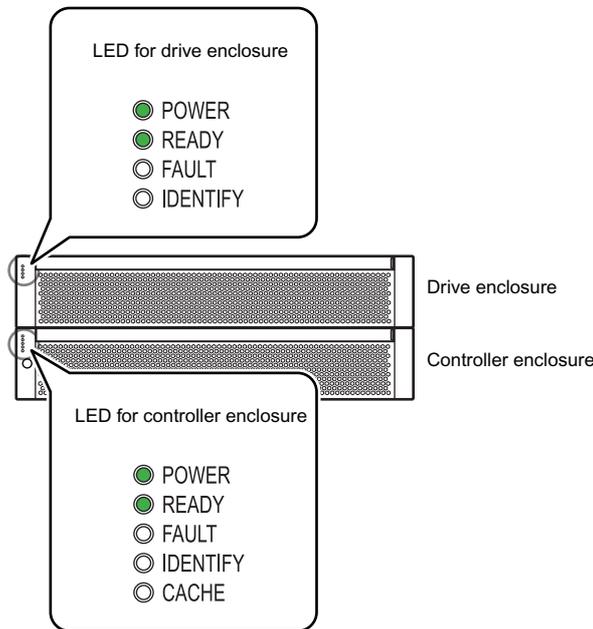
End of procedure

2.1.3   Powering Off

This section explains how to turn off the ETERNUS DX Disk storage system.

IMPORTANT

- When turning off the ETERNUS DX Disk storage system, the power shuts off after the data in the cache memory is written to the disk. Therefore, it may take one minute (maximum six minutes) for the power supply to be completely turned off.
- Do not turn off the power of the device or network devices that connect the ETERNUS DX Disk storage system and server while the server is operating. Turning the power off may result in the loss of data or prevent data from being saved.

Procedure

1 Press and hold the console panel's power switch (⏻) for 4 seconds or longer.
The READY LED should turn off.

IMPORTANT	Press the Power switch only once. If the Power switch is pressed again while either the POWER LED or the READY LED is on, the ETERNUS DX Disk storage system power may turn on.

Power switch

Drive Enclosure

Controller Enclosure
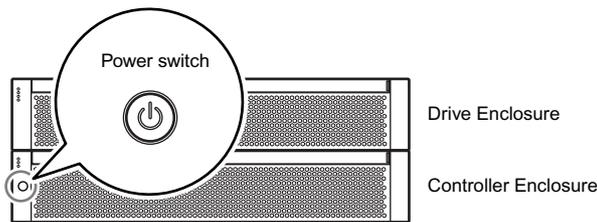
2 The ETERNUS DX Disk storage system power is turned off.
When the power is turned off, the POWER LED will go out.

N o t e	When drive enclosures are installed, the power turns off automatically.

End of procedure

2.2 Attaching and Removing the Flange Cover

This section explains how to attach and remove the flange cover of the 2.5" type controller enclosure.

⚠ CAUTION	Do

• At the completion of this operation, check that the flange cover is attached.

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■ Procedure for attaching the flange cover

Attach the flange cover in the following order.

Procedure

1 Slide the tab inside the top of the flange cover over the top-left corner of the controller enclosure.

IMPORTANT	When fitting the flange cover, be careful not to touch the power switch (⏻).
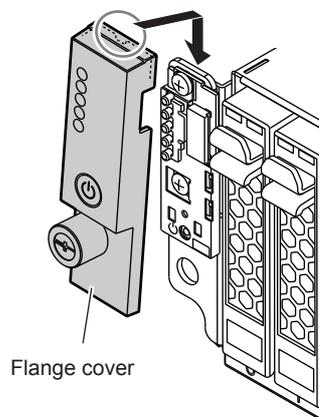
Flange cover

2 Tighten the thumb screw to fasten the flange cover.
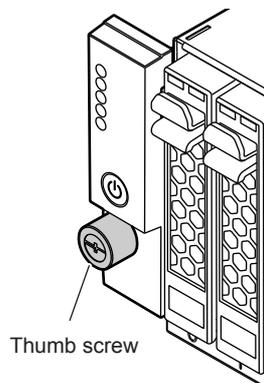
Thumb screw

End of procedure

■ Procedure for removing the flange cover

Loosen the thumb screw to remove the flange cover.

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2.3   Attaching and Removing the Front Cover

This section explains how to attach and remove the front cover of the 3.5" type controller enclosure or 3.5" type drive enclosure.

⚠ CAUTION

Do

• After completing the operation, be sure to reattach the front cover.

N o t e

This section explains how to attach and remove the front cover of the 3.5" type controller enclosure, but the same procedure is used to attach and remove the front cover of the 3.5" type drive enclosure.

■ Procedure for attaching the front cover

Attach the front cover in the following order.

Procedure

1   Fit the front cover in the left end slot of the controller enclosure to attach.

IMPORTANT   Be careful so that the part of the front cover to be fit in the slot does not touch the power switch (⏻).

Slot
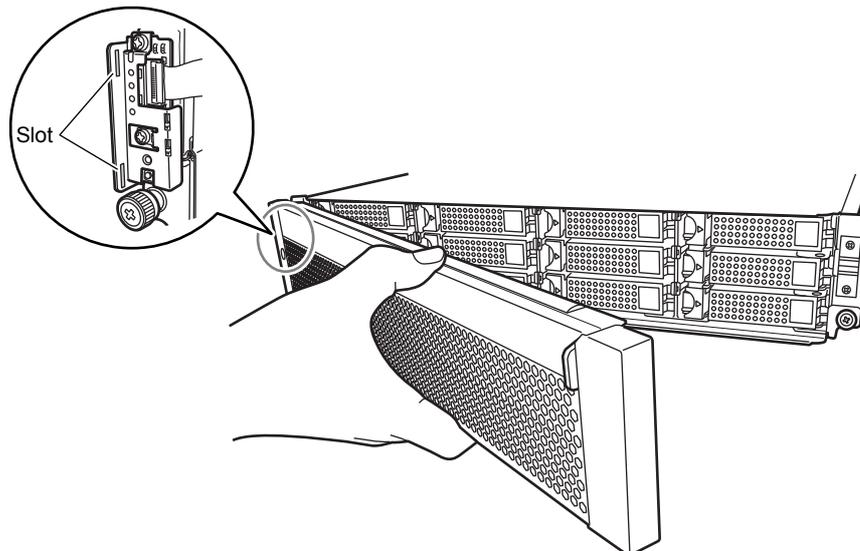
2   Holding the tab on the front cover, attach the right side of the cover to the enclosure.

> ⚠ **CAUTION**
>
> Do
>
> • When attaching the right side of the front cover, support its left side with your left hand, to prevent it from coming loose and falling.

Tab
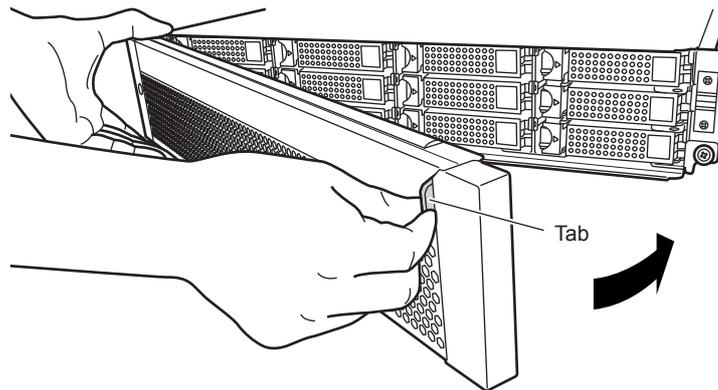
End of procedure

■ Procedure for removing the front cover

Remove the front cover in the following order.

Procedure

1 By holding the tab of the front cover, pull the cover toward you to remove it.

⚠ CAUTION

Do

• When removing the right side of the front cover, support its left side with your left hand, to prevent it from coming loose and falling.

Tab
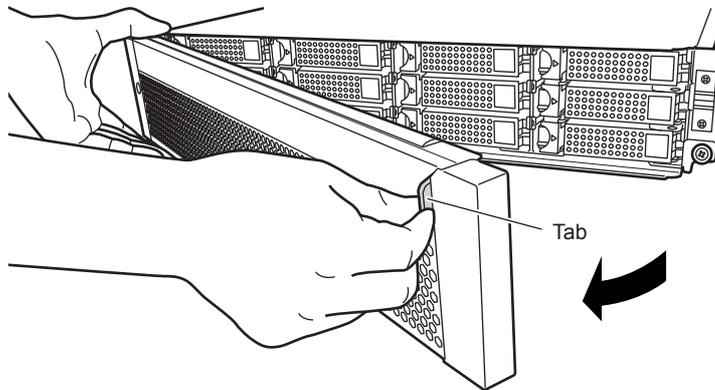
End of procedure

2.4   Turning On and Off the AUTO POWER Switch

This section explains how to enable the AC automatic linkage mode by turning the AUTO POWER switch of the controller enclosure to "ON".
When AC automatic linkage mode is enabled, the ETERNUS DX Disk storage system is automatically turned on when the power supply recovers after a power failure.
When the AUTO POWER switch of the controller enclosure is set to "OFF", the AC automatic linkage mode is disabled.

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Procedure

1 Remove the flange cover from the 2.5" type controller enclosure.
Remove the front cover from the 3.5" type controller enclosure.

For details on how to remove the flange cover, refer to "2.2 Attaching and Removing the Flange Cover" (page 34).
For details on how to remove the front cover, refer to "2.3 Attaching and Removing the Front Cover" (page 36).

2 Turn the AUTO POWER switch of the controller enclosure to "ON".

Push up the AUTO POWER switch to the "ON" side using the pin that is provided with the ETERNUS DX Disk storage system.
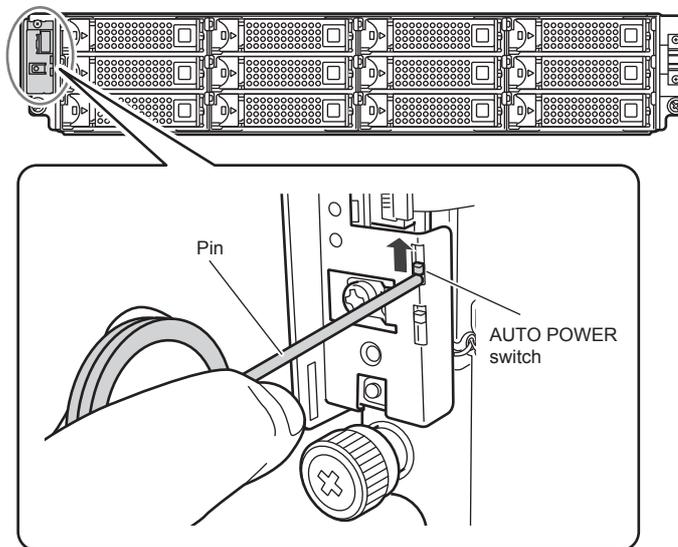
IMPORTANT
- The AUTO POWER switch of the drive enclosure is turned to "OFF" as the factory setting, and should not be turned to "ON".
- If AC power is being supplied, turning the AUTO POWER switch of the controller enclosure to "ON" will cause the ETERNUS DX Disk storage system to turn on.
- If the AUTO POWER switch of the controller enclosure is turned to "ON", connecting the power cord to the outlet will cause the ETERNUS DX Disk storage system to turn on.

3 Re-attach the flange cover to the 2.5" type controller enclosure.
Re-attach the front cover to the 3.5" type controller enclosure.

For details on how to attach the flange cover, refer to "2.2 Attaching and Removing the Flange Cover" (page 34).
For details on how to attach the front cover, refer to "2.3 Attaching and Removing the Front Cover" (page 36).

End of procedure

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2.5   Using the IP RESET Switch

This section describes how to operate the IP RESET switch on the controller enclosure.
The following setting can be performed by operating the IP RESET switch:

- Switching the Master CM

> **N o t e** For the dual controller model, the controller through which the ETERNUS DX Disk storage system is set up and operated is called the "Master CM", while the other controller is called the "Slave CM". The single controller model only has a "Master CM" controller.

- Restoring the LAN port settings (network environment settings) to the factory default settings.

The procedure to operate the IP RESET switch is as follows:

Procedure

1 Remove the flange cover from the 2.5" type controller enclosure.
Remove the front cover from the 3.5" type controller enclosure.

For details on how to remove the flange cover, refer to "2.2 Attaching and Removing the Flange Cover" (page 34).
For details on how to remove the front cover, refer to "2.3 Attaching and Removing the Front Cover" (page 36).

2 Operate the IP RESET switch to change settings.

- To switch the Master CM
  Press the IP RESET switch once.
  The MASTER LED on the controller that is set as the Master CM turns green.

- To restore the LAN port settings (network environment settings) to the factory default
  Press the IP RESET Switch twice within two seconds.
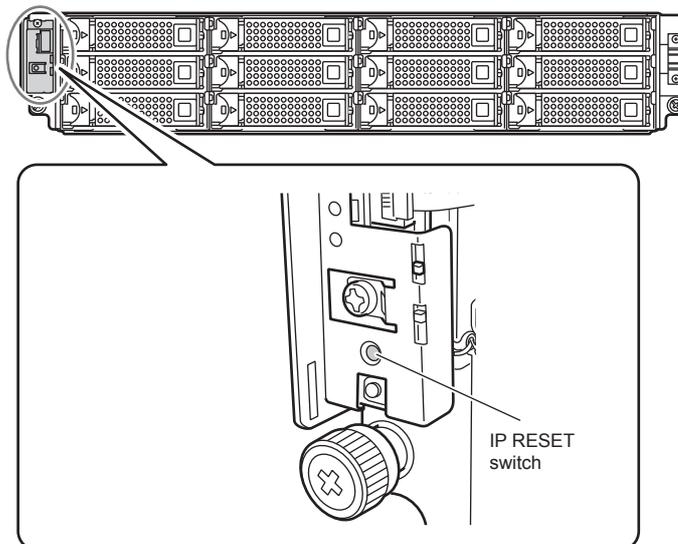
IP RESET switch

3 Re-attach the flange cover to the 2.5" type controller enclosure.
Re-attach the front cover to the 3.5" type controller enclosure.

For details on how to attach the flange cover, refer to "2.2 Attaching and Removing the Flange Cover" (page 34).
For details on how to attach the front cover, refer to "2.3 Attaching and Removing the Front Cover" (page 36).

End of procedure

Chapter 3   Setup

This chapter describes the required settings for operation of the ETERNUS DX Disk storage system and provides notes for setting up the ETERNUS DX Disk storage system.

3.1   Data Encryption

Encrypting data as it is being written to the disk prevents information leakage caused by fraudulent decoding.
Even if a disk is removed and stolen by malicious third parties, data cannot be decoded.
The encryption function only encrypts the data stored on the disks, so server access results in the transmission of plain text. Therefore, this function is effective against leakage of data being transferred via sneaker net, but has no effect on data leakage via server access.

This section describes the restrictions and notes on encrypting data.
For details on the data encryption procedure, refer to "ETERNUS Web GUI User's Guide" or "ETERNUS CLI User's Guide".

- Encrypted volumes cannot be changed to unencrypted volumes.
  To cancel the encryption for a volume, back up the data in the encrypted volume, delete the encrypted volume, and restore the backed up data.
- When copying encrypted volumes (using copy operations via server), transfer performance may not be as good as when copying unencrypted volumes.
- Snap Data Pool Volumes (SDPVs) cannot be encrypted after they are created. To create an encrypted SDPV, set encryption when creating a volume.

3.2   Eco-mode

Eco-mode is a function that is specifically designed to reduce the power consumption that is characteristic of Massive Arrays of Idle Disks (MAID). Eco-mode saves power by managing the scheduled operation times of specified disks and stopping the motors of disks during periods when they are not required.
Disk spin-up and spin-down schedules can be set for each RAID group, and can also be set to allow backup operations.
If an access occurs while a motor is stopped, the disk is immediately spun up and access proceeds normally after approximately one to three minute.

The disk motors can be turned on and off as required by linking the following Storage Foundation Software ETERNUS SF to Eco-mode.
- ETERNUS SF Storage Cruiser
- ETERNUS SF AdvancedCopy Manager

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The following hierarchical storage management software can be also linked with Eco-mode. When using the Eco-mode function with these software, an Eco-mode disk operation schedule does not need to be set, since these software turns on the disk motors when stopped disks are accessed.

- IBM Tivoli Storage Manager for Space Management, Tivoli Storage Manager HSM for Windows
- Dynamic Storage Tiering (DST) function in Symantec Veritas Storage Foundation

The restrictions and notes on using Eco-mode are described below.
For details on the Eco-mode procedure, refer to "ETERNUS Web GUI User's Guide" or "ETERNUS CLI User's Guide".

- To set Eco-mode, use ETERNUS Web GUI, ETERNUS SF Storage Cruiser, or ETERNUS SF AdvancedCopy Manager (hereinafter, referred to as Storage Foundation Software ETERNUS SF).
- Eco-mode cannot be used for the following disks:
    - System disks
    - Hot spares
- Disk motors in the following RAID groups are not stopped by the Eco-mode schedule:
    - RAID groups that contain a system disk
    - RAID groups in which no volumes are registered
    - RAID groups in which SDPVs are registered
- The operation time of disks varies depending on the Eco-mode schedule and the disk access.
    - When an Eco-mode schedule is set, the motor of a disk is turned on 30 minutes before the scheduled operation time period starts. When no access occurs for the time interval that is set in the motor-off interval setting of the Eco-mode general setting function of ETERNUS Web GUI or ETERNUS CLI before the scheduled operation time period finishes, the motor of a disk is turned off 30 minutes after the scheduled operation time period finishes. When an access occurs within the motor-off time interval before the scheduled operation time period finishes, the disk motor of the last disk that was accessed remains turned on for the time interval that is set in the "Host I/O Monitoring Interval".
    - Access to a stopped disk outside of the scheduled operation time period causes the motor of the stopped disk to be spun up, allowing normal access in about one to three minute. When a set time elapses since the last access to a disk, the motor of the disk is stopped. The time to stop the motor of the disk is the time that is set in the "Host I/O Monitoring Interval" of the Eco-mode general setting function of ETERNUS Web GUI or ETERNUS CLI. The default setting is 30 minutes.
    - If a disk is activated from the stopped state more than a set amount of times in a day, the Eco-mode schedule is not applied and disk motors are not stopped by the Eco-mode. The number of disk activations from a stopped state can be set in the "Disk Motor Spin-down Limit Count" of the Eco-mode general setting of ETERNUS Web GUI or ETERNUS CLI. The default setting is 3 times.

