

IBM Cloud Object Storage System  
Version 3.14.7

*IBM Small J10 Disk Enclosure Manual*  
*4957-J10/4958-J10*



**Note**

Before using this information and the product it supports, read the following information:

- The general information in *Notices*
- The information in *Safety and environmental notices*
- The information in the *IBM Environmental Notices and User Guide* (provided on a DVD)

This edition applies to IBM COS Small Disk Enclosure J10 and is valid until replaced by new editions.

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## Document information

### Intended purpose and audience

This manual contains the instructions for installing and maintaining this appliance. The audience for this guide consists of those individuals responsible for installing IBM Cloud Object Storage System<sup>™</sup> appliances.

#### Note:

- The equipment and device described for installation herein are sophisticated and relatively complex to install. The party or parties installing the equipment must be familiar with installations of computer hardware and disk drives prior to attempting this installation. Only personnel proficient in working with computer hardware and disk drives should attempt to install this appliance.
- After all appliances have been installed in the rack, refer to the *Appliance Configuration Guide* to configure the appliance settings required prior to setting up the system.
- After these appliances are configured, refer to the *System Manager Administration Guide* for information about how to configure, operate, and maintain your system.
- Both the *Appliance Configuration Guide* and the *System Manager Administration Guide* assume that all necessary appliances for the system are installed in the rack.



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## Safety and environmental notices

Review the safety notices, environmental notices, and electronic emission notices for IBM® Cloud Object Storage System before you install and use the product.

Suitability for telecommunication environment - This product is not intended to connect directly or indirectly by any means whatsoever to interfaces of public telecommunications networks.

Examples of a caution and a danger notice. Numbers in parentheses refer to message numbers in the *IBM Safety Notices* publication G229-9054, which is included with your product.

### CAUTION:

**A caution notice indicates the presence of a hazard that has the potential of causing moderate or minor personal injury. (C001)**

### DANGER

<b>A danger notice indicates the presence of a hazard that has the potential of causing death or serious personal injury. (D002)</b>
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## Safety notices

Safety notices for this product.

Familiarize yourself with the *IBM Safety Notices* publication G229-9054, which is included with your product.

**DANGER:** When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- If IBM supplied the power cord(s), connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.
- Do not open or service any power supply assembly.
- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.
  - For AC power, disconnect all power cords from their AC power source.
  - For racks with a DC power distribution panel (PDP), disconnect the customer's DC power source to the PDP.
- When connecting power to the product ensure all power cables are properly connected.
  - For racks with AC power, connect all power cords to a properly wired and grounded electrical outlet. Ensure that the outlet supplies proper voltage and phase rotation according to the system rating plate.
  - For racks with a DC power distribution panel (PDP), connect the customer's DC power source to the PDP. Ensure that the proper polarity is used when attaching the DC power and DC power return wiring.
- Connect any equipment that will be attached to this product to properly wired outlets.
- When possible, use one hand only to connect or disconnect signal cables.

- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Do not attempt to switch on power to the machine until all possible unsafe conditions are corrected.
- Assume that an electrical safety hazard is present. Perform all continuity, grounding, and power checks specified during the subsystem installation procedures to ensure that the machine meets safety requirements.
- Do not continue with the inspection if any unsafe conditions are present.
- Before you open the device covers, unless instructed otherwise in the installation and configuration procedures: Disconnect the attached AC power cords, turn off the applicable circuit breakers located in the rack power distribution panel (PDP), and disconnect any telecommunications systems, networks, and modems.
- Connect and disconnect cables as described in the following procedures when installing, moving, or opening covers on this product or attached devices.

To disconnect:

1. Turn off everything (unless instructed otherwise).
2. For AC power, remove the power cords from the outlets.
3. For racks with a DC power distribution panel (PDP), turn off the circuit breakers located in the PDP and remove the power from the Customer's DC power source.
4. Remove the signal cables from the connectors.
5. Remove all cables from the devices.

To connect:

1. Turn off everything (unless instructed otherwise).
2. Attach all cables to the devices.
3. Attach the signal cables to the connectors.
4. For AC power, attach the power cords to the outlets.
5. For racks with a DC power distribution panel (PDP), restore the power from the Customer's DC power source and turn on the circuit breakers located in the PDP.
6. Turn on the devices.

Sharp edges, corners and joints may be present in and around the system. Use care when handling equipment to avoid cuts, scrapes and pinching. (D005)

**CAUTION:** The battery contains lithium. To avoid possible explosion, do not burn or charge the battery.

*Do Not:*

- Throw or immerse into water
- Heat to more than 100 degrees C (212 degrees F)
- Repair or disassemble

Exchange only with the approved part. Recycle or discard the battery as instructed by local regulations. In the United States, IBM has a process for the collection of this battery. For information, call 1-800-426-4333. Have the IBM part number for the battery unit available when you call. (C003)

**DANGER:** Observe the following precautions when working on or around your IT rack system:

- Heavy equipment-personal injury or equipment damage might result if mishandled.
- Always lower the leveling pads on the rack cabinet.
- Always install stabilizer brackets on the rack cabinet unless the earthquake option is to be installed.
- To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.

- Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices. In addition, do not lean on rack mounted devices and do not use them to stabilize your body position (for example, when working from a ladder).



- Each rack cabinet might have more than one power cord.
  - For AC powered racks, be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.
  - For racks with a DC power distribution panel (PDP), turn off the circuit breaker that controls the power to the system unit(s), or disconnect the customer's DC power source, when directed to disconnect power during servicing.
- Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.
- An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (R001 part 1 of 2)

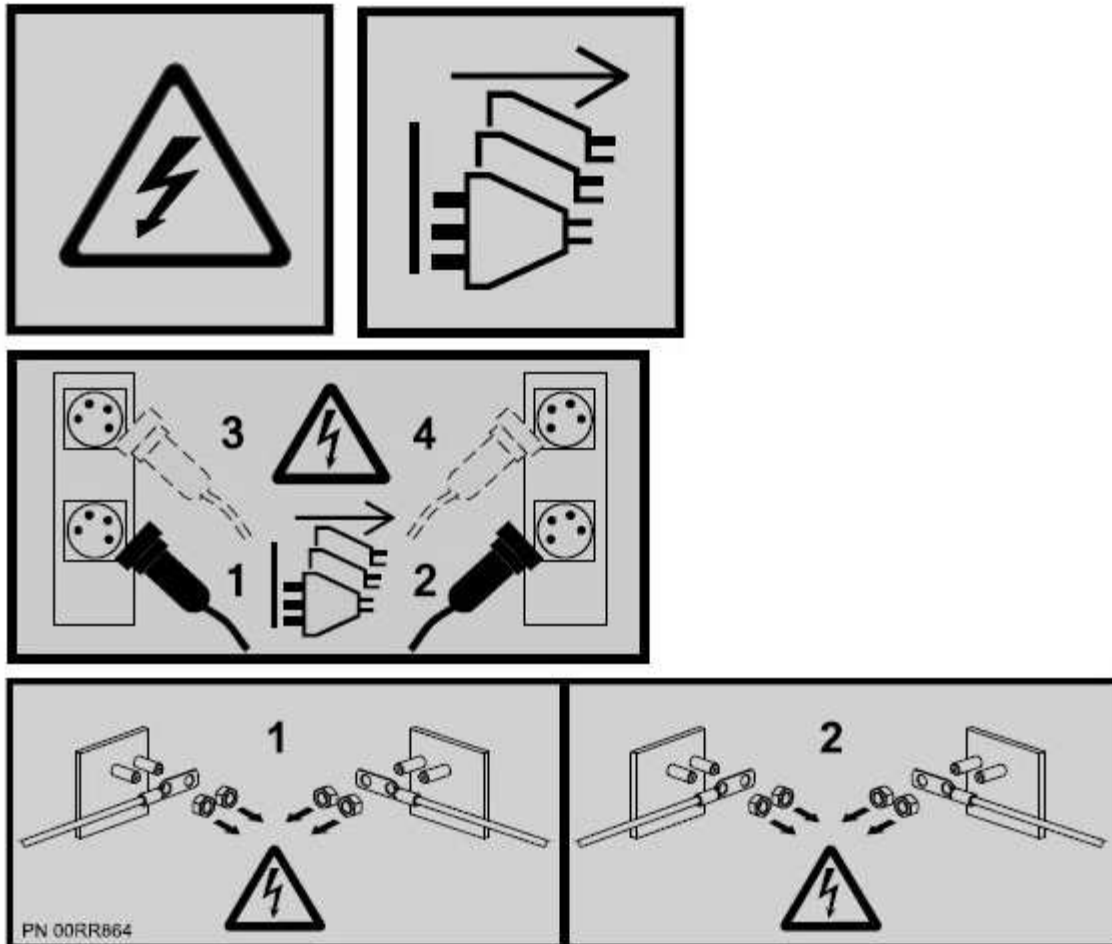
#### CAUTION:

- Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.
- Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.
- Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.
- (For sliding drawers.) Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack or if the rack is not bolted to the floor. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.

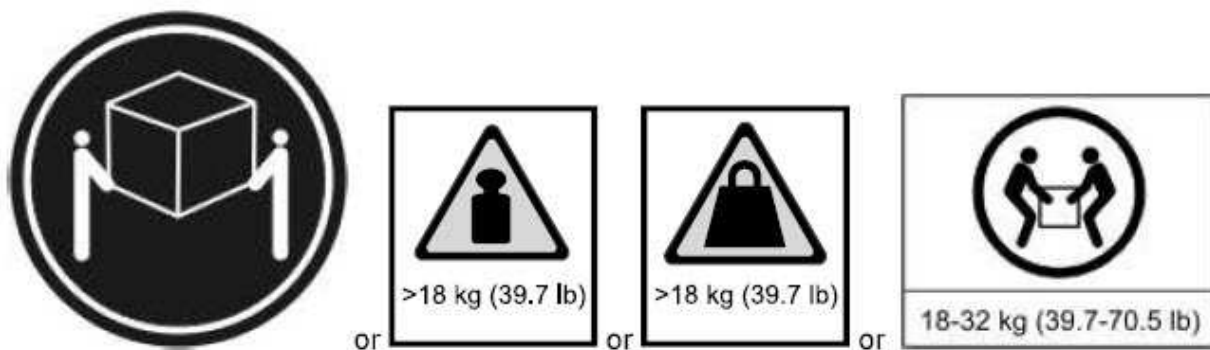


- (For fixed drawers.) This drawer is a fixed drawer and must not be moved for servicing unless specified by the manufacturer. Attempting to move the drawer partially or completely out of the rack might cause the rack to become unstable or cause the drawer to fall out of the rack. (R001 part 2 of 2)

**DANGER:** Multiple power cords. The product might be equipped with multiple AC power cords or multiple DC power cables. To remove all hazardous voltages, disconnect all power cords and power cables. (L003)



**CAUTION:** The weight of this part or unit is between 18 and 32 kg (39.7 and 70.5 lb). It takes two persons to safely lift this part or unit. (C009)



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## Environmental notices

This information contains all of the environmental notices for IBM Systems products in English and other languages.

The IBM Systems Environmental Notices information includes statements on limitations, product information, product recycling and disposal, battery information, flat panel display, refrigeration and water-cooling systems, external power supplies, and safety data sheets.

## Electromagnetic Compatibility Notices

### Class A Notices

The following Class A statements apply to IBM products and their features unless designated as electromagnetic compatibility (EMC) Class B in the feature information.

When attaching a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices supplied with the monitor.

### Canada Notice

CAN ICES-3 (A)/NMB-3(A)

### European Community and Morocco Notice

This product is in conformity with the protection requirements of Directive 2014/30/EU of the European Parliament and of the Council on the harmonization of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.

Warning: This equipment is compliant with Class A of CISPR 32. In a residential environment this equipment may cause radio interference.

## Germany Notice

### **Deutschsprachiger EU Hinweis: Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit**

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2014/30/EU zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55032 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der IBM empfohlene Kabel angeschlossen werden. IBM übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung von IBM verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung von IBM gesteckt/eingebaut werden.

EN 55032 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden:

"Warnung: Dieses ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funk-Störungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen zu ergreifen und dafür aufzukommen."

### **Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten**

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)". Dies ist die Umsetzung der EU-Richtlinie 2014/30/EU in der Bundesrepublik Deutschland.

### **Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC Richtlinie 2014/30/EU) für Geräte der Klasse A**

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:

International Business Machines Corp.  
New Orchard Road  
Armonk, New York 10504  
Tel: 914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:

IBM Deutschland GmbH  
Technical Relations Europe, Abteilung M456  
IBM-Allee 1, 71139 Ehningen, Germany  
Tel: +49 (0) 800 225 5426  
email: HalloIBM@de.ibm.com

Generelle Informationen:

**Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55032 Klasse A.**



## Japan Electronics and Information Technology Industries Association (JEITA) Notice

(一社) 電子情報技術産業協会 高調波電流抑制対策実施

要領に基づく定格入力電力値： Knowledge Center の各製品の

仕様ページ参照

This statement applies to products less than or equal to 20 A per phase.

高調波電流規格 JIS C 61000-3-2 適合品

This statement applies to products greater than 20 A, single phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。

- 回路分類 : 6 (単相、P F C回路付)
- 換算係数 : 0

This statement applies to products greater than 20 A per phase, three-phase.

高調波電流規格 JIS C 61000-3-2 準用品

本装置は、「高圧又は特別高圧で受電する需要家の高調波抑制対策ガイドライン」対象機器（高調波発生機器）です。

- 回路分類 : 5 (3相、P F C回路付)
- 換算係数 : 0

## Japan Voluntary Control Council for Interference (VCCI) Notice

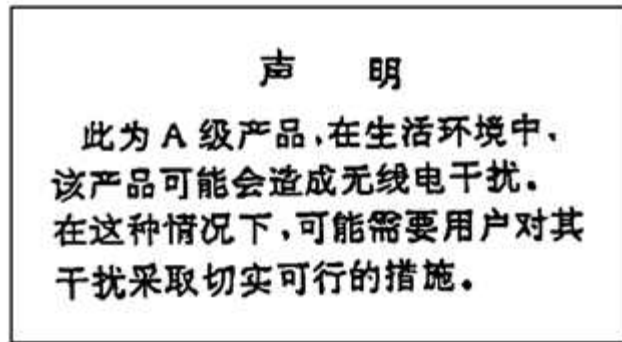
この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

V C C I - A

## Korea Notice

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

## People's Republic of China Notice



## Russia Notice

ВНИМАНИЕ! Настоящее изделие относится к классу А. В жилых помещениях оно может создавать радиопомехи, для снижения которых необходимы дополнительные меры

## Taiwan Notice

### 警告使用者：

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

IBM Taiwan Contact Information:

台灣IBM 產品服務聯絡方式：  
台灣國際商業機器股份有限公司  
台北市松仁路7號3樓  
電話：0800-016-888

## United States Federal Communications Commission (FCC) Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Proper cables and connectors are available from IBM-authorized dealers. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

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

### Responsible Party:

International Business Machines Corporation  
New Orchard Road  
Armonk, NY 10504  
Contact for FCC compliance information only: [fccinfo@us.ibm.com](mailto:fccinfo@us.ibm.com)

## Declared noise emissions

### Declared noise emissions in accordance with ISO 9296<sup>(1-5)</sup>

Table 1. Declared noise emissions in accordance with ISO 9296<sup>(1-5)</sup>

Product description Models: A10, C10, M10, J10, J11 & J12	Declared A-weighted sound power level, $L_{WA,m}$ (B)		Declared A-Weighted Sound Pressure Level, $L_{pA,m}$ (dB)		Statistical adder for verification $K_v$ (B)	
	Operating	Idling	Operating	Idling	Operating	Idling
Typical Configuration: 23 ± 2 degrees C, 500m	7.1 <sup>(6)</sup>	7.1 <sup>(6)</sup>	60	60	0.3	0.3
Maximum configuration: 27 degrees C, 500m	7.3 <sup>(6)</sup>	7.3 <sup>(6)</sup>	60	60	0.3	0.3
Maximum configuration: Worst-case ambient Fan failure	8.7 <sup>(6)</sup>	8.7 <sup>(6)</sup>	74	74	0.3	0.3

Notes:

1. Declared level  $L_{WA,m}$  is the upper-limit A-weighted sound power level; Declared level  $L_{pA,m}$  is the mean A-weighted sound pressure level measured at the 1-meter bystander positions.
2. The statistical adder for verification,  $K_v$ , is a quantity to be added to the declared mean A-weighted sound power level,  $L_{WA,m}$  such that there will be a 95% probability of acceptance, when using the verification procedures of ISO 9296, if no more than 6.5% of the batch of new equipment has A-weighted sound power levels greater than ( $L_{WA,m} + K_v$ ).
3. The quantity  $L_{WAc}$  (formerly called  $L_{WA,d}$ ), can be computed from the sum of  $L_{WA,m}$  and  $K_v$ .
4. All measurements made in conformance with ISO 7779 and declared in conformance with ISO 9296.
5. B, dB, abbreviations for bels and decibels, respectively. 1 B = 10 dB.
6. **Note:** Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room where you designate the racks to be installed; the noise levels from other equipment; the room ambient temperature, and employees' location in relation to the equipment. Further, compliance with such government regulations also depends upon a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. IBM recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

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## Support information

Technical support contacts.

