

KAYTUS Storage Platform KS2000G7&KS3000G7 Product White Paper

Document Version 1.0

Release Date 06/20/2025

FW Version 7.5.1.x



Copyright © KAYTUS SYSTEMS PTE. LTD. All rights reserved.

KAYTUS owns the copyright of this document and reserves the right to change it at any time. Without the permission of KAYTUS, no entity or individual may reproduce or transmit the contents of this document in any form.

Notice

This document provides detailed information on the product and helps you to understand and use it. The screenshots involved are only examples. Please refer to the interface shown on the actual device.

Due to product upgrades or other reasons, the contents of this document will be changed at any time, and subject to change without notice. Unless otherwise agreed, this document is only used as a guide, and all statements, information, and suggestions in this document do not constitute any express or implied warranty.

If you have any questions or suggestions about this document, please contact KAYTUS SYSTEMS PTE. LTD.

Contact us

Service Hotline:	+65 6611 8899 (Global) 1800 611 8899 (Singapore)
Address:	150 Beach Road, #14-05/08, Gateway West, Singapore 189720 KAYTUS SYSTEMS PTE. LTD.
Website:	https://www.kaytus.com
Technical Support:	servicesupport@kaytus.com

Security Statement

We take data security and privacy seriously, and pay attention to the security of products and solutions to provide you better services. Before you formally use the storage, read the following security statement.

1. To protect data privacy, when you change the use of storage or eliminate old storage devices, reset the software to the factory default settings, delete information, and clear logs. At the same time, it is recommended that a third-party secure eraser tool be used to fully erase the system drive where the storage software is located.
2. The storage may read and use the personal data of your users (such as email address and IP address of the alert recipients) during the business operation or fault location. The storage provides necessary security protection measures for the processing activities of the whole life cycle of personal data, such as collection, storage, use, transmission, and deletion. At the same time, you are obliged to formulate necessary privacy policies that comply with the laws and regulations of the country or region and take adequate measures to make sure that the personal data of your users are fully protected.
3. We attach great importance to product data security, and the storage provides necessary security protection measures for the processing activities of the whole life cycle of system operation and security data in strict accordance with relevant laws, regulations, and regulatory requirements. As a system operator and security data processor, you are obliged to formulate necessary privacy policies that comply with the laws and regulations of the country or region and take adequate measures to make sure that system operation and security data are fully protected.
4. For the statement of open-source components of the storage, contact our customer service directly.
5. It is necessary for some security features of the storage to be configured independently, such as authentication, transmission encryption, and storage data encryption. These configuration operations may have a certain impact on the performance and usability of the storage. You can decide whether to configure security features according to the application environment.
6. The storage comes with some interfaces/commands for production, installation, and return to factory service, and advanced commands for fault location. Improper use may cause device anomalies or business interruption. It is recommended that you contact our customer service for consultancy when necessary.
7. We have established a comprehensive response and handling mechanism for product vulnerabilities to make sure that security issues are dealt with as soon as possible. If you find any security issues when using the storage, or seek necessary support for product security, contact our customer service directly.

In the above statement, “we” and “us” refer to KAYTUS SYSTEMS PTE. LTD.; KAYTUS SYSTEMS PTE. LTD. has the final right to interpret the statement.

Contents

Security Statement	ii
1 Product introduction	1
1.1 Overview.....	1
1.2 Features.....	1
1.3 Application Solutions	2
2 Control enclosure.....	4
2.1 Overview.....	4
2.2 Controller module.....	6
2.3 PCIe cards.....	8
2.4 PSU module	10
2.5 BBU module	10
2.6 FAN module	11
3 Disk enclosure	13
3.1 JBOD.....	13
3.1.1 Overview	13
3.1.2 I/O module	17
3.1.3 PSU/FAN module	18
3.2 JBOF.....	19
3.2.1 Overview	19
3.2.2 I/O module	20
3.2.3 PSU/FAN module	20
4 LED indicator	22
4.1 LEDs of control enclosure.....	22
4.1.1 Enclosure LEDs	22
4.1.2 Controller LEDs	23
4.1.3 Disk LEDs.....	25
4.1.4 PSU/BBU/FAN LEDs.....	25
4.2 LEDs of JBOD.....	27
4.2.1 Enclosure LEDs	27
4.2.2 I/O module LEDs	27
4.2.3 Disk LEDs.....	28
4.2.4 PSU/FAN LEDs	31
4.3 LEDs of JBOF	32
4.3.1 Enclosure LEDs	32
4.3.2 I/O module LEDs	33
4.3.3 Disk LEDs.....	33
4.3.4 PSU/FAN LEDs	34
5 Connection	36

5.1 Multi-controller connection	36
5.2 Connection between control enclosures and disk enclosures	37
5.2.1 Connection between control enclosures and JBODs	37
5.2.2 Connection between control enclosures and JBOFs	38
6 FRUs	40
7 Technical specifications	42
7.1 Hardware features	42
7.1.1 All-flash storage platform	42
7.1.2 Hybrid-flash storage platform	43
7.2 Software features	44
7.3 Physical features	45
8 Acronyms	46

1 Product introduction

1.1 Overview

KS2000G7 and KS3000G7 are entry-level centralized storage platforms designed for small and medium-sized businesses. Equipped with intelligent management software, KS2000G7 and KS3000G7 support integrated hardware platform of IP SAN and FC SAN, and mainstream protocols such as NVMe, SAS, PCIe, FC, and iSCSI. KS2000G7 and KS3000G7 have reached industry-leading level of the same grade products in terms of performance, function, reliability and usability.

As storage platforms specially designed for smart computing, big data and cloud platform, KS2000G7 and KS3000G7 can meet the demands for data storage, disaster recovery and backup in various application scenarios such as OLTP/OLAP, virtualization and file sharing, and are widely used in finance, communications, energy, medical, education, manufacturing and other industries.

1.2 Features

KS2000G7 and KS3000G7 inherit the product design concept of active storage and integrates technologies of cloud storage. KS2000G7 and KS3000G7 provide industry-leading data protection solutions to meet various demands for data protection, make sure of six-nine (99.9999%) availability, and fully guarantee business continuity and data security.

- Support the deployment of multi-controller cluster to provide a continuously available platform for host applications, preventing business interruption caused by any single enclosure failure.
- With technologies such as full-stripe write and global wear leveling, bring into full play the performance advantages of SSD, decrease damage and failure rates of SSD, thus achieving high performance and high reliability.
- Improve storage space utilization, extend the life of SSD, and effectively decrease TCO through data deduplication and data compression technology.
- Use distributed RAID to improve drive utilization and performance, eliminate the single disk write-in bottleneck of traditional RAID, effectively improve reconstruction speed, and decrease the risk of RAID failure.
- Transparently and seamlessly take over the original business through the heterogeneous virtualization, and achieve unified resource management.
- Provide data protection technologies such as InLocalCopy (InSnapShot, InClone, and InBackup) and

InRemoteCopy to enable data protection of local systems, remote systems and systems in multiple locations.

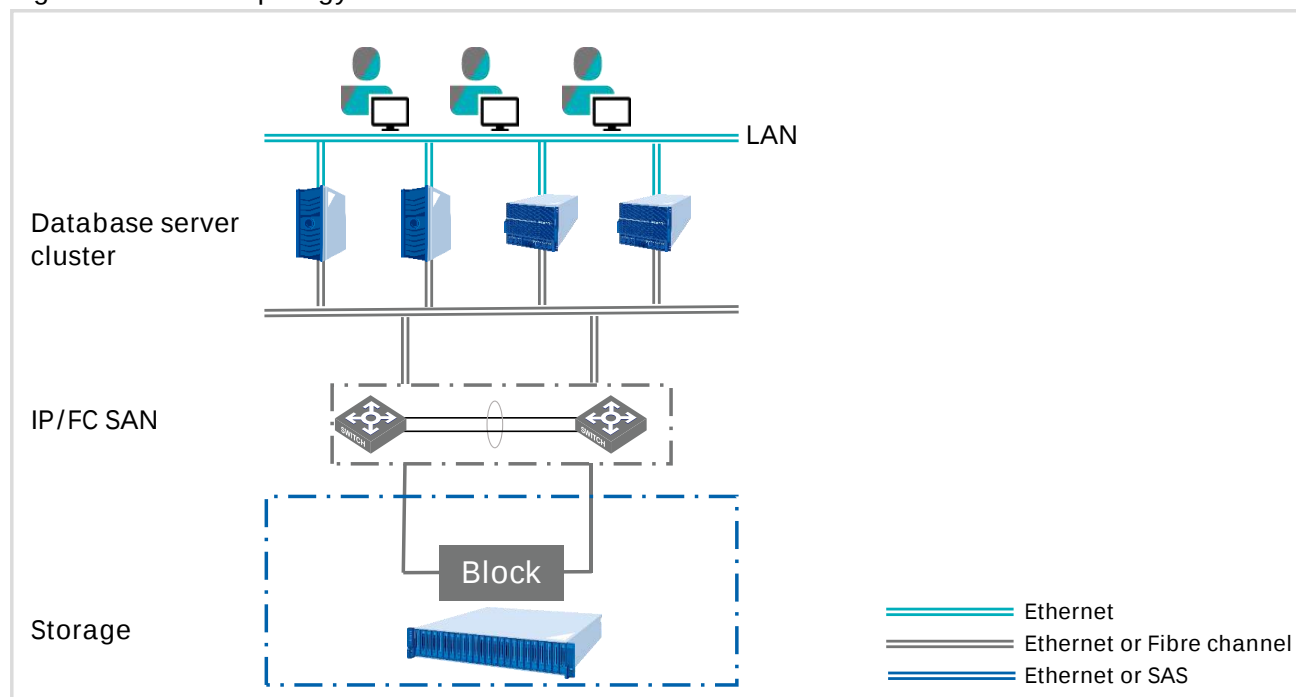
- Flexible and efficient disaster recovery system and multi-level solutions.
- Support quick upgrade without business interruption.

1.3 Application Solutions

Basic application Solution

KS2000G7 and KS3000G7 are feature-rich, support multiple protocols, data types, and host interfaces, which can meet the demands of different business types and performance. With KS2000G7 or KS3000G7, you can obtain dual benefits of performance and cost, reducing initial investment cost and TCO.

Figure 1-1 Basic topology

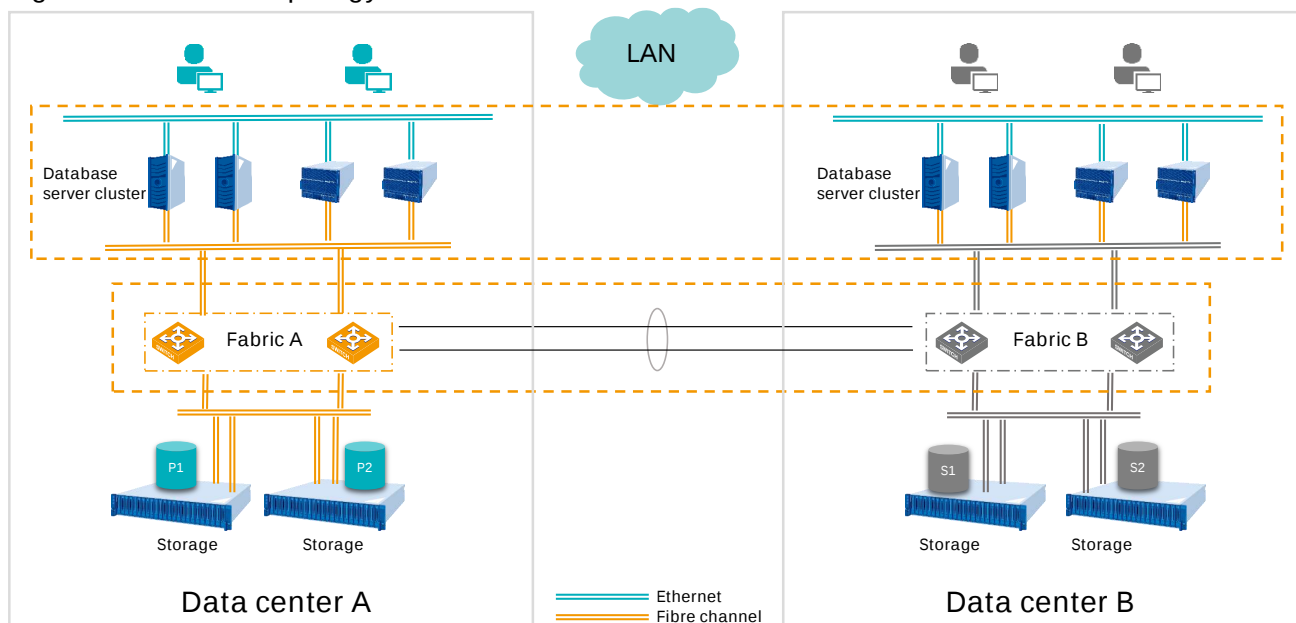


InMetro application Solution

Critical services not only have higher performance requirements for storage, but also bring challenges to business continuity. Featured by security and reliability, mature technology, simplify and efficiency, automatic changing, and with no need of virtualized gateway, KS3000G7 can guarantee business continuity and high availability of applications through InMetro technology.

KS3000G7 can work with different host systems to achieve high availability between different datacenters and provide continuous access to services. When a disaster occurs in any one of the storages, the other storage continues to provide service.

Figure 1-2 InMetro topology



2

Control enclosure

KS2000G7 and KS3000G7 supply two types of control enclosures that follow. AS a hardware platform designed with disk and controller integration, the control enclosure has its own storage space and can be used independently without disk enclosure.

- 2U12 SAS control enclosure with 3.5-inch disk or 2.5-inch disk
- 2U25 SAS control enclosure with 2.5-inch disk

2.1 Overview

This section describes the components, views, and dimensions of control enclosure.