(Example 1) Setting the Eco-mode schedule via ETERNUS Web GUI
  Operation schedule is set as 9:00 to 21:00 and there are no accesses outside of the scheduled period
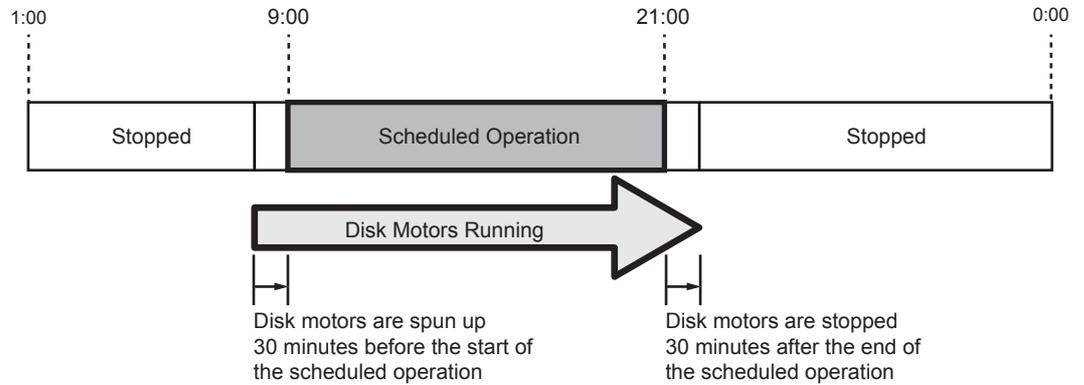
(Example 2) Setting the Eco-mode schedule via ETERNUS Web GUI
  Operation schedule is set as 9:00 to 21:00 and there are accesses outside of the scheduled period

*1: The time that is set in the motor-off interval setting of the "Host I/O Monitoring Interval" of the Eco-mode general setting function
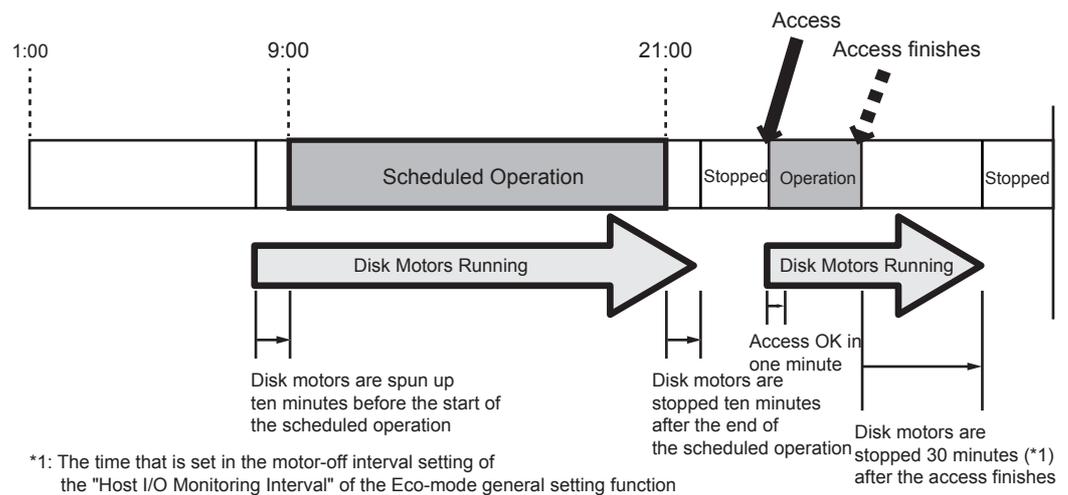
- Eco-mode schedules are executed according to the date and time that are set in the ETERUS DX Disk storage system. To turn on and turn off the disk motors according to the schedule that is set, use the Network Time Protocol (NTP) server in the date and time setting in ETERNUS Web GUI to set automatic adjustment of the date and time.
- Up to four disks can be activated at once in a single enclosure. When attempting to activate more than four disks at once, the first four of the disks are activated, and then the rest of the disks are activated. When this happens, the server will see increased response times and access paths may be lost, in which case the RAID configuration or disk installation status may need to be reviewed.

3.3   Data Management

The ETERNUS DX Disk storage system allows for the expansion of volumes and RAID group capacities, migration among RAID groups, and the changing of RAID levels when the volumes are defined.
Exact details depend on the desired operation. Select from the following procedures.
This section describes the restrictions on using each function of the ETERNUS DX Disk storage system and the notes on setting up each function of the ETERNUS DX Disk storage system.
For details on the above procedures, refer to "ETERNUS Web GUI User's Guide" or "ETERNUS CLI User's Guide".

■ Expansion of volume capacity

- RAID Migration (with increased migration destination capacity)
  When volume capacity is insufficient, a volume can be moved to a RAID group that has enough free space. This function is recommended for use when the desired free space is available in the destination.
- LUN Concatenation
  Adds areas of free space to an existing volume to expand its capacity. This uses existing free space to efficiently expand the volume.

■ Expansion of RAID group capacity

- Logical Device Expansion
  Adds new disks to an existing RAID group to expand the RAID group capacity. This is used to expand the existing RAID group capacity instead of adding a new RAID group to add the volumes.

■ Migration of RAID groups

- RAID Migration
  If the performance of the current RAID groups is not satisfactory due to conflicting volumes, RAID Migration may be used to improve the performance by redistributing the RAID group configuration.

■ Changing the RAID level

- RAID Migration (to a RAID group with a different RAID level)
  Migrating to a RAID group with a different RAID level changes the RAID level of volumes. This is used to change the RAID level for a specific volume.
- Logical Device Expansion (and changing RAID levels when adding the new disks)
  The RAID level may also be changed when adding new disks to a RAID group. This is used to convert the RAID level of all the volumes belonging to a given RAID group.

3.3.1 RAID Migration

RAID Migration is a function that transfers a volume to a different RAID group while guaranteeing the integrity of the data. By using RAID Migration, RAID groups and volumes can be hot switched. This allows easy redistribution of volumes among RAID groups in response to customer needs. The redistribution of volumes and reconfiguration of RAID groups (e.g. changing the RAID level from RAID5 to RAID1+0) can be performed while the system is running.

This section describes the restrictions and notes on using RAID Migration.
For details on the RAID Migration procedure, refer to "ETERNUS Web GUI User's Guide" or "ETERNUS CLI User's Guide".

- Volumes can be specified as a target for RAID Migration.
- The maximum number of volumes for simultaneous RAID Migration operations is 32.
- A total volume capacity of up to 8TB can be used for simultaneous RAID Migration operations.
- The volume type that can be migrated is "Open". RAID groups can be selected as the RAID Migration destination.
- RAID Migration cannot be performed when the source volume type is "SDV" or "SDPV".
- Select RAID groups with an unused area that is more than the capacity of the migration source volume.
- RAID levels that are supported by the ETERNUS DX Disk storage system can be set for the source and destination RAID groups.
- The final volume number (LUN) will be the same as the initial volume number, and from the point of view of the server, pre-migration, migrating and post-migration volumes are accessed indistinguishably.
- If the power is turned off or an electrical power outage occurs during RAID Migration, the process will simply continue when the power is restored.
- When RAID Migration is used to increase the volume (LUN) capacities, note that the increased size of the expanded volumes may not always be dynamically re-recognized by the server, depending on the server-side OS (type and version) being used. Refer to the applicable OS and file system documentation before dynamically expanding the volume capacity.
   This is not necessary when building a new system after the volume capacity has been expanded.

3.3.2 Logical Device Expansion (LDE)

Logical Device Expansion (LDE) allows the capacity of an existing RAID group to be dynamically expanded by the addition of extra disks. By expanding the capacity of existing RAID group, a new volume can be added without having to add new RAID groups.

This section describes the restrictions and notes on using LDE.
For details on the LDE procedure, refer to "ETERNUS Web GUI User's Guide" or "ETERNUS CLI User's Guide".

- A RAID group can be specified as a target for LDE.
- Multiple LDEs cannot be performed simultaneously.
- LDE can be performed if the new RAID group capacity is the same or larger than the old capacity.

- When adding disks, use a disk with a capacity that is the same or with a larger capacity than the disks in the RAID groups that are targets for LDE. After LDE completes, all the disks in the target RAID groups are recognized as having the same capacity as the disk with the smallest capacity in the RAID group. The rest of the capacity in the disks that have a larger capacity cannot be used.
- LDE can be performed on a RAID group that contains an Advanced Copy target (copy source or copy destination) volume.
- Capacity expansion and changing the level of a RAID group can be performed at the same time.
- Since the data cannot be recovered after the failure of LDE, back up all the data of the volumes in the target RAID group to another area before performing LDE. If LDE fails, recover using this backup data.
- Volumes cannot be added to the target RAID groups while LDE is running. Volumes can be added after LDE is complete. Volumes cannot be deleted from the target RAID groups while LDE is running.
- If the power is turned off or an electrical power outage occurs during LDE, the process will simply continue when the power is restored.

3.3.3 LUN Concatenation

LUN Concatenation is a function that is used to add new area to a volume for expanding the volume capacity available to the server. The ability to concatenate widely distributed free areas in the ETERNUS DX Disk storage system allows efficient use of the disk capacity.
Unused areas, which may be either part or all of a RAID group, are used to create new volumes that are then added together (concatenated) to form a single large volume.

This section describes the restrictions and notes on using LUN Concatenation.
For details on the LUN Concatenation procedure, refer to "ETERNUS Web GUI User's Guide" or "ETERNUS CLI User's Guide".

- Volumes can be specified as a target for LUN Concatenation.
- Multiple volumes can be concatenated. Up to 16 volumes can be concatenated.
- Maximum concatenated volume capacity is 32TB.
- The minimum required capacity of each volume being concatenated is 1GB.
- Conditions for volumes to be concatenated are as follows:
  - Only "Open" type volumes can be used for LUN Concatenation. SDV cannot be concatenated. The encryption status of a concatenated volume is the same status as a volume that is to be concatenated.
  - The RAID levels may be any that are supported by the ETERNUS DX Disk storage system with no need for all to be the same or any other limitation. It is also possible to connect up volumes with different RAID levels. Volumes in RAID groups with different types (such as capacity or speed) of disks can be concatenated. However, RAID groups with the same RAID level and same disk type are recommended for concatenated volumes to ensure that performance is not affected.
- LUN Concatenation cannot be performed under the following conditions:
  - When the volume to be concatenated contains an Advanced Copy session.
  - When the number of volumes to be concatenated is fewer than the maximum number of volumes that can be concatenated but the resulting capacity exceeds the maximum single LUN capacity allowed by the ETERNUS DX Disk storage system.
- It is possible to add extra volumes to an already concatenated volume.

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- After concatenation, any number of formatting processes can be started at once.
- Because the server-side LUNs are not changed by volume concatenation, an OS reboot is not required. However, this function only expands the volumes in the ETERNUS DX Disk storage system. Server-side recognition and volume expansion is OS dependent.
- The logical unit number of each concatenated volume does not change and remains accessible from the server before, during, and after the concatenation.
- If the power is turned off or an electrical power outage occurs during LUN Concatenation, the concatenation will simply continue the next time the power is turned on.
- It is recommended that the data on the volumes that are to be concatenated be backed up first.
- When LUN Concatenation is used to increase the volume (LUN) capacities, note that the increased size of the expanded volumes may not always be dynamically re-recognized by the server, depending on the server-side OS (type and version) being used. Refer to the applicable OS and file system documentation before dynamically expanding the volume capacity.
   This is not necessary when building a new system after the volume capacity has been expanded.
- A concatenated volume can be used as an OPC, EC, or QuickOPC copy source or copy destination. It can also be used as a SnapOPC+ copy source.
- When a volume that is using ETERNUS SF AdvancedCopy Manager to run backups is expanded via LUN Concatenation, the volume will need to be registered with ETERNUS SF AdvancedCopy Manager again.

Chapter 4   Operations

This chapter describes the control of the LAN for operation management of the ETERNUS DX Disk storage system, and the monitoring the status of the ETERNUS DX Disk storage system.

4.1   LAN for Operation Management

The ETERNUS DX Disk storage system must be connected to the LAN for operation management. When remote support is used, information on errors of the ETERNUS DX Disk storage system or other events can be notified to the remote support center.
This section explains how the LAN control controller of the ETERNUS DX Disk storage system operates.

■ LAN Control Controller (Master CM/Slave CM)

For a dual-controller type, the controller (CM) that is given the authority to manage the LAN is called the Master CM and the other CM is called the Slave CM.
When an error occurs in the Master CM or LAN, the Master CM is switched automatically.
IP addresses of the LAN ports are not assigned to each CM. These IP addresses are assigned to the role of master or slave. If the Master CM is switched, the same IP addresses are reused.
Therefore, even if the Master CM is switched and the physical port is changed, access can be maintained via the same IP addresses.
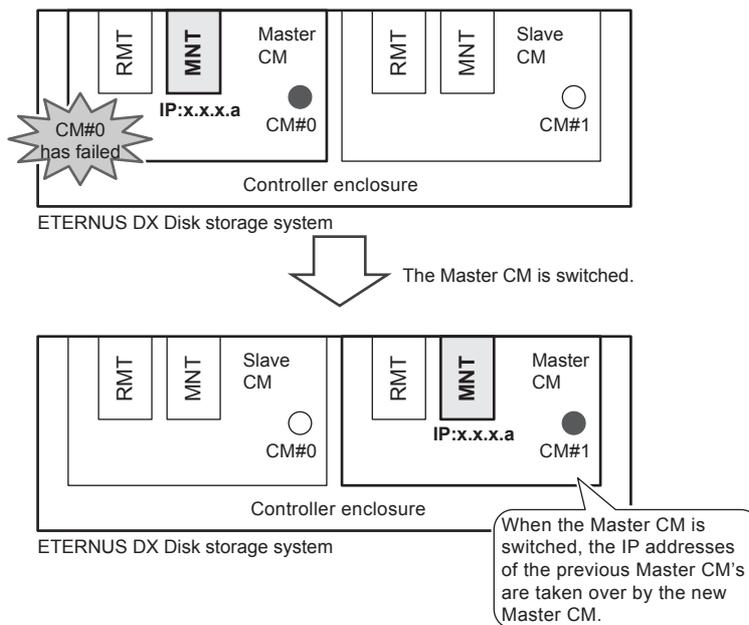
Figure 4.1   LAN control (switching of the Master CM)

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> **N o t e**
>
> - Each CM has an LED that lights up green to identify when it is the Master CM.
> - Setting the IP address of the Slave CM ensures that ETERNUS Web GUI or ETERNUS CLI can be used from the Slave CM if an error occurs on the LAN path for the Master CM.
>   The Master CM and the Slave CM perform different functions. The Slave CM can only switch the Master CM and display the status of the ETERNUS DX Disk storage system.
>   The IP address of the Slave CM does not need to be set for normal operation.
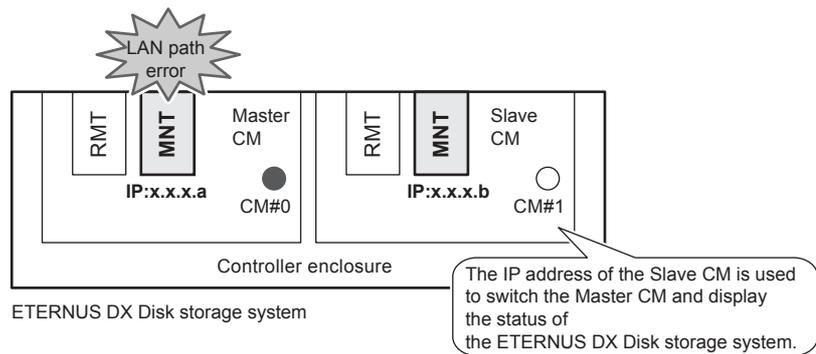
Figure 4.2   LAN control (when the IP address of the Slave CM is set)

4.2   Monitoring ETERNUS DX Disk Storage System Status

Check the status of the ETERNUS DX Disk storage system regularly by checking the LEDs or the status display function of ETERNUS Web GUI.

> ⚠ **CAUTION**
>
> Impending trouble may be indicated by the warning message FAULT LEDs of the ETERNUS DX Disk storage system. The LEDs and the general status of ETERNUS Web GUI should be checked regularly to prevent any serious trouble from occurring.

In addition, setting event notification enables e-mail notification messages or SNMP Trap messages for events with the ETERNUS DX Disk storage system in order to monitor the status of the ETERNUS DX Disk storage system.

> **N o t e**
>
> Event notification and status display for the ETERNUS DX Disk storage system can be performed by ETERNUS CLI. When ETERNUS CLI is used, refer to "ETERNUS CLI User's Guide".

4.2.1   LED Status Check

The status of the ETERNUS DX Disk storage system can be checked by the LEDs.
If the FAULT LED in front of the ETERNUS DX Disk storage system is orange, contact your
maintenance engineer.

4.2.2   Displaying Status via ETERNUS Web GUI

The status of the ETERNUS DX Disk storage system can be checked in the Overview screen of
ETERNUS Web GUI.
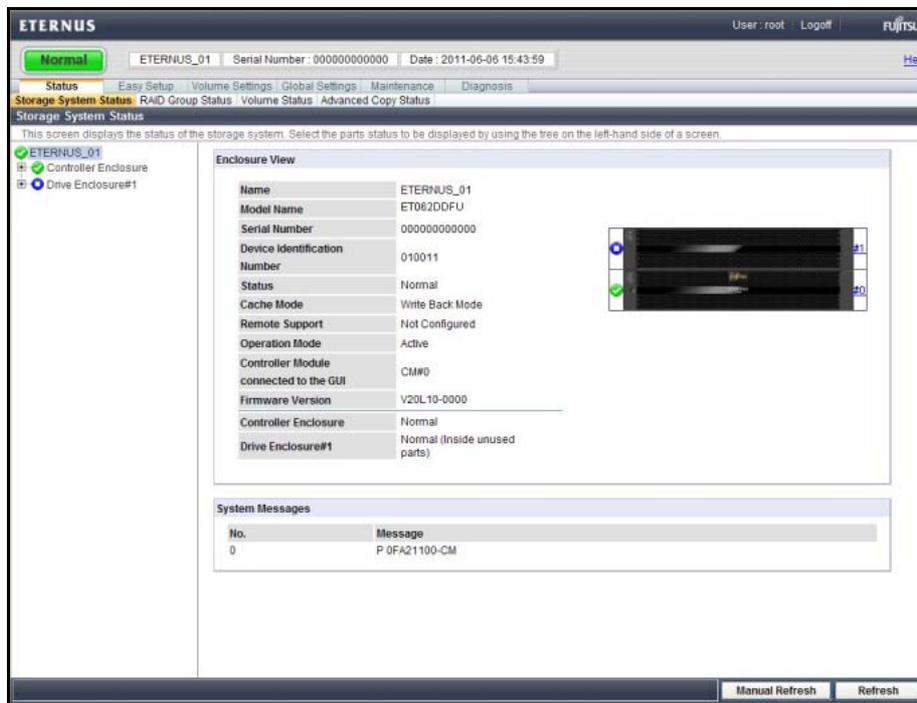
Figure 4.3   ETERNUS Web GUI screen

Table 4.1 shows the general status.

Status of each component in the ETERNUS DX Disk storage system is monitored periodically,
and the result is displayed as a general status image with character strings.

Table 4.1   General status of ETERNUS Web GUI

General status	ETERNUS DX Disk storage system status
Normal (Green)	The ETERNUS DX Disk storage system is in normal state.
Not Ready (Red)	"Not Ready" is a status where an abnormality is detected at a power-off, and I/O access from the server cannot be received.
Error (Red)	The ETERNUS DX Disk storage system is in error state.
Maintenance (Orange)	The ETERNUS DX Disk storage system is under maintenance.
Warning (Yellow)	The ETERNUS DX Disk storage system is in warning state.
Warning (Gray)	The component is installed in the ETERNUS DX Disk storage system, but not used.

Refer to "ETERNUS Web GUI User's Guide" for details.

4.2.3   Event Notification

By setting event notification, if an error (event) occurs in the ETERNUS DX Disk storage system, the event information is notified.

The methods that can be used to notify an event are "E-Mail", "SNMP Trap", "REMCS", and "Host Sense Key Code Qualifier". Note that REMCS is not available in the EMEA&I region.

For the procedure on setting event notification, refer to "User's Guide -Installation-".

■ E-Mail

When an event occurs in the ETERNUS DX Disk storage system, an e-mail is sent to the specified e-mail address.
For more details on notified event information, refer to "Appendix A Event Notification Message List" (page 86).

■ SNMP Trap

When an event occurs in the ETERNUS DX Disk storage system, an SNMP Trap is sent to the SNMP Manager (monitoring server).
For more details on event information notified by SNMP Trap, refer to "Appendix A Event Notification Message List" (page 86).

■ REMCS

The information for errors that occur in the ETERNUS DX Disk storage system is notified to the remote support center.
Warning and Error events are notified.

■ Host Sense Key Code Qualifier

When an event occurs in the ETERNUS DX Disk storage system, host senses (sense codes) are sent to the server. For details on sense codes, refer to "Appendix A Event Notification Message List" (page 86).
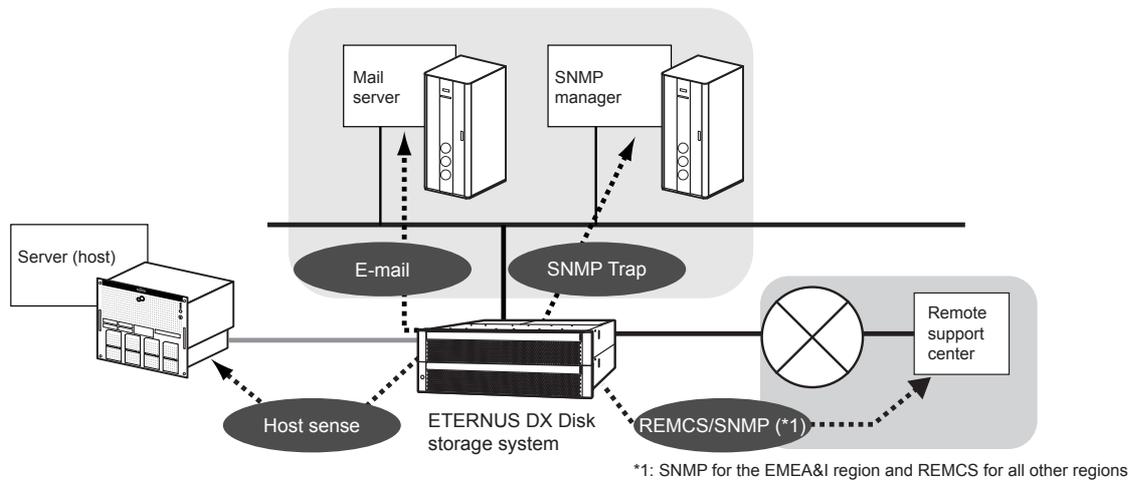
Figure 4.4   Event notification

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Chapter 5   Installing Optional Products

The following optional products can be installed in the ETERNUS DX Disk storage system:

- Disk
- Drive enclosure
- Controller
- Expander

This chapter explains the installation rules, handling instructions, and installation procedures for these optional products.

