XCubeDAS Series Hardware Owner's Manual

Applicable Models:
XD5324D, XD5324S, XD5316D, XD5316S
XD5312D, XD5312S, XD5326D, XD5326S

QSAN Technology, Inc.
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Notices

This XCubeDAS hardware owner's manual is applicable to the following XCubeDAS models:

XCubeDAS Storage System 4U 19" Rack Mount Models

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XD5324D	Dual Controller	LFF 24-disk 4U Chassis
XD5324S	Single Controller	LFF 24-disk 4U Chassis

XCubeDAS Storage System 3U 19" Rack Mount Models

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XD5316D	Dual Controller	LFF 16-disk 3U Chassis
XD5316S	Single Controller	LFF 16-disk 3U Chassis

XCubeDAS Storage System 2U 19" Rack Mount Models

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XD5312D	Dual Controller	LFF 12-disk 2U Chassis
XD5312S	Single Controller	LFF 12-disk 2U Chassis
XD5326D	Dual Controller	SFF 26-disk 2U Chassis
XD5326S	Single Controller	SFF 26-disk 2U Chassis

Information contained in this manual has been reviewed for accuracy. But it could include typographical errors or technical inaccuracies. Changes are made to the document periodically. These changes will be incorporated in new editions of the publication. QSAN may make improvements or changes in the products. All features, functionality, and product specifications are subject to change without prior notice or obligation. All statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems.

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Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products.

All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

Regulatory Statements

FCC Statement

This device has been shown to be in compliance with and was tested in accordance with the measurement procedures specified in the Standards and Specifications listed below.

Technical Standard: FCC Part 15 Class A

                IC ICES-003

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。VCC1-A

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

CE Statement

This device has been shown to be in compliance with and was tested in accordance with the measurement procedures specified in the Standards and Specifications listed below.

Technical Standard: EMC DIRECTIVE 2014/30/EU

                                 (EN55022 / EN55024)

UL Statement

Rack Mount Instructions - The following or similar rack-mount instructions are included with the installation instructions:

1. Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
2. Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
3. Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
4. Circuit Overloading – Careful consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
5. Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

CAUTION:
The main purpose of the system left and right ears are for 19" rack use only. Do NOT use those ears to carry or transport the system.

The ITE is not intended to be installed and used in a home, school or public area accessible to the general population, and the thumbscrews should be tightened with a tool after both initial installation and subsequent access to the panel.

Warning: Always remove all power supply cords before service

This equipment intended for installation in restricted access locations.

- Access should only be allowed by qualified SERVICE PERSONS or by USERS who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken.
- Access is through the use of a TOOL or lock and key, or other means of security, and is controlled by the authority responsible for the location.

- Recommended operation temperature: 0 ~ 40°C (31.99 ~ 103.99°F); operation rating (100-127 Vac, 50-60Hz, 10.0A; 200-240 Vac, 50-60Hz, 5.0A)

CAUTION: (English)

Risk of explosion if battery is replaced by incorrect type. Please replace the same or equivalent type battery use and dispose of used batteries according to the instructions.

ATTENTION: (French)

IL Y A RISQUE D'EXPLOSION SI LA BATTERIE EST REMPLACEE PAR UNE BATTERIE DE TYPE INCORRECT. METTRE AU REBUT LES BATTERIES USAGEES CONFORMEMENT AUX INSTRUCTIONS.

VORSICHT: (German)

Explosionsgefahr bei unsachgemasem Austausch der Batterie. Entsorgung gebrauchter Batterien nach Anleitung.

ADVERTENCIA: (Spanish)

Las baterias pueden explotar si no se manipulan de forma apropiada. No desmonte ni tire las baterias al fuego. Siga las normativas locales al desechar las baterias agotadas.

警告: (Simplified Chinese)

电池如果更换不正确会有爆炸的危险，请依制造商说明处理用过之电池。

警告: (Traditional Chinese)

電池如果更換不正確會有爆炸的危險，請依製造商說明處理用過之電池。

INFORMATION:

QSAN provides limited warranty for QSAN-branded hardware products:

- System hardware and peripheral product (s): **3** years limited warranty from date of original purchase.

For more detail warranty policy, please refer to QSAN official web site:

https://qsan.com/warranty

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Preface

About This Manual

This manual provides technical guidance for designing and implementing QSAN XCubeDAS series DAS system, and it is intended for use by system administrators, DAS designers, storage consultants, or anyone who has purchased these products and is familiar with servers and computer networks, network administration, storage system installation and configuration, storage area network management, and relevant protocols.

> **CAUTION:**
> Do NOT attempt to service, change, disassemble or upgrade the equipment's components by yourself. Doing so may violate your warranty and expose you to electric shock. Refer all servicing to authorized service personnel. Please always follow the instructions in this owner's manual.

Related Documents

There are related documents which can be downloaded from the website.

- All XCubeDAS Documents
- XCubeDAS QIG (Quick Installation Guide)
- XCubeDAS Hardware Owner's Manual
- XCubeDAS CubeView User's Manual
- XCubeDAS CLI User's Manual
- Compatibility Matrix
- White Papers
- Application Notes

Technical Support

Do you have any questions or need help trouble-shooting a problem? Please contact QSAN Support, we will reply to you as soon as possible.

- Via the Web: https://qsan.com/support
- Via Telephone: +886-2-7720-2118 extension 136
  (Service hours: 09:30 - 18:00, Monday - Friday, UTC+8)
- Via Skype Chat, Skype ID: qsan.support
  (Service hours: 09:30 - 02:00, Monday - Friday, UTC+8, Summer time: 09:30 - 01:00)
- Via Email: support@qsan.com

Information, Tip, and Caution

This manual uses the following symbols to draw attention to important safety and operational information.

INFORMATION:
INFORMATION provides useful knowledge, definition, or terminology for reference.

TIP:
TIP provides helpful suggestions for performing tasks more effectively.

CAUTION:
CAUTION indicates that failure to take a specified action could result in damage to the system.

Conventions

The following table describes the typographic conventions used in this manual.

Conventions	Description
Bold	Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels. Example: Click the **OK** button.

<Italic>	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: copy *<source-file> <target-file>*.
[ ] square brackets	Indicates optional values. Example: [a | b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a | b } indicates that you must choose either a or b.
| vertical bar	Indicates that you have a choice between two or more options or arguments.
/ Slash	Indicates all options or arguments.
underline	Indicates the default value. Example: [<u>a</u> | b]

1. Overview

Thank you for purchasing QSAN Technology, Inc. products. QSAN XCubeDAS XD5300 Series is a cost-effective DAS (Direct Attached Storage) or JBOD (Just a Bunch Of Disks) for server expansion. It is also a RAID expansion enclosure for QSAN SAN (Storage Area Network) XCubeSAN series. The XD5300 series expansion units are designed with the latest 12Gb/s SAS expander, and built for a wide range of workloads, including databases, big data and analytics, media streaming, video surveillance, private clouds, file and print serving, e-mail and collaboration.

1.1. XCubeDAS Series Product Overview

QSAN XCubeDAS series is a DAS storage system, the system is fully compatible with all major 12Gb/s SAS host cards, RAID controller cards, servers, and operating systems, including Windows Server 2008/2012/2016, Storage Spaces, SLES (SUSE Linux Enterprise Server), RHEL (Red Hat Enterprise Linux), CentOS (Community ENTerprise Operating System), Solaris, Free BSD, and Mac OS X. The system hardware is a modular design for FRU (field replacement unit). All the hardware modules are inside the rack mount chassis including system controller module, front panel, rear panel, redundant power supply, and fan module. This manual will direct you step by step to familiarize you with the XCubeDAS hardware components, how to install the system, carry out the initial configure, and provide you with some quick maintenance.

XCubeSAN series supports several standard form factors:

- LFF (Large Form Factor): 12-bay 19" rack mount 2U chassis, 16-bay 19" rack mount 3U chassis, and 24-bay 19" rack mount 4U chassis.
- SFF (Small Form Factor): 26-bay 19" rack mount 2U chassis.

24-bay 4U 19" rack mount chassis   16-bay 3U 19" rack mount chassis

12-bay 2U 19" rack mount chassis   26-bay 2U 19" rack mount chassis
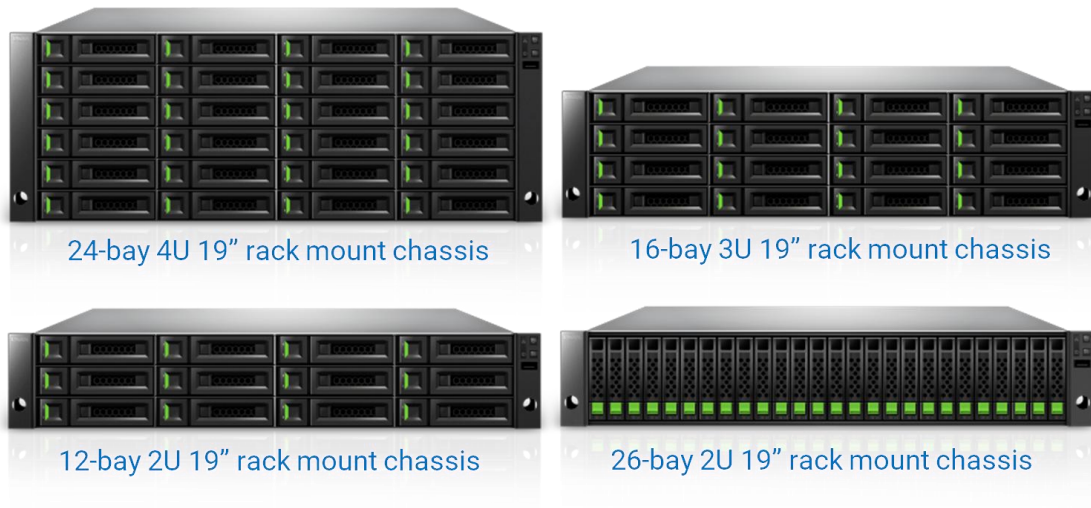
Figure 1-1   Form Factors of All XCubeSAN Series Models

The following tables provide detailed information about all XCubeDAS Series models arranged by form factors.

Table 1-1   XCubeDAS Series Storage System 4U 19" Rack Mount Models

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XD5324D	Dual Controller	LFF 24-bay 4U Chassis
XD5324S	Single Controller	LFF 24-bay 4U Chassis

Table 1-2   XCubeDAS Series Storage System 3U 19" Rack Mount Models

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XD5316D	Dual Controller	LFF 16-bay 3U Chassis
XD5316S	Single Controller	LFF 16-bay 3U Chassis

Table 1-3   XCubeDAS Series Storage System 2U 19" Rack Mount Models

Model Name	Controller Type	Form Factor, Bay Count, and Rack Unit
XD5312D	Dual Controller	LFF 12-bay 2U Chassis
XD5312S	Single Controller	LFF 12-bay 2U Chassis
XD5326D	Dual Controller	SFF 26-bay 2U Chassis
XD5326S	Single Controller	SFF 26-bay 2U Chassis

1.2.   XCubeDAS Series Hardware Features

The following is a list of the key hardware components and optional components of the XCubeDAS series for reference.

- Latest 12Gb SAS 3.0 technology
- Full range product selections
- Flexible expansion
- Dual-Active controller and high availability design with no single point of failure
- 10 x 12Gb/s SAS wide ports and total 480Gb/s bandwidth
- Up to 24,000MB/s sequential read and 22,000MB/s sequential write throughput, up to 4.2 million sequential IOPS
- Versatile topologies, zoning, and runtime configuration
- Intuitive CubeView DAS central management software
- Complete HBA and RAID controller cards support
- Compatible with VMware vSAN and Microsoft Server 2016
- Redundant power supply units and fan modules
- Wake on SAS functionality by using SAS cable with sideband to connect with the XCubeSAN series
- You can also use SSDs to boost your overall system speed. If you purchase SATA SSDs for your dual controller XCubeSAN system; you have to purchase 6G MUX board from QSAN channel partners. Because there are different LFF and SFF disk drive trays, 6G MUX board is needed to adapt to the type of bracket:
  - SATA 6Gb MUX board for installing 2.5" SATA SSD into LFF 3.5" disk drive tray
  - SATA 6Gb MUX board for installing 2.5" SATA SSD into SFF 2.5" disk drive tray

1.3.   XCubeDAS Series Hardware Specifications

Following tables are hardware specifications of XS5200 and XS3200 series.

Table 1-4   XD5300 Series Hardware Specifications

Model name	XD5324D (Dual) XD5324S (Single)	XD5316D (Dual) XD5316S (Single)	XD5312D (Dual) XD5312S (Single)	XD5326D (Dual) XD5326S (Single)
Form Factor	4U 24-bay, LFF	3U 16-bay, LFF	2U 12-bay, LFF	2U 26-bay, SFF
I/O Controller	Dual-active or Single-upgradable controller			
Host & Expansion Connectivity (per Controller)	5 x 12Gb/s SAS wide ports (SFF-8643, internal) connectors (connect with the SAS cable by using mini-SAS HD SFF-8644 connector)			
Drive Type	Mix & match 3.5" & 2.5" SAS, NL-SAS HDD 2.5" SAS, SATA[1] SSD			2.5" SAS, NL-SAS HDD 2.5" SAS, SATA[1] SSD
HBAs & RAID Cards Support[2]	Broadcom (LSI) 12Gb/s & 6Gb/s SAS HBAs Broadcom (LSI) 12Gb/s & 6Gb/s SAS RAID Controller Cards ATTO 12Gb/s & 6Gb/s SAS HBAs ATTO 6Gb/s SAS RAID Controller Cards			
OS Support	Windows Server 2008, 2008 R2, 2012, 2012 R2, 2016 Storage Spaces SLES 10, 11, 12 RHEL 5, 6, 7 CentOS 6, 7 Solaris 10, 11 FreeBSD 9, 10 Mac OS X 10.11 or later VMware, Hyper-V, & Citrix			
Dimension (H x W x D)	19" Rack mount 170.3 x 438 x 515 mm	19" Rack mount 130.4 x 438 x 515 mm	19" Rack mount 88 x 438 x 515 mm	19" Rack mount 88 x 438 x 491 mm
Power Supply	80 PLUS Platinum, two redundant 770W (1+1) AC Input • 100-127V 10A, 50-60Hz • 200-240V 5A, 50-60Hz DC Output • +12V 63.4A • +5VSB 2.0A			
Fan Module	2 x hot pluggable/redundant fan modules			
Temperature	• Operating temperature 0 to 40°C			

	•	Shipping temperature -10°C to 50°C
Relative Humidity	•	Operating relative humidity 20% to 80% non-condensing
	•	Non-operating relative humidity 10% to 90%

[1] 6Gb MUX board needed for 2.5" SATA drives in dual controller system.

[2] The HBAs and RAID controller cards also specify the maximum number of drive/device support. Broadcom (LSI) 12Gb/s SAS HBA supports up to 1,024 drives/devices, Broadcom (LSI) 12Gb/s SAS RAID controller card up to 240 drives/devices, and ATTO 12Gb/s SAS HBA supports up to 2,048 drives.

1.4. XCubeDAS Series Package Contents

Following list are the package contents for the XCubeDAS series models.

- System Chassis (x1)
- Disk Drive Trays

    ◦ XD5324 (4U 24-bay, LFF): 3.5" Disk Drive Tray (x24)
    ◦ XD5316 (3U 24-bay, LFF): 3.5" Disk Drive Tray (x16)
    ◦ XD5312 (2U 12-bay, LFF): 3.5" Disk Drive Tray (x12)
    ◦ XD5326 (2U 26-bay, SFF): 2.5" Disk Drive Tray (x26)

- AC Power Cords (x2)
- RS-232 Console Cable (x2) for Dual Controller Model; (x1) for Single Controller Model
- SAS 12G Expansion Cable (x2) for Dual Controller Model; (x1) for Single Controller Model
- Screws Pack for Disk Drives
- Quick Installation Guide

1.5. XCubeDAS Series Optional Accessories

Following list are optional accessories for all XCubeDAS series models. If you want to purchase these optional components, please contact your nearest local reseller or visit QSAN official web site: https://qsan.com/location

Table 1-5   XCubeDAS Series Accessories

Model Name	Picture	Description	Applied Models
CBL-CNL		Console Cable, Phone-jack, 1 Meter	XD5324 XD5316 XD5312 XD5326
CBL-12SW150		SAS 12G Expansion Cable with Wake-on-SAS, SFF-8644 to SFF-8644, 1.5 Meters (This cable is not suitable for connecting HBA or RAID card)	
CBL-12SH150		SAS 12G Expansion Cable, SFF-8644 to SFF-8644, 1.5 Meters	
SLR-RM3640		Slide Rail	
HDT-351		3.5" Disk Drive Tray	XD5324 XD5316 XD5312
HDM-351		SATA 6Gb MUX Board and Bracket for HDT-351 (2.5" SATA drives only)	
HDT-251		2.5" Disk Drive Tray	XD5326
HDM-251		SATA 6Gb MUX Board and Bracket for HDT-251	

2. System Components Overview

This chapter outlines the key hardware components or modules of the XCubeDAS system. After reading this chapter, you will have a basic understanding of each part of the XCubeDAS hardware and give you the ability to be able to successfully configure and operate your XCubeDAS system. Following is the list of key components or modules of XCubeDAS:

- Front Panel
- System Disk Drive Numbering
- Supported Disk Drives and SSDs
- Rear Panel
- Power Unit
- Fan Module

2.1. Front Panel

The XCubeDAS Series features a unique design: the system controls and indicators is located on the right ear. The system controls and indicators module integrates functional buttons and system state indicators, which can be easily operated and read by user. The figure below contains detailed information about the button and indicators module. For a greater understanding of the related colors and behaviors of each indicator on the front panel, please refer to the chapter 5.1, Front Panel section in the Descriptions of LEDs and Buttons chapter.

System Controls and Indicators
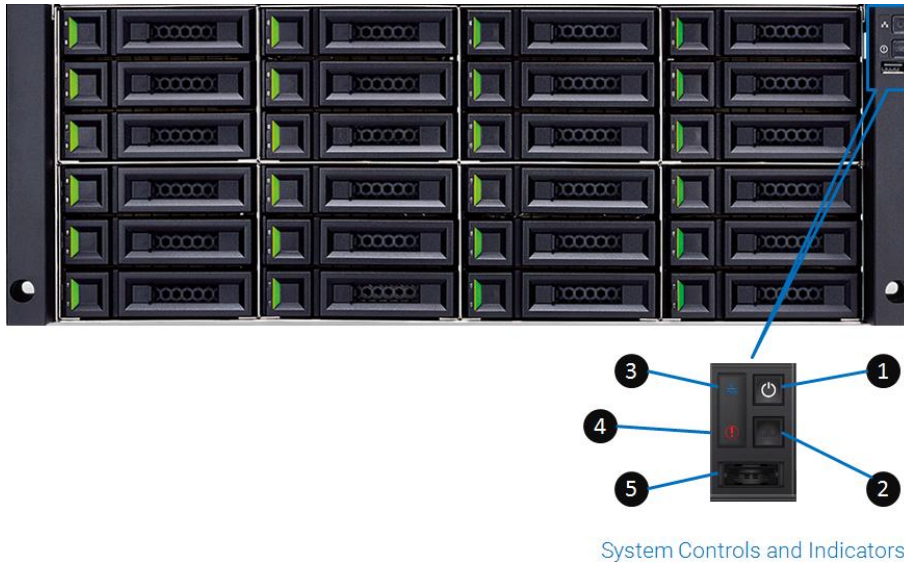
Figure 2-1   System Controls and Indicators

Table 2-1   Descriptions of System Controls and Indicators

Number	Description
1	System Power Button/LED
2	UID (Unique Identifier) Button/LED
3	System Access LED
4	System Status LED
5	USB Port (Reserved)

Figures and the table below illustrate LFF & SFF system front panel components.

Figure 2-2   LFF & SFF System Front Panel Components

Table 2-2   LFF & SFF System Front Panel Components

Number	Description
1	System Left Ear
2	Disk Drive Tray
3	System Right Ear
4	The System Controls and Indicators

- Disk Drive Tray Indicators: figures and the table below illustrate LFF and SFF disk drive tray indicators.

LFF Disk Drive Tray   SFF Disk Drive Tray
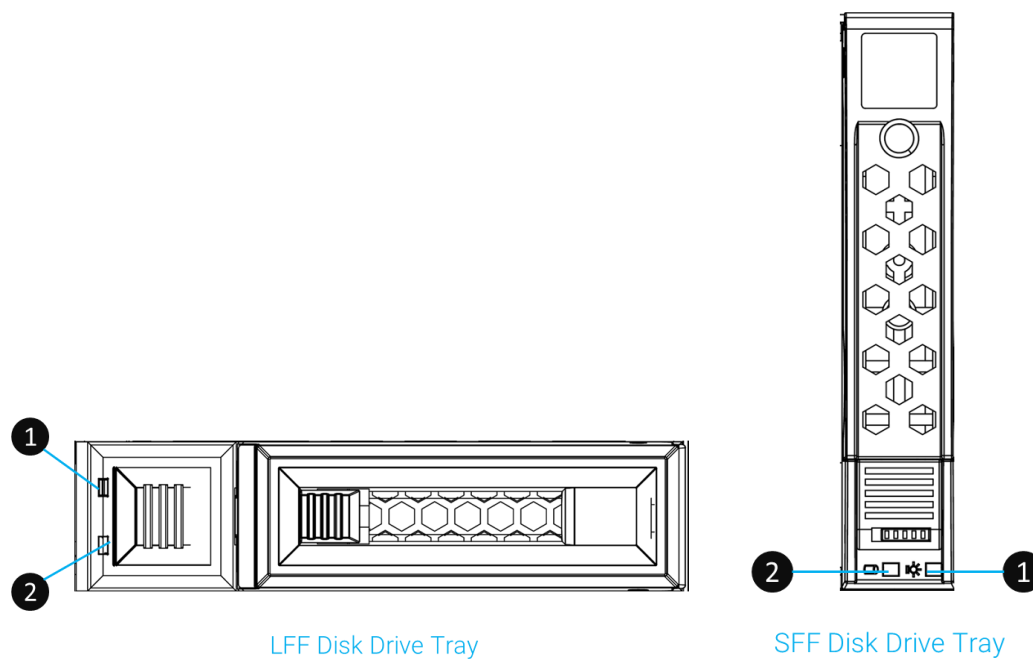
Figure 2-3   Disk Drive Indicators of LFF & SFF Disk Drive Tray

Table 2-3   Disk Drive Indicators of LFF & SFF Disk Drive Tray

Number	Description
1	Disk Drive Power LED
2	Disk Drive Status LED

For a greater understanding of the related color and the behavior of the disk drive, please refer to the chapter 5.1, Front Panel section in the Descriptions of LEDs and Buttons chapter.