Components of control enclosure

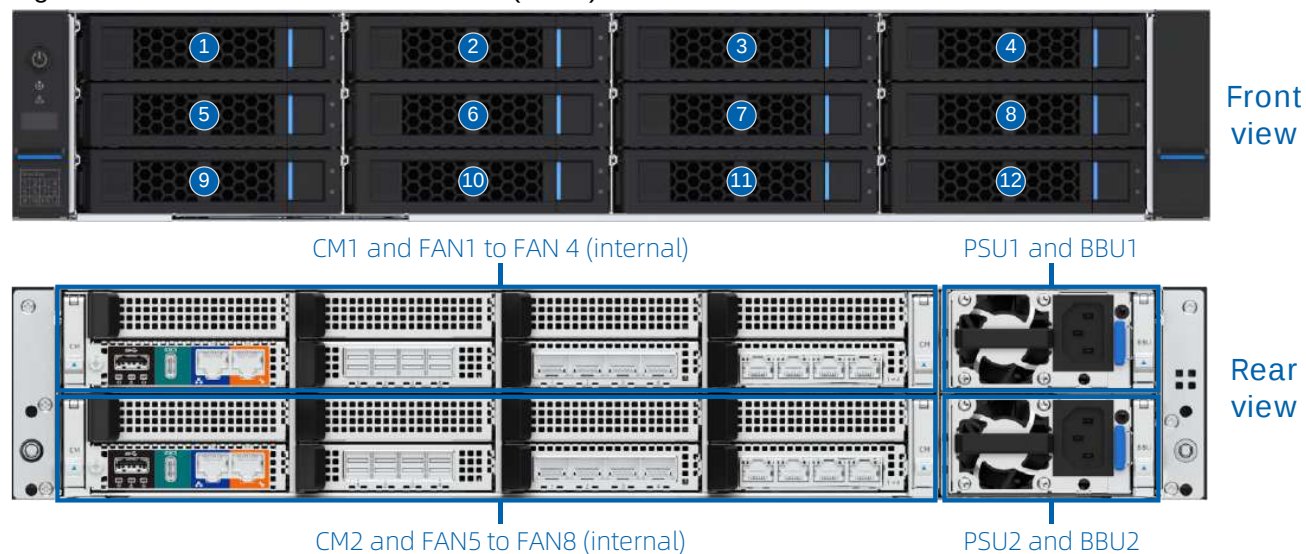
Table 2-1 Components of control enclosure

Component	Description
Controller module (CM)	2 controller modules. For more information, see 2.2 Controller module .
Disk module	12 disks or 25 disks.
PSU module	2 PSU modules. For more information, see 2.4 PSU module .
BBU module	2 BBU modules. For more information, see 2.5 BBU module .
FAN module	8 FAN modules. For more information, see 2.6 FAN module .
LED indicator	For more information, see 4.1 LEDs of control enclosure .

Views of control enclosure

Figure 2-1 shows the front view and rear view of 2U12 control enclosure, with disk IDs and component names identified.

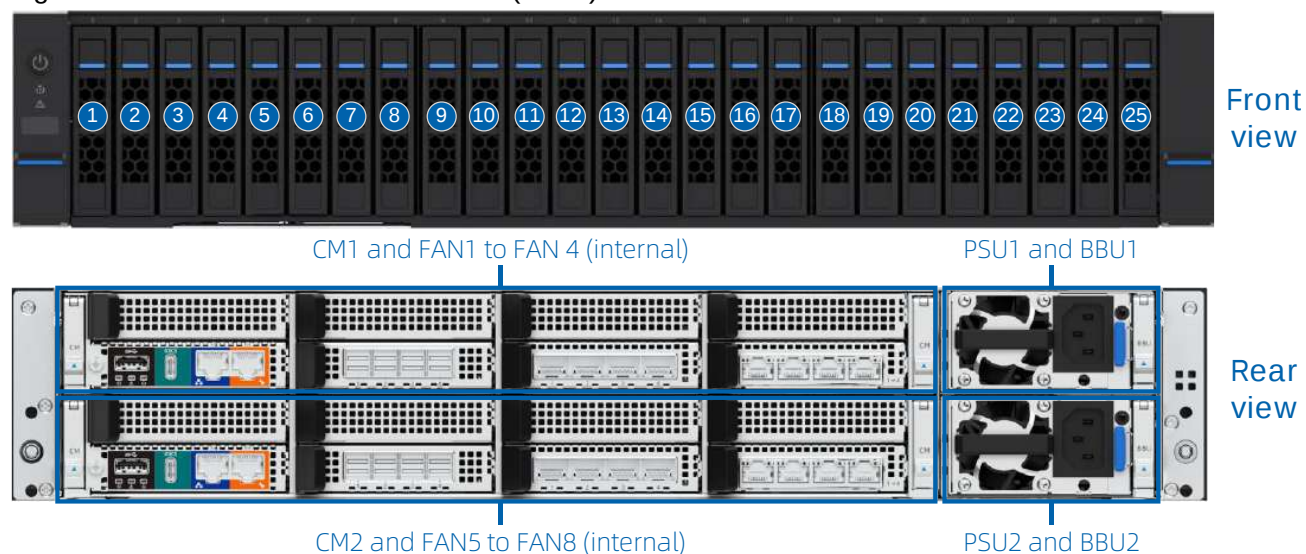
Figure 2-1 Views of control enclosure (2U12)



Note: The fan number is the number specified in the whole control enclosure.

Figure 2-2 shows the front view and rear view of 2U25 control enclosure, with disk IDs and component names identified.

Figure 2-2 Views of control enclosure (2U25)



Note: The fan number is the number specified in the whole control enclosure.

Dimensions of control enclosure

Figure 2-3 shows the dimensions of the 2U12 control enclosure and Figure 2-4 shows the dimensions of the 2U25 control enclosure. Make sure that both end of the enclosure are at least 15 centimeter away from the rack for heat dissipation.

Figure 2-3 Dimensions of 2U12 control enclosure (vertical view)

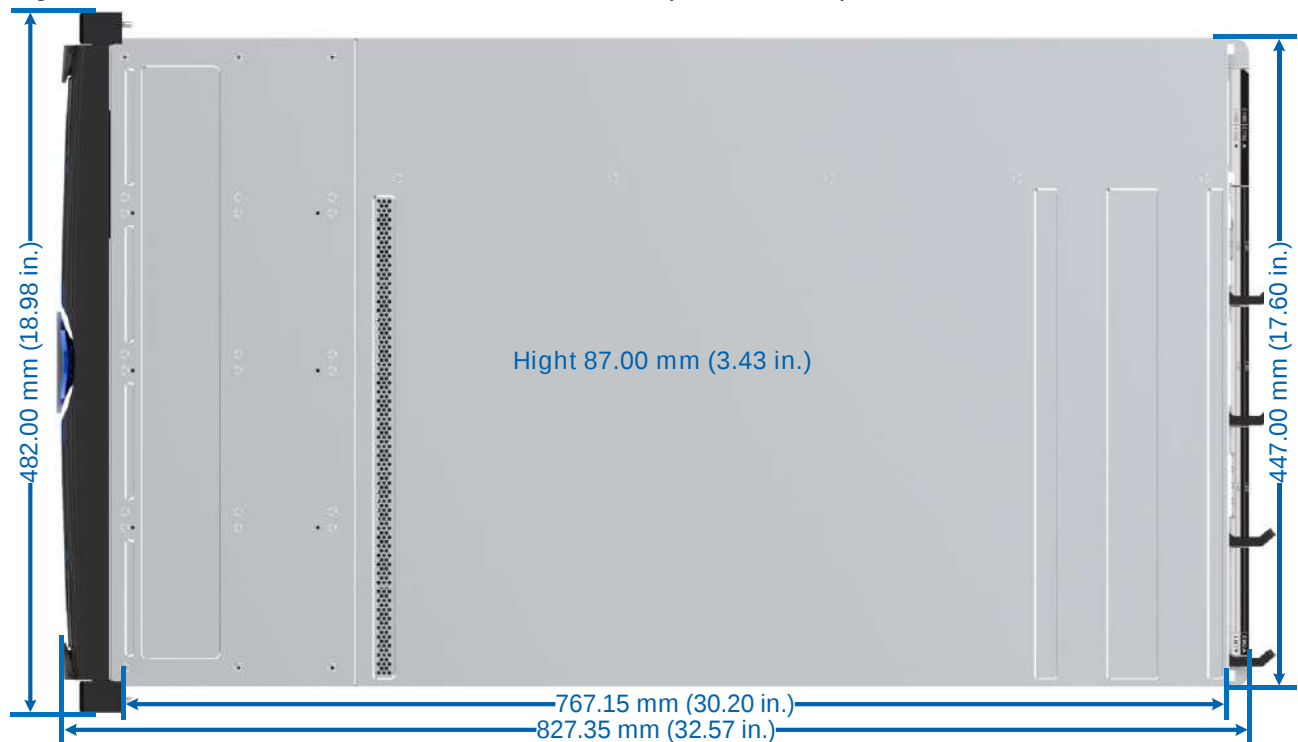
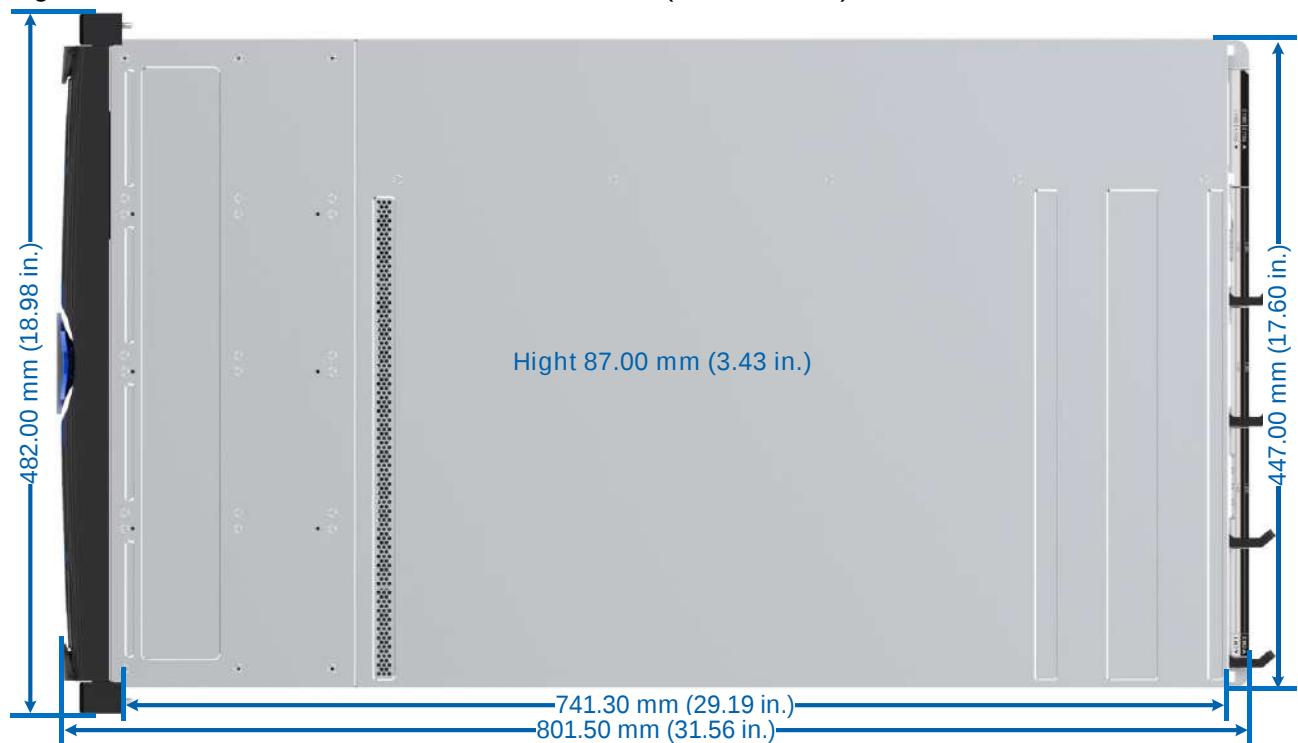


Figure 2-4 Dimensions of 2U25 control enclosure (vertical view)



2.2 Controller module

The controller modules work in active-active mode and the cache data stored in the current controller module is also stored in the other controller module as a mirror copy. When any controller module fails,

the business can be taken over directly by the controller module that works correctly to prevent data loss and business interruption.

Internal structure and components

Figure 2-5 shows the internal structure of the controller module, Table 2-2 shows the descriptions of components.

Figure 2-5 Internal structure of controller module

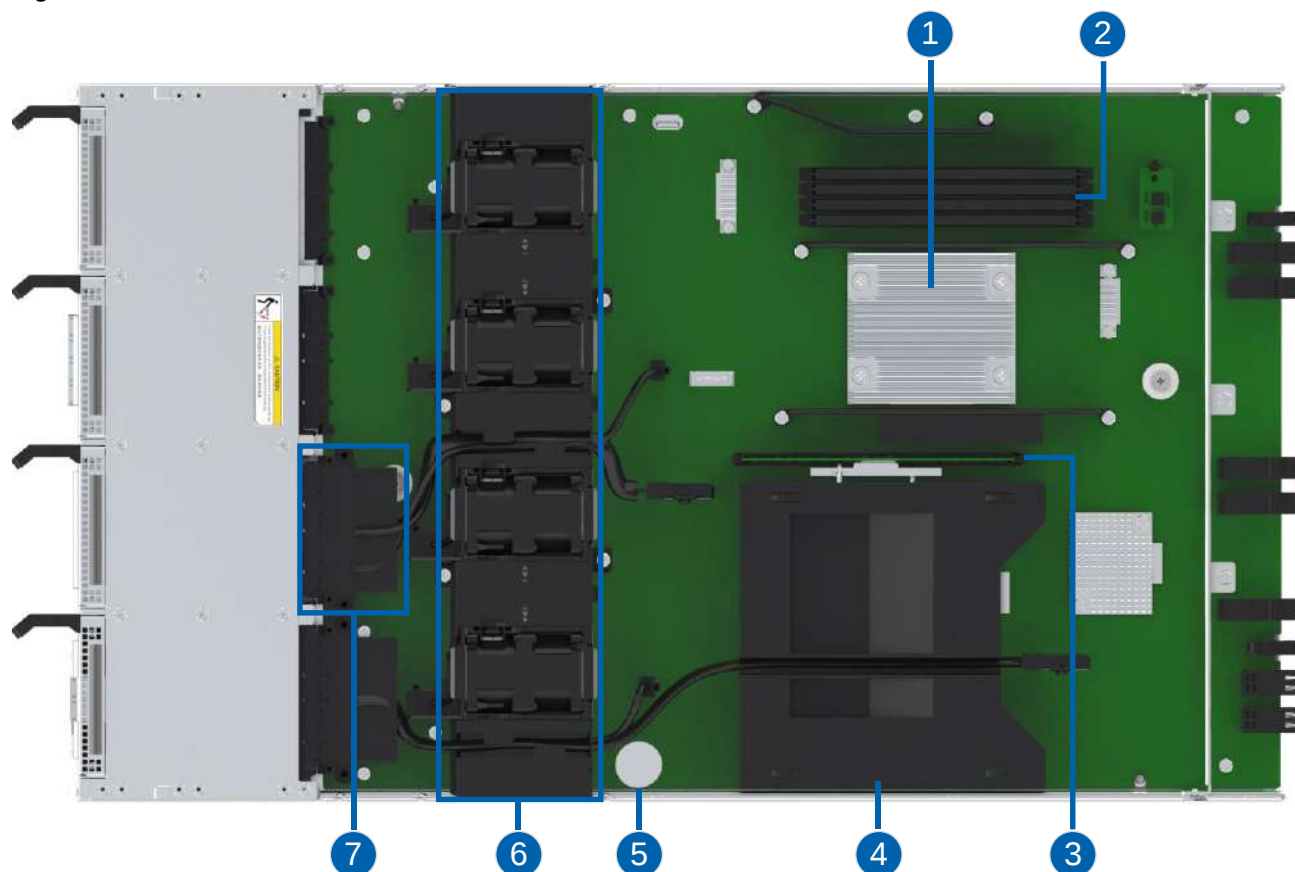


Table 2-2 Components of controller module

No.	Component	Description
1	CPU	1 CPU and 1 CPU radiator.
2	DIMM slot	4 DIMM slots, supporting DDR4 RDIMM.
3	BMC board	1 BMC board for enclosure management.
4	Air deflector and system disk	1 air deflector and 1 M.2 PCIe SSD.
5	CMOS battery	1 CMOS battery for keeping system time.
6	FAN module	4 FAN modules. For more information, see 2.6 FAN module .