Disks and drive enclosures can be added by yourself.
However, be sure to read "Safety Precautions" before performing any of these installation procedures.

5.1   Installing Disks

Optional disks can be installed while the ETERNUS DX Disk storage system is running without affecting the system.
This section explains how to install optional disks.

⚠ CAUTION	Do Not 🚫

- Do not uninstall or move a disk that is already installed.
  Contact your sales representative or maintenance engineer if disks that are installed by default need to be uninstalled or moved to another slot.
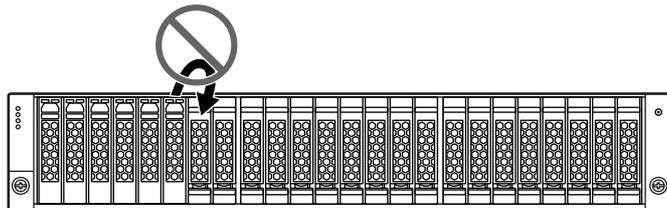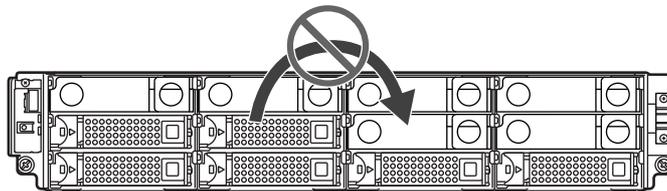
5.1.1　Installation Rules for Disks

This section explains the installation rules for disks.

■ 2.5" disks

2.5" disks can be installed in the front side of a 2.5" type controller enclosure.

Disks can be installed in any slots of an enclosure.
Figure 5.1 shows the positions of 2.5" disk slots.

Slot#0	Slot#1	Slot#2	Slot#3	Slot#4	Slot#5	Slot#6	Slot#7	Slot#8	Slot#9	Slot#10	Slot#11	Slot#12	Slot#13	Slot#14	Slot#15	Slot#16	Slot#17	Slot#18	Slot#19	Slot#20	Slot#21	Slot#22	Slot#23
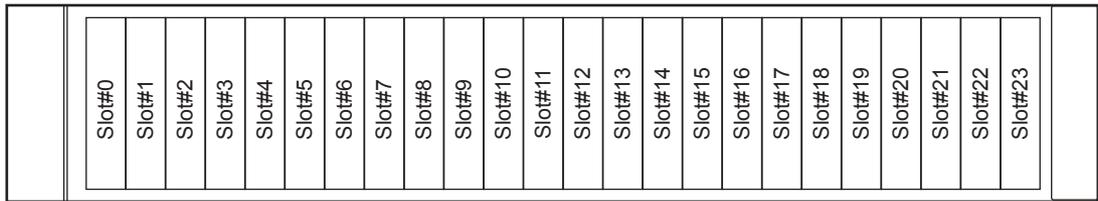
Figure 5.1　Position of 2.5" disk slots

⚠ WARNING

Do Not 🚫

- System disks are installed in Slot#0 and Slot#1. Never remove system disks. Doing so will render the ETERNUS DX Disk storage system unusable.

■ 3.5" disks

3.5" disks can be installed in the front side of a 3.5" type controller enclosure or a 3.5" type drive enclosure.

Different types of disks can be installed in the same enclosure. Disks can be installed in any slots of an enclosure.
Figure 5.2 shows the positions of 3.5" disk slots.

Slot#8	Slot#9	Slot#10	Slot#11
Slot#4	Slot#5	Slot#6	Slot#7
Slot#0	Slot#1	Slot#2	Slot#3
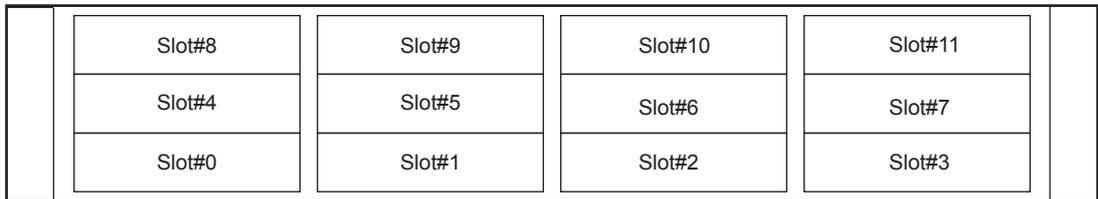
Figure 5.2　Position of 3.5" disk slots

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⚠ WARNING

Do Not
🚫

- System disks are installed in Slot#0 and Slot#1 of the controller enclosure. Never remove system disks. Doing so will render the ETERNUS DX Disk storage system unusable.

5.1.2   Installable Disks

Table 5.1 and Table 5.2 show the installable disks.

Table 5.1   Installable disks (2.5" disks)

Model name	Product name
ETED3HB-L, FTS:ETED3HB-L	Disk Drive(2.5inch) 300GB 10krpm x1 for DX60 S2
ETED4HB-L, FTS:ETED4HB-L	Disk Drive(2.5inch) 450GB 10krpm x1 for DX60 S2
ETED6HB-L, FTS:ETED6HB-L	Disk Drive(2.5inch) 600GB 10krpm x1 for DX60 S2
ETED9HB-L, FTS:ETED9HB-L	Disk Drive(2.5inch) 900GB 10krpm x1 for DX60 S2

Table 5.2   Installable disks (3.5" disks)

Model name	Product name
ETED3HA-L, FTS:ETED3HA-L	Disk Drive(3.5inch) 300GB 15krpm x1 for DX60 S2
ETED4HA-L, FTS:ETED4HA-L	Disk Drive(3.5inch) 450GB 15krpm x1 for DX60 S2
ETED6HA-L, FTS:ETED6HA-L	Disk Drive(3.5inch) 600GB 15krpm x1 for DX60 S2
ETEN1HA-L, FTS:ETEN1HA-L	Disk Drive(3.5inch) 1TB 7.2krpm x1 for DX60 S2
ETEN2HA-L, FTS:ETEN2HA-L	Disk Drive(3.5inch) 2TB 7.2krpm x1 for DX60 S2
ETEN3HA-L, FTS:ETEN3HA-L	Disk Drive(3.5inch) 3TB 7.2krpm x1 for DX60 S2

At time of purchase, the installable disk type may be different from those described.
To find the web-site to check the latest version of this manual, refer to "Read Me First".

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P3AM-5512-02ENZ0

5.1.3   Disk Handling Instructions

■ About condensation

<table>
<tr>
<td>

⚠ CAUTION

</td>
<td>

Do

❗

• When moving a disk from a cold place, such as an un-conditioned store house in winter, to a warmer places such as an air-conditioned room, the severe temperature change may result in condensation forming.
To avoid this, allow the packed disks sufficient time in the warmer place (one hour for each 15°C of temperature difference) to adapt to the new temperature.

</td>
</tr>
</table>

■ About static electricity

<table>
<tr>
<td>

⚠ CAUTION

</td>
<td>

Do Not

🚫

• Do not touch the surface of the board of the disks.

Do

❗

• When handling disks, make sure to wear a wrist strap or touch a metal part to discharge the human body's natural static electricity. Failure to discharge static electricity may cause device failure.
• Leave the disk in its package until ready to install it.

</td>
</tr>
</table>

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■ **About shock**

! CAUTION

Do Not

- Do not lay the disks directly on a desk or similar hard surface. Always use a rubber mat or other soft material to cushion the disks against physical shocks.
- Do not stack disks or stand disks on end.
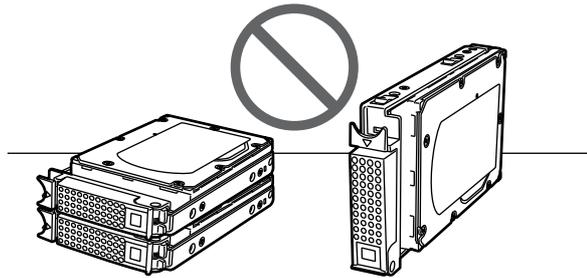
- Do not apply external force to the interface connectors.
- Do not knock or drop the disks on hard objects.

5.1.4   Additional Disk Installation Procedure

This section describes how to install additional disks in the ETERNUS DX Disk storage system.

⚠ CAUTION

Do

• If additional disks are installed in a way other as described in this section, damage and/or device failure or electrical shock may occur.

Do Not

• Do not install disks that are for use in other devices.

■ 2.5" disks

Procedure

1 Check that all components of the ETERNUS DX Disk storage system are in normal status, using the Storage System Status screen of ETERNUS Web GUI.

2 Wear a wrist strap or touch a metal part to discharge the human body's natural static electricity.

3 Remove the dummy disk unit from the slot in which the disk is to be installed.

Simultaneously push into the tabs in the upper and lower parts of the dummy disk unit, and pull it straight out of the disk slot.

Dummy disk unit
Tabs
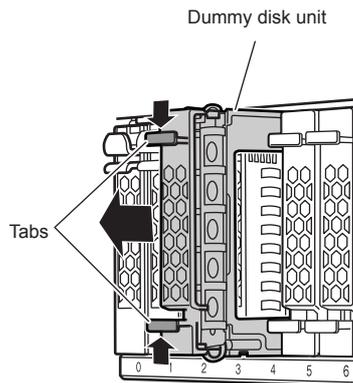
IMPORTANT   The removed dummy disk unit should be retained for future use.

4 Install the new disk.

  4-1 Press the catch on the disk lock lever to unlock it.

Catch
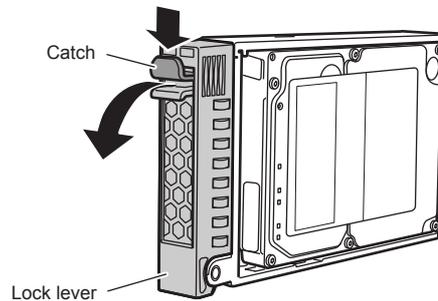
Lock lever

  4-2 Insert the disk all the way into in the slot, making sure that it is firmly seated and keeping the lock lever open.
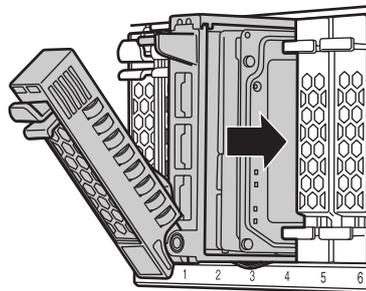
> IMPORTANT   Hold the disk with both hands to protect against jarring.

  4-3 Swing the lock lever in the direction of the arrow, until the lock clicks shut.

Lock lever
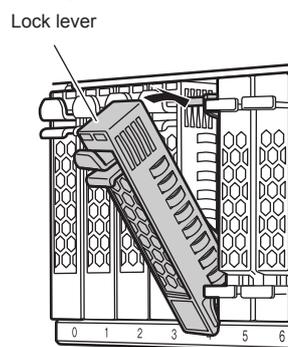
  4-4 Check that the newly installed disk's DISK READY LED lights up green after approximately 30 seconds.

5 Repeat Step 3 and Step 4 for each additional disk.

6 If a wrist strap is used, remove the wrist strap.

7 On the Storage System Status screen of ETERNUS Web GUI, check that the added disks have been recognized.

8   Set up RAID groups, volumes, hot spares, and Host Affinity settings on the new disks, as required.

End of procedure

■ 3.5" disks

Procedure

1   Check that all components of the ETERNUS DX Disk storage system are in normal status, using the Storage System Status screen of ETERNUS Web GUI.

2   Remove the front cover.

For details on how to attach the front cover, refer to "2.3 Attaching and Removing the Front Cover" (page 36).

3   Wear a wrist strap or touch a metal part to discharge the human body's natural static electricity.

4   Remove the dummy disk unit from the slot in which the disk is to be installed.

Hook your fingers and push into the holes of the dummy disk unit, and pull it straight out of the disk slot.
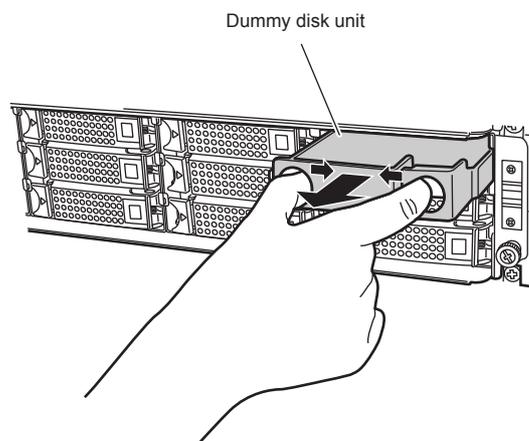
Dummy disk unit

IMPORTANT   The removed dummy disk unit should be retained for future use.

5 Install the new disk.

5-1 Press the catch on the disk lock lever to unlock it.

Catch
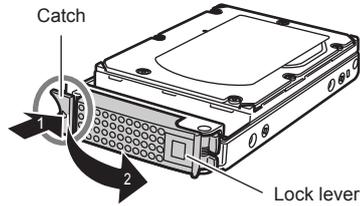
Lock lever

5-2 Insert the disk all the way into in the slot, making sure that it is firmly seated and keeping the lock lever open.
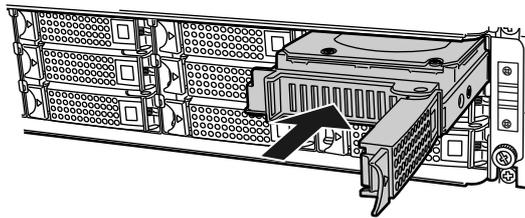
IMPORTANT
- Hold the disk with both hands to protect against jarring.
- Insert the disk until the lock lever hooks reach the slot protrusions.

5-3 Swing the lock lever in the direction of the arrow, until the lock clicks shut.
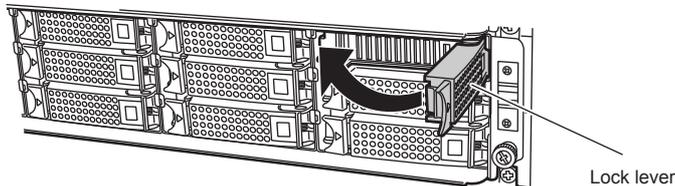
Lock lever

IMPORTANT   Make sure that the lock lever hooks have engaged the slot protrusions.

Lock lever hooks have engaged

Lock lever hooks have not engaged

Slot protrusion

Slot protrusion

Hook

Hook
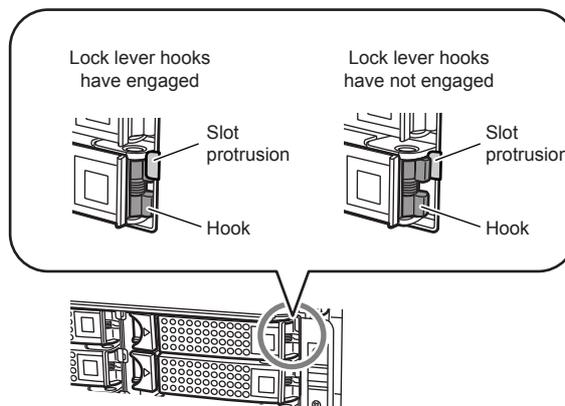
5-4 Check that the newly installed disk's DISK READY/FAULT LED lights up green after approximately 30 seconds.

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6 Repeat Step 4 and Step 5 for each additional disk.

7 Remove the wrist strap.

8 Remove the front cover.
  For details on how to attach the front cover, refer to "2.3 Attaching and Removing the Front Cover" (page 36).

9 On the Storage System Status screen of ETERNUS Web GUI, check that the added disks have been recognized.

10 Set up RAID groups, volumes, hot spares, and Host Affinity settings on the new disks, as required.

End of procedure

5.2　Installing Drive Enclosures

Optional drive enclosures can be installed while the ETERNUS DX Disk storage system is running without affecting the system.
This section explains how to install optional drive enclosures.

5.2.1　Installation Rules for Drive Enclosures

Only one drive enclosure can be connected to a 3.5" type controller enclosure.

Drive enclosures cannot be connected to 2.5" type controller enclosures.

5.2.2　Installable Drive Enclosures

Table 5.3 shows the installable drive enclosures.

Table 5.3　Installable drive enclosures

Model name	Product name
ETEED1DU-L, FTS:ETEED1DU-L	Drive enclosure for DX60 S2 (3.5inch, single-expander type)
ETEED2DU-L, FTS:ETEED2DU-L	Drive enclosure for DX60 S2 (3.5inch, dual-expander type)

At time of purchase, the installable drive enclosure model may be different from those described. To find the web-site to check the latest version of this manual, refer to "Read Me First".

5.2.3   Drive Enclosure Handling Instructions

■ About condensation

⚠ CAUTION	**Do**
	• When moving a drive enclosure from a cold place, such as an unconditioned store house in winter, to a warmer place such as an air-conditioned room, the severe temperature change may result in condensation forming. To avoid this, allow the packed drive enclosures sufficient time in the warmer place (one hour for each 15°C of temperature difference) to adapt to the new temperature.

■ About static electricity

⚠ CAUTION	**Do**
	• When handling drive enclosures, make sure to wear a wrist strap or touch a metal part to discharge the human body's natural static electricity. Failure to discharge static electricity may cause device failure.

■ About shock

⚠ CAUTION	**Do Not**
	• Do not handle the drive enclosure roughly or subject it to physical shocks when laying it down. • Do not stack the drive enclosures. • Do not knock or drop the drive enclosure on hard objects.

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5.2.4   Drive Enclosure Rack Installation Procedure

This section describes how to install a drive enclosure in a rack.

> ⚠ **CAUTION**
>
> Do
>
> - If drive enclosures are installed in a way other as described herein, damage and/or device failure or electrical shock may occur.
> - Do not install drive enclosures with cables, such as power cords, connected.
> - Do not knock the other devices installed in the rack when installing drive enclosures.

IMPORTANT
- Connect the cables after installing the drive enclosure in a rack by following the "Add Drive Enclosure" procedure of ETERNUS Web GUI.
- Install the disk after expanding the drive enclosure.

Procedure

1   Wear a wrist strap or touch a metal part to discharge the human body's natural static electricity.

2   Attach the rack rails to the rack.

■ For the EMEA&I region

(1) Attach the 2U rack rail to the left rear rack pillar.
The M5 centering screws should be inserted in the 1st and 6th holes above the base line of the controller enclosure.

2U Bracket

M5 Centering screws (10mm)
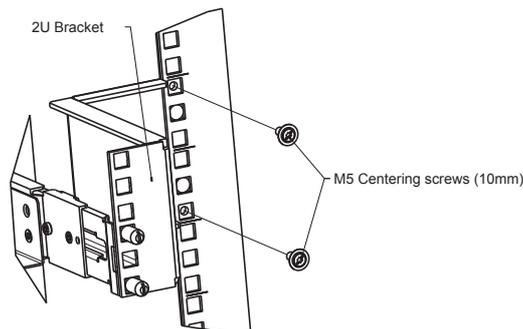
(2) Insert the pins of the left slide rail in the 1st and 3rd holes from the bottom of the 2U rack rail.
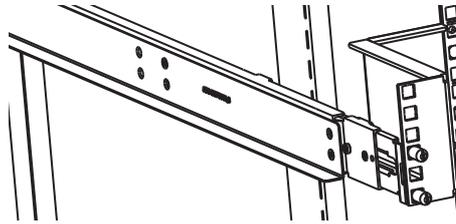
(3) Secure the left slide rail to the front pillar using the M5 centering screw and M5 pan head screws.
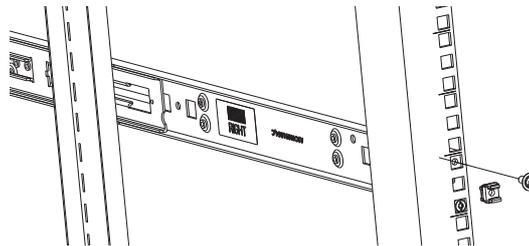
(4) For the right slide rail, insert the pins in the holes of the rear pillar, and secure the other side of the slide rail to the front pillar in the same way as the left slide rail.

