Quantum

QXS Site Planning Guide

QXS-3/4/6 Series Hybrid Storage

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About This Guide

This guide provides site planning information for the following QXS Hybrid systems:

- QXS-312, QXS-324
- QXS-412, QXS-424, QXS-448, QXS-456
- QXS-648, QXS-656

Intended audience

This guide is intended for storage customers and technicians.

NOTE: This guide provides information for site planning at your storage location.

Prerequisites

Prerequisites for planning, installing, and using this product include knowledge of:

- Servers and computer networks
- Network administration
- Storage system installation and configuration
- Storage area network (SAN) management and direct attach storage (DAS)
- Converged Network Controllers (CNCs)
- Fibre Channel (FC) and Ethernet protocols

Related Documentation

Table 1 provides related documents for the QXS systems.

Table 1 Related Documentation

For Information About	See
Web links to download Quantum QX and QXS Storage guides listed below, but not shipped with the product	*QX and QXS Documentation Sheet**
Enhancements, known issues, and late-breaking information not included in product documentation	*QX or QXS Release Notes*
Product overview and overview of setup tasks	*QX and QXS Getting Started Guide*
Regulatory compliance and safety and disposal information	*QX and QXS Series Product Regulatory Compliance and Safety**
Using a 12- and 24-drive rackmount bracket kit to install a chassis into a rack	*QX/QXS 12- and 24-Drive Rackmount Bracket Kit Installation Guide*
Using a 48-drive rackmount bracket kit to install a chassis into a rack	*QXS 48-Drive Rackmount Bracket Kit Installation Guide*
Using a 56-drive rackmount bracket kit to install a chassis into a rack	*QXS 56-Drive Rackmount Bracket Kit Installation Guide*
Installing the front bezel on a QX and QXS system	*QX and QXS Bezel Installation Guide*
Product hardware setup and related troubleshooting	*QX and QXS Setup Guide*
Using the CLI to configure and manage the product	*QX and QXS CLI Reference Guide*
Identifying and installing or replacing CRUs	*QX & QXS CRU Installation and Replacement Guide*
Events that the QX and QXS Series may report, and recommended actions to take in response to those events	*QX and QXS Event Descriptions Reference Guide*
Managing a QXS system by using its primary web interface (V3), the Disk Management Utility	*QXS Disk Management Utility User Guide V3*
Managing a QX and QXS system by using its secondary web interface (V2), the Disk Management Utility	*QX and QXS Disk Management Utility User Guide V2*
* Printed document included with product	

Document conventions and symbols

Table 2 provides document conventions and symbols.

Table 2 Document conventions

Convention	Element
Blue text	Cross-reference links and e-mail addresses
Blue, underlined text	Web site addresses
Bold text	• Key names • Text typed into a GUI element, such as into a box • GUI elements that are clicked or selected, such as menu and list items, buttons, and check boxes
Italic text	Text emphasis
`Monospace text`	• File and directory names • System output • Code • Text typed at the command-line
`Monospace, italic text`	• Code variables • Command-line variables
`Monospace, bold text`	Emphasis of file and directory names, system output, code, and text typed at the command-line

WARNING! Indicates that failure to follow directions could result in bodily injury.

△ **CAUTION:** Indicates that failure to follow directions could result in damage to equipment or data.

IMPORTANT: Provides clarifying information or specific instructions.

NOTE: Provides additional information.

TIP: Provides helpful hints and shortcuts.

Chapter 1

QXS and Cabinet Information

This chapter provides the following information:

- QXS-3/4/6 General Chassis Information
- General Cabinet Information
- QXS-3/4/6 Series Supported Configurations

QXS-3/4/6 General Chassis Information

This section provides general information for the following chassis:

- QXS-312, QXS-324
- QXS-412, QXS-424, QXS-448, QXS-456
- QXS-648, QXS-656

Chassis with Bezels Installed

The front of the QXS-312, QXS-324, QXS-412, QXS-424, QXS-448, and QXS-648 are all 2U high (3.5 inches/88.9mm) and use the same bezel (2U). The QXS-456 and QXS-656 are 4U high (7 inches/177.8mm) and also use the same bezel (4U). Refer to Figure 1 for images of the chassis with bezels installed.

Figure 1 System Front View (with Bezel)

1 QXS-312, QXS-324, QXS-412, QXS-424, QXS-448, and QXS-648 Chassis (2U high)

2 QXS-456 and QXS-656 Chassis (4U high)

Chassis with Bezels Removed

Figure 2 provides images of the front of the QXS-312, QXS-324, QXS-412, QXS-424, QXS-448, QXS-648, QXS-456, and QXS-656 with the bezels removed.

Figure 2 Chassis Front View (Bezel Removed)

1 QXS-312 or QXS-412 Chassis
- 2U high
- 12 drives installed

2 QXS-324 or QXS-424 Chassis
- 2U high
- 24 drives installed

3 QXS-448 or QXS-648 Chassis
- 2U high
- 3 drawers
- 16 drives per drawer
- 48 drives installed

4 QXS-456 or QXS-656 Chassis
- 4U high
- 2 drawers
- 28 drives per drawer
- 56 drives installed

General Cabinet Information

This section includes the following information:

- Standard Cabinet
- Cabinet Height
- Cabinet Vertical Support Rails
- Cabinet Configurations with Chassis and Drives

Standard Cabinet

Figure 3 provides an image of a standard cabinet which includes locations of the following:

- Front door
- Rear door
- Vertical support rails
- Air vent

Figure 3 Standard Cabinet

1	Front door	**2**	Rear door
3	Vertical support rails	**4**	Air vent

Standard features of the cabinet include:

- Front and rear door that can be closed and locked
- Vertical rails, with mounting holes, to allow installation of storage
- 40U high cabinet and 19 inches/48.3cm wide
- Four rolling coasters/wheels
- Four leveling pads (bottom of cabinet)
- A stabilizing foot (after installation of permanent location)
- Access for storage cabling
- AC or DC power source (2 each)

WARNING! Risk of bodily harm and/or injury. Comply with the following:

- Always populate the cabinet from bottom to top to prevent tipping.
- If a cabinet must be moved, use adequate personnel and/or a forklift to relocate the cabinet.
  - Push the cabinet from the front when moving.
  - A fully populated cabinet can weigh almost 3000 pounds (1360.777kg).
  - Cabinets are hard to move, even on a flat surface/floor.
- If moving a cabinet on an incline, always remove the top-half storage arrays/devices to prevent from tipping.

NOTE: Install the applicable storage rack on the cabinet support rails, then install the chassis/expansion storage unit, and then populate the unit with applicable drives (HDDs or SSDs).

Ensure to place the cabinet in a location that allows sufficient space to maintain and service (remove and replace parts) the applicable units within the cabinet.

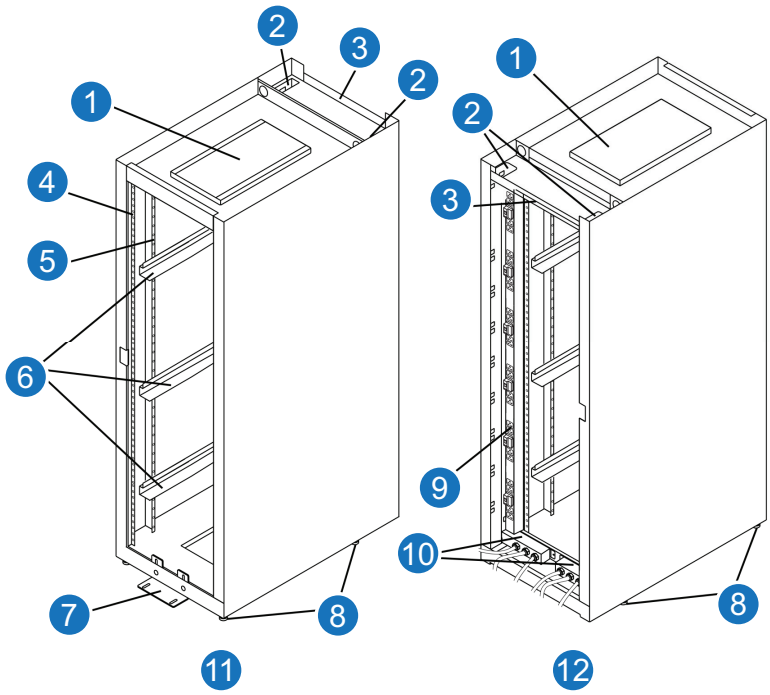
Cabinet Height

Cabinets heights might vary. A common cabinet is 40U high.

- A height of 1U equals 1.75-inches (44.45-mm).
- So, a 40U cabinet will have 70 inches (1778 mm/1.778 km) of storage space.

Figure 4 provides a standard cabinet identifying components (callouts) in the front and rear of the unit. Callout descriptions are provided below the illustration.

Figure 4 Front and Rear View of Cabinet



1 Ventilation cover
2 Cable access opening
3 Rear plate
4 Support rails
5 Vertical support rails
6 Mounting rails
7 Stability foot
8 Leveling feet (variable adjust)
9 Power distribution
10 AC power entry boxes
11 Front of cabinet
12 Rear of cabinet

Cabinet Vertical Support Rails

The cabinet vertical support rails can contain square holes, round holes, or pre-tapped holes. Refer to the following documents for rackmount installation information:

- *QX and QXS 12- and 24-Drive Rackmount Install Guide* (Doc number: 6-68390-01)
- *QXS 48-Drive Rackmount Install Guide* (Doc number: 6-68391-01)
- *QXS 56-Drive Rackmount Install Guide* (Doc number: 6-68392-01)

Cabinet Configurations with Chassis and Drives

Table 3 provides the maximum number of chassis and maximum number of drives that can be installed within a standard 40U cabinet configuration.

NOTE: Configurations depend on customer requirements. Refer to QXS-3/4/6 Series Supported Configurations on page 5 for RAID chassis and expansion chassis maximum combinations.

Table 3 Cabinet Configurations

Chassis Type	Maximum Chassis in Cabinet	Maximum Drives in Cabinet
QXS-312 or QXS-412 (2U, 12 drive)	20	240
QXS-324 or QXS-424 (2U, 24 drive)	20	480
QXS-448 or QXS-648 (2U, 48 drive)	20	960
QXS-456 or QXS-656 (4U, 56 drives)	10	560

QXS-3/4/6 Series Supported Configurations

Table 4 identifies the supported hybrid QXS supported configurations. Each system configuration (RAID chassis and expansion chassis) can only contain a specific number of chassis and drives.

Table 4 Hybrid QXS Supported Configurations

System	Chassis Type	RAID Chassis	Max Expansion Chassis	Max Total Drives
QXS-312	2U12	1	3	48
QXS-324	2U24	1	3	96
QXS-412	2U12	1	7	96
QXS-424	2U24	1	7	192
QXS-448	2U48	1	3	192
QXS-456	4U56 (4) & 2U12 (2)	1	5	248

System	Chassis Type	RAID Chassis	Max Expansion Chassis	Max Total Drives
QXS-648	2U48	1	3	192
QXS-656	4U56 (4) & 2U12 (2)	1	7	248
Note 1: Always consider the max drive number when mixing different chassis combinations.				
Note 2: It is impossible to identify all possible chassis combinations within the hybrid QXS supported configurations.				

CAUTION: Ensure that the cabinet weight (populated with chassis, drives, units) does not exceed the floor loading specifications.

You should record the total weight of your applicable cabinets (with contents). Use this information to check floor loading restrictions and/or elevator weight restrictions.

Figure 5 provides a standard cabinet fully populated with storage and servers (front of cabinet, with door closed).

Figure 5 Fully Populated Cabinet

Chapter 2

QXS-3 Series Specifications

This chapter provides the following information:

- QXS-312/324 RAID and Expansion Chassis
- QXS-312/324 RAID and Expansion Physical Requirements
- QXS-312/324 RAID and Expansion Rackmount Chassis Weights

QXS-312/324 RAID and Expansion Chassis

Table 5 identifies physical dimensions of the QXS-312/324 RAID and expansion chassis.

Table 5 QXS-312/324 RAID and Expansion Chassis Physical Dimensions

Chassis	Height	Width (chassis only)	Depth (excluding cables)	Maximum # Drives
QXS-312 RAID	2U (3.5 inches/ 8.89cm)	17.6 inches (44.7cm)	20.57 inches (52.25cm)	12 (LFF: 3.5 inch)
QXS-312 Expansion	2U (3.5 inches/ 8.89cm)	17.6 inches (44.7cm)	20.57 inches (52.25cm)	12 (LFF: 3.5 inch)
QXS-324 RAID	2U (3.5 inches/ 8.89cm)	17.6 inches (44.7cm)	20.46 inches (51.9cm)	24 (SFF: 2.5 inch)
QXS-324 Expansion	2U (3.5 inches/ 8.89cm)	17.6 inches (44.7cm)	20.46 inches (51.9cm)	24 (SFF: 2.5 inch)

Packaged Dimensions and Weight

Table 6 identifies the packaged dimensions and weight of the QXS-312/324 RAID and expansion chassis.

Table 6 QXS-312/324 RAID and Expansion Chassis Packaged Dimensions and Weight

Chassis	Height	Width	Depth	Weight
QXS-312 RAID (FC/iSCSI)	10.75 inches/ 27.31cm	25.875 inches 65.72cm	29 inches/73.66cm	60 lbs/27.22kg
QXS-312 RAID (SAS)	10.25 inches/ 26.04cm	25.75 inches/ 65.41cm	28.75 inches/ 73.03cm	70 lbs/31.75kg
QXS-312 Expansion	10.125 inches/ 25.72cm	29 inches/ 73.66cm	30 inches/ 76.2cm	50 lbs/22.68kg
QXS-324 RAID (FC/iSCSI)	10.5 inches/ 26.67cm	25.875 inches/ 65.72cm	28.75 inches/ 73.03cm	70 lbs/31.75kg
QXS-324 RAID (SAS)	10.25 inches/ 26.04cm	25.75 inches/ 65.41cm	28.75 inches/ 73.03cm	70 lbs/31.75kg
QXS-324 Expansion	10.5 inches/ 26.67cm	26.125 inches/ 66.36cm	29 inches/73.66cm	50 lbs/22.68kg

Bezel

The QXS 2U drive chassis includes a bezel sub-assembly that attaches to the front panel of the chassis. The bezel, comprised of a vented cover attached to an electro-magnetic interference (EMI) shield, is pre-assembled and packed within a box contained in the enclosure master shipping container.

Instructions for attaching/removing the bezel are provided in the *QXS Bezel Installation Guide*.