For more information on the product or help with troubleshooting, contact IBM Support at [ibm.com/mysupport](http://ibm.com/mysupport) or visit the Directory of worldwide contacts.

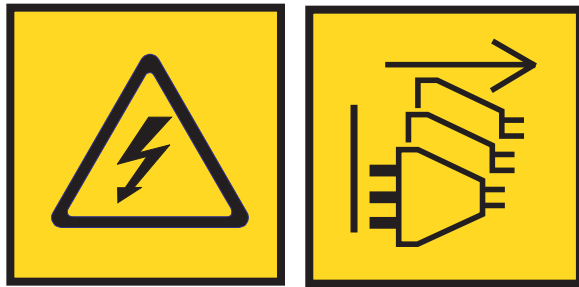


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## Chapter 1. Appliance safety precautions

Observe physical, electrical, and electronic component safety precautions.

**DANGER:** An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (D004)



**DANGER:** Multiple power cords. The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords. (L003)

---

### Physical

Ensure that your equipment rack is placed in a dust-free, well-ventilated area close to an uninterruptible power supply (UPS). Leave enough room behind and around the rack for services and sufficient airflow.

- Keep the area around the appliance clean and free of clutter.
- Place the appliance top cover and any appliance components that were removed away from the appliance or on a table so that they do not accidentally get damaged.
- While you are working on the appliance, do not wear loose clothing such as neckties and unbuttoned shirt sleeves. They can retain a charge even if you are wearing a wrist strap, or could be pulled into a fan.
- After you access the inside of the appliance, close the appliance and secure it to the rack unit with the retention screws after you ensure that all connections are made.
- Close the rack's front door and all panels and components on the appliances when not servicing to maintain proper cooling.

---

### Electrical

Basic electrical safety precautions must be followed to protect yourself and the appliance:

- Do not work alone with high-voltage components.
- Be aware of the locations of the power switch on the appliance and the room's emergency power-off switch, disconnection switch, or electrical outlet. If an electrical accident occurs, quickly remove power from the system.

## **DANGER**

A danger of explosion exists if the Onboard battery is installed upside down, which reverses its polarities. This battery must be replaced only with the same or an equivalent type that is recommended by the manufacturer. Dispose of used batteries according to the battery manufacturer's instructions.

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## **Electronic components**

Electrostatic discharge (ESD) is generated by two objects with different electrical charges when they come into contact with each other. An ESD neutralizes this difference, which can damage electronic components and printed circuit boards (PCBs). In general, the following measures are sufficient to neutralize this difference before contact is made to protect equipment from ESD:

- Use a grounded wrist strap that is designed to prevent ESDs.
- Keep all components in their antistatic containers until ready for installation.
- Touch a grounded metal object before you remove any board from its antistatic container.
- Remove any jewelry or metal objects from your body. They are excellent metal conductors that can create short circuits and harm you if they come into contact with printed circuit boards or areas where power is present.



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## Chapter 2. System overview

This section is an overview of the IBM COS Small Disk Enclosure that looks at the front, top, and rear panels.

---

### Small disk enclosure

The disk enclosure consists of a sheet metal enclosure assembly with an integrated mid plane PCB and module runner system.

- The disk enclosure has a 19 inch rack mounting that enables it to be installed on to standard 19 inch racks, and uses either four EIA units of rack space , or two EIA units of rack space (3.5 inches) for a 2U enclosure respectively.
- The mid plane PCB has 12 drive connections.
- There 12 drive bays at the front of the enclosure, in horizontal. Each drive bay holds a plug-in drive carrier module

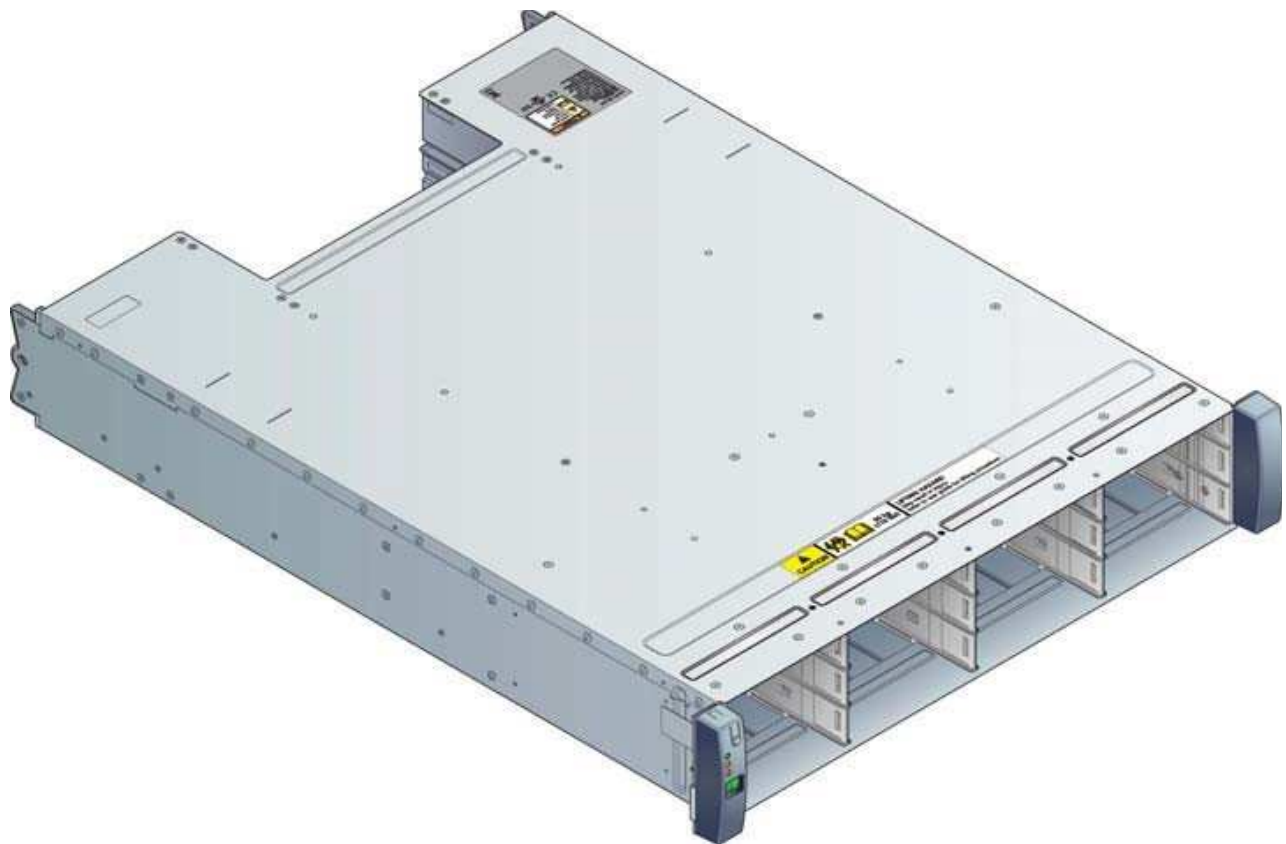


Figure 1. IBM COS 2U12 Disk Enclosure

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### Enclosure configuration

The IBM COS Small Disk Enclosure supports 2U (rack space) disk drive enclosure that holds 12 low profile (1 inch high), 3.5 inch form factor drives in a horizontal orientation - see the figures below.

**Note:** Each individual disk drive is hot pluggable and replaceable on site.



*Figure 2. IBM COS 2U12 Enclosure System – front view*

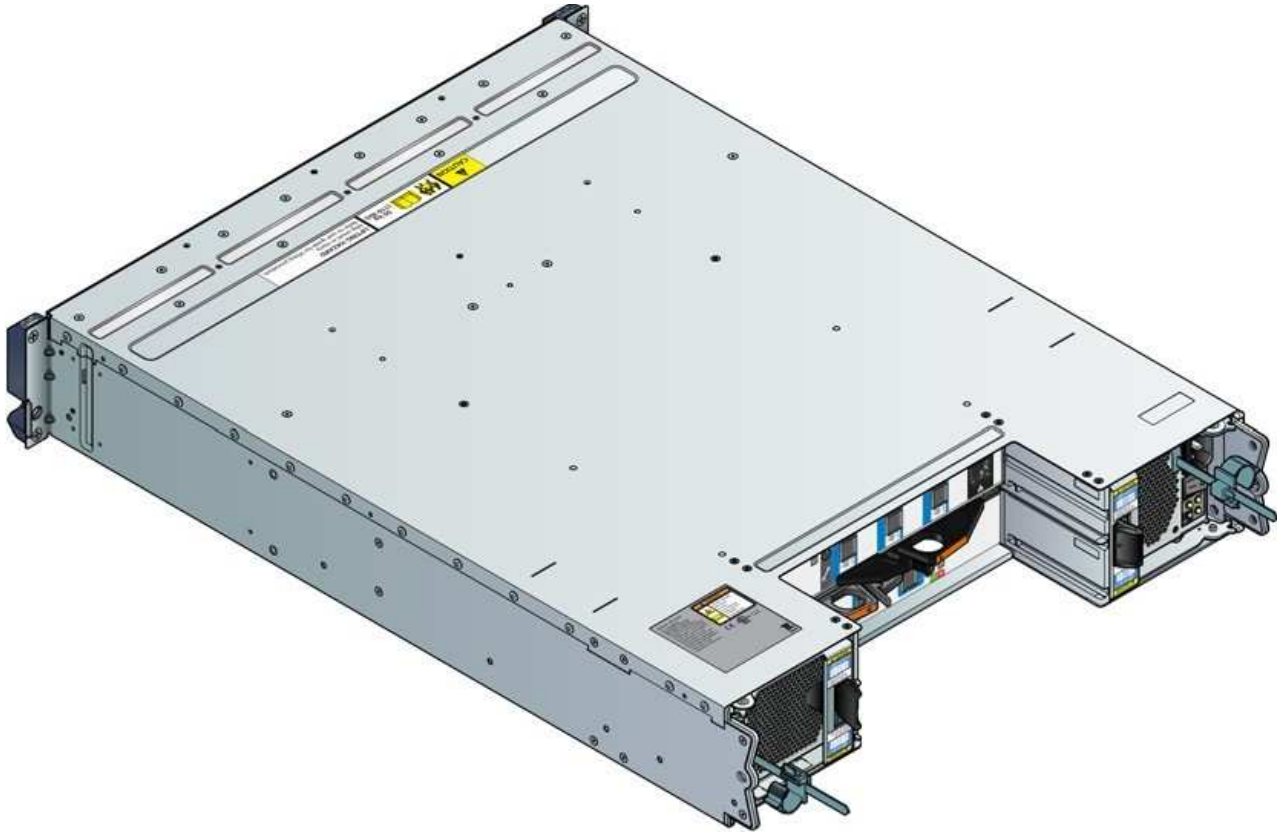


Figure 3. IBM COS 2U12 Enclosure System – rear view

---

## Enclosure specifications

Available small disk enclosures are described below.

### IBM COS small disk enclosure 2U12

12 x low profile (1 inch high), 3.5 inch form factor drives.

Table 2. IBM COS small disk enclosure variants

Product	Configuration	PCMs	SBB I/O	I/O Blanks
4957-J10	12Gb/s direct dock SAS	2	1	1
4958-J10				

---

## Enclosure core product

The small disk enclosure design concept is described.

The design concept is based on an enclosure subsystem together with a set of plug-in modules. A typical enclosure system, as supplied, includes the following:

- A small disk enclosure contains:
  - A mid plane PCB
  - An integral, front flange mounted operator's (ops) panel.

- Two 580W, 100-240V AC power cooling modules (PCMs)
- One I/O module: SBB Primary Interface
- One I/O blank: SBB Secondary Interface
- 12 - 3.5" SAS HDDs
- A rail kit for rack mounting
- A documentation package
- All feature order components

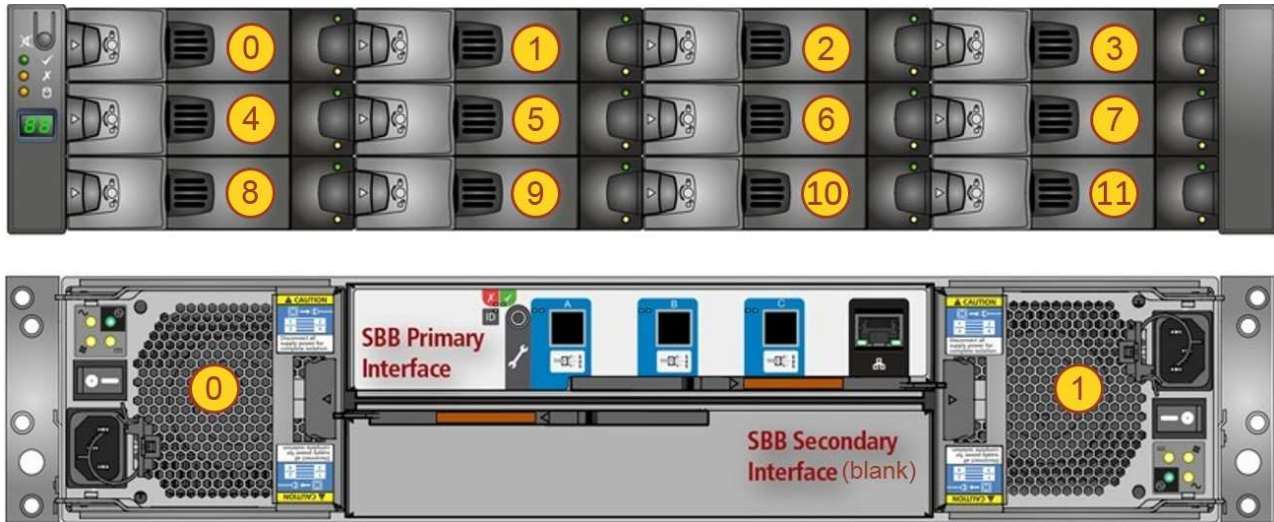


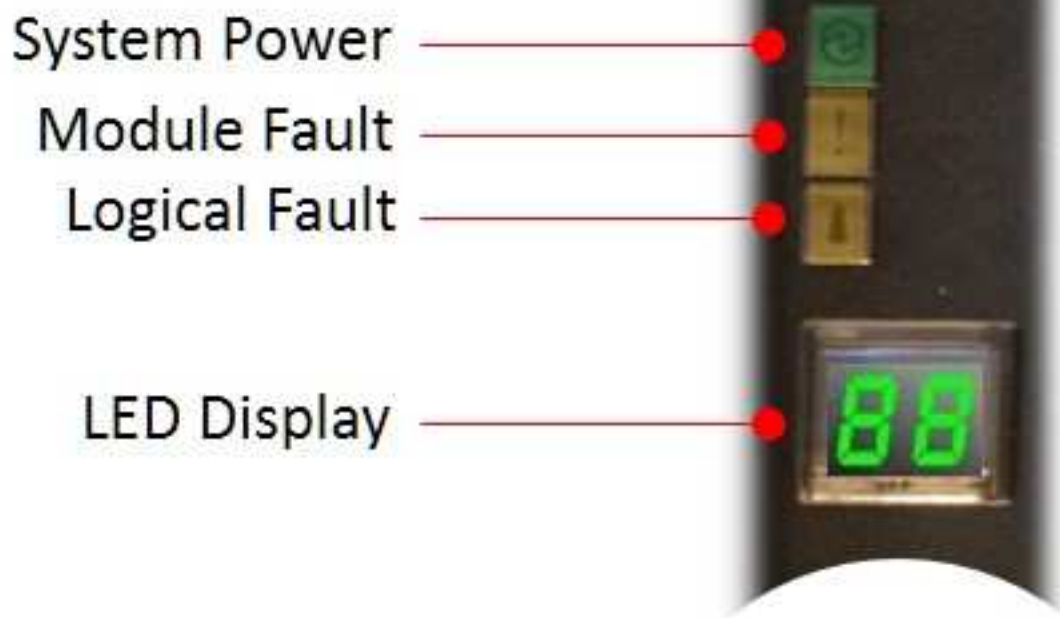
Figure 4. IBM COS Module Locations (2U12)

**Note:** Partially populated disk configurations are not supported on the small J10 disk enclosure. All disk slots must be populated prior to initial use.