7	OCP4 cable	1 OCP4 cable for expanding a PCIe slot.
---	------------	---

Rear view and components

Figure 2-6 shows the rear view of the controller module, Table 2-3 shows the descriptions of components.

Figure 2-6 Rear view of controller module

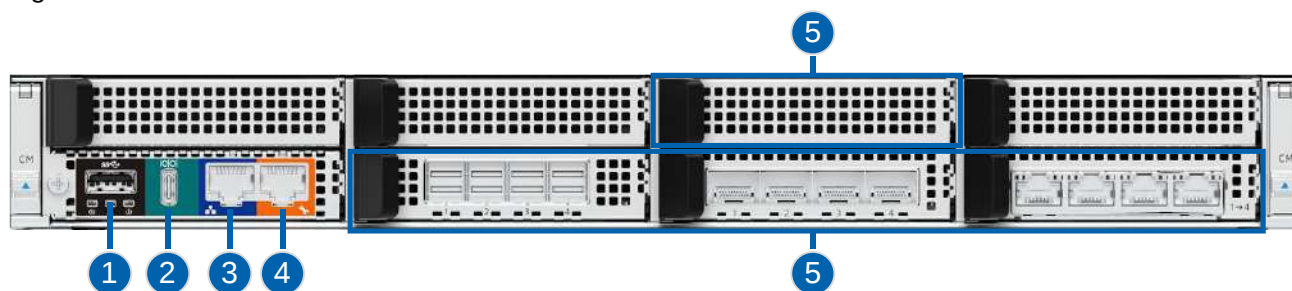


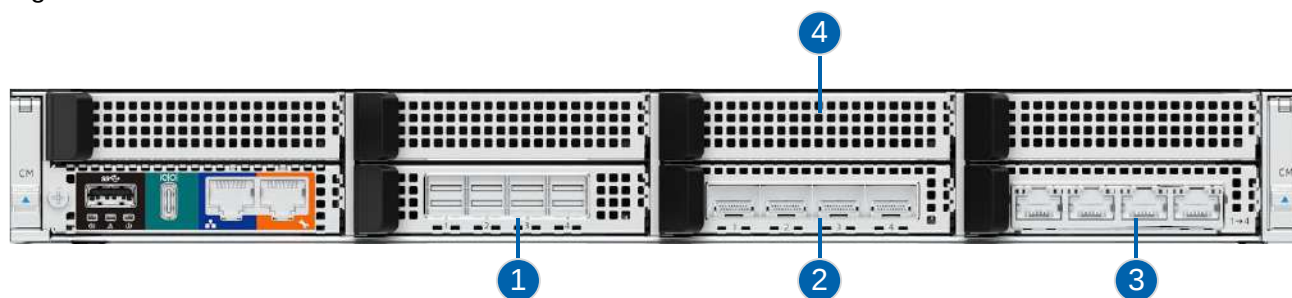
Table 2-3 Components of controller module

No.	Component	Description
1	USB port	1 USB port for connecting the USB flash drive for information of the controller module or the system.
2	Type-C serial port	1 Type-C serial port for system debugging and motherboard debugging of storage platform.
3	Management port	1 1 Gb management port (called U port) for administrator to manage and configure storage.
4	Technician port	1 1 Gb technician port (called T port) for professional management personnel and maintenance personnel to initialize system or debug. It can be changed to a management port after the clustered system is created.
5	PCIe slot	4 PCIe slots for PCIe cards. For more information, see 2.3 PCIe cards .

2.3 PCIe cards

PCIe cards are designed in accordance with OCP 3.0 for easy maintenance. Each controller module supplies four PCIe slots, as shown in Figure 2-7.

Figure 2-7 PCIe slots of control enclosure



PCIe cards can be used for interconnection between front-end and back-end, interconnection between controller modules, performance improvement, and so on. Through FC cards, Ethernet cards, and RoCE cards, the hosts can be directly connected to the storage.

- KS2000G7 supports FC card, Ethernet card, RoCE card, and SAS card.
- KS3000G7 supports FC card, Ethernet card, RoCE card, SAS card, NVMe extend card, and QAT card.

The specifications and limits of PCIe cards for each controller module are as shown in Table 2-4. Priority of each slot: slot 1 = slot 2 > slot 3 > slot 4.

Table 2-4 PCIe cards for each controller module

Card type	Specification	Slot limit	Quantity
FC card	2-port 16Gb 4-port 16Gb	No slot limit. Slot 1 and slot 2 are recommended.	4
	2-port 32Gb 4-port 32Gb		
	2-port 64Gb 4-port 64Gb		
Ethernet card	4-port 1Gb	No slot limit. Slot 1 and slot 2 are recommended.	4
	2-port 10Gb 4-port 10Gb		
	2-port 25Gb 4-port 25Gb		
	2-port 100Gb		
RoCE card	2-port 25Gb	No slot limit. Slot 1 and slot 2 are recommended.	4
	2-port 100Gb		
SAS card	4-port 4×12Gb	No slot limit. Slot 3 and slot 4 are recommended.	3

NVMe extend card	4-port	Only slot 3 and slot 4 can be used.	2
QAT card	-	No slot limit. Slot 3 and slot 4 are recommended.	1

2.4 PSU module

PSU modules used by KS2000G7 and KS3000G7 are platinum PSU or titanium PSU that are 80 PLUS® certified products. The PSU module provides energy for the control enclosure, and can convert the external voltage into different types of voltage necessary to the control enclosure. The PSU module uses 1+1 redundant design to prevent single points of failure.

The locations of PSU modules in the control enclosure are as shown in Figure 2-8.

Figure 2-8 PSU modules of control enclosure



The storage system use an energy-saving and emission-reducing design, supporting balance mode and master-slave mode. It can automatically change the work mode of PSU modules referring to the system load, improving power conversion efficiency. When the system load is high, the work mode of PSU modules will be changed to balance mode. When the system load is low, the work mode of PSU modules will be changed to master-slave mode.

2.5 BBU module

The BBU module provides backup power for the control enclosure to make sure of the security of business data when the external power supply fails. Each control enclosure has two BBU modules, serving the two controller modules in one-to-one mode.

BBU module is in the BBU control module, as shown in Figure 2-9.

Figure 2-9 BBU module of control enclosure



When PSU modules supply power redundantly, BBU modules are in cold-standby status. When PSU modules cannot supply power redundantly, BBU modules are in hot-standby status. When all PSU modules fail to supply power (PSU failure or power outage), BBU modules can continue to supply power to their corresponding controller modules to make sure that the system writes the data and system configuration information in the cache to the system disk to prevent data loss.

When fully charged, the BBU module can support two consecutive PSU failures or power outages. After the power failure is restored, the data stored on the system disk will be read out immediately and restored to the cache. The fully-charged BBU module can supply data protection for two to five seconds when the power is flash broken (such as non-stable voltage and wrong operation of PSU) to make the system work correctly, without system restart or business interruption.

The specifications of the BBU module are as shown in Table 2-5.

Table 2-5 BBU specifications of control enclosure

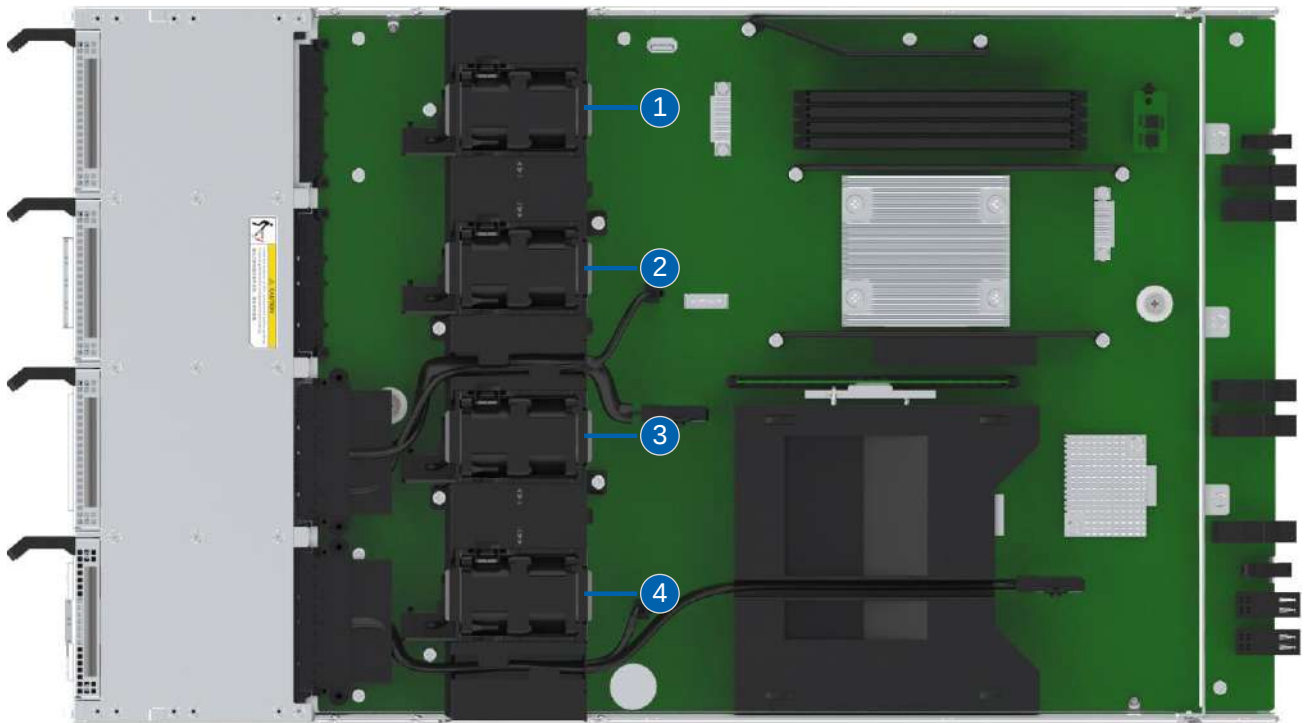
Parameter	Value
Power backup capability	15.2 WH
Battery capacity	1.8 Ah/14.4 V
Power backup voltage	9.6 V to 12.8 V
Internal battery connection	4S1P (four connected in series and one connected in parallel)

2.6 FAN module

The fan module can dissipate heat for the control enclosure and make sure of its correct operation at maximum power consumption. The FAN module uses N+1 redundant design to prevent single points of failure.

There are four FAN modules numbered 1 to 4 in the controller module, as shown in Figure 2-10. The FAN modules can dissipate heat for the controller module, disk modules, and PCIe cards.

Figure 2-10 FAN module of control enclosure



Note: The fan number is the number specified in the controller module.

3

Disk enclosure

KS2000G7 supplies SAS disk enclosure (JBOD), and KS3000G7 supplies SAS disk enclosure (JBOD) and NVMe disk enclosure (JBOF). The control enclosure can share all its features and resources with the connected disk enclosures. There are four types of disk enclosures and they can be used at the same time.

- JBOD:
 - 2U12 JBOD with 3.5-inch disk or 2.5-inch disk
 - 2U25 JBOD with 2.5-inch disk
 - 3U48 JBOD with 3.5-inch disk or 2.5-inch disk
- JBOF: 2U25 JBOF with 2.5-inch disk

3.1 JBOD

3.1.1 Overview

This section describes the components, views, and dimensions of JBOD.

Components of JBOD

Table 3-1 Components of JBOD

Component	Description
I/O module (IOM)	2 I/O modules. For more information, see 3.1.2 I/O module .
Disk module	12 disks, 25 disks, or 48 disks.
PSU	2 PSU modules. For more information, see 3.1.3 PSU/FAN module .
FAN	2 FAN modules in 2U JBOD, 4 FAN modules in 3U JBOD. For more information, see 3.1.3 PSU/FAN module .
LED indicator	For more information, see 4.2 LEDs of JBOD .

Views of 2U JBOD

Figure 3-1 shows the front view and rear view of 2U12 JBOD, with disk IDs and component names identified.

