



# ThinkSystem SD650 Dual Node DWC Tray and NeXtScale n1200 DWC Enclosure Maintenance Manual



**Machine Types:** 7X58 and 5468

## Note

Before using this information and the product it supports, be sure to read and understand the safety information and the safety instructions, which are available at:

[https://pubs.lenovo.com/safety\\_documentation/](https://pubs.lenovo.com/safety_documentation/)

[http://systemx.lenovofiles.com/help/topic/com.lenovo.sysx.safety.doc/safety\\_pdf.pdf](http://systemx.lenovofiles.com/help/topic/com.lenovo.sysx.safety.doc/safety_pdf.pdf)

The server is intended for use in a system/rack always installed on the load side of Power Distribution Unit (PDU) or Uninterruptible Power Supply (UPS) supplying a maximum 20 A branch circuit protection. The overall system/rack connection to mains power is to be a Pluggable Type B connector.

In addition, be sure that you are familiar with the terms and conditions of the Lenovo warranty for your solution, which can be found at:

<http://datacentersupport.lenovo.com/warrantylookup>

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## Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information（安全信息）。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

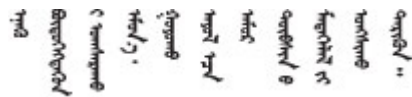
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.



Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་ཐབས་འདི་བདེ་སྤྱད་མ་བྱས་གོང་། སྐྱོར་གྱི་ཡིད་གཟབ་  
བྱ་འདྲ་མིན་ཡིད་པའི་འོད་ཟེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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canjbinj soengq cungj vahgangj ancien siusik.

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## Safety inspection checklist

Use the information in this section to identify potentially unsafe conditions with your solution. As each machine was designed and built, required safety items were installed to protect users and service technicians from injury.

**Note:** The product is not suitable for use at visual display workplaces according to §2 of the Workplace Regulations.

### CAUTION:

**This equipment must be installed or serviced by trained personnel, as defined by the NEC, IEC 62368-1 & IEC 60950-1, the standard for Safety of Electronic Equipment within the Field of Audio/Video, Information Technology and Communication Technology. Lenovo assumes you are qualified in the servicing of equipment and trained in recognizing hazards energy levels in products. Access to the equipment is by the use of a tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.**

**Important:** Electrical grounding of the solution is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Use the following checklist to verify that there are no potentially unsafe conditions:

1. Make sure that the power is off and the power cord is disconnected.
2. Check the power cord.
  - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
  - Make sure that the power cord is the correct type.

To view the power cords that are available for the server:

- a. Go to:

<http://dcsc.lenovo.com/#/>

- b. Click **Preconfigured Model** or **Configure to order**.

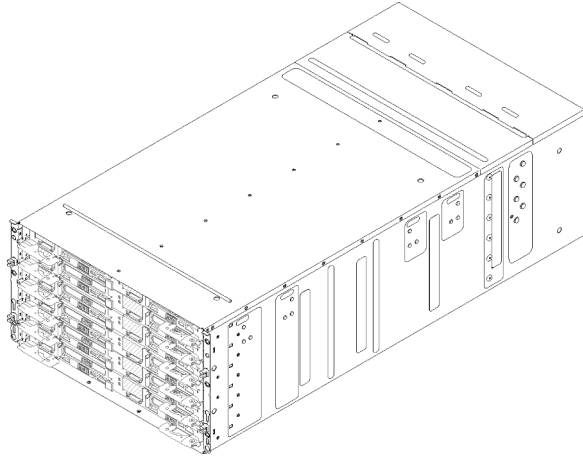
- c. Enter the machine type and model for your server to display the configurator page.
- d. Click **Power → Power Cables** to see all line cords.
  - Make sure that the insulation is not frayed or worn.
- 3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
- 4. Check inside the solution for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
- 5. Check for worn, frayed, or pinched cables.
- 6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.



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## Chapter 1. Introduction

The ThinkSystem SD650 Neptune® DWC Trays and DW612 Neptune® DWC Enclosure is a 6U solution designed for high-volume network transaction processing. This solution includes a single enclosure that can contain up to six SD650 trays, which are designed to deliver a dense, scalable platform for distributed enterprise and hyperconverged solutions.