## Operator's (Ops) panel

### Overview

The enclosure front panel has an operator's (ops) panel on the left hand mounting flange: a flexible cable connects the Ops panel to the mid plane, as shown below in the figure. The Ops panel is a passive component: the mid plane controls the panel and the I/O modules control all the panel's functions. An integral part of the enclosure chassis, it is not replaceable on site.



*Figure 5. Enclosure Front Operator's Panel*

**System power on/standby LED (green/amber)**

Shows amber when only standby power is available. Shows green when system power is available.

**Module fault LED (amber)**

Comes on when there is a system hardware fault. It may be associated with a fault LED on a PCM, or I/O module that helps the user to identify which component is at fault.

## Logical status LED (amber)

Indicates a change of status or fault from something other than the enclosure management (EM) system. This may be from an internal or external RAID controller or HBA, communicated to the enclosure (normally through SES). It is usually associated with a disk drive and LEDs at each disk drive position helps the user to identify the drive affected.

## Thermal sensor

This thermal sensor is on the outside the enclosure and connects to another thermal sensor on the mid plane of the enclosure. This external thermal sensor sends input to the enclosure about its external operating ambient temperature. Its other function is to cause a warning signal to be generated by the SES when there is a break in this sensor's connection to the enclosure mid plane.

**Note:** Refer to the section on “Ops Panel LEDs” for a description of the LED and switch functions.

*Table 3. Ops Panel LEDs Status*

LED	Status
System Power	Constant green: good or positive indication Constant amber: fault present
Module Fault	Constant or flashing amber: fault present
Logical Fault	Constant or flashing amber: fault present

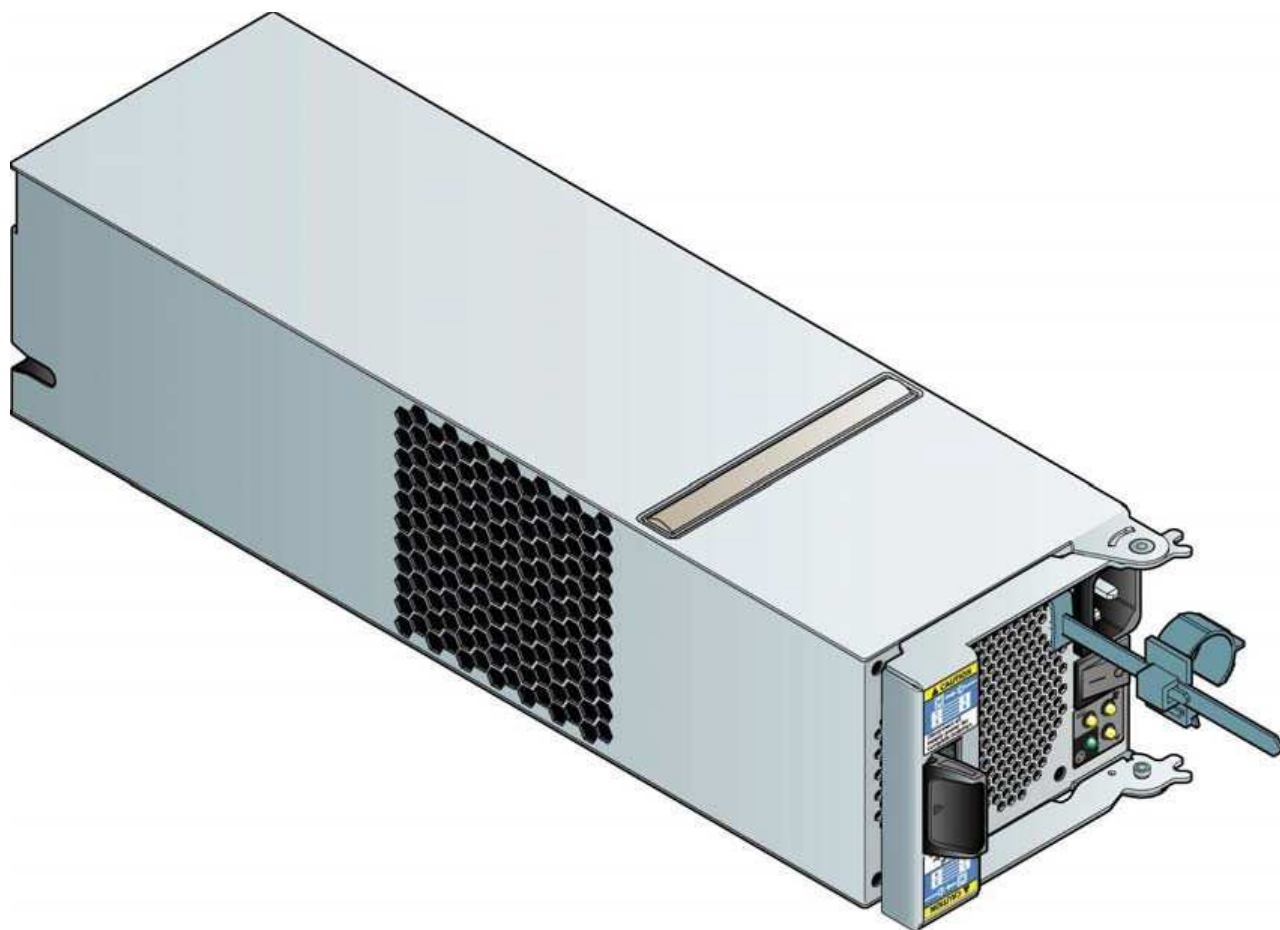
---

## Power cooling module (PCM)

AC-DC power is provided by up to four auto-ranging power cooling modules (PCMs) with integrated axial cooling fans, up to 2 in each module. The SBB I/O modules control the fan speed. See the section that describes the system airflow.

### 580W PCM

A 580W PCM voltage operating range is nominally 100V - 240V AC. Also see the *System airflow* section for optimal cooling within the enclosure(s).



*Figure 6. 580W Power Cooling Module*



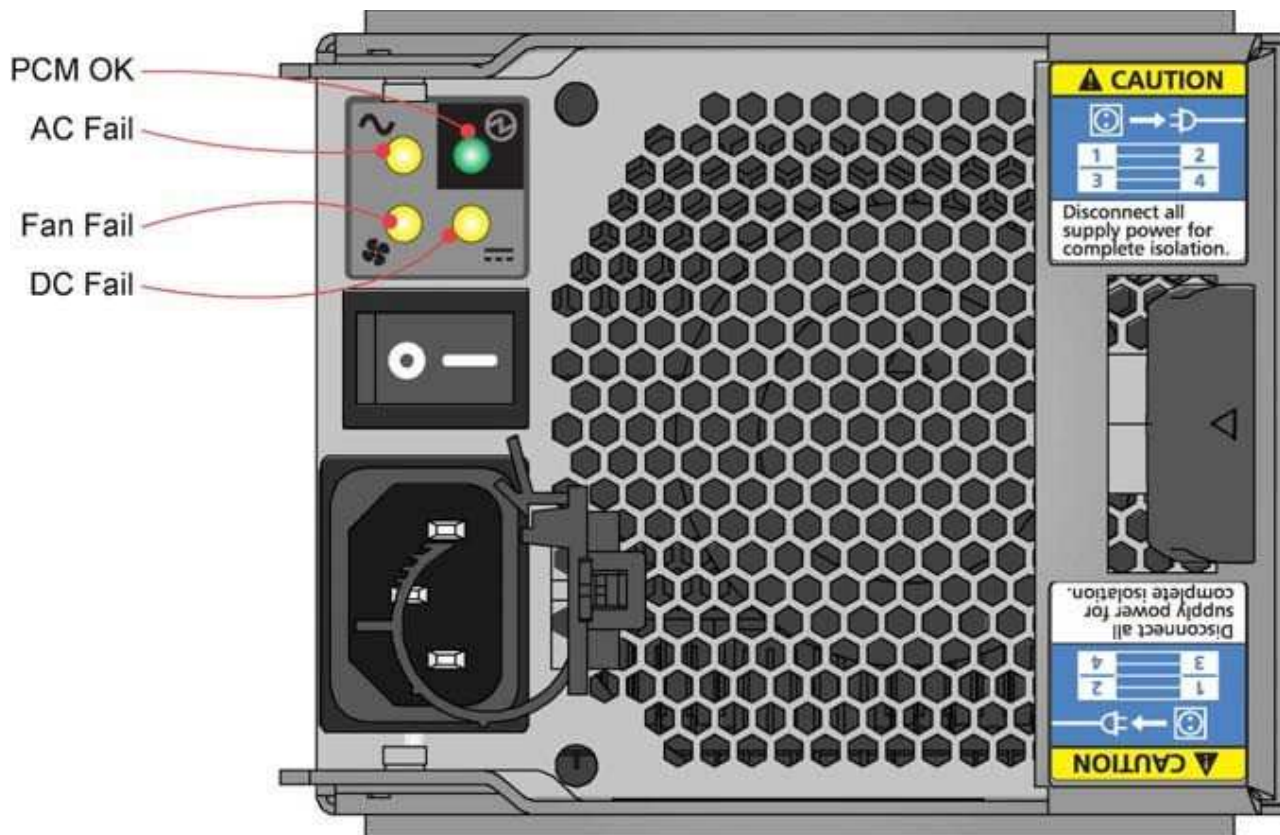


Figure 7. 580W PCM LEDs

Table 4. LEDs - 580W PCM

PCM LED	LED behavior status
PCM OK	Green
AC Input Fail	Amber
Fan Fail	Amber
DC Output Fail	Amber

## Multiple PCMs

The IBM COS small disk enclosure system includes two PCMs in multiple PCMs that provide redundant power control for the system. This is done so that if one PCM fails, the other(s) maintains the power supply and enclosure operation is not affected while you replace the faulty module.

PCMs are hot-pluggable and replacement should only take a few seconds to do. Replacement must be completed within a few seconds after the removal of the defective PCM.

**Note:** Important Operation of the enclosure with ANY modules missing will disrupt the airflow and the drives will not receive sufficient cooling. It is **ESSENTIAL** that all apertures hold active or dummy drives before you switch on the enclosure system.



## Multiple power supply unit modules

The storage system includes two PSUs which provide redundant power control for the system so that if one module fails, the other maintains the power supply, and enclosure operation is not affected while you replace the faulty module.

PSUs are hot-pluggable, and replacement should only take a few seconds to do. Replacement must be completed as soon as possible after the removal of the defective PSU to avoid a thermal exception. The replacement procedure should be completed within an absolute maximum of three minutes.

### Important:

Operation of the enclosure with any modules missing will disrupt the airflow, and the disks will not receive sufficient cooling. It is essential that all slots are fitted with PSUs prior to powering on the enclosure.

## System airflow

The system must be operated with low pressure rear exhaust installation. Back pressure created by rack doors and obstacles is not to exceed 5 pascals (0.5mm water gauge). The cooling system provides sufficient capacity to ensure that maximum temperatures are not exceeded.

---

## I/O module

### Overview

This user guide describes the 12Gb/s SAS I/O module. Blank modules must be put in all empty SBB slots.

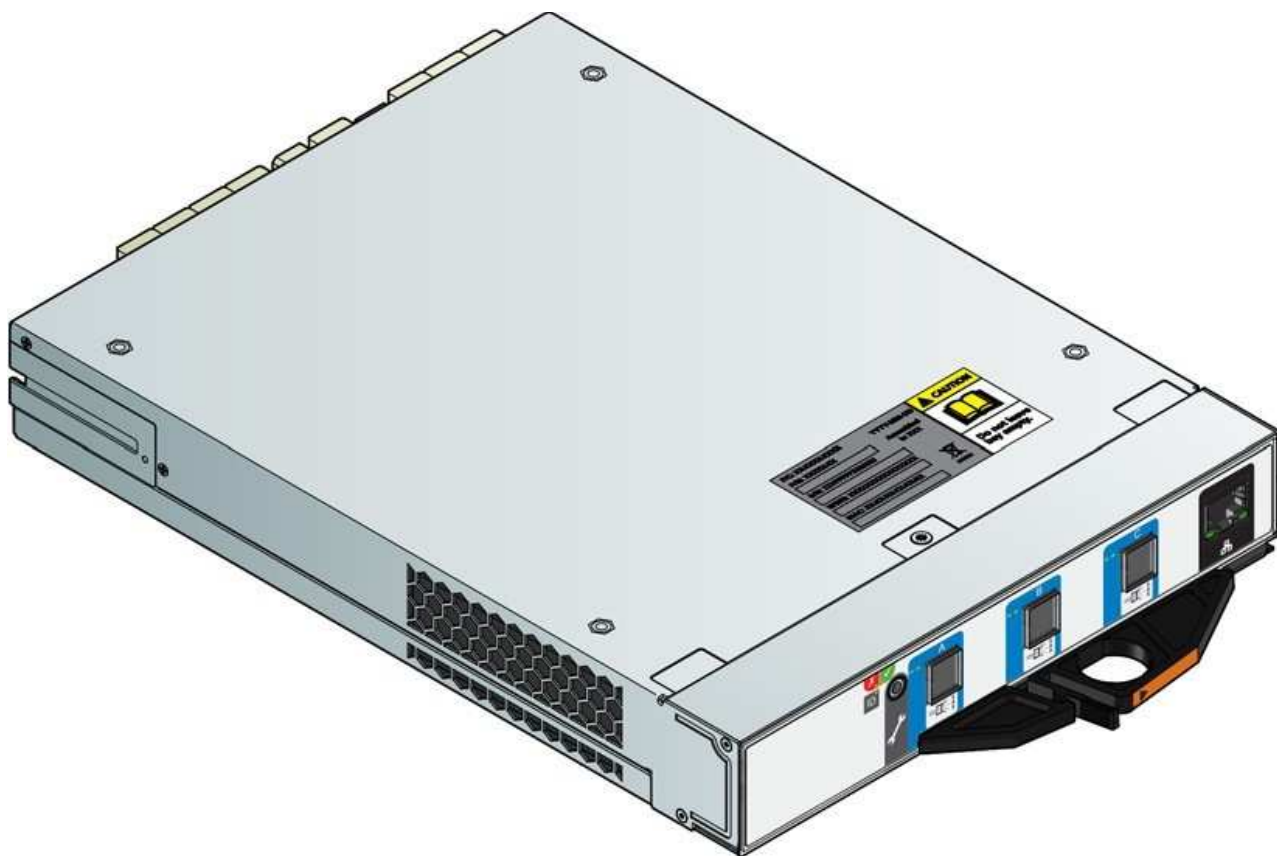


Figure 8. 12Gb/s SAS I/O Module

The system operates from one module with a dummy module providing airflow control in the other slot. Module presence is checked against the (initial power-on) configuration to determine invalid configuration conditions.