Figure 3-1 Views of 2U12 JBOD

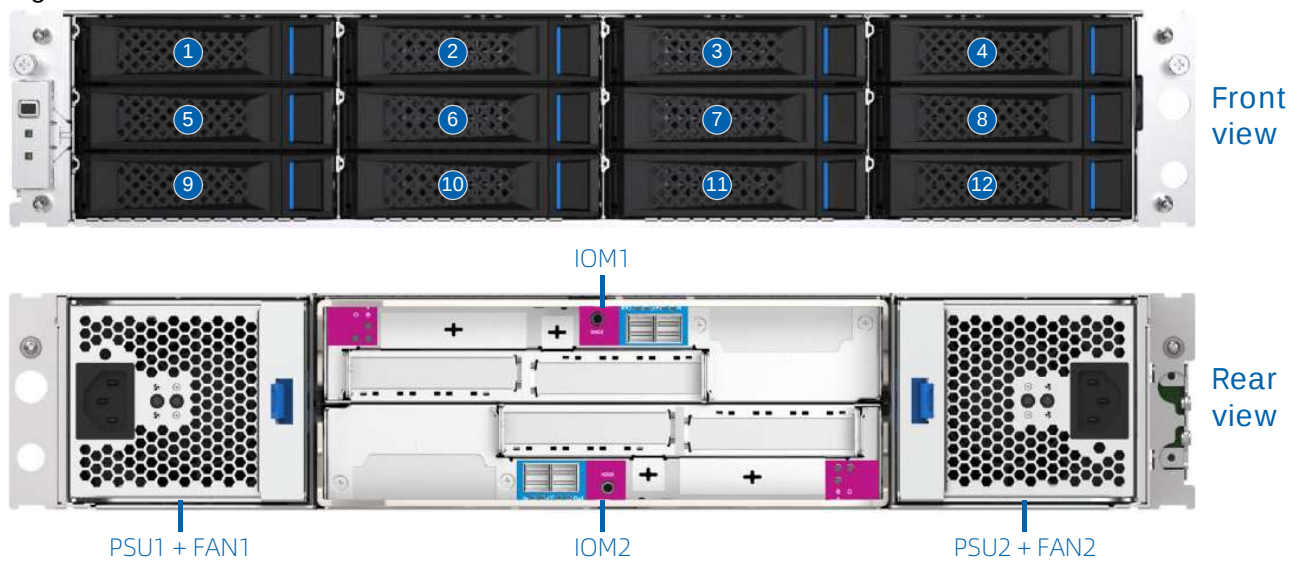
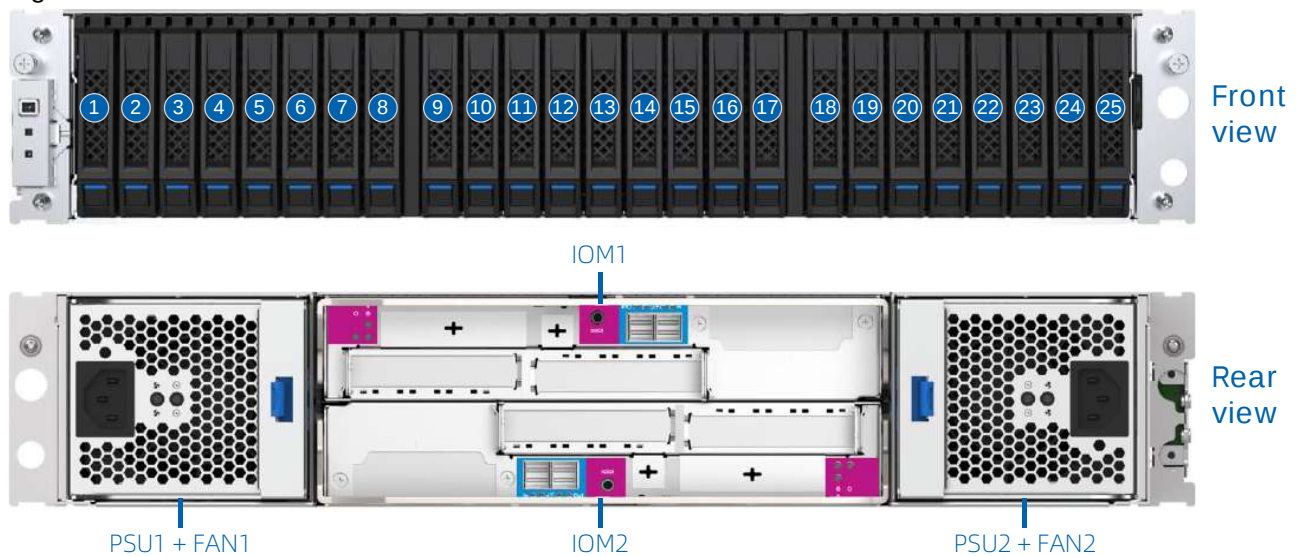


Figure 3-2 shows the front view and rear view of 2U25 JBOD, with disk IDs and component names identified.

Figure 3-2 Views of 2U25 JBOD



Views of 3U JBOD

A 3U JBOD has four high-density disk drawers, each with 12 disks. Figure 3-3 shows the front view and rear view of 3U JBOD, with disk drawer IDs and component names identified.

Figure 3-3 Views of 3U JBOD

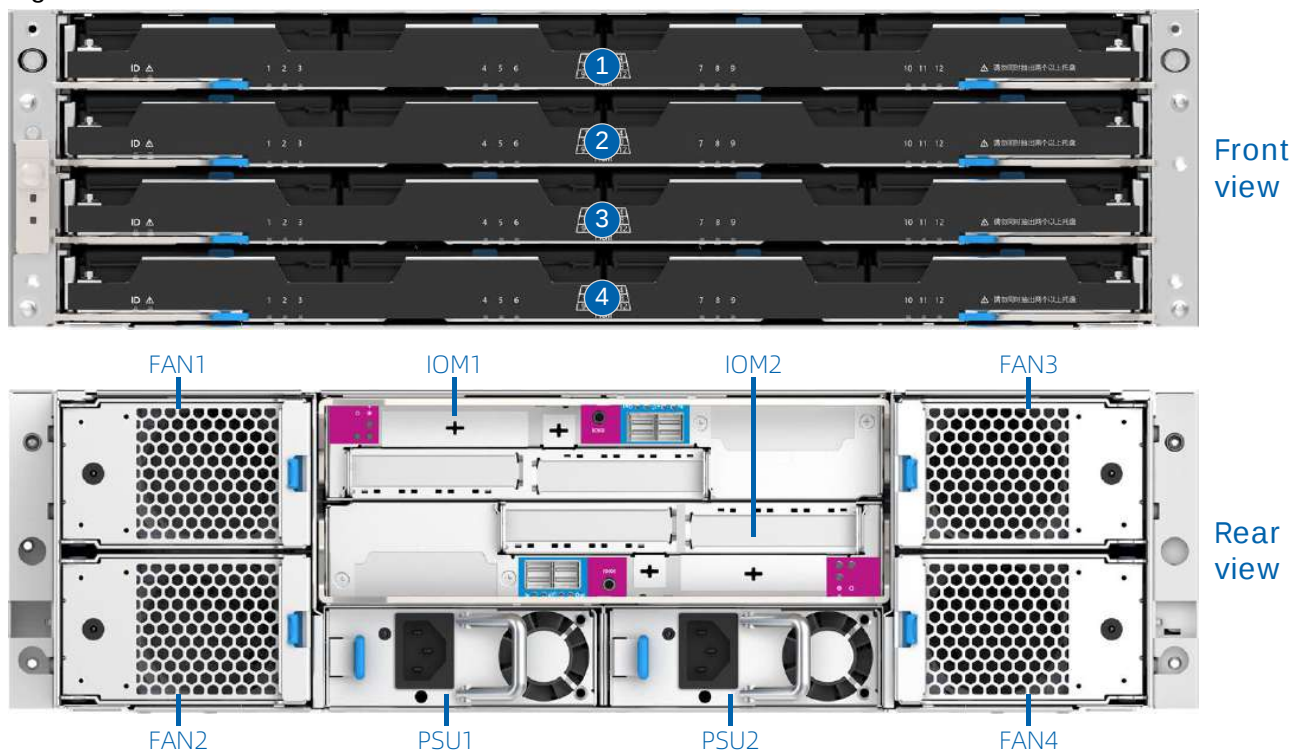


Figure 3-4 shows the IDs of all disks in the enclosure, and Figure 3-5 shows the IDs of all disks in each disk drawer.

Figure 3-4 Disk ID within enclosure

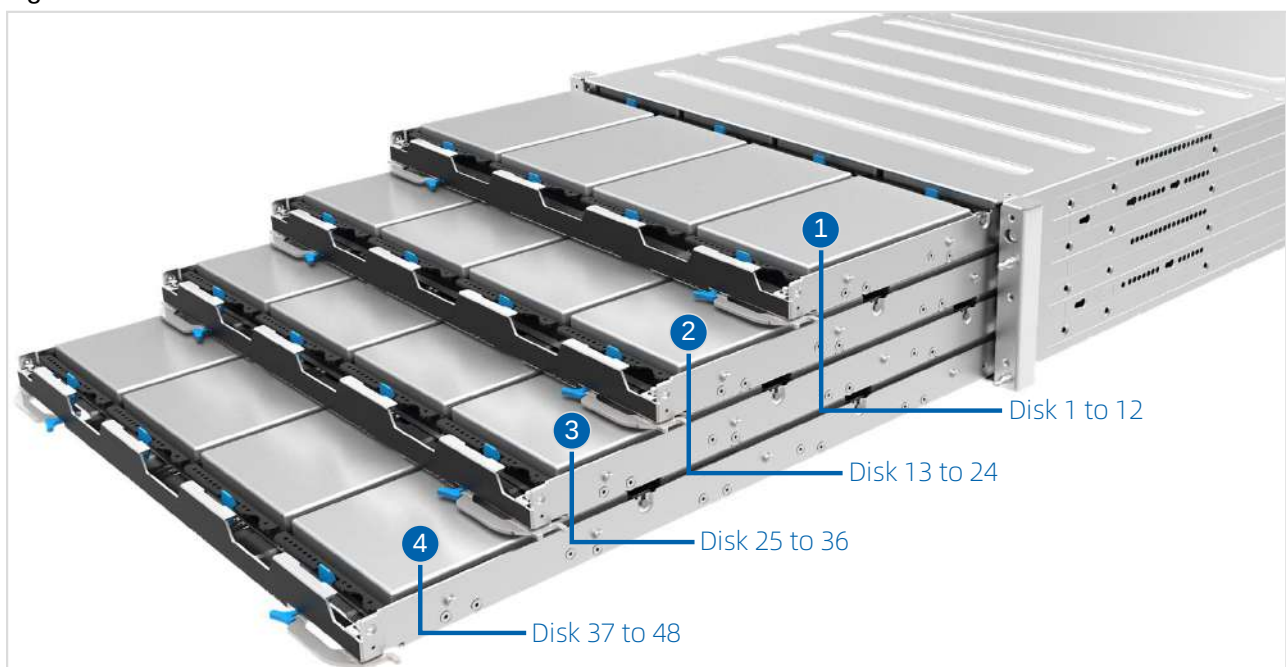


Figure 3-5 Disk ID within disk drawer



Dimensions of JBOD

Figure 3-6 shows the dimension of 2U JBOD and Figure 3-7 shows the dimension of 3U JBOD. Make sure that both end of the enclosure are at least 15 centimeter away from the rack for heat dissipation.

Figure 3-6 Dimensions of 2U JBOD (vertical view)

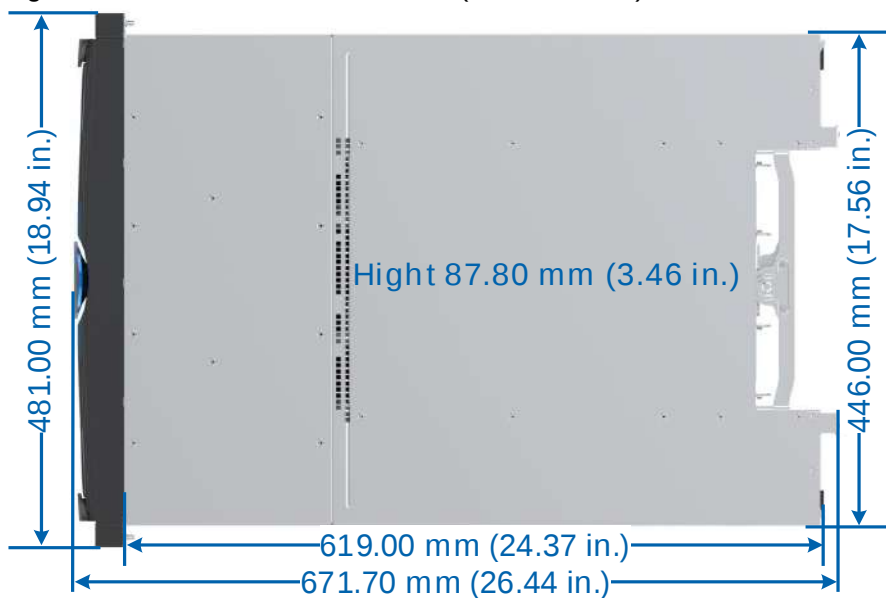
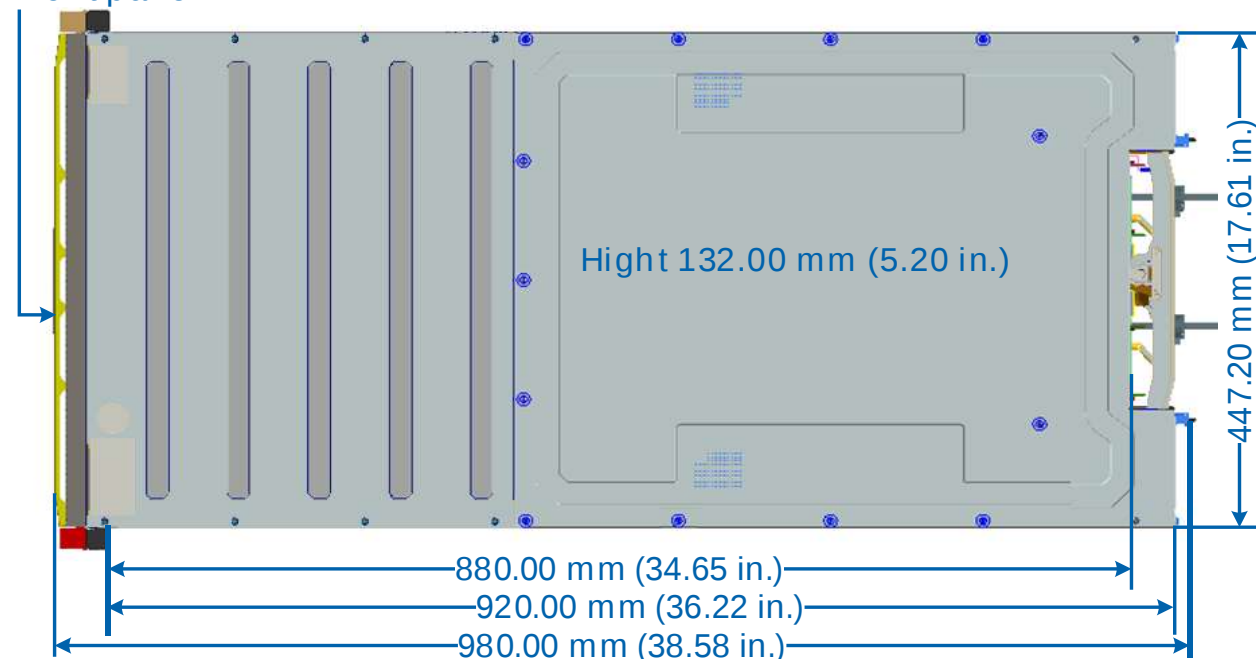


Figure 3-7 Dimensions of 3U JBOD (vertical view)

Front panel



3.1.2 I/O module

A JBOD has two I/O modules. The I/O module of 2U JBOD and 3U JBOD are the same. Figure 3-8 shows the rear view of the I/O module, Table 3-2 shows the descriptions of components.