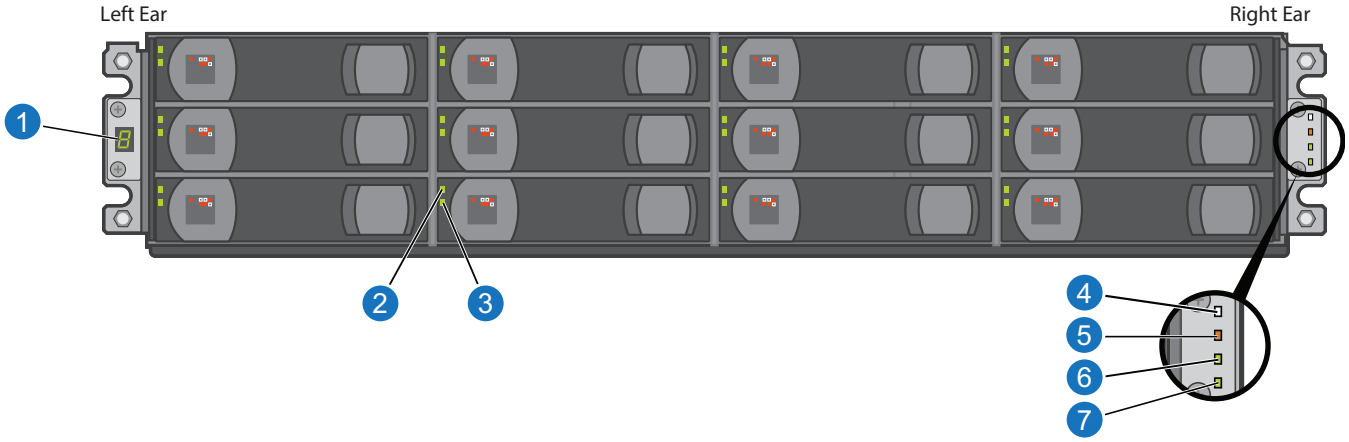
CAUTION: The bezel should be properly installed while the chassis is in operation to ensure adequate EMI protection for the drives.

---

12 Drive Front Panel Components

Figure 6 provides the 2U12 drive chassis (for the RAID or expansion chassis) with the bezel removed.

Figure 6 2U12 Drive Chassis (Bezel Removed)

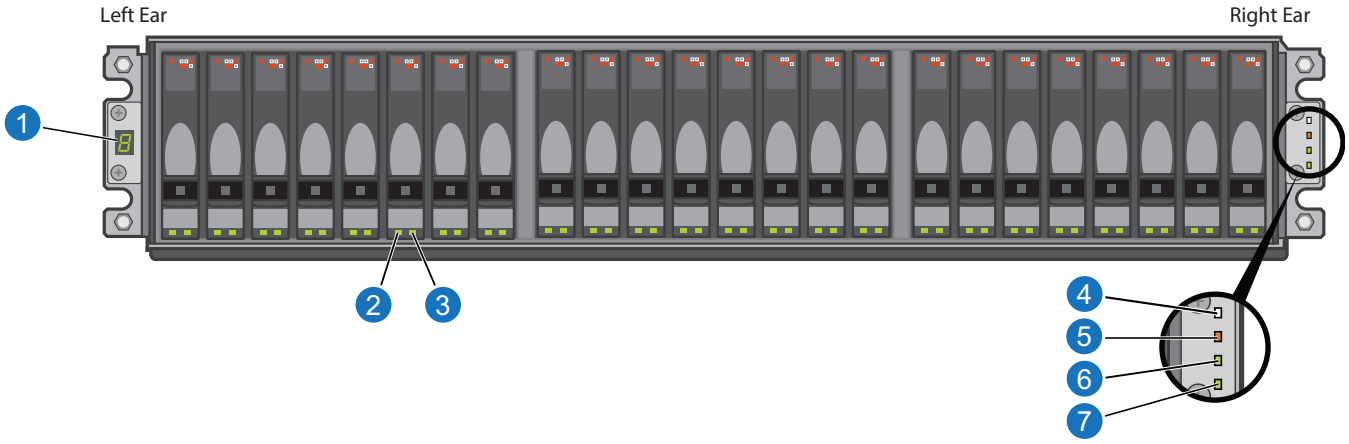


1 Chassis ID LED
2 Chassis status LED: Power/Activity
3 Drive status LED: Fault
4 Chassis status LED: Unit Locator
5 Chassis status LED: Fault/Service Required
6 Chassis status LED: CRU OK
7 Chassis status LED: Temperature Fault
Note: 3.5" drive blank not shown

24 Drive Front Panel Components

Figure 7 provides the 2U24 drive chassis (for the RAID or expansion chassis) with the bezel removed.

Figure 7 2U24 Drive Chassis (Bezel Removed)

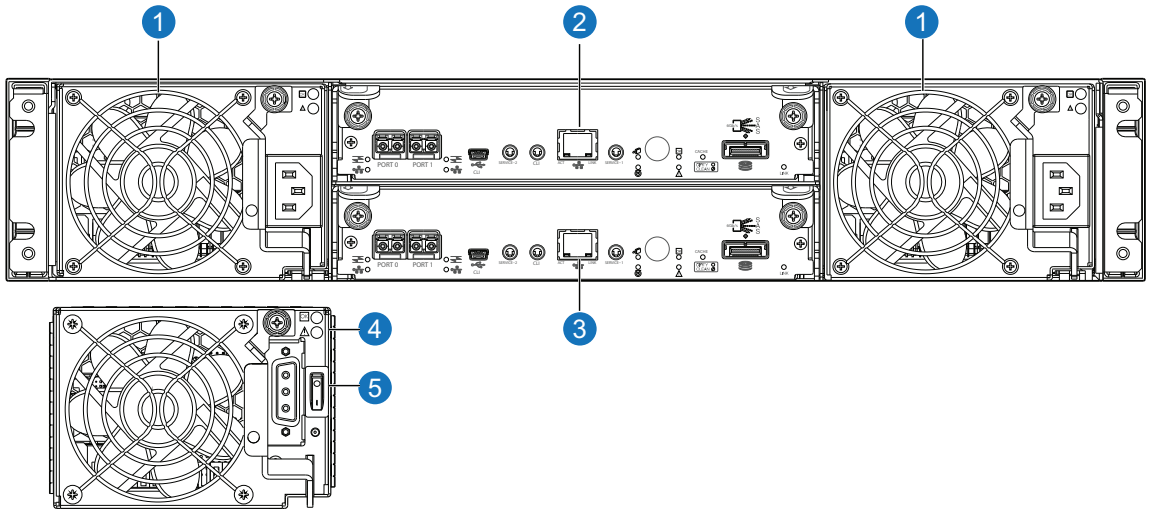


1 Chassis ID LED
2 Chassis status LED: Power/Activity
3 Drive status LED: Fault
4 Chassis status LED: Unit Locator
5 Chassis status LED: Fault/Service Required
6 Chassis status LED: CRU OK
7 Chassis status LED: Temperature Fault
Note: 2.5" drive blank not shown

12 and 24 Drive RAID Chassis: Rear Panel Components

Figure 8 provides a representative example of the 12 and 24 drive RAID chassis (rear panel components).

Figure 8 12 and 24 Drive RAID Chassis: Rear Panel Components



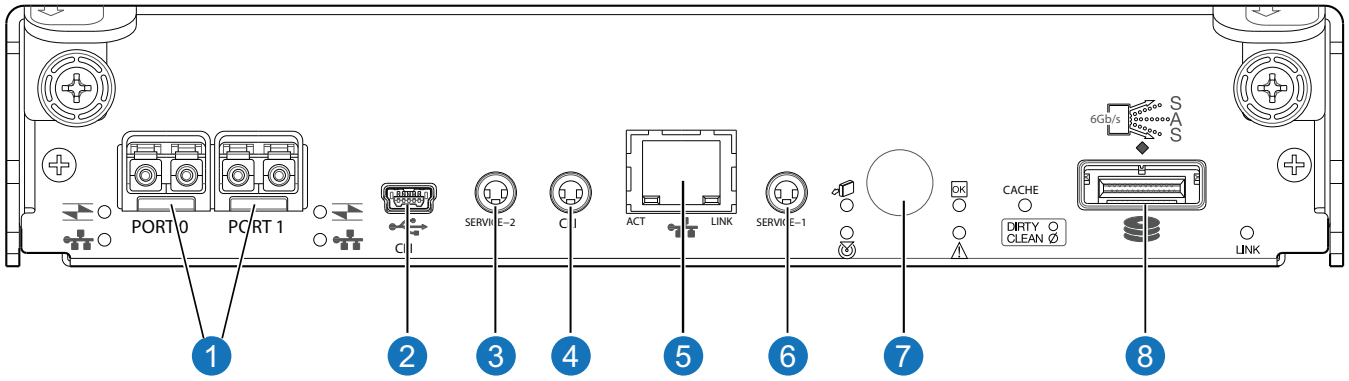
1 AC Power Supplies (qty. 2)

2 Controller I/O Module A

3 Controller I/O Module B

Figure 9 provides the controller I/O module (with ports identified).

Figure 9 Controller I/O Module



1 CNC FC or iSCSI SFP+ Ports (used for host connection or replication)

2 CLI Port (USB - Type B)

3 Service Port 2 (Service Personnel Use Only)

4 Reserved for future use

5 Network Port

6 Service Port 1 (Service Personnel Use Only)

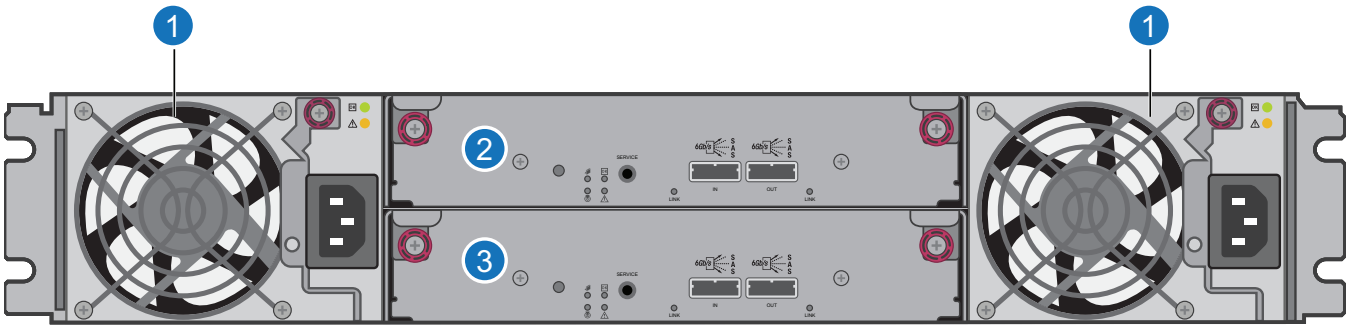
7 Disabled button (used by engineering only) (Sticker shown covering the opening)

8 mini-SAS expansion port

12 and 24 Drive Expansion Chassis: Rear Panel Components

Figure 10 provides the 12 and 24 drive expansion chassis (rear panel components).

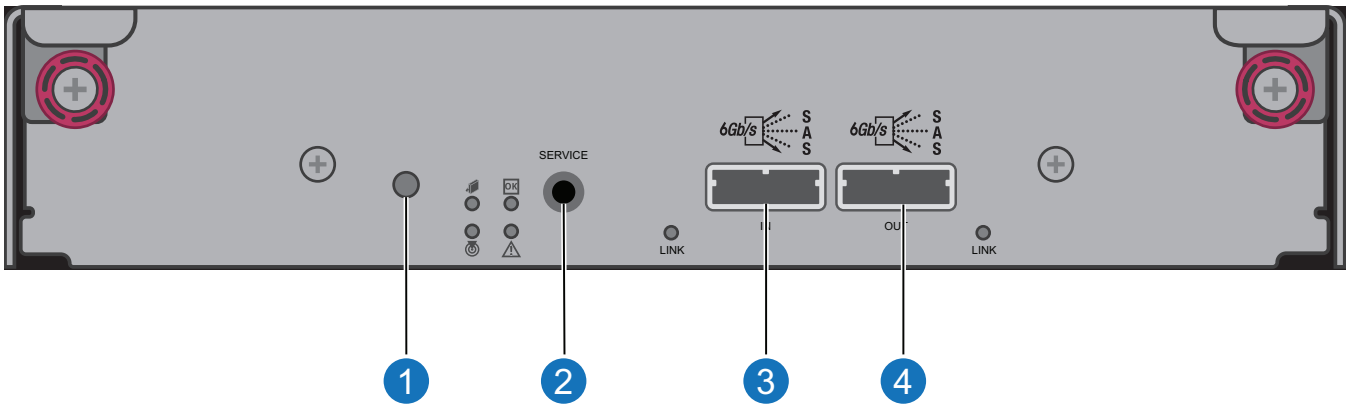
Figure 10 Expansion Chassis: Rear Panel Components



1 Power supplies (AC shown)
2 Expansion I/O Module A
3 Expansion I/O Module B

Figure 11 provides the 12 and 24 drive expansion I/O module (ports identified).

Figure 11 Expansion I/O Module (ports identified)



1 Disabled button (used by engineering/test only)
2 Service port (used by service personnel only)
3 mini-SAS In port
4 mini-SAS Out port

QXS-312/324 RAID and Expansion Physical Requirements

The floor space at the installation site must be strong enough to support the combined weight of the rack, RAID chassis, expansion chassis, and any additional equipment. The site also requires sufficient space for installation, operation, and servicing of the chassis, together with sufficient ventilation to allow a free flow of air to all chassis.

Composition

The RAID chassis and expansion chassis is comprised of sheet steel that is bonded together using rivets, welding, and other forced contact methods. The metal surfaces are free from non-conductive coatings and paint.

Chassis Designators

The RAID and expansion chassis designators are as follows:

- 2U12 chassis (LFF):
  - "2U12" denotes the 3.5" QXS-312 chassis (with controller or expansion modules)
  - The 2U12 chassis is equipped with a drive in each drive slot
- 2U24 chassis (SFF):
  - "2U24" denotes the 2.5" QXS-324 chassis (with controller or expansion modules)
  - The 2U24 chassis is equipped with a drive in each drive slot
- Two controller modules or two expansion modules per chassis
- Two power supplies per chassis

QXS-312/324 RAID and Expansion Rackmount Chassis Dimensions

Table 7 provides the RAID and expansion rackmount chassis dimensions.

Table 7 QXS-312/324 RAID and Expansion Rackmount Chassis Dimensions

Specifications	Rackmount
2U Height (y-axis):	8.9 cm (3.5 inches)
Width (x-axis): • Chassis-only • Chassis with ear caps or chassis bezel	 • 44.7 cm (17.6 inches) • 47.9 cm (18.9 inches)
12-Drive Chassis (LFF, 2U12): • Rear of chassis ear to controller latch • Front of chassis ear to rear of cable bend	 • 54.9 cm (21.6 inches) • 59.9 cm (23.6 inches)
24-Drive Chassis (SFF, 2U24): • Rear of chassis ear to controller latch • Front of chassis ear to rear of cable bend	 • 51.8 cm (20.4 inches) • 57.9 cm (22.8 inches)

QXS-312/324 RAID and Expansion Rackmount Chassis Weights

This section provides the following information:

- QXS-312/324 RAID Rackmount Chassis Weights
- QXS-312/324 Expansion Rackmount Chassis Weights

QXS-312/324 RAID Rackmount Chassis Weights

Table 8 provides the RAID rackmount chassis weights.