## 12Gb/s SAS I/O Module LEDs

Table 5. SAS Activity LEDs

Condition	Activity LED (green)	Fault LED (amber)
No Cable Present	Off	Off
Cable Present	On	Off
All links up, no activity.		
Cable Present All links up.	Flash with aggregate port activity	Off
Critical Fault	Off	On
Any fault which causes operation of the cable to cease or fail to start, e.g. over current trip.		
Non-Critical Fault	Flash with aggregate port activity	Flashing - 1s on 1s off
Any fault which does not cause the connection to cease operation, e.g. not all links established over temperature.		

Table 6. Module Status LEDs

LED	State	Description
Module Fault (amber)	On	A fault condition.
	Off	Module is operating normally.
Power (green)	On	Module powered.
	Off	No power.
ID (blue)	On	Controller being identified.

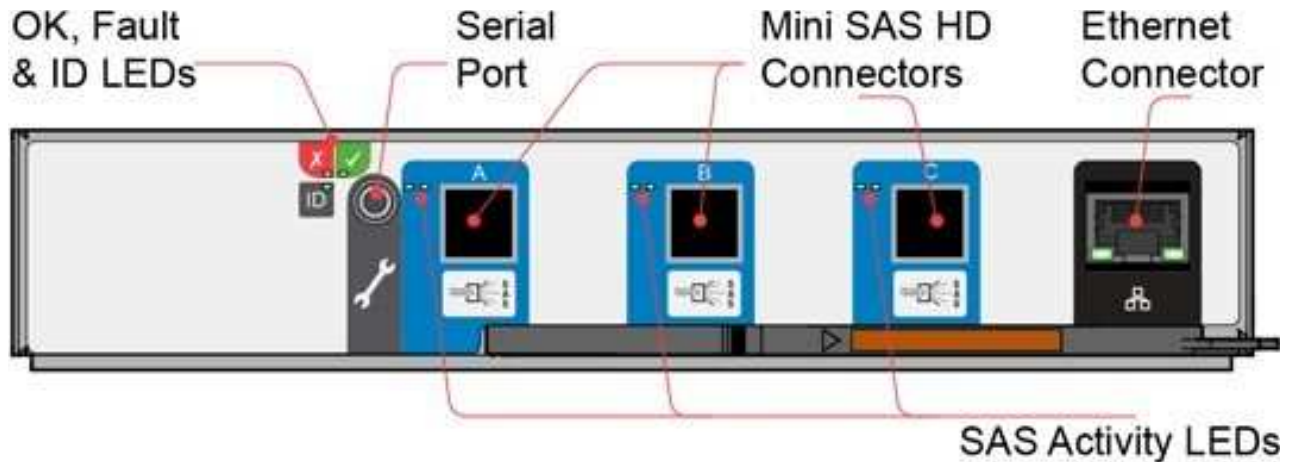


Figure 9. 12Gb/s SAS I/O Module Connectors and Indicators (viewed from rear of enclosure)

The I/O module has three mini-SAS-HD (SFF-8644) connector receptacles. By default each is configured as a SAS-3 universal port.

## Blank I/O modules

Blank I/O modules are provided and must be put in any vacant I/O module bay to make sure of airflow and correct operation.

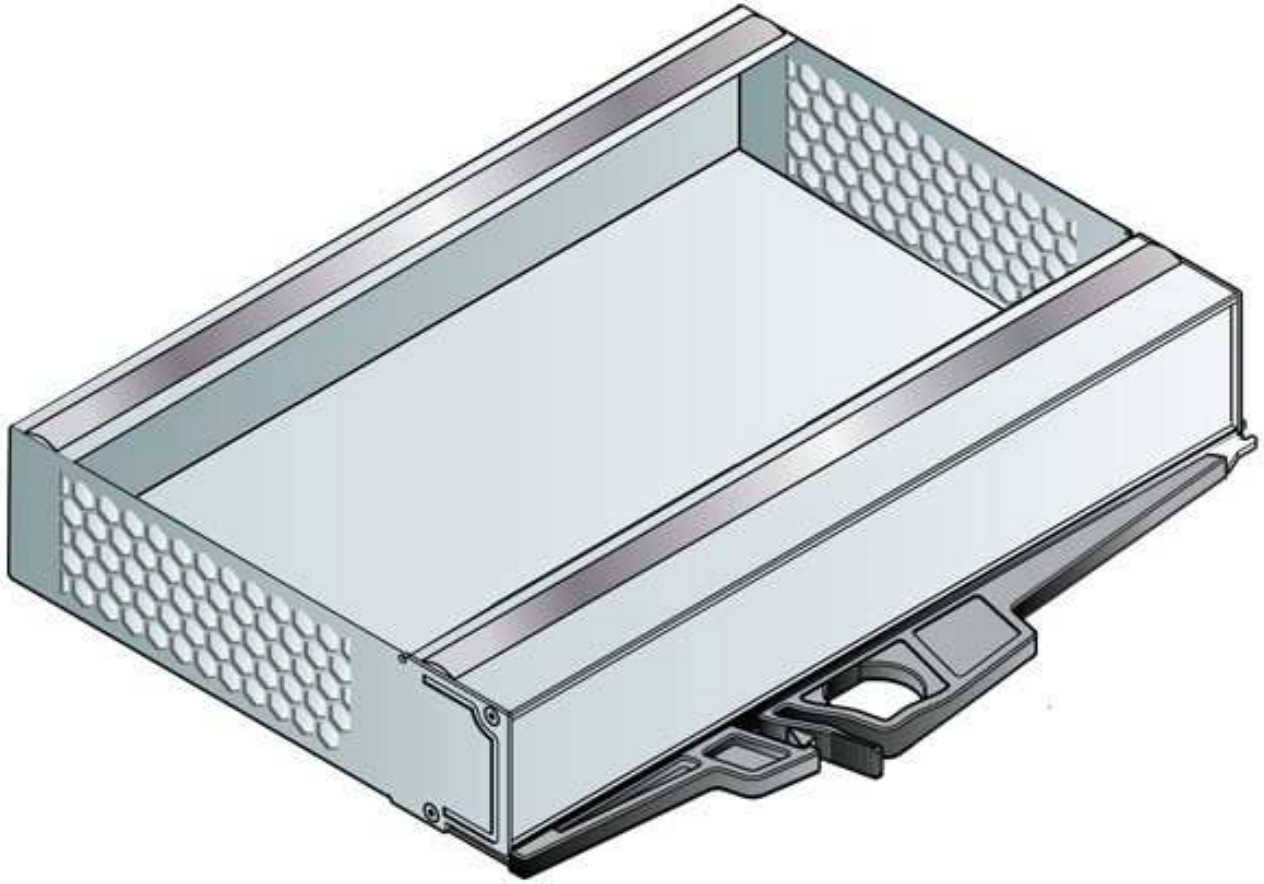


Figure 10. Blank I/O Module

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## Drive carrier modules

The drive carrier module comprises a hard disk held by a carrier.

- Each drive bay holds a single low profile 1.0 inch high, 3.5 inch form factor disk drive in its carrier. Drives are horizontal.

A sheet steel carrier holds each disk drive: which provides thermal conduction, radio frequency and electro-magnetic induction protection and physically protects the drive.

The front cap also has an ergonomic handle which gives the following functions:

- Secure location of the carrier into and out of drive bays.
- Positive 'spring loading' of the drive/mid plane connector.

The carrier can use these interfaces:

- Serial Attached SCSI.



Figure 11. 3.5" SAS Drive

## Drive status indicators

Green and amber LEDs on the front of each drive carrier module indicate Disk drive status as shown in the figure below. The SEP controls these LEDs, see the section that describes these LEDs' states.

## Anti-tamper locks

The drive carrier handles have Anti-tamper locks, as shown below in the figures, which are accessed through the small cutout in the latch section of the handle. These locks disable the normal 'pinch' latch action of the carrier handle.

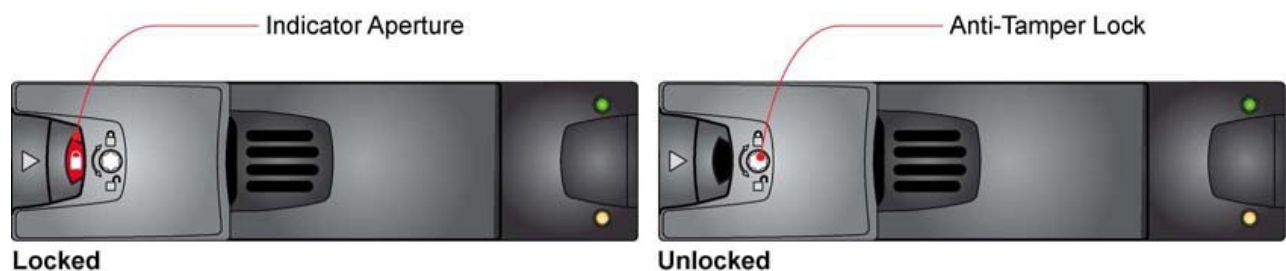


Figure 12. Anti-tamper Lock (3.5" Drive)



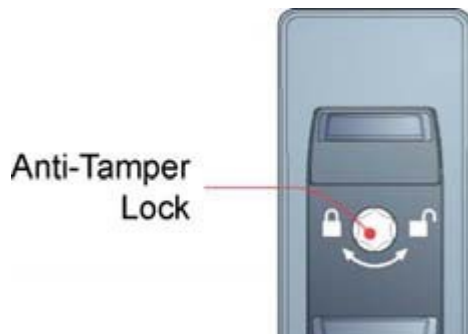


Figure 13. Anti-tamper Lock (3.5" Drive)

## Chapter 3. Installation

This chapter discusses how to plan and install your IBM COS small disk enclosure into an industry standard 19 inch rack cabinet.

### CAUTION:

To install the IBM COS small disk enclosure, use only the power cords supplied.

### Installation planning

You must be familiar with the configuration requirements of your IBM Cloud Object Storage Small Disk Enclosure system before you start installation. See the previous section for the correct locations of each of the plug-in modules.

**Important:** Only service personnel should do installation work..

Table 7. Small disk enclosure configuration

Module type	Location
Drive Carrier Modules	ALL drive bays must be populated with drives. No bays should be empty
Power Cooling Modules	Two must be installed. Full power redundancy is provided – this lets the system continue to operate while a faulty PCM is replaced.
IOM Modules	A maximum of two SBB I/O modules can be installed. The unused slot must have a blank I/O module. One IOM must be installed.

### Prepare for installing the small disk enclosure

The IBM COS Small Disk Enclosure is delivered with all drive carrier modules installed.

**Note:** The enclosure together with all its component parts is too heavy for one person to easily install into a rack cabinet.

**CAUTION:** Make sure that you wear an effective anti-static wrist or ankle strap and obey all conventional ESD precautions when you touch modules and components. Do not touch midplane, motherboard and module connectors, etc.



Before beginning the enclosure installation, familiarize yourself with the system configuration requirements. The figures listed below show the locations for each plug-in module:

This section gives very important preparation requirements and good handling procedures. We encourage you to use these procedures for a successful installation.

## How to prepare the site and host server

Before you start, make sure that the site where you will install and use your IBM COS small storage system has:

- A Standard AC power from an independent source or a rack power distribution unit with an UPS (Universal Power Supply).
- IBM COS Controller node

## How to unpack the small disk enclosure

1. Examine the packaging for crushes, cuts, water damage or any other evidence of mishandling during transit. If you suspect that damage has happened, photograph the packaging before you open it: this is for possible future reference.
2. The following figure shows the sequence for how to unpack.

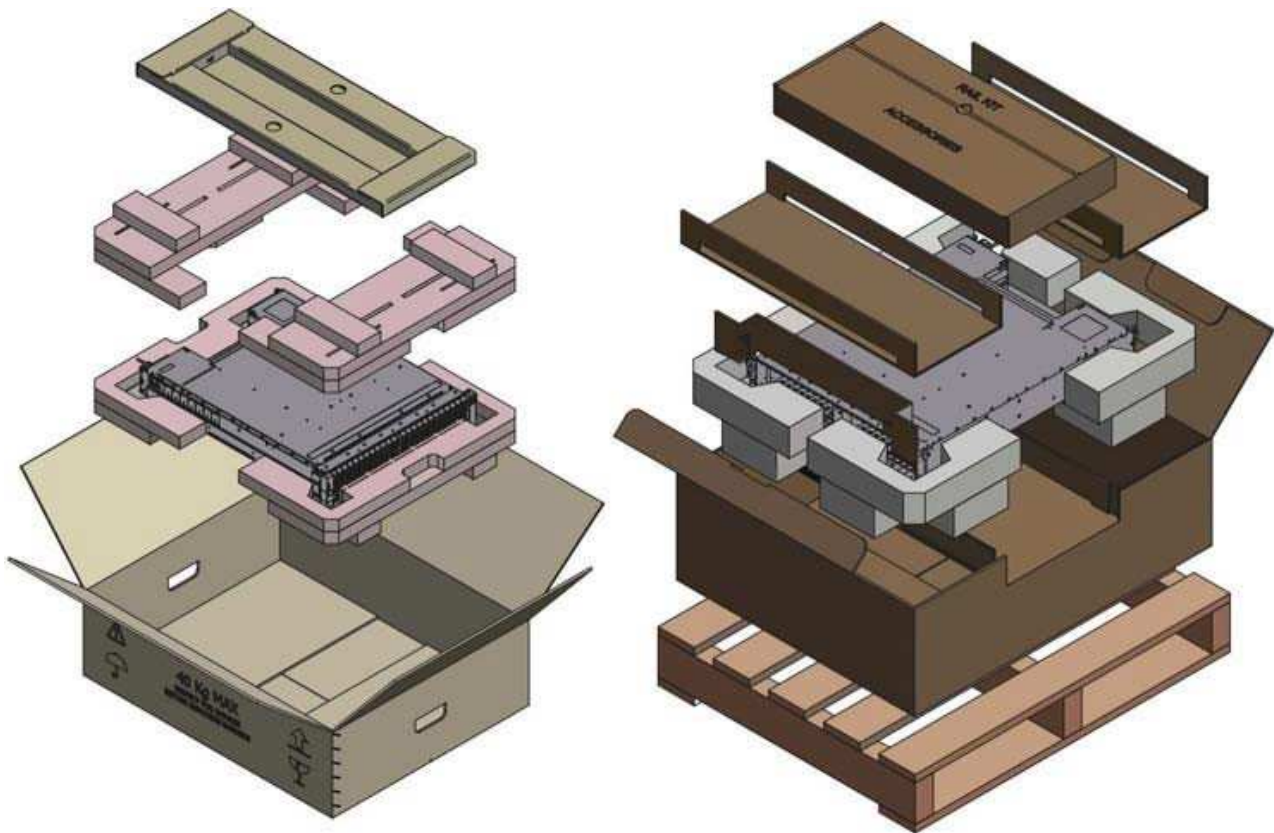


Figure 14. How to unpack the small disk enclosure

## How to plan and configure your installation

You should become familiar with the configuration requirements of your small disk enclosure system before you begin installation. Refer to the section on system configurations for more information.



## Requirements for installation of the racks

You can install the small disk enclosure in an industry standard 19 inch cabinet that is capable of holding such enclosures.