*Figure 1. Enclosure with six SD650 trays installed*

The solution comes with a limited warranty. For details about the warranty, see:  
<https://support.lenovo.com/us/en/solutions/ht503310>

For details about your specific warranty, see:  
<http://datacentersupport.lenovo.com/warrantylookup>

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## Specifications

The following information is a summary of the features and specifications of the solution. Depending on the model, some features might not be available, or some specifications might not apply.

## Enclosure specifications

Table 1. Enclosure specifications

Specification	Description
Power supply	<p>Supports six hot-swap ac power supplies</p> <ul style="list-style-type: none"><li>• 1300-watt ac</li><li>• 1500-watt ac</li><li>• 2000-watt ac</li></ul> <p><b>Important:</b></p> <ol style="list-style-type: none"><li>1. Power supplies and redundant power supplies in the enclosure must be with the same power rating, wattage or efficiency Level.</li><li>2. Power supplies with 240 V dc are not hot-swappable. To remove the power cord, ensure you have turned off the server or disconnected the dc power sources at the breaker panel.</li><li>3. In order for the ThinkSystem products to operate error free in both a DC or AC electrical environment, a TN-S earthing system which complies to 60364-1 IEC 2005 standard has to be present or installed.</li></ol>
Fan power control (FPC) module	<ul style="list-style-type: none"><li>• Hot-swappable</li></ul>
Size	<p>6U enclosure</p> <ul style="list-style-type: none"><li>• Height: 263.3 mm (10.37 inches)</li><li>• Depth: 914.5 mm (36 inches)</li><li>• Width: 447 mm (17.6 inches)</li><li>• Weight:<ul style="list-style-type: none"><li>– Fully configured (stand-alone): approximately 135.5 kg (298 lbs)</li><li>– Empty enclosure (with midplane, FPC, and cables): approximately 25 kg (55 lbs)</li></ul></li></ul>
Acoustical noise emissions	<ul style="list-style-type: none"><li>• Operation: 7.0 bels</li><li>• Idle: 6.5 bels</li></ul> <p><b>Notes:</b></p> <ul style="list-style-type: none"><li>• The following readings are worst case for the air cooling. The water cooling results would be significantly less.</li><li>• The declared acoustic noise level are based on specified configurations and they may change depending on configuration/condition changes.</li><li>• The declared acoustic noise levels may increase greatly, if high-power components are installed such as high-power NICs, high-power processors and GPUs.</li></ul>
Heat output	<p>Approximate heat output:</p> <ul style="list-style-type: none"><li>• Minimum configuration (with one minimal configuration tray): 433 BTU per hour (127 watts)</li><li>• Maximum configuration (with six maximal configuration trays): 40946 BTU per hour (12000 watts)</li></ul>

Table 1. Enclosure specifications (continued)

Specification	Description
Electrical input	<ul style="list-style-type: none"> <li>• Sine-wave input (50-60 Hz) required</li> <li>• Input voltage range: <ul style="list-style-type: none"> <li>– Minimum: 200 V AC</li> <li>– Maximum: 240 V AC</li> </ul> </li> </ul>
Water requirement	<p><b>Attention:</b> The water required to initially fill the system side cooling loop must be reasonably clean, bacteria-free water (&lt;100 CFU/ml) such as de-mineralized water, reverse osmosis water, de-ionized water, or distilled water. The water must be filtered with an in-line 50 micron filter (approximately 288 mesh). The water must be treated with anti-biological and anti-corrosion measures. Environment quality must be maintain over the lifetime of the system to receive warranty and support on affecting components. For more information please see <a href="#">Lenovo Neptune Direct Water-Cooling Standards</a>.</p> <ul style="list-style-type: none"> <li>• Minimum water flow rate: 6.0 liters per minute per enclosure, assuming 1.0 lpm per compute tray with 6 trays per enclosure (1 tray consists of 2 compute nodes) <ul style="list-style-type: none"> <li>– For processors below 205 W: 6.0 liters per minute per enclosure, assuming 1.0 lpm per compute tray with 6 trays per enclosure (1 tray consists of 2 compute nodes)</li> </ul> </li> <li>• Maximum pressure: 4.4 bars</li> </ul>