M5 Centering screw (10mm)

M5 Cage nut

M5 Pan head screw (10mm)
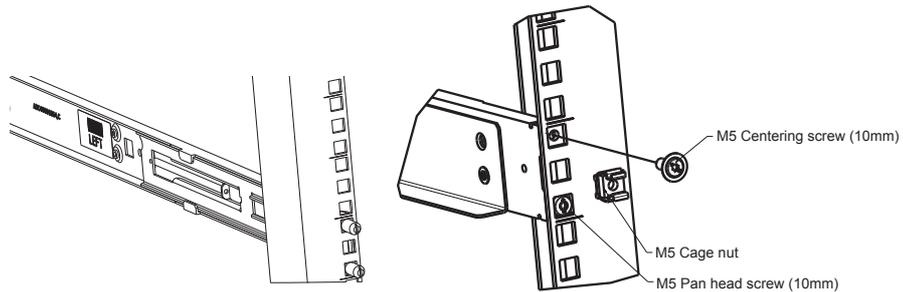
(5) Push the M5 cage nuts into the 2nd holes of the front rack pillars above the base line of the drive enclosure.
The M5 centering screw and M5 pan head screw positions for the slide rails and 2U rack rail are determined relatively to the base line of the drive enclosure.
Tighten the screws referring to the following figure.

[Left]   [Right]

3rd position (M5 centering screw)

2nd position (M5 cage nut)

2U   Drive enclosure

1st position (M5 pan head screw)

3rd position (M5 centering screw)

2nd position (M5 cage nut)

1st position (M5 pan head screw)

Base line of drive enclosure

Rack rails

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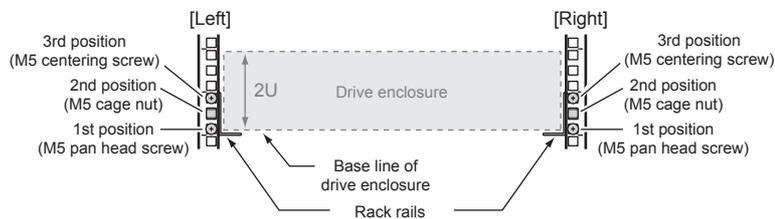
■ For regions other than EMEA&I

(1) Adjust the sizes of the rack rail (for left side) and the rack rail (for right side) to fit the rack.
Loosen the M4 screws to adjust the length of the rack rails to match the distance between the front and rear rack pillars. Leave the M4 screws slightly unscrewed, as the rack rail must be attached to the rack before they can be completely tightened.

(Rear rack pillars)

Loosen the M4 screws, and adjust the rack rails to the depth of the rack.

Rack rail (for left side)
"L" is stamped on the inner side of the rack rail (for left side).

[Left]

(Front rack pillars)

Rack rail (for right side)
"R" is stamped on the inner side of the rack rail (for right side).

[Right]
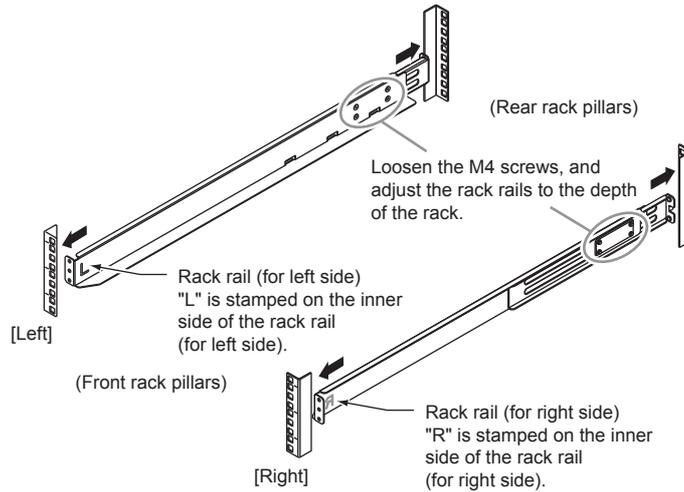
(2) Attach the rack rails to the rack.

> **Note**
> • If the rack pillars have square (approx. 9mm) holes, screw holders will need to be used when attaching the rack rails.
> • Make sure to attach the rack rails and rack pillars so that they fit exactly together without any space between them.

Washers

M5 screws

M5 screws

Rack rail (for left side)

(Rear rack pillars)

Washers

Washers

M5 screws

(Front rack pillars)

M5 screws

Rack rail (for right side)

Washers

ETERNUS DX60 S2 Disk storage system User's Guide -Operation-
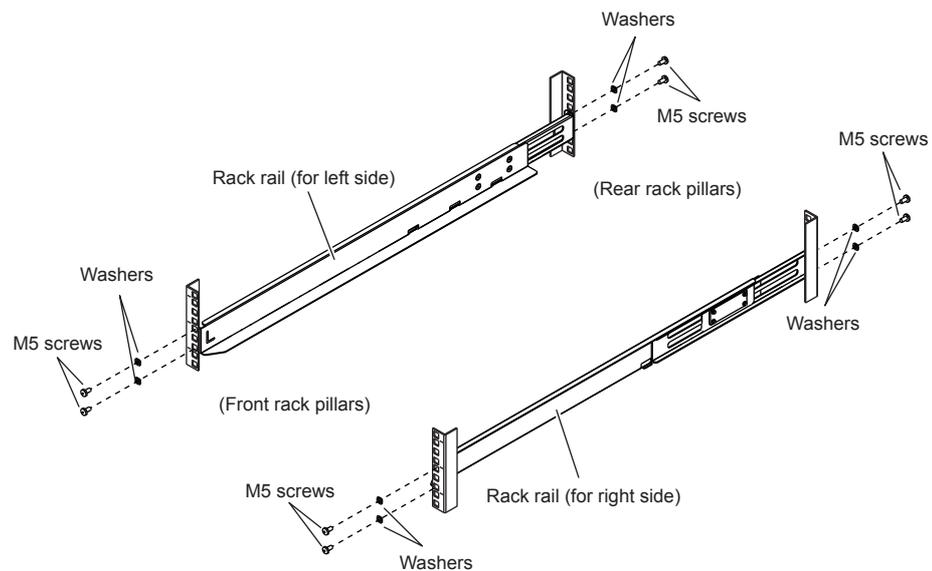
The M5 screw positions for the rack rails are determined relative to the drive enclosure base line.
The M5 screws should be inserted in the 1st and 3rd holes above the base line.
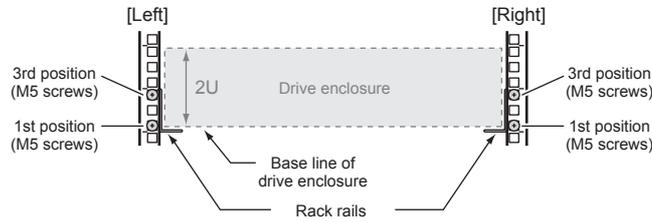
(3) Tighten the M4 screws of the rack rails that were slightly unscrewed in <u>Step (1)</u>.

3 Remove the front cover.

For details on how to attach the front cover, refer to <u>"2.3 Attaching and Removing the Front Cover" (page 36)</u>.

4 Install the drive enclosure in the rack.

> ⚠ CAUTION
>
> Do
>
> • When installing or removing the drive enclosure to or from the rack, make sure to have the right and left sides and the bottom of the drive enclosure by two or more people. Failure to do so may cause injury.

5 Fix the drive enclosure in the rack.

Use the two thumb screws at the front of the drive enclosure to fasten it in the rack.

ETERNUS DX60 S2 Disk storage system User's Guide -Operation-
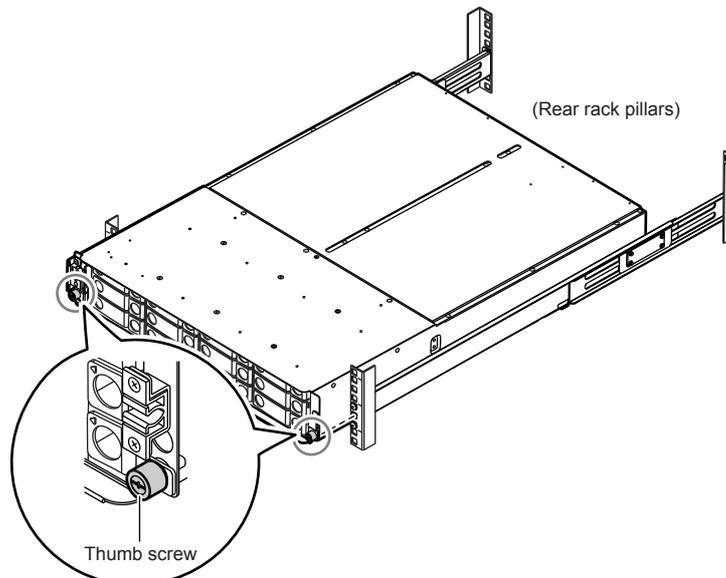
6 Check the settings of the AUTO POWER switch and the MODE SELECT switch.

- AUTO POWER switch
  Check that the AUTO POWER switch is set to the OFF position. Do not change to ON.

- MODE SELECT switch
  Check that the MODE SELECT switch is set to the ON position. Do not change to OFF.
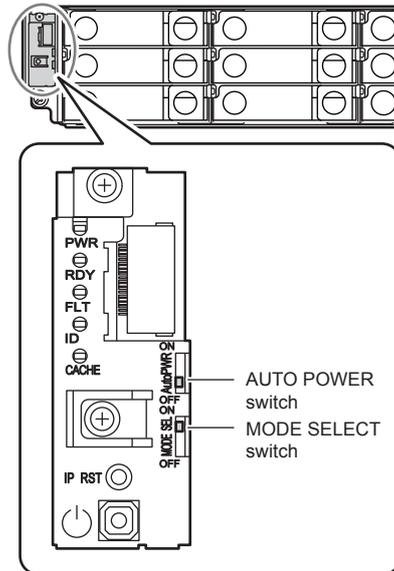
End of procedure

5.2.5   Additional Drive Enclosure Installation

This section explains how to install additional drive enclosures in the ETERNUS DX Disk storage system.

Procedure

1   Check that all components of the ETERNUS DX Disk storage system are in normal status, using the Storage System Status screen of ETERNUS Web GUI.

2   Wear a wrist strap or touch a metal part to discharge the human body's natural static electricity.

3   Click [Add Drive Enclosure] under the [Hardware Maintenance] menu on the [Maintenance] tab in the ETERNUS Web GUI screen.
The [Add Drive Enclosure] initial screen appears.

4   Click the [Next] button.
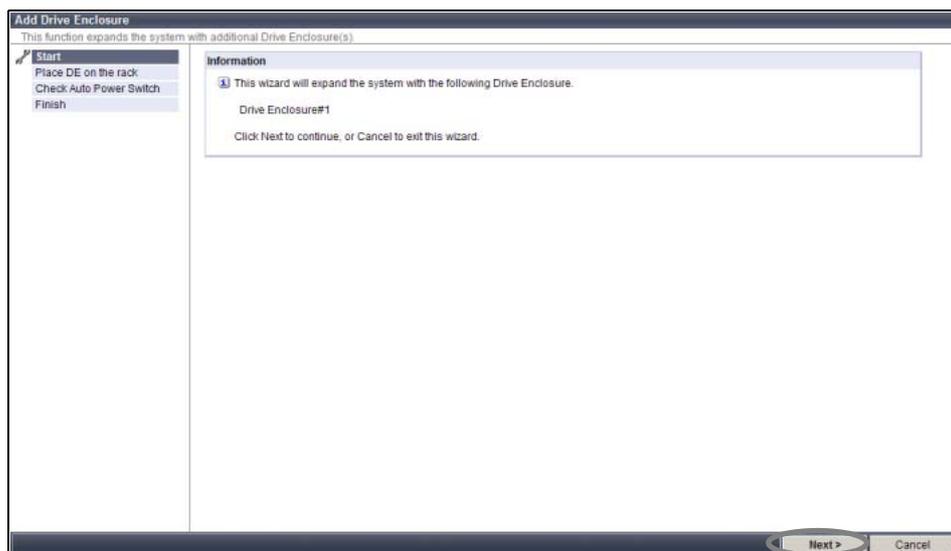
A screen to show how to install the drive enclosure appears.
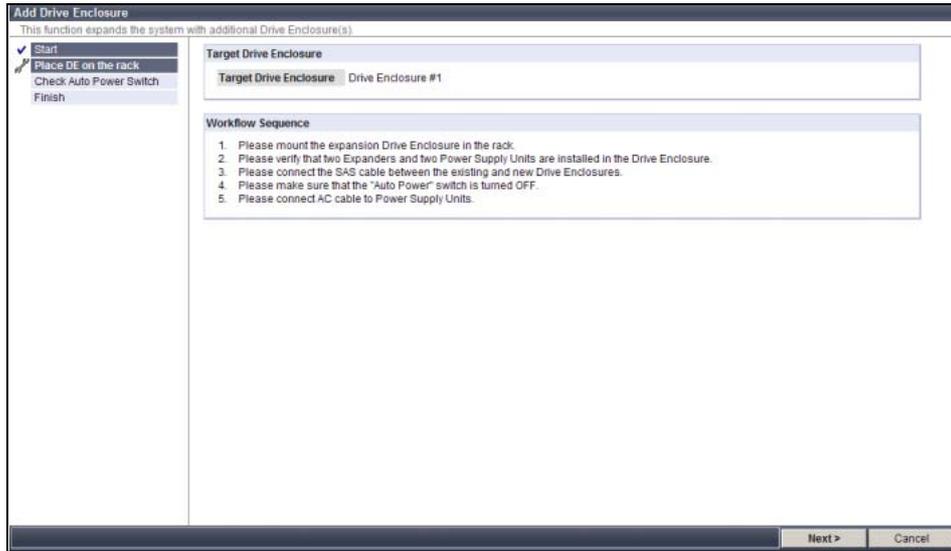
5 Connect the miniSAS cable (for drive enclosures).

5-1 Connect the DI (OUT) port at controller 0 (CM#0) of controller enclosure, to the DI (IN) port at expander 0 (EXP#0) of the drive enclosure 1 with the miniSAS cable.

(1) Connect the plug to be connected to DI (OUT) port, to the DI (OUT) port of the Controller 0 (CM#0).
Remove the port cover from the DI (OUT) port before inserting the plug.

Controller enclosure

ETERNUS DX60 S2 Disk storage system User's Guide -Operation-
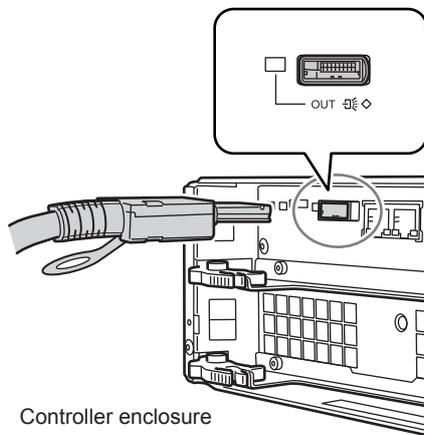
(2) Connect the plug to be connected to DI (IN) port, to the DI (IN) port of the expander 0 (EXP#0).
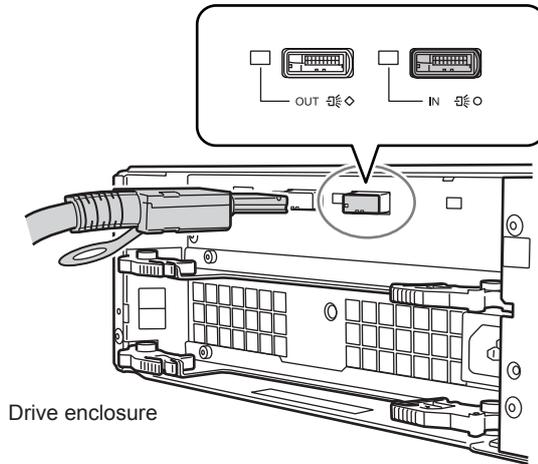
Drive enclosure

5-2 For a dual-controller type, connect the DI (OUT) port at controller 1 (CM#1) of controller enclosure, to the DI (IN) port at expander 1 (EXP#1) of the drive enclosure 1 with the miniSAS cable.
Connect the miniSAS cable in the same way as Step 5-1.

The following shows the miniSAS connection figure between controller enclosure and drive enclosure.

IMPORTANT Do not connect anything to the DI (OUT) port on the drive enclosure.

- For a single-controller type

Drive enclosure

Controller enclosure
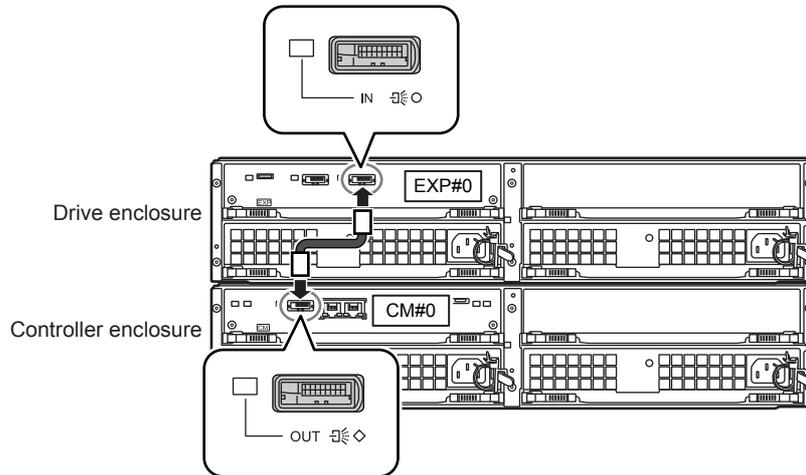
- For a dual-controller type
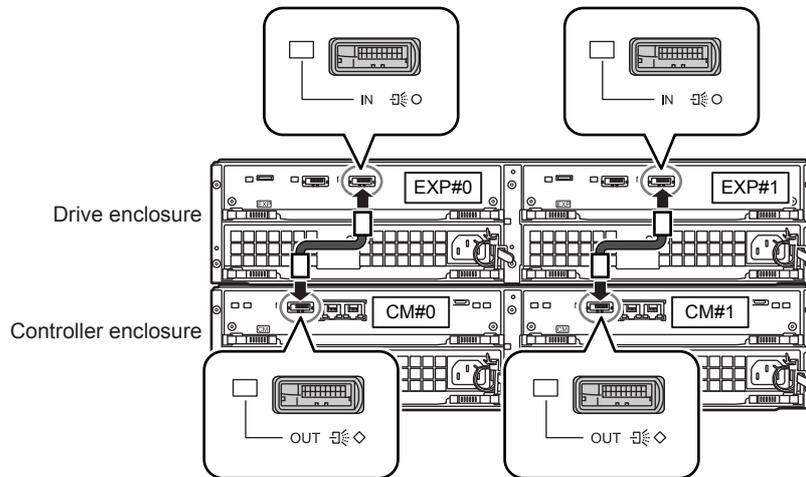
6   Connect the power cord to the drive enclosure.

IMPORTANT	A drive enclosure has two power supply units (PSU#0 and PSU#1). The power cords must be connected to the inlets of both power supply units.

6-1   Connect the power cord plugs to the inlets of the power supply units.
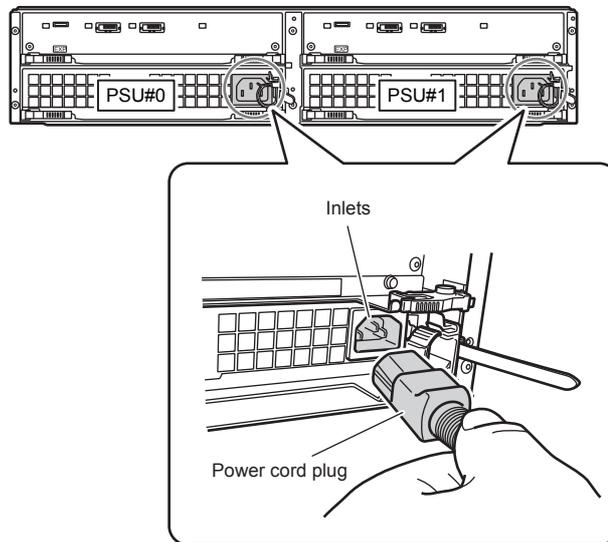
6-2   Fix the plug of the power cord with the release tie.
Wrap the release tie around the power cord. The release tie can be fastened from either side.