2.2.   System Disk Drive Numbering

Figures below illustrate the XCubeDAS system disk drive numbering. The disk drive numbering for LFF system starts from the top of first row in left column; this kind of disk drive numbering rule helps to balance the system weight distribution and enable easy management of disk drives zoning. The SFF system disk drive numbering is single row from left to right. If you want to check the disk drive numbering rule while installing the disk drives into the system, for LFF, you can find a disk drive numbering sticker on the right side of the system chassis top cover; for SFF system, the disk drive numbering is printed on the lower part of the system front.

Figure 2-4   System Disk Drive Numbering for the XCubeDAS Series

2.3.   Supported Disk Drives and SSDs

The table below shows supported disk drives and SSDs for all XCubeDAS series models. This can be a reference for you to purchase suitable disk drives or SSDs for your system.

QSAN has qualified the popular SAS HDDs and SAS/SATA SSDs available in the market; to ensure that you have the highest level of flexibility in choosing the most advanced HDDs or SSDs available from the manufacturers or purchase the best cost/performance SAS HDDs or SAS/SATA SSDs from the market, to suit your budget/performance. We hope that this will significantly reduce your IT infrastructure investment cost. If you want to check the compatible HDDs or SSDs for your XCubeDAS system, please refer to the [Compatibility Matrix](#) table.

Table 2-4   Supported Disk Drive Types

Form Factor of Disk Drive Tray	Drive Type	Connection Interface
LFF 3.5"	HDD	SAS, NL-SAS
	SSD	SAS, SATA[2]
SFF 2.5"	HDD	SAS, NL-SAS
	SSD	SAS, SATA[3]

INFORMATION:

[2] When installing SATA SSDs in dual controller models, it needs to install optional SATA 6Gb MUX board and bracket for 3.5" disk drive tray (model name: HDM-351).

[3] When installing SATA SSDs in dual controller models, it needs to install optional SATA 6Gb MUX board and bracket for 2.5" disk drive tray (model name: HDM-251).

Please contact a QSAN authorized reseller for details purchasing information.

2.4.   Rear Panel

The following content outlines the detail of the XCubeDAS series rear panel and components. In this section, you will learn the name and location of the key components and modules in the rear panel.

2.4.1. Rear Panel Layout

Figures and the table below illustrate the LFF and SFF system rear panel layout.
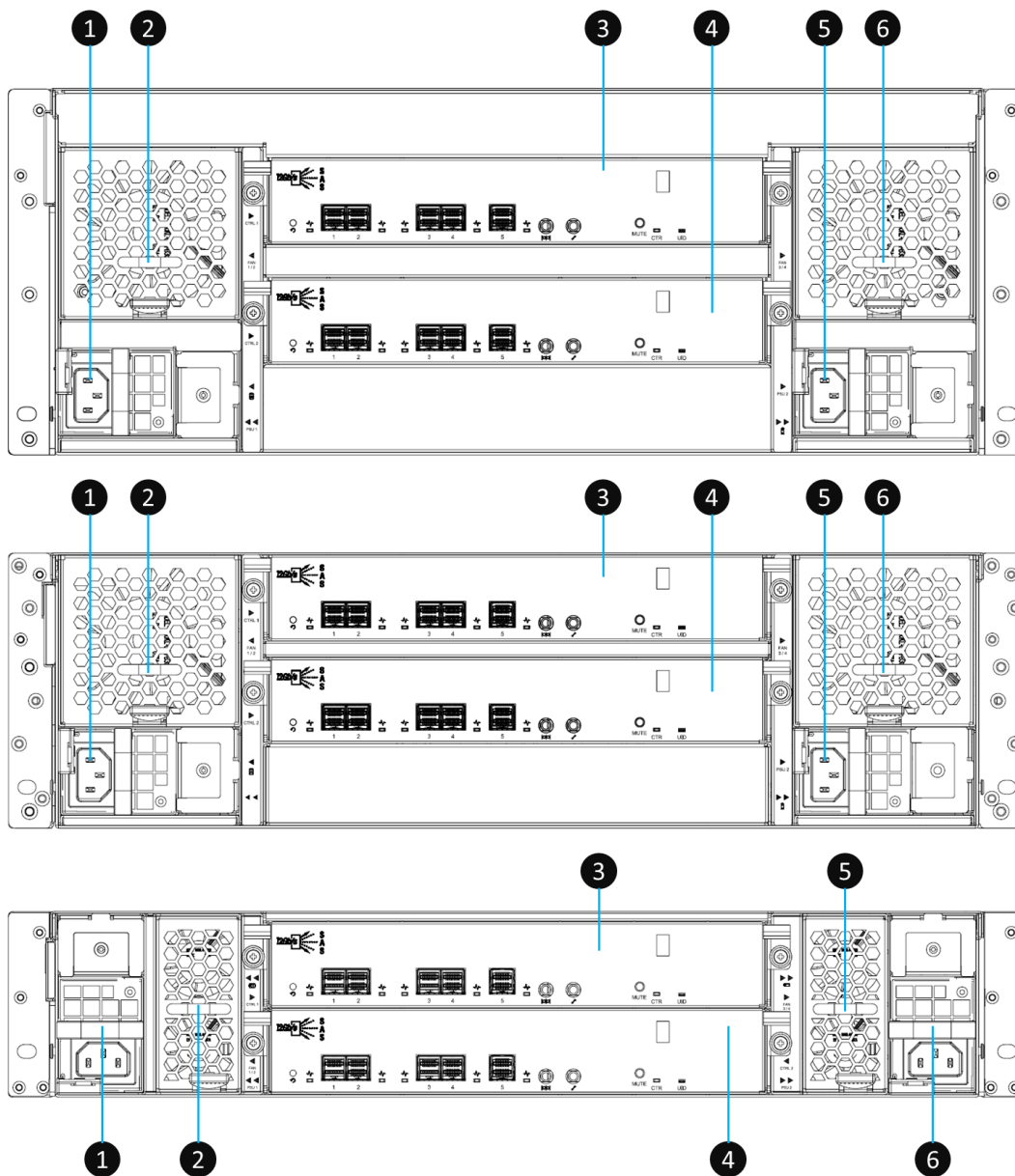
Figure 2-5   LFF & SFF Rear Panel Layout

Table 2-5   LFF & SFF Rear Panel Layout

Number	Description
1	Power Supply Unit 1
2	Fan Module 1
3	Controller Module 1[4]
4	Controller Module 2
5	Fan Module 2
6	Power Supply Unit 2

INFORMATION:

[4] If the XCubeSAN chassis is configured with a single controller module, the controller module MUST be installed in the upper slot.

2.4.2. Controller Module

The following image and table illustrate each component of a controller module. In this section, you will learn the name and location of each port, LED and host cards (optional parts).
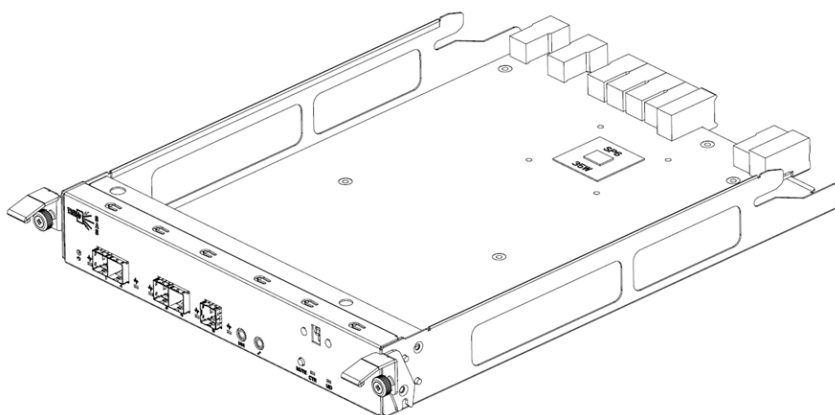
Figure 2-6   General View of the Controller Module

= SAS LED

UID = Unique Identifier LED

CTR = Controller Status LED
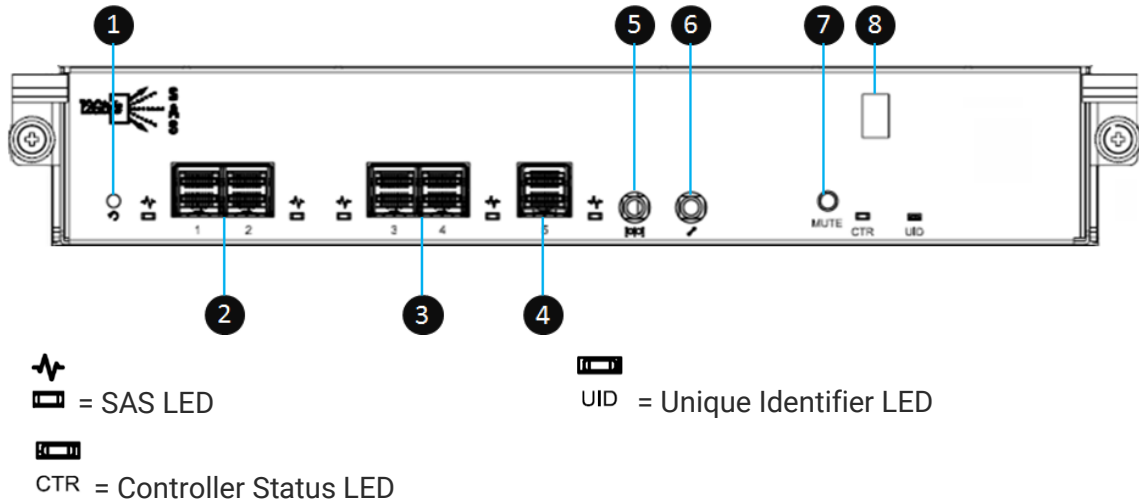
Figure 2-7   Components of the Controller Module

Table 2-6   Description of the Controller Module Components

Number	Description
1	Reset to Factory Default Button
2	12Gb/s SAS Wide Port 1 and Port 2 (SFF8644)
3	12Gb/s SAS Wide Port 3 and Port 4 (SFF8644)
4	12Gb/s SAS Wide Port 5 (SFF8644)
5	Console Port (3.5mm jack to RS232)[5]
6	Service Port[6]
7	Buzzer Mute Button
8	Seven-segment LED Display

INFORMATION:

[5] Console cable (NULL modem cable) to connect from console port of the storage system to a RS 232 port on the management PC. The console settings are on the following: Baud rate: 115,200, 8 data bit, no parity, 1 stop bit, and no flow control; terminal Type: vt100.

[6] Reserved.

For a greater understanding of the related color and the behavior of the controller module, please refer to the chapter 5.2, Rear Panel section in the Descriptions of LEDs and Buttons chapter.

2.5.   Power Supply Unit

All XCubeDAS series models are equipped with two redundant and hot swappable PSUs (Power Supply Units). The PSU for 3U/4U systems and 2U systems are the same, but the installation direction is different. (If you pull out the PSU from the system chassis, for 4U/3U system, the sticker on the PSU will be at down side; for 2U system, the sticker will be at right side).The images and the table below illustrate the location of PSU in the LFF or SFF system.
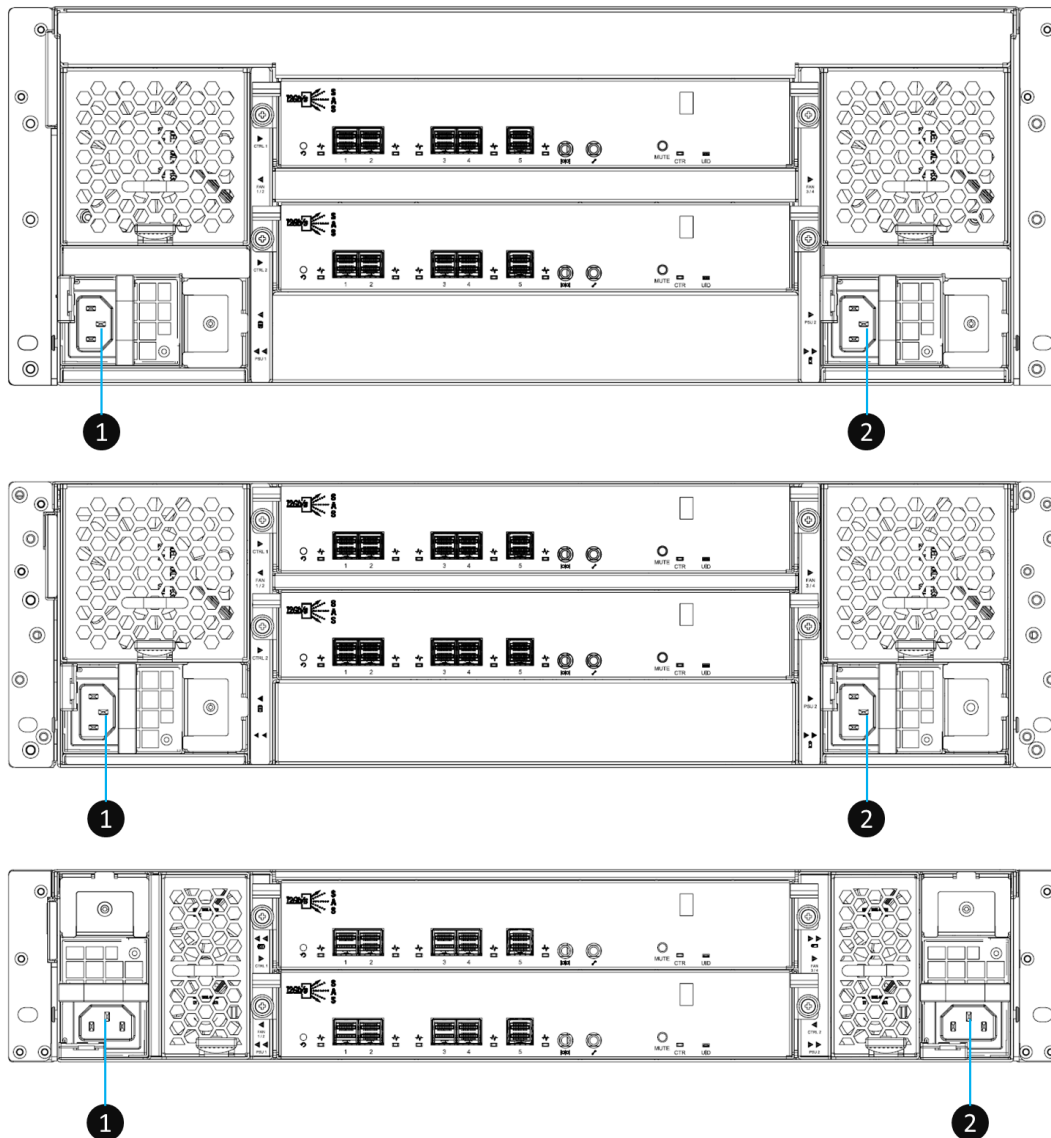
Figure 2-8   Location of the Power Supply Unit in the LFF or SFF System

Table 2-7 Location of the Power Supply Unit in the LFF or SFF System

Number	Description
1	PSU 1
2	PSU 2
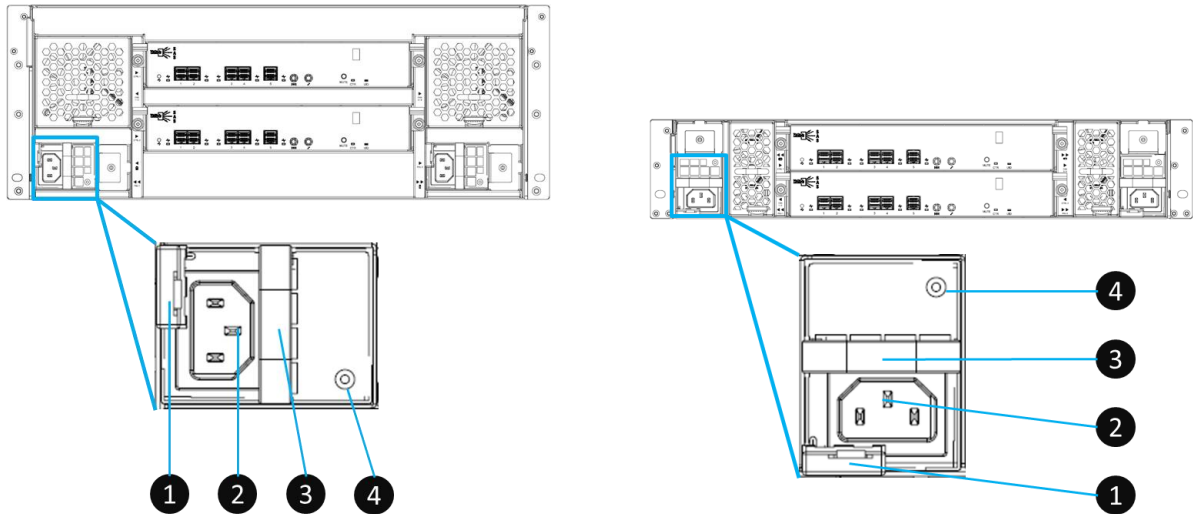
Figure 2-9 Components of the Power Supply Unit

Table 2-8 Components of the Power Supply Unit

Number	Description
1	PSU Release Tab
2	PSU Power Cord Connect
3	PSU Handle
4	PSU LED Indicator

If you want to learn more about the related color and behavior of the PSU LED, please refer to the chapter 5.2, Rear Panel section in the Descriptions of LEDs and Buttons chapter.

2.6. Fan Module

All XCubeDAS series models are equipped with two redundant and hot swappable fan modules. The fan module for 4U/3U systems are the same, however 2U systems are different. Each fan module includes two fans. Images and tables below illustrate the location and mechanical components of the fan module that is installed in the LFF and SFF system.
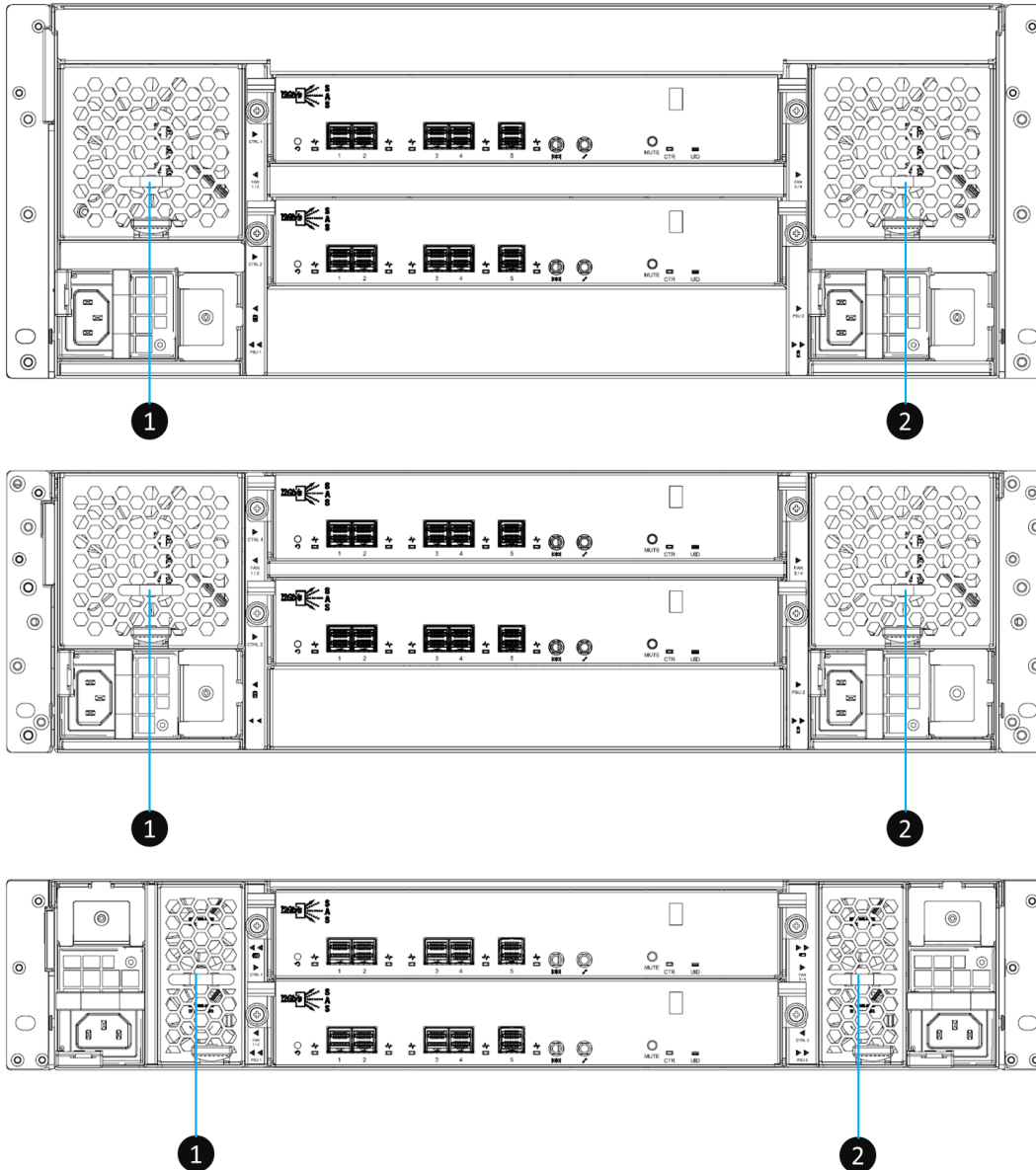
Figure 2-10   Location of Each Fan Module Installed in the LFF or SFF System