Figure 3-8 Rear view of I/O module (JBOD)

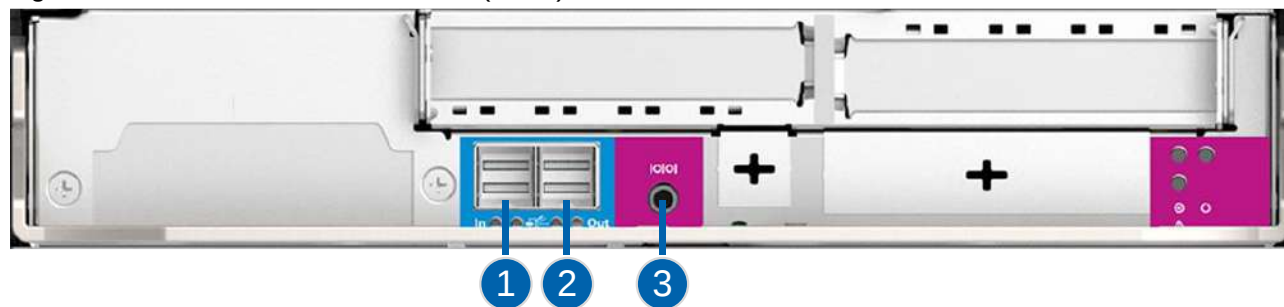


Table 3-2 Components of I/O module (JBOD)

No.	Component	Description
1	SAS port (in)	1 4×12 Gb SAS 3.0 port for connecting control enclosure or upper-level JBOD.
2	SAS port (out)	1 4×12 Gb SAS 3.0 port for connecting lower-level JBOD.
3	Serial port	1 serial port for system debugging and motherboard debugging of storage platform.

3.1.3 PSU/FAN module

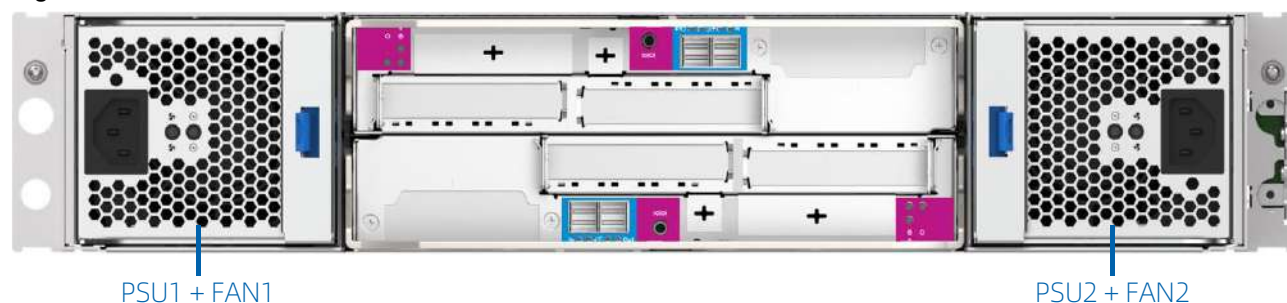
PSU module and FAN module are all redundant to prevent single points of failure.

- The PSU module provides energy for the disk enclosure, and can convert the external voltage into different types of voltage necessary to the disk enclosure.
- The FAN module can dissipate heat for the disk enclosure and make sure of its correct operation at maximum power consumption.

PSU module and FAN module of 2U JBOD

The FAN module of 2U JBOD is in the PSU module, as shown in Figure 3-9.

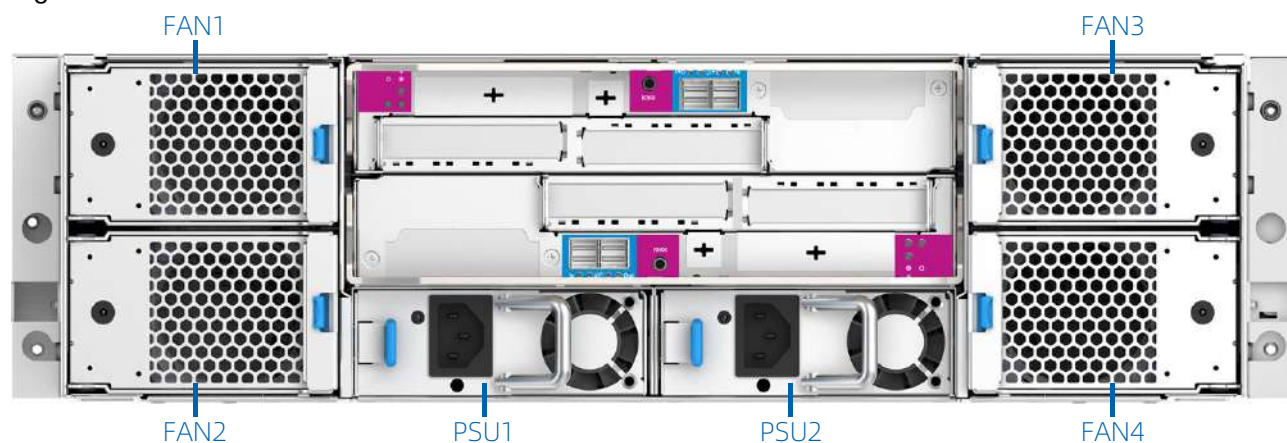
Figure 3-9 PSU module and FAN module of 2U JBOD



PSU module and FAN module of 3U JBOD

The FAN module of 3U JBOD is independent of the PSU module, as shown in Figure 3-10.

Figure 3-10 PSU module and FAN module of 3U JBOD



3.2 JBOF

3.2.1 Overview

This section describes the components, views, and dimensions of JBOF.

Components of JBOF

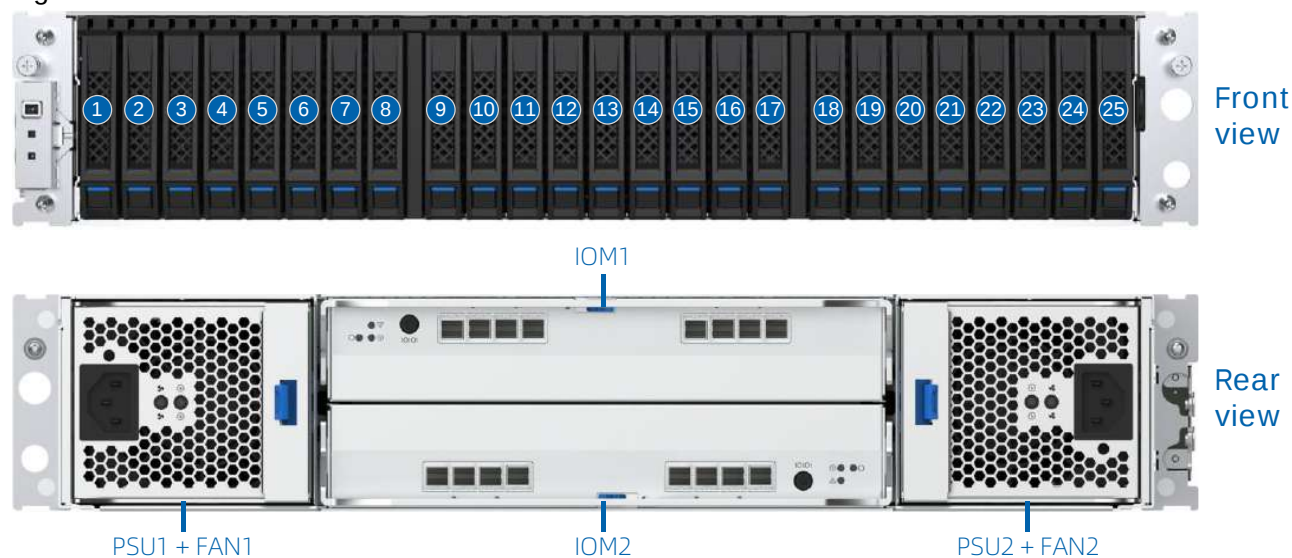
Table 3-3 Components of JBOF

Component	Description
I/O module (IOM)	2 I/O modules. For more information, see 3.2.2 I/O module .
Disk module	25 NVMe SSDs.
PSU module	2 PSU modules. For more information, see 3.2.3 PSU/FAN module .
FAN module	2 FAN modules. For more information, see 3.2.3 PSU/FAN module .
LED indicator	For more information, see 4.3 LEDs of JBOF .

Views of JBOF

Figure 3-11 shows the front view and rear view of JBOF, with disk IDs and component names identified.

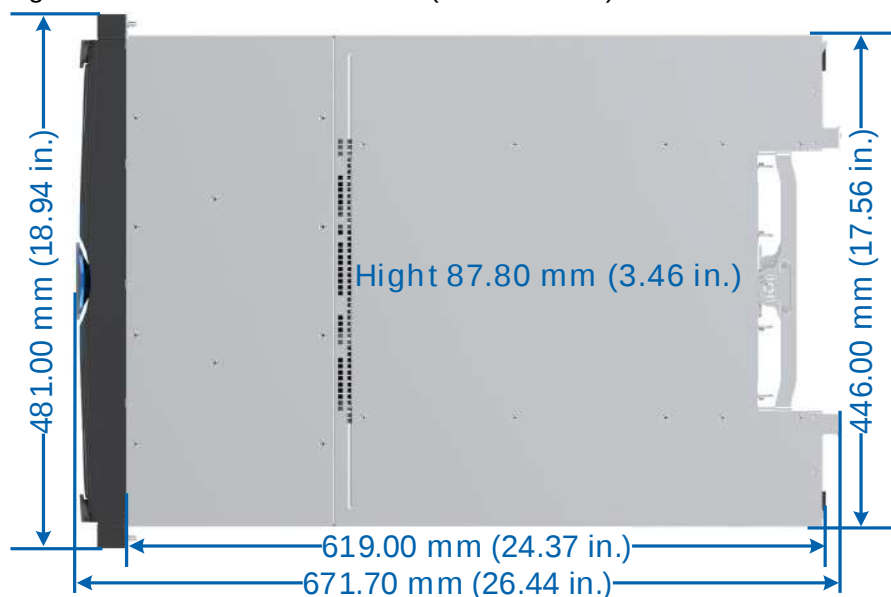
Figure 3-11 Views of JBOF



Dimensions of JBOF

Figure 3-12 shows the dimensions of JBOF. Make sure that both end of the enclosure are at least 15 centimeter away from the rack for heat dissipation.

Figure 3-12 Dimensions of JBOF (vertical view)



3.2.2 I/O module

A JBOF has two I/O modules. Figure 3-13 shows the rear view of the I/O module, Table 3-4 shows the descriptions of components.

Figure 3-13 Rear view of I/O module (JBOF)



Table 3-4 Components of I/O module (JBOF)

No.	Component	Description
1	PCIe port (in)	4 PCIe 3.0 ports for connecting control enclosure or upper-level JBOF.
2	PCIe port (out)	4 PCIe 3.0 ports for connecting lower-level JBOF.
3	Serial port	1 serial port for system debugging and motherboard debugging of storage platform.

3.2.3 PSU/FAN module

PSU module and FAN module are all redundant to prevent single points of failure.

- The PSU module provides energy for the disk enclosure, and can convert the external voltage into different types of voltage necessary to the disk enclosure.
- The FAN module can dissipate heat for the disk enclosure and make sure of its correct operation at maximum power consumption.

The FAN module of JBOF is in the PSU module, as shown in Figure 3-14.

Figure 3-14 PSU module of JBOF



4 LED indicator

Each LED indicator (referred to as LED) of the control enclosure and disk enclosure can show one of several status, as shown in Table 4-1.

Table 4-1 LED status

Status	Description
On	The LED stays on.
0.33 Hz flashing	The LED turns on and off at a frequency of 0.33 Hz. It is on for 2 s, off for 1 s, and then repeats.
0.5 Hz flashing	The LED turns on and off at a frequency of 0.5 Hz. It is on for 1 s, off for 1 s, and then repeats.
1 Hz flashing	The LED turns on and off at a frequency of 1 Hz. It is on for 500 ms, off for 500 ms, and then repeats.
2 Hz Flashing	The LED turns on and off at a frequency of 2 Hz. It is on for 250 ms, off for 250 ms, and then repeats.
4 Hz flashing	The LED turns on and off at a frequency of 4 Hz. It is on for 125 ms, off for 125 ms, and then repeats.
Blinking	The LED comes on to show some activity, and then turns off. The frequency and duration depends on the activity.
Off	The LED stays off.

4.1 LEDs of control enclosure

4.1.1 Enclosure LEDs

The enclosure LEDs are at the hangers of control enclosure. Take 2U25 control enclosure as an example, the locations of enclosure LEDs are as shown in Figure 4-1, and the introduction is as shown in Table 4-2.

Figure 4-1 Enclosure LEDs of control enclosure



Table 4-2 Enclosure LEDs of control enclosure

No.	Name	Color	Status	Description
1	Power LED	Green	On	The enclosure is powered, and the system is operating correctly.
			0.5 Hz flashing	The two controller modules are all in standby mode or powered off.
			Off	The enclosure is powered off.
2	Location LED	Blue	On	The enclosure is being located.
			Off	The enclosure is not located or powered off.
3	Alarm LED	Red	On	The enclosure is faulty.
			Off	The enclosure works correctly or is powered off.
4	Enclosure ID LED	Green	On	- The enclosure ID will be shown when any controller module in the enclosure is in the clustered system. - The 000 will be shown when no controller modules in the enclosure are in the clustered system.
			Off	The two controller modules are all in standby mode or powered off.

**Caution**

The power LED is also a power switch button, which is only used for powering on the enclosure after you power off the storage system or the enclosure. Do not use it in other scenarios.

4.1.2 Controller LEDs

The locations of controller LEDs are as shown in Figure 4-2, and the introduction is as shown in Table 4-3.

Figure 4-2 Controller LEDs



Table 4-3 Controller LEDs

No.	Name	Color	Status	Description
1	Power and status LED	Green	On	The controller module is powered on, and the system is operating correctly.
			0.5 Hz flashing	The system is collecting dumps.
			2 Hz flashing	The controller module is in system boot phase.
			Off	The controller module is powered off or the system is in shutdown status.
2	Alarm LED	Red	On	The controller module is faulty.
			Off	The controller module works correctly or is powered off.
3	Location and configuration node LED	Blue	On	The controller module is being located.
		Green	On	The controller module is a configuration node.
		Off		The controller module is not located, is not a configuration node, or is powered off.
4	Network connection status LED	Green	On	The network is connected correctly and works at the highest speed.
		Yellow	On	The network is connected correctly but does not work at the highest speed.
		Off		The network is not connected correctly.
5	Network data transmission LED	Green	On	The network is connected correctly but there is no data transmission.
			Blinking	The network is connected correctly and there is data transmission.
			Off	The network is not connected correctly.

4.1.3 Disk LEDs

The locations of disk LEDs are as shown in Figure 4-3, and the introduction is as shown in Table 4-4.