## Tray specifications

Table 2. Tray specifications

Specification	Description
Size	<p>Tray</p> <ul style="list-style-type: none"> <li>• Height: 41.0 mm (1.6 inches)</li> <li>• Depth: 742.0 mm (29.2 inches)</li> <li>• Width: 438.0 mm (17.25 inches)</li> <li>• Weight estimation: 17.2 kg (38 lb)</li> </ul>
Environment	<p><b>Attention:</b> Environment quality must be maintain over the lifetime of the system to receive warranty and support on affecting components. For water quality requirement, see <a href="#">Lenovo Neptune Direct Water-Cooling Standards</a>.</p> <p>The SD650 tray complies with ASHRAE class A2 specifications. The SD650 tray is supported in the following environment:</p> <ul style="list-style-type: none"> <li>• Water Temperature: <ul style="list-style-type: none"> <li>– Operating: ASHRAE class W4: 2 - 45°C (35.6 - 113°F)</li> </ul> <p><b>Note:</b> The SD650 tray supports up to 50°C for special configurations and for end-users with sufficient data center operating conditions. Consult your local Lenovo representative for more information.</p> </li> <li>• Air temperature: <ul style="list-style-type: none"> <li>– Operating: ASHRAE class A2: 10 - 35°C (50 - 95°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 300 m (984 ft) of altitude increase.</li> <li>– Solution off: 5 - 45°C (41 - 113°F)</li> <li>– Shipping/storage: -40 - 60°C (-40 - 140°F)</li> </ul> </li> <li>• Maximum altitude: 3048 m (10 000 ft)</li> <li>• Relative Humidity (non-condensing): <ul style="list-style-type: none"> <li>– Operating: <ul style="list-style-type: none"> <li>– ASHRAE Class A2: 8% - 80%, maximum dew point : 21°C (70°F)</li> </ul> </li> <li>– Shipment/storage: 8% - 90%</li> </ul> </li> <li>• Particulate contamination: <p>Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the solution. For information about the limits for particulates and gases, see <a href="#">“Particulate contamination” on page 280</a>.</p> <p><b>Note:</b> The solution is designed for standard data center environment and recommended to be placed in industrial data center.</p> </li> </ul>

## Node specifications

Table 3. Node specifications

Specification	Description
Processor (depending on the model)	<ul style="list-style-type: none"><li>• Supports up to two Intel Xeon series multi-core processors per node (1 tray consists of 2 nodes)</li><li>• Level-3 cache</li></ul> <p><b>Notes:</b></p> <ol style="list-style-type: none"><li>1. Use the Setup utility to determine the type and speed of the processors in the node.</li><li>2. For a list of supported processors, see <a href="https://serverproven.lenovo.com/">https://serverproven.lenovo.com/</a>.</li><li>3. With certain processors installed, if UEFI Boot Mode is set to Legacy then PXE Boot from the onboard Gigabit Ethernet port may not work as expected and is not supported. The affected processors are all processors with embedded Omni Path fabric. These are processors models that have an F at the end of the model name and include (but not limited to) the following processor models:<ul style="list-style-type: none"><li>• Intel Xeon Gold 6126F Processor</li><li>• Intel Xeon Gold 6130F Processor</li><li>• Intel Xeon Gold 6138F Processor</li><li>• Intel Xeon Gold 6142F Processor</li><li>• Intel Xeon Gold 6148F Processor</li><li>• Intel Xeon Platinum 8160F Processor</li><li>• Intel Xeon Platinum 8176F Processor</li></ul></li></ol>
Memory	<p>See “Memory module installation order” in <i>Setup Guide</i> for detailed information about memory configuration and setup.</p> <ul style="list-style-type: none"><li>• Slots: 12 DIMM slots + 4 DC Persistent Memory Module (DCPMM) slots per node (1 tray consists of 2 nodes)</li><li>• Minimum: 8 GB (single DDR4 DIMM per processor)</li><li>• Maximum: 768 GB<ul style="list-style-type: none"><li>– 384 GB (12 x 32GB RDIMM)</li><li>– 768 GB (12 x 64GB LRDIMM)</li></ul></li><li>• Maximum: 2.384 TB (4x 512GB (DCPMM + 12x 32GB RDIMM) in Memory Mode</li><li>• Type:<ul style="list-style-type: none"><li>– PC4-21300 (dual-rank), 2933 MT/s, error correcting code (ECC), double-data-rate 4 (DDR4) registered DIMM (RDIMM) or load reduced DIMM (LRDIMM)</li><li>– DC Persistent Memory Module (DCPMM)</li></ul></li><li>• Supports (depending on the model):<ul style="list-style-type: none"><li>– 8 GB, 16 GB, and 32 GB size DIMMs</li><li>– 64 GB LRDIMM</li><li>– 128 GB, 256 GB, and 512 GB DCPMM</li></ul></li></ul>