Release tie
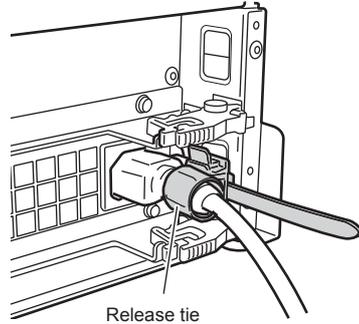
7   Connect the power cords to the socket.

Connect the plug at the other end of each power cord to the socket.

| IMPORTANT | Power supply failure can be prevented by connecting the power cords on the PSU#0 side and the PSU#1 side to different power sources. |

⚠ CAUTION

Do Not

• Do not use the server service outlet to connect a power cord for the ETERNUS DX Disk storage system.

The drive enclosure turns on.

8   Check that the drive enclosure's POWER LED and READY LED are on.

○ POWER
○ READY
○ FAULT
○ IDENTIFY   Drive enclosure
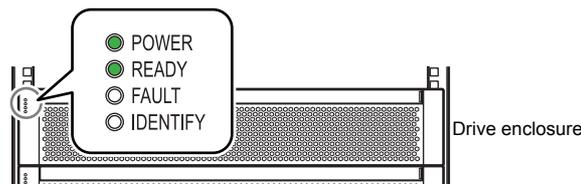
9   Click the [Next] button.

The drive enclosure recognition process is performed. When the process completes, the drive enclosure's AUTO POWER switch check procedure screen is displayed.

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10 Check the drive enclosure's AUTO POWER switch is OFF, and click the [Next] button.
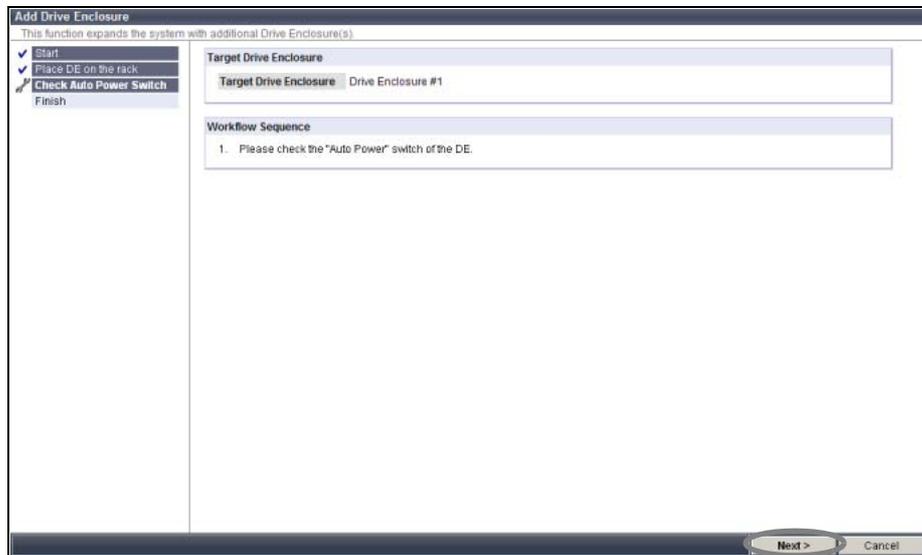
The expansion completion screen is displayed.

11 Click the [OK] button.

The [Add Drive Enclosure] screen is closed.

12 On the Storage System Status screen, check that the added drive enclosures have been recognized.

13 Install the disks.

Refer to "5.1.4 Additional Disk Installation Procedure" (page 59) for the appropriate procedure.

14 If a wrist strap is used, remove the wrist strap.

15 Attach the front cover.

For details on how to attach the front cover, refer to "2.3 Attaching and Removing the Front Cover" (page 36).

End of procedure

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Chapter 6 Maintenance

This chapter describes maintenance for the ETERNUS DX Disk storage system.

6.1 Periodic Backup

In case of a system failure, important data should be regularly backed up.

⚠ CAUTION

Do

- We recommend that you backup important data regularly. If the ETERNUS DX Disk storage system fails and the data has not been backed up, it may be lost.

6.2 Volume Formatting Time

Table 6.1 shows the time for volume formatting (when the volume capacity is 100GB).

Table 6.1   Time for volume formatting (disk)

RAID level	No. of disks	Volume formatting time (*1)		
		2.5" SAS disks	3.5" SAS disks	Nearline SAS disks
RAID1	2	Approx. 40 minutes/ 100GB	Approx. 35 minutes/ 100GB	Approx. 73 minutes/ 100GB
RAID1+0	8	Approx. 30 minutes/ 100GB	Approx. 25 minutes/ 100GB	Approx. 43 minutes/ 100GB
RAID5	5	Approx. 25 minutes/ 100GB	Approx. 25 minutes/ 100GB	Approx. 49 minutes/ 100GB
RAID5+0	6	Approx. 30 minutes/ 100GB	Approx. 25 minutes/ 100GB	Approx. 43 minutes/ 100GB
RAID6	6	Approx. 40 minutes/ 100GB	Approx. 30 minutes/ 100GB	Approx. 58 minutes/ 100GB

*1:   The value shows the time required for volume formatting when the volume capacity is 100GB and there is no server I/O. The time that is required depends on the type and configuration of the disk.

6.3 Rebuild/Copyback Process Time

This section explains the time required for Rebuild/Copyback.

■ Rebuild process time

Table 6.2 shows the time required for the rebuild process (when the volume capacity is 100GB).

Table 6.2   Rebuild process time (disk)

RAID level	No. of disks	Rebuild process time (*1)		
		2.5" SAS disks	3.5" SAS disks	Nearline SAS disks
RAID1	2	Approx. 27 minutes/ 100GB	Approx. 20 minutes/ 100GB	Approx. 47 minutes/ 100GB
RAID1+0	8	Approx. 7 minutes/ 100GB	Approx. 5 minutes/ 100GB	Approx. 11 minutes/ 100GB
RAID5	5	Approx. 10 minutes/ 100GB	Approx. 10 minutes/ 100GB	Approx. 15 minutes/ 100GB
RAID5+0	6	Approx. 7 minutes/ 100GB	Approx. 7 minutes/ 100GB	Approx. 11 minutes/ 100GB
RAID6	6	Approx. 13 minutes/ 100GB	Approx. 13 minutes/ 100GB	Approx. 21 minutes/ 100GB

*1:   The time required to rebuild a 100GB volume of the indicated RAID level, number and type of disks when there is no concurrent server I/O. The time that is required depends on the type and configuration of the disk.

■ Copyback process time

Table 6.3 shows the time required for the copyback process (when the volume capacity is 100GB).

Table 6.3   Copyback process time (disk)

RAID level	No. of disks	Copyback process time (*1)		
		2.5" SAS disks	3.5" SAS disks	Nearline SAS disks
RAID1	2	Approx. 27 minutes/ 100GB	Approx. 20 minutes/ 100GB	Approx. 49 minutes/ 100GB
RAID1+0	8	Approx. 7 minutes/ 100GB	Approx. 5 minutes/ 100GB	Approx. 11 minutes/ 100GB
RAID5	5	Approx. 10 minutes/ 100GB	Approx. 7 minutes/ 100GB	Approx. 16 minutes/ 100GB
RAID5+0	6	Approx. 7 minutes/ 100GB	Approx. 5 minutes/ 100GB	Approx. 11 minutes/ 100GB
RAID6	6	Approx. 13 minutes/ 100GB	Approx. 13 minutes/ 100GB	Approx. 20 minutes/ 100GB

*1:   The time required to copyback a 100GB volume of the indicated RAID level, number and type of disks when there is no concurrent server I/O. The time that is required depends on the type and configuration of the disk.

6.4 Maintenance Service

This section explains the ETERNUS DX Disk storage system maintenance service.

IMPORTANT	When performing maintenance service, the maintenance engineer connects a PC terminal used for maintenance to the ETERNUS DX Disk storage system. Also, the maintenance engineer may require information that is necessary for performing maintenance operations. If the maintenance engineer has any requirement, we ask that they be handled.

6.4.1 Maintenance Support Period

The standard maintenance support period for ETERNUS DX Disk storage system is five years from the date of purchase, or is defined in your service level agreement (SLA).

6.4.2 Related Service

■ Remote Support

If a possible error that may occur is detected or an error occurs when remote support is used, the contents of events are automatically sent to the remote support center and then the user is notified by the remote support center.

Chapter 7   Troubleshooting

This chapter explains troubleshooting when errors occur.

If you notice anything unusual during operation, then refer to to check the ETERNUS DX Disk storage system status, prepare the necessary information with , and contact your maintenance engineer.

- When the ETERNUS DX Disk storage system is turned off
- When the ETERNUS DX Disk storage system refuses to turn on
- When the READY LED is not on
- When the FAULT LED is on
- When the FAULT LED blinks
- When the ETERNUS DX Disk storage system cannot be connected via a network service
- When I/O access is slow
- When the server does not recognize the volumes

7.1   Check List

■ **When the ETERNUS DX Disk storage system is turned off**

Check the following points: If none of these resolve the problem, leave the ETERNUS DX Disk storage system alone and contact your maintenance engineer.

- Is the ETERNUS DX Disk storage system's power cord disconnected?

- Is main line switch of power distribution unit (MAIN LINE SWITCH) turned to OFF (O)?

- Is there a power failure?

- Has there been a recent main power failure?
  If the ETERNUS DX Disk storage system is in AC automatic power mode (i.e. AUTO POWER switch is turned to ON), the ETERNUS DX Disk storage system turns on automatically after the power is restored.

■ **When the ETERNUS DX Disk storage system refuses to turn on**

Check the following points: If none of these resolve the problem, leave the ETERNUS DX Disk storage system alone and contact your maintenance engineer.

- Is the ETERNUS DX Disk storage system's power cord disconnected?

- Is main line switch of power distribution unit (MAIN LINE SWITCH) turned to OFF (O)?

- Is there a power failure?

- Is the miniSAS cable (for drive enclosures) disconnected?

■ When the READY LED is not on

If more than ten minutes have passed since the ETERNUS DX Disk storage system's power was turned on and the READY LED still has not turned on, contact your maintenance engineer.

■ When the FAULT LED is on

Check the general status of ETERNUS Web GUI and perform the necessary action. If none of these resolve the problem, leave the ETERNUS DX Disk storage system alone and contact your maintenance engineer.

> **N o t e**   When checking the general status and detailed information on products via ETERNUS CLI, refer to "ETERNUS CLI User's Guide".

● When the general status of ETERNUS Web GUI is `Error`

• Check whether one side of the miniSAS cable (for drive enclosures) is connected. If not, install the connector in the DI port.

• Check if the miniSAS cable (for drive enclosures) is connected. If the miniSAS cable (for drive enclosures) is not connected, connect it with the following procedure.

Procedure

1 Press the controller enclosure's Power Switch for four seconds or more to turn off the ETERNUS DX Disk storage system.
Drive enclosures with no miniSAS cables connected will remain on.

2 Connect the miniSAS cable while the drive enclosure is on.

3 Press the controller enclosure's Power Switch to turn on the ETERNUS DX Disk storage system.

End of procedure

● When the general status of ETERNUS Web GUI is `Not Ready`

Check whether the miniSAS cables (for drive enclosures) are connected in the correct order. If not, reconnect the miniSAS cables in the following order.

Procedure

1 Press the controller enclosure's Power Switch for four seconds or more to turn off the ETERNUS DX Disk storage system, and turn off the AC power.

2 Re-connect the miniSAS cable.

3 Make sure that power is being supplied, then turn the ETERNUS DX Disk storage system on.

End of procedure

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■ When the FAULT LED blinks

Check the general status in ETERNUS Web GUI. A general status of [Warning] indicates that the
ETERNUS DX Disk storage system contains a component that requires preventive maintenance.
Use the Storage System Status screen's device tree to check the detailed information on the
component whose ⚠ image is on, and contact your maintenance engineer.

> N o t e   When checking the general status and detailed information on products via
ETERNUS CLI, refer to "ETERNUS CLI User's Guide".

■ When the ETERNUS DX Disk storage system cannot be connected via a network
service

Check the following points: If none of these resolve the problem, contact your maintenance
engineer.

- Is the ETERNUS DX Disk storage system turned off?

- Has the LAN cable become disconnected? For the dual controller model, does the controller
  to which the LAN cable is connected have an unlit MASTER LED?

- Have any network devices (such as LAN switch or router) failed? Are the network device
  settings invalid?

- Are the environment settings for the network service invalid?

- Is the IP address incorrect?

- Are the environment settings for the ETERNUS DX Disk storage system LAN port invalid?

If none of these problems are indicated, return the ETERNUS DX Disk storage system network
settings to their default values.

> IMPORTANT   Note that the settings (network environment settings) for all of the LAN
ports are initialized after the following procedure is performed.

Procedure

1 Remove the flange cover from the 2.5" type controller enclosure.
Remove the front cover from the 3.5" type controller enclosure.

For details on how to remove the flange cover, refer to "2.2 Attaching and Removing the
Flange Cover" (page 34).
For details on how to remove the front cover, refer to "2.3 Attaching and Removing the
Front Cover" (page 36).

2 Press the IP RESET Switch twice in a row within two seconds.

The setting information related to the network is returned to the factory default.

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3 Re-attach the flange cover from the 2.5" type controller enclosure.
Re-attach the front cover to the 3.5" type controller enclosure.

For details on how to attach the flange cover, refer to "2.2 Attaching and Removing the Flange Cover" (page 34).
For details on how to attach the front cover, refer to "2.3 Attaching and Removing the Front Cover" (page 36).

4 Access ETERNUS Web GUI or ETERNUS CLI by using the default IP address to perform the network environment settings.

IMPORTANT   Make sure that all of the desired network services are set to "Enable".

- If ETERNUS Web GUI is to be used, set "http" and/or "https" to "Enable". If "Disable" is set, ETERNUS Web GUI access to the ETERNUS DX Disk storage system is not allowed.
- If ETERNUS CLI is to be used, set "telnet" and/or "SSH" to "Enable". If "Disable" is set, ETERNUS CLI access to the ETERNUS DX Disk storage system is not allowed.
- If monitoring software is to be used, set "Maintenance" and/or "Maintenance-Secure" to "Enable". If "Disable" is set, monitoring software access to the ETERNUS DX Disk storage system is not allowed.
- If the "ping" command is to be used, set "ICMP" to "Enable". If "Disable" is set, the ETERNUS DX Disk storage system will not be able to respond to "pings".

5 Check that the ETERNUS DX Disk storage system can be connected to via each of the desired network services.
If not, contact your maintenance engineer.

End of procedure

■ When I/O access is slow

Check the following points: When the cause is not identified, contact your maintenance engineer.

- Check that the ambient temperature does not exceed the operating environment conditions.
  If so, Nearline SAS disk performance may be reduced.

- Click the icon of each part in the Storage System Status screen of ETERNUS Web GUI to check if an abnormality is detected in ETERNUS DX Disk storage system parts.
  If an abnormality is detected, contact your maintenance engineer.
- Check the controller status.
  When the controller fails, the data in cache memory is directly written to the disks. This causes temporary performance degradation.
  When the controller fails, contact your maintenance engineer.

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- Check the path status.

  - When using the ETERNUS Multipath Driver, start ETERNUS Multipath Manager.
    If an abnormality is detected in a path, refer to the ETERNUS Multipath Driver manuals
    and follow the direction given in the manuals.

  - When not using the ETERNUS Multipath Driver, use the path management tool and check
    the path status that each software provides, and handle the problem if necessary.

- Check the loading of the ETERNUS DX Disk storage system. If the load is out of balance
  because of operation content changing and so forth.

- Check the transfer speed of the FC port.
  If the transfer speed for the ETERNUS DX Disk storage system is different from the server or
  the FC switch, set the same transfer speed as the server or FC switch.

- Check the number of command queues in the server.
  When there are no problems in the process capacity of the server, adjust the number of
  command queues so that the I/Os are issued for the appropriate number.
  For details on the number of command queues, refer to "User's Guide -Server Connection-".

■ When the server does not recognize the volumes

Check the following points: If none of these resolve the problem, leave the ETERNUS DX Disk
storage system alone and contact your maintenance engineer.

- Check the status of the ETERNUS DX Disk storage system and other devices such as
  network devices connecting the server and the ETERNUS DX Disk storage system, and
  ensure that there are no problems with the power supply.

- Check if an error occurs in a path by using a path management tool such as ETERNUS
  Multipath Manager. Refer to the relevant manuals and take the required actions.

7.2   Required Information for Inquiries

Before contacting your maintenance engineer when trouble occurs, prepare the following information:
For details on the maintenance service, refer to "6.4 Maintenance Service" (page 78).

● The model name and the serial number of the ETERNUS DX Disk storage system

This information can be checked by using ETERNUS Web GUI, ETERNUS CLI, or the label on the front of the ETERNUS DX Disk storage system.

Device ID label

```
MODEL.  ( ETxxxxx )        — Model name
SERIAL. ( xxxxxxxxxx )     — Serial number
```

ETERNUS Web GUI screen
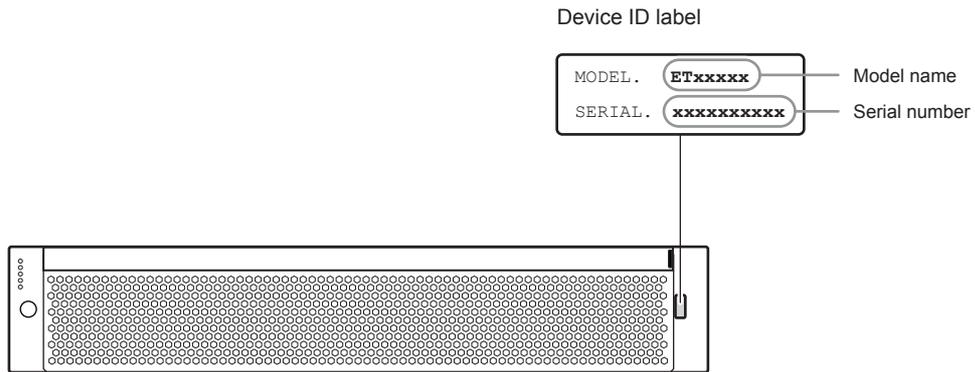
Model name - Serial number
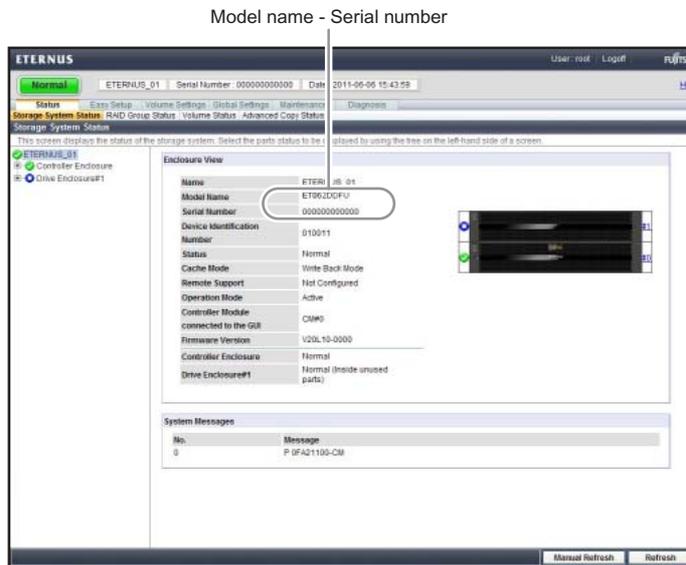
ETERNUS CLI ("show enclosure-status" command)

```
CLI> show enclosure-status
Enclosure View
Name                    [ETERNUS DX60 S2]
Model Upgrade Status    [Not Possible]
Model Name              [ETxxxxx]        — Model name
Serial Number           [xxxxxxxxxx]     — Serial number
  :
```

● Details about the trouble, any actions taken, and the results of these actions.

● The devices that are connected to the ETERNUS DX Disk storage system

  - The models of the server and network devices
  - The UPS model

● Log/dump information for the ETERNUS DX Disk storage system

When your maintenance engineer asks for the log/dump information of the ETERNUS DX Disk storage system, obtain the required log/dump information using the log/dump collection function of ETERNUS Web GUI.
Refer to "ETERNUS Web GUI User's Guide" for how to obtain this information.