Table 2-9   Location of Each Fan Module Installed in the LFF or SFF System

Number	Description
1	Fan 1 and Fan 2
2	Fan 3 and Fan 4
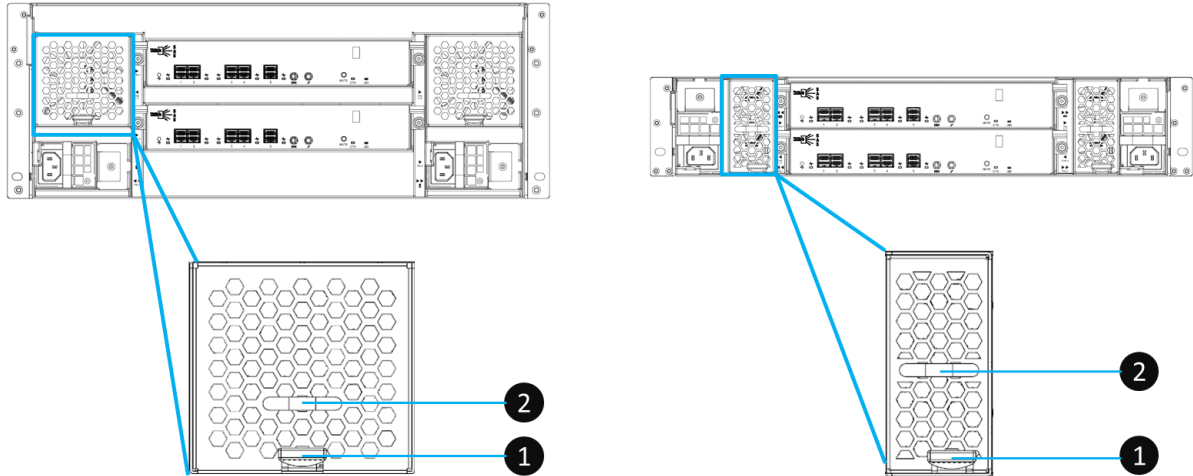
Figure 2-11   Mechanical Components of the Fan Module

Table 2-10   Mechanical Components of the Fan Module

Number	Description
1	Fan Module Release Tab
2	Fan Module Handle

2.7.   Seven-segment LED Display

The XCubeDAS XD5300 series features the seven-segment LED display for users to easily identify a specific XCubeDAS system. The enclosure ID is assigned by head unit (XCubeSAN series) automatically. The seven -segment LED display supports up to ten XCubeDAS systems, and the numbering rule will start from 1 to A. For dual controller models, both controllers will display the same enclosure ID. After the XD5300 had been assigned the enclosure ID, head unit will assign the same enclosure ID when the system reboots or goes shutdown. These enclosure IDs can be clean and reset if you execute the Clean Expansion ID[7] function in SANOS UI -> **Maintenance** -> **Reset to Defaults** of XCubeSAN series. If you want to learn more about how to reset your system to factory, please refer to the chapter 6.5.5, Rest to Factory Default section in XCubeSAN SANOS 4.0 User's Manual.
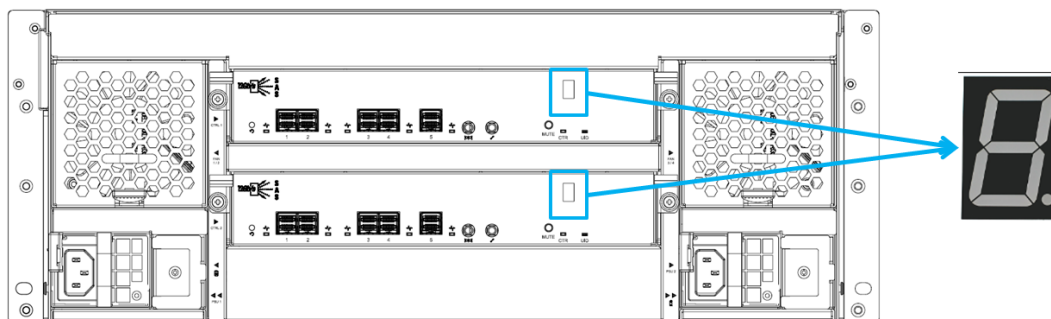
Figure 2-12   Seven-segment LED Display

INFORMATION:
[7] Clean Expansion ID function will be available in SANOS firmware 1.1.0.

---

3. Installing the System Hardware

This chapter will show you the detailed procedure of the XCubeDAS series hardware installation and initial configuration.

3.1. Installation Checklist

To ensure a successful system installation and initial configuration, you can follow the procedures in the checklist below by order.

Table 3-1   Installation Checklist

Step	Task	Where to Find the Detail Procedure
1	Installing disk drives into the trays	Chapter 3.2
2	Installing the optional slide rails	Chapter 3.3
3	Installing the trays into the system	Chapter 3.4
4	Connecting the system to a host	Chapter 3.5
5	Connecting power cords and powering on the system	Chapter 3.6
6	Discover and monitor the system	Chapter 3.9

3.2. Installing Disk Drives into the Trays

Key Components of the Disk Drive Tray

The following content illustrates the key components of both LFF and SFF disk drive trays.
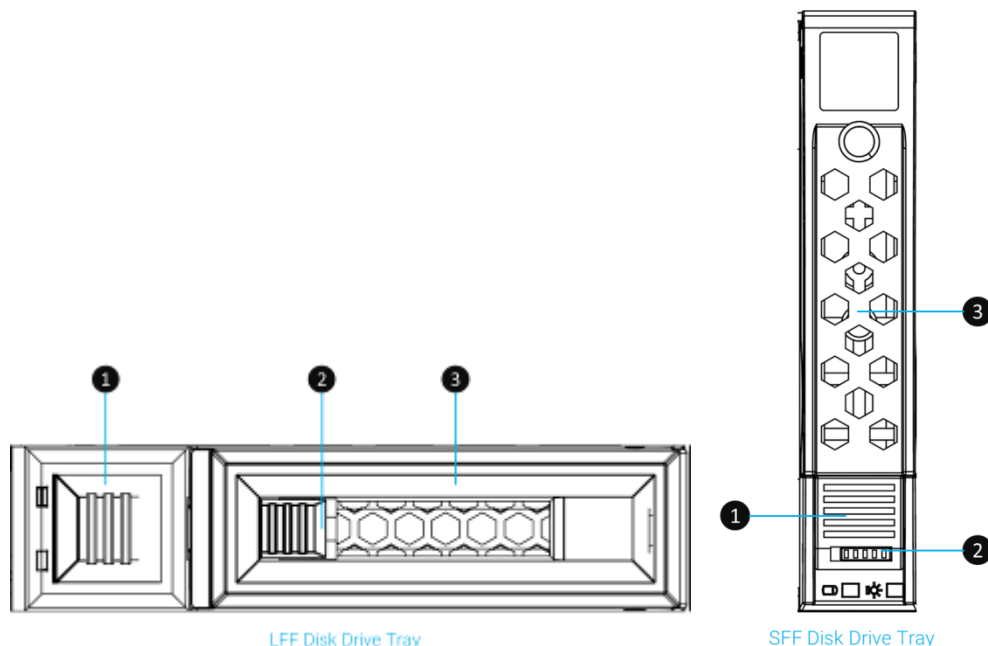
Figure 3-1   Front Side Components of LFF & SFF Disk Drive Trays

Table 3-2   Front Side Components of LFF & SFF Disk Drive Trays

Item Number	Description
1	Carrier Handle Release Button
2	Release Button Lock
3	Carrier Handle

Unlock the Disk Drive Tray and Remove from the System

The standard position of the disk drive tray is locked to prevent damage during transport. You must unlock disk drive trays before starting to install drives into the system chassis. The following content is the detailed steps for removing a disk drive tray from the system:

- Unlock release button lock: shift the lock from left to right. (LFF and SFF trays)
- Procedure of opening the LFF disk drive tray carrier handle: shift the carrier handle release button from right to left; then carrier handle will automatically pop out.
- Procedure of opening the SFF disk drive tray carrier handle: shift the carrier handle release button from up to down; then carrier handle will automatically pop out.
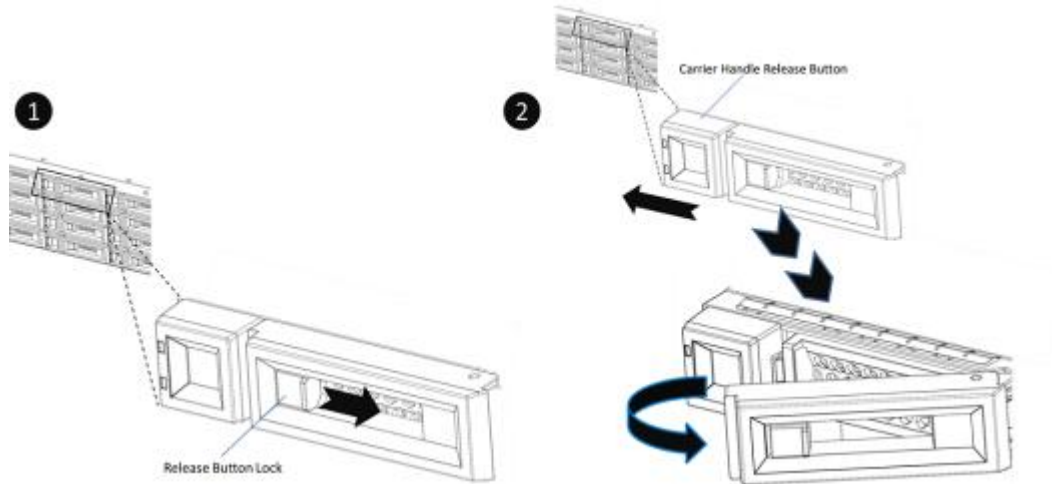
Figure 3-2   Unlock and Open the Carrier Handle of a Disk Drive Tray (LFF)
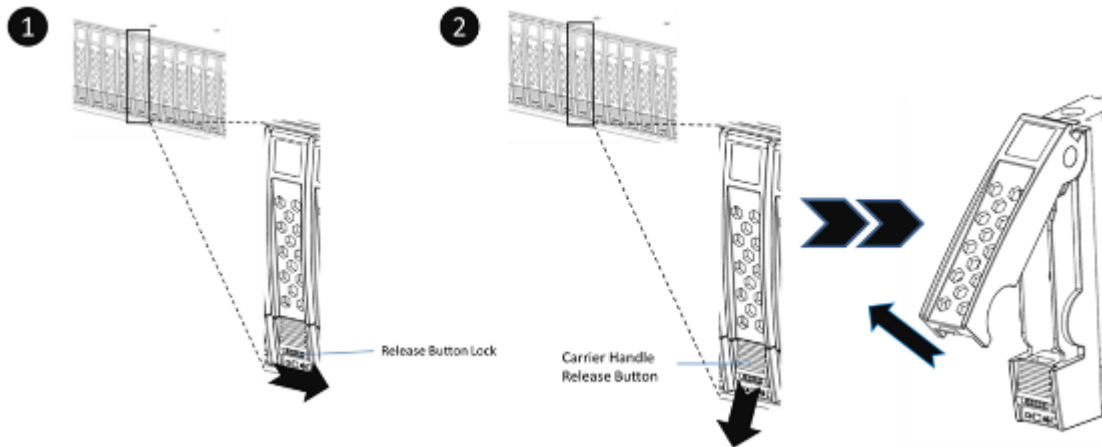
Figure 3-3   Unlock and Open the Carrier Handle of a Disk Drive Tray (SFF)

- The following content is the procedure for removing disk drive trays from the system:
  ◦ Hold the carrier handle and pull the disk drive tray out until it is free of the disk drive bay.
  ◦ Repeat steps above for another empty disk drive trays that you would like to remove.
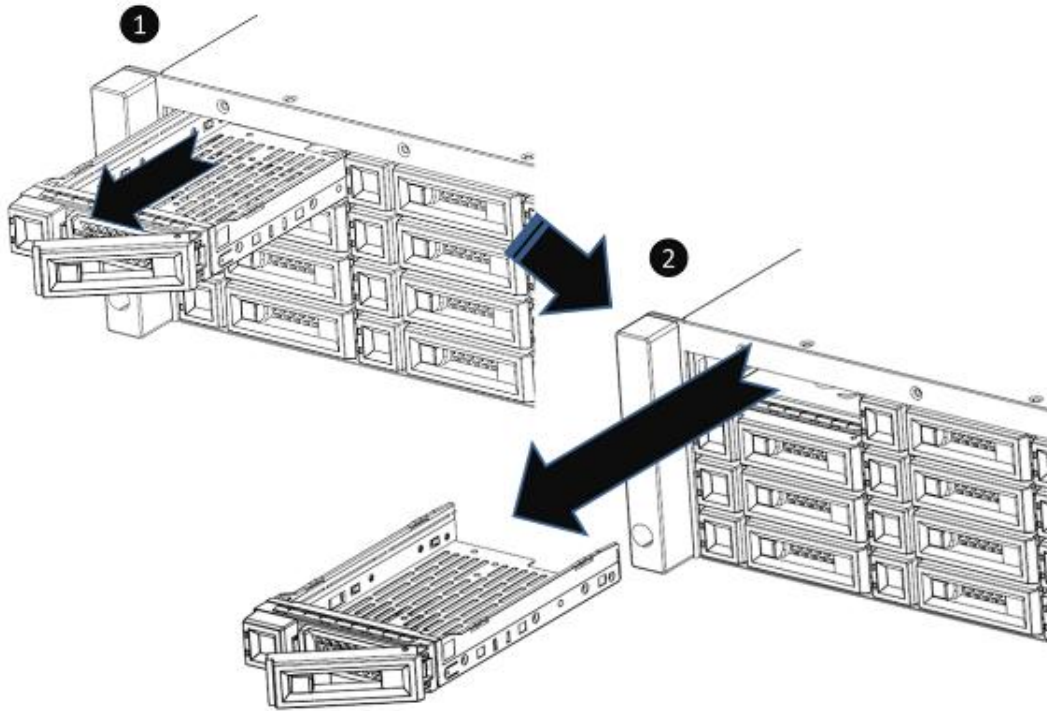
Figure 3-4   Hold the Carrier Handle and Pull out the Disk Drive Tray (LFF)
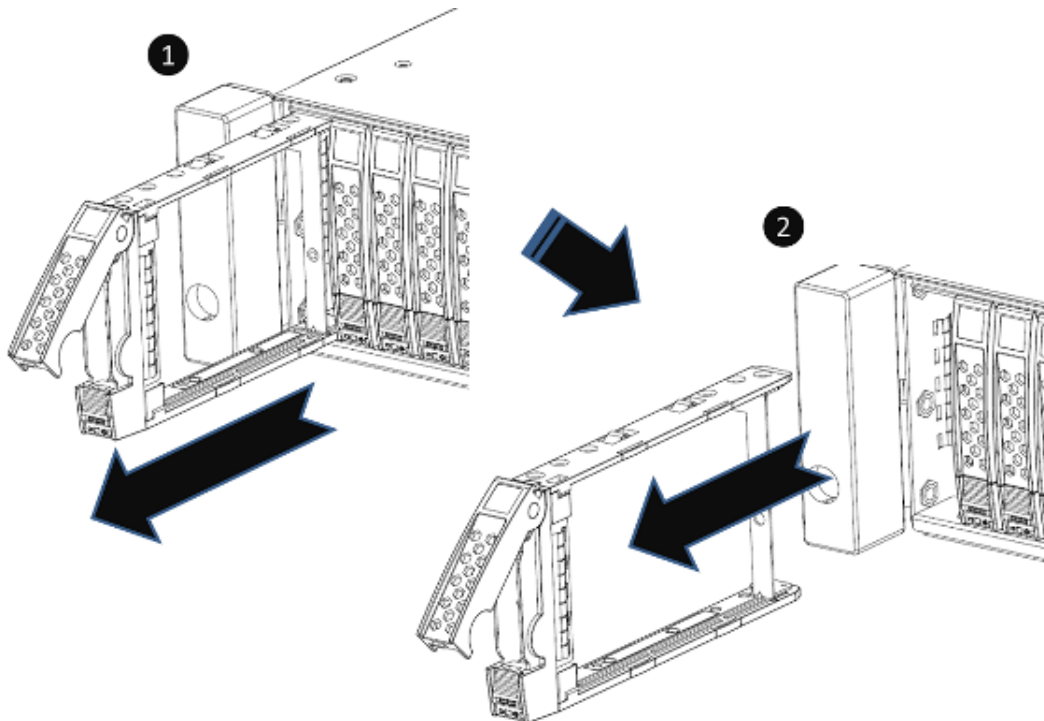
Figure 3-5   Hold the Carrier Handle and Pull out the Disk Drive Tray (SFF)

Installing a Disk Drive into a Tray

Following contents and figures are detail steps of installing a disk drive into the tray.

- For installing an LFF disk drive into an LFF tray

    ◦ Place a disk drive tray onto a stable surface.
    ◦ Align the disk drive to the tray (with disk connector facing away from carrier handle) and align four disk drive tray screw holes located on both sides of the hard drive
    ◦ Install and tighten all four screws to secure the disk drive within the tray.
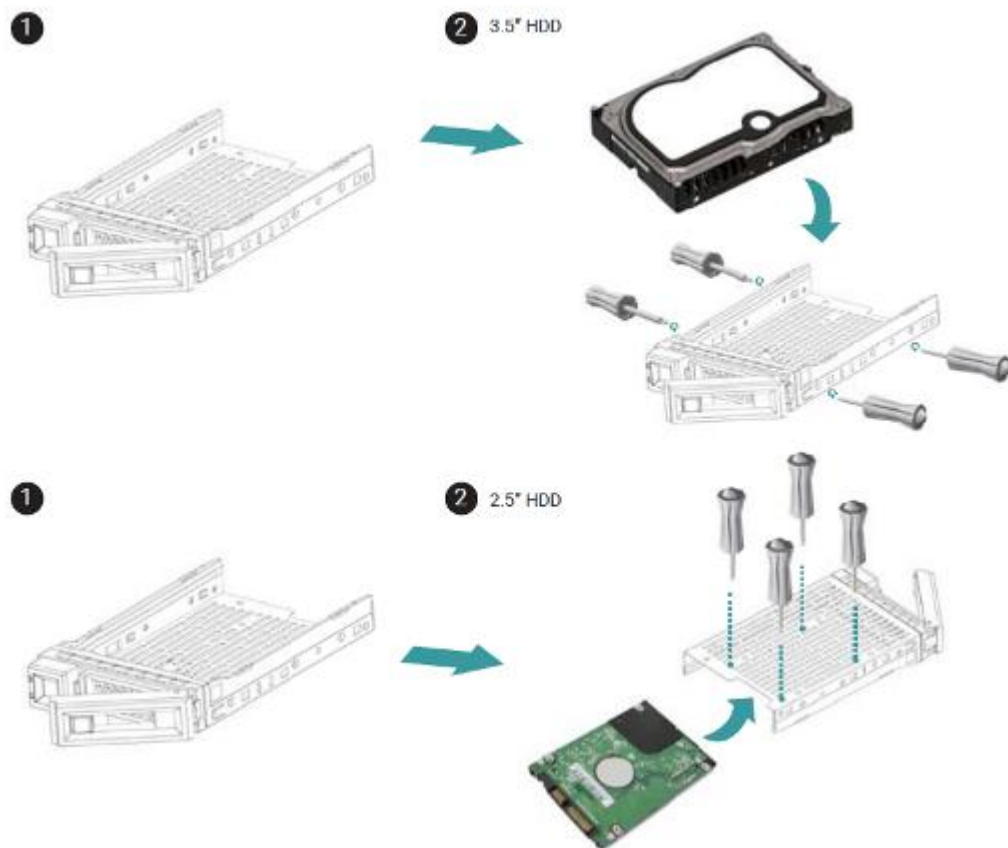
Figure 3-6   Align a Disk Drive & Install into a Tray (LFF-to-LFF)

- For installing an SFF disk drive into an LFF tray

    ◦ Place a disk drive tray onto a stable surface.
    ◦ Align the disk drive to the tray with the connector facing away from the carrier handle.
    ◦ Align four disk drive tray screw holes (front row at the bottom side of the tray for SAS interface disk drive; a rear row for SATA interface SSD) to the disk drive.

◦ Install and tighten all four screws to secure disk drive.
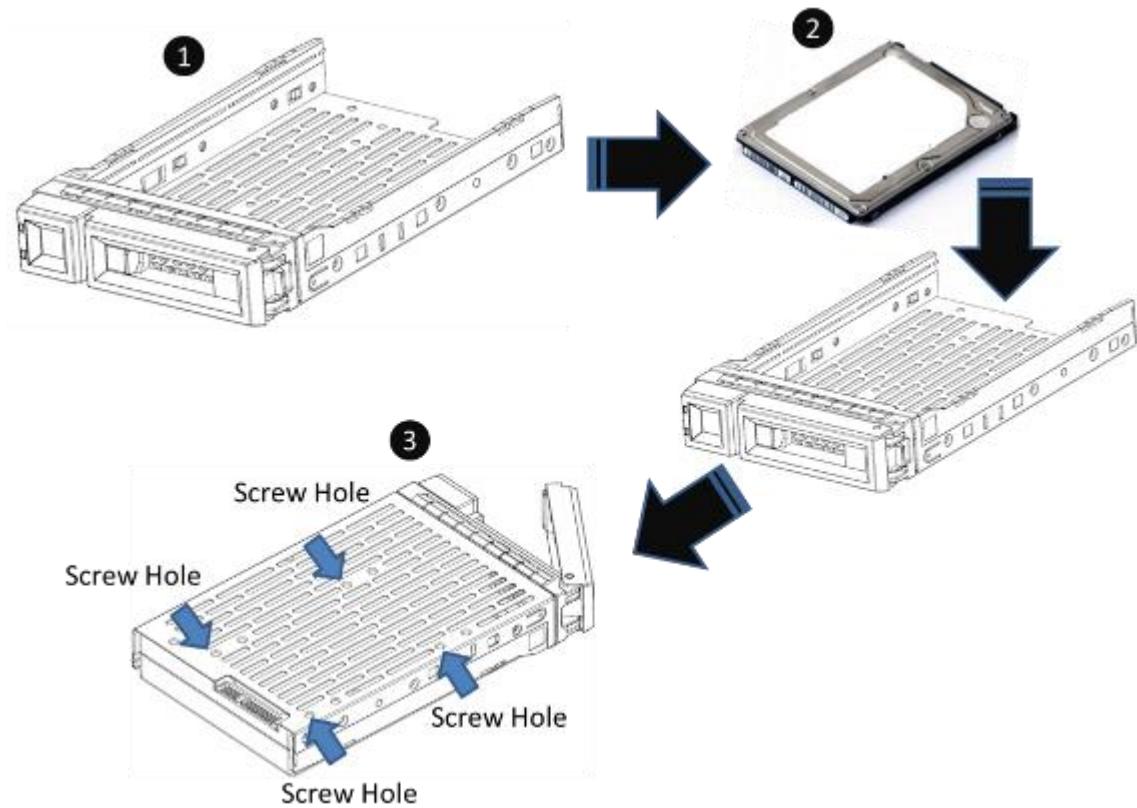
Figure 3-7   Align a Disk Drive & Install into a Tray (SFF-to-LFF)

• For installing an SFF disk drive into an SFF tray

  ◦ Place a disk drive tray onto a stable surface.
  ◦ Remove the supporting bracket. Then align the disk drive with the connector facing away from the carrier handle.
  ◦ Align four disk drive tray screw holes on both sides of the disk tray.
  ◦ Install and tighten all four screws to secure disk drive within the tray.
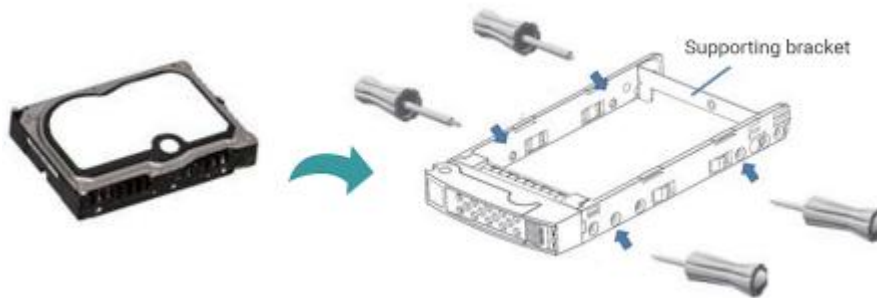
Figure 3-8   Align a Disk Drive & Install into a Tray (SFF-to-SFF)

The table below shows the available disk drive trays, MUX board with bracket, and their descriptions.