Table 3. Node specifications (continued)

Specification	Description
Drive bays	<p>Supports up to two 2.5-inch simple-swap SATA/NVMe drive bays per node (1 tray consists of 2 nodes).</p> <p><b>Attention:</b> As a general consideration, do not mix standard 512-byte and advanced 4-KB format drives in the same RAID array because it might lead to potential performance issues.</p> <p>Supports the following 2.5-inch simple-swap drive:</p> <ul style="list-style-type: none"> <li>• Two 2.5-inch 7mm SATA solid-state drives per node (1 tray consists of 2 nodes)</li> <li>• One 2.5-inch 15mm SATA/NVMe hard disk drive/solid-state drive per node (1 tray consists of 2 nodes)</li> </ul>
M.2 drive/backplane	<p>ThinkSystem M.2 with Mirroring Enablement Kit contains dual M.2 backplane supports up to two identical M.2 drives.</p> <p>Supports 2 different physical sizes of M.2 drives:</p> <ul style="list-style-type: none"> <li>• 42 mm (2242)</li> <li>• 80 mm (2280)</li> </ul> <p>See <a href="#">“Install an M.2 drive into the M.2 backplane” on page 146</a> for supported M.2 drive configurations.</p>
RAID	<ul style="list-style-type: none"> <li>• Software RAID supports for RAID levels 0 and 1 for SATA storages</li> <li>• Integrated on-board Hardware RAID supports for RAID levels 1 for M.2 SSD</li> </ul>
Video controller (integrated into Lenovo XClarity Controller)	<ul style="list-style-type: none"> <li>• ASPEED</li> <li>• SVGA compatible video controller</li> <li>• Avocent Digital Video Compression</li> <li>• Video memory is not expandable</li> </ul> <p><b>Note:</b> Maximum video resolution is 1920 x 1200 at 60 Hz.</p>
Input/Output (I/O) features	<ul style="list-style-type: none"> <li>• Front panel</li> <li>• KVM breakout cable connector</li> <li>• One STD USB 3.0 connector with Intel DCI feature</li> <li>• One 1GbE Ethernet connector with share-NIC feature for Lenovo XClarity Controller access</li> <li>• One 1GbE Ethernet connector dedicated for Lenovo XClarity Controller access</li> </ul>

Table 3. Node specifications (continued)

Specification	Description
Operating systems	<p>Supported and certified operating systems include:</p> <ul style="list-style-type: none"> <li>• Microsoft Windows Server</li> <li>• VMware ESXi</li> <li>• Red Hat Enterprise Linux</li> <li>• SUSE Linux Enterprise Server</li> </ul> <p>References:</p> <ul style="list-style-type: none"> <li>• Complete list of available operating systems: <a href="https://lenovopress.lenovo.com/osig">https://lenovopress.lenovo.com/osig</a>.</li> <li>• OS deployment instructions: See “Deploy the operating system” in <i>Setup Guide</i>.</li> </ul>
Minimum configuration for debugging	<ul style="list-style-type: none"> <li>• One n1200 Enclosure</li> <li>• One SD650 Dual Node DWC Tray (contains two computer nodes)</li> <li>• One processor on location 1 on specific node</li> <li>• One CFF v2 power supply (any type)</li> <li>• One DIMM (any type) on specific node</li> <li>• One disk (any type)(If OS is needed for debugging)</li> </ul>

## Upgrade existing NeXtScale nx360 M5 to ThinkSystem SD650

The following enclosure requirements are mandatory if you are upgrading existing NeXtScale nx360 M5 to SD650.