Appendix A Event Notification Message List

This appendix describes the messages that are notified when event notification is enabled in the e-mail notification settings of ETERNUS Web GUI or ETERNUS CLI.

A.1 Message Format

This section describes the format and content of the event notification messages listed below.

- E-mail
- SNMP
- Host sense

A.1.1   E-Mail

An example of event notification by e-mail and its contents are shown below:

Subject	This is ETxxxxx[1] notification message. Serial No: 0000000000[2] (Information)[3]
| E-mail Notification Setup | ```
user comment.[4]

EVENT:
16 volume(s) created[5]

EVENT CODE: I 00000025[6]
SEVERITY:   Information[7]
REPORT NO:  0-0005[8]
DATE:       JAN 26 11:16:00 2011[9]
DETAIL:
Volume               Type        Capacity      RAID Group
    2:Volume0        Open            512MB     2:RAIDgrp
    3:Volume1        Open            512MB     2:RAIDgrp
    6:Volume2        Open            512MB     2:RAIDgrp
    7:Volume3        Open            512MB     2:RAIDgrp
    8:Volume4        Open            512MB     2:RAIDgrp
    9:Volume5        Open            512MB     2:RAIDgrp
   10:Volume6        Open            512MB     2:RAIDgrp
   11:Volume7        Open            512MB     2:RAIDgrp
   12:Volume8        Open            512MB     2:RAIDgrp
   13:Volume9        Open            512MB     2:RAIDgrp
   14:Volume10       Open            512MB     2:RAIDgrp
   15:Volume11       Open            512MB     2:RAIDgrp
   16:Volume12       Open            512MB     2:RAIDgrp
   17:Volume13       Open            512MB     2:RAIDgrp
   18:Volume14       Open            512MB     2:RAIDgrp
   19:Volume15       Open            512MB     2:RAIDgrp[10]
``` |

Number		Description
Subject	1	The model name of the ETERNUS DX Disk storage system is displayed.
	2	The serial number of the ETERNUS DX Disk storage system is displayed.

	3	The Severity of the event is displayed. One of the following items is displayed for the message:
		    Error: indicates an error
		    Warning: indicates a warning
		    Information: indicates that information is provided
		    Test: indicates a test mail

Number		Description
Message	4	A comment that is set using the e-mail notification setting of ETERNUS Web GUI or ETERNUS CLI is displayed.
	5	A message that indicates the event is displayed. Refer to "A.2 Message List" (page 92) for details.
	6	The message event type and the event code that are separated by a blank are displayed. One of the following letters is output as an event type: "P", "J", "M", "I", "R" Event code is an 8-digit hexadecimal number according to the message. Refer to "A.2 Message List" (page 92) for details.

	7	The Severity of the event is displayed. One of the following items is displayed for the message:
		    Error: indicates an error
		    Warning: indicates a warning
		    Information: indicates that information is provided
		    Test: indicates a test mail

	8	The event serial number, which increases from the startup of the ETERNUS DX Disk storage system, is displayed in the "x-$yyyy$" format.
		    x: Controller number (0 or 1)
		    $yyyy$: Serial number
		The event serial number is reset when the ETERNUS DX Disk storage system is turned on or restarted.

	9	The time when the event occurred is displayed in the "$Mmm\ dd\ hh{:}mm{:}ss\ yyyy$" format.
		    Mmm: Abbreviation of each month (Jan – Dec)
		    dd: Date. If the date is a single digit, "0" is output before the date number.
		    $hh{:}mm{:}ss$: "hh" indicates the hour (00 – 23), "mm" indicates minutes (00 – 59), and "ss" indicates seconds (00 – 59).
		    $yyyy$: The year is display with four digits.

	10	The detailed information of the event is displayed. For multiple process results, each process result is displayed on a separate line.

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A.1.2   SNMP

The ETERNUS DX Disk storage system supports SNMPv1.
To monitor the ETERNUS DX Disk storage system using SNMP Trap, software that can receive and analyze SNMP Traps must be used on the network.
This section describes the type and the notification format of Traps. For details on the messages that are notified by SNMP Trap, refer to .

■ Trap type

There are two types of Traps: Generic Trap (standard Trap) and Specific Trap (extended Trap). Generic Trap is a Trap that is defined by the SNMP protocol. Specific Trap is a Trap that has been created specifically for the ETERNUS DX Disk storage system. The ETERNUS DX Disk storage system supports the following types of Traps:

● Generic Trap (standard Trap)

Trap No.	Name	Description
0	coldStart	For an ETERNUS DX Disk storage system, this Trap is sent when the controller starts up and restarts and when SNMP is set.
4	authenticationFailure	An unauthorized access occurred.
6	enterpriseSpecific	Extended Trap

● Specific Trap (extended Trap)

Trap No.	Name	Description
2	fjdarye101ItemFault	This Trap is sent to notify that a component fails or degrades.
5	fjdarye101ItemWarning	This Trap is sent to notify that a component requires preventive maintenance.
6	fjdarye101SensorStatusChange	This Trap is sent to notify that a temperature error is detected.
7	fjdarye101MaintenanceRequired	This Trap is sent to notify that an event requires maintenance or preventive maintenance.
9	fjdarye101Information	This Trap is sent to notify Information-level events.
22	fjdarye101ItemFaultToNormal	This Trap is sent to notify that an event notified by Trap No. 2 returns to normal status.
25	fjdarye101ItemWarningToNormal	This Trap is sent to notify that an event notified by Trap No. 5 returns to normal status.
26	fjdarye101SensorStatusChangeToNormal	This Trap is sent to notify that an event notified by Trap No. 6 returns to normal status.

■ **Trap notification format**

The notification format of SNMPv1 is shown below.

● Generic Trap (standard Trap)

Trap type	enterprise	agent-address	generic-trap	specific-trap	time-stamp	variable-bindings
coldStart	1.3.6.1.2.1.11	The IP address of the Master CM for the port (MNT or RMT) that is specified in the SNMP Agent environment setting	0	0	The operation time of the SNMP Agent (centiseconds) The operation time is reset when the SNMP Agent starts or restarts.	N/A
authenticationFailure			4			N/A

● Specific Trap (extended Trap)

Trap type			enterprise	agent-address	generic trap	specific trap	time-stamp	variable-bindings
Trap No.	Name	Description						
2	fjdarye101 ItemFault	Notification of component failure or component degradation	1.3.6.1.4.1 .211.4.1.1. 126.1.101	The IP address of the Master CM for the port (MNT or RMT) that is specified in the SNMP Agent environment setting	6	2	The operation time of the SNMP Agent (centiseconds) The operation time is reset when the SNMP Agent starts or restarts.	Information[1]:fjdaryTrapItemId Information[2]:fjdarySspMachineId Information[3]:fjdaryTrapMessage
5	fjdarye101 ItemWarning	Notification of events that require preventive maintenance				5		Information[1]:fjdaryTrapItemId Information[2]:fjdarySspMachineId Information[3]:fjdaryTrapMessage Information[4]:fjdaryTrapWarningInfo
6	fjdarye101 SensorStatus Change	Notification of temperature error				6		Information[1]:fjdaryTrapItemId Information[2]:fjdarySspMachineId Information[3]:fjdaryTrapSensorInfo Information[4]:fjdaryTrapMessage
7	fjdarye101 Maintenance Required	Notification of events that require maintenance or preventive maintenance				7		Information[1]:fjdarySspMachineId Information[2]:fjdaryTrapMaintenanceInfo Information[3]:fjdaryTrapMessage
9	fjdarye101 Information	Information notification				9		Information[1]:fjdarySspMachineId Information[2]:fjdaryTrapMessage
22	fjdarye101 ItemFaultTo Normal	Notification of alarm cancel for Trap No. 2				22		Information[1]:fjdaryTrapItemId Information[2]:fjdarySspMachineId Information[3]:fjdaryTrapMessage
25	fjdarye101 ItemWarning ToNormal	Notification of alarm cancel for Trap No. 5				25		Information[1]:fjdaryTrapItemId Information[2]:fjdarySspMachineId Information[3]:fjdaryTrapMessage Information[4]:fjdaryTrapWarningInfo
26	fjdarye101 SensorStatus ChangeTo Normal	Notification of alarm cancel for Trap No. 6				26		Information[1]:fjdaryTrapItemId Information[2]:fjdarySspMachineId Information[3]:fjdaryTrapSensorInfo Information[4]:fjdaryTrapMessage

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● variable-bindings meanings

MIB object name	MIB object ID	Description
fjdarySspMachineId	1.3.6.1.4.1.211.1.21.1.101.1.1.0	Indicates the ID of the ETERNUS DX Disk storage system.
fjdaryTrapMessage	1.3.6.1.4.1.211.1.21.1.101.11.0	Indicates the Message (Event Code + ' ' (blank) + Event Message).
fjdaryTrapItemId	1.3.6.1.4.1.211.1.21.1.101.7.0	Indicates the value that identifies the component.
fjdaryTrapWarningInfo	1.3.6.1.4.1.211.1.21.1.101.10.0	Indicates additional information for an event that is used by Specific Trap No. 5 and Trap No. 25.
fjdaryTrapSensorInfo	1.3.6.1.4.1.211.1.21.1.101.8.0	Indicates additional information for an event that is used by Specific Trap No. 6 and Trap No. 26.
fjdaryTrapMaintenanceInfo	1.3.6.1.4.1.211.1.21.1.101.9.0	Indicates additional information for an event that is used by Specific Trap No. 7.

A.1.3　Host Sense

The ETERNUS DX Disk storage system returns the host sense (sense code) to the server when an error occurs in the ETERNUS DX Disk storage system.

The cause of the error can be determined by using SK (Sense Key), ASC (Additional Sense Code), and ASCQ (Additional Sense Code Qualifier) as the host sense.

The conversion pattern of the sense code that is notified to the server is set by using the host response settings of ETERNUS Web GUI or ETERNUS CLI.
For details on the sense code that is notified to the server, refer to .

A.2 Message List

This section describes the event notification messages for each severity.

A.2.1 Common Terms

The following table shows components and terms that are used in A.2.2 to A.2.4

Abbreviation	Meaning	Description
CM	Controller Module	Units that control all the operations in the device.
CE	Controller Enclosure	A cabinet to install the CMs, which are the main control sections of the ETERNUS DX Disk storage system.
DE	Drive Enclosure	Cabinets for installing disks.
FE Expander	Front-end Expander	A module in CE that provides communication path between CMs.
BE Expander	Back-end Expander	A module in CE that provides communication path between CM and DE.
DI	Drive Interface	Back-end interface module on CMs.
SCU	System Capacitor Unit	A device in a CM that supplies power to back up the cache memory data in the non-volatile memory when a power failure occurs.
SFP	Small Form Factor Pluggable	An SFP module that is installed in the host interface port.
EXP	Expander	Abbreviation for expanders.
DE Expander	DE Expander	A module in DE that provides communication path between CM and DE.
PSU	Power Supply Unit	Power supply units for units in CEs or DEs.

Abbreviation	Meaning
SMART	Self-Monitoring Analysis and Reporting Technology
F/W	Firmware

A.2.2   Error Messages

This section describes the messages that are sent when the severity is Error for each type of event.

■ Error message list

● When the event type is "P"

The following messages are sent when components fail or degrade or when a temperature error is detected.

| Event type and event code | SNMP Trap | | | Upper: Message | Remarks |
	Trap No.	TrapItemID	Trap Sensor Info	Lower: Description	
P 01*SSMM*00	2	0100*MM*00	-	Controller Module#*m*(*zz xx*Hz) Fault <*pppppppppppp ssssssssss rrrrr*>	These messages are notified when "Module was broken" is enabled for Error Severity Level in the event notification setting. They are not notified during maintenance operations.

				CM is disconnected.
				  SS: Component subtype
				  MM: CM module ID (10 – 11)
				  m: CM number (0 – 1)
				  zz: Model name (FC4G, SAS, or iSCSI)
				  xx: CPU frequency (1.2GHz)
				  pp...: Component number
				  ss...: Serial number
				  rr...: Version	

P 06*SSMM*00	2	0600*MM*00	-	Controller Module#*m*(*zz xx*Hz) BE Expander Fault <*pppppppppppp ssssssssss rrrrr*>	

				CM EXP is disconnected.
				  SS: Component subtype
				  MM: CM module ID (10 – 11)
				  m: CM number (0 – 1)
				  zz: Model name (FC4G, SAS, or iSCSI)
				  xx: CPU frequency (1.2GHz)
				  pp...: Component number
				  ss...: Serial number
				  rr...: Version	

P 08*SSMM*0*p*	2	0800*MM*0*p*	-	Controller Module#*m*(*zz xx*Hz) DI Port#*p* Fault <*pppppppppppp ssssssssss rrrrr*>	

				CM DI Port is disconnected.
				  SS: Component subtype
				  MM: CM module ID (10 – 11)
				  p: Port number (0 – 1)
				  m: CM number (0 – 1)
				  zz: Model name (FC4G, SAS, or iSCSI)
				  xx: CPU frequency (1.2GHz)
				  pp...: Component number
				  ss...: Serial number
				  rr...: Version	

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Event type and event code	SNMP Trap			Upper: Message	Remarks
	Trap No.	TrapItemID	Trap Sensor Info	Lower: Description	
P 09*SSMM*00	2	0900*MM*00	–	Controller Module#*m*(*zz xx*Hz) SAS Port Fault <*pppppppppppp ssssssssss rrrrr*>	These messages are notified when "Module was broken" is enabled for Error Severity Level in the event notification setting. They are not notified during maintenance operations.

				CM SAS Port is disconnected.
				    SS: Component subtype
				    MM: CM module ID (10 – 11)
				    m: CM number (0 – 1)
				    zz: Model name (FC4G, SAS, or iSCSI)
				    xx: CPU frequency (1.2GHz)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

P 0A*SSMM*0*p*	2	0A00*MM*0*p*	–	Controller Module#*m*(*zz xx*Hz) BE Expander Port#*p* Fault <*pppppppppppp ssssssssss rrrrr*>	

				CM BE Expander Port is disconnected.
				    SS: Component subtype
				    MM: CM module ID (10 – 11)
				    p: Port number (0 – 2)
				    m: CM number (0 – 1)
				    zz: Model name (FC4G, SAS, or iSCSI)
				    xx: CPU frequency (1.2GHz)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

P 0B*SSMM*00	2	0B00*MM*00	–	Controller Module#*m*(*zz xx*Hz) Cache(MEM) Fault <*pppppppppppp ssssssssss rrrrr*>	

				CM memory is disconnected.
				    SS: Component subtype
				    MM: CM module ID (10 – 11)
				    m: CM number (0 – 1)
				    zz: Model name (FC4G, SAS, or iSCSI)
				    xx: CPU frequency (1.2GHz)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

P 0C*SSMM*00	2	0C00*MM*00	–	Controller Module#*m*(*zz xx*Hz) Flash ROM Fault <*pppppppppppp ssssssssss rrrrr*>	

				CM Flash ROM is disconnected.
				    SS: Component subtype
				    MM: CM module ID (10 – 11)
				    m: CM number (0 – 1)
				    zz: Model name (FC4G, SAS, or iSCSI)
				    xx: CPU frequency (1.2GHz)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

Event type and event code	SNMP Trap			Upper: Message	Remarks
	Trap No.	TrapItemID	Trap Sensor Info	Lower: Description	
P 0E*SSMM*00	2	0E00*MM*00	-	Controller Module#*m*(*zz xx*Hz) NAND Controller Fault <*pppppppppppp ssssssssss rrrrr*>	These messages are notified when "Module was broken" is enabled for Error Severity Level in the event notification setting. They are not notified during maintenance operations.

				NAND Controller is disconnected.
				    SS: Component subtype
				    MM: CM module ID (10 – 11)
				    m: CM number (0 – 1)
				    zz: Model name (FC4G, SAS, or iSCSI)
				    xx: CPU frequency (1.2GHz)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

P 0F*SSMM*00	2	0F00*MM*00	-	Controller Module#*m*(*zz xx*Hz) SCU Fault <*pppppppppppp ssssssssss rrrrr*>	

				SCU is disconnected.
				    SS: Component subtype
				    MM: CM module ID (10 – 11)
				    m: CM number (0 – 1)
				    zz: Model name (FC4G, SAS, or iSCSI)
				    xx: CPU frequency (1.2GHz)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

P 11*SSMM*0*p*	2	1100*MM*0*p*	-	Controller Module#*m*(*zz xx*Hz) Port#*p* Fault <*pppppppppppp ssssssssss rrrrr*>	

				CM Port is disconnected.
				    SS: Component subtype
				    MM: CM module ID (10 – 11)
				    p: Port number (0 – 1)
				    m: CM number (0 – 1)
				    zz: Model name (FC4G, SAS, or iSCSI)
				    xx: CPU frequency (1.2GHz)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

P 12*SSMM*00	2	1200*MM*00	-	Controller Module#*m*(*zz xx*Hz) FE Expander Fault <*pppppppppppp ssssssssss rrrrr*>	

				CM FE Expander is disconnected.
				    SS: Component subtype
				    MM: CM module ID (10 – 11)
				    m: CM number (0 – 1)
				    zz: Model name (FC4G, SAS, or iSCSI)
				    xx: CPU frequency (1.2GHz)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

Event type and event code	SNMP Trap			Upper: Message	Remarks
	Trap No.	TrapItemID	Trap Sensor Info	Lower: Description	
P 13*SSMM*0*p*	2	1300*MM*0*p*	-	Controller Module#*m*(*zz xx*Hz) FE Expander Port#*p* Fault <*pppppppppppp ssssssssss rrrrr*>	These messages are notified when "Module was broken" is enabled for Error Severity Level in the event notification setting. They are not notified during maintenance operations.

				CM FE Expander Port is disconnected.
				    SS: Component subtype
				    MM: CM module ID (10 – 11)
				    p: Port number (0 – 1)
				    m: CM number (0 – 1)
				    zz: Model name (FC4G, SAS, or iSCSI)
				    xx: CPU frequency (1.2GHz)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

P 1A00MM0*p*	2	1A00*MM*0*p*	-	FC SFP Controller Module#*m* Port#*p* Fault <*pppppppppppppppp ssssssssssssssss rrrr oooooooo*>	

				SFP is disconnected.
				    MM: CM module ID (10 – 11)
				    p: Port number (0 – 1)
				    m: CM number (0 – 1)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version
				    oo...: Additional information	

P 80*SSdd*0*N*	2	8000*dd*0*N*	-	Disk Drive DE#*dd*-Disk#*n*(SAS *xxx*GB *yy*krpm *ccccccc*) Fault <*pppppppppppp ssssssssssss rrrr*>	These messages are notified when "Disk was broken" is enabled for Error Severity Level in the event notification setting. They are not notified during maintenance operations.

				3.5 inch Disk is disconnected.
				    SS: Component subtype
				    dd: DE-ID ("00" for a controller enclosure)
				    N: Disk slot number (0 – b (hexadecimal))
				    n: Disk slot number (0 – 11 (decimal))
				    xxx: Disk capacity (GB/TB)
				    yy: Disk speed
				    cc...: Disk information (RAID level or hot spare (Spare))
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

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| Event type and event code | SNMP Trap | | | Upper: Message | Remarks |
	Trap No.	TrapItemID	Trap Sensor Info	Lower: Description	
P 80*SSdd*0*N*	2	8000*dd*0*N*	–	Disk Drive DE#*dd*-Disk#*n*(SAS *xxx*GB *yy*krpm *cccccc*) Failed Usable <*pppppppppppp ssssssssssss rrrr*>	These messages are notified when "Disk was broken" is enabled for Error Severity Level in the event notification setting. They are not notified during maintenance operations.

				3.5 inch Disk is disconnected.
				    SS: Component subtype
				    dd: DE-ID ("00" for a controller enclosure)
				    N: Disk slot number (0 – b (hexadecimal))
				    n: Disk slot number (0 – 11 (decimal))
				    xxx: Disk capacity (GB/TB)
				    yy: Disk speed
				    cc...: Disk information (RAID level or hot spare (Spare))
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