- Minimum depth: 707mm (27.83 inches) from rack posts to maximum extremity of enclosure (excludes rear cabling).
- Weight: up to 29kg (64lb), dependent upon configuration, per enclosure.
- There must be a minimum gap of 25mm (1 inch) clearance between the rack cover and front of drawer; and 50mm (2 inches) rear clearance between the rear of the drawer and rear of the rack. This is to make sure there is correct air flow around the enclosure.
- The rack should cause a maximum back pressure of 5 pascals (0.5mm water gauge).

---

## Rack mount rail kit

Various sets of rack mounting rails are available for use in 19 inch rack cabinets. These rails have been designed and tested for the maximum enclosure weight and to make sure that multiple enclosures may be installed without loss of space within the rack. Use of other mounting hardware may cause some loss of rack space.

Contact IBM support to make sure suitable mounting rails are available for the rack you are to use.

---

## Power cord connection

Connect the power cord(s) to the power distribution unit(s) (PDUs), as shown in the following figure.

**Important:** When more than one PCM is fitted, all power cords must be connected to at least two separate and independent supplies to guarantee redundancy.

### CAUTION:

**Always remove the power connections before you remove the PCM from the enclosure.**

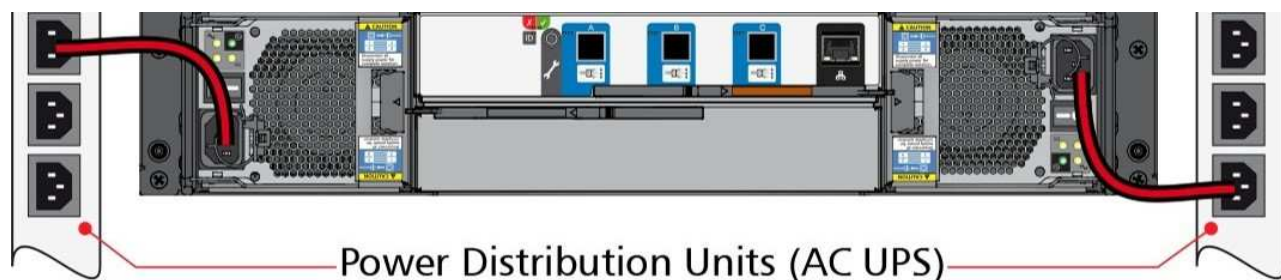


Figure 15. Typical AC Power Cable Connections to PCMs

**Important:** The small disk enclosure is fitted with two redundant PSUs. All power cords must be connected to at least two separate and independent power supplies to ensure redundancy.

- The figure above shows the power connection from a single-core PSU to a PDU using C19 connectors.
- The C20 plug on the PSU connects to the C19 receptacle of the power cord. The C20 plug on the power cord connects to the C19 receptacle in the PDU.

**CAUTION:****Power connection concerns:**

- Never connect the power cord to the PSU before installing the PSU in the system.
- Always remove the power connections *before* you remove the PSU from the enclosure.
- Standard (single-lead) power cords must only be connected to a supply range of 100–240V AC as indicated on each PSU's hazardous voltage warning label.

**Testing enclosure connections**

See the section *Powering on/powering off*. Once the power-on sequence succeeds, the storage system is ready to be connected.

---

**Grounding checks**

The product must only be connected to a power source that has a safety electrical earth connection.

**Note:** If more than one 2U enclosure goes in a rack, the importance of the earth connection to the rack increases, because the rack will have a larger “EARTH LEAKAGE CURRENT” (“TOUCH CURRENT”).

Examine the earth connection to the rack before the switch on: an electrical engineer who is qualified to the appropriate local and national standards must do the examination.

---

**System configurations**

The basic configuration is a single IBM COS Small Disk Enclosure connected to a single IBM COS Controller Node

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**SAS cable connections**

The following figure and steps describe how to connect the SAS cables from a single IBM COS Small Disk Enclosure connected to a single IBM COS Controller Node, and when to power the unit on.

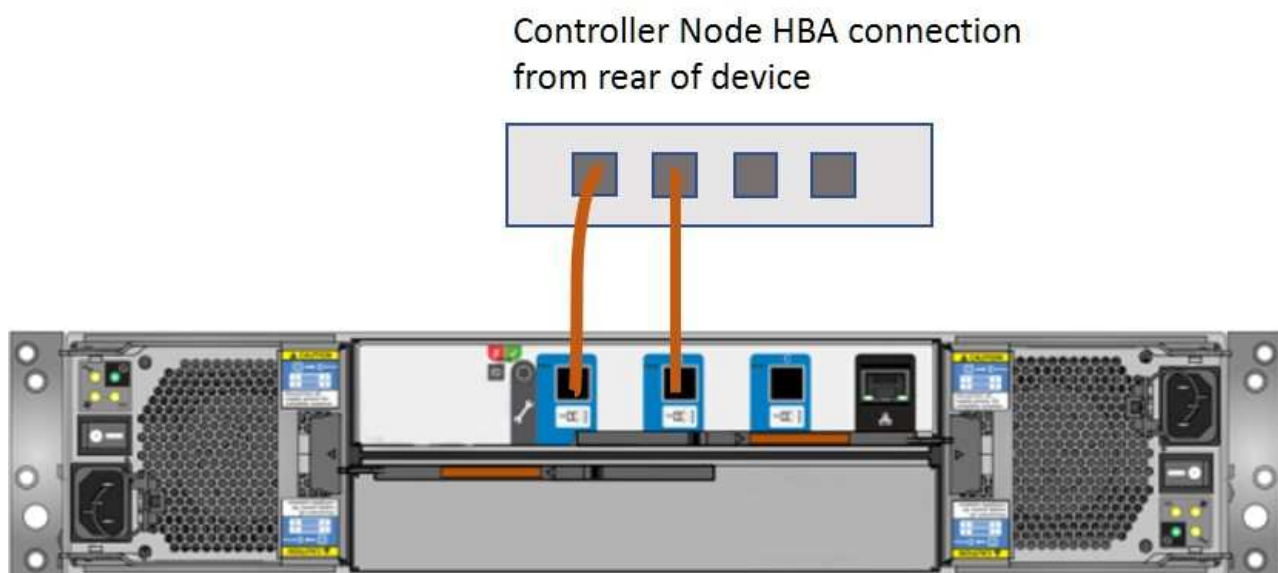


Figure 16. SAS cable connections

1.

**Important:** The COS Controller Node and the COS Small Disk Enclosure must be powered off before attaching the first of the two supplied Mini-SAS HD cables.

Make the first cable connection between the far-left port on the HBA as shown in the figure, and the far-left port on the I/O Module installed in the small disk enclosure. The second cable is connected between the second port from the left on the HBA and the middle port on the I/O Module.

2. Power on the COS small disk enclosure.
3. When the COS small disk enclosure has reached a steady state, then proceed to power on the Controller Node.



---

## Chapter 4. Operation

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### Powering on

#### About this task

Before powering on the enclosure system, make sure that all modules are firmly seated in their correct bays. Verify that you have successfully completed the sequential instructions in the section covering installation planning.

#### CAUTION:

**Do not operate the enclosure system until the ambient temperature is within the specified operating range described in the *Environmental requirements* section. If the drive modules have been recently installed, make sure they have had time to adjust to the environmental conditions before they operate.**

#### Procedure

1. Power on the system by connecting the power cables to the PDU and moving the PCM switch to the “on” position. See the *Power cord connection* section.
2. The system power LED on the ops panel should be lit green when the enclosure power is activated (and the disk drive motors should start).

**Important:** If mains power is lost for any reason, on restoration of power the system will re-start automatically.

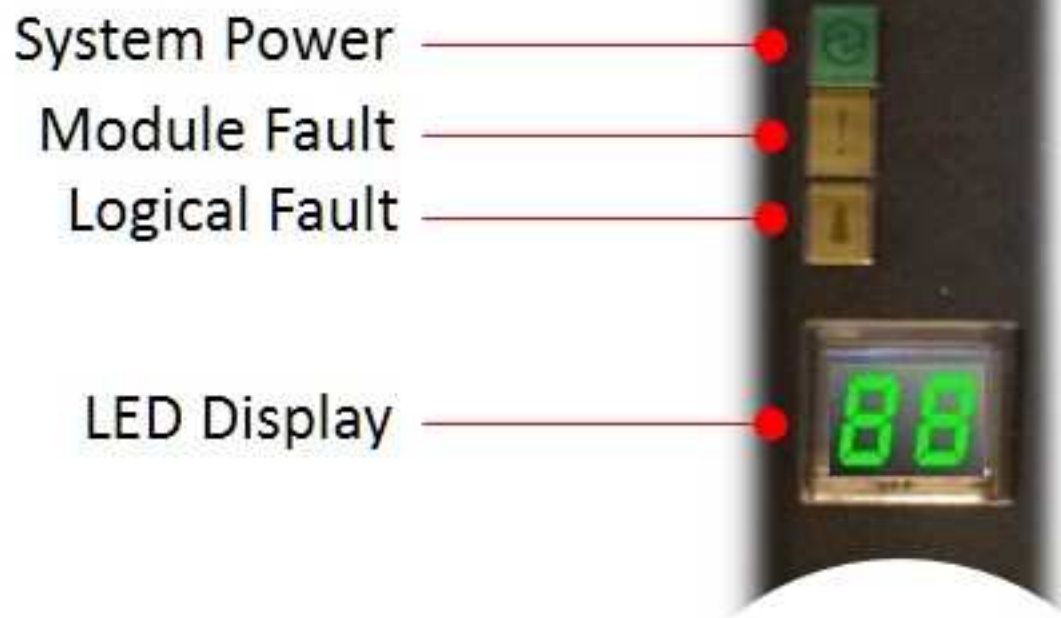
**Note:** Refer to the section on Initial start-up problems for details of the ops panel LEDs and related fault conditions.

---

### Operator's (Ops) panel

#### Overview

The enclosure front panel has an operator's (ops) panel on the left hand mounting flange: a flexible cable connects the Ops panel to the mid plane, as shown below in the figure. The Ops panel is a passive component: the mid plane controls the panel and the I/O modules control all the panel's functions. An integral part of the enclosure chassis, it is not replaceable on site.



*Figure 17. Enclosure Front Operator's Panel*

**System power on/standby LED (green/amber)**

Shows amber when only standby power is available. Shows green when system power is available.

**Module fault LED (amber)**

Comes on when there is a system hardware fault. It may be associated with a fault LED on a PCM, or I/O module that helps the user to identify which component is at fault.

## Logical status LED (amber)

Indicates a change of status or fault from something other than the enclosure management (EM) system. This may be from an internal or external RAID controller or HBA, communicated to the enclosure (normally through SES). It is usually associated with a disk drive and LEDs at each disk drive position helps the user to identify the drive affected.

## Thermal sensor

This thermal sensor is on the outside the enclosure and connects to another thermal sensor on the mid plane of the enclosure. This external thermal sensor sends input to the enclosure about its external operating ambient temperature. Its other function is to cause a warning signal to be generated by the SES when there is a break in this sensor's connection to the enclosure mid plane.

**Note:** Refer to the section on “Ops Panel LEDs” for a description of the LED and switch functions.

*Table 8. Ops Panel LEDs Status*

LED	Status
System Power	Constant green: good or positive indication Constant amber: fault present
Module Fault	Constant or flashing amber: fault present
Logical Fault	Constant or flashing amber: fault present

---

## Disk drive LEDs

Each drive carrier module incorporates two LEDs, green and amber, as shown in the following figures for the different drive carriers.



*Figure 18. 3.5" Drive Carrier LEDs*

- In normal operation the green LED will be on and will flicker as the drive operates.
- In normal operation the amber LED state will be:
  - Blinking if no drive is present
  - Off as the drive operates
  - On if there is a drive fault

---

## Power off

### About this task

**CAUTION:**

**You must power off your head node first, then power off the disk enclosure.**

To power the enclosure system down, switch off the PCM(s) installed in the enclosure by moving the PCM switch to the “Off” position.



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## Chapter 5. Troubleshooting and problem solving

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### Overview

The small disk enclosure system includes a Storage Enclosure Processor (SEP) and associated monitoring and control logic to enable it to diagnose problems within the enclosure's power, cooling and drive systems.

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### Initial start-up problems

#### Faulty power cords

Check that you have correctly cabled the system. Contact IBM support for replacements if:

- Power cables are missing or damaged.
- Plugs are incorrect.
- Power cables are too short.

#### Controller Node does not recognize the small disk enclosure system

1. Verify that the interface cables from the enclosure to the IBM COS node controller are fitted correctly.
2. Verify that the LEDs on all installed drive carrier modules are on (green).
3. Verify that the drive carrier modules have been correctly installed.
4. Check any visible SAS indicators (COS Controller Node HBA, and IOM control module).
5. Verify that ClevOS has been installed correctly.

---

### LEDs

#### Overview

LED colors are used consistently throughout the enclosure and its components for indicating status:

**Green** Good or positive indication

**Flashing green/amber**

Non-critical condition

**Amber**

Critical fault

#### 580W PCM LEDs

Under normal conditions the PCM OK LEDs will be a constant green. When a fault occurs, the colors of the LEDs will be as shown in the following table. See also Figure 7 on page 10.

*Table 9. PSU LED status*

PCM OK(Green)	Fan Fail (Amber)	AC Fail (Amber)	DC Fail (Amber)	Status
Off	Off	Off	Off	No AC on any PCM
Off	Off	On	On	No AC on this PCM only

Table 9. PSU LED status (continued)

On	Off	Off	Off	AC present; PCM working correctly
On	Off	Off	On	PCM fan speed is outside acceptable limits
Off	On	Off	Off	PCM fan has failed
Off	On	On	On	PCM fault (over temperature, over voltage, over current)
Flashing	Off	Off	Off	Standby mode
Off	Flashing	Flashing	Flashing	PCM firmware download in progress

## Ops panel LEDs

The front panel displays the aggregated status of all the modules. The enclosure status LEDs located on the front panel are labeled in Figure 5 on page 7 and they are individually described in the narrative subsections that follow the table.

Table 10. Ops Panel LED states

System Power (Green/Amber)	Module Fault (Amber)	Logical Fault (Amber)	LED Display	Associated LEDs/Alarms	Status
On	Off	Off			5V standby power present, overall power failed or switched off
On	On	On	On		Ops panel power on (5s), test state
On	Off	Off			Power on, all functions good
On	On			PCM fault LEDs, fan fault LEDs	Any PCM fault, fan fault, over or under temperature
On	On			SBB module LEDs	Any SBB module fault
On	On			No module LEDs	Enclosure logical fault
On	Flash			Module status LED on SBB module	Unknown (invalid or mixed) SBB module type installed, I2C bus failure (inter-SBB communications), I/O VPD configuration error

Table 10. Ops Panel LED states (continued)

System Power (Green/Amber)	Module Fault (Amber)	Logical Fault (Amber)	LED Display	Associated LEDs/Alarms	Status
On	Flash			PCM fault LEDs, fan fault LEDs	Unknown (invalid or mixed) PCM type installed or I2C bus failure (PCM comms)
On		On		Array in failed or degraded state	Drive failure has occurred causing loss of availability or redundancy
On		Flash		Array in impacted state	Arrays operating background function
On	Flash			SES state S1	Enclosure ID setting different from initial power-on setting
			Flash		Enclosure identification or invalid ID selected

## Disk drive carrier module LEDs

Disk drive status is monitored by a blue LED and an amber LED mounted on the front of each drive carrier module, as shown in the figures below. The drive module LED conditions are defined in the table following the figure.

- In normal operation the green LED is on, and flickers as the drive operates.
- In normal operation the amber LED state is:
  - Off if there is no drive present.
  - Off as the drive operates.
  - On if there is a drive fault.



Figure 19. 3.5" Drive carrier LEDs

Table 11. LEDs: Drive carrier LEDs

Drive LED (green)	Drive LED (amber)	Associated Ops Panel LED	Status
Off	Off	None	No drive installed
On/ Flashing	Off	None	Drive installed and operational
On	Flashing: 1s on/1s off	None	SES device identity set
On	On	Logical fault (amber)	SES device fault bit set
Off	On	Module fault (amber)	Power control circuit failure
On	Flashing: 3s on/1s off	Logical fault (amber)	SES device rebuild bit set

## I/O Module LEDs

I/O module LED states are shown in the following table.