Table 8 QXS-312/324 RAID Rackmount Chassis Weights

Specifications	Rackmount
12-Drive Chassis (LFF, 2U12): • Chassis with FRUs (no drives)[1-3] • Chassis with FRUs (including drives)[1-4]	9.3 kg (20.6 lb) [chassis] • 18.1 kg (40.0 lb) • 27.7 kg (61.0 lb)
24-Drive Chassis (SFF, 2U24): • Chassis with FRUs (no drives)[1-3] • Chassis with FRUs (including drives)[1-4]	8.6 kg (19.0 lb) [chassis] • 17.4 kg (38.4 lb) • 23.4 kg (51.6 lb)

[1]Weights shown are nominal, and subject to variances.

[2]Rail kits add between 2.8 kg (6.2 lb) and 3.4 kg (7.4 lb) to the aggregate chassis weight.

[3]Weights may vary due to different power supplies, IOMs, and differing calibrations between scales.

[4]Weights may vary due to actual number and type of drives (SAS SSD, enterprise SAS, or midline SAS) and air management modules installed.

QXS-312/324 Expansion Rackmount Chassis Weights

Table 9 provides the expansion rackmount chassis weights.

Table 9 QXS-312/324 Expansion Rackmount Chassis Weights

Specifications	Rackmount
12-Drive Chassis (LFF, 2U12): • Chassis with FRUs (no drives)[1-3] • Chassis with FRUs (including drives)[1-4]	8.6 kg (19.0 lb) [chassis] • 16.2 kg (35.8 lb) • 22.2 kg (49.0 lb)
24-Drive Chassis (SFF, 2U24): • Chassis with FRUs (no drives)[1-3] • Chassis with FRUs (including drives)[1-4]	8.6 kg (19.0 lb) [chassis] • 16.1 kg (35.6 lb) • 25.6 kg (56.6 lb)

[1]Weights shown are nominal, and subject to variances.

[2]Rail kits add between 2.8 kg (6.2 lb) and 3.4 kg (7.4 lb) to the aggregate chassis weight.

[3]Weights may vary due to different power supplies, IOMs, and differing calibrations between scales.

[4]Weights may vary due to actual number and type of drives (SAS SSD, enterprise SAS, or midline SAS) and air management modules installed.

Chapter 3

QXS-4 Series Specifications

This chapter provides the following information:

- QXS-412/424/448 RAID and Expansion Chassis
- QXS-456 RAID and Expansion Chassis
- QXS-4 Series RAID and Expansion Physical Requirements
- QXS-4 Series RAID and Expansion Rackmount Chassis Weights

QXS-412/424/448 RAID and Expansion Chassis

Table 10 identifies physical dimensions of the QXS-412/424/448 RAID and expansion chassis.

Table 10 QXS-412/424/448 RAID and Expansion Chassis Physical Dimensions

Chassis	Height	Width (chassis only)	Depth (excluding cables)	Maximum # Drives
QXS-412 RAID	2U (3.5 inches/ 8.89cm)	17.6 inches (44.7cm)	20.57 inches (52.25cm)	12 (LFF: 3.5 inch)
QXS-412 Expansion	2U (3.5 inches/ 8.89cm)	17.6 inches (44.7cm)	20.57 inches (52.25cm)	12 (LFF: 3.5 inch)
QXS-424 RAID	2U (3.5 inches/ 8.89cm)	17.6 inches (44.7cm)	20.46 inches (51.9cm)	24 (SFF: 2.5 inch)
QXS-424 Expansion	2U (3.5 inches/ 8.89cm)	17.6 inches (44.7cm)	20.46 inches (51.9cm)	24 (SFF: 2.5 inch)
QXS-448 RAID	2U (3.5 inches/ 8.89cm)	17.6 inches (44.7cm)	30.6 inches (77.724cm)	48 (SFF: 2.5 inch)
QXS-448 Expansion	2U (3.5 inches/ 8.89cm)	17.6 inches (44.7cm)	30.6 inches (77.724cm)	48 (SFF: 2.5 inch)

Packaged Dimensions and Weight

Table 11 identifies the packaged dimensions and weight of the QXS-412/424/448 RAID and expansion chassis.

Table 11 QXS-412/424/448 RAID and Expansion Chassis Packaged Dimensions and Weight

Chassis	Height	Width	Depth	Weight
QXS-412 RAID (FC/iSCSI)	10.875 inches /27.62cm	26 inches/66.04cm	29.25 inches/ 74.30cm	70 lbs/31.75kg
QXS-412 RAID (SAS)	10.875 inches/ 27.62cm	26 inches/66.04cm	29.25 inches/ 74.30cm	70 lbs/31.75kg
QXS-412 Expansion	10.125 inches/ 25.72cm	29 inches/73.66cm	30 inches/76.20cm	50 lbs/22.68kg
QXS-424 RAID (FC/iSCSI)	10.5 inches/ 26.67cm	25.875 inches/ 65.72cm	29 inches/73.66cm	60 lbs/27.22kg
QXS-424 RAID (SAS)	10.5 inches/ 26.67cm	25.875 inches/ 65.72cm	29 inches/73.66cm	60 lbs/27.22kg
QXS-424 Expansion	10.5 inches/ 26.67cm	26.125 inches/ 66.36cm	30 inches/76.20cm	50 lbs/22.68kg
QXS-448 RAID (FC/iSCSI)	9.75 inches/ 24.77cm	24 inches/60.96cm	37.875 inches/ 96.20cm	110 lbs/49.90kg
QXS-448 RAID (SAS)	10.125 inches/ 25.72cm	23.75 inches/ 60.33cm	37.25 inches/ 94.62cm	90 lbs/40.82kg
QXS-448 Expansion	9.875 inches/ 25.08cm	23.875 inches/ 60.64cm	37.75 inches/95.89cm	80 lbs/36.29kg

Bezel

The QXS 2U drive chassis includes a bezel sub-assembly that attaches to the front panel of the chassis. The bezel, comprised of a vented cover attached to an electro-magnetic interference (EMI) shield, is pre-assembled and packed within a box contained in the enclosure master shipping container.

Instructions for attaching/removing the bezel are provided in the *QXS Bezel Installation Guide*.

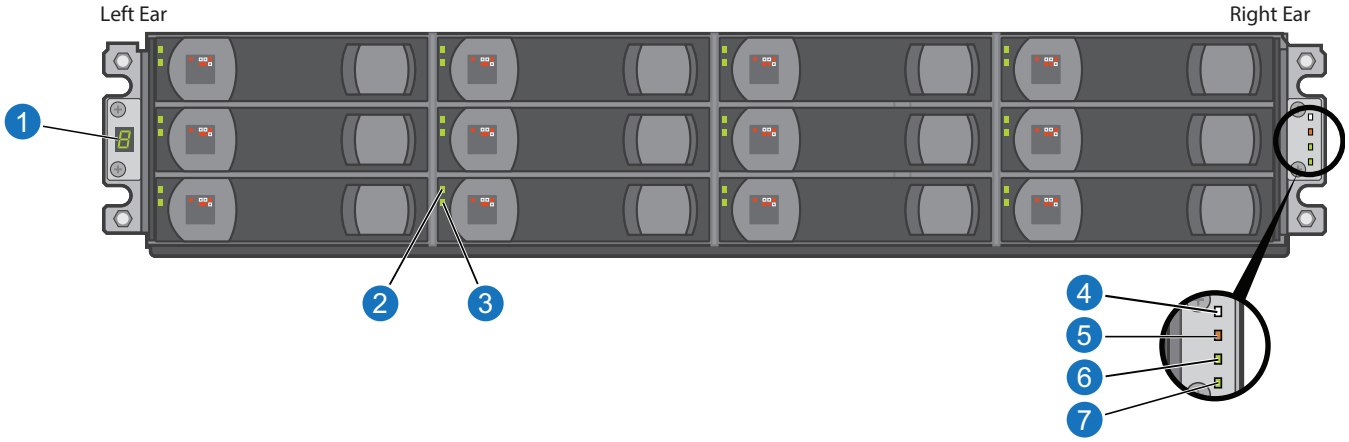
CAUTION: The bezel should be properly installed while the chassis is in operation to ensure adequate EMI protection for the drives.

---

12 Drive Front Panel Components

Figure 12 provides the 2U12 drive chassis (for the RAID or expansion chassis) with the bezel removed.

Figure 12 2U12 Drive Chassis (Bezel Removed)

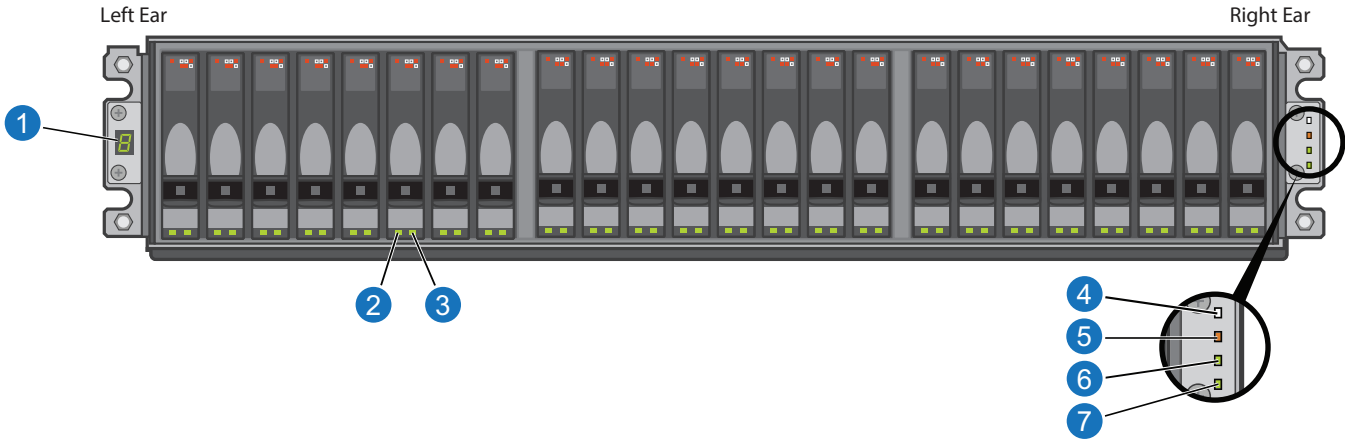


1 Chassis ID LED
2 Chassis status LED: Power/Activity
3 Drive status LED: Fault
4 Chassis status LED: Unit Locator
5 Chassis status LED: Fault/Service Required
6 Chassis status LED: CRU OK
7 Chassis status LED: Temperature Fault
Note: 3.5" drive blank not shown

24 Drive Front Panel Components

Figure 13 provides the 2U24 drive chassis (for the RAID or expansion chassis) with the bezel removed.

Figure 13 2U24 Drive Chassis (Bezel Removed)

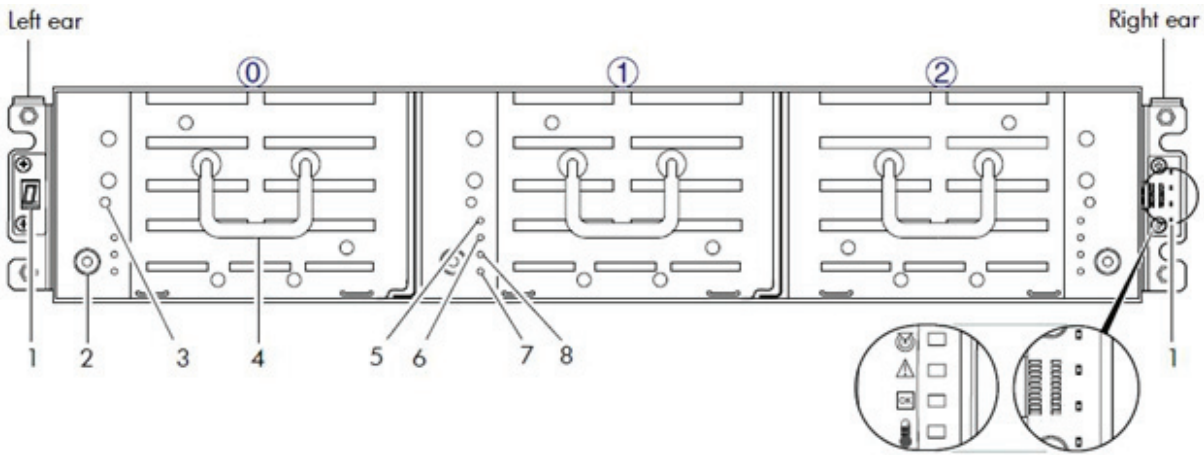


1 Chassis ID LED
2 Chassis status LED: Power/Activity
3 Drive status LED: Fault
4 Chassis status LED: Unit Locator
5 Chassis status LED: Fault/Service Required
6 Chassis status LED: CRU OK
7 Chassis status LED: Temperature Fault
Note: 2.5" drive blank not shown

48 Drive Front Panel Components

Figure 14 provides the 2U48 drive chassis (for the RAID or expansion chassis) with the bezel removed.

Figure 14 2U48 Drive Chassis (Bezel Removed)

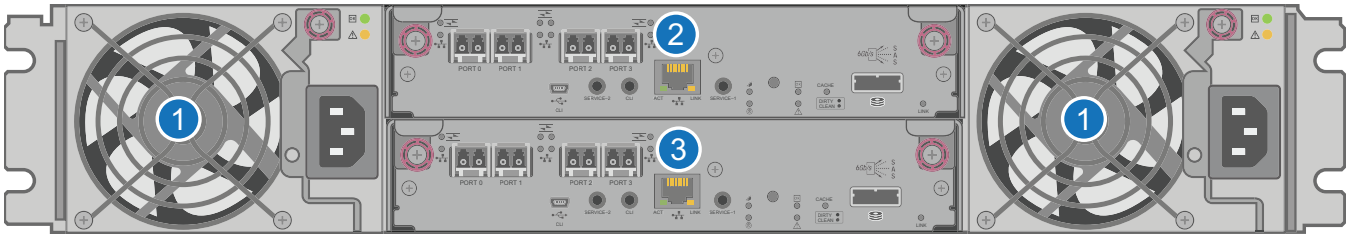


1 Chassis ID LED
2 Thumbscrew (for securing or accessing drawers)
3 Disabled Button (used by engineering only)
4 Drawer Handle (shown in stowed position)
5 Drawer Status LED: FRU OK
6 Drawer Status LED: Fault/Service Required
7 Drawer Status LED: OK to Remove
8 Drawer Status LED: Unit Locator

12, 24, and 48 Drive RAID Chassis: Rear Panel Components

Figure 15 provides a representative example of the 12, 24, and 48 drive RAID chassis (rear panel components).