Table 3-3   Available Disk Drive Trays for XCubeDAS Series

Model Name	Picture	Description	Applied Models
HDT-351		3.5" Disk Drive Tray	XD5324 XD5316 XD5312
HDM-351		SATA 6Gb MUX Board and Bracket for HDT-351 (2.5" SATA drives only)	
HDT-251		2.5" Disk Drive Tray	XD5326
HDM-251		SATA 6Gb MUX Board and Bracket for HDT-251	

3.3.   Installing the Optional Slide Rails

If you did not purchase QSAN qualified slide rails, please skip this section. The table below shows the available slide rail, model name, and its description.

Table 3-4   Available Slide Rails for XCubeDAS Series

Model Name	Picture	Description	Applied Models
SLR-RM3640		Slide Rail	XD5300 Series

INFORMATION:

Slide rails is an optional part of all XCubeSAN series models, if you did not purchase QSAN qualified slide rails, you can skip the fourth step of the system installation tasks. If you want to purchase QSAN qualified slide rails: full extension and thin slide with tool-less bracket: AA612508 series, please contact QSAN authorized reseller.

CAUTION:

The populated XCubeDAS system can be very heavy, to avoid any potential injury or harm to installers, or damage to the system, we strongly recommend at least two certified operators or engineers perform the system installation.

TIP:

Install the disk drive trays into the system after the system chassis is mounted in the rack. Doing this can reduce the loading of the overall weight when you mount the system chassis in the rack.

1. First step of the slide rails installation

   ○ Take the slide rails from the carton.
   ○ Pull the inner rail out and slide the intermediate rail back.

1) Pull the inner rail out and slide the intermediate rail back.

Pull tab forward
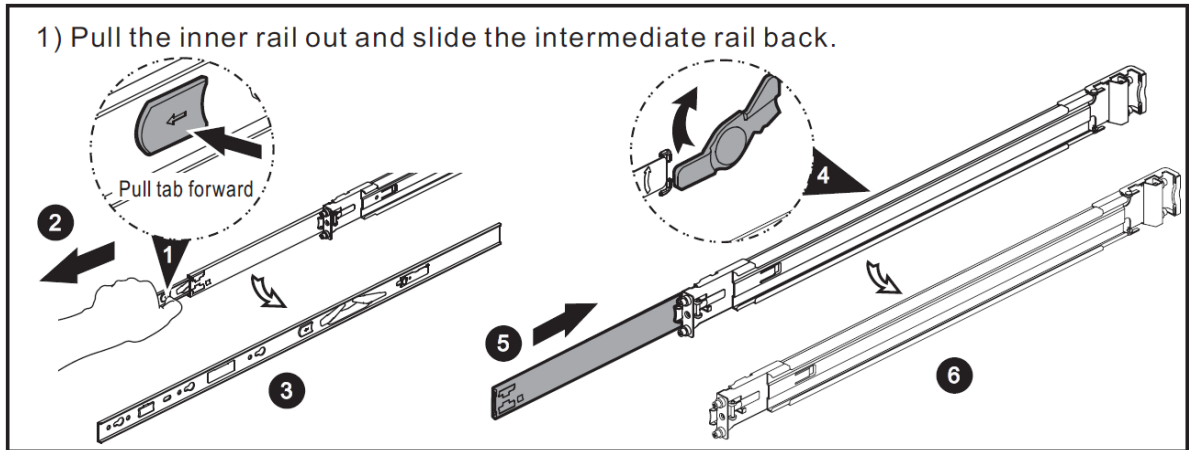
Figure 3-9   First Step of the Slide Rails Installation

2. Second step of the slide rails installation

    ◦ Install the inner member onto the chassis.

2) Install the inner rail onto the chassis.

Click!
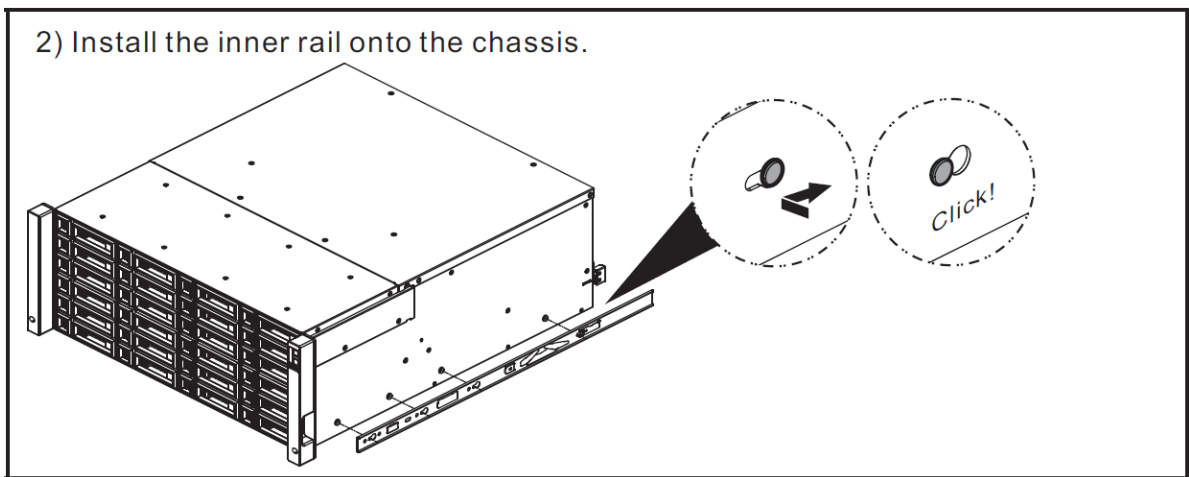
Figure 3-10   Second Step of the Slide Sails Installation

3. Third step of the slide rails installation

    ◦ Install the outer rail/bracket assembly to the frame.
    ◦ Repeat this installation step for the other side.
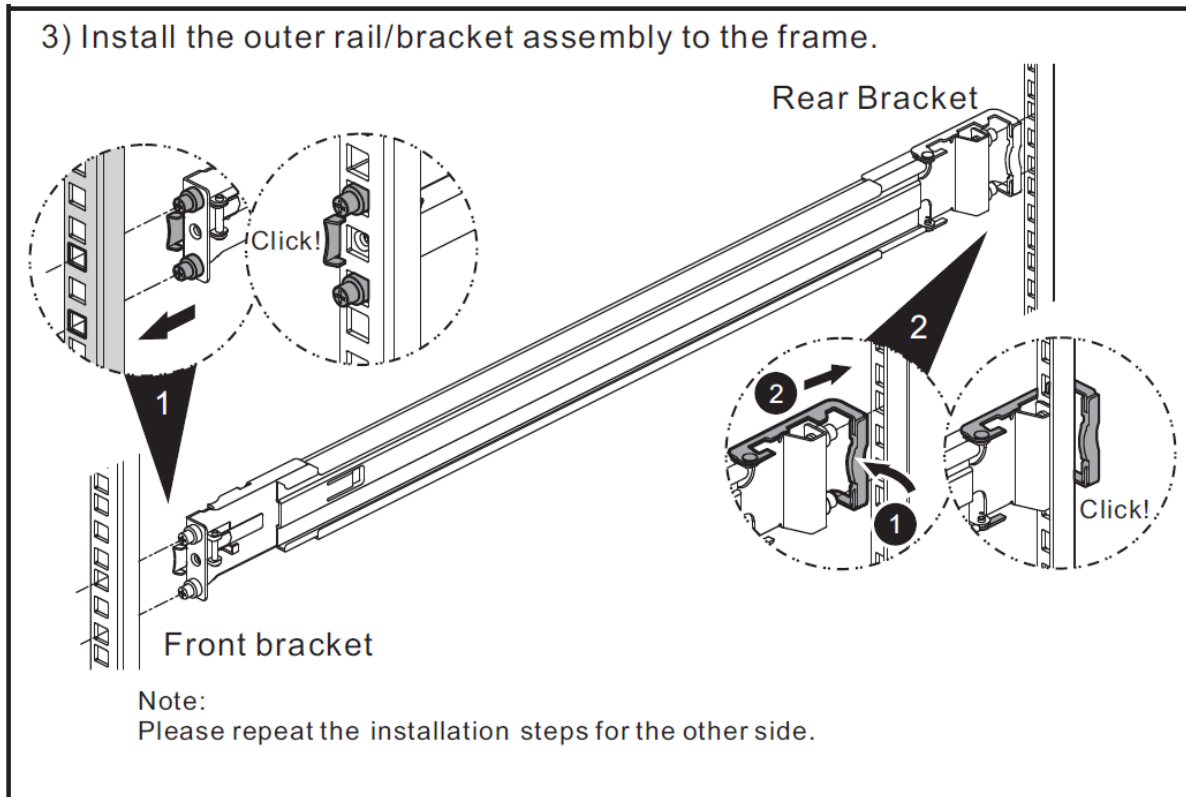
Figure 3-11   Third Step of the Slide Rails Installation

4. Fourth step of the slide rails installation

    ◦ Pull the middle member fully extended in locked position.
    ◦ Ensure ball bearing retainer is located at the front of the middle member.
    ◦ Insert chassis into middle-outer member.
    ◦ When hitting the stop, pull/push release tab to unlock and retract chassis into rack.
    ◦ Use M5x20 screws to fasten the chassis ear.[8]

INFORMATION:
[8] If you purchase optional slide rails, M5x20 screws that are dedicated for optional slide rails are packed in the screws pack.

---

4) Insert the chassis to complete the installation.

Step 1.
Pull the middle rail fully extended in locked position.
Step 2.
Ensure ball bearing retainer is located at the front of the middle rail.
Step 3.
Insert chassis into middle-outer rail.
Step 4.
When hit the stop, pull / push release tab to unlock and retract chassis into rack.
Step 5.
Use M5x20 screws to fasten the chassis ear.

Figure 3-12   Fourth Step of the Slide Sails Installation

3.4.   Installing the Trays into the System

Before installing, please check if the carrier handle is at the open position. The following procedure is for installing a tray into both LFF and SFF systems.

The following content and images are detailed steps for installing a tray into the system.

- Align a disk drive with the tray to the empty bay you would like to install and then push it all the way into the disk drive bay until the carrier handle is at closed position.
- Lock the release button lock by pushing the lock from right to left.
- Refer to the label on the system chassis for disk drive numbering. (Disk drive numberings of 2U 26-bay are printed on the chassis.)

Release Button Lock
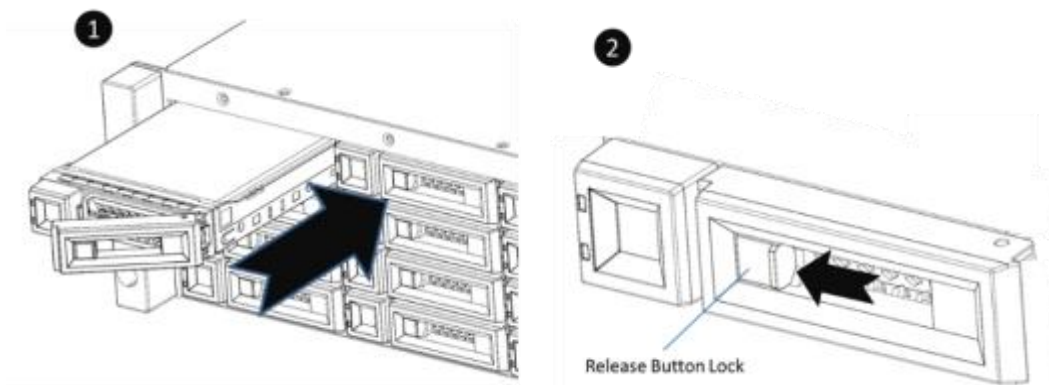
Figure 3-13   Install a Tray into the System and Lock the Release Button Lock (LFF)
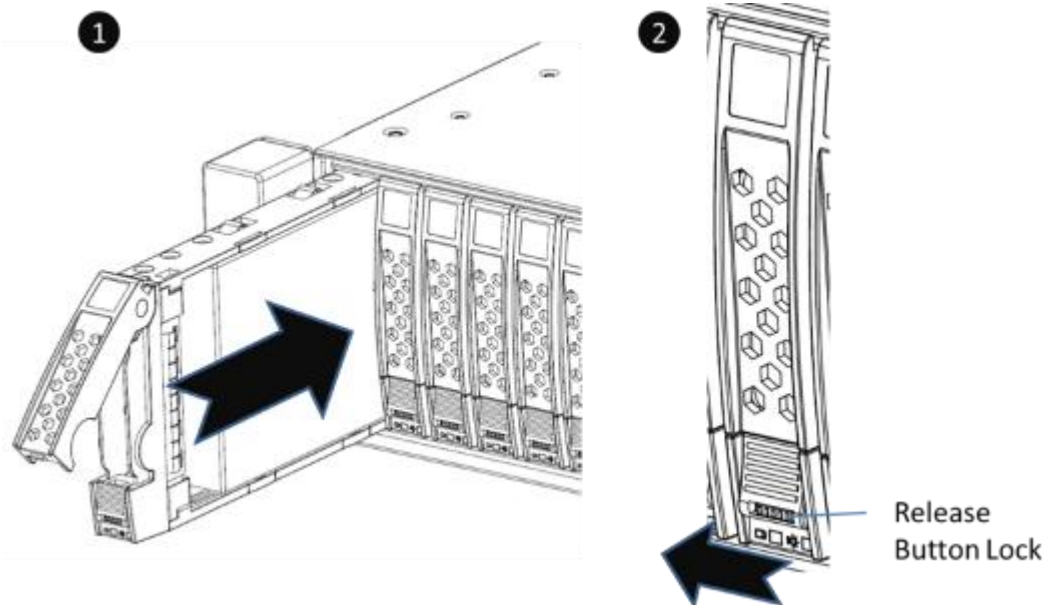
Figure 3-14   Install a Tray into the System and Lock the Release Button Lock (SFF)

3.5.   Connecting the System to a Host

The XCubeDAS series products are equipped with five 12Gb/s SAS wide ports (SFF-8644) per controller for server storage expansion or array expansion unit for QSAN XCubeSAN series as a scale up solution. To learn more about advanced types of cabling, please refer to the chapter 4, Deployment Types and Cabling.

3.5.1.   Server Storage Expansion (DAS or JBOD)

One Server / One XCubeDAS / Dual Path
The following figure shows an example of a dual controller, direct connect enclosure configuration with one server accessing the storage. One server is direct connected to a dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cables (SAS 12G expansion cable, SFF-8644 to SFF-8644).
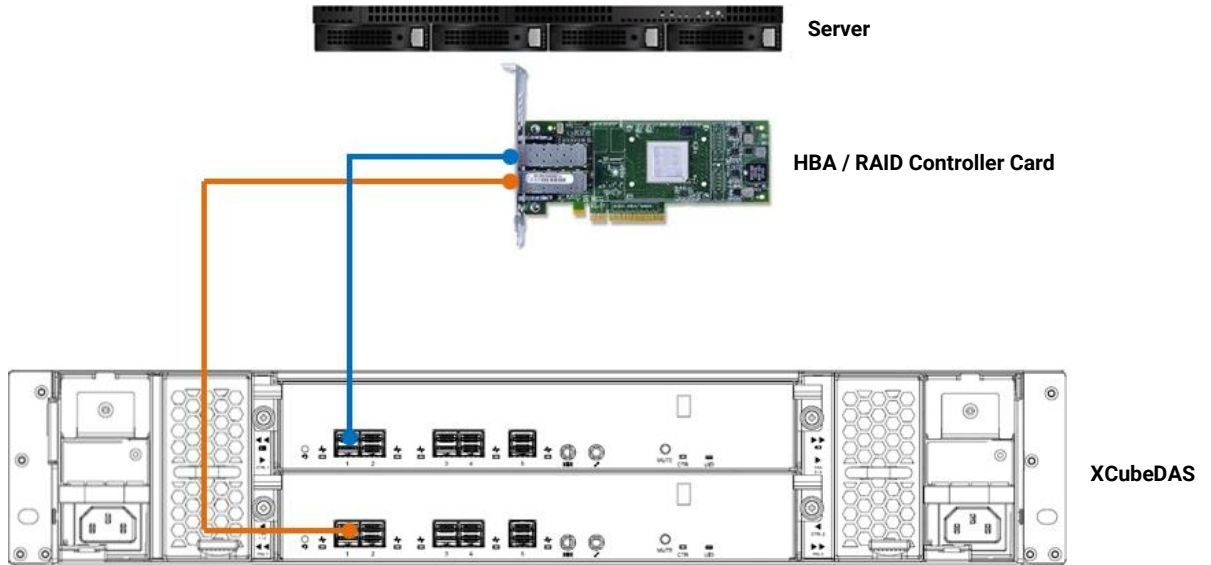
Figure 3-15   One Server / One XCubeDAS / Dual Path

3.5.2. XCubeSAN RAID Expansion

One XCubeSAN / One XCubeDAS / Dual Path

The following figure shows an example of a dual controller XCubeSAN series connected to a dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).
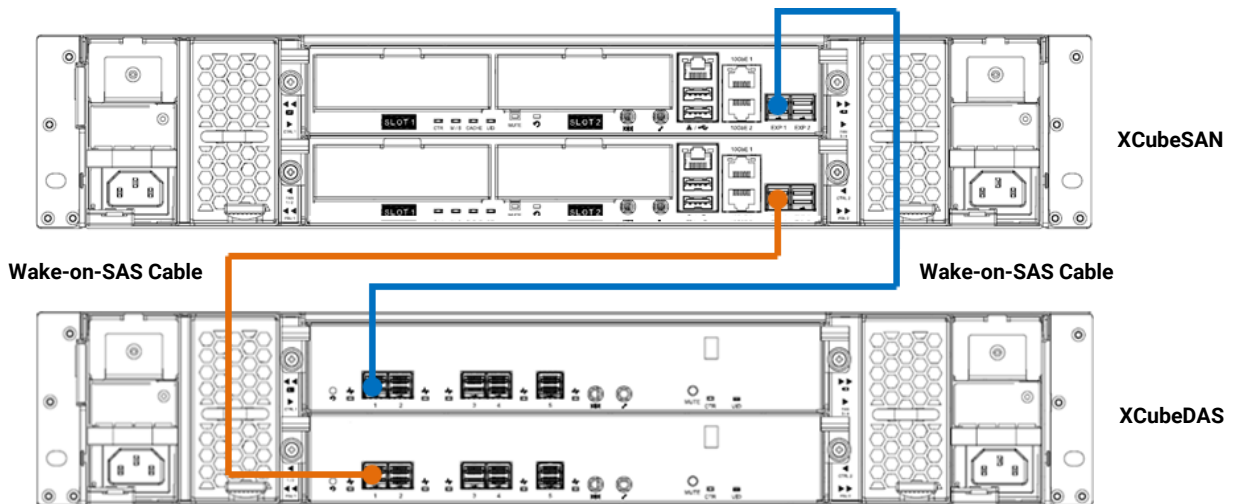
Figure 3-16   One XCubeSAN / One XCubeDAS / Dual Path

3.6. Connecting Power Cords and Powering ON the System

Before you power on your XCubeDAS system for the first time, please make sure following tasks are done:

- Check the power cord type. The power cords for the XCubeDAS series will vary depending on your country/region. If you find the power cords included with your XCubeDAS system doesn't match your current country/region, you may need to buy an adapter for each power cord to connect the power outlet.
   Power cord ratings:

   - 100 – 127V~ 10A
   - 200 – 240 V~ 5A

- Install all disk drives in the system so the controllers can identify and configure them at power-up.
- Connect cables that connect the management port and data ports to your network, and then power cords to the system; finally press the power button once to power on the XCube SAN.