**Attention:** Only Lenovo Professional Service - Data Center Services is allowed to perform the upgrading task.

- Update all firmware to the latest level
- Flow rate only needs to be adjusted if 205 W processors installed. If 205 W processors installed, increase the water flow rate to 1.25 liters per minute per tray.

## Firmware updates

Several options are available to update the firmware for the solution.

You can use the tools listed here to update the most current firmware for your server and the devices that are installed in the server.

- Best practices related to updating firmware is available at the following site:
  - <http://lenovopress.com/LP0656>
- The latest firmware can be found at the following site:
  - <http://datacentersupport.lenovo.com/products/servers/thinksystem/sd650-dwc-dual-node-tray/7x58/downloads>
- You can subscribe to product notification to stay up to date on firmware updates:
  - <https://datacentersupport.lenovo.com/tw/en/solutions/ht509500>

## Update method terminology

- **In-band update.** The installation or update is performed using a tool or application within an operating system that is executing on the server's core CPU.
- **Out-of-band update.** The installation or update is performed by the Lenovo XClarity Controller collecting the update and then directing the update to the target subsystem or device. Out-of-band updates have no dependency on an operating system executing on the core CPU. However, most out-of-band operations do require the server to be in the S0 (Working) power state.
- **On-Target update.** The installation or update is initiated from an Operating System executing on the server's operating system.
- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server's Lenovo XClarity Controller.
- **UpdateXpress System Packs (UXSPs).** UXSPs are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. UXSPs are server machine-type specific and are built (with firmware and device driver updates) to support specific Windows Server, Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) operating system distributions. Machine-type-specific firmware-only UXSPs are also available.

## Firmware updating tools

See the following table to determine the best Lenovo tool to use for installing and setting up the firmware:

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
<b>Lenovo XClarity Provisioning Manager (LXPM)</b>	In-band <sup>2</sup> On-Target	✓		✓		
<b>Lenovo XClarity Controller (XCC)</b>	Out-of-band Off-Target	✓	Selected I/O devices	✓		
<b>Lenovo XClarity Essentials OneCLI (OneCLI)</b>	In-band Out-of-band On-Target Off-Target	✓	All I/O devices		✓	✓
<b>Lenovo XClarity Essentials UpdateXpress (LXCE)</b>	In-band Out-of-band On-Target Off-Target	✓	All I/O devices	✓		✓
<b>Lenovo XClarity Essentials Bootable Media Creator (BoMC)</b>	In-band Out-of-band Off-Target	✓	All I/O devices	✓ (BoMC application)	✓ (BoMC application)	✓

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
<b>Lenovo XClarity Administrator (LXCA)</b>	In-band <sup>1</sup> Out-of-band <sup>2</sup> Off-Target	✓	All I/O devices	✓		✓
<b>Lenovo XClarity Integrator (LXCI) for VMware vCenter</b>	Out-of-band Off-Target	✓	Selected I/O devices	✓		
<b>Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center</b>	In-band Out-of-band On-Target Off-Target	✓	All I/O devices	✓		✓
<b>Lenovo XClarity Integrator (LXCI) for Microsoft System Center Configuration Manager</b>	In-band On-Target	✓	All I/O devices	✓		✓
<b>Notes:</b> 1. For I/O firmware updates. 2. For BMC and UEFI firmware updates.						

#### • **Lenovo XClarity Provisioning Manager**

From Lenovo XClarity Provisioning Manager, you can update the Lenovo XClarity Controller firmware, the UEFI firmware, and the Lenovo XClarity Provisioning Manager software.

**Note:** By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you start the server and press the key specified in the on-screen instructions. If you have changed that default to be the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

For additional information about using Lenovo XClarity Provisioning Manager to update firmware, see:

“Firmware Update” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>

**Important:** Lenovo XClarity Provisioning Manager (LXPM) supported version varies by product. All versions of Lenovo XClarity Provisioning Manager are referred to as Lenovo XClarity Provisioning Manager and LXPM in this document, unless specified otherwise. To see the LXPM version supported by your server, go to <https://pubs.lenovo.com/lxpm-overview/>.

#### • **Lenovo XClarity Controller**

If you need to install a specific update, you can use the Lenovo XClarity Controller interface for a specific server.