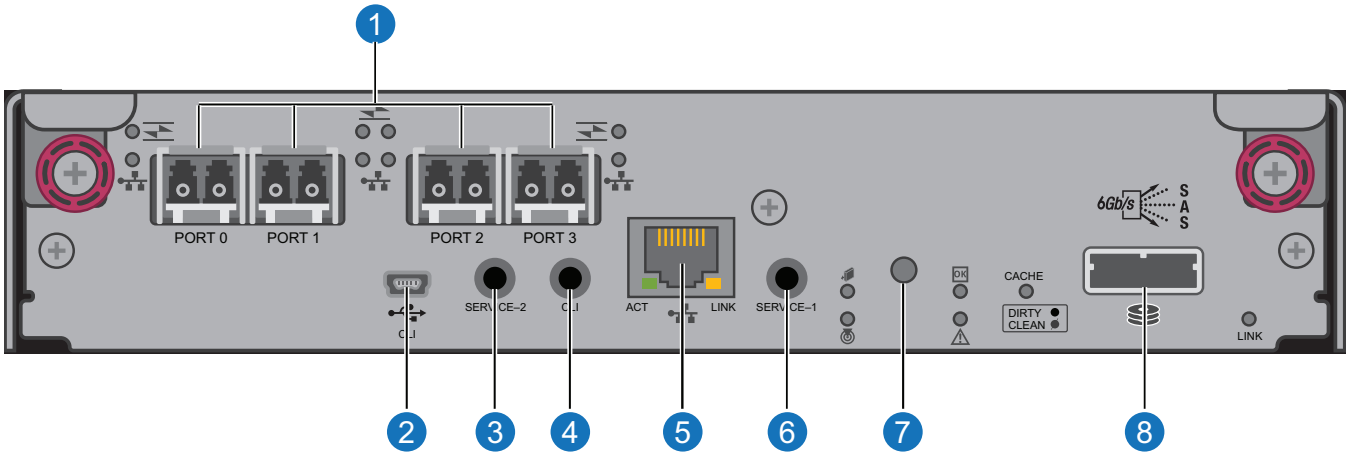
Figure 15 12, 24, and 48 Drive RAID Chassis: Rear Panel Components



1 AC Power Supplies (qty. 2)
2 Controller I/O Module A
3 Controller I/O Module B

Figure 16 provides the controller I/O module (with ports identified).

Figure 16 Controller I/O Module



1 CNC FC or iSCSI SFP+ Ports (used for host connection or replication)

2 CLI Port (USB - Type B)

3 Service Port 2 (Service Personnel Use Only)

4 Reserved for future use

5 Network Port

6 Service Port 1 (Service Personnel Use Only)

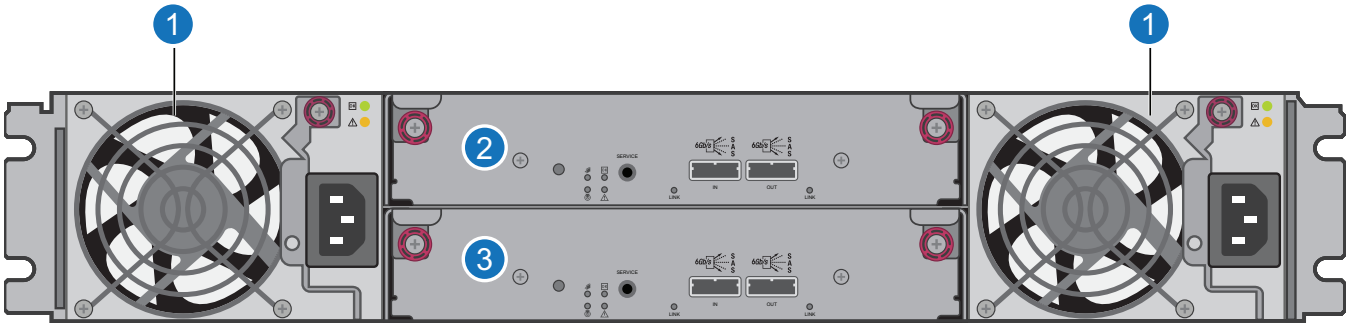
7 Disabled button (used by engineering only) (Sticker shown covering the opening)

8 mini-SAS expansion port

12, 24, and 48 Drive Expansion Chassis: Rear Panel Components

Figure 17 provides the 12, 24, and 48 drive expansion chassis (rear panel components).

Figure 17 Expansion Chassis: Rear Panel Components



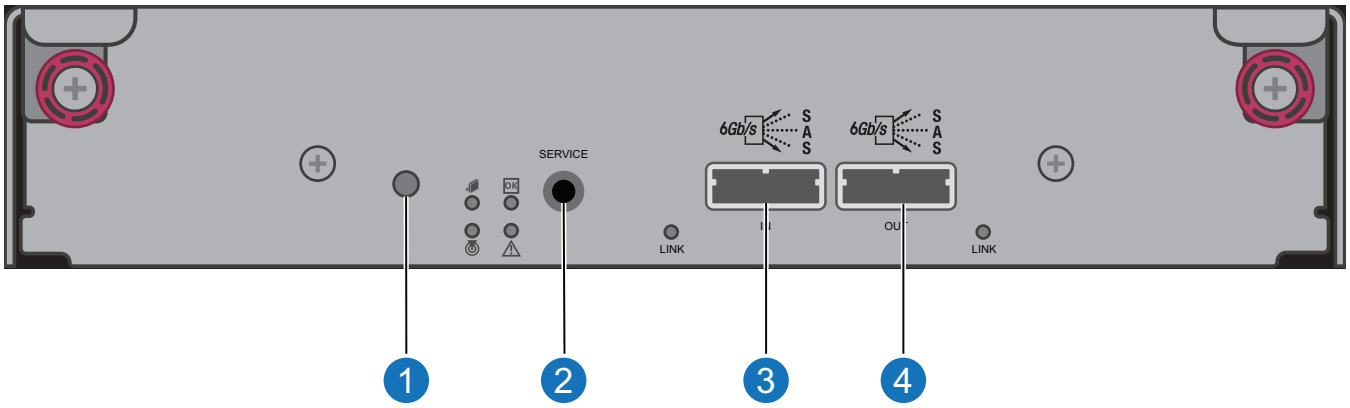
1 Power supplies (AC shown)

2 Expansion I/O Module A

3 Expansion I/O Module B

Figure 18 provides the 12, 24, and 48 drive expansion I/O module (ports identified).

Figure 18 Expansion I/O Module (ports identified)



1 Disabled button (used by engineering/test only)
2 Service port (used by service personnel only)
3 mini-SAS In port
4 mini-SAS Out port

QXS-456 RAID and Expansion Chassis

Table 12 identifies physical dimensions of the QXS-456/656 RAID and expansion chassis.

Table 12 QXS-456/656 RAID and Expansion Chassis Physical Dimensions

Chassis	Height	Width (chassis only)	Depth (excluding cables)	Maximum # Drives
QXS-456 RAID	4U (7 inches/ 17.78cm)	17.6 inches (44.7cm)	32.9 inches (83.6cm)	56 (LFF: 3.5 inch)
QXS-456 Expansion	4U (7 inches/ 17.78cm)	17.6 inches (44.7cm)	32.9 inches (83.6cm)	56 (LFF: 3.5 inch)

Packaged Dimensions and Weight

Table 13 identifies the packaged dimensions and weight of the QXS-456 RAID and expansion chassis.

Table 13 QXS-456 RAID and Expansion Chassis Packaged Dimensions and Weight

Chassis	Height	Width	Depth	Weight
QXS-456 RAID (FC/iSCSI)	14 inches /35.56cm	24 inches/60.96cm	39 inches/99.06cm	150 lbs/68.04kg
QXS-456 RAID (SAS)	14 inches/35.56cm	24 inches/60.96cm	39 inches/99.06cm	150 lbs/68.04kg
QXS-456 Expansion	14 inches/35.56cm	24 inches/60.96cm	39 inches/99.06cm	139 lbs/63.05kg

Bezel

The QXS 4U drive chassis includes a bezel sub-assembly that attaches to the front panel of the chassis. The bezel, comprised of a vented cover attached to an electro-magnetic interference (EMI) shield, is pre-assembled and packed within a box contained in the enclosure master shipping container.

The bezel might include a removable air filter that can be serviced or replaced. Instructions for attaching/removing the bezel, and for servicing or replacing the air filter, are provided in the *QXS Bezel Installation Guide*.

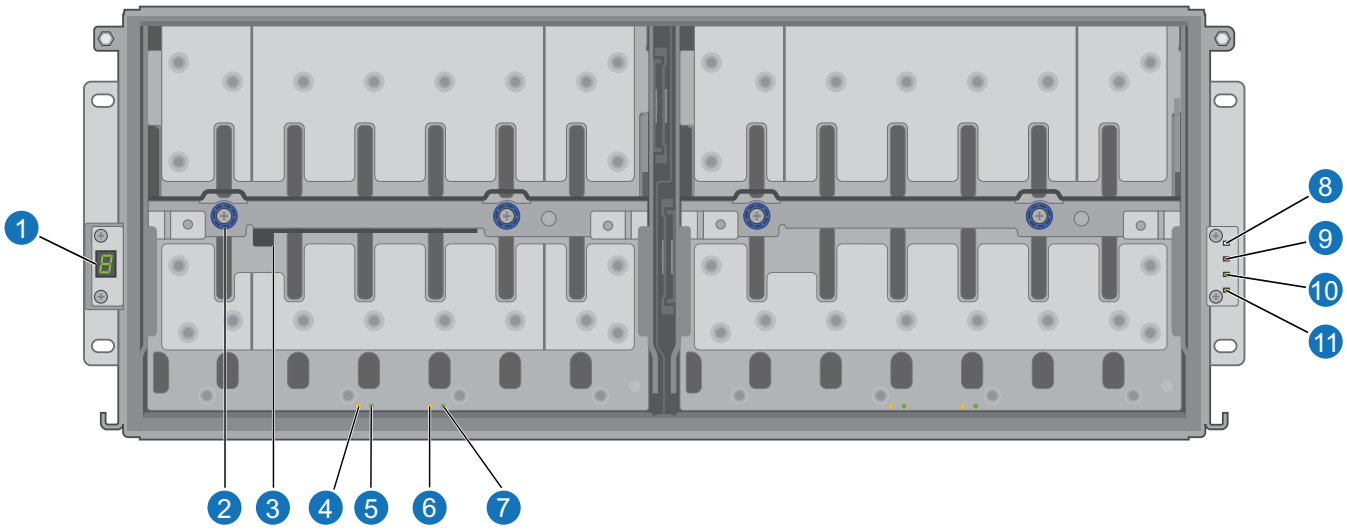
CAUTION: Whether configured with or without an air filter, to ensure adequate EMI protection for the drives, the bezel should be properly installed while the chassis is in operation.

---

56 Drive Front Panel Components

Figure 19 provides the 4U56 drive chassis (for the RAID or expansion chassis) with the bezel removed.

Figure 19 4U56 Drive Chassis (Bezel Removed)

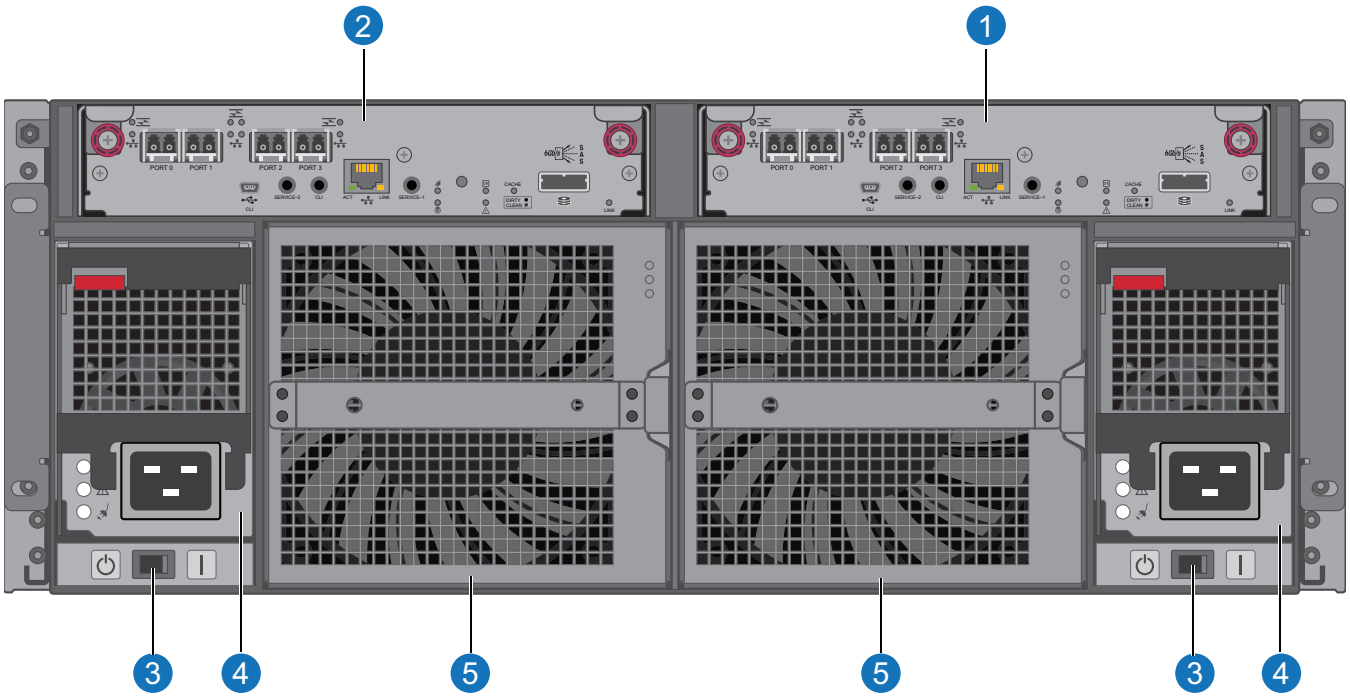


1 Chassis ID LED
2 Thumbscrew for securing or accessing drawer
3 Drawer handle (shown in stowed position)
4 Drawer status LED: Unit Locator
5 Drawer status LED: OK to Remove
6 Drawer status LED: Fault/Service Required
7 Drawer status LED: FRU OK
8 Chassis status LED: Unit Locator
9 Chassis status LED: Fault/Service Required
10 Chassis status LED: FRU OK
11 Chassis status LED: Temperature Fault

56 Drive RAID Chassis: Rear Panel Components

Figure 20 provides the 4U56 drive RAID chassis (rear panel components).