Press the power button one time to power on the system

Figure 3-17   Press the Power Button One Time to Power on the System

> **INFORMATION:**
> The power cord rating is the minimum requirement. The rating of the power cord that you purchase must equal to or higher than the minimum requirement to ensure the system safety and reliability.
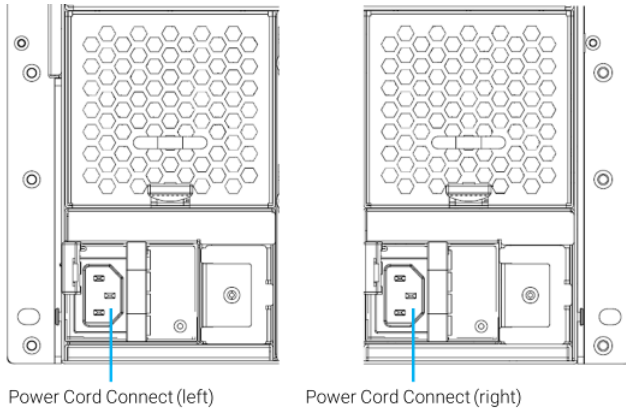
Figure 3-18   PSU Power Cord Connects

INFORMATION:

The Following are the operational conditions for all XCubeDAS series models:

Temperature:

- Operating temperature 0 to 40°C
- Shipping temperature -10°C to 50°C

Relative Humidity:

- Operating Relative Humidity 20% to 80% non-condensing
- Non-Operating Relative Humidity 10% to 90%

TIP:

The XCubeDAS series will remember the current power state when the power failed by accent. If the system is online state, after power is recovered, the system will power on automatically. If the system is offline, the system will keep power off.

3.7.   Powering OFF the System

To power off the system, please follow the steps outlined below:

- Stop all I/O from all hosts to the DAS systems.
- Press and hold the power button for **4 seconds**.
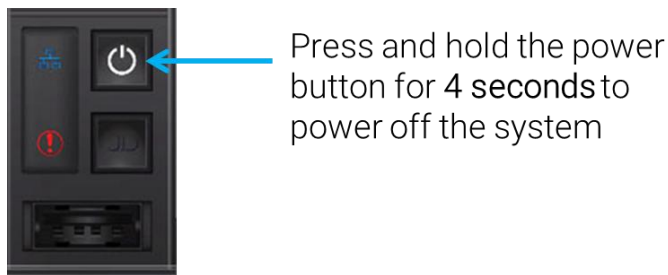
Press and hold the power
button for **4 seconds** to
power off the system

Figure 3-19   Power off the System by Power Button

3.8.   Wake-on-SAS to Power ON / OFF the System

For use with QSAN XCubeSAN series, QSAN's Wake-on-SAS technology allows you to remotely power on/off all cascaded XD5300 expansion enclosures by using QSAN proprietary SAS cables. Wake-on-SAS ensures that expansion enclosures will not run idly, consuming electricity after the SAN storage system is shut down for maintenance or other purposes. Wake-on-SAS can avoid unnecessary electricity waste by allowing your devices to be on only when it is necessary. A further advantage of Wake-on-SAS is that when you turn on the SAN, the expansion enclosures will wake automatically, so there is no need to worry about degrading a volume if you forget to turn them on first.

The table below shows the available expansion cable, model name, and its description.

Table 3-5   Available Expansion Cable for XCubeDAS Series

Model Name	Picture	Description	Applied Models
CBL-12SW150		SAS 12G Expansion Cable with Wake-on-SAS, SFF-8644 to SFF-8644, 1.5 Meters (This cable is not suitable for connecting HBA or RAID card)	XD5300 Series

The following diagram shows that after the XCubeSAN series SAN storage receives the magic packet being sent from the client's computer, it powers on automatically and uses Wake-on-SAS functionality to power-on the attached XD5300 expansion enclosures.

Mini SAS HD Cable

XCubeSAN Series SAN Storage

Wake-on-SAS

XD5300 Expansion Enclosure
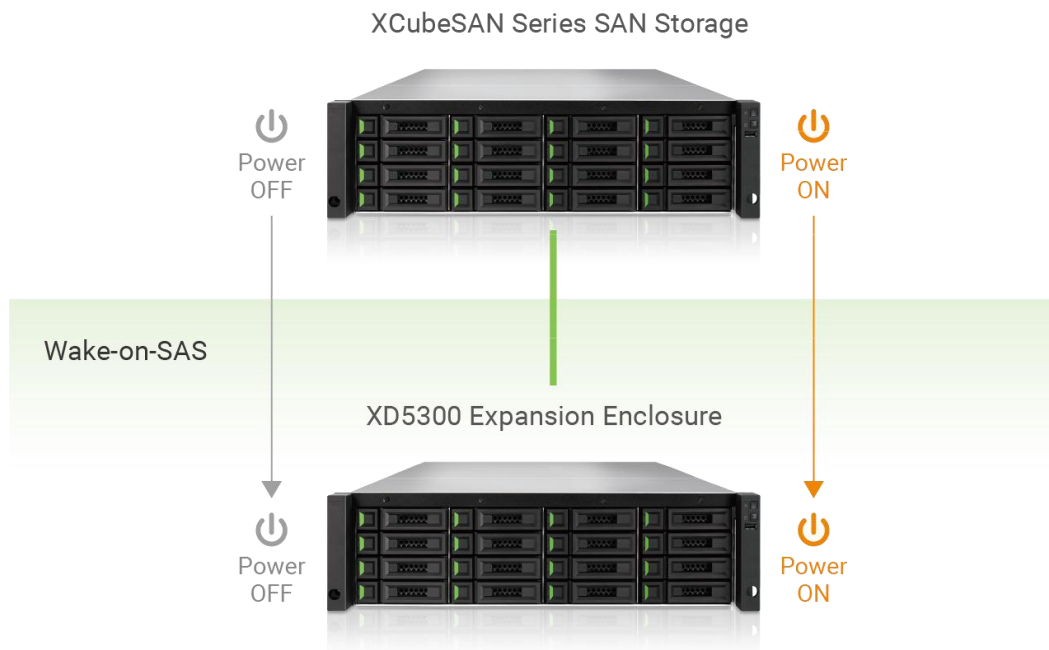
Figure 3-20   Wake-on-SAS Technology

3.9. Discover and Monitor the System

After powering on the system, the next step is to discover the system on the host. If the XCubeDAS series is connected as a server storage expansion, please refer to the user guide of the HBAs or RAID controller cards. If the XCubeSAN series is connected as the expansion unit of the XCubeSAN series, please refer to the chapter 8, Storage Management in the XCubeSAN SANOS 4.0 User's Manual.

To monitor the system, we provide a CubeView utility which is central management software with graphic user interface to monitor the XCubeDAS series system. For more information, please refer to the XCubeDAS CubeView User's Manual. In addition, we also provide CLI (Command Line Interface) to manage command line interface. For more information, please refer to the XCubeDAS CLI User's Manual.

4. Deployment Types and Cabling

This chapter will show detailed deployment types and cabling for the XCubeDAS series. You can start to build up a deployment plan for your XCubeDAS series in server storage expansion (DAS or JBOD) or QSAN XCubeSAN series array expansion enclosure.

4.1. Deployment Types

XCubeDAS series supports the following deployment types:

Table 4-1   Deployment Types

Deployment Type	Description
Single Path (for single or dual controller models)	In a single path deployment, one path is connected from the host/server to the XCubeDAS system. In this deployment, only one controller in the enclosure is used.
Dual Path (for dual controller models)	In a dual path deployment, two paths are connected from the host/server to the XCubeDAS system. In this deployment, both controllers in the system are used. Because dual path deployments provide two paths to the server or array expansion for redundancy even in the event of device, cable, or power failure. In dual-path deployment environment, disk drives must support dual paths I/O (SAS interface).
Server Attached (for single or dual controller models)	In a server attached deployment, the server within an HBA or a RAID controller card is connected to the XCubeDAS system. In this deployment, both single and dual path deployment modes are supported. Several models of HBAs and RAID controller cards are supported for use with XCubeDAS series. For more information, please refer to the Compatibility Matrix table.
QSAN SAN Array Expansion Enclosure Attached (for single or dual controller models)	In a QSAN SAN array expansion enclosure attached deployment, the SAN array within the expansion ports is connected to the XCubeDAS system. In this deployment, both single and dual path deployment modes are supported. For more information, please refer to the

For more detail deployment type and cabling, please refer following sections.

4.2. Cabling the System

The following examples illustrate how to configure the cabling for the XCubeDAS series. Recommended SAS cable length for the host connection is less than 3 meters. The XCubeDAS supports a maximum of up to 260 drives for the system storage space expansion; both single and dual path cabling are supported. The expansion cables are needed for XCubeDAS series in server storage expansion (DAS or JBOD). If users want to enable wake on SAS for the XCubeSAN series array expansion enclosures, the QSAN genuine SAS cable with sideband is required to enable this feature.

The table below shows the available cables, model name, and its description.

Table 4-2   Available Cables for XCubeDAS Series

Model Name	Picture	Description	Applied Models
CBL-12SW150		SAS 12G Expansion Cable with Wake-on-SAS, SFF-8644 to SFF-8644, 1.5 Meters (This cable is not suitable for connecting HBA or RAID card)	XD5300 Series
CBL-12SH150		SAS 12G Expansion Cable, SFF-8644 to SFF-8644, 1.5 Meters	

4.2.1. Expansion Configuration Rules

For the maximum number of extension enclosures and disk drives support, it depends on the capability of the HBAs and RAID controller cards. Please refer to the user guides of the HBAs or RAID controller cards.

For the expansion of QSAN XCubeSAN series SAN storage, it supports up to ten of mixing XCubeDAS XD5300 series for expansion and allows scaling up to 286 disk drives (including SAN storage). Please refer to the chapter 4.2.1, Expansion Configuration Rules in the XCubeSAN Hardware Owner's Manual.

4.2.2. Server Storage Expansion with Single Path Deployment

Cascade Topology: One Server / One XCubeDAS / Single Path

The following figure shows an example of a single controller, direct connect enclosure configuration with one server accessing the storage. One server is direct connected to a single controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable, SFF-8644 to SFF-8644).

Server

HBA / RAID Controller Card
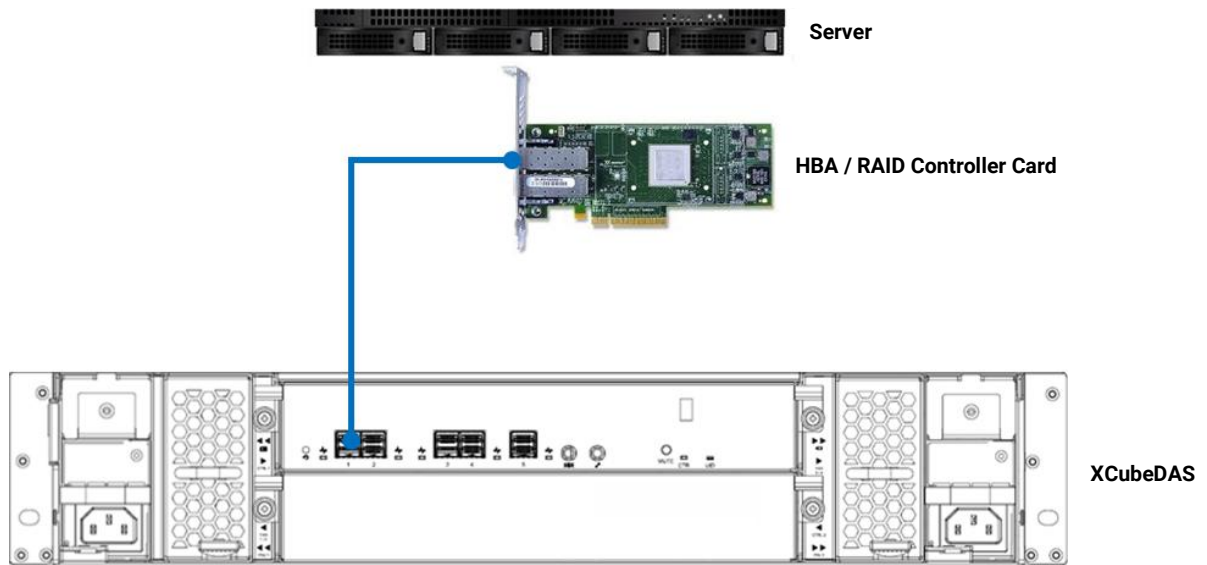
XCubeDAS

Figure 4-1   Cascade Topology: One Server / One XCubeDAS / Single Path

4.2.3. Server Storage Expansion with Dual Path Deployment

For redundancy, recommend to connect two paths and run MPIO (MultiPath I/O) configurations to ensure data consistency in the rare event of a failure in the host connectivity from a single path.

Cascade Topology: One Server / One XCubeDAS / Dual Path

The following figure shows an example of a dual controller, direct connect enclosure configuration with one server accessing the storage. One server is direct connected to a dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cables (SAS 12G expansion cable, SFF-8644 to SFF-8644).

Figure 4-2   Cascade Topology: One Server / One XCubeDAS / Dual Path

Cascade Topology: One Server / Two XCubeDAS / Dual Path

The following figure shows an example of a dual controller, direct connect enclosure configuration with one server accessing the storage. One server is direct connected to a dual controller XCubeDAS XD5300 series, which is in turn connected to the second dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cables (SAS 12G expansion cable, SFF-8644 to SFF-8644).
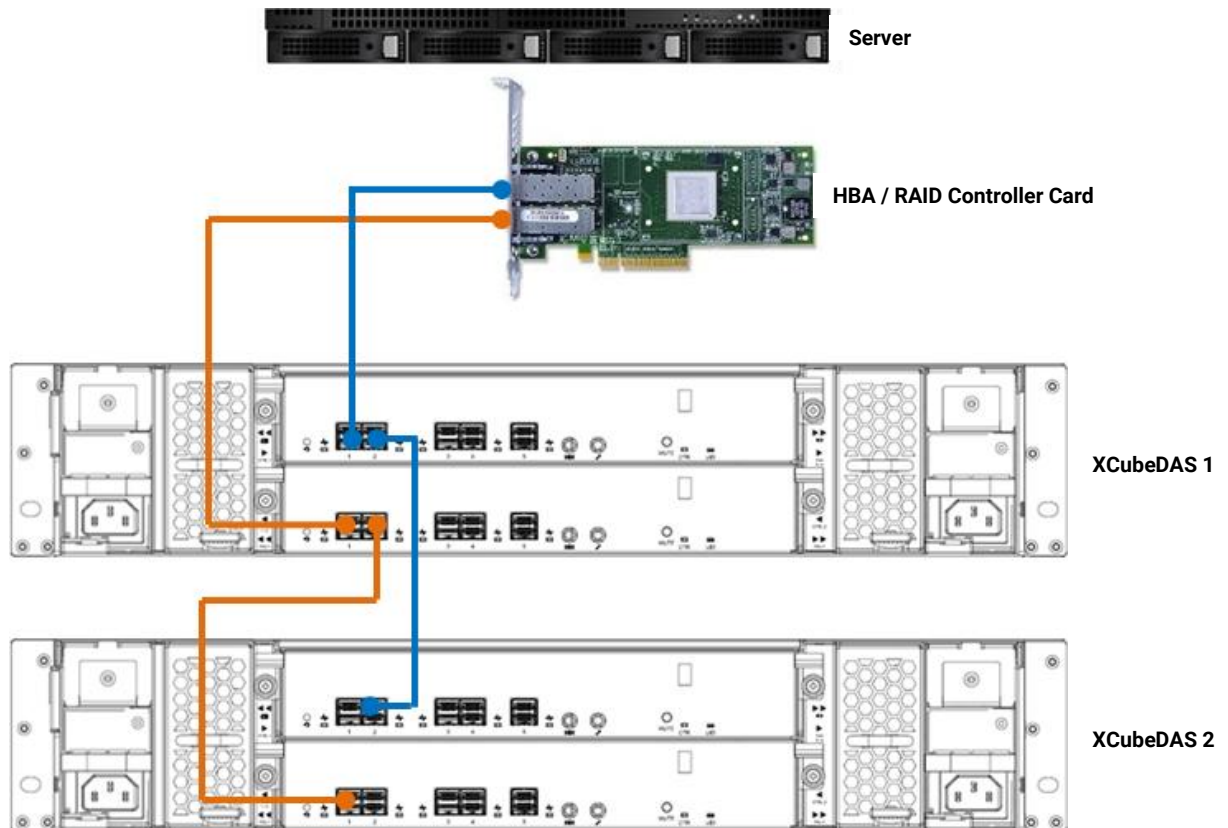
Figure 4-3   Cascade Topology: One Server / Two XCubeDAS / Dual Path

Reverse Topology: One Server / Two XCubeDAS / Dual Path

The XCubeDAS can be connected in redundant connection mode based on forward direction and backward direction. This provides the optimal networking reliability.

The following figure shows an example of a dual controller, direct connect enclosure configuration with one server accessing the storage. One server is direct connected to a dual controller XCubeDAS XD5300 series, which is in turn connected to the dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cables (SAS 12G expansion cable, SFF-8644 to SFF-8644). The connection in forward direction is shown as blue cables. The connection in backward direction is shown as orange cables.
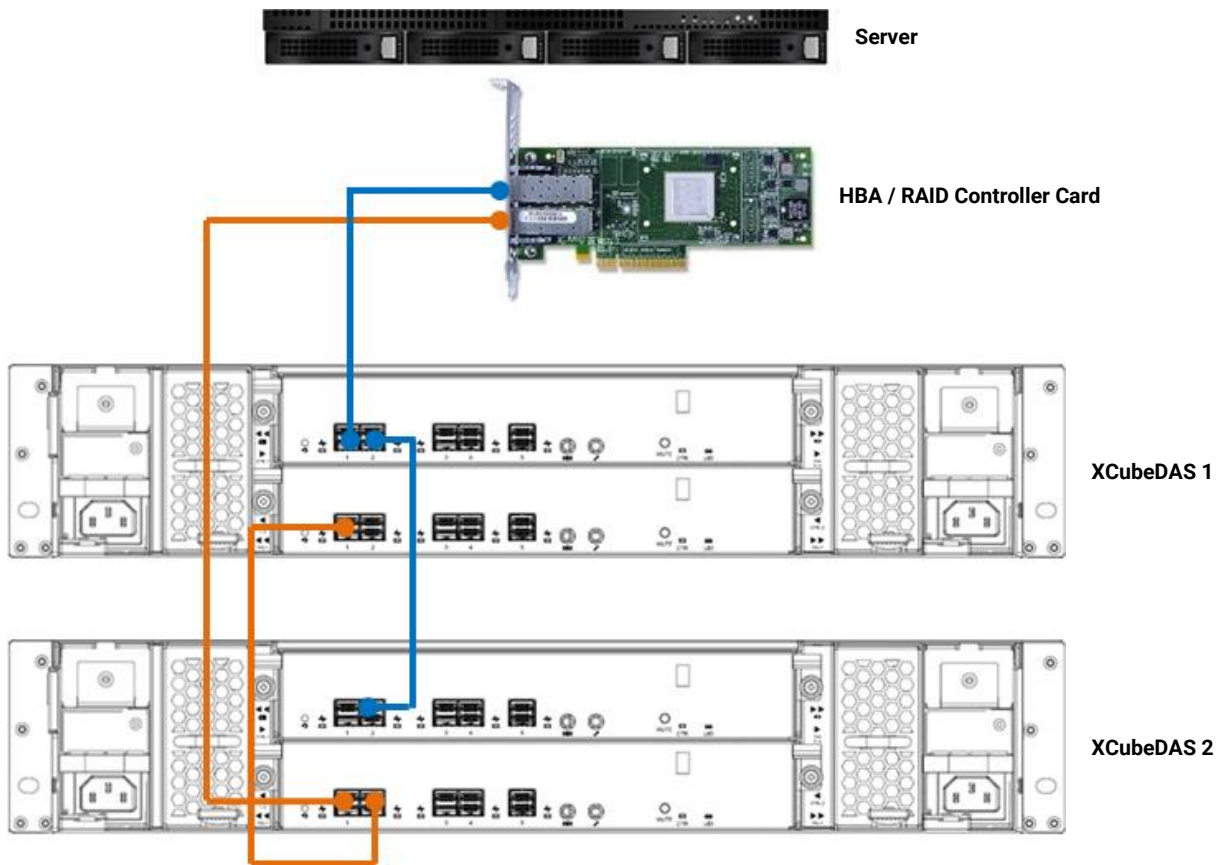
Figure 4-4   Reverse Topology: One Server / Two XCubeDAS / Dual Path

> **INFORMATION:**
> Reverse topology support depends on the capability of the HBAs or RAID controller cards.