**Notes:**

- To perform an in-band update through Windows or Linux, the operating system driver must be installed and the Ethernet-over-USB (sometimes called LAN over USB) interface must be enabled.

For additional information about configuring Ethernet over USB, see:

“Configuring Ethernet over USB” section in the XCC documentation version compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>

- If you update firmware through the Lenovo XClarity Controller, make sure that you have downloaded and installed the latest device drivers for the operating system that is running on the server.

For additional information about using Lenovo XClarity Controller to update firmware, see:

“Updating Server Firmware” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>

**Important:** Lenovo XClarity Controller (XCC) supported version varies by product. All versions of Lenovo XClarity Controller are referred to as Lenovo XClarity Controller and XCC in this document, unless specified otherwise. To see the XCC version supported by your server, go to <https://pubs.lenovo.com/lxcc-overview/>.

- **Lenovo XClarity Essentials OneCLI**

Lenovo XClarity Essentials OneCLI is a collection of command line applications that can be used to manage Lenovo servers. Its update application can be used to update firmware and device drivers for your servers. The update can be performed within the host operating system of the server (in-band) or remotely through the BMC of the server (out-of-band).

For additional information about using Lenovo XClarity Essentials OneCLI to update firmware, see:

[https://pubs.lenovo.com/lxce-onecli/onecli\\_c\\_update](https://pubs.lenovo.com/lxce-onecli/onecli_c_update)

- **Lenovo XClarity Essentials UpdateXpress**

Lenovo XClarity Essentials UpdateXpress provides most of OneCLI update functions through a graphical user interface (GUI). It can be used to acquire and deploy UpdateXpress System Pack (UXSP) update packages and individual updates. UpdateXpress System Packs contain firmware and device driver updates for Microsoft Windows and for Linux.

You can obtain Lenovo XClarity Essentials UpdateXpress from the following location:

<https://datacentersupport.lenovo.com/solutions/lnvo-xpress>

- **Lenovo XClarity Essentials Bootable Media Creator**

You can use Lenovo XClarity Essentials Bootable Media Creator to create bootable media that is suitable for firmware updates, VPD updates, inventory and FFDC collection, advanced system configuration, FoD Keys management, secure erase, RAID configuration, and diagnostics on supported servers.

You can obtain Lenovo XClarity Essentials BoMC from the following location:

<https://datacentersupport.lenovo.com/solutions/lnvo-bomc>

- **Lenovo XClarity Administrator**

If you are managing multiple servers using the Lenovo XClarity Administrator, you can update firmware for all managed servers through that interface. Firmware management is simplified by assigning firmware-compliance policies to managed endpoints. When you create and assign a compliance policy to managed endpoints, Lenovo XClarity Administrator monitors changes to the inventory for those endpoints and flags any endpoints that are out of compliance.

For additional information about using Lenovo XClarity Administrator to update firmware, see:

[http://sysmgmt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update\\_fw.html](http://sysmgmt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html)

- **Lenovo XClarity Integrator offerings**

Lenovo XClarity Integrator offerings can integrate management features of Lenovo XClarity Administrator and your server with software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center.

For additional information about using Lenovo XClarity Integrator to update firmware, see:

<https://pubs.lenovo.com/lxci-overview/>

## Configuring the LAN over USB interface manually

To perform a firmware update through the operating system using Lenovo XClarity Essentials OneCLI, the Lenovo XClarity Controller must be configured to use the LAN over USB interface. The firmware update package attempts to perform the setup automatically, if needed. If the automatic setup fails or if you prefer to set up the LAN over USB manually, use one of the following procedures.

Additional information about using the Lenovo XClarity Controller to enable LAN over USB is available at:

<https://pubs.lenovo.com/lxcc-overview/>

## Installing the LAN over USB Windows device driver

When you install a Windows operating system, there might be an unknown RNDIS device in the Device Manager. Lenovo provides a Windows INF file that identifies this device.

Complete the following steps to install `ibm_rndis_server_os.inf`:

**Note:** You only have to perform these steps if the compute node is running a Windows operating system and the `ibm_rndis_server_os.inf` file has not been previously installed. The file only has to be installed once. It is required by Windows operating systems to detect and use the LAN over USB functionality.