Figure 4-3 Disk LEDs

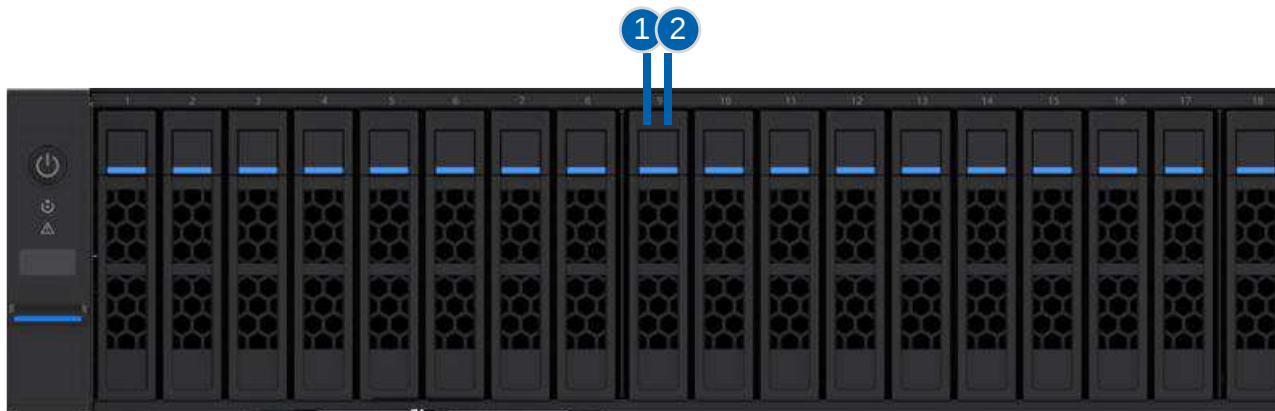


Table 4-4 Disk LEDs

No.	Name	Color	Status	Description
1	Status LED	Green	On	The disk works correctly.
			Blinking	Read-write operations are being done on the disk.
			Off	The disk is powered off or offline.
2	Alarm and location LED	Red	On	The disk is faulty.
		Blue	on	The disk is being located.
		Off		● The disk is powered off or unplugged. ● The disk works correctly. ● The disk is not being located.

4.1.4 PSU/BBU/FAN LEDs

The locations of PSU LEDs, BBU LEDs, and FAN LEDs are as shown in Figure 4-4, and the introduction is as shown in Table 4-5.

Figure 4-4 PSU/BBU/FAN LEDs of control enclosure



Table 4-5 PSU/BBU/FAN LEDs of control enclosure

No.	Name	Color	Status	Description
1	PSU status/alarm/ location LED	Green	On	The PSU works correctly.
			0.33 Hz flashing	The PSU is a backup PSU and is in cold redundancy status.
			2 Hz flashing	The PSU is being upgraded online.
		Amber	On	The PSU is faulty, such as OTP, OVP, and OCP.
			1 Hz flashing	High temperature, high power, high current, or slow fan operation occurs on the PSU.
			2 Hz flashing	The PSU is being located.
		Off		No external power input.
2	BBU status/alarm/ location LED	Green	On	The BBU is fully charged and works correctly. It can supply power loss protection twice.
			0.5 Hz flashing	The BBU is charging and can supply power loss protection once.
			2 Hz flashing	The BBU is charging and cannot supply power loss protection.
		Red	On	The BBU is faulty. The related controller module may get into service mode.
		Blue	On	The BBU is being located.
		Off		The controller module is powered off or the system is in shutdown status.
3	FAN status/alarm LED	Green	On	The FAN works correctly.
		Red	On	The FAN is faulty.
		Off		The enclosure is powered off or the system is in shutdown status.

4.2 LEDs of JBOD

4.2.1 Enclosure LEDs

The enclosure LEDs located at the hangers of 2U JBOD and 3U JBOD are the same.

Take 2U25 JBOD as an example, the locations of enclosure LEDs are as shown in Figure 4-5, and the introduction is as shown in Table 4-6.

Figure 4-5 Enclosure LEDs of JBOD



Table 4-6 Enclosure LEDs of JBOD

No.	Name	Color	Status	Description
1	Power LED	Green	On	The enclosure is powered on.
			Off	The enclosure is powered off.
2	Location LED	Amber	On	The enclosure is being located.
			Off	The enclosure is not located or powered off.
3	Alarm LED	Amber	On	The enclosure is faulty.
			Off	The enclosure works correctly or is powered off.

4.2.2 I/O module LEDs

The I/O module LEDs of 2U JBOD and 3U JBOD are the same. The locations of I/O module LEDs are as shown in Figure 4-6, and the introduction is as shown in Table 4-7.

Figure 4-6 I/O module LEDs of JBOD

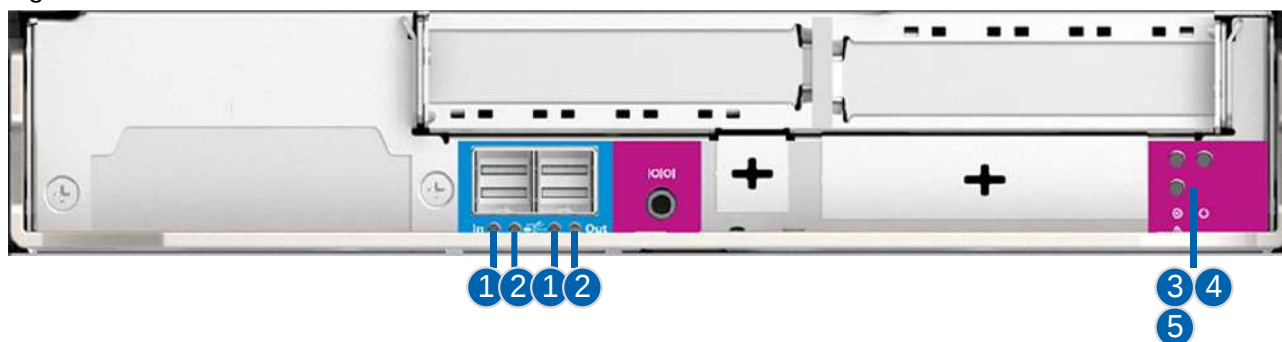


Table 4-7 I/O module LEDs of JBOD

No.	Name	Color	Status	Description
1	Connection status LED for SAS port	Green	On	The SAS Port is connected.
			Off	The SAS Port is not connected.
2	Alarm LED for SAS port	Amber	On	The SAS Port is faulty.
			Off	The SAS Port works correctly.
3	Power LED for I/O module	Green	On	The I/O module is powered on.
			Off	The I/O module is not powered.
4	System status LED	Green	On	The system is operating correctly.
			2 Hz flashing	OSSES cannot get the vital product data (VPD) information.
			Off	The system is in shutdown status.
5	Alarm and location LED for I/O module	Amber	On	The I/O module is faulty.
			2 Hz flashing	The I/O module is being located.
			Off	The I/O module works correctly.

4.2.3 Disk LEDs

Disk LEDs of 2U JBOD

The locations of disk LEDs of 2U12 JBOD and 2U25 JBOD are the same. The locations of disk LEDs are as shown in Figure 4-7, and the introduction is as shown in Table 4-8.

Figure 4-7 Disk LEDs of 2U JBOD



Table 4-8 Disk LEDs of 2U JBOD

No.	Name	Color	Status	Description
1	Status LED	Green	On	The disk works correctly.
			Blinking	Read-write operations are being done on the disk.
			Off	The disk is powered off or offline.
2	Alarm and location LED	Red	On	The disk is faulty.
			2 Hz flashing	The disk is being located.
			Off	● The disk is powered off or unplugged. ● The disk works correctly. ● The disk is not being located.

Disk LEDs of 3U JBOD

3U JBOD has LEDs for the disk drawer and LEDs for the disk, which are located in the disk drawer or on the disk drawer panel, as shown in Figure 4-8 and Figure 4-9, and the introduction is as shown in Table 4-9. The disk status LEDs on the disk drawer panel are numbered 1 to 12, which correspond to the disk numbers in the disk drawer respectively.

Figure 4-8 LEDs in the disk drawer

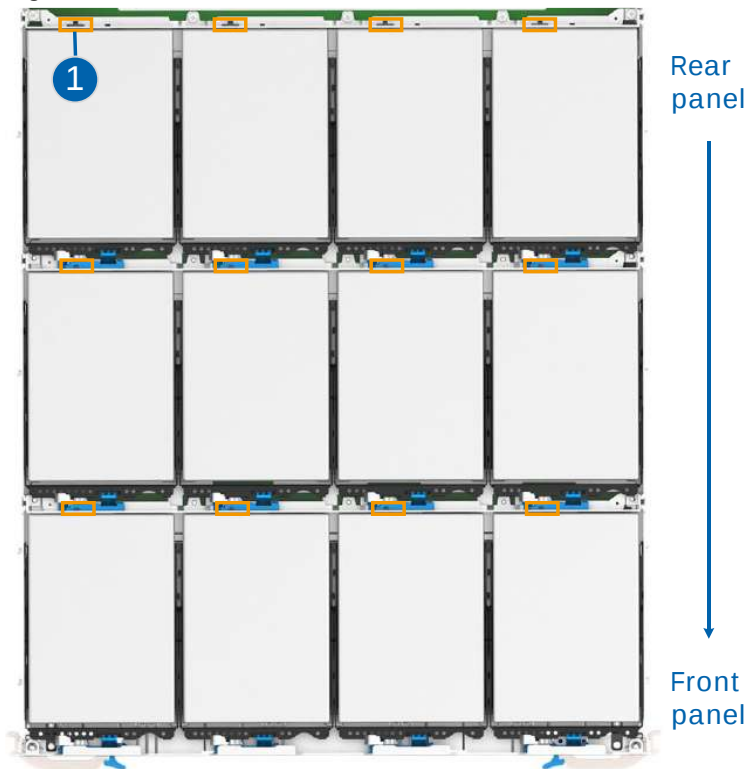


Figure 4-9 LEDs on the disk drawer panel

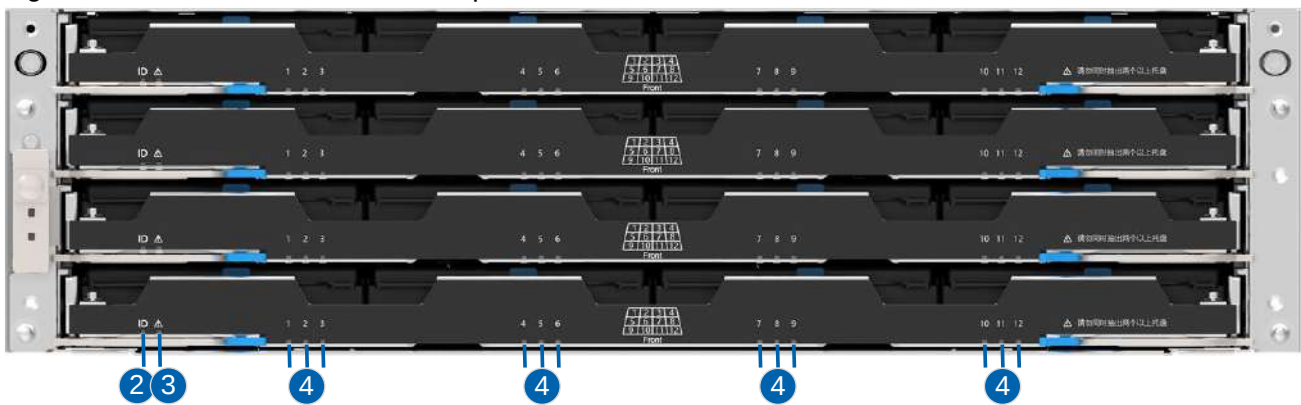


Table 4-9 Disk LEDs of 3U JBOD

No.	Name	Color	Status	Description
1	Alarm and location LED for disk	Red	On	The disk is faulty.
			2 Hz flashing	The disk is being located.
2	Location LED for drawer disk or disk	Blue	On	The disk drawer is being located.
			2 Hz flashing	Any of the disks in the disk drawer is being located.
3	Alarm LED for drawer	Red	On	The disk drawer is faulty, or any of the disks in the

	disk or disk			disk drawer is faulty.
4	Status LED for disk	Green	On	The disk works correctly.
			Blinking	Read-write operations are being done on the disk.

4.2.4 PSU/FAN LEDs

The locations of PSU LEDs and FAN LEDs of 2U JBOD and 3U JBOD are as shown in Figure 4-10 and Figure 4-11, and the introduction is as shown in Table 4-10.

Figure 4-10 PSU LEDs and FAN LEDs of 2U JBOD

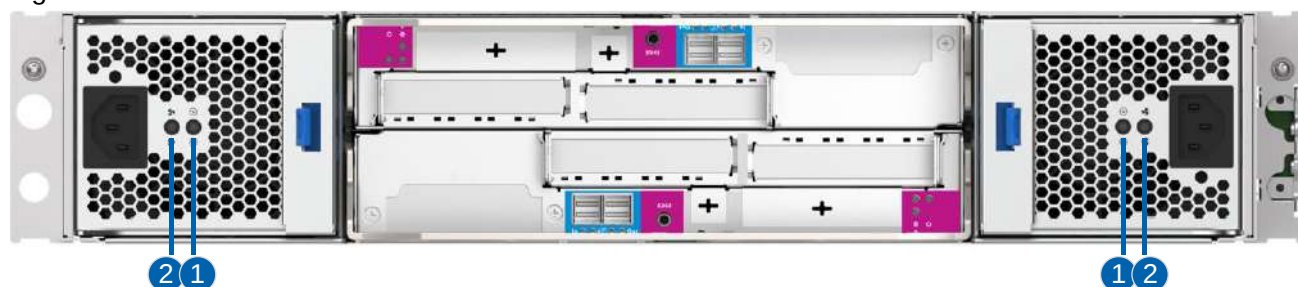


Figure 4-11 PSU LEDs and FAN LEDs of 3U JBOD

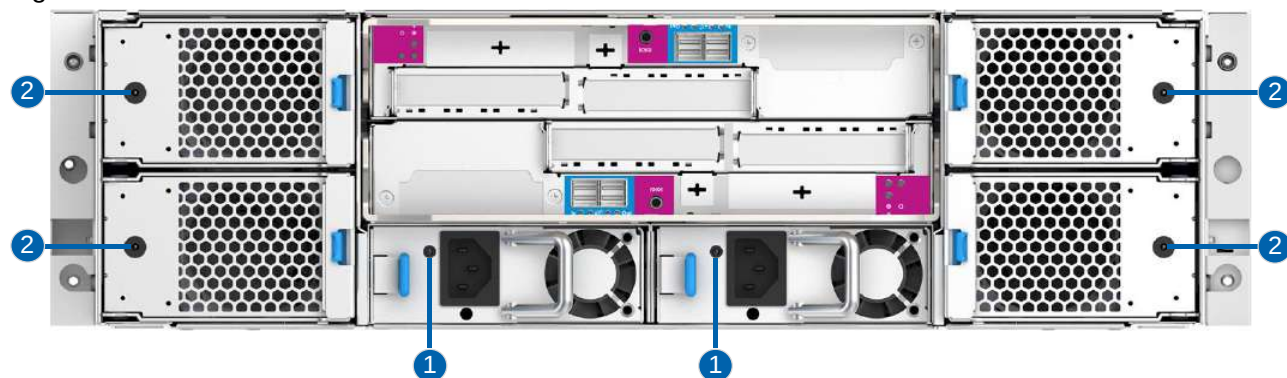


Table 4-10 PSU LEDs and FAN LEDs of JBOD

No.	Name	Color	Status	Description
1	PSU status/alarm/location LED	Green	On	The PSU works correctly.
		Amber	On	- The PSU has no input voltage, but the parallel redundant PSU works correctly. - The PSU is faulty and is under maintenance, and the system is in shutdown status.
			4 Hz flashing	The PSU is being located. Note: Not applicable to 1100 W PSU.
		Off		No external power input.