4.2.4. XCubeSAN Array Expansion with Single Path Deployment

Cascade Topology: One XCubeSAN / One XCubeDAS / Single Path

The following figure shows an example of a single controller XCubeSAN series connected to a single controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).
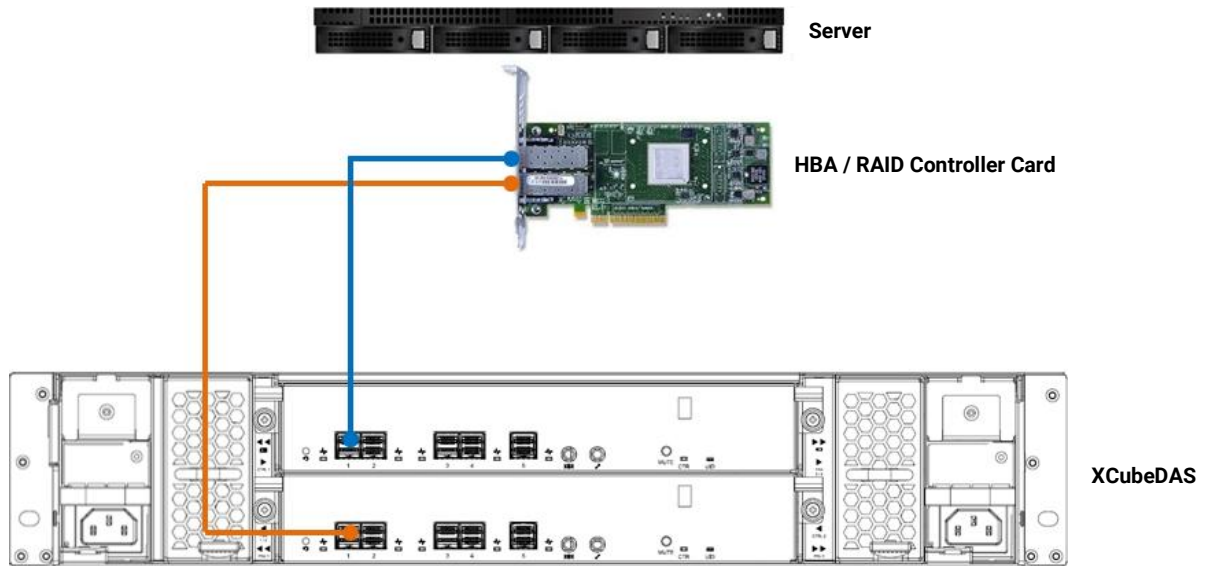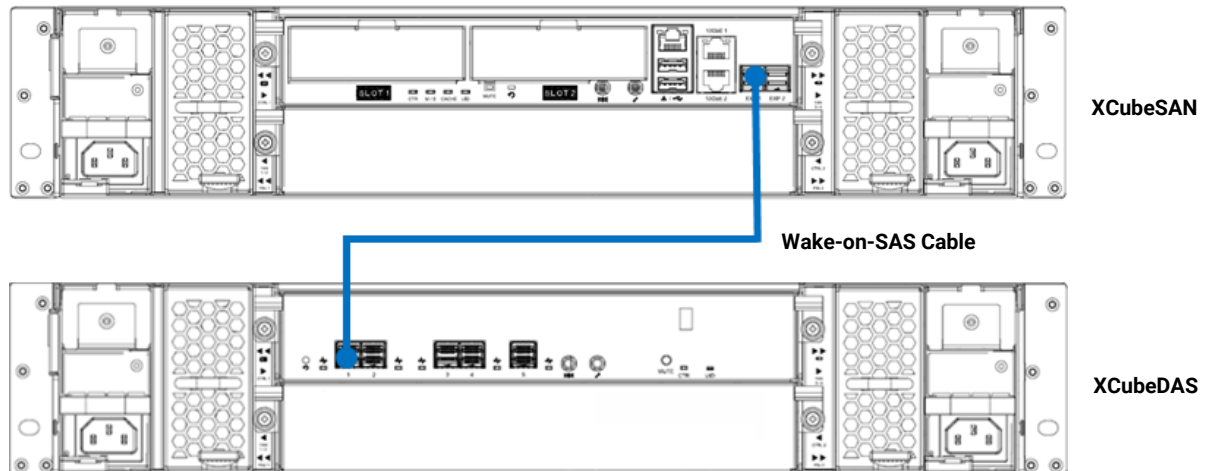

Figure 4-5   *Cascade Topology: One XCubeSAN / One XCubeDAS / Single Path*

4.2.5. XCubeSAN Array Expansion with Dual Path Deployment

For redundancy, recommend to connect two paths and run MPIO (MultiPath I/O) configurations to ensure data consistency in the rare event of a failure in the host connectivity from a single path.

Cascade Topology: One XCubeSAN / One XCubeDAS / Dual Path

The following figure shows an example of a dual controller XCubeSAN series connected to a dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).


XCubeSAN

Wake-on-SAS Cable

Wake-on-SAS Cable

XCubeDAS

Figure 4-6   Cascade Topology: One XCubeSAN / One XCubeDAS / Dual Path

Cascade Topology: One XCubeSAN / Two XCubeDAS / Dual Path

The following figure shows an example of a dual controller XCubeSAN series connected to a dual controller XCubeDAS XD5300 series which is in turn connected to the second dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).

Figure 4-7   Cascade Topology: One XCubeSAN / Two XCubeDAS / Dual Path

Reverse Topology: One XCubeSAN / Two XCubeDAS / Dual Path

The XCubeDAS can be connected in redundant connection mode based on forward direction and backward direction. This provides the optimal networking reliability.

The following figure shows an example of a dual controller XCubeSAN series connected to a dual controller XCubeDAS XD5300 series which is in turn connected to the second dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644). The connection in forward direction is shown as blue cables. The connection in backward direction is shown as orange cables.

Figure 4-8   Reverse Topology: One XCubeSAN / Two XCubeDAS / Dual Path

> **INFORMATION:**
> Reverse topology will be available in SANOS firmware 1.1.0.

Tree Topology: One Server / Two XCubeDAS

The XCubeDAS can be connected in tree topology to reduce the latency.

The following figure shows an example of a dual controller XCubeSAN series connected to two dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cable (SAS 12G expansion cable with Wake-on-SAS, SFF-8644 to SFF-8644).
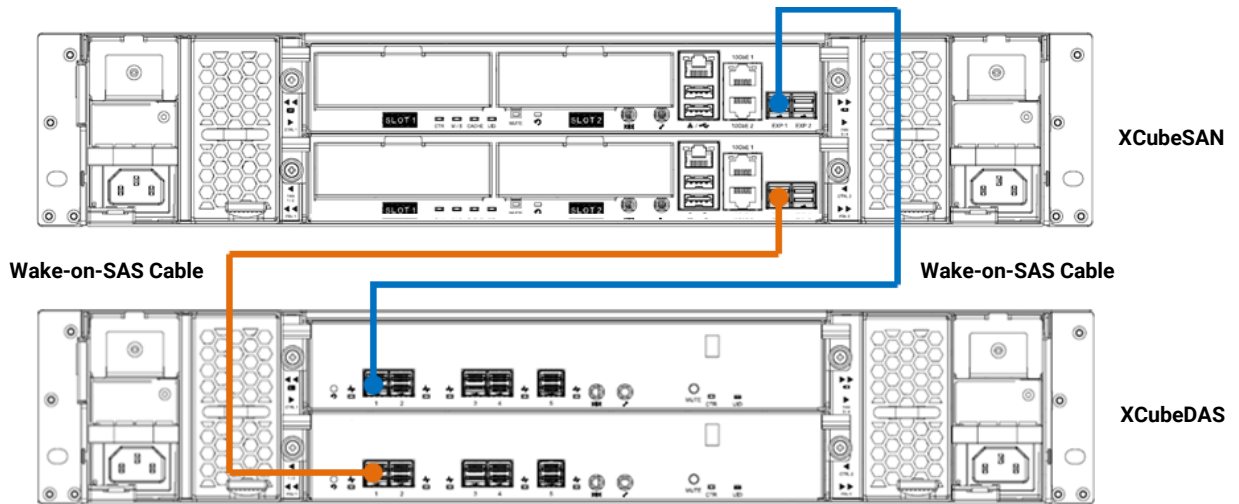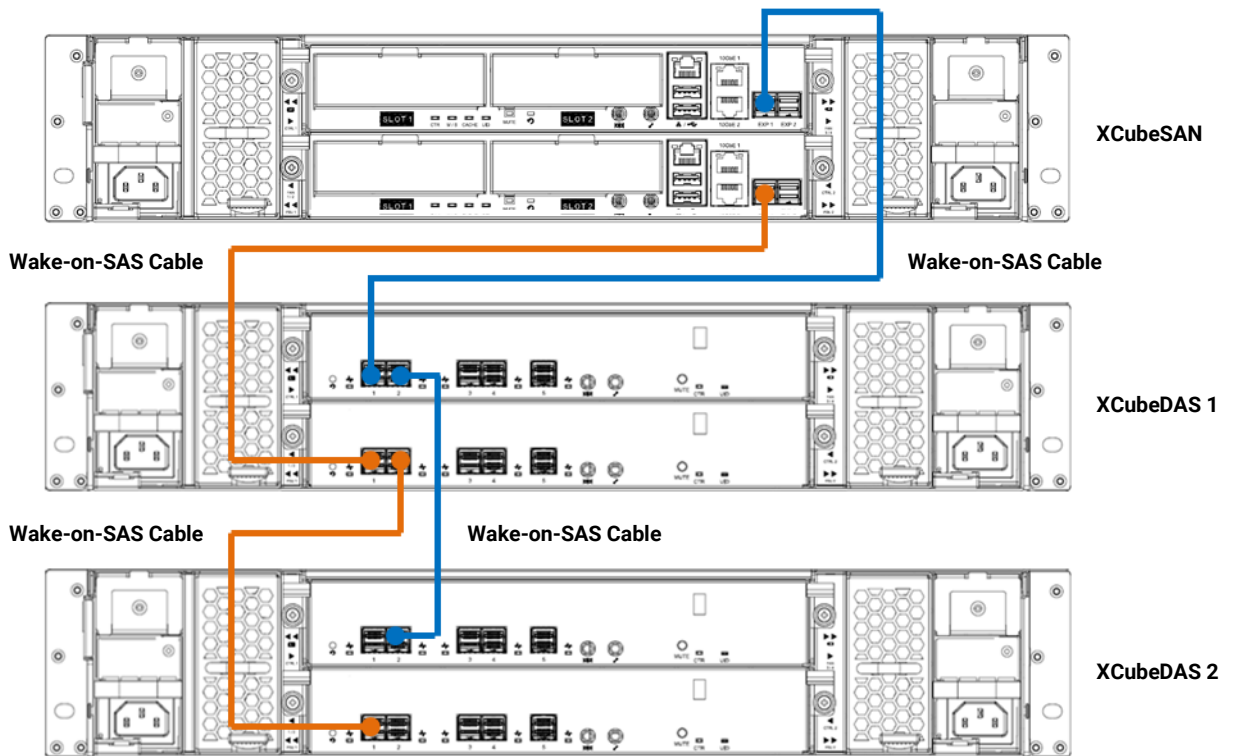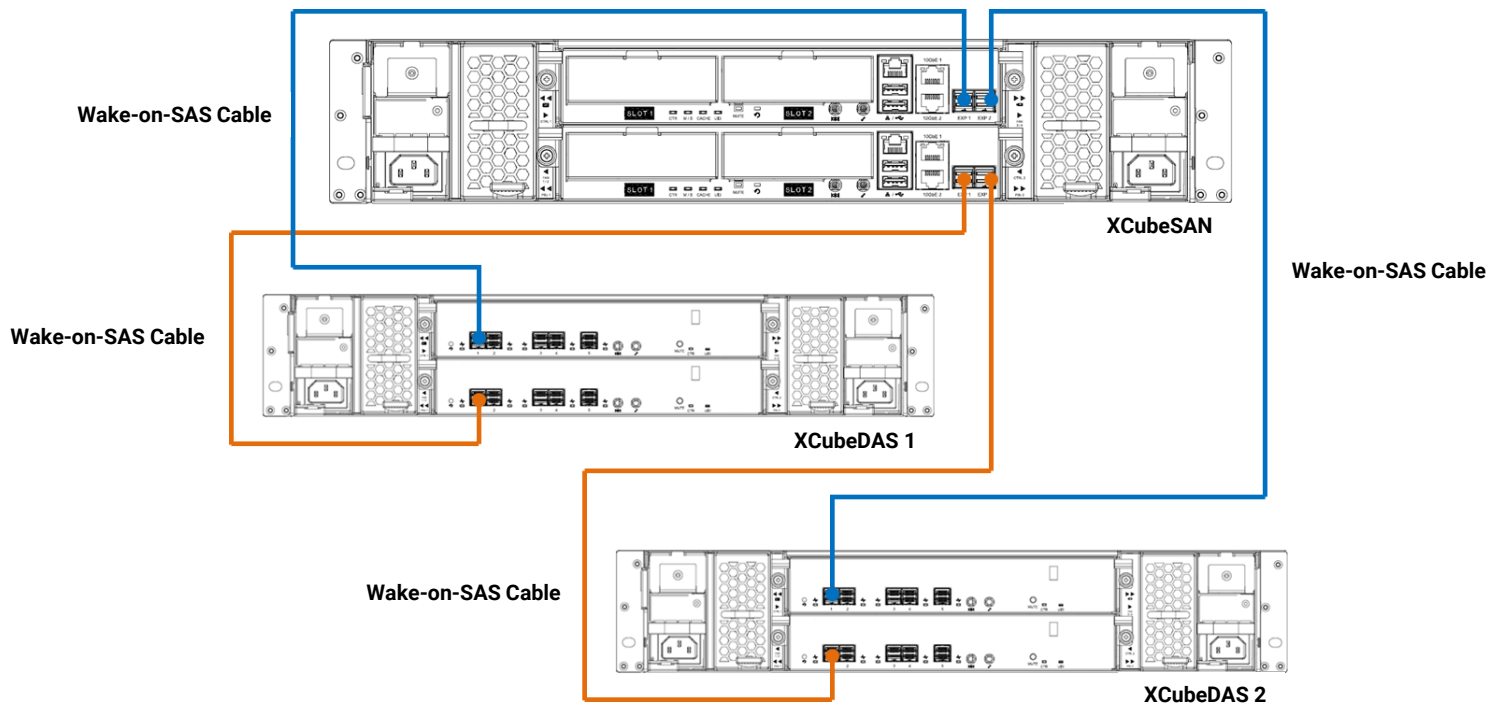

Figure 4-9   *Tree Topology: One XCubeSAN / Two XCubeDAS / Dual Path*

> **INFORMATION:**
> Tree topology will be available in SANOS firmware 1.1.0.

4.2.6. Multi-server Attached Cabling Deployment

Cascade Topology: Five Servers / One XCubeDAS / Dual Path

The following figure shows an example of a dual controller, direct connect enclosure configuration with five servers accessing the storage. Five servers are direct connected to a dual controller XCubeDAS XD5300 series using mini SAS HD to mini SAS HD cables (SAS 12G expansion cable, SFF-8644 to SFF-8644).
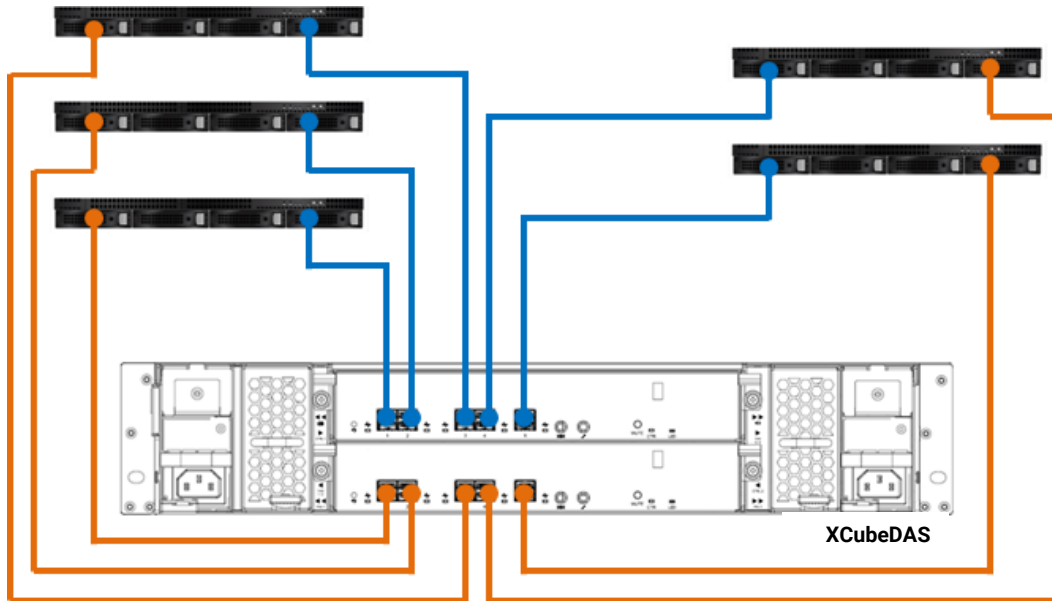
Figure 4-10   Cascade Topology: Five Servers / One XCubeDAS / Dual Path

5. Descriptions of LEDs and Buttons

In this chapter, you can find all LED definitions and button behaviors of the XCubeDAS series models. By reviewing this chapter, you will have a basic understanding about the current status of the system or specific components by recognizing the LED status.

5.1. Front Panel

In this session, we will describe the system controls and indicators, and the disk drive LEDs in the front panel.

5.1.1. System Controls and Indicators

XCubeDAS features the button and indication module on the right ear. Please refer to the following content for definitions of LED behaviors.

System Controls and Indicators
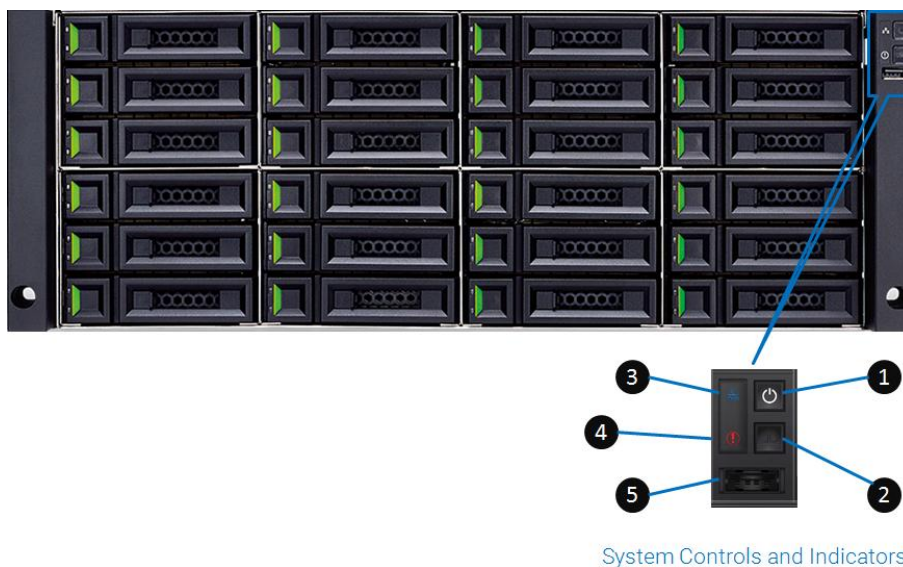
Figure 5-1   System Controls and Indicators

Table 5-1   Descriptions of the System Controls and Indicators LEDs

Number	Description	Definition
1	Enclosure Power Button/LED	**Power Button** • Press the button one time to turn ON the system power and keep pressing for 4 seconds to turn OFF the system power. **Power LED** • Solid White: Power is ON (at least one power supply unit is supplying power to the system). • Blinking White: The system is in the stage of boot or shutdown. • Off: The system is shutdown.
2	UID Button/LED	**UID (Unique Identifier) button** • Press the button one time to turn it ON; press it again to turn it OFF. **UID (Unique Identifier) LED** • Press the button to turn it ON, and press it again to turn it OFF. • Solid Blue: The system has been identified. • Off: The system has not been identified.
3	Enclosure Access LED	**Enclosure Access LED** (Indicate the host interface connectivity.) • Blinking Blue: The host interface activity is on-going. • Off: There is no host interface activity.
4	Enclosure Status LED	**Status LED** (Indicate current health status of the system.) • Solid Amber: System has errors including PSU failure, abnormal voltage, abnormal temperature, any fan module failed or removed. • Off: The system is healthy.
5	USB Port	The USB port is reserved.

5.1.2. Disk Drive LEDs

Please refer to the following content for definitions of LED behaviors.

LFF Disk Drive Tray   SFF Disk Drive Tray
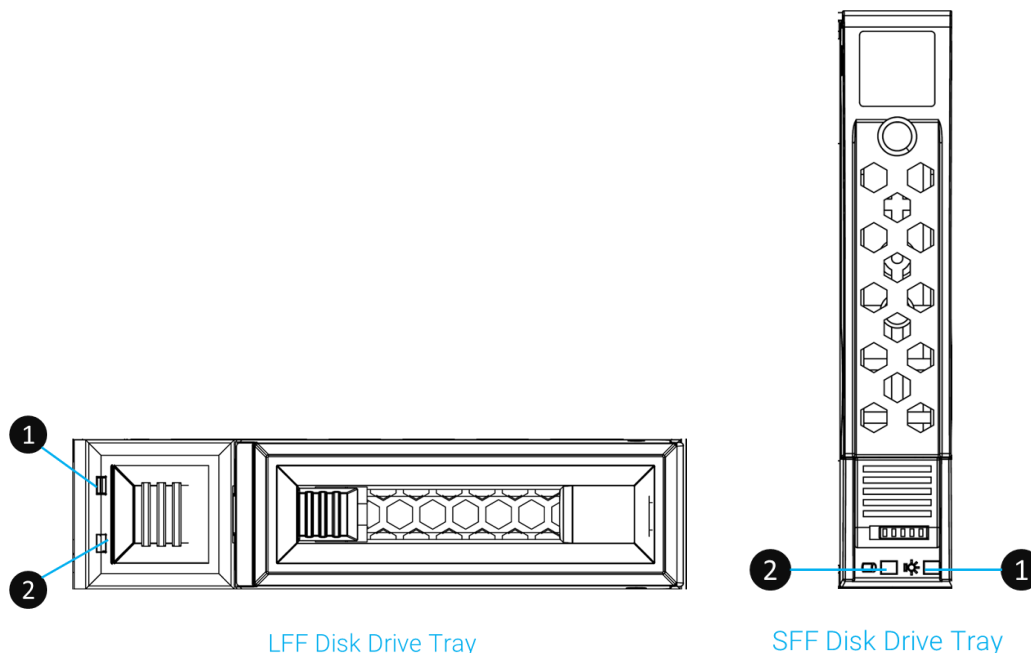
Figure 5-2   Disk Drive Indicators of LFF & SFF Disk Drive Tray

Table 5-2   Descriptions of Disk Drive LEDs

Number	Description	Definition
1	Disk Drive Power LED	• Solid Blue: The disk drive is inserted and no data access. • Blinking Blue: The disk drive is accessing data. • Off: There is no disk drive inserted.
2	Disk Drive Status LED	• Solid Amber: There is disk drive error. • Blinking Amber (interval of 0.5 sec): The disk drive is rebuilding. • Blinking Amber (interval of 0.05 sec): Identify the disk drive. • Off: The disk drive is healthy.

5.2. Rear Panel

In this session, we will describe the system control LEDs and PSU LEDs in the rear panel.