Table 12. I/O module LED states

I/O Module OK (green)	I/O Module Fault (amber)	SAS Activity LED (green)	Status
On	Off		I/O module OK
Off	On		I/O module fault. For replacement procedure see “Replacing an I/O module” on page 43
		Off	No external host port connection
		On	External host port connection - no activity
		Flashing	External host port connection - activity
Flashing			I/O module VPD error

## Temperature sensors

Temperature sensors throughout the enclosure and its components monitor the thermal health of the storage system. Exceeding the limits of critical values will cause a notification to occur.

## Troubleshooting the small disk enclosure system

### Alarm conditions

The following sections describe common problems that can occur with your small disk enclosure system, and some possible solutions. For the problems listed in the table below, the pertinent fault LEDs on the enclosure front panel will light amber to indicate a fault. See also “Operator’s (Ops) panel” on page 6.

Table 13. Alarm conditions

Status	Severity	Alarm
PCM alert – loss of DC power from a single PCM	Fault – no loss of redundancy	S1
PCM alert – loss of DC power from a single PCM	Fault – loss of redundancy	S1

Table 13. Alarm conditions (continued)

Status	Severity	Alarm
PCM fan fail	Fault – loss of redundancy	S1
SBB module detected PCM fault	Fault	S1
PCM removed	Configuration error	None
Enclosure configuration error (VPD)	Fault – critical	S1
Low warning temperature alert	Warning	S1
High warning temperature alert	Warning	S1
Over temperature alarm	Fault – critical	S4
I2C bus failure	Fault – loss of redundancy	S1
Ops panel communication error (I2C)	Critical fault	S1
SBB interface module fault	Fault – critical	S1
SBB interface module removed	Warning	None
Drive power control fault	Warning – no loss of drive power	S1
Drive power control fault	Fault– critical – loss of drive power	S1
Insufficient power available	Warning	None

**Note:** For details on how to remove and replace a module see Chapter 6., “Module Removal and Replacement.”

## Power Cooling Module (PCM) faults

Table 14. Alarm conditions

Symptom	Cause	Action
Ops panel module fault LED amber	Any power fault.	Check AC mains connections to PCM is live.
Fan fail LED is illuminated on PCM.	A fan failure.	Replace PCM.

## Thermal monitoring and control

The small disk enclosure system uses extensive thermal monitoring, and takes a number of actions to ensure component temperatures are kept low, and also to minimize acoustic noise. Air flow is from the front to the rear of the enclosure.

Table 15. Thermal monitoring and control

Symptom	Cause	Action
<p>If the ambient air is below 25 °C and the fans are observed to increase in speed then some restriction on airflow may be causing additional internal temperature rise.</p> <p><b>Note:</b> This is not a fault condition.</p>	<p>The first stage in the thermal control process is for the fans to automatically increase in speed when a thermal threshold is reached. This may be caused by higher ambient temperatures in the local environment and may be perfectly normal.</p> <p><b>Note:</b> This threshold changes according to the number of drives and power supplies fitted.</p>	<ol style="list-style-type: none"> <li>1. Check the installation for any airflow restrictions at either the front or rear of the enclosure. A minimum gap of 25mm at the front and 50mm at the rear is recommended.</li> <li>2. Check for restrictions due to dust build-up. Clean as appropriate.</li> <li>3. Check for excessive re-circulation of heated air from rear to the front. Use of the enclosure in a fully enclosed rack is not recommended.</li> <li>4. Check that all blank modules are in place and secure.</li> <li>5. Reduce the ambient temperature.</li> </ol>

## Thermal alarm

Table 16. Thermal alarm

Symptom	Cause	Action
<ol style="list-style-type: none"> <li>1. Ops panel module fault LED is amber.</li> <li>2. Fan fail LED is lit on one or more PCMs.</li> </ol>	<p>Internal temperature exceeds a pre-set threshold.</p>	<ol style="list-style-type: none"> <li>1. Check that the local ambient environment temperature is below the specification.</li> <li>2. Check the installation for any airflow restrictions at either the front or rear of the enclosure. A minimum gap of 25mm at the front and 50mm at the rear is recommended.</li> <li>3. Check for restrictions due to dust build-up. Clean as appropriate.</li> <li>4. Check for excessive re-circulation of heated air from rear to the front. Use of the enclosure in a fully enclosed rack is not recommended.</li> <li>5. If possible shutdown the enclosure and investigate the problem before continuing.</li> </ol>

## Dealing with hardware faults

Ensure that you have obtained a replacement module of the same type before removing any faulty module as described in the *Module removal and replacement* section.

**Important:** If the enclosure system is powered up and you remove any module, replace it immediately. If the system is used with any modules missing for more than a few seconds, the enclosure(s) can overheat, causing power failure and potential data loss. Such action can invalidate the product warranty.

**Important:**

Observe applicable/conventional ESD precautions when handling modules and components, as described in the *ESD precautions* section. Avoid contact with mid-plane components, module connectors, leads, pins, and exposed circuitry.

---

## **Continuous operation during replacement**

ClevOS supports HOT swapping of data disk drives.

If a small disk enclosure is equipped with two or more PCMs, they can maintain power to the system while a faulty PCM is replaced.

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## **Field Replaceable Units (FRUs) for IBM COS Small Disk Enclosure**

See the FRU Guide: [https://www.ibm.com/support/knowledgecenter/STXNRM\\_3.14.5/coss.doc/fruReference\\_j10.html](https://www.ibm.com/support/knowledgecenter/STXNRM_3.14.5/coss.doc/fruReference_j10.html)





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## Chapter 6. Module removal and installation

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### Overview

**Important:** Always have available a replacement or blank module before removing the old module. When you replace a module, you must never leave an empty bay in the rear of the enclosure.

### ESD precautions

**Important:** It is recommended that you fit and check a suitable anti-static wrist or ankle strap and observe all conventional ESD precautions when handling COS small disk enclosure plug-in modules and components. Avoid contact with midplane components and module connectors.

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### Replacing a PCM

The Power Cooling Module (PCM) is hot-swappable and therefore removal and installation may be performed by the user.

**CAUTION:**

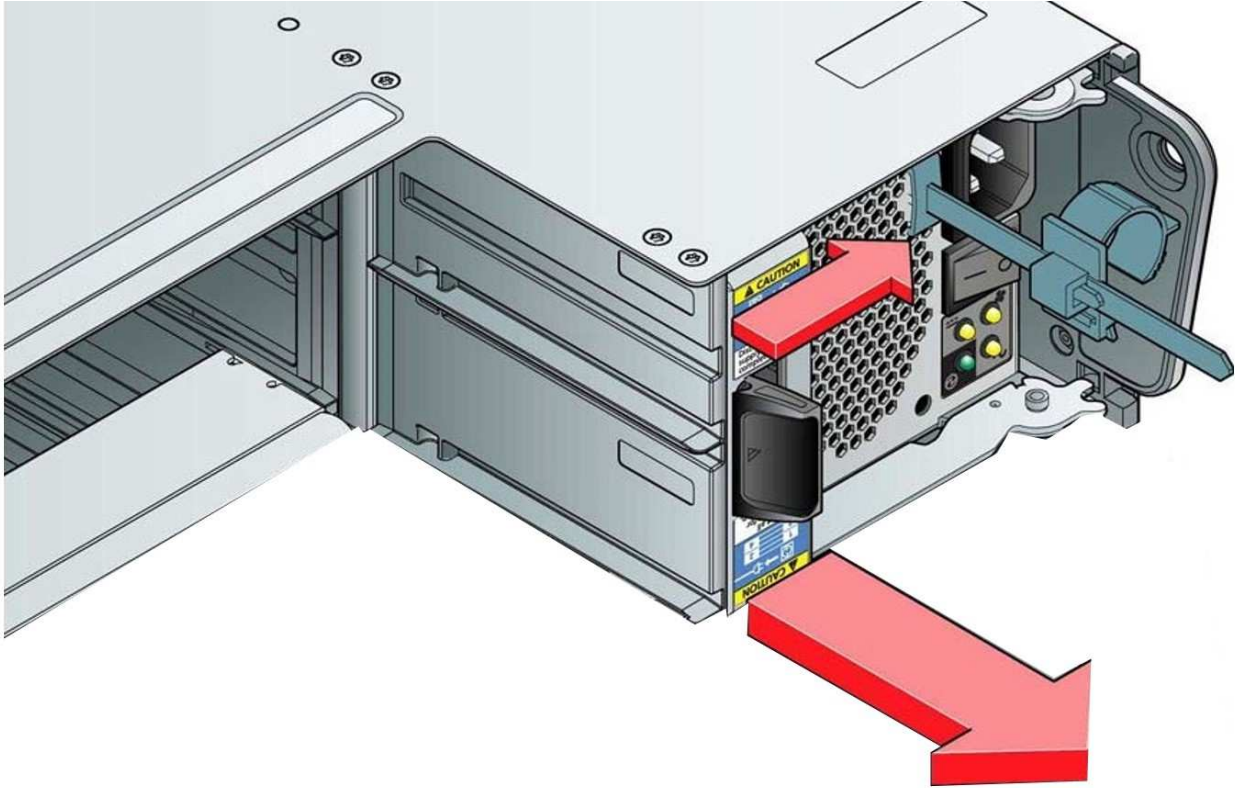
**Do not remove the cover from the PCM due to danger from electric shock inside. Return the PCM to your supplier for repair.**

### Removing a PCM

**Important:** Operation of the enclosure with any modules missing will disrupt the airflow and the drives will not receive sufficient cooling. It is essential that all apertures are filled before operating the enclosure system.

**Important:** Prior to removing the PCM, disconnect the power from the PCM, by either the mains switch (where present) or by physically removing the power source in order to ensure that your system has warning of an imminent power shutdown. A faulty PCM must be replaced by a fully operational PCM within 24 hours.

1. Ensure that you identify the faulty PCM correctly.
2. Switch off and disconnect the power supply cord.
3. Grasp the latch and the side of the PCM handle between thumb and forefinger, squeeze together and open the handle to cam the PCM out of the enclosure , as shown in the following figure.



*Figure 20. Removing a PCM (1 of 2)*

4. Grip the handle and withdraw the PCM as shown in the following figure.

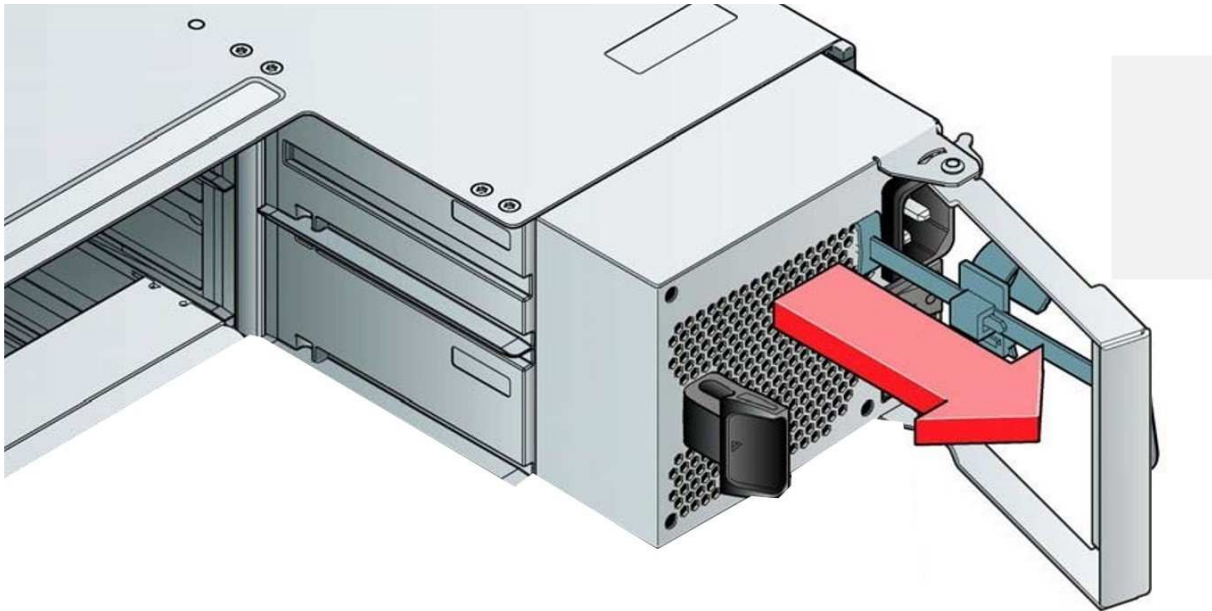
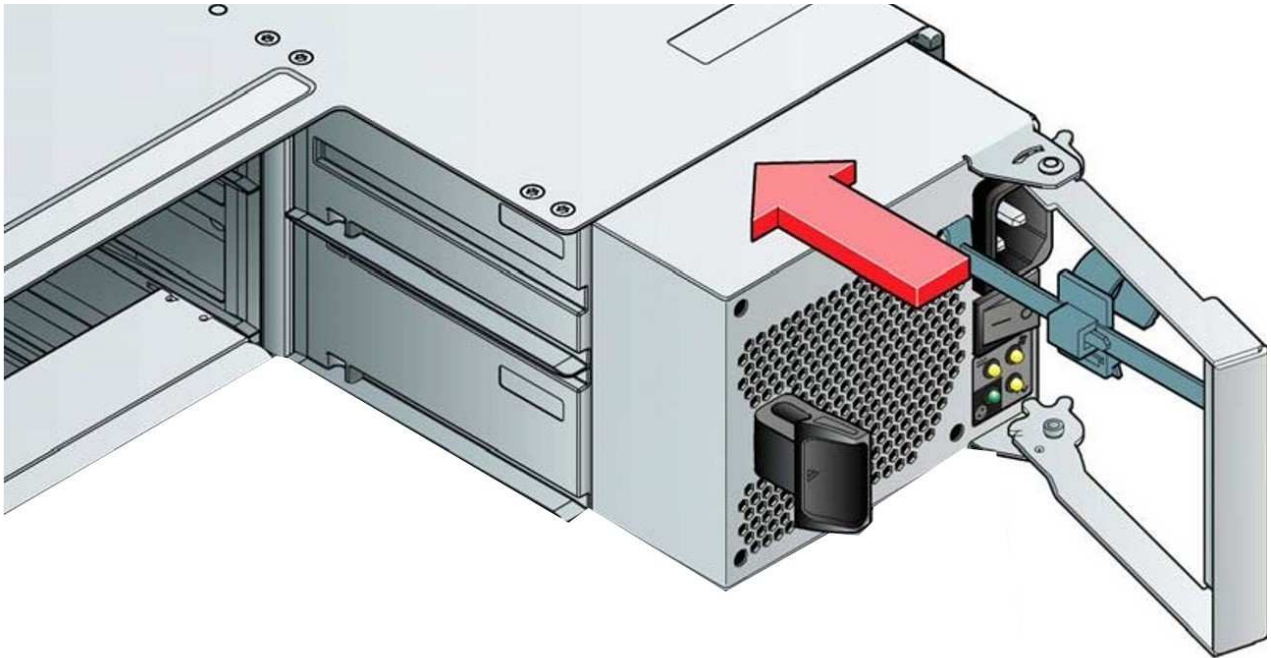


Figure 21. Removing a PCM (2 of 2)

## Installing a PCM

**Important:** Handle the PCM carefully and avoid damaging the connector pins. Do not install the PCM if the following conditions exist:

1. Check for damage, especially to all connectors.
2. With the PCM handle in the open position, slide the module into the enclosure as shown in the following figure.



*Figure 22. Installing a PCM (1 of 2)*

3. Cam the module home by manually closing the PCM handle. A click should be heard as the handle latch engages as shown in the following figure.