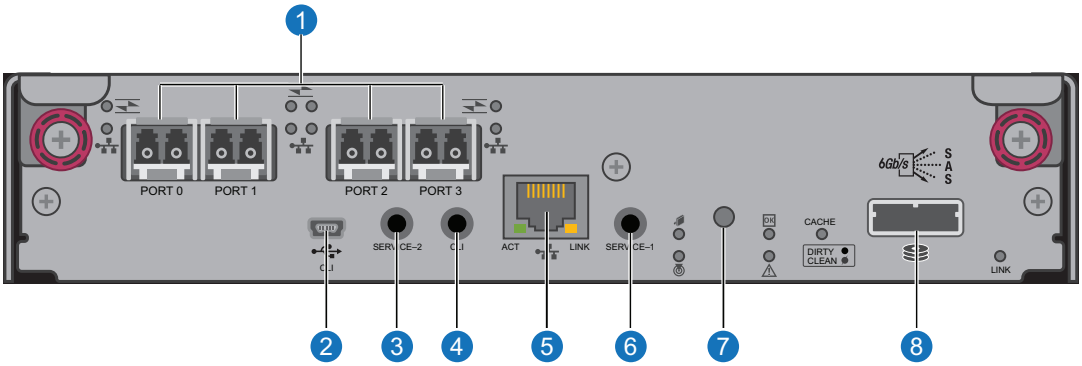
Figure 20 4U56 Drive RAID Chassis (rear panel components)



1 Controller I/O module A
2 Controller I/O module B
3 AC power supply switch
4 Power supply module
5 Fan control module (FCM)

Figure 21 provides the controller I/O module (with ports identified).

Figure 21 Controller I/O Module

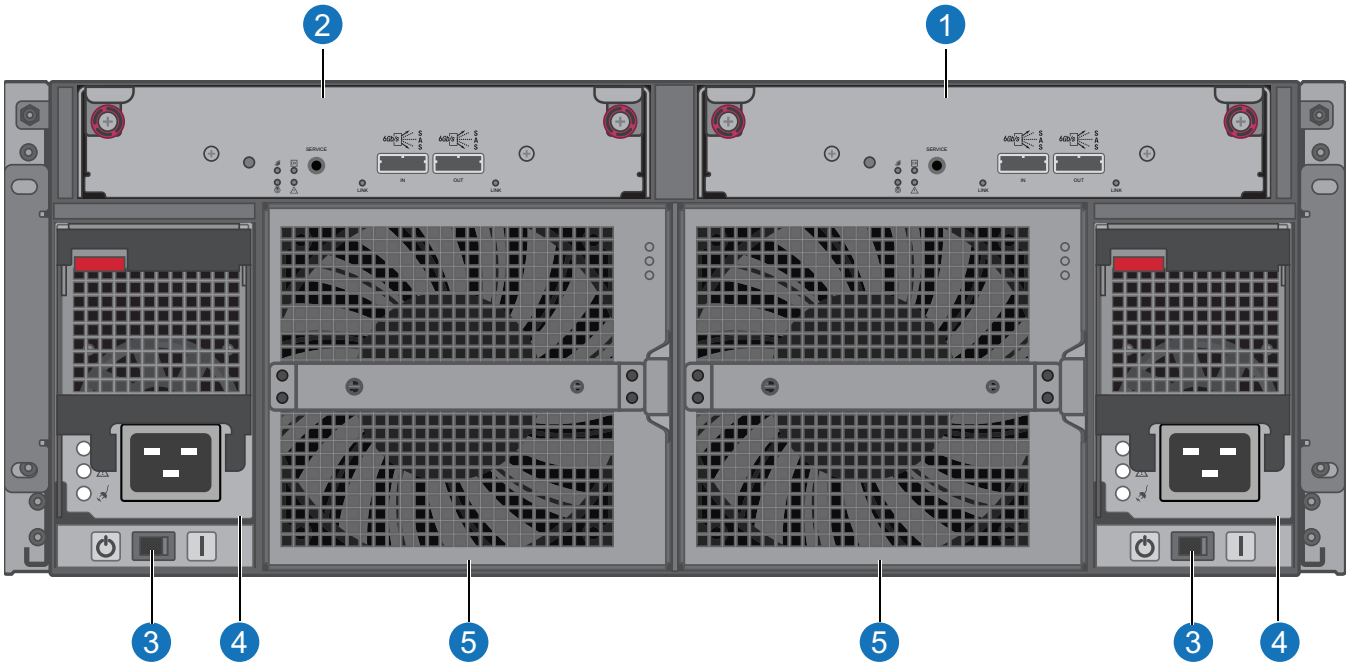


1 CNC FC or iSCSI SFP+ Ports (used for host connection or replication)
2 CLI Port (USB - Type B)
3 Service Port 2 (Service Personnel Use Only)
4 Reserved for future use
5 Network Port
6 Service Port 1 (Service Personnel Use Only)
7 Disabled button (used by engineering only) (Sticker shown covering the opening)
8 mini-SAS expansion port

56 Drive Expansion Chassis: Rear Panel Components

Figure 22 provides the 4U56 drive expansion chassis (rear panel components).

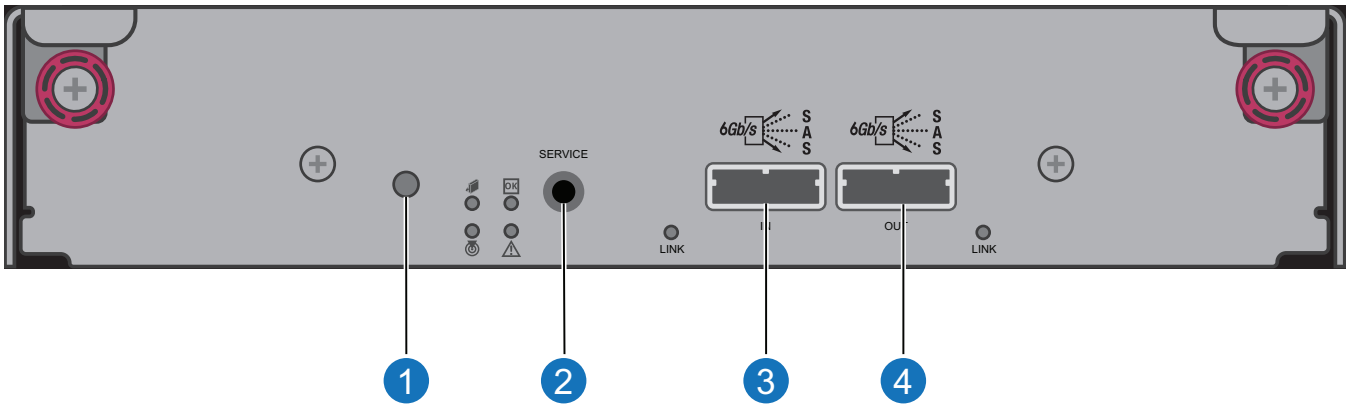
Figure 22 4U56 Drive Expansion Chassis (rear panel components)



1 Expansion I/O module A
2 Expansion I/O module B
3 AC power supply switch
4 Power supply module
5 Fan control module (FCM)

Figure 23 provides the 4U56 drive expansion I/O module (ports identified).

Figure 23 Expansion I/O Module (ports identified)



1 Disabled button (used by engineering/test only)
2 Service port (used by service personnel only)
3 mini-SAS In port
4 mini-SAS Out port

QXS-4 Series RAID and Expansion Physical Requirements

The QXS-4 series RAID and Expansion chassis consist of the following systems:

- QXS-412 (12-drive, LFF drives)
- QXS-424 (24-drive, SFF drives)
- QXS-448 (48-drive, SFF drives)
- QXS-456 (56-drive, LFF drives)

The floor space at the installation site must be strong enough to support the combined weight of the rack, RAID chassis, expansion chassis, and any additional equipment. The site also requires sufficient space for installation, operation, and servicing of the chassis, together with sufficient ventilation to allow a free flow of air to all chassis.

Composition

The RAID chassis and expansion chassis is comprised of sheet steel that is bonded together using rivets, welding, and other forced contact methods. The metal surfaces are free from non-conductive coatings and paint.

Chassis Designators

The RAID and expansion chassis designators are as follows:

- 2U12 chassis (LFF):
  - "2U12" denotes the 3.5" 12-drive chassis (with controller or expansion modules)
  - The 2U12 chassis is equipped with a drive in each drive slot
- 2U24 chassis (SFF):
  - "2U24" denotes the 2.5" 24-drive chassis (with controller or expansion modules)
  - The 2U24 chassis is equipped with a drive in each drive slot
- 2U48 chassis (SFF):
  - "2U48" denotes the 2.5" 48-drive chassis (with controller or expansion modules)
  - The 2U48 chassis includes three installed drawers that must be populated with drives and possibly air management system (AMS) inserts if applicable, after the chassis is installed into the rack.
  - The table in this section assumes each drive slot contains a drive module.
- 4U56 chassis (high-capacity with LFF drives)
  - "4U56" denotes the 3.5" 56-drive chassis (with controller or expansion modules)
  - The 4U56 chassis includes two installed drawer slots that must be populated with drives after the chassis is installed into the rack.
- Two controller modules or two expansion modules per chassis
- Two power supplies per chassis

QXS-4 Series RAID and Expansion Rackmount Chassis Dimensions

Table 14 provides the RAID and expansion rackmount chassis dimensions for the 12, 24, and 48-drive chassis.

Table 14 QXS-4 Series RAID and Expansion Rackmount Chassis Dimensions (12, 24, & 48-Drive Chassis)

Specifications	Rackmount
2U Height (y-axis):	8.9 cm (3.5 inches)
Width (x-axis): • Chassis-only • Chassis with ear caps or chassis bezel	 • 44.7 cm (17.6 inches) • 47.9 cm (18.9 inches)
12-Drive Chassis (LFF, 2U12): • Rear of chassis ear to controller latch • Front of chassis ear to rear of cable bend	 • 54.9 cm (21.6 inches) • 59.9 cm (23.6 inches)
24-Drive Chassis (SFF, 2U24): • Rear of chassis ear to controller latch • Front of chassis ear to rear of cable bend	 • 51.8 cm (20.4 inches) • 57.9 cm (22.8 inches)
48-Drive Chassis (SFF, 2U48): • Rear of chassis ear to controller latch • Front of chassis ear to rear of cable bend	 • 74.4 cm (29.3 inches) • 81.5 cm (32.1 inches)

Table 15 provides the RAID and expansion rackmount chassis dimensions for the 56-drive chassis..

Table 15 QXS-4 Series RAID and Expansion Rackmount Chassis Dimensions (56-Drive Chassis)

Specifications	Rackmount
4U Height (y-axis):	17.8 cm (7 inches)
Width (x-axis): • Chassis-only • Chassis with ear caps or chassis bezel • Rear of chassis ear to controller latch • Front of chassis ear to rear of cable bend	 • 45.1 cm (17.8 inches) • 47.9 cm (18.9 inches) • 51.8 cm (20.4 inches) • 57.9 cm (22.8 inches)

QXS-4 Series RAID and Expansion Rackmount Chassis Weights

This section provides the following information:

- QXS-4 Series RAID Rackmount Chassis Weights
- QXS-4 Series Expansion Rackmount Chassis Weights

QXS-4 Series RAID Rackmount Chassis Weights

Table 16 provides the RAID rackmount chassis weights (12, 24, 48, and 56-drive systems).

Table 16 QXS-4 Series RAID Rackmount Chassis Weights (12, 24, 48, and 56-drive systems)

Specifications	Rackmount
12-Drive Chassis (LFF, 2U12): • Chassis with FRUs (no drives)[1-3] • Chassis with FRUs (including drives)[1-4]	9.3 kg (20.6 lb) [chassis] • 18.1 kg (40.0 lb) • 27.7 kg (61.0 lb)
24-Drive Chassis (SFF, 2U24): • Chassis with FRUs (no drives)[1-3] • Chassis with FRUs (including drives)[1-4]	8.6 kg (19.0 lb) [chassis] • 17.4 kg (38.4 lb) • 23.4 kg (51.6 lb)
48-Drive Chassis (SFF, 2U48): • Chassis with FRUs (no drives)[1-3] • Chassis with FRUs (including drives)[1-4]	12.7 kg (28.0 lb) [chassis] • 23.1 kg (50.9 lb) • 34.0 kg (74.9 lb)
56-Drive Chassis (LFF, 4U56): • Chassis with FRUs (no drives)[1-3] • Chassis with FRUs (including drives)[1-4]	14.9 kg (32.8 lb) [chassis] • 46.3 kg (102.1 lb) • 87.0 kg (191.7 lb)

[1]Weights shown are nominal, and subject to variances.

[2]Rail kits add between 2.8 kg (6.2 lb) and 3.4 kg (7.4 lb) to the aggregate chassis weight.

[3]Weights may vary due to different power supplies, IOMs, and differing calibrations between scales.

[4]Weights may vary due to actual number and type of drives (SAS SSD, enterprise SAS, or midline SAS) and air management modules installed.

QXS-4 Series Expansion Rackmount Chassis Weights

Table 17 provides the expansion rackmount chassis weights (12, 24, 48, and 56-drive systems).

Table 17 QXS-4 Series Expansion Rackmount Chassis Weights (12, 24, 48, and 56-drive systems)

Specifications	Rackmount
12-Drive Chassis (LFF, 2U12): • Chassis with FRUs (no drives)[1-3] • Chassis with FRUs (including drives)[1-4]	8.6 kg (19.0 lb) [chassis] • 16.2 kg (35.8 lb) • 22.2 kg (49.0 lb)
24-Drive Chassis (SFF, 2U24): • Chassis with FRUs (no drives)[1-3] • Chassis with FRUs (including drives)[1-4]	8.6 kg (19.0 lb) [chassis] • 16.1 kg (35.6 lb) • 25.6 kg (56.6 lb)
48-Drive Chassis (SFF, 2U48): • Chassis with FRUs (no drives)[1-3] • Chassis with FRUs (including drives)[1-4]	12.7 kg (28.0 lb) [chassis] • 20.3 kg (44.8 lb) • 31.2 kg (68.8 lb)
56-Drive Chassis (LFF, 4U56): • Chassis with FRUs (no drives)[1-3] • Chassis with FRUs (including drives)[1-4]	14.9 kg (32.8 lb) [chassis] • 45.0 kg (99.1 lb) • 85.6 kg (188.7 lb)

[1]Weights shown are nominal, and subject to variances.

[2]Rail kits add between 2.8 kg (6.2 lb) and 3.4 kg (7.4 lb) to the aggregate chassis weight.

[3]Weights may vary due to different power supplies, IOMs, and differing calibrations between scales.

[4]Weights may vary due to actual number and type of drives (SAS SSD, enterprise SAS, or midline SAS) and air management modules installed.

Chapter 4

QXS-6 Series Specifications

This chapter provides the following information:

- QXS-648 RAID and Expansion Chassis
- QXS-656 RAID and Expansion Chassis
- QXS-6 Series RAID and Expansion Physical Requirements
- QXS-6 Series RAID and Expansion Rackmount Chassis Weights

QXS-648 RAID and Expansion Chassis

Table 18 identifies physical dimensions of the QXS-648 RAID and expansion chassis.