5.2.1. Controller LEDs

Please refer to the following content for definitions of the LED behaviors.
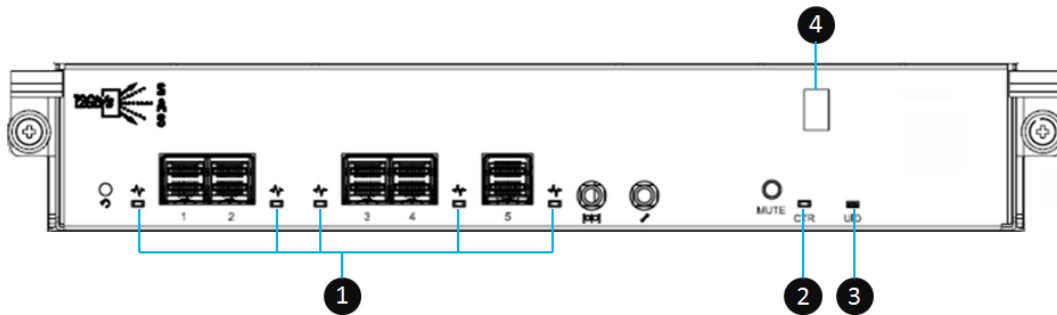
Figure 5-3   The Controller LEDs

Table 5-3   Descriptions of XCubeDAS Series Controller LEDs

Number	Description	Definition
1	12Gb SAS Port LED	• Blinking Amber: Data is accessing.
2	Controller Status LED	• Solid Green: Controller status is normal. • Solid Red: The System is booting or the controller is failed.
3	UID (Unique Identifier) LED	• Solid Blue: The enclosure has been identified. • Off: The enclosure is not being identified.
4	Enclosure ID	• --: The enclosure ID is not supported. • Number: The enclosure has been identified the number.

5.2.2. Power Supply Unit LED

Please refer to the following content for definitions of the LED behaviors.
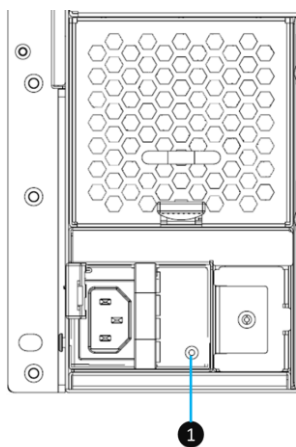
Figure 5-4   The Power Supply Unit LED

Table 5-4   Descriptions of the Power Supply Unit LED

Number	Description	Definition
1	PSU LED	• Solid Green: The PSU is on and normal. • Blinking Green: The PSU is off, +5VSB (Standby) is on • Solid Amber: There is critical event caused shutdown. • Blinking Amber: There are PSU warning events including high temperature, high power, high current, slow fan, or under input voltage.

6.   Quick Maintenance

This chapter provides quick maintenance and instruction of removing / installing FRU (Field Replaceable Unit) or optional components of all the XCubeDAS series models. All of the XCubeDAS models feature the HA design, any of the FRU components can be hot swapped and replaced with zero downtime in the rare event of a component failure. If you encounter any issues caused by FRU components while operating the XCubeDAS, please refer to related section and follow the quick troubleshooting procedures step by step.

> ⚠️ **CAUTION:**
> We recommend that all maintenance is carried out by a certified technician. Do not attempt to carry out any maintenance outside of those outlined in the following section of this guide. System damage due to incorrect maintenance or FRU replacement can affect your product warranty. If you are unsure of the problem related to your XCubeDAS series system, we strongly recommend you to contact or get help from QSAN support team:
>
> - Via the Web: https://qsan.com/support
> - Via Telephone: +886-2-7720-2118 extension 136
>   (Service hours: 09:30 - 18:00, Monday - Friday, UTC+8)
> - Via Skype Chat, Skype ID: qsan.support
>   (Service hours: 09:30 - 02:00, Monday - Friday, UTC+8, Summer time: 09:30 - 01:00)
> - Via Email: support@qsan.com

6.1.   Removing / Installing the Controller Module

This section outlines how to check the status of your controller module and the procedure of removing / installing the controller module when encountering problems.

Removing the Controller Module

⚠️ **CAUTION:**
- The controller module is heavy and fragile; please use both hands while installing, removing, or carrying the controller module. Recommended place for removing the controller module: the system is in a well secured rack or on a stable surface.

- For single controller model, the controller must be installed into slot 1 (the top slot of the system in rear view) and you must install the dummy controller cage provided for the empty slot to ensure the proper system cooling.

If you see the controller status LED shows solid red color, which means your controller module is encountering an issue and need to be replaced immediately. You need to follow the procedures below to remove problematic controller module and install a healthy one.

Figure 6-1   Warning Message of Controller Module by the Status LED

- The following images illustrate mechanical components of the controller module.
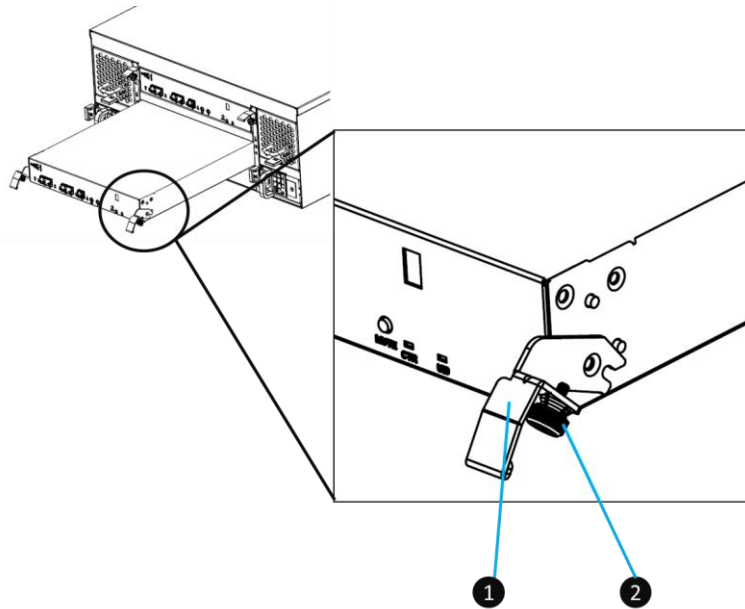
Figure 6-2   Mechanical Components of the Controller Module

Table 6-1   Mechanical Components of the Controller Module

Number	Description
1	Release Lever
2	Thumb Screw

The following are detailed steps for removing the controller module from the system chassis.

- Use a Phillips screwdriver to loosen the thumb screws on each release levers.
- Pull down both release levers at the same time and then pull out about half length of the controller module by holding two release levers.
- Use one hand to hold one end of the controller module (the side with release levers) and the other hand hold the bottom of the controller; pull out the controller module until it is free from the system chassis.
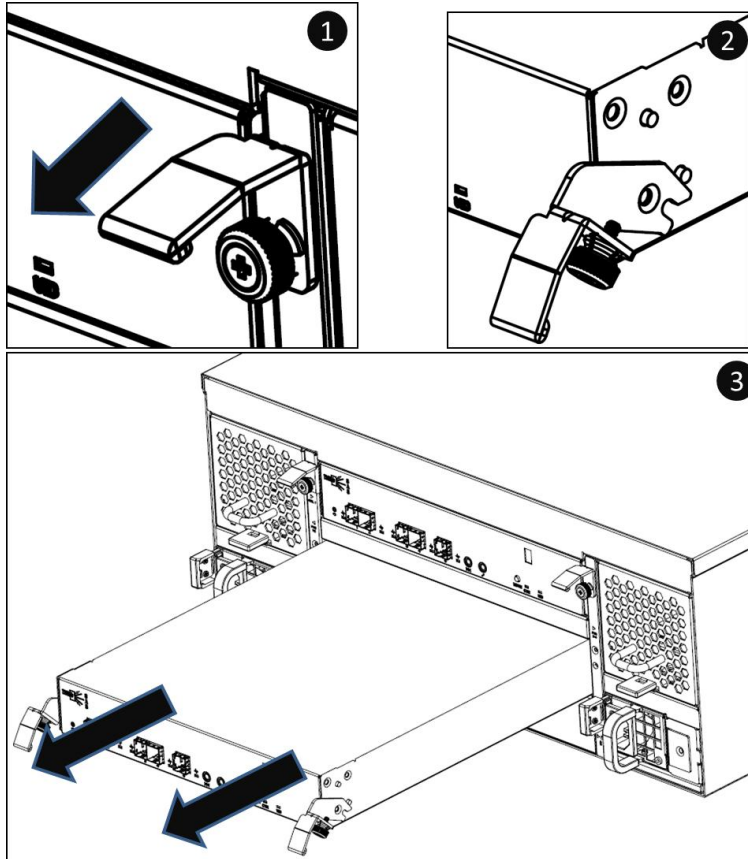
Figure 6-3   Procedures of Removing the Controller Module

Installing the Controller Module

The following content and images are the detail steps of installing the controller module into the system chassis.

- Make sure the position of both release levers of the controller is at downward.
- Align and place the controller to the empty controller slot.
- Push the controller module all the way into the controller slot until the position of two release levers move upward automatically.
- Pull up both release leavers at the same time until they totally parallel with the controller cage and then use a Phillips screw driver to tighten both screws.
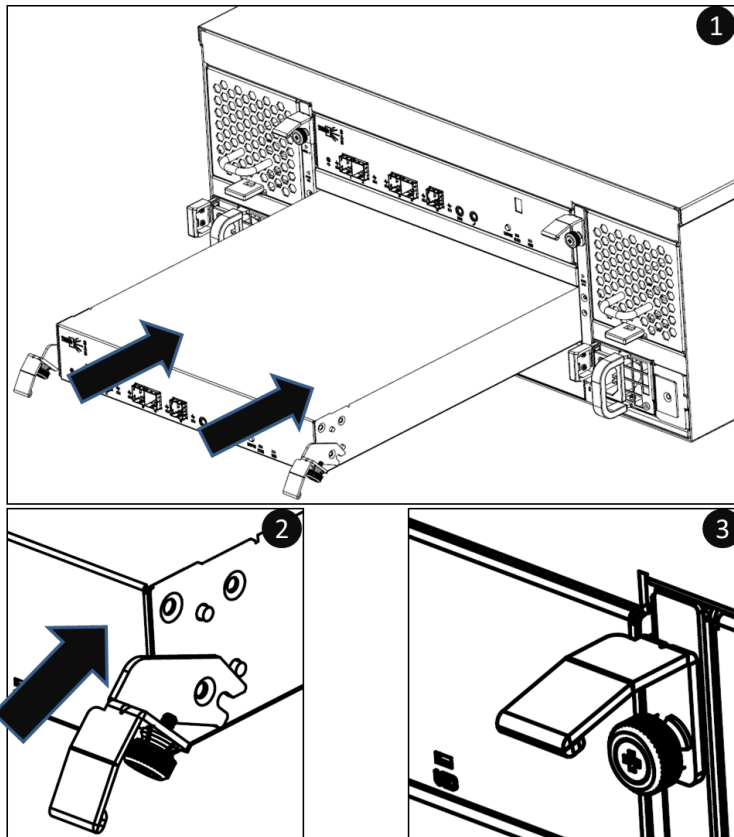
Figure 6-4   Detailed Procedures of the Controller Module installation

- After about 30 seconds from the time you have installed the controller module into the system chassis, the status LED will show solid green color if controller module is successfully installed.

6.2.   Removing / Installing the Power Supply Unit

The standard XCubeDAS series system comes with two redundant PSUs (Power Supply Units) that allow users to hot swap it when one of the PSUs is not functioning.

All XCubeDAS models are fitted with the same PSU, but the installation direction came differ. Please refer to the following content for the PSU removal / installation guide.

> ⚠️ **CAUTION:**
> The power supply unit is heavy and fragile; please use both hands while installing, removing, or carrying the controller module. Recommended place for removing the controller module: the system is in a well secured rack or on a stable surface.

If you see the PSU LED shows solid or blinking amber color which means your PSU has encountered an issue and need to be replaced immediately. You need to follow the procedure of how to remove problematic PSU module and install a healthy one.

Removing the Power Supply Unit

The images and the table below provide description of mechanical components of the PSU. Please note that the PSU installed in 4U/3U or 2U system chassis are the same but the installation direction is different (If you pull out the PSU from the system chassis, for 4U/3U systems, the sticker on the PSU will be facing downwards; for 2U system, the sticker will be on the right hand side). Please be sure to use the correct installation direction of the PSU to prevent any potential damage by improper installation.
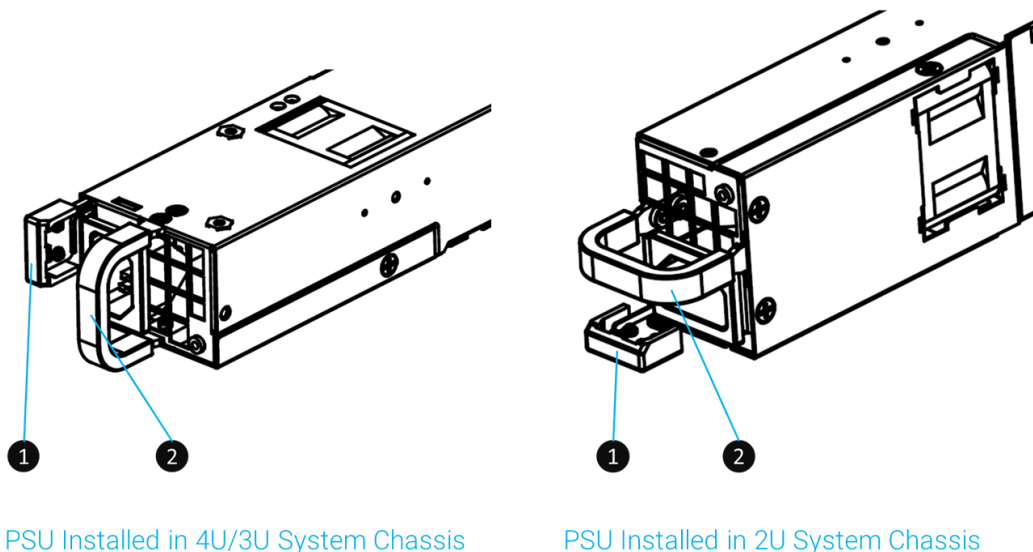

PSU Installed in 4U/3U System Chassis   PSU Installed in 2U System Chassis

Figure 6-5   *Mechanical Components of the PSU*

Table 6-2   Mechanical Components of the PSU

Number	Description
1	PSU Release Tab
2	PSU Handle

Before removing the PSU, disconnect the power cord from the wall outlet; then remove the other end that is connected to the PSU.

The following are detailed steps of removing a PSU from the system chassis.

- Hold the PSU handle first, and then press the release tab.
- Pull out the power supply about half of the total PSU length.
- Use one hand to hold one end of the PSU (the side with release tab) and the other hand hold the bottom of the power supply unit; pull out the power supply unit until it is free from the system chassis.
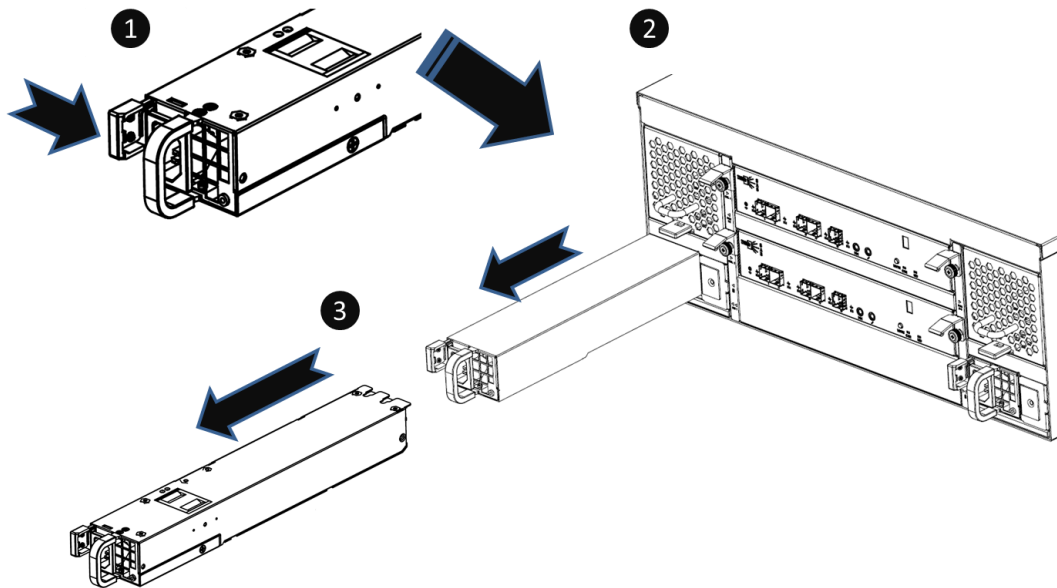

Figure 6-6   Procedures of Removing the Power Supply Unit

Installing the Power Supply Unit
The following are detailed steps of installing the PSU into the system chassis.

- Use one hand to hold one end of the power supply unit (the side with release tab and handle) and the other hand hold the bottom of the power supply unit; then align the PSU with the empty PSU slot.

- Push the PSU all the way into the empty slot until you hear the "click" sound from the release tab.
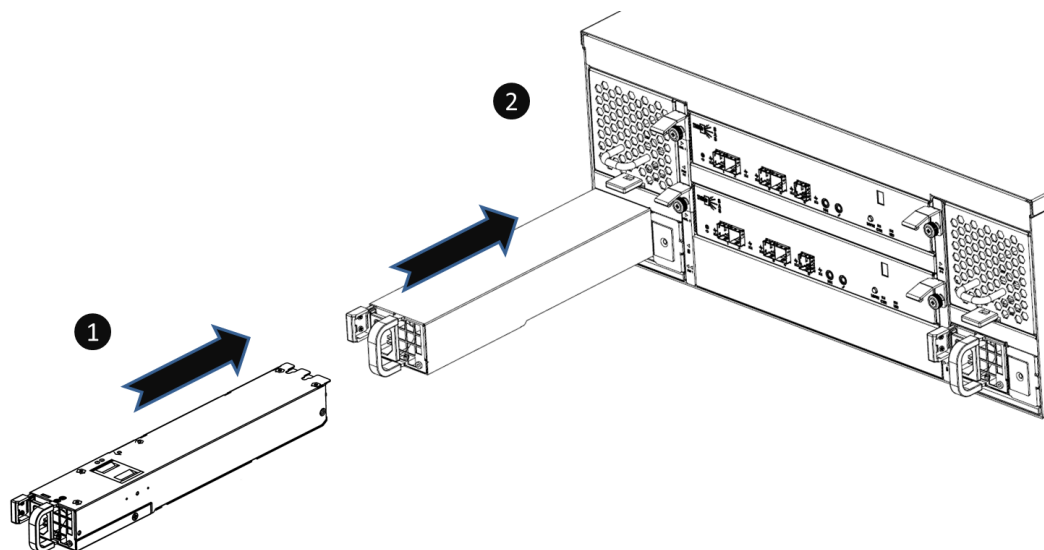

Figure 6-7   Installing the Power Supply Unit in the System Chassis

If the PSU is successfully installed, the status LED will show solid green color (if no other malfunction is encountered).

6.3.   Removing / Installing the Fan Module

The standard XCubeDAS system comes with two redundant fan modules that allow you to hot swap it when one of the fan modules encounters an issue. In the event that the fan module fails, it can be hot-swapped. The XCubeDAS series utilizes two types of fan module for 4U/3U and 2U system chassis. Please refer to the following information for the fan module removing / installing procedures.

> **CAUTION:**
> The fan module is heavy; please use both hands while removing, holding, or carrying the fan module. The fan module is hot swappable, but power off the system to do the fan module installing or removing is highly recommended. Recommended place for installing / removing a fan module: the system is on the well secured rack or onto stable surface.

If you see following phenomenon of your XCubeDAS:

- The system status LED shows solid amber color.
- The fan module is running at high RPM.
- The PSU and controller are normal which means your fan module has encountered an issue and needs to be immediately replaced. You need to follow the procedures below to remove problematic fan module and install a healthy one.

Removing the Fan Module

Figures below are fan modules for 4U/3U or 2U system chassis.

Fan Module for 4U/3U System Chassis   Fan Module for 2U System Chassis
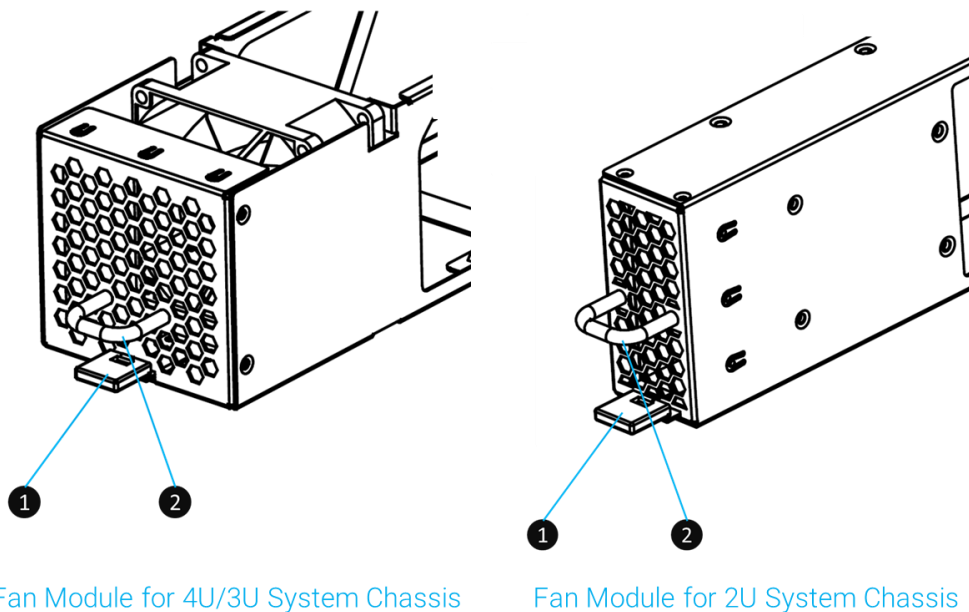
Figure 6-8   Mechanical Components of the Fan Module

Table 6-3   Mechanical Components of the Fan Module

Number	Description
1	The Fan Module Release Tab
2	The Fan Module Handle

The following details the steps of removing the fan module from the system chassis.

- Hold the fan module handle first, and then press the release tab.
- Pull out the fan module around half of the total fan module length.