2	FAN status/alarm/ location LED	Green	On	The FAN works correctly.
		Amber	On	The FAN is faulty.
		Green and amber 4 Hz flashing alternately		The FAN is being located.
		Off		The enclosure is powered off or the system is in shutdown status.

4.3 LEDs of JBOF

4.3.1 Enclosure LEDs

The enclosure LEDs are located at the hangers, as shown in Figure 4-12. The introduction is as shown in Table 4-11.

Figure 4-12 Enclosure LEDs of JBOF



Table 4-11 Enclosure LEDs of JBOF

No.	Name	Color	Status	Description
1	Power LED	Green	On	The enclosure is powered on.
			Off	The enclosure is powered off.
2	Location LED	Blue	On	The enclosure is being located.
			Off	The enclosure is not located or powered off.
3	Alarm LED	Red	On	The enclosure is faulty.
			Off	The enclosure works correctly or is powered off.

4.3.2 I/O module LEDs

The locations of I/O module LEDs are as shown in Figure 4-13, and the introduction is as shown in Table 4-12.

Figure 4-13 I/O module LEDs of JBOF



Table 4-12 I/O module LEDs of JBOF

No.	Name	Color	Status	Description
1	Connection status LED for NVMe extend card	Green	On	The PCIe link is established.
			Off	The cable is not connected, or the PCIe link is not established.
2	Fault LED for NVMe extend card	Amber	On	The PCIe link is faulty. The link bandwidth is not the maximum bandwidth of PCIe 3.0 ×16.
			Off	The cable is not connected, or the PCIe link is established correctly.
3	Power LED	Green	On	The I/O module is powered on.
			Off	The I/O module is not powered.
4	Status LED for I/O module	Green	On	The system is operating correctly.
			Off	The system is not operating.
5	Fault and location LED for I/O module	Amber	On	The I/O module is faulty.
			Off	The I/O module is operating correctly.
		Blue	On	The I/O module has been located.
			Off	The I/O module is not located.

4.3.3 Disk LEDs

The locations of disk LEDs are as shown in Figure 4-14, and the introduction is as shown in Table 4-13.

Figure 4-14 Disk LEDs of JBOF

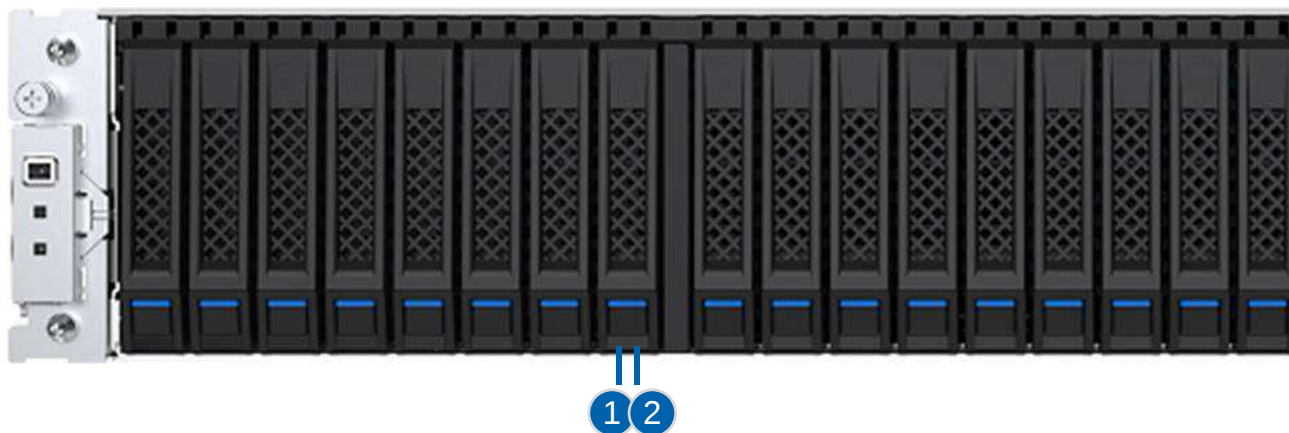


Table 4-13 Disk LEDs of JBOF

No.	Name	Color	Status	Description
1	Alarm and location LED	Red	On	The disk is faulty.
			2 Hz flashing	The disk is being located.
			Off	- The disk is powered off or unplugged. - The disk works correctly. - The disk is not being located.
2	Status LED	Green	On	The disk works correctly.
			Blinking	Read-write operations are being done on the disk.
			Off	The disk is powered off or offline.

4.3.4 PSU/FAN LEDs

The locations of PSU LEDs and FAN LEDs are as shown in Figure 4-15, and the introduction is as shown in Table 4-14.

Figure 4-15 PSU/FAN LEDs of JBOF



Table 4-14 PSU/FAN LEDs of JBOF

No.	Name	Color	Status	Description
1	PSU status/alarm/ location LED	Green	On	The PSU works correctly.
		Amber	On	● The PSU has no input voltage, but the parallel redundant PSU works correctly. ● The PSU is faulty and is under maintenance, and the system is in shutdown status.
			4 Hz flashing	The PSU is being located.
		Off		No external power input.
2	FAN status/alarm/ location LED	Green	On	The FAN works correctly.
		Amber	On	The FAN is faulty.
		Green and amber 4 Hz flashing alternately		The FAN is being located.
		Off		The enclosure is powered off or the system is in shutdown status.

5 Connection

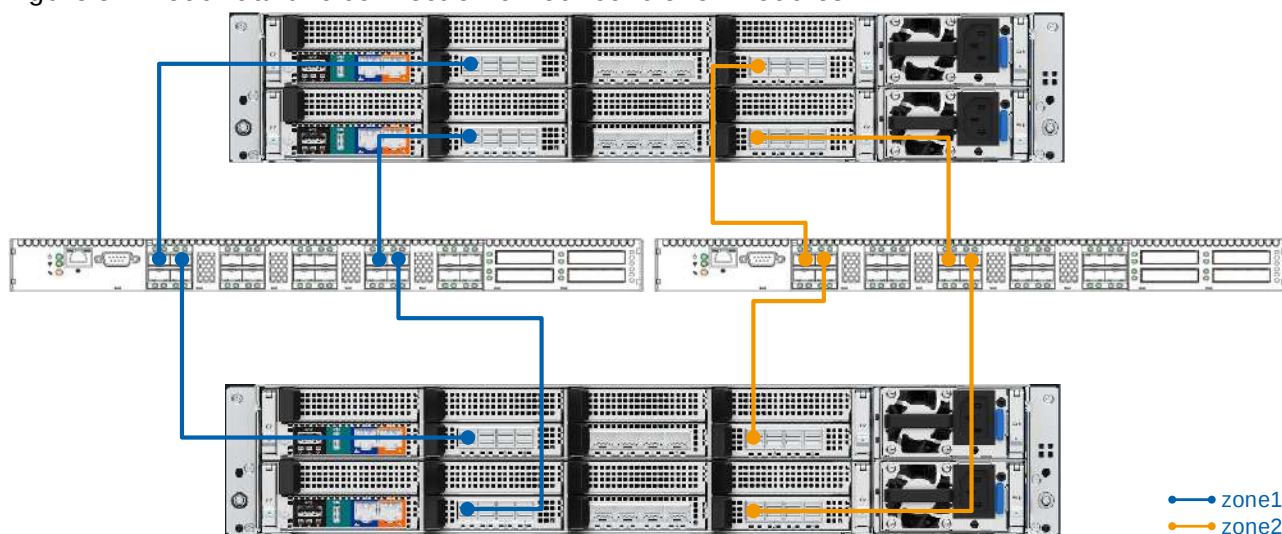
5.1 Multi-controller connection

KS3000G7 can provide storage services in multi-controller mode, and controller modules can be connected through FC or RoCE. In a cluster, the two connection methods cannot be used at the same time, that is, FC links and RoCE links cannot be used for cluster connection at the same time.

FC connection

Controller modules are connected through FC cards and FC switches. Take redundant connection of four controller modules as an example, as shown in Figure 5-1.

Figure 5-1 Redundant FC connection of four controller modules



RoCE connection

Controller modules can be connected through the two methods that follow.

- Connected directly through RoCE cards.
- Connected through RoCE cards and Ethernet switches.

Take redundant connection of four controller modules as an example, as shown in Figure 5-2 and Figure 5-3.

Figure 5-2 Redundant RoCE direct-connection of four controller modules

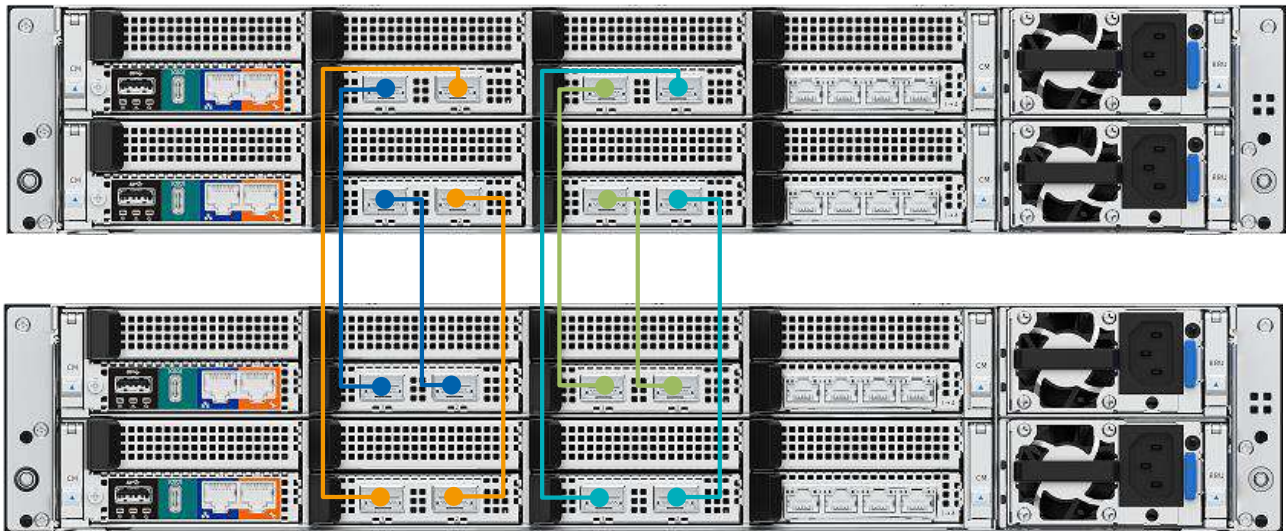
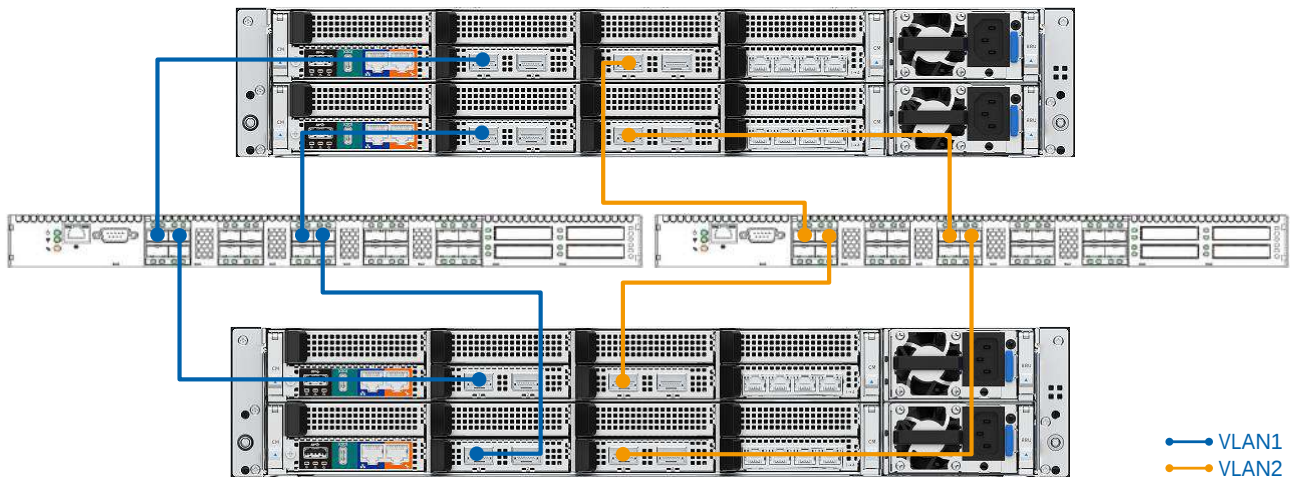


Figure 5-3 Redundant RoCE inter-connection of four controller modules



5.2 Connection between control enclosures and disk enclosures

The control enclosure of KS2000G7 can connect JBODs, and the control enclosure of KS3000G7 can connect JBODs and JBODs.

- A SAS card is necessary to connect JBODs.
- An NVMe extend card is necessary to connect JBODs.

5.2.1 Connection between control enclosures and JBODs

It is necessary to obey the rules that follow to connect JBODs to a control enclosure.