Table 18 QXS-648 RAID and Expansion Chassis Physical Dimensions

Chassis	Height	Width (chassis only)	Depth (excluding cables)	Maximum # Drives
QXS-648 RAID	2U (3.5 inches/ 8.89cm)	17.6 inches (44.7cm)	30.6 inches (77.72cm)	48 (2.5 inch)
QXS-648 Expansion	2U (3.5 inches/ 8.89cm)	17.6 inches (44.7cm)	30.6 inches (77.72cm)	48 (2.5 inch)

Packaged Dimensions and Weight

Table 19 identifies the packaged dimensions and weight of the QXS-648 RAID and expansion chassis.

Table 19 QXS-648 RAID and Expansion Chassis Packaged Dimensions and Weight

Chassis	Height	Width	Depth	Weight
QXS-648 RAID (FC/iSCSI)	9.75 inches/ 24.77cm	24 inches/60.96cm	37.875 inches/ 96.20cm	110 lbs/49.90kg
QXS-648 RAID (SAS)	10.125 inches/ 25.72cm	23.75 inches/ 60.33cm	37.25 inches/ 94.62cm	90 lbs/40.82kg
QXS-648 Expansion	9.875 inches/ 25.08cm	23.875 inches/ 60.64cm	37.75 inches/ 95.89cm	70 lbs/31.75kg

Bezel

The QXS 2U drive chassis includes a bezel sub-assembly that attaches to the front panel of the chassis. The bezel, comprised of a vented cover attached to an electro-magnetic interference (EMI) shield, is pre-assembled and packed within a box contained in the enclosure master shipping container.

Instructions for attaching/removing the bezel are provided in the *QXS Bezel Installation Guide*.

CAUTION: The bezel should be properly installed while the chassis is in operation to ensure adequate EMI protection for the drives.

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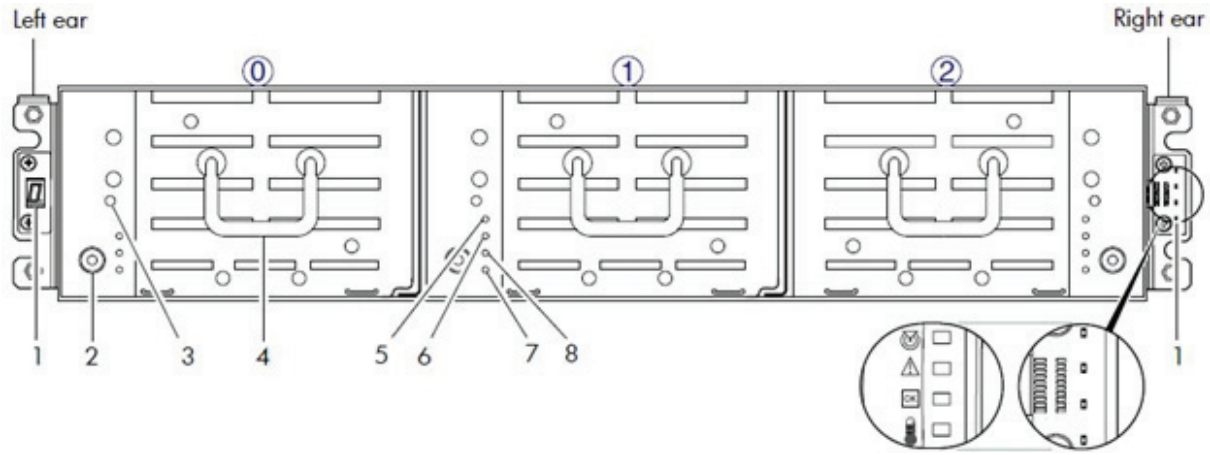
48 Drive Front Panel Components

Figure 24 provides the 2U48 drive chassis (for the RAID or expansion chassis) with the bezel removed.

Figure 24 2U48 Drive Chassis (Bezel Removed)

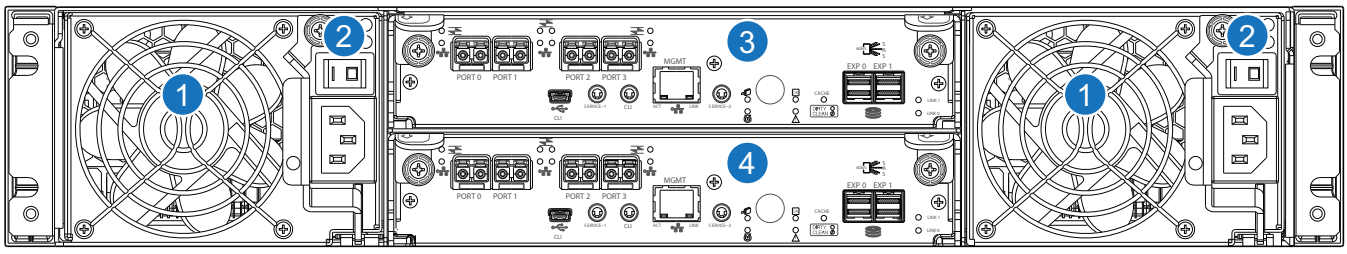


1 Chassis ID LED
2 Thumbscrew (for securing or accessing drawers)
3 Disabled Button (used by engineering only)
4 Drawer Handle (shown in stowed position)
5 Drawer Status LED: FRU OK
6 Drawer Status LED: Fault/Service Required
7 Drawer Status LED: OK to Remove
8 Drawer Status LED: Unit Locator

48 Drive RAID Chassis: Rear Panel Components

Figure 25 provides a representative example of the 48 drive RAID chassis (rear panel components).

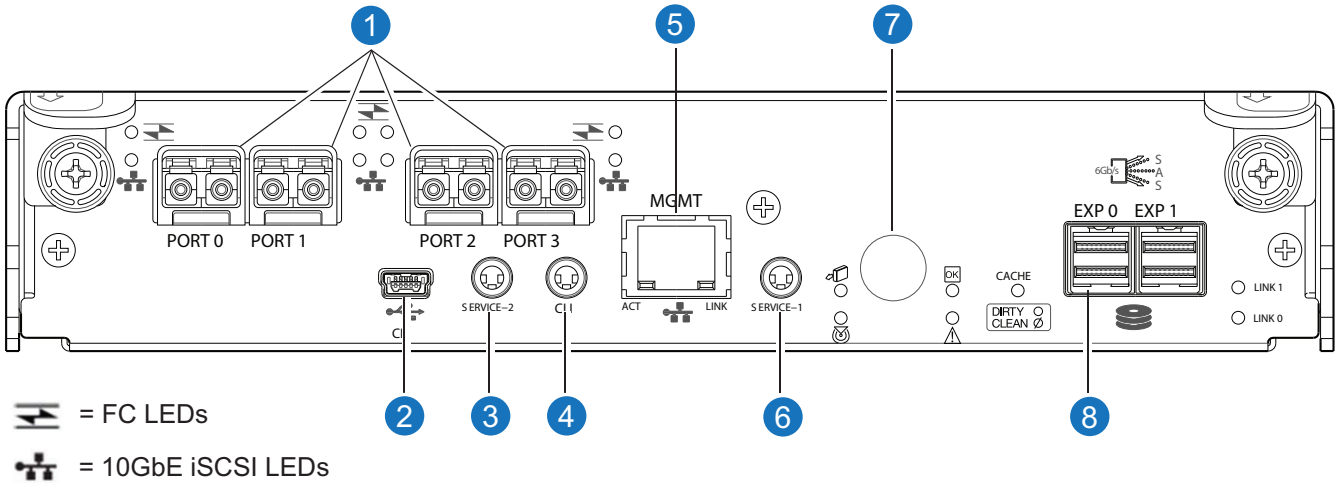
Figure 25 48 Drive RAID Chassis: Rear Panel Components



1 AC Power Supplies (qty. 2)
2 AC Power Switch (qty. 2)
3 Controller I/O Module A
4 Controller I/O Module B

Figure 26 provides the controller I/O module (with ports identified).

Figure 26 Controller I/O Module



1 CNC FC or iSCSI SFP+ Ports (used for host connection or replication)

2 CLI Port (USB - Type B)

3 Service Port 2 (Service Personnel Use Only)

4 Reserved for future use

5 Network Port

6 Service Port 1 (Service Personnel Use Only)

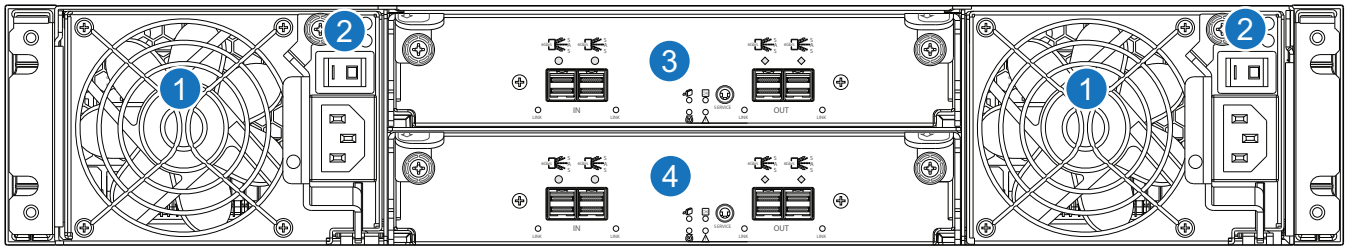
7 Disabled button (used by engineering only) (Sticker shown covering the opening)

8 mini-SAS expansion port

48 Drive Expansion Chassis: Rear Panel Components

Figure 27 provides the 48 drive expansion chassis (rear panel components).

Figure 27 Expansion Chassis: Rear Panel Components



1 Power supplies (AC shown, 2 each)

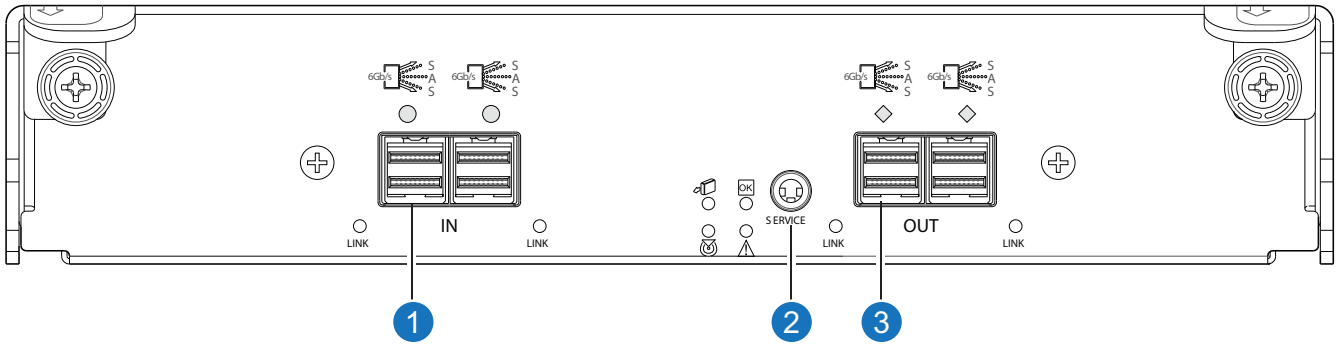
2 AC Power Switch

3 Expansion I/O Module A

4 Expansion I/O Module B

Figure 28 provides the 48 drive expansion I/O module (ports identified).

Figure 28 Expansion I/O Module (ports identified)



1 HD Mini-SAS In port

2 Service port (used by service personnel only)

3 HD Mini-SAS Out port

QXS-656 RAID and Expansion Chassis

Table 20 identifies physical dimensions of the QXS-656 RAID and expansion chassis.

Table 20 QXS-456/656 RAID and Expansion Chassis Physical Dimensions

Chassis	Height	Width (chassis only)	Depth (excluding cables)	Maximum # Drives
QXS-656 RAID	4U (7 inches/ 17.78cm)	17.6 inches (44.7cm)	32.9 inches (83.6cm)	56 (LFF: 3.5 inch)
QXS-656 Expansion	4U (7 inches/ 17278cm)	17.6 inches (44.7cm)	32.9 inches (83.6cm)	56 (LFF: 3.5 inch)

Packaged Dimensions and Weight

Table 21 identifies the packaged dimensions and weight of the QXS-656 RAID and expansion chassis.

Table 21 QXS-656 RAID and Expansion Chassis Packaged Dimensions and Weight

Chassis	Height	Width	Depth	Weight
QXS-656 RAID (FC/iSCSI)	14 inches/35.56cm	24 inches/60.96cm	39 inches/99.06cm	150 lbs/68.04kg
QXS-656 RAID (SAS)	14 inches/35.56cm	24 inches/60.96cm	39 inches/99.06cm	150 lbs/68.04kg
QXS-656 Expansion	14 inches/35.56cm	24 inches/60.96cm	39 inches/99.06cm	139 lbs/63.05kg

Bezel

The QXS 4U drive chassis includes a bezel sub-assembly that attaches to the front panel of the chassis. The bezel, comprised of a vented cover attached to an electro-magnetic interference (EMI) shield, is pre-assembled and packed within a box contained in the enclosure master shipping container.

The bezel might include a removable air filter that can be serviced or replaced. Instructions for attaching/removing the bezel, and for servicing or replacing the air filter, are provided in the *QXS Bezel Installation Guide*.

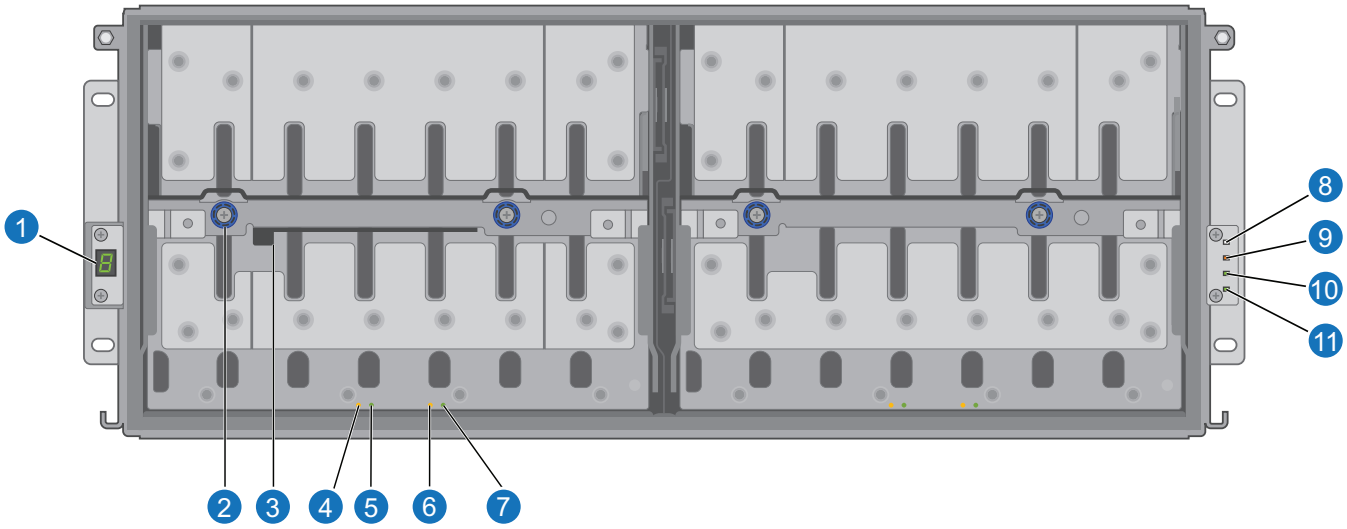
CAUTION: Whether configured with or without an air filter, to ensure adequate EMI protection for the drives, the bezel should be properly installed while the chassis is in operation.