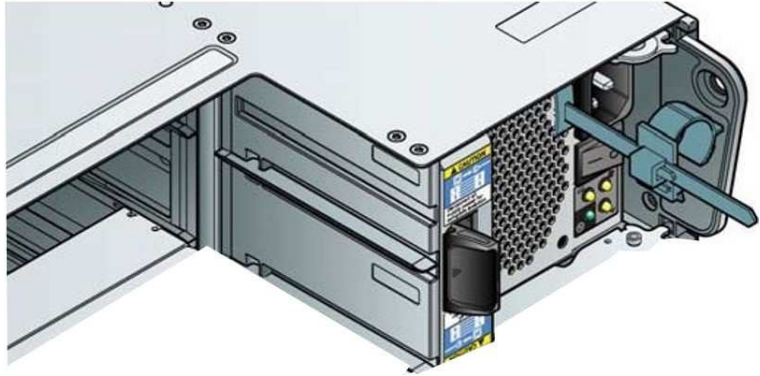


Figure 23. Installing a PCM (2 of 2)

4. Connect the power cables to the power source and to the PCM.
5. Secure the strain relief bales.

---

## Replacing a drive carrier module

**Important:** Observe all conventional ESD precautions when handling COS small disk enclosure modules and components. Avoid contact with midplane components and module connectors, etc.

### Removing a 3.5-inch Drive Carrier Module

**Important:** Damage can occur to a drive if it is removed while it still spins. If possible use the operating system to spin down the drives prior to removal. If this is not possible we recommend that you perform all steps of the following procedure to make sure that the drive has stopped prior to removal.

1. If the anti-tamper lock has been activated, de-activate it by locating the key into its socket and rotating it counter-clockwise until the indicator is no longer visible in the aperture beside the key.
2. Press the latch in the handle towards the handle hinge as shown in the figure below to release the carrier handle.

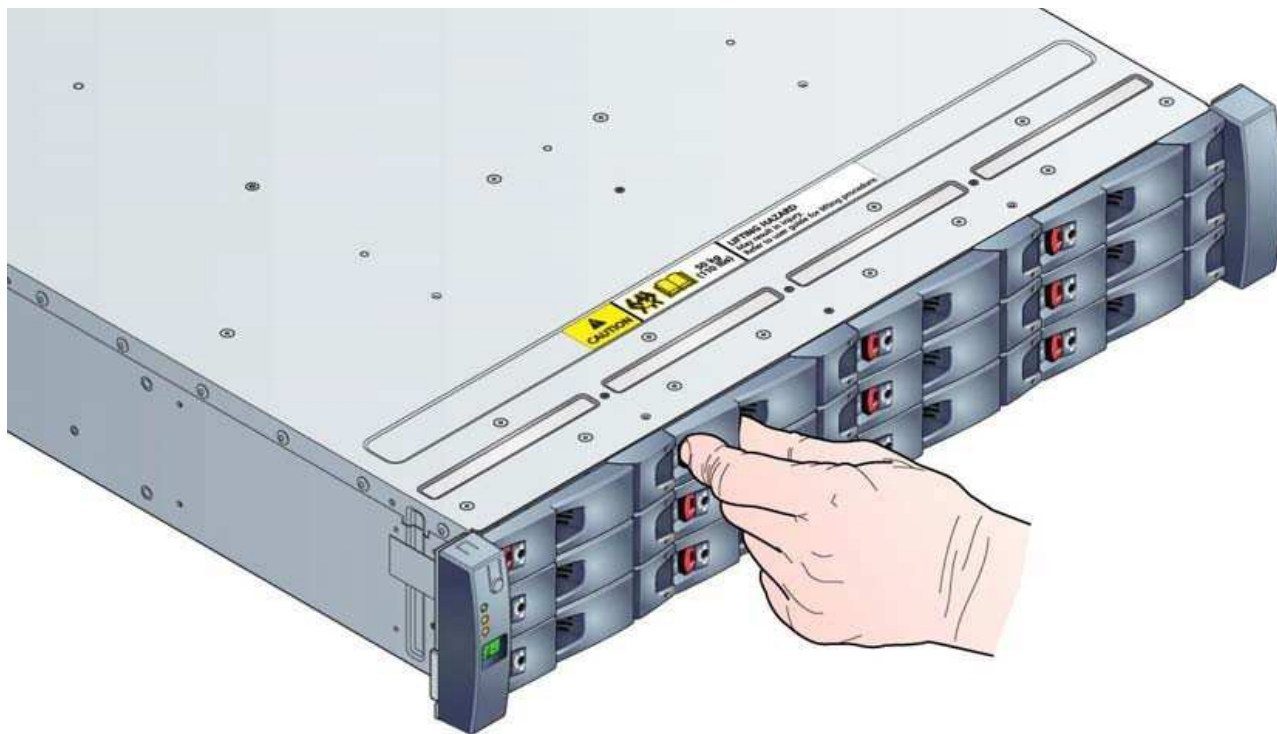


Figure 24. Removing a Drive Carrier Module (1 of 2)

3. Gently remove the drive carrier module approximately 1 inch (25mm), then wait 30 seconds.

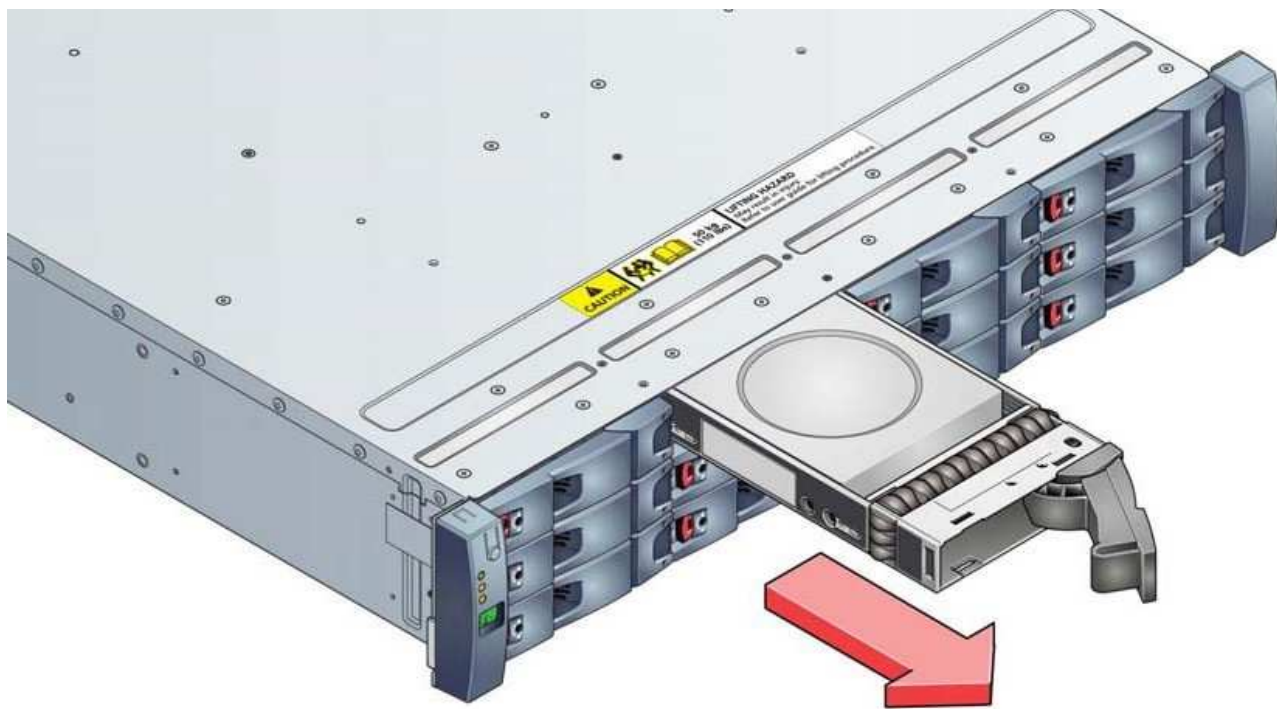


Figure 25. Removing a Drive Carrier Module (2 of 2)

4. Remove the module fully from the drive bay.



## Installing a 3.5-inch Drive Carrier Module

**Important:** A drive carrier module cannot be installed if its anti-tamper lock is activated outside the enclosure. Refer to the above section for the de-activation procedure.

1. Release the drive carrier handle, by depressing the latch in the handle as shown in the following figure.



*Figure 26. Installing a Drive Carrier Module (1 of 2)*

2. Put the drive carrier module into the enclosure as shown in the following figure. Make sure that the drive carrier is in a position so that the drive points up and the handle opens from the left.

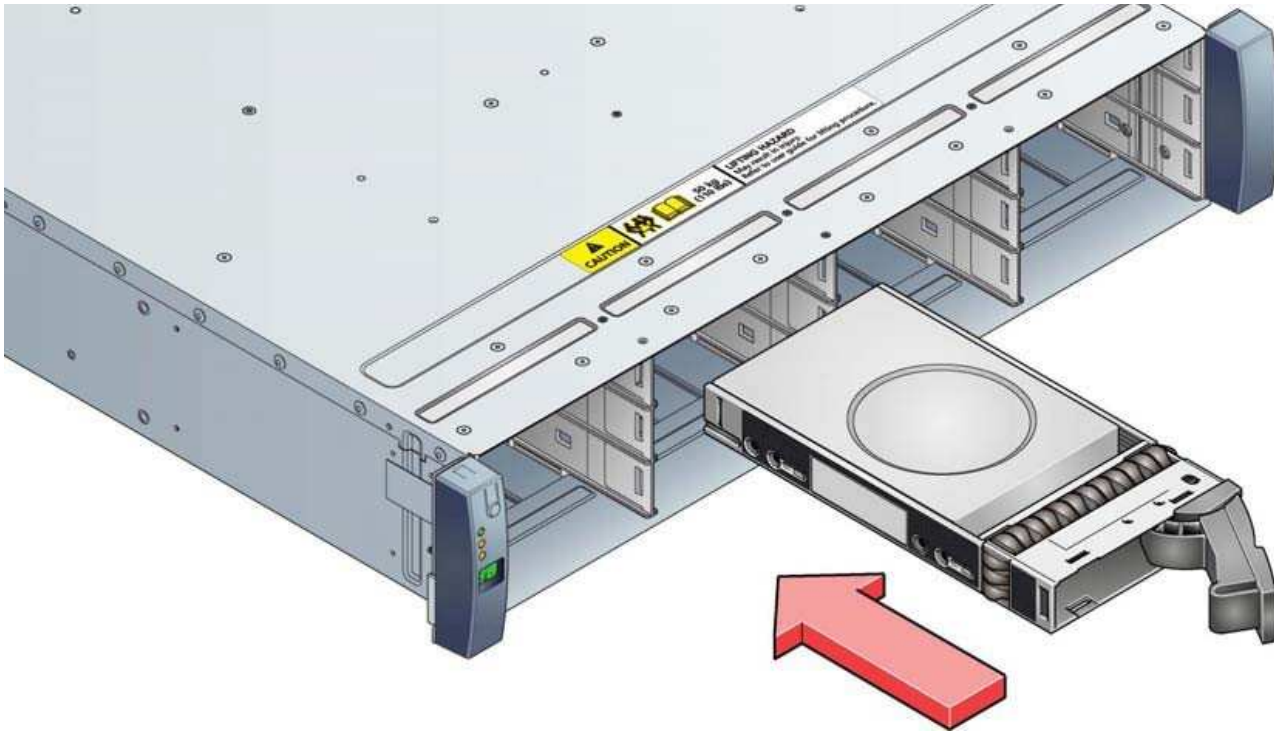


Figure 27. Installing a Drive Carrier Module (1 of 2)

3. Slide the drive carrier fully into the enclosure.
4. Cam the drive carrier home. The camming foot on the carrier will engage into a slot in the enclosure. Continue to push firmly until the handle fully engages. A click should be heard as the latch engages and holds the handle closed.

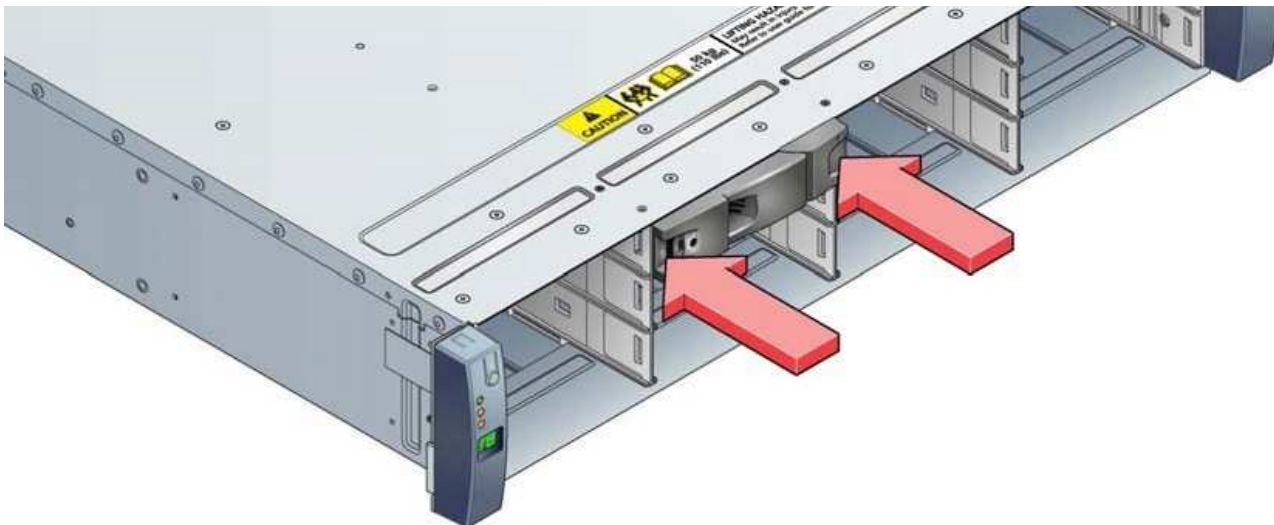


Figure 28. Engaging a Drive Carrier Module in an Enclosure

## Activating the Anti-tamper Locks

1. Carefully put the lock key provided into the cutout in the handle.
2. Position the key into its socket.
3. Rotate the key in a clockwise direction until the indicator is visible in the aperture beside the key.



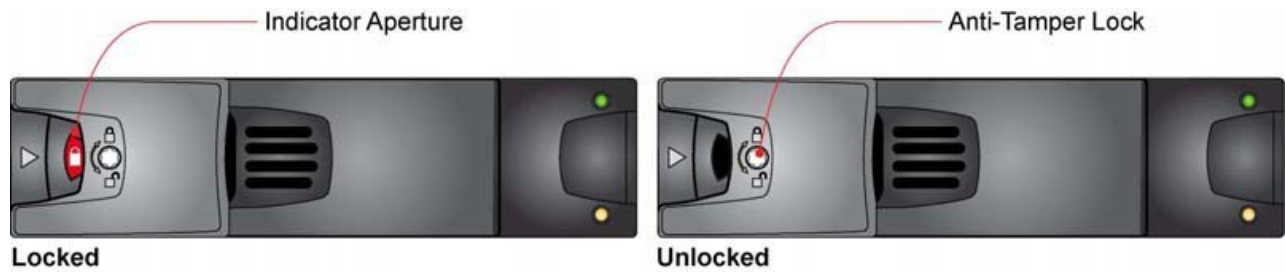


Figure 29. Activating the Anti-tamper Lock

4. Remove the key.

---

## Replacing an I/O module

The I/O module is hot-swappable and therefore removal or replacement may be done by the user while the power supply is on.

### Removing an I/O module

**Important:** Do not remove this module unless a replacement can be immediately added. The system must not be operated without all modules in place.