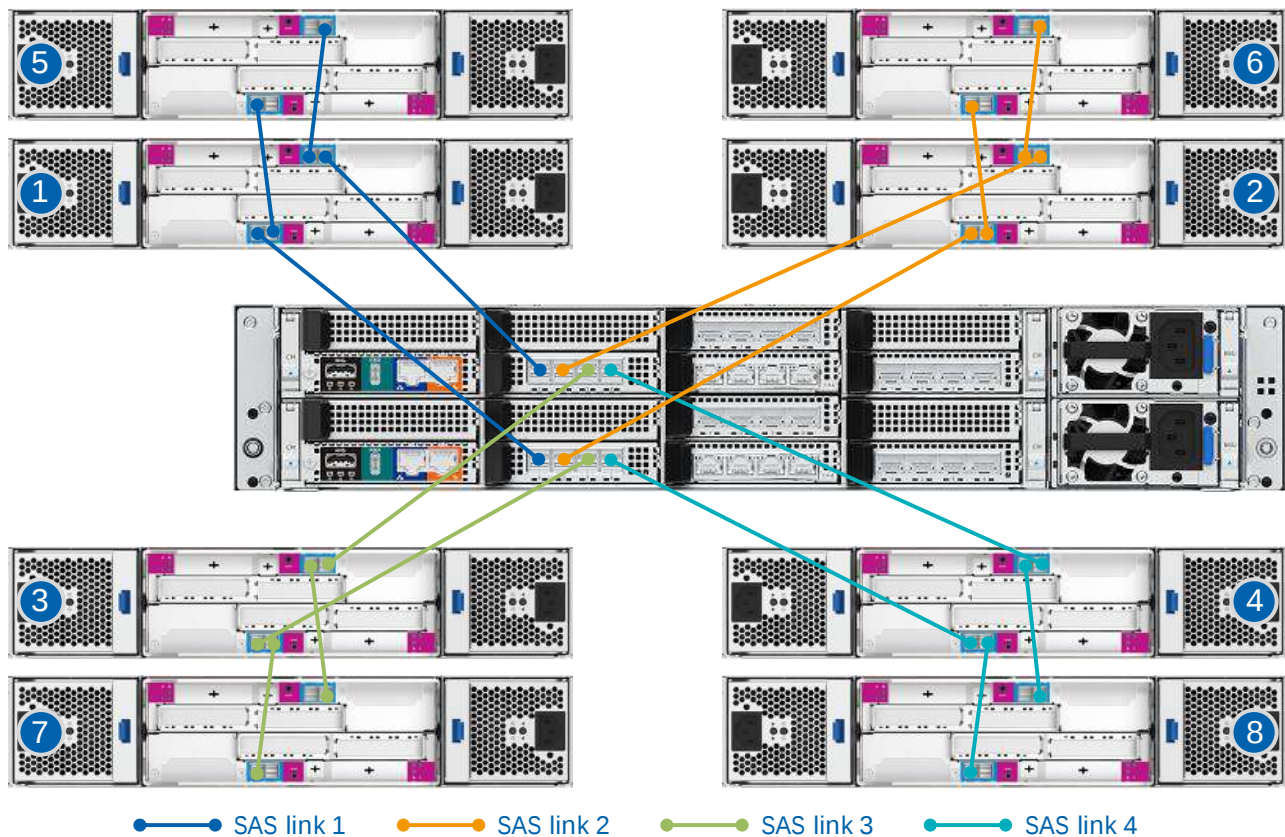
- Parallel connection takes precedence over series connection. JBODs must be connected to the control enclosure in parallel first and then in series, and make sure that the difference in the number of JBODs connected to each SAS link be less than or equal to one.
- SAS ports of control enclosures must be symmetrically used, that is, the port used of each controller

module must be the same. Each SAS port of the controller module corresponds to a SAS link.

- SAS ports of each controller module of a control enclosure should be connected to SAS port 1 (in) of each I/O module of a JBOD.
- SAS port 2 (out) of each I/O module of a JBOD should be connected to SAS port 1 (in) of each I/O module of a lower-level JBOD.

The connection examples of are as shown in Figure 5-4. The serial number in the figure shows the order in which JBODs are connected. When the actual number is less than the number shown in the figure, only connect the necessary JBODs; when the actual number is more than the number shown in the figure, continue to connect JBODs referring to the above rules.

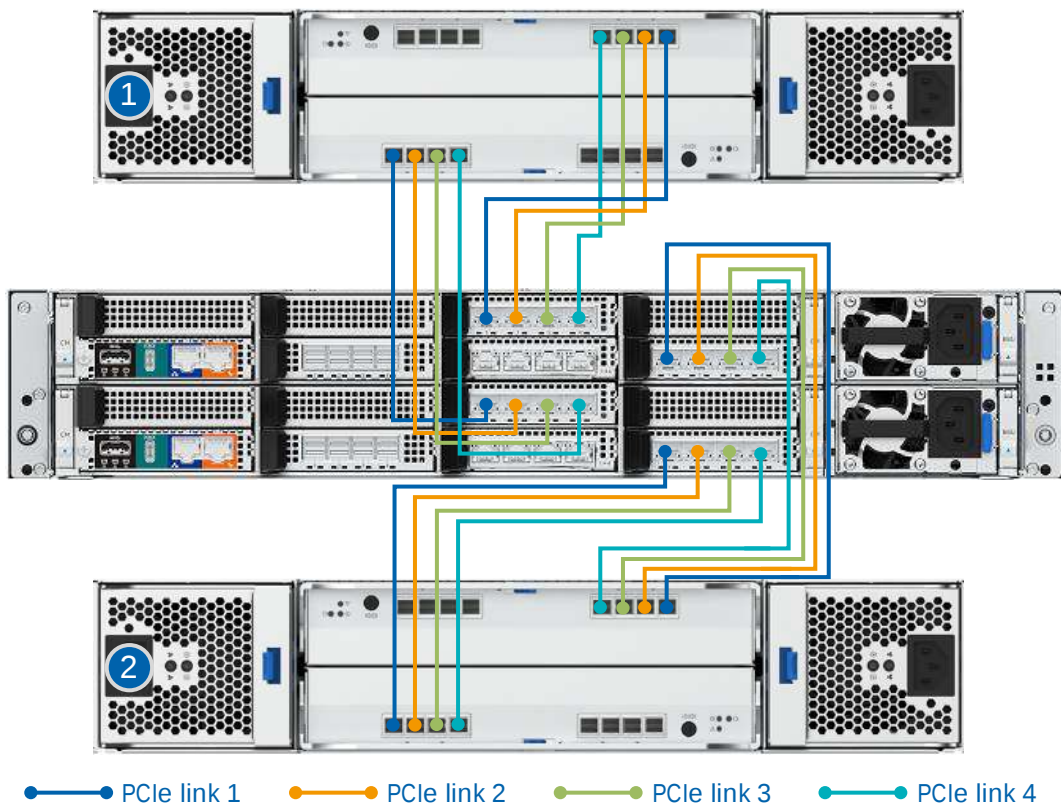
Figure 5-4 Connection with 8 JBODs (one 4-port SAS cards for each controller module)



5.2.2 Connection between control enclosures and JBODs

The PCIe port of the controller module has a one-to-one correspondence with the PCIe port of JBODs, that is, 1-1, 2-2, 3-3, and 4-4. The connection between the control enclosure and JBODs is shown in Figure 5-5.

Figure 5-5 Connection with JBOFs



6

FRUs

FRU name	Control enclosure (KS2000G7)	Control enclosure (KS3000G7)	2U disk enclosure	3U disk enclosure
Controller module	√	√	-	-
DIMM	√	√	-	-
I/O module	-	-	√	√
PSU module	√	√	√	√
BBU module	√	√	-	-
BBU control module	√	√		
FAN module	√	√	√	√
Disk module	√	√	√	√
Disk backplane	√	√	√	√
Disk drawer	-	-	-	√
UI board	√	√	-	-
FC card	√	√	-	-
Ethernet card	√	√	-	-
RoCE card	√	√	-	-
SAS card	√	√	-	-
NVMe extend card	-	√	-	-
QAT card	-	√	-	-
UI cable	√	√	-	-
Optical fiber	√	√	-	-

SAS cable	√	√	√	√
Power cable	√	√	√	√

Note:

- √ shows that the enclosure involves this FRU.
- - shows that the enclosure does not involve this FRU.
- For 2U JBOD, the FAN module is in the PSU module. When any module fails, the PSU module and the FAN module need to be replaced as a whole FRU. For other enclosures, the FAN module can be replaced separately.



Caution

Use the storage tool provided by the manufacturer to store the disks, and do not stack or bump the disks.

7

Technical specifications

7.1 Hardware features

7.1.1 All-flash storage platform

Name	KS3000G7
Control enclosure	2U25 enclosure
Disk enclosure	2U25 JBOD, 2U25 JBOD, and 3U48 JBOD
Controller module	2~4, Active-Active working mode
Disk	NVMe SSD and SAS SSD
Maximum number of disk per I/O group	601
CPU for each controller module	1 with 4 cores
Cache for each controller module	64 GB, 128 GB, and 256 GB
Maximum cache	1024 GB
DRAM Cache protection	BBU power loss protection
Management ports for each enclosure	● 1 technician port (T port) ● 1 management port (U port) ● 1 Type-C serial port ● 1 USB port
Maximum number of back-end ports for each enclosure	● 12 (extended by three 4-port SAS cards) ● 8 (extended by two 4-port NVMe extend cards)
Front-end host protocols	FC-NVMe, RoCE-NVMe, FC-SCSI, and iSCSI
Front-end host ports	● FC: 16 Gb, 32 Gb, and 64 Gb ● Ethernet: 1 Gb, 10 Gb, 25 Gb, and 100 Gb
Maximum number of front-end host ports for each enclosure	16
Hot-swappable modules	Controller module, disk module, PSU, BBU, FAN, FC card, SAS card, and RoCE card

Redundant modules	Controller module: 1+1 redundancy PSU: 1+1 redundancy FAN: N+1 redundancy
-------------------	---

7.1.2 Hybrid-flash storage platform

Name	KS2000G7	KS3000G7
Control enclosure	2U12 enclosure and 2U25 enclosure	
Disk enclosure	2U12 JBOD, 2U25 JBOD, and 3U48 JBOD	2U25 JBOF, 2U12 JBOD, 2U25 JBOD, and 3U48 JBOD
Controller module	2, Active-Active working mode	2~4, Active-Active working mode
Disk	SAS SSD, SAS HDD, and NL-SAS HDD	NVMe SSD, SAS SSD, SAS HDD, and NL-SAS HDD
Maximum number of disk per I/O group	409	601
CPU for each controller module	1 with 2 cores	1 with 4 cores
Cache for each controller module	32 GB, 64 GB, 128 GB, and 256 GB	64 GB, 128 GB, and 256 GB
Maximum cache	512 GB	1024 GB
DRAM Cache protection	BBU power loss protection	
Management ports for each enclosure	● 1 technician port (T port) ● 1 management port (U port) ● 1 Type-C serial port ● 1 USB port	
Maximum number of back-end ports for each enclosure	12 (extended by three 4-port SAS cards)	● 12 (extended by three 4-port SAS cards) ● 8 (extended by two 4-port NVMe extend cards)
Front-end host protocols	FC-NVMe, RoCE-NVMe, FC-SCSI, and iSCSI	
Front-end host ports	● FC: 16 Gb, 32 Gb, and 64 Gb ● Ethernet: 1 Gb, 10 Gb, 25 Gb, and 100 Gb	
Maximum number of front-end host ports for each enclosure	16	
Hot-swappable modules	Controller module, disk module, PSU, BBU, FAN, FC card, SAS card, and RoCE card	

Redundant modules	Controller module: 1+1 redundancy PSU: 1+1 redundancy FAN: N+1 redundancy
-------------------	---

7.2 Software features

Name	KS2000G7	KS3000G7
RAID levels	InRAID 5/6	InRAID 5/6
Maximum number of hosts per I/O group	512	1024
Maximum number of volumes	2048	4096
Maximum capacity of volumes	512 TB	
Maximum number of snapshots	2048	4096
Host OS	Windows Server, RHEL, SLES, CentOS, Kylin, UOS, etc.	
Features for resource efficiency	InThin InRAID InTune InVirtualization	InThin InRAID InCompression InDedupe InTune InVirtualization
Features for data protection	InSnapShot InClone InBackup InRemoteCopy InErase	InSnapShot InClone InBackup InRemoteCopy InMetro InEncryption InErase
Features for critical business assurance	InQoS InAutoPartition	
Features for virtualization	● Cross-vender storage heterogeneous virtualization for unified management. ● RAID virtualization with block-level virtualization technology.	

- Mainstream cloudification technologies such as container and OpenStack.

7.3 Physical features

Name	KS2000G7&KS3000G7
Dimensions (W*D*H mm/in., D is the length of the enclosure into the rack)	2U12 control enclosure: 447.00 × 767.15 × 87.00 (17.60 × 30.20 × 3.43) 2U25 control enclosure: 447.00 × 741.30 × 87.00 (17.60 × 29.19 × 3.43) 2U JBOD and JBOF: 446.00 × 619.00 × 87.80 (17.56 × 24.37 × 3.46) 3U JBOD: 447.20 × 920.00 × 132.00 (17.61 × 36.22 × 5.20)
Weight (with no disk, kg/lbs)	2U12 control enclosure: 31.0/68.3 2U25 control enclosure: 29.2/64.4 2U12 JBOD: 28.8/63.5 2U25 JBOD: 23.8/52.5 3U48 JBOD: 44.0/97.0 2U25 JBOF: 23.0/50.7
Maximum power of PSU	Control enclosure: 800 W 2U JBOD and JBOF: 850 W 3U JBOD: 1100 W/1200 W
Input nominal voltage	● AC: 220 V (180 V to 264 V) AC, supports 110 V dual-live-wire input (2W+PE), 10 A, 50/60 Hz, IEC60320-C14 ● DC • 800 W, 850 W, and 1200 W PSU: 240 V (180 V to 320 V) DC, IEC60320-C14 • 1100 W PSU: 240 V (240 V to 320 V) DC, IEC60320-C14
Power consumption (maximum/typical/minimum)	● KS2000G7: 610 W / 480 W / 400 W ● KS3000G7: 618 W / 520 W / 440 W
Operating temperature	Altitude of 0 m to 900 m (0 ft to 2,953 ft): 5°C to 35°C (41°F to 95°F) Altitude of 900 m to 3,048 m (2,953 ft to 10,000 ft): The temperature decreases by 1°C (33.8°F) for each 300 m (984 ft).
Storage temperature	-40°C to 70°C (-40°F to 158°F) (with no BBU and HDD), 0°C to 70°C (32°F to 158°F) recommended
Operating humidity	10% RH to 90% RH (no condensation)
Storage humidity	10% RH to 93% RH (no condensation)

8

Acronyms

B	
BBU	Battery Backup Unit
C	
CMC	Chassis Management Controller
CPU	Central Processing Unit
F	
FC	Fibre Channel
FRU	Field Replaceable Units
H	
HDD	Hard Disk Drive
I	
iSCSI	Internet Small Computer System Interface
O	
OLAP	Online Analytical Processing
OLTP	Online Transaction Processing
P	
PCIe	Peripheral Component Interconnect Express
PSU	Power Supply Unit
R	
RAID	Redundant Arrays of Independent Disks
RoCE	RDMA over Converged Ethernet
RPO	Recovery Point Objective
RTO	Recovery Time Objective

S	
SAN	Storage Area Network
SAS	Serial Attached SCSI
SCSI	Small Computer System Interface
SSD	Solid State Drive