---

56 Drive Front Panel Components

Figure 29 provides the 4U56 drive chassis (for the RAID or expansion chassis) with the bezel removed.

Figure 29 4U56 Drive Chassis (Bezel Removed)

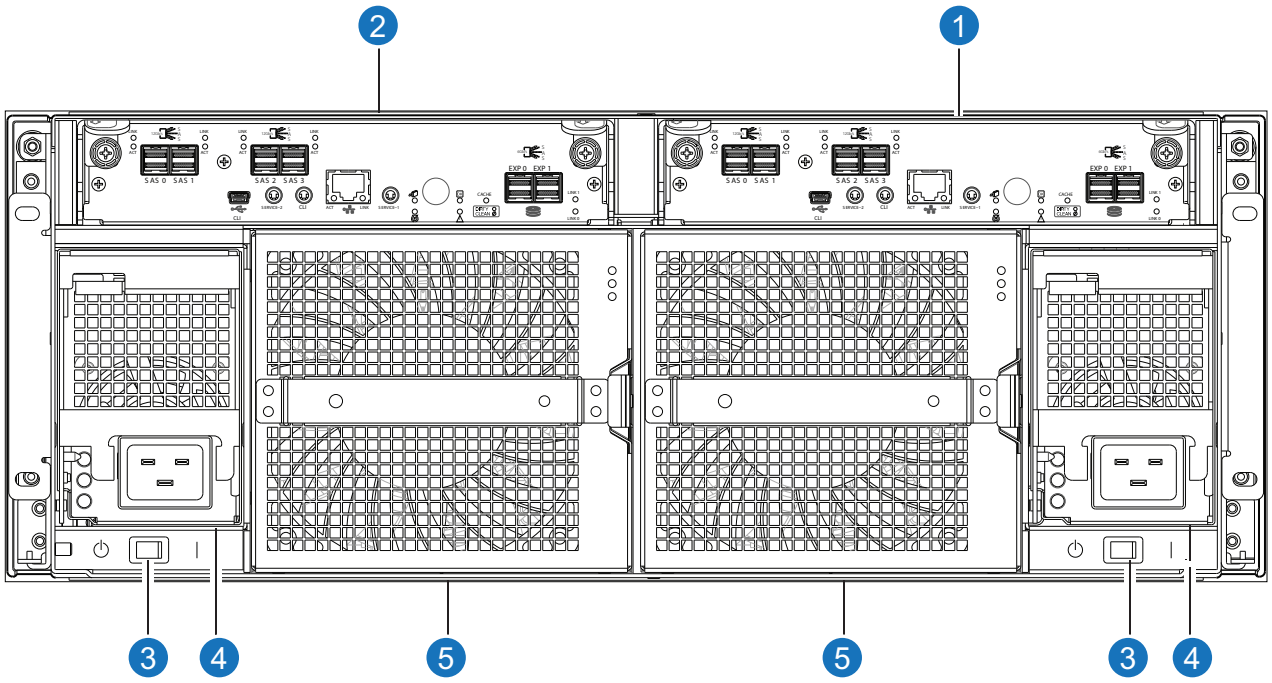


1 Chassis ID LED
2 Thumbscrew for securing or accessing drawer
3 Drawer handle (shown in stowed position)
4 Drawer status LED: Unit Locator
5 Drawer status LED: OK to Remove
6 Drawer status LED: Fault/Service Required
7 Drawer status LED: FRU OK
8 Chassis status LED: Unit Locator
9 Chassis status LED: Fault/Service Required
10 Chassis status LED: FRU OK
11 Chassis status LED: Temperature Fault

56 Drive RAID Chassis: Rear Panel Components

Figure 30 provides the 4U56 drive RAID chassis (rear panel components).

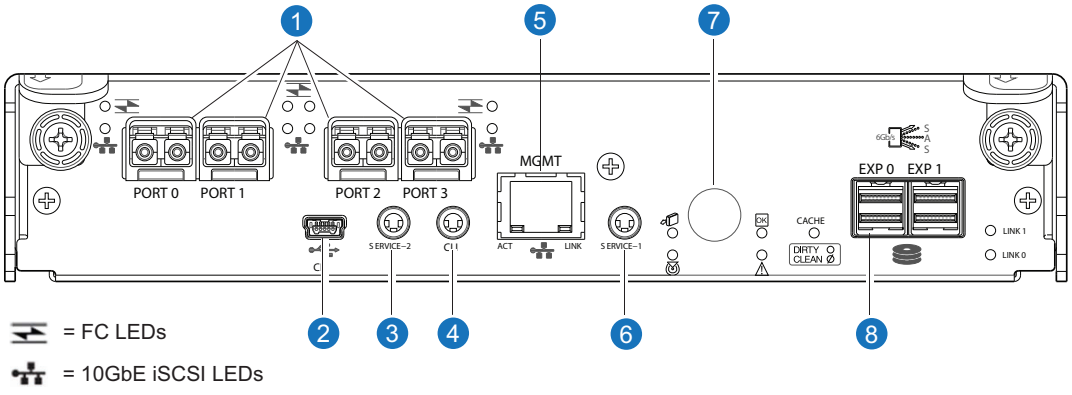
Figure 30 4U56 Drive RAID Chassis (rear panel components)



1 Controller I/O module A
2 Controller I/O module B
3 AC power supply switch (Qty 2)
4 Power supply module (Qty 2)
5 Fan control module (FCM, Qty 2)

Figure 31 provides the controller I/O module (with ports identified).

Figure 31 Controller I/O Module

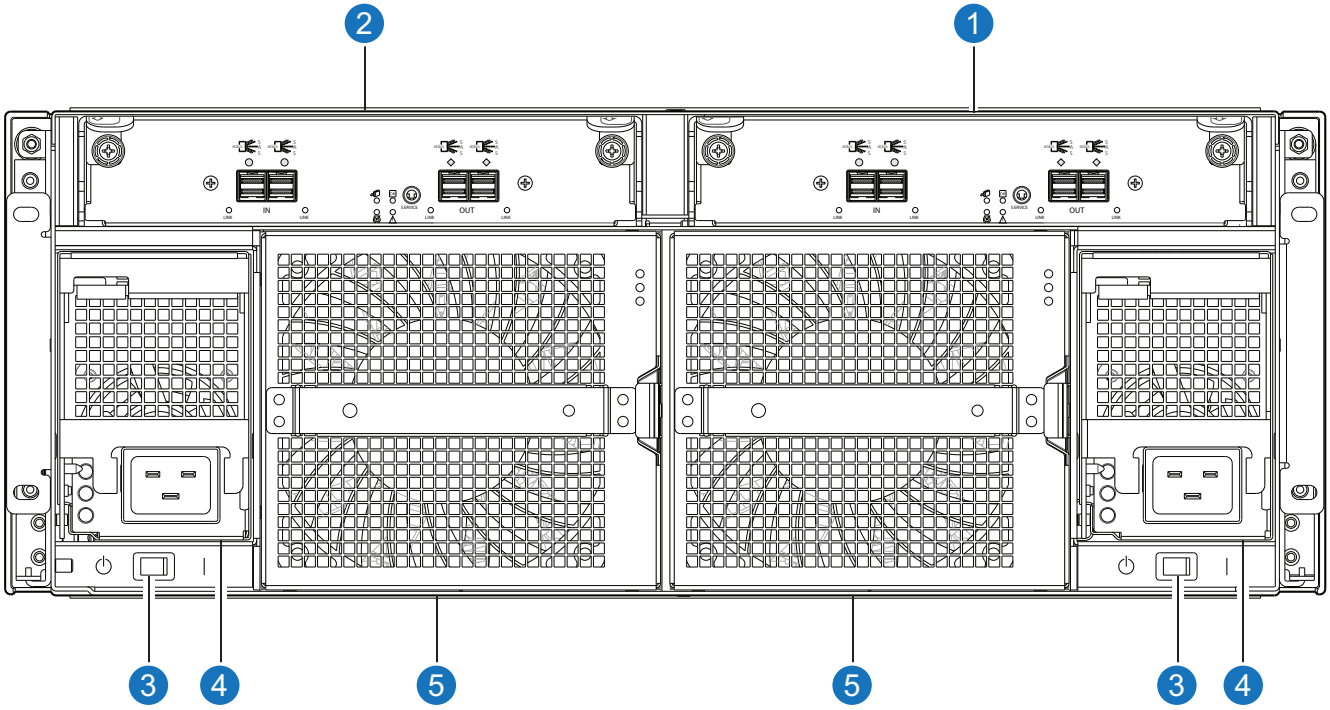


1 CNC FC or iSCSI SFP+ Ports (used for host connection or replication)
2 CLI Port (USB - Type B)
3 Service Port 2 (Service Personnel Use Only)
4 Reserved for future use
5 Network Port
6 Service Port 1 (Service Personnel Use Only)
7 Disabled button (used by engineering only) (Sticker shown covering the opening)
8 HD Mini-SAS expansion port

56 Drive Expansion Chassis: Rear Panel Components

Figure 32 provides the 4U56 drive expansion chassis (rear panel components).

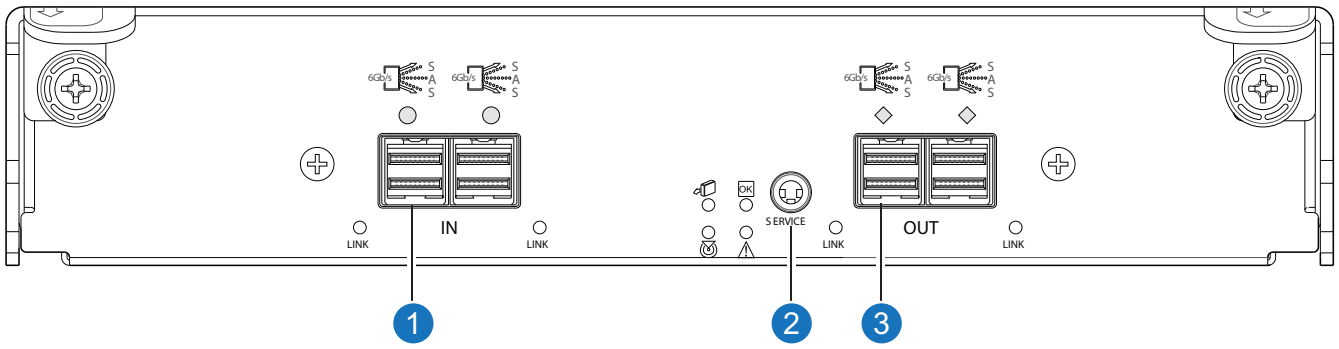
Figure 32 4U56 Drive Expansion Chassis (rear panel components)



1 Expansion I/O module A
2 Expansion I/O module B
3 AC power supply switch
4 Power supply module
5 Fan control module (FCM)

Figure 33 provides the 4U56 drive expansion I/O module (ports identified).

Figure 33 Expansion I/O Module (ports identified)



1 HD Mini-SAS In port
2 Service port (used by service personnel only)
3 HD Mini-SAS Out port

QXS-6 Series RAID and Expansion Physical Requirements

The QXS-6 series RAID and Expansion chassis consist of the following systems:

- QXS-448 (48-drive, SFF drives)
- QXS-456 (56-drive, LFF drives)

The floor space at the installation site must be strong enough to support the combined weight of the rack, RAID chassis, expansion chassis, and any additional equipment. The site also requires sufficient space for installation, operation, and servicing of the chassis, together with sufficient ventilation to allow a free flow of air to all chassis.

Composition

The RAID chassis and expansion chassis is comprised of sheet steel that is bonded together using rivets, welding, and other forced contact methods. The metal surfaces are free from non-conductive coatings and paint.

Chassis Designators

The RAID and expansion chassis designators are as follows:

- 2U48 chassis (SFF):
  - "2U48" denotes the 2.5" 48-drive chassis (with controller or expansion modules)
  - The 2U48 chassis includes three installed drawers that must be populated with drives and possibly air management system (AMS) inserts if applicable, after the chassis is installed into the rack.
  - The table in this section assumes each drive slot contains a drive module.
- 4U56 chassis (high-capacity with LFF drives)
  - "4U56" denotes the 3.5" 56-drive chassis (with controller or expansion modules)
  - The 4U56 chassis includes two installed drawer slots that must be populated with drives after the chassis is installed into the rack.
- Two controller modules or two expansion modules per chassis
- Two power supplies per chassis

QXS-6 Series RAID and Expansion Rackmount Chassis Dimensions

Table 22 provides the RAID and expansion rackmount chassis dimensions for the 48-drive chassis.

Table 22 QXS-4 Series RAID and Expansion Rackmount Chassis Dimensions (48-Drive Chassis)

Specifications	Rackmount
2U Height (y-axis):	8.9 cm (3.5 inches)
Width (x-axis): • Chassis-only • Chassis with ear caps or chassis bezel	 • 44.7 cm (17.6 inches) • 47.9 cm (18.9 inches)
48-Drive Chassis (SFF, 2U48): • Rear of chassis ear to controller latch • Front of chassis ear to rear of cable bend	 • 74.4 cm (29.3 inches) • 81.5 cm (32.1 inches)

Table 23 provides the RAID and expansion rackmount chassis dimensions for the 56-drive chassis..

Table 23 QXS-4 Series RAID and Expansion Rackmount Chassis Dimensions (56-Drive Chassis)

Specifications	Rackmount
4U Height (y-axis):	17.8 cm (7 inches)
Width (x-axis): • Chassis-only • Chassis with ear caps or chassis bezel • Rear of chassis ear to controller latch • Front of chassis ear to rear of cable bend	 • 45.1 cm (17.8 inches) • 47.9 cm (18.9 inches) • 51.8 cm (20.4 inches) • 57.9 cm (22.8 inches)

QXS-6 Series RAID and Expansion Rackmount Chassis Weights

This section provides the following information:

- QXS-6 Series RAID Rackmount Chassis Weights
- QXS-6 Series Expansion Rackmount Chassis Weights

QXS-6 Series RAID Rackmount Chassis Weights

Table 24 provides the RAID rackmount chassis weights (48 and 56-drive systems).