P 81*SSddNN*	2	8000*ddNN*	–	Disk Drive DE#*dd*-Disk#*nn*(SAS *xxx*GB *yy*krpm *cccccc*) Fault <*pppppppppppp ssssssssssss rrrr*>	

				2.5 inch Disk is disconnected.
				    SS: Component subtype
				    dd: DE-ID ("00" for a controller enclosure)
				    NN: Disk slot number (0 – 17 (hexadecimal))
				    nn: Disk slot number (0 – 23 (decimal))
				    xxx: Disk capacity (GB/TB)
				    yy: Disk speed
				    cc...: Disk information (RAID level or hot spare (Spare))
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

P 81*SSddNN*	2	8000*ddNN*	–	Disk Drive DE#*dd*-Disk#*nn*(SAS *xxx*GB *yy*krpm *cccccc*) Failed Usable <*pppppppppppp ssssssssssss rrrr*>	

				2.5 inch Disk is disconnected.
				    SS: Component subtype
				    dd: DE-ID ("00" for a controller enclosure)
				    NN: Disk slot number (0 – 17 (hexadecimal))
				    nn: Disk slot number (0 – 23 (decimal))
				    xxx: Disk capacity (GB/TB)
				    yy: Disk speed
				    cc...: Disk information (RAID level or hot spare (Spare))
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

Event type and event code	SNMP Trap			Upper: Message	Remarks
	Trap No.	TrapItemID	Trap Sensor Info	Lower: Description	
P 88*SSddNN*	2	8000*ddNN*	-	Disk Drive DE#*dd*-Disk#*nn*(SAS *xxx*GB *yy*krpm *cccccc*) Fault <*ppppppppppppp ssssssssssss rrrr*>	This message are notified when the relevant event is detected during Disk Patrol.

				Disk is disconnected because an error was detected by Disk Patrol.
				    SS: Component subtype
				    dd: DE-ID ("00" for a controller enclosure)
				    NN: Disk slot number (hexadecimal)
				        3.5 inch disks: 0 – 0b
				        2.5 inch disks: 0 – 17
				    nn: Disk slot number (decimal)
				        3.5 inch disks: 0 – 11
				        2.5 inch disks: 0 – 23
				    xxx: Disk capacity (GB/TB)
				    yy: Disk speed
				    cc...: Disk information (RAID level or hot spare (Spare))
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

P 90*SSdd*0*n*	2	9000*dd*0*n*	-	Expander DE#*dd*/EXP#*n* Fault <*ppppppppppppp sssssssssss rrrrr*>	These messages are notified when "Module was broken" is enabled for Error Severity Level in the event notification setting. They are not notified during maintenance operations.

				DE Expander is disconnected.
				    SS: Component subtype
				    dd: DE-ID ("00" for a controller enclosure)
				    n: EXP number (0 – 1)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

P 91*SSddnp*	2	9100*ddnp*	-	Expander Port DE#*dd*/EXP#*n*/Port#*p* Fault <*ppppppppppppp sssssssssss rrrrr*>	

				DE Expander Port is disconnected.
				    SS: Component subtype
				    dd: DE-ID ("00" for a controller enclosure)
				    n: EXP number (0 – 1)
				    p: Port number (0 – 1)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

P D2*SSdd*0*n*	2	D200*dd*0*n*	-	Power Supply Unit DE#*dd*/PSU#*n* Fault <*ppppppppppppp sssssssssss rrrr*>	These messages are notified when "Module was broken" is enabled for Error Severity Level in the event notification setting. They are not notified during maintenance operations.

				PSU is disconnected.
				    SS: Component subtype
				    dd: DE-ID ("00" for a controller enclosure)
				    n: PSU slot number (0 – 1)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

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Event type and event code	SNMP Trap			Upper: Message	Remarks
	Trap No.	TrapItemID	Trap Sensor Info	Lower: Description	
P DA*SSdd*00	6	DA00*dd*00	2	DE Exhaust temperature DE#*dd* Fatal	These messages are notified when "Module was broken" is enabled for Error Severity Level in the event notification setting. They are not notified during maintenance operations.
				CE exhaust temperature error or DE exhaust temperature error (fatal error) is detected. *SS*: Component subtype *dd*: DE-ID ("00" for a controller enclosure)	
P DA*SSdd*00	2	DA00*dd*00	-	DE Exhaust temperature sensor DE#*dd* Fault	
				CE exhaust temperature error or DE exhaust temperature error (sensor failure) is detected. *SS*: Component subtype *dd*: DE-ID ("00" for a controller enclosure)	
P DB*SSdd*00	2	DB00*dd*00	-	DE Intake temperature sensor DE#*dd* Fault	
				CE intake temperature error or DE intake temperature error (sensor failure) is detected. *SS*: Component subtype *dd*: DE-ID ("00" for a controller enclosure)	

● When the event type is "M"

The following messages are sent when an event that requires maintenance occurs:

Event type and event code	SNMP Trap		Upper: Message	Remarks
	Trap No.	Trap Maintenance Info	Lower: Description	
M 21810*xxx*	7	21810*xxx*	RAID Group#0*xxx* recovered end of Rebuild processing	These messages are notified when "RAID Degradation Event" is enabled for Warning Level in the event notification setting. They are not notified during maintenance operations.
			Rebuilding to a hot spare or a replaced disk is complete, but Bad Data (data lost identifier) exists. *xxx*: RAID group number	
M E005n*xxx*	7	E005*xxxx*	WRITE BAD DATA	
			Writing of Bad Data (data lost identifier) occurs. *xxx*: RAID group number	
M E10300*xx*	7	E10300*xx*	PINNED DATA was created CM#*m*	These messages are notified when the relevant event occurs.
			Pinned Data occurs. *xx*: CM module ID in which Pinned Data occurred *m*: CM number in which Pinned Data occurred	
M E2070001	7	E2070001	NOT READY(01:Configuration Error)	
			The device is in Not Ready status. Shipment settings (model setting) and configurations are not applied.	
M E2070002	7	E2070002	NOT READY(02:CM F/W Version Error)	
			The device is in Not Ready status. Firmware version for the CM is not correct.	
M E2070004	7	E2070004	NOT READY(04:Restore Fail)	
			The device is in Not Ready status. Backup is successfully complete, but cannot perform the restoration.	

Event type and event code	SNMP Trap		Upper: Message	Remarks
	Trap No.	Trap Maintenance Info	Lower: Description	
M E207000B	7	E207000B	NOT READY(11:Power Off/Fail Incomplete)	These messages are notified when the relevant event occurs.
			The device is in Not Ready status. Failed to power off. Or the device power turns off immediately after the device powers on.	
M E207000C	7	E207000C	NOT READY(12:Backup Fail)	
			The device is in Not Ready status. Backup failed.	
M E207000D	7	E207000D	NOT READY(13:Multi CM Down)	
			The device is in Not Ready status. Adjoining CMs with LUs are degraded.	
M E207000E	7	E207000E	NOT READY(14:Machine Down Recovery End)	
			The device is in Not Ready status. Machine down recovery is performed.	
M E207000F	7	E207000F	NOT READY(15:Machine Down Recovery Failed)	
			The device is in Not Ready status. Failed to perform machine down recovery.	
M E2070010	7	E2070010	NOT READY(16:DE Build Error)	
			The device is in Not Ready status. Failed to configure DE because of miniSAS cable errors or FC cable errors.	
M E2070011	7	E2070011	NOT READY(17:CM Memory Shortage)	
			The device is in Not Ready status. Memory capacities are smaller than the minimum value in multiple CMs.	
M E2070015	7	E2070015	NOT READY(21:Configuration Data restored from System Disk)	
			Maintenance is performed for the CM in cold mode. The ETERNUS DX Disk storage system normally powers off and then on, and the status becomes Ready.	
M E2070016	7	E2070016	NOT READY(22:No Version)	
			The device is in Not Ready status. The version table is invalid.	

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A.2.3   Warning Messages

This section describes the messages that are sent when the severity is Warning.

■ Warning message list

The following messages are sent when components require maintenance or preventive mainte-
nance, when the battery reaches its expiration date, for unusual temperatures, and for other
warning events.

Event type and event code	SNMP Trap			Upper: Message	Remarks
	Trap No.	TrapItemID	(*1)	Lower: Description	
J 01*SSMM*00	5	0100*MM*00	0x*ww*	Controller Module#*m*(*zz xx*Hz) Warning factor(*ww*) <*pppppppppppp ssssssssss rrrrr*>	These messages are notified when "Module reported a Warning" is enabled for Warning Severity Level in Setup Event Notification. They are not notified during maintenance operations.

				CM error other than above is detected.
				    SS: Component subtype
				    MM: CM module ID (10 – 11)
				    m: CM number (0 – 1)
				    zz: Model name (FC4G, SAS, or iSCSI)
				    xx: CPU frequency (1.2GHz)
				    ww: Factor code
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

J 06*SSMM*00	5	0600*MM*00	0x00	Controller Module#*m*(*zz xx*Hz) BE Expander Warning <*pppppppppppp ssssssssss rrrrr*>	

				CM BE Expander error is detected.
				    SS: Component subtype
				    MM: CM module ID (10 – 11)
				    m: CM number (0 – 1)
				    zz: Model name (FC4G, SAS, or iSCSI)
				    xx: CPU frequency (1.2GHz)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

J 08*SSMM*0*p*	5	0800*MM*0*p*	0x00	Controller Module#*m*(*zz xx*Hz) DI Port#*p* Warning <*pppppppppppp ssssssssss rrrrr*>	

				CM DI Port error is detected.
				    SS: Component subtype
				    MM: CM module ID (10 – 11)
				    p: Port number (0 – 1)
				    m: CM number (0 – 1)
				    zz: Model name (FC4G, SAS, or iSCSI)
				    xx: CPU frequency (1.2GHz)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

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Event type and event code	SNMP Trap			Upper: Message	Remarks
	Trap No.	TrapItemID	(*1)	Lower: Description	
J 09*SSMM*00	5	0900*MM*00	0x00	Controller Module#*m*(*zz xx*Hz) SAS Port Warning <*pppppppppppp ssssssssss rrrrr*>	These messages are notified when "Module reported a Warning" is enabled for Warning Severity Level in Setup Event Notification. They are not notified during maintenance operations.

				CM SAS Port error is detected.
				  SS: Component subtype
				  MM: CM module ID (10 – 11)
				  m: CM number (0 – 1)
				  zz: Model name (FC4G, SAS, or iSCSI)
				  xx: CPU frequency (1.2GHz)
				  pp...: Component number
				  ss...: Serial number
				  rr...: Version	

J 0A*SSMM*0*p*	5	0A00*MM*0*p*	0x00	Controller Module#*m*(*zz xx*Hz) BE Expander Port#*p* Warning <*pppppppppppp ssssssssss rrrrr*>	

				CM BE Expander Port error is detected.
				  SS: Component subtype
				  MM: CM module ID (10 – 11)
				  p: Port number (0 – 2)
				  m: CM number (0 – 1)
				  zz: Model name (FC4G, SAS, or iSCSI)
				  xx: CPU frequency (1.2GHz)
				  pp...: Component number
				  ss...: Serial number
				  rr...: Version	

J 0C*SSMM*00	5	0C00*MM*00	0x00	Controller Module#*m*(*zz xx*Hz) Flash ROM Warning <*pppppppppppp ssssssssss rrrrr*>	

				CM Flash ROM error is detected.
				  SS: Component subtype
				  MM: CM module ID (10 – 11)
				  m: CM number (0 – 1)
				  zz: Model name (FC4G, SAS, or iSCSI)
				  xx: CPU frequency (1.2GHz)
				  pp...: Component number
				  ss...: Serial number
				  rr...: Version	

J 0E*SSMM*00	5	0E00*MM*00	0x00	Controller Module#*m*(*zz xx*Hz) NAND Flash Warning <*pppppppppppp ssssssssss rrrrr*>	

				CM NAND Flash error is detected.
				  SS: Component subtype
				  MM: CM module ID (10 – 11)
				  m: CM number (0 – 1)
				  zz: Model name (FC4G, SAS, or iSCSI)
				  xx: CPU frequency (1.2GHz)
				  pp...: Component number
				  ss...: Serial number
				  rr...: Version	

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Event type and event code	SNMP Trap			Upper: Message	Remarks
	Trap No.	TrapItemID	(*1)	Lower: Description	
J 80*SSdd*0*N*	5	8000*dd*0*N*	0x00	Disk Drive DE#*dd*-Disk#*n*(SAS *xxx*GB *yy*krpm *ccccccc*) SMART <*pppppppppppp ssssssssssss rrrr*>	These messages are notified when "Disk reported a Warning" is enabled for Warning Level in the event notification setting. They are not notified during maintenance operations.

				SMART is reported from the 3.5 inch Disk.
				    SS: Component subtype
				    dd: DE-ID ("00" for a controller enclosure)
				    N: Disk slot number (0 – b (hexadecimal))
				    n: Disk slot number (0 – 11 (decimal))
				    xxx: Disk capacity (GB/TB)
				    yy: Disk speed
				    cc...: Disk information (RAID level or hot spare (Spare))
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

J 80*SSdd*0*N*	5	8000*dd*0*N*	0x00	Disk Drive DE#*dd*-Disk#*n*(SAS *xxx*GB *yy*krpm *ccccccc*) Warning <*pppppppppppp ssssssssssss rrrr*>	

				3.5 inch Disk error is detected.
				    SS: Component subtype
				    dd: DE-ID ("00" for a controller enclosure)
				    N: Disk slot number (0 – b (hexadecimal))
				    n: Disk slot number (0 – 11 (decimal))
				    xxx: Disk capacity (GB/TB)
				    yy: Disk speed
				    cc...: Disk information (RAID level or hot spare (Spare))
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

J 81*SSdd*N*N*	5	8000*ddNN*	0x00	Disk Drive DE#*dd*-Disk#*nn*(SAS *xxx*GB *yy*krpm *ccccccc*) SMART <*pppppppppppp ssssssssssss rrrr*>	

				SMART is reported from the 2.5 inch Disk.
				    SS: Component subtype
				    dd: DE-ID ("00" for a controller enclosure)
				    NN: Disk slot number (0 – 17 (hexadecimal))
				    nn: Disk slot number (0 – 23 (decimal))
				    xxx: Disk capacity (GB/TB)
				    yy: Disk speed
				    cc...: Disk information (RAID level or hot spare (Spare))
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

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| Event type and event code | SNMP Trap | | | Upper: Message | Remarks |
	Trap No.	TrapItemID	(*1)	Lower: Description	
J 81*SSddNN*	5	8000*ddNN*	0x00	Disk Drive DE#*dd*-Disk#*nn*(SAS *xxx*GB *yy*krpm *ccccccc*) Warning <*pppppppppppp ssssssssssss rrrr*>	These messages are notified when "Disk reported a Warning" is enabled for Warning Level in the event notification setting. They are not notified during maintenance operations.

				2.5 inch Disk error is detected.
				    SS: Component subtype
				    dd: DE-ID ("00" for a controller enclosure)
				    NN: Disk slot number (0 – 17 (hexadecimal))
				    nn: Disk slot number (0 – 23 (decimal))
				    xxx: Disk capacity (GB/TB)
				    yy: Disk speed
				    cc...: Disk information (RAID level or hot spare (Spare))
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

J 90*SSdd*0*n*	5	9000*dd*0*n*	0x00	Expander DE#*dd*/EXP#n Warning <*pppppppppppp ssssssssss rrrrr*>	These messages are notified when "Module reported a Warning" is enabled for Warning Severity Level in Setup Event Notification. They are not notified during maintenance operations.

				DE Expander error is detected.
				    SS: Component subtype
				    dd: DE-ID ("00" for a controller enclosure)
				    n: EXP number (0 – 1)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

J 91*SSddnp*	5	9000*ddnp*	0x00	Expander Port DE#*dd*/EXP#*n*/Port#*p* Warning <*pppppppppppp ssssssssss rrrrr*>	

				DE Expander Port error is detected.
				    SS: Component subtype
				    dd: DE-ID ("00" for a controller enclosure)
				    p: Port number (0 – 1)
				    n: EXP number (0 – 1)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

J C1*MM*0000	5	0100*MM*00	0x00	Controller Module#*m*(*zz xx*Hz) Reboot <*pppppppppppp ssssssssss rrrrr*>	

				CM is rebooted.
				    MM: CM module ID (10 – 11)
				    m: CM number (0 – 1)
				    zz: Model name (FC4G, SAS, or iSCSI)
				    xx: CPU frequency (1.2GHz)
				    pp...: Component number
				    ss...: Serial number
				    rr...: Version	

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Event type and event code	SNMP Trap			Upper: Message	Remarks
	Trap No.	TrapItemID	(*1)	Lower: Description	
J C3*SSMM*00	5	0B00*MM*00	0x00	Controller Module#*m*(*zz xx*Hz) Cache(MEM) Correctable Error <ppppppppppppppppppp ssssssssssss rrrrrr>	These messages are notified when "Module reported a Warning" is enabled for Warning Severity Level in Setup Event Notification. They are not notified during maintenance operations.
				Many correctable errors occurred in the CM memory. *SS*: Component subtype *MM*: CM module ID (10 – 11) *m*: CM number (0 – 1) *zz*: Model name (FC4G, SAS, or iSCSI) *xx*: CPU frequency (1.2GHz) *pp*...: Component number *ss*...: Serial number *rr*...: Version	
J D*200dd*0*n*	5	D*200dd*0*n*	0x00	Power Supply Unit DE#*dd*/PSU#*n* Warning <*ppppppppppppp ssssssssss rrrr*>	
				PSU error is detected. *dd*: DE-ID ("00" for a controller enclosure) *n*: PSU number (0 – 1) *pp*...: Component number *ss*...: Serial number *rr*...: Version	
J DA*SSdd*00	6	DA00*dd*00	1	DE Exhaust temperature DE#*dd* Warning	
				DE exhaust temperature error (Warning) is detected. *SS*: Component subtype *dd*: DE-ID ("00" for a controller enclosure)	
J DB*SSdd*00	6	DB00*dd*00	1	DE Intake temperature DE#*dd* Warning	
				DE intake temperature error (Warning) is detected. *SS*: Component subtype *dd*: DE-ID ("00" for a controller enclosure)	

*1:   This row indicates TrapWarningInfo for Trap No. 5 and TrapSensorInfo for Trap No. 6.

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A.2.4 Informational Messages

This section describes the messages that are sent when the severity is Information.

■ Informational message list

● When the event type is "I"

The following messages are sent when an information-level event occurs:

Event type and event code	SNMP Trap	Upper: Message	Remarks
		Middle: Detail information	
	Trap No.	Lower: Description	
I 00000001	9	Power on completed ($a)	These messages are notified when "Power on Completed" is enabled for Informational Level in the event notification setting.
		Detail information is not displayed.	
		The device is powered ON. $a: VxxLxx-xxxx (Firmware version)	
I 00000002	9	Controller firmware updated ($a)	These messages are notified when "Controller Firmware update" is enabled for Informational Level in the event notification setting.
		Detail information is not displayed.	
		Controller firmware version is updated. $a: VxxLxx-xxxx (Firmware version)	
I 00000011	9	Snap Data Pool (SDP) capacity reached $a%. (Policy Level1: Threshold $b%)	These messages are notified when "Informational message defined by SDP policy" is enabled for Informational Level in the event notification setting.
		Detail information is not displayed.	

		Snap Data Pool (unencrypted) usage rate exceeds the threshold (Level1) $a% and reaches $b%.
		    $a: Usage rate of Snap Data Pool
		    $b: Threshold of Snap Data Pool	

I 00000011	9	Snap Data Pool (SDP) capacity of the encryption reached $a%. (Policy Level1: Threshold $b%)	
		Detail information is not displayed.	

		Snap Data Pool (encrypted) usage rate exceeds the threshold (Level1) $a% and reaches $b%.
		    $a: Usage rate of Snap Data Pool
		    $b: Threshold of Snap Data Pool	

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Event type and event code	SNMP Trap	Upper: Message	Remarks
		Middle: Detail information	
	Trap No.	Lower: Description	
I 00000012	9	Snap Data Pool (SDP) capacity reached *$a*%. (Policy Level2: Threshold *$b*%)	These messages are notified when "Warning condition defined by SDP policy" is enabled for Informational Level in the event notification setting.
		Detail information is not displayed.	

		Snap Data Pool (unencrypted) usage rate exceeds the threshold (Level2) *$a*% and reaches *$b*%.
		    $a: Usage rate of Snap Data Pool
		    $b: Threshold of Snap Data Pool	

I 00000012	9	Snap Data Pool (SDP) capacity of the encryption reached *$a*%. (Policy Level2: Threshold *$b*%)	
		Detail information is not displayed.	