- Use one hand to hold one end of the fan module (the side with release tab and handle) and the other hand hold the bottom of the module; pull out the module until it is free from the system chassis.
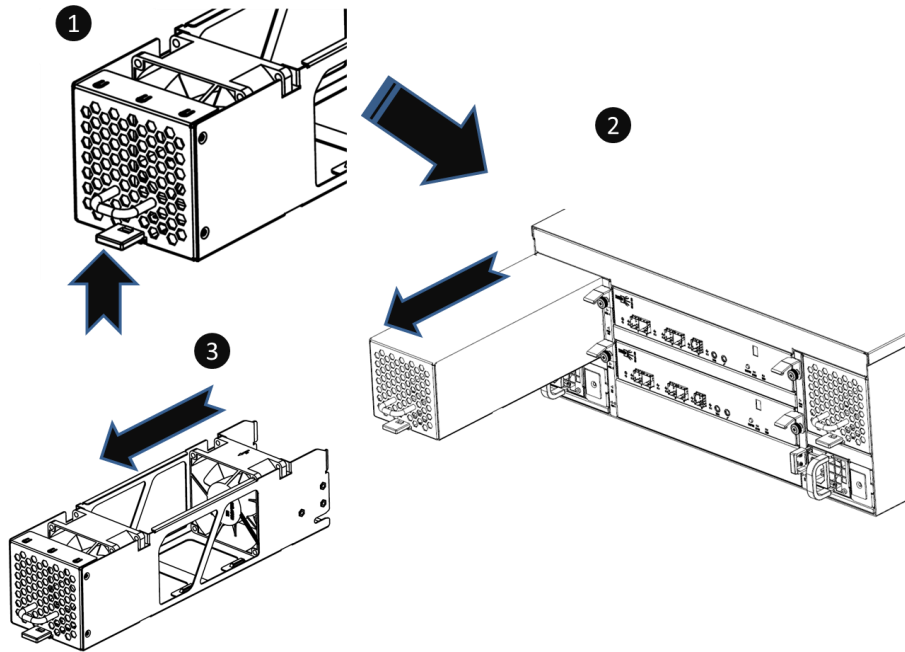

Figure 6-9   Procedures of Removing the Fan Module

Installing the Fan Module
The following details the steps of installing the fan module into the system chassis.

- Use one hand to hold one end of the fan module (the side with release tab and handle) and the other hand hold the bottom of the module; then align it with the empty slot. Installation direction of LFF and SFF systems is the same.
- Push the fan module all the way into the empty slot until hear the "click" sound from the release tab.
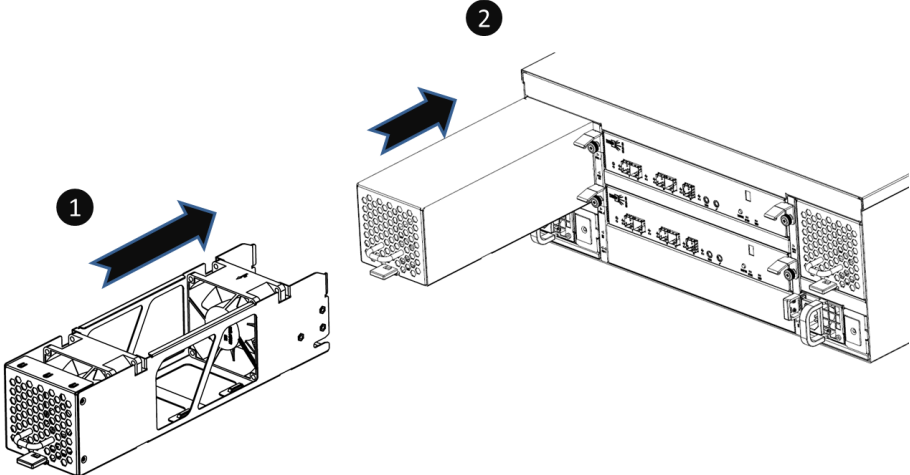
Figure 6-10   *Procedures of Installing the Fan Module*

If the fan module is successfully installed, the system status LED will turn off.

7.   Support and Other Resources

7.1.   Getting Technical Support

After installing your device, locate the serial number on the sticker located on the side of the chassis and use it to register your product at https://partner.qsan.com/ (End-User Registration). We recommend registering your product in QSAN partner website for firmware updates, document download, and latest news in eDM. To contact QSAN Support, please use the following information.

- Via the Web: https://qsan.com/support
- Via Telephone: +886-2-7720-2118 extension 136
  (Service hours: 09:30 - 18:00, Monday - Friday, UTC+8)
- Via Skype Chat, Skype ID: qsan.support
  (Service hours: 09:30 - 02:00, Monday - Friday, UTC+8, Summer time: 09:30 - 01:00)
- Via Email: support@qsan.com

Information to Collect
- Product name, model or version, and serial number
- Operating system name and version
- Firmware version
- Error messages or capture screenshots
- Product-specific reports and logs
- Add-on products or components installed
- Third-party products or components installed

Information for Technical Support
The following system information is necessary for technical support, please refer to following for what and where to get the information of your XCubeDAS series model.

7.2.   Online Customer Support

For better customer support, every XCubeDAS series models include the console cable (two for dual controller models), one for single controller models) for online support. Please follow the procedures below to setup the online help environment for QSAN support team.

The following procedure will help you to setup the serial console via the console cable that is enclosed in the shipping carton. The following image is the appearance of the console cable.

Figure 7-1   Appearance of a Console Cable

Procedures to Setup the Serial Console

1. Setup the serial cable between the controller and one server/host like in the below image.
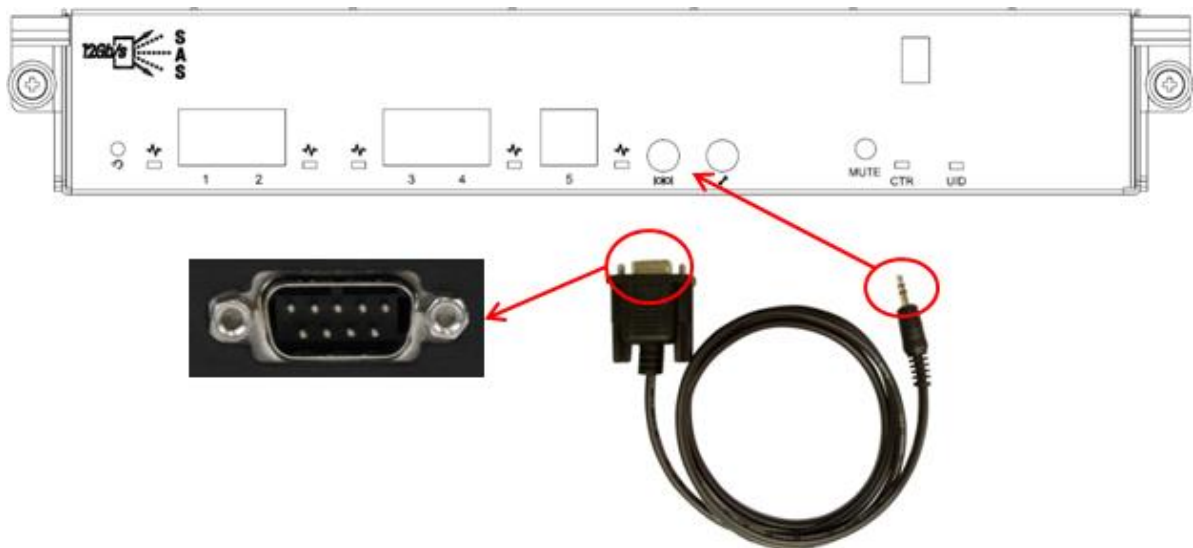

Figure 7-2   Connect the Console Cable

2. You must use terminal software such as HyperTerminal or Putty to open the console after the connection is made.

> **INFORMATION:**
> For more information about terminal software, please refer to
>
> HyperTerminal: http://www.hilgraeve.com/hyperterminal/
>
> PuTTY: http://www.putty.org/
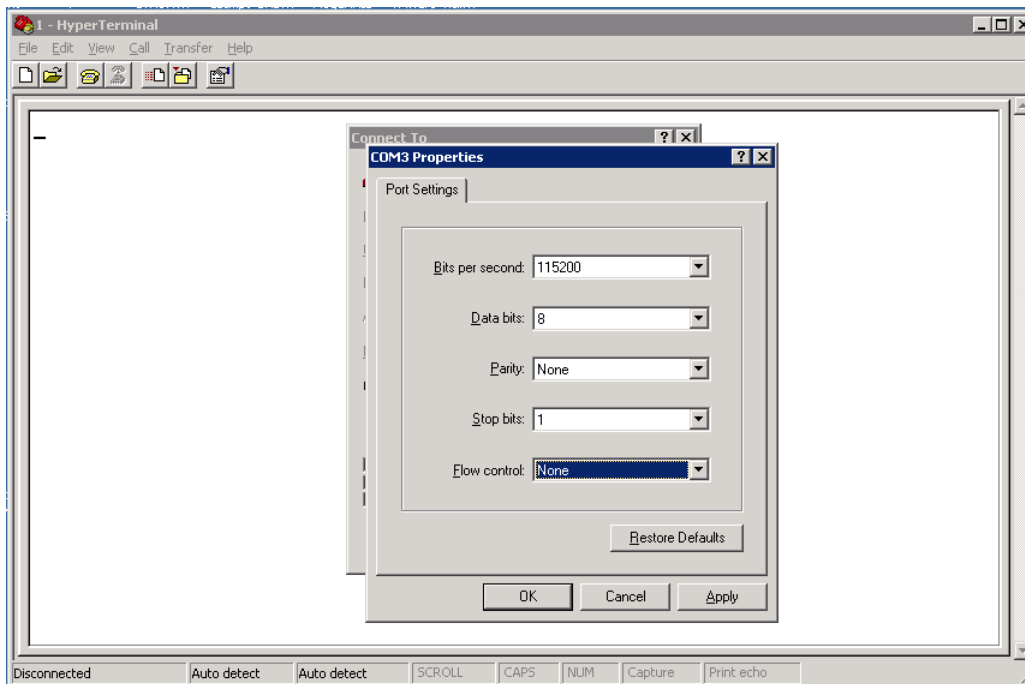
3. Here we first demonstrate HyperTerminal. The console settings are on the following.

   Baud rate: 115200, 8 data bit, no parity, 1 stop bit, and no flow control
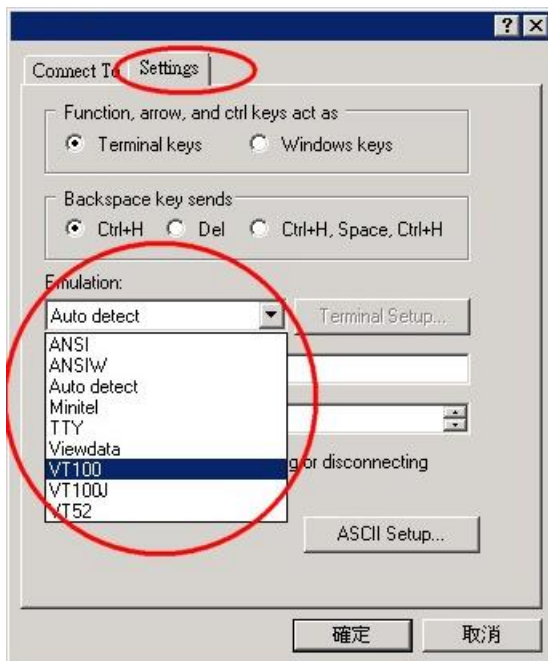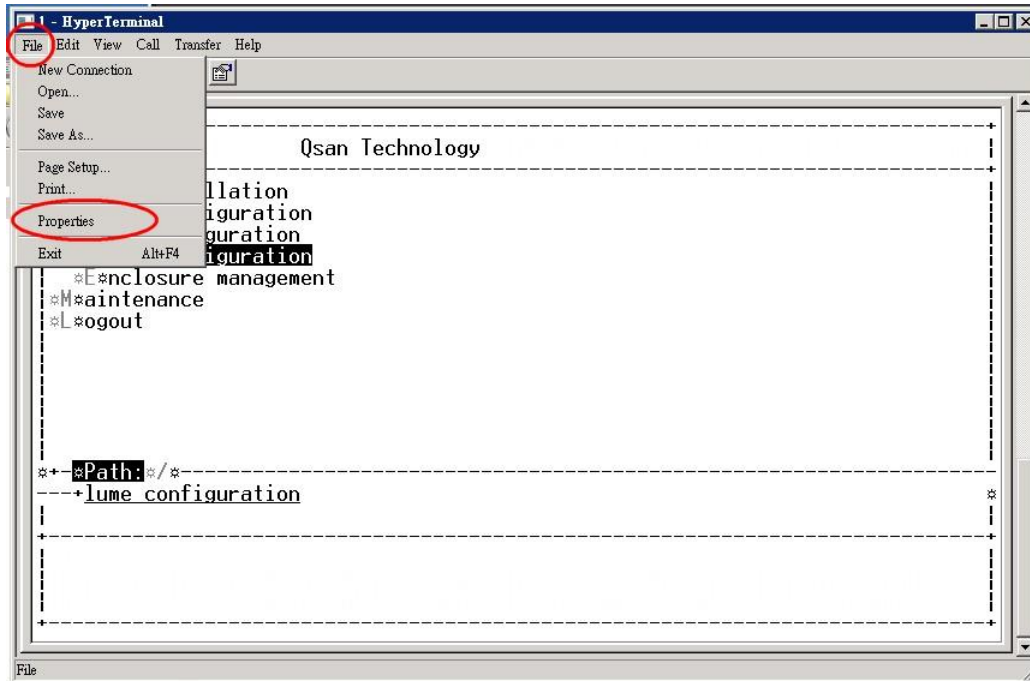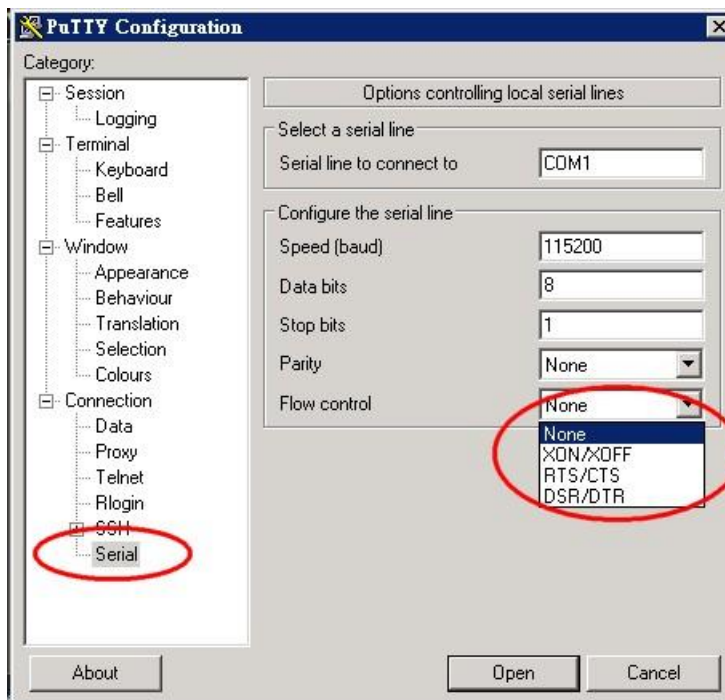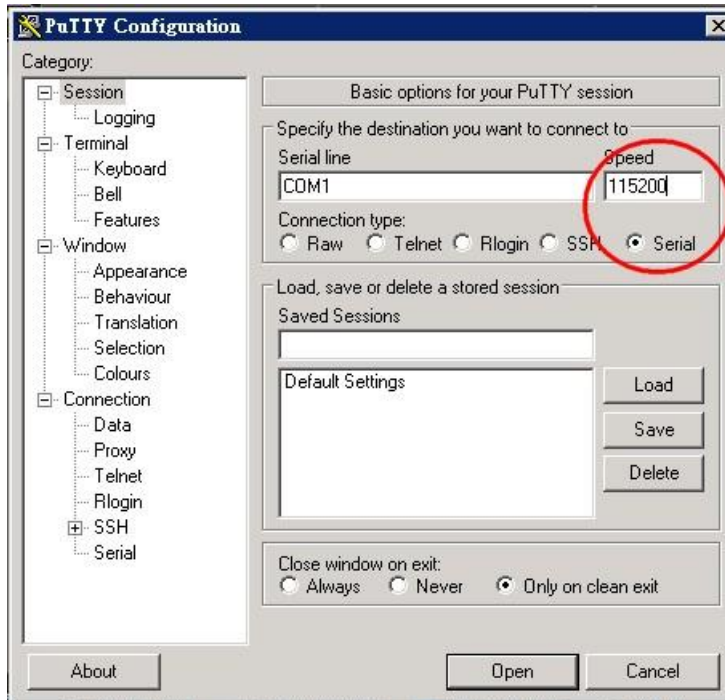
   Terminal type: vt100

Figure 7-3   The Procedures of Setup Serial Console by HyperTerminal

4. If you are using PuTTY instead, please refer to below
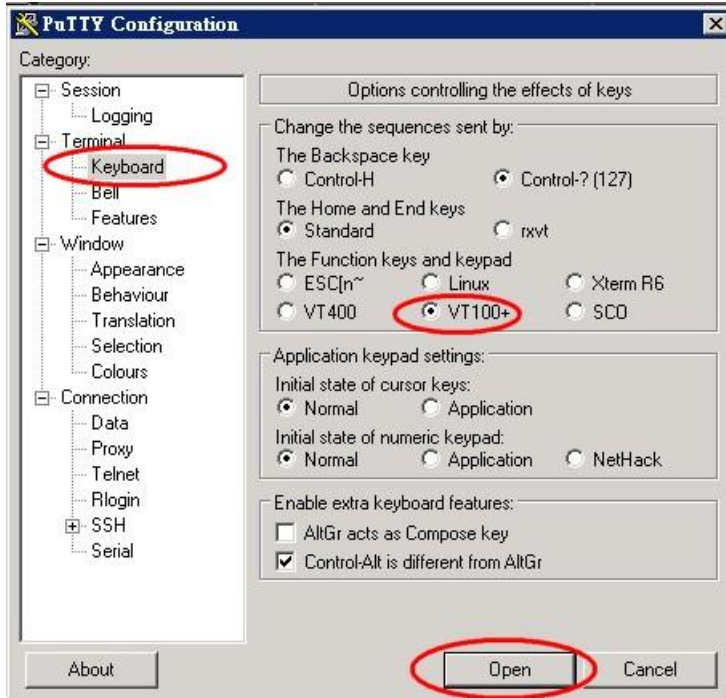
Figure 7-4   The Procedures of Setup Serial Console by PuTTY

5. Users should be able to login the controller system via console cable by following the procedures above.

Setup the connection for online support

Following is the procedure to setup the connection for online support via TeamViewer:

1. Please download the TeamViewer from following hyper link:
   https://www.teamviewer.com/en/download/
2. Install TeamViewer.
3. Please provide the ID/password showed on the application to QSAN support team member to join the online support session.

7.3.   Accessing Product Updates

To download product updates, please visit QSAN website:

https://qsan.com/download

7.4. Documentation Feedback

QSAN is committed to providing documentation that meets and exceeds your expectations. To help us improve the documentation, email any errors, suggestions, or comments to docsfeedback@qsan.com.

When submitting your feedback, include the document title, part number, revision, and publication date located on the front cover of the document.

Appendix

End-User License Agreement (EULA)

Please read this document carefully before you use our product or open the package containing our product.

YOU AGREE TO ACCEPT TERMS OF THIS EULA BY USING OUR PRODUCT, OPENING THE PACKAGE CONTAINING OUR PRODUCT OR INSTALLING THE SOFTWARE INTO OUR PRODUCT. IF YOU DO NOT AGREE TO TERMS OF THIS EULA, YOU MAY RETURN THE PRODUCT TO THE RESELLER WHERE YOU PURCHASED IT FOR A REFUND IN ACCORDANCE WITH THE RESELLER'S APPLICABLE RETURN POLICY.

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QSAN Technology, Inc. ("QSAN") is willing to grant you ("User") a license of software, firmware and/or other product sold, manufactured or offered by QSAN ("the Product") pursuant to this EULA.

License Grant

QSAN grants to User a personal, non-exclusive, non-transferable, non-distributable, non-assignable, non-sub-licensable license to install and use the Product pursuant to the terms of this EULA. Any right beyond this EULA will not be granted.

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License Limitations

User may not, and may not authorize or permit any third party to: (a) use the Product for any purpose other than in connection with the Product or in a manner inconsistent with the design or documentations of the Product; (b) license, distribute, lease, rent, lend, transfer, assign or otherwise dispose of the Product or use the Product in any commercial hosted or service bureau environment; (c) reverse engineer, decompile, disassemble or attempt to discover the source code for or any trade secrets related to the Product, except and only to

the extent that such activity is expressly permitted by applicable law notwithstanding this limitation; (d) adapt, modify, alter, translate or create any derivative works of the Licensed Software; (e) remove, alter or obscure any copyright notice or other proprietary rights notice on the Product; or (f) circumvent or attempt to circumvent any methods employed by QSAN to control access to the components, features or functions of the Product.

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IN NO EVENT WILL QSAN BE LIABLE FOR THE COST OF COVER OR FOR ANY DIRECT, INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL, CONSEQUENTIAL OR SIMILAR DAMAGES OR LIABILITIES WHATSOEVER (INCLUDING, BUT NOT LIMITED TO LOSS OF DATA, INFORMATION, REVENUE, PROFIT OR BUSINESS) ARISING OUT OF OR RELATING TO THE USE OR INABILITY TO USE THE PRODUCT OR OTHERWISE UNDER OR IN CONNECTION WITH THIS EULA OR THE PRODUCT, WHETHER BASED ON CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY OR OTHER THEORY EVEN IF QSAN HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

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IN ANY CASE, QSAN'S LIABILITY ARISING OUT OF OR IN CONNECTION WITH THIS EULA OR THE PRODUCT WILL BE LIMITED TO THE TOTAL AMOUNT ACTUALLY AND ORIGINALLY PAID BY CUSTOMER FOR THE PRODUCT. The foregoing Disclaimer and Limitation of Liability will apply to the maximum extent permitted by applicable law. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the exclusions and limitations set forth above may not apply.

Termination

If User breaches any of its obligations under this EULA, QSAN may terminate this EULA and take remedies available to QSAN immediately.

Miscellaneous

- QSAN reserves the right to modify this EULA.
- QSAN reserves the right to renew the software or firmware anytime.

- QSAN may assign its rights and obligations under this EULA to any third party without condition.
- This EULA will be binding upon and will inure to User's successors and permitted assigns.
- This EULA shall be governed by and constructed according to the laws of R.O.C. Any disputes arising from or in connection with this EULA, User agree to submit to the jurisdiction of Taiwan Shilin district court as first instance trial.