Table 24 QXS-6 Series RAID Rackmount Chassis Weights (48 & 56-drive systems)

Specifications	Rackmount
48-Drive Chassis (SFF, 2U48): • Chassis with FRUs (no drives)[1-3] • Chassis with FRUs (including drives)[1-4]	12.7 kg (28.0 lb) [chassis] • 23.1 kg (50.9 lb) • 34.0 kg (74.9 lb)
56-Drive Chassis (LFF, 4U56): • Chassis with FRUs (no drives)[1-3] • Chassis with FRUs (including drives)[1-4]	14.9 kg (32.8 lb) [chassis] • 46.3 kg (102.1 lb) • 87.0 kg (191.7 lb)

[1]Weights shown are nominal, and subject to variances.

[2]Rail kits add between 2.8 kg (6.2 lb) and 3.4 kg (7.4 lb) to the aggregate chassis weight.

[3]Weights may vary due to different power supplies, IOMs, and differing calibrations between scales.

[4]Weights may vary due to actual number and type of drives (SAS SSD, enterprise SAS, or midline SAS) and air management modules installed.

QXS-6 Series Expansion Rackmount Chassis Weights

Table 25 provides the expansion rackmount chassis weights (48 and 56-drive systems).

Table 25 QXS-6 Expansion Rackmount Chassis Weights (48 and 56-drive systems)

Specifications	Rackmount
48-Drive Chassis (SFF, 2U48): • Chassis with FRUs (no drives)[1-3] • Chassis with FRUs (including drives)[1-4]	12.7 kg (28.0 lb) [chassis] • 20.3 kg (44.8 lb) • 31.2 kg (68.8 lb)
56-Drive Chassis (LFF, 4U56): • Chassis with FRUs (no drives)[1-3] • Chassis with FRUs (including drives)[1-4]	14.9 kg (32.8 lb) [chassis] • 45.0 kg (99.1 lb) • 85.6 kg (188.7 lb)

[1]Weights shown are nominal, and subject to variances.

[2]Rail kits add between 2.8 kg (6.2 lb) and 3.4 kg (7.4 lb) to the aggregate chassis weight.

[3]Weights may vary due to different power supplies, IOMs, and differing calibrations between scales.

[4]Weights may vary due to actual number and type of drives (SAS SSD, enterprise SAS, or midline SAS) and air management modules installed.

Chapter 5

Environment and Requirements

This chapter provides the following information:

- Site Requirements
- Weight and Placement Guidelines
- Electrical Guidelines
- Ventilation and Cabling Requirements
- Management Host Requirements
- RAID and Expansion Chassis Environmental Requirements

Site Requirements

The following sections provide requirements and guidelines that you must address when preparing your site for the installation.

When selecting an installation site for the system, choose a location not subject to excessive heat, direct sunlight, dust, or chemical exposure. These conditions greatly reduce the system's longevity and might void your warranty.

Chassis Power Requirements

Each chassis has two power supplies for redundancy. If full redundancy is required, use a separate power source for each module.

The AC power in each power supply is auto-ranging and is automatically configured to an input voltage range from 88 – 264 VAC with an input frequency of 47 – 63 Hz. The power supplies meet standard voltage requirements for both U.S. and international operation. The power supplies use standard industrial wiring with line-to-neutral or line-to-line power connections.

The 2U24/2U12 chassis and the high-density 4U56 chassis support DC power supplies as an alternative to using AC power supplies.

Each power cable connects one of the power supply modules to an independent, external power source. To ensure power redundancy, connect the two power cables to two separate circuits; for example, to one commercial circuit and one uninterruptible power source (UPS).

RAID and Expansion Chassis Site Wiring and AC Power Requirements

Table 26 provides the RAID chassis AC power requirements required for all installations using AC power supplies in the QXS 12, 24, 48, and 56-drive systems.

Table 26 QXS RAID Chassis 12, 24, 48, and 56-Drive Power Requirements (AC Input)

Measurement (AC)	Rating for 12-Drive Chassis	Rating for 24-Drive Chassis	Rating for 48-Drive Chassis	Rating for 56-Drive Chassis
Input power requirements	100 to 240VAC, 50/60Hz, 7.2A	100 to 240VAC, 50/60Hz, 7.2A	100 to 240VAC, 50/60Hz	200 to 240VAC, 50/60Hz
Maximum input power	475W maximum continuous	475W maximum continuous	640W maximum continuous	958W maximum continuous
Heat dissipation	1622 BTUs/hour	1622 BTUs/hour	2245 BTUs/hour	3271 BTUs/hour
Power Supply	Bronze Rated-high efficiency	Bronze Rated-high efficiency	Gold Rated-high efficiency	Gold Rated-very high efficiency
	82% @ 20% load	82% @ 20% load	75% @ 10% load	82% @ 10% load
	86% @ 80% load	86% @ 80% load	88% @ 20% load	90% @ 20% load
	85% @ 100% load	85% @ 100% load	92% @ 50% load	94% @ 50% load
			88% @ 100% load	91% @ 100% load

Table 27 provides the expansion chassis AC power requirements required for all installations using AC power supplies in the QXS 12, 24, 48, and 56-drive systems.

Table 27 QXS Expansion Chassis 12, 24, 48, and 56-Drive Power Requirements (AC Input)

Measurement (AC)	Rating for 12-Drive Chassis	Rating for 24-Drive Chassis	Rating for 48-Drive Chassis	Rating for 56-Drive Chassis
Input power requirements	100 to 240VAC, 50/60Hz	100 to 240VAC, 50/60Hz	100 to 240VAC, 50/60Hz	200-240VAC 50/60Hz;6-5A (1200W)
Maximum input power	436W maximum continuous	436W maximum continuous	640W maximum continuous	1200W maximum continuous
Heat dissipation	1488 BTUs/hour	1488 BTUs/hour	2245 BTUs/hour	4095 BTUs/hour
Power Supply	Bronze Rated-high efficiency	Bronze Rated-high efficiency	Gold Rated-high efficiency	Platinum Rated-very high efficiency
	82% @ 20% load	82% @ 20% load	75% @ 10% load	82% @ 10% load
	86% @ 80% load	86% @ 80% load	88% @ 20% load	90% @ 20% load
	85% @ 100% load	85% @ 100% load	92% @ 50% load	94% @ 50% load
			88% @ 100% load	91% @ 100% load

Additional requirements include:

- All AC mains and supply conductors to power distribution boxes for the rack-mounted system must be enclosed in a metal conduit or raceway when specified by local, national, or other applicable government codes and regulations.
- Ensure that the voltage and frequency of your power source match the voltage and frequency inscribed on the equipment's electrical rating label.

- To ensure redundancy, provide two separate power sources for the chassis . These power sources must be independent of each other, and each must be controlled by a separate circuit breaker at the power distribution point.
- The system requires voltages within minimum fluctuation. The customer-supplied facilities' voltage must maintain a voltage with not more than ± 5 percent fluctuation. The customer facilities must also provide suitable surge protection.
- Site wiring must include an earth ground connection to the AC power source. The supply conductors and power distribution boxes (or equivalent metal chassis) must be grounded at both ends.
- Power circuits and associated circuit breakers must provide sufficient power and overload protection. To prevent possible damage to the AC power distribution boxes and other components in the rack, use an external, independent power source that is isolated from large switching loads (such as air conditioning motors, elevator motors, and factory loads).

RAID and Expansion Chassis Site Wiring and DC Power Requirements

Table 28 provides the RAID chassis DC power requirements required for all installations using DC power supplies in the QXS 12, 24, and 56-drive systems.

Table 28 QXS RAID Chassis 12, 24, 48, and 56-Drive Power Requirements (DC Input)

Measurement (DC)	Rating for 12-Drive Chassis	Rating for 24-Drive Chassis	Rating for 48-Drive Chassis	Rating for 56-Drive Chassis
Input power requirements	-39 to -72VDC, -48/-60V nominal	-39 to -72VDC, -48/-60V nominal	N/A	-48 to -60VDC at 25-20A (1200W)
Maximum input power	500W maximum continuous	500W maximum continuous	N/A	1200W maximum continuous
Heat dissipation	1706 BTUs/hour	1706 BTUs/hour	N/A	4095 BTUs/hour

Table 29 provides the expansion chassis DC power requirements required for all installations using DC power supplies in the QXS 12, 24, and 56-drive systems.

Table 29 QXS Expansion Chassis 12, 24, 48, and 56-Drive Power Requirements (DC Input)

Measurement (DC)	Rating for 12-Drive Chassis	Rating for 24-Drive Chassis	Rating for 48-Drive Chassis	Rating for 56-Drive Chassis
Input power requirements	-39 to -72VDC, -48/-60V nominal	-39 to -72VDC, -48/-60V nominal	N/A	-48 to -60VDC at 25-20A (1200W)
Maximum input power	500W maximum continuous	500W maximum continuous	N/A	1200W maximum continuous
Heat dissipation	1706 BTUs/hour	1706 BTUs/hour	N/A	4095 BTUs/hour

Additional requirements include:

- All DC mains and supply conductors to power distribution boxes for the rack-mounted system must comply with local, national, or other applicable government codes and regulations.
- Ensure that the voltage of your power source matches the voltage inscribed on the equipment's electrical label.

- To ensure redundancy, provide two separate power sources for the chassis . These power sources must be independent of each other, and each must be controlled by a separate circuit breaker at the power distribution point.
- The system requires voltages within minimum fluctuation. The customer-supplied facilities' voltage must maintain a voltage within the range specified on the equipment's electrical rating label. The customer facilities must also provide suitable surge protection.
- Site wiring must include an earth ground connection to the DC power source. Grounding must comply with local, national, or other applicable government codes and regulations.
- Power circuits and associated circuit breakers must provide sufficient power and overload protection.

Weight and Placement Guidelines

Weight and placement guidelines include:

- Refer to the rackmount bracket kit installation guide pertaining to your product for guidelines about installing chassis into the rack.
- When installing chassis into the rack, populate from the bottom position and move upwards for optimal rack stability.
- The weight of an chassis depends on the number and type of modules installed.
- Ideally, use two people to lift a chassis. However, one person can safely lift an chassis if its weight is reduced by removing the power supplies and drive modules.
- Do not place chassis in a vertical position. Always install and operate the chassis in a horizontal orientation.
- When installing chassis in a rack, make sure that any surfaces over which you might move the rack can support the weight. To prevent accidents when moving equipment, especially on sloped loading docks and up ramps to raised floors, ensure you have a sufficient number of helpers. Remove obstacles such as cables and other objects from the floor.
- To prevent the rack from tipping, and to minimize personnel injury in the event of a seismic occurrence, securely anchor the rack to a wall or other rigid structure that is attached to both the floor and to the ceiling of the room.

Electrical Guidelines

Electrical guidelines include:

- These chassis work with single-phase power systems having an earth ground connection. To reduce the risk of electric shock, do not plug an chassis into any other type of power system.

NOTE: Contact your facilities manager or a qualified electrician if you are not sure what type of power is supplied to your building.

- Chassis are shipped with a grounding-type (three-wire) power cord. To reduce the risk of electric shock, always plug the cord into a grounded power outlet.
- Do not use household extension cords with the chassis. Not all power cords have the same current ratings. Household extension cords do not have overload protection and are not meant for use with computer systems.

Ventilation and Cabling Requirements

This section includes the following information:

- Ventilation Requirements
- Cabling Requirements

Ventilation Requirements

Ventilation requirements include:

- Do not block or cover ventilation openings at the front and rear of an chassis. Never place an chassis near a radiator or heating vent. Failure to follow these guidelines can cause overheating and affect the reliability and warranty of your chassis.
- Leave a minimum of 15.2 cm (6 inches) at the front and rear of each chassis to ensure adequate airflow for cooling. No cooling clearance is required on the sides, top, or bottom of chassis .
- Leave enough space in the front and rear of an chassis to allow access to chassis components for servicing. Removing a component requires a clearance of at least 38.1 cm (15 inches) in front of and behind the chassis.

Cabling Requirements

Cabling requirements include:

- Keep power and interface cables clear of foot traffic. Route cables in locations that protect the cables from damage.
- Route interface cables away from motors and other sources of magnetic or radio frequency interference.
- Stay within the cable length limitations.
- QXS Storage RAID chassis and expansion chassis are suitable for connection to intra-building or non-exposed wiring or cabling only.
- QXS Storage RAID chassis and expansion chassis are suitable for installation in Network Telecommunication Facilities and locations where the NEC applies. QXS Storage RAID chassis and expansion chassis are not suitable for Outside Plant (OSP) installations.

Management Host Requirements

A local management host with at least one mini-USB connection is recommended for the initial installation and configuration of a RAID chassis. After you configure one or both of the controller modules with an IP address, you then use a remote management host on an Ethernet network to manage and monitor.

NOTE: Connections to this device must be made with shielded cables – grounded at both ends – with metallic RFI/EMI connector hoods, in order to maintain compliance with NEBS and FCC Rules and Regulations.

RAID and Expansion Chassis Environmental Requirements

This section includes the following information for the RAID and expansion chassis:

- Operating Environmental Specifications
- Non-operating Environmental Specifications
- Declared Acoustic Noise Levels

Operating Environmental Specifications

Table 30 provides QXS 12, 24, 48, and 56-drive operating environmental specifications.

Table 30 QXS 12, 24, 48, and 56-Drive Operating Environmental Specifications

Specification	Range
Altitude	To 3,000 meters (9,843 feet) 2U12/2U24/2U48] To 1,829 meters (6,000 feet) [4U56]
Temperature*	(41°F to 104°F) 5°C to 40°C
Humidity	10% to 90% RH up to 40°C (104°F) non-condensing
Shock	3.0 g, 11 ms, ½ sine pulses, X, Y, Z
Vibration	(Shaped-spectrum) 5 Hz to 500 Hz, 0.14 G_{rms} total X, Y, Z
*Tempeature is de-rated by 2°C (3.6°F) for every 1 km (3,281) feet above sea level.	

Non-operating Environmental Specifications

Table 31 provides QXS 12, 24, 48, and 56-drive non-operating environmental specifications.

Table 31 QXS 12, 24, 48, and 56-Drive Non-operating Environmental Specifications

Specification	Range
Altitude	To 12,000 meters (39,370 feet)
Shipping Temperature*	-40°F to 158°F (-40°C to 70°C)
	Note: De-rate 2°C for every km, up to 3000 meters
Humidity	Up to 93% RH @ 104°F (40°C) non-condensing
Shock	15.0 g, 11 ms, ½ sine pulses, X, Y, Z [2U12/2U24/2U48] 1” drop to hard unyielding surface per NEBS GR-63-CORE Unpackaged Equipment Shock Criteria (§4.3.2) [4U56]
Vibration	(Shaped-spectrum) 2.8 Hz to 365.4 Hz, 0.852 G_{rms} total (horizontal) 2.8 Hz to 365.4 Hz, 1.222 G_{rms}total (vertical)

Declared Acoustic Noise Levels

Table 32 provides QXS 12, 24, 48, and 56-drive declared acoustic noise levels.

Table 32 QXS 12, 24, 48, and 56-Drive Declared Acoustic Noise Levels

Specification	Range
Sound Power	LWAd=6,75 B
Sound Pressure	LpAm - 55dBA