		Snap Data Pool (encrypted) usage rate exceeds the threshold (Level2) *$a*% and reaches *$b*%.
		    $a: Usage rate of Snap Data Pool
		    $b: Threshold of Snap Data Pool	

I 00000013	9	Snap Data Pool (SDP) capacity reached *$a*%. (Policy Level3: Threshold *$b*%)	These messages are notified when "Error condition defined by SDP policy" is enabled for Informational Level in the event notification setting.
		Detail information is not displayed.	

		Snap Data Pool (unencrypted) usage rate exceeds the threshold (Level3) *$a*% and reaches *$b*%.
		    $a: Usage rate of Snap Data Pool
		    $b: Threshold of Snap Data Pool	

I 00000013	9	Snap Data Pool (SDP) capacity of the encryption reached *$a*%. (Policy Level3: Threshold *$b*%)	
		Detail information is not displayed.	

		Snap Data Pool (encrypted) usage rate exceeds the threshold (Level3) *$a*% and reaches *$b*%.
		    $a: Usage rate of Snap Data Pool
		    $b: Threshold of Snap Data Pool	

I 00000020	9	*%d* RAID group(s) created	This message is notified when "Created RAID Group" is enabled for Informational Level in the event notification setting.
		RAID Group LV CM Capacity *$a*:*$b* *$c* *$d* *$e* *$a*:*$b* *$c* *$d* *$e* *$a*:*$b* *$c* *$d* *$e* :	

		%d RAID groups are registered.
		    %d: Quantity
		    $a: RAID group number
		    $b: RAID group name
		    $c: RAID level
		    $d: Assigned CM
		    $e: Capacity	

I 00000021	9	*%d* RAID group(s) deleted	This message is notified when "Deleted RAID Group" is enabled for Informational Level in the event notification setting.
		RAID Group *$a*:*$b* *$a*:*$b* *$a*:*$b* :	

		%d RAID groups are deleted.
		    %d: Quantity
		    $a: RAID group number
		    $b: RAID group name	

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Event type and event code	SNMP Trap	Upper: Message	Remarks
		Middle: Detail information	
	Trap No.	Lower: Description	
I 00000022	9	%d RAID group name(s) changed	This message is notified when "RAID Group Name Changed" is enabled for Informational Level in the event notification setting.
		No. Name(old) Name(new) $a $b $c $a $b $c $a $b $c :	
		%d RAID group names are changed. 　%d: Quantity 　$a: RAID group number 　$b: RAID group name (before change) 　$c: RAID group name (after change)	
I 00000023	9	%d hot spare(s) added	This message is notified when "Assigned Hot Spare" is enabled for Informational Level in the event notification setting.
		DE Slot Type RAID Group $a $b $c $d:$e $a $b $c $d:$e $a $b $c $d:$e :	
		%d hot spares are registered. 　%d: Quantity 　$a: DE-ID ("00" for a controller enclosure) 　$b: Slot number 　$c: Type (Global or Dedicated) 　$d: RAID group number (only for Dedicated Hot Spares) 　$e: RAID group name (only for Dedicated Hot Spares)	
I 00000024	9	%d hot spare(s) released	This message is notified when "Released Hot Spare" is enabled for Informational Level in the event notification setting.
		DE Slot Type RAID Group $a $b $c $d:$e $a $b $c $d:$e $a $b $c $d:$e :	
		%d hot spares are released. 　%d: Quantity 　$a: DE-ID ("00" for a controller enclosure) 　$b: Slot number 　$c: Type (Global or Dedicated) 　$d: RAID group number (only for Dedicated Hot Spares) 　$e: RAID group name (only for Dedicated Hot Spares)	
I 00000025	9	%d volume(s) created	This message is notified when "Created Volume" is enabled for Informational Level in the event notification setting.
		Volume Type Capacity RAID Group 　$a:$b $c $d $e 　$a:$b $c $d $e 　$a:$b $c $d $e 　:	
		%d volumes are created. 　%d: Quantity 　$a: Volume number 　$b: Volume name 　$c: Volume type 　$d: Capacity (MB) 　$e: RAID group number	

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Event type and event code	SNMP Trap	Upper: Message	Remarks
		Middle: Detail information	
	Trap No.	Lower: Description	
I 00000026	9	%d volume(s) deleted	This message is notified when "Deleted Volume" is enabled for Informational Level in the event notification setting.
		Volume $a:$b $a:$b $a:$b :	

		%d volumes are deleted.
		    %d: Quantity
		    $a: Volume number
		    $b: Volume name	

I 00000027	9	%d volume name(s) changed	This message is notified when "Volume Name Changed" is enabled for Informational Level in the event notification setting.
		No. Name(old) Name(new) $a $b $c $a $b $c $a $b $c :	

		%d volume names are changed.
		    %d: Quantity
		    $a: Volume number
		    $b: Volume name (before change)
		    $c: Volume name (after change)	

I 00000030	9	FC port parameters changed (CM#%a port#%b)	This message is notified when "FC Port Parameters Changed" is enabled for Informational Level in the event notification setting.
		Connect $a Transfer Rate $b Host Affinity $c Frame Size $d Reset Scope $e Reserve Cancel at Chip Reset $f	

		The FC port parameter is changed.
		    %a: CM number (0 – 1)
		    %b: Port number (0 – 1)
		    $a: Connection topology (Fabric or FC-AL)
		    $b: Transfer speed
		    $c: Host affinity (Enable or Disable)
		    $c: Frame size
		    $d: Reset Scope (I_T_L or T_L)
		    $e: Reserve Reservation if Chip Reset (Enable or Disable)	

I 00000031	9	SAS port parameters changed (CM#%a port#%b)	This message is notified when "SAS Port Parameters Changed" is enabled for Informational Level in the event notification setting.
		Host Affinity $a Reset Scope $b Reserve Cancel at Chip Reset $c	

		The SAS port parameter is changed.
		    %a: CM number (0 – 1)
		    %b: Port number (0 – 1)
		    $a: Host affinity (Enable or Disable)
		    $b: Reset Scope (I_T_L or T_L)
		    $c: Reserve Reservation if Chip Reset (Enable or Disable)	

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Event type and event code	SNMP Trap	Upper: Message	Remarks
		Middle: Detail information	
	Trap No.	Lower: Description	
I 00000032	9	iSCSI port parameters changed (CM#%a port#%b)	This message is notified when "iSCSI Port Parameters Changed" is enabled for Informational Level in the event notification setting.
		IP Address $a Subnet Mask $b Gateway $c iSNS Server $d iSCSI Name $e Alias Name $f Host Affinity $h Reset Scope $i Reserve Cancel at Chip Reset $j CHAP $k Header Digest $l Data Digest $m CmdSN Count $n (This item is displayed when the CmdSN count number is set.)	

		The iSCSI port parameter is changed.
		    %a: CM number (0 – 1)
		    %b: Port number (0 – 1)
		    $a: IP address
		    $b: Subnet mask
		    $c: Default gateway
		    $d: iSNS server
		    $e: iSCSI Name
		    $f: Alias Name
		    $h: Host affinity (Enable or Disable)
		    $i: Reset Scope (I_T_L or T_L)
		    $j: Reserve Reservation if Chip Reset (Enable or Disable)
		    $k: CHAP (Enable or Disable)
		    $l: Header Digest (CRC32C or OFF)
		    $m: Data Digest (CRC32C or OFF)
		    $n: CmdSN count number	

I 00000033	9	Host WWN registered	This message is notified when "FC Host Information Changed" is enabled for Informational Level in the event notification setting.
		No. Name WWN Host Response $a $b $c $d:$e $a $b $c $d:$e $a $b $c $d:$e :	

		An FC host is registered.
		    $a: Host number
		    $b: Host name
		    $c: Host WWN
		    $d: Host response number
		    $e: Host response name	

I 00000033	9	Host SAS Address registered	This message is notified when "SAS Host Information Changed" is enabled for Informational Level in the event notification setting.
		No. Name SAS Address Host Response $a $b $c $d:$e $a $b $c $d:$e $a $b $c $d:$e :	

		A SAS host is registered.
		    $a: Host number
		    $b: Host name
		    $c: SAS address
		    $d: Host response number
		    $e: Host response name	

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Event type and event code	SNMP Trap	Upper: Message	Remarks
		Middle: Detail information	
	Trap No.	Lower: Description	
I 00000034	9	iSCSI host registered	This message is notified when "iSCSI Host Information Changed" is enabled for Informational Level in the event notification setting.
		No. Name iSCSI Name (IP Address:Port#) $a $b $c ($d) $a $b $c ($d) $a $b $c ($d) : No. Alias Name Host Response $a $f $g:$h $a $f $g:$h $a $f $g:$h :	

		An iSCSI host is registered.
		    $a: Host number
		    $b: Host name
		    $c: iSCSI Name
		    $d: IP address
		    $f: Alias Name
		    $g: Host response number
		    $h: Host response name	

I 00000035	9	%d host name(s) changed	This message is notified when "Host Name Defined" is enabled for Informational Level in the event notification setting.
		No. Name(old) Name(new) $a $b $c $a $b $c $a $b $c :	

		%d host names are changed.
		    %d: Quantity
		    $a: Host number
		    $b: Host name (before change)
		    $c: Host name (after change)	

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Event type and event code	SNMP Trap	Upper: Message	Remarks
		Middle: Detail information	
	Trap No.	Lower: Description	
I 00000036	9	Host response registered	This message is notified when "Host Response Changed" is enabled for Informational Level in the event notification setting.
		(A)Byte-0 of Inquiry Response (B)Inquiry VPD ID Type (C)Inquiry Standard Data Version (D)Command Timeout Interval (E)Load Balance Response (F)Reservation Conflict Response for Test Unit Ready (G)Host Specific Mode (H)Asymmetric/Symmetric Logical Unit Access (I)LUN Mapping Changes (J)LUN Capacity Expansion (K)Vendor Unique Sense Code (L)Sense Data Conversion No.　Name　(A)　(B)　(C)　(D)　　　(E)　(F)　(G)　(H)　(I)　(J) 0x$x　$y　　$a　$b　$c　$d sec.　$e　$f　$g　$h　$i　$j 0x$x　$y　　$a　$b　$c　$d sec.　$e　$f　$g　$h　$i　$j : 0x$x　$y　　$a　$b　$c　$d sec.　$e　$f　$g　$h　$i　$j : No.　Name　(I)　(J)　(K)　(L) 0x$x　$y　　$i　$j　$k　$l 0x$x　$y　　$i　$j　$k　$l $A -> $B : 0x$x　$y　　$i　$j　$k　$l :	
		A host response is registered. 　$x: Host response number 　$y: Host response name 　$a: Byte-0 of Inquiry Response 　$b: Inquiry VPD ID Type 　$c: Inquiry Standard Data Version 　$d: Command monitoring time 　$e: Overload response status 　$f: Reservation Conflict Response for Test Unit Ready 　$g: Specific host operation 　$h: Logical Unit access topology 　$i: Add or remove volumes 　$j: Change volume capacity 　$k: Vendor Unique Sense Code 　$l: Sense code conversion pattern (When "Customize" is selected, the conversion source sense and converted sense is displayed in "$A -> $B" format. 　　$A: Conversion source sense (SK/ASC/ASCQ) 　　$B: Converted sense (SK/ASC/ASCQ))	
I 00000037	9	LUN mapping registered (CM#%a port#%b Host Affinity Disable)	This message is notified when "LUN Mapping Changed" is enabled for Informational Level in the event notification setting.
		LUN　Volume $c　　$d:$e $c　　$d:$e $c　　$d:$e :	
		A LUN mapping (with host affinity disabled) is registered. 　%a: CM number (0 – 1) 　%b: Device number (0 – 1) 　$c: Logical unit number 　$d: Volume number 　$e: Volume name	

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Event type and event code	SNMP Trap	Upper: Message	Remarks
		Middle: Detail information	
	Trap No.	Lower: Description	
I 00000038	9	Reset group changed	This message is notified when "Reset Group Changed" is enabled for Informational Level in the event notification setting.
		0 1 0 1 0 1 CM#0 port#0 * - - - CM#0 port#1 - * - - CM#1 port#0 - - * - CM#1 port#1 - - - *	

		A reset group is changed.
		    *: A port is selected.
		    -: A port is not selected.	

I 00000039	9	Host affinity group registered (No.*%a*)	These messages are notified when "LUN Mapping Defined" is enabled for Informational Level in the event notification setting.
		Affinity Group *$a*:*$b* (LUN*$x*-*$y*) LUN Volume *$c* *$d*:*$e* *$c* *$d*:*$e* *$c* *$d*:*$e* :	

		A host affinity group is registered.
		    %a: Affinity group number
		    $a: Affinity group number
		    $b: Affinity group name
		    $x*-*$y: Range of LUN
		    $c: Logical unit number
		    $d: Volume number
		    $e: Volume name	

I 0000003A	9	LUN mapping registered (CM#*%a* port#*%b* Host Affinity Enable)	
		Host Host Affinity *$a*:*$b* *$c*:*$d*	

		A LUN mapping (with host affinity enabled) is registered.
		    %a: CM number (0 – 1)
		    %b: Port number (0 – 1)
		    $a: Host number
		    $b: Host name
		    $c: Host affinity group number
		    $d: Host affinity group name	

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● When the event type is "R"

The following messages are sent when a normal state is restored for Error or Warning level events.

Event type and event code	SNMP Trap			Upper: Message	Remarks
	Trap No.	TrapItemID	(*1)	Lower: Description	
R 06SSMM00	25	0600MM00	0	Controller Module#m(zz xxHz) BE Expander Normal <pppppppppppp ssssssssss rrrrr>	These messages are notified when "Recovery from Error" is enabled for Warning Level in the event notification setting. They are not notified during maintenance operations.
				Normal status is restored for a CM BE Expander error. SS: Component subtype MM: CM module ID (10 – 11) m: CM number (0 – 1) zz: Model name (FC4G, SAS, or iSCSI) xx: CPU frequency (1.2GHz) pp...: Component number ss...: Serial number rr...: Version	
R 90SSddnn	25	9000ddnn	0	Expander DE#dd/EXP#n Normal <pppppppppppp ssssssssss rrrrr>	
				Normal status is restored for a DE Expander error. SS: Component subtype dd: DE-ID ("00" for a controller enclosure) nn: Port number (00 – 01) n: EXP number (0 – 1) pp...: Component number ss...: Serial number rr...: Version	
R D2SSdd0n	22	D200dd0n	-	Power Supply Unit DE#dd/PSU#n Normal <pppppppppppp ssssssssss rrrr>	
				Normal status is restored for a PSU error. SS: Component subtype dd: DE-ID ("00" for a controller enclosure) n: PSU number (0 – 1) pp...: Component number ss...: Serial number rr...: Version	
R DASSdd00	26	DA00dd00	0	DE OUT TEMP Normal	
				Normal status is restored for a CE exhaust temperature error or DE exhaust temperature error. dd: DE-ID ("00" for a controller enclosure)	
R DBSSdd00	26	DB00dd00	0	DE IN TEMP Normal	
				Normal status is restored for a CE intake temperature error or DE intake temperature error. dd: DE-ID ("00" for a controller enclosure)	

*1:   This row indicates TrapWarningInfo for Trap No. 25 and TrapSensorInfo for Trap No. 26.

A.2.5   Test Messages

The messages that are sent when the test notification of an event is performed in ETERNUS Web GUI or ETERNUS CLI are described below.

■ Send Test E-Mail

The message is notified when the test notification of e-mail is performed in ETERNUS Web GUI or ETERNUS CLI.

Event type and event code	Message
T FFFFFFFF	Test E-mail Message

■ Test Trap transmission

The message is notified when the test notification of the SNMP Trap is performed in ETERNUS Web GUI or ETERNUS CLI.

Trap No.	TrapItemId	TrapMessage
2	0x80000000	SNMP Trap Test

> **Note** The Trap No. and ItemId in the test Trap are the same as the notification that is sent when the disk in Slot#0 of DE#00 is in Fault status. A disk is not actually disconnected when a test Trap is notified.

A.2.6   Sense Codes

This section describes the sense codes that are notified to the server.

Sense code			Description	Remarks
SK	ASC	ASCQ		
02	04	00	The device is in Not Ready status.	This sense code is notified when the relevant event occurs.
04	F1	01	CM is disconnected.	These sense codes are notified when "Module was broken" is enabled for Error Severity Level in the event notification setting. They are not notified during maintenance operations.
04	F1	1A	SFP is disconnected.	
04	F1	80	3.5 inch Disk is disconnected.	These sense codes are notified when "Disk was broken" is enabled for Error Severity Level in the event notification setting. They are not notified during maintenance operations.
04	F1	81	2.5 inch Disk is disconnected.	
04	F1	88	Disk is disconnected because an error occurred during the Write check of the disk patrol.	These sense codes are notified when the relevant event is detected during Disk Patrol.

Sense code			Description	Remarks
SK	ASC	ASCQ		
04	F1	90	DE Expander is disconnected.	These sense codes are notified when "Module was broken" is enabled for Error Severity Level in the event notification setting. They are not notified during maintenance operations.
04	F1	91	DE Expander Port is disconnected.	
04	F1	D2	PSU is disconnected.	
04	F1	DA	CE exhaust temperature error or DE exhaust temperature error is detected.	
04	F1	DB	CE intake temperature error or DE intake temperature error (sensor failure) is detected.	
04	F2	06	CM EXP is disconnected.	
04	F2	08	CM DI port is disconnected.	
04	F2	09	CM SAS port is disconnected.	
04	F2	0A	CM BE Expander port is disconnected.	
04	F2	0B	CM memory is disconnected.	
04	F2	0C	CM Flash ROM is disconnected.	
04	F2	0E	NAND Controller is disconnected.	
04	F2	0F	SCU is disconnected.	
04	F2	11	CM Port is disconnected.	
04	F2	12	CM FE Expander is disconnected.	
04	F2	13	CM FE Expander Port is disconnected.	
04	F8	00	Pinned Data occurs.	This sense code is notified when the relevant event occurs.
06	11	90	Writing of Bad Data (data lost identifier) occurs.	These sense codes are notified when "RAID Degradation Event" is enabled for Warning Level in the event notification setting. They are not notified during maintenance operations.
06	F2	80	Rebuilding to a hot spare is performed.	These sense codes are notified when "RAID Recovery Event" is enabled for Warning Level in the event notification setting. They are not notified during maintenance operations.
06	F2	81	Rebuilding to a Disk Drive is performed.	
06	F2	82	Rebuilding to a hot spare is complete.	
06	F2	83	Rebuilding to a Disk Drive is complete.	
06	F2	84	Copyback starts.	
06	F2	85	Copyback is complete.	
06	F2	88	Rebuilding to a hot spare or a replaced disk is complete, but Bad Data (data lost identifier) exists.	These sense codes are notified when "RAID Degradation Event" is enabled for Warning Level in the event notification setting. They are not notified during maintenance operations.
06	F2	8A	Rebuilding to a disk is halted.	
06	F2	8B	Rebuilding to a replaced disk is halted.	
06	F2	8C	Copyback is halted.	
06	F2	8D	Copyback is halted because an error is found in the copy source disk.	
06	FB	01	CM error is detected.	These sense codes are notified when "Module reported a Warning" is enabled for Warning Severity Level in Setup Event Notification. They are not notified during maintenance operations.
06	FB	06	CM BE Expander is detected.	
06	FB	08	CM DI Port error is detected.	
06	FB	09	CM SAS Port error is detected.	
06	FB	0A	CM BE Expander Port error is detected.	
06	FB	0C	CM Flash ROM error is detected.	
06	FB	0E	CM NAND Flash error is detected.	

Sense code			Description	Remarks
SK	ASC	ASCQ		
06	FB	80	SMART is reported from the 3.5 inch SAS Disk.	These sense codes are notified when "Disk reported a Warning" is enabled for Warning Level in the event notification setting. They are not notified during maintenance operations.
06	FB	81	SMART is reported from the 2.5 inch SAS Disk.	
06	FB	90	DE Expander error is detected.	These sense codes are notified when "Module reported a Warning" is enabled for Warning Severity Level in Setup Event Notification. They are not notified during maintenance operations.
06	FB	91	DE Expander Port error is detected.	
06	FB	0B	Many correctable errors occurred in the CM memory.	
06	FB	D2	PSU error is detected.	
06	FB	DA	DE exhaust temperature error (Warning) is detected.	
06	FB	DB	DE intake temperature error (Warning) is detected.	
06	C1	01	CM is rebooted	

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