1. Grasp the module latch between the thumb and forefinger and squeeze them together to release the latch.
2. Pull the latch out to release the module from the enclosure as shown in the following figure.

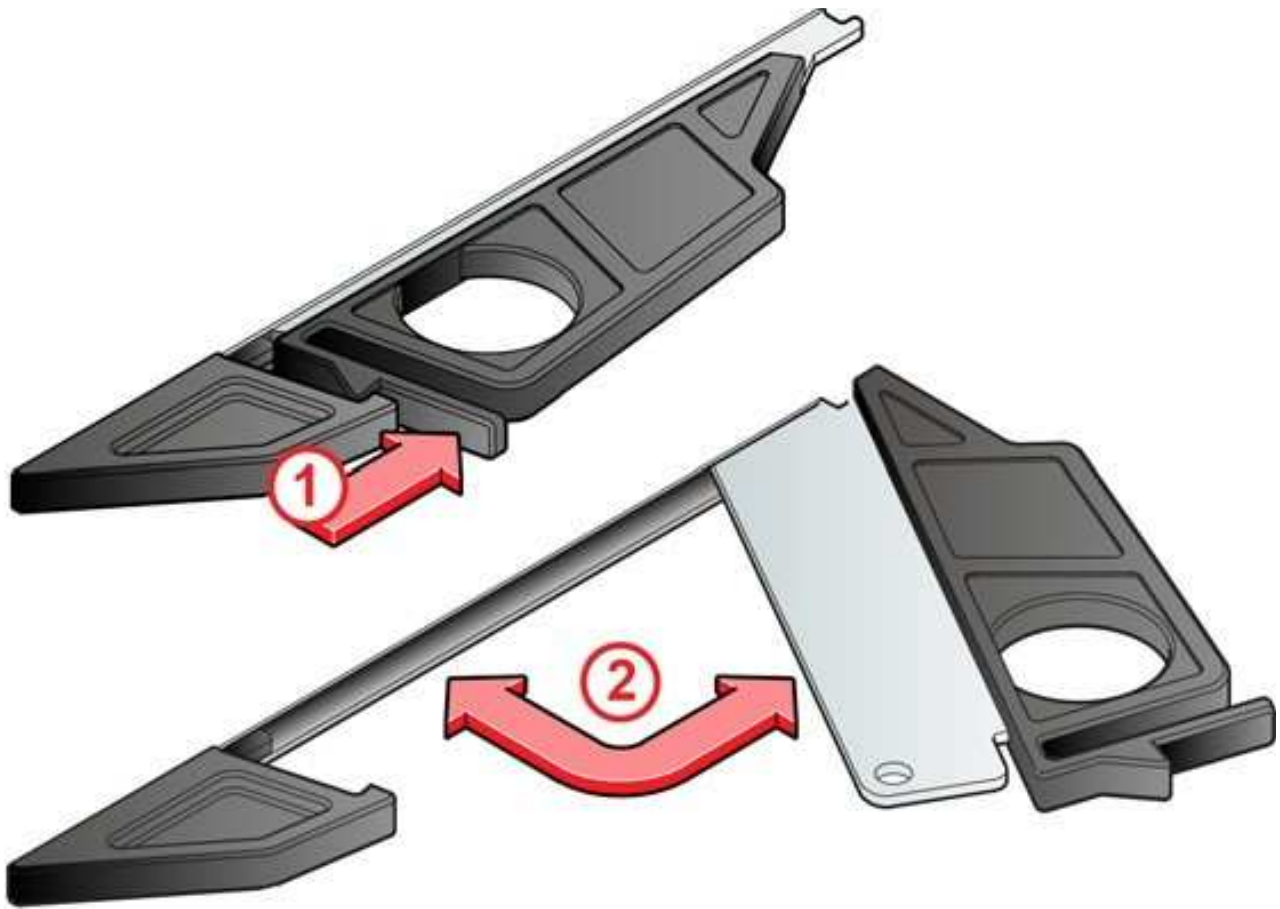


Figure 30. I/O Module Latch Operation

3. Grip the latch handles and remove the module as shown in the following figure.

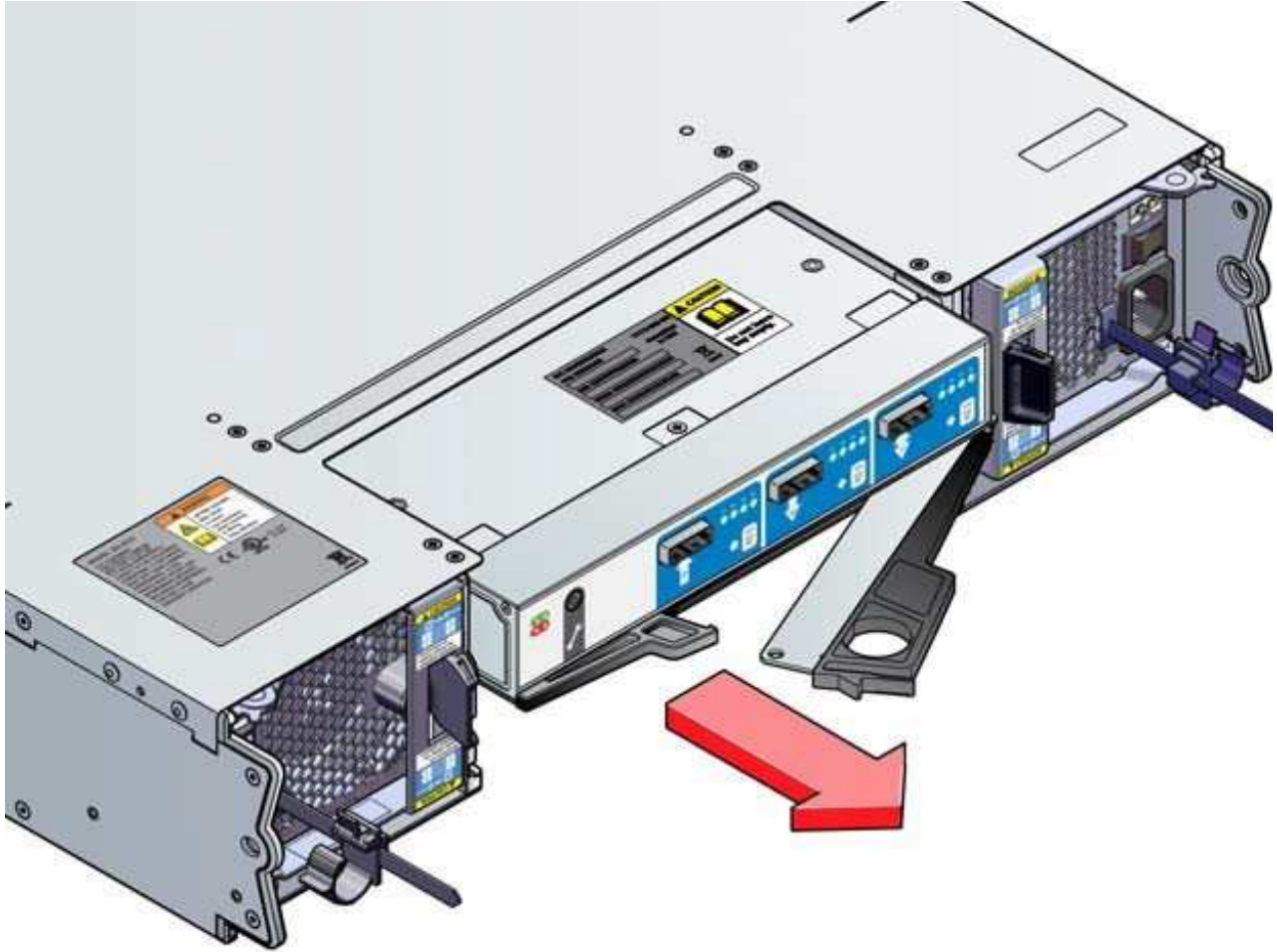


Figure 31. Removing an I/O Module

**Note:** Picture represents of replacing module but only Top module is populated in a small disk enclosure

## Installing an I/O module

**Important:** EMC precautions: if passive copper cables are connected, the cable must not have a connection to a common ground/earth point.

1. Examine for damage, closely inspect the interface connector. Do not install it if the pins are bent.
2. With the latches in the open position as shown in the figure below, slide the module into the enclosure until the latches engage.

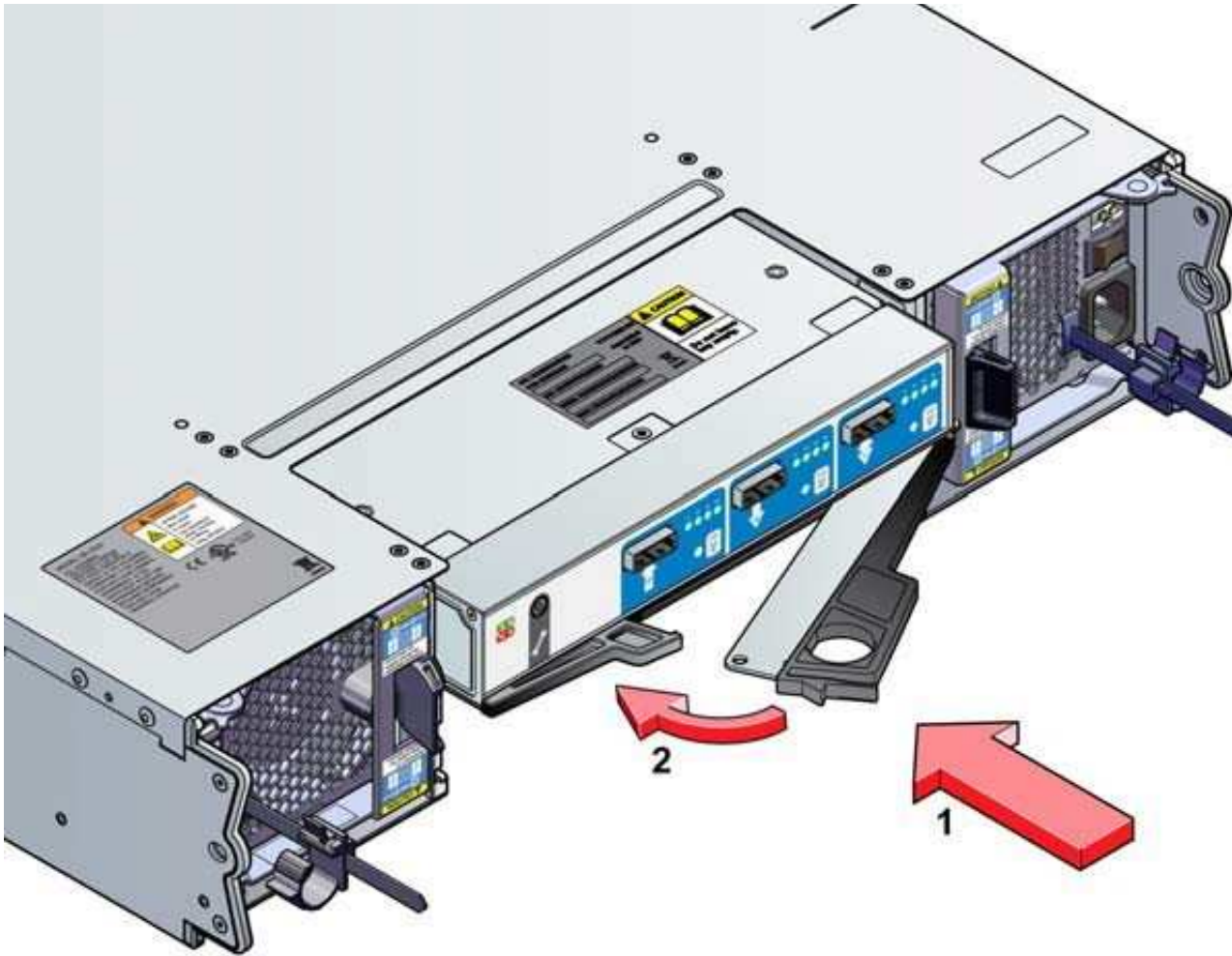


Figure 32. Installing an I/O Module

**Note:** This picture is shown for illustrative purposes only. The unit you are provided may be different than the one pictured and represents the task of replacing the module. The top module is populated in the small disk enclosure.

3. Set the module in position by manually closing the latches. A click should be heard as the latches engage.

**Note:** The I/O module may take up to one minute to re-initialize after the cables are inserted.

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## Spare parts and ancillary items

The following replaceable parts are available for the IBM COS Small Disk Enclosure system:

- Chassis (including midplane and motherboard)
- I/O module
- AC power cooling module
- Power cords C13-C14
- 19 inch rack mounting rail kit

## Chapter 7. Technical specifications

### Enclosure dimensions

Table 17. Small disk enclosure dimensions

Specification	Imperial units	Metric units
Height (enclosure, overall)	3.46 inches	87.9 mm
Width across mounting flange	19.01 inches	483 mm
Width across body of enclosure	17.44 inches	443 mm
Depth from front mounting flange to extremity of enclosure body	22.71 inches	576.8 mm
Depth from ops panel to furthest extremity of enclosure	24.79 inches	629.6 mm
Depth from front mounting flange to furthest extremity of enclosure	23.74 inches	602.9 mm

### Enclosure weights

Table 18. Small disk enclosure weights

Component	Imperial units	Metric units
Storage enclosure (empty)	10.56 lb	4.80 kg
Drive carrier module	1.98 lb	0.9 kg
Dummy carrier module	0.11 lb	0.05 kg
PCM	7.7 lb	3.5 kg
Blank PCM	1.32 lb	0.61 kg
I/O module	3.3 lb	1.53 kg
Blank I/O module	1.1 lb	0.5 kg
Enclosure (fully populated) total weight (maximum)	64 lb	29 kg

### Environmental requirements

Table 19. Ambient temperature and humidity

Specification	Temperature range	Relative humidity	Max. Wet Bulb
Operating	5°C to 35°C	20% to 80% non-condensing	28°C
Non-operating	-40°C to +70°C	5% to 100% non-precipitating	29°C

Specification	Measurement/description
Airflow	System must be operated with low pressure rear exhaust installation.  Back pressure created by rack doors and obstacles not to exceed 5Pa (0.5 mm H <sub>2</sub> O)

Specification	Measurement/description
Altitude,operating	-100to 3,048 meters (0 to 10,000 feet). Maximum operating temperature is de-rated by 1°C for each 300 m above 900 m (2952.76 feet)
Altitude,non-operating	-305 to 12192m (-1 000 to 40 000ft)
Shock,operating	Vertical axis 5g 10ms 1/2 sine
Shock,non-operating	30g 10ms 1/2 sine
Vibration,operating	0.21g RMS 5-500 Hz random
Vibration,non-operating	1.04g RMS 2-200 Hz random
Vibration, relocation	0.3g 2-200 Hz sine 0.4 decades per minute
Orientation and mounting: <ul style="list-style-type: none"> <li>• Rack rails</li> <li>• Rack characteristics</li> </ul>	19" Rack mount (2EIA Units) Tofit 800mm depth racks compliant with the SSI se specification Back pressure not exceeding 5Pa (~0.5mm H2O)

## Power Cooling Module specifications

Table 20. Power cooling module specifications

Specification	Measurement/description
Dimensions (size)	84.3mmhigh x 104.5mm wide x 340.8mm long (3.32in x 4.11in x 37.03in)
Maximum output power	580 W
Voltage range	100–240 VAC rated
Frequency	50–60 Hz
Voltage range selection	Auto-ranging: 90–264 VAC, 47–63 Hz
Maximum inrush current	20A
Power factor correction	≥95%@ nominal input voltage
Harmonics	MeetsEN61000-3-2
Output	+5V @: 42A, +12 V:@ 38A, +5 V standby voltage @ 2.7A
Hot pluggable	Yes
Switches and LEDs	AC mains switch and four status indicator LEDs
Enclosure cooling	Dual axial cooling fans with variable fan speed control

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