- Step 1. Click **Administrative Tools** → **Computer Management** → **Device Manager** and find the RNDIS Device. Click **Properties** → **Driver** → **Reinstall driver**. Point the solution to the `\Windows\inf` directory where it can find the `ibm_rndis_server_os.inf` file and install the device.
- Step 2. Click **Administrative Tools** → **Device Manager**. Right-click **Network adapters** and select **Scan for hardware changes**. A small pop-up confirms that the Ethernet device is found and installed. The New Hardware Wizard starts automatically.
- Step 3. When you are prompted Can Windows connect to Windows Update to search for software?, select **No, not this time**. Click **Next** to continue.
- Step 4. When you are prompted What do you want the wizard to do?, select **Install from a list or specific location (Advanced)**. Click **Next** to continue.
- Step 5. When you are prompted Please choose your search and installation options, select **Don't search. I will choose the driver to install**. Click **Next** to continue.
- Step 6. When you are prompted Select a hardware type, and then click Next, select **Network adapters**. Click **Next** to continue.
- Step 7. When you are prompted with the statement Completing the Found New Hardware Wizard, click **Finish**. A new local area connection appears. If the message This connection has limited or no connectivity is displayed, ignore this message.
- Step 8. Return to the Device Manager. **Lenovo USB Remote NDIS Network Device** appears under **Network Adapters**.
- Step 9. Use the Lenovo XClarity Controller interface to view or set the IP address for the LAN adapter.

Additional information about using the Lenovo XClarity Controller to configure LAN over USB is available at:


<https://pubs.lenovo.com/lxcc-overview/>

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## Tech Tips

Lenovo continually updates the support website with the latest tips and techniques that you can use to solve issues that your server might encounter. These Tech Tips (also called retain tips or service bulletins) provide procedures to work around issues or solve problems related to the operation of your server.

To find the Tech Tips available for your server:

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
2. Click on the documentation icon  from the navigation pane.
3. Click **Documentation Type** → **Solution** from the drop-down menu.

Follow the on-screen instructions to choose the category for the problem that you are having.

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## Security advisories

Lenovo is committed to developing products and services that adhere to the highest security standards in order to protect our customers and their data. When potential vulnerabilities are reported, it is the responsibility of the Lenovo Product Security Incident Response Team (PSIRT) to investigate and provide information to our customers so they may put mitigation plans in place as we work toward providing solutions.

The list of current advisories is available at the following site:

[https://datacentersupport.lenovo.com/product\\_security/home](https://datacentersupport.lenovo.com/product_security/home)

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## Power on nodes

When a tray is plugged into the enclosure, each node performs a short self-test (power LED flashes quickly - 4 times per second). Once the self test is completed successfully, the node enters a standby state (power LED flashes slowly - once per a second).

### S002



#### **CAUTION:**

**The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

Each node can be turned-on (power LED on) in any of the following ways:

- You can press the power button.
- The node can restart automatically after a power interruption.
- The node can respond to remote power-on requests sent to the Lenovo XClarity Controller.

For information about powering off nodes, see [“Power off nodes” on page 13](#).

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## Power off nodes

Each node remains in a standby state when it is connected to a power source, allowing the Lenovo XClarity Controller to respond to remote power-on requests.

To remove all power from the nodes (power status LED off), remove the tray from the enclosure.

**Note:** This removes power immediately from both nodes.

To place the solution in a standby state (power status LED flashes once per second):

**Note:** The Lenovo XClarity Controller can place the solution in a standby state as an automatic response to a critical system failure.

- Start an orderly shutdown using the operating system (if supported by your operating system).
- Press the power button to start an orderly shutdown (if supported by your operating system).
- Press and hold the power button for more than 4 seconds to force a shutdown.

When in a standby state, the solution can respond to remote power-on requests sent to the Lenovo XClarity Controller. For information about powering on the solution, see [“Power on nodes” on page 12](#).



## Chapter 2. Solution components

Use the information in this section to learn about each of the components associated with your solution.

### Identifying your component

When you contact Lenovo for help, the machine type, model, and serial number information helps support technicians to identify your components and provide faster service.

The enclosure machine type, model number and serial number are on the enclosure label that can be found on the front of the enclosure, as shown in the following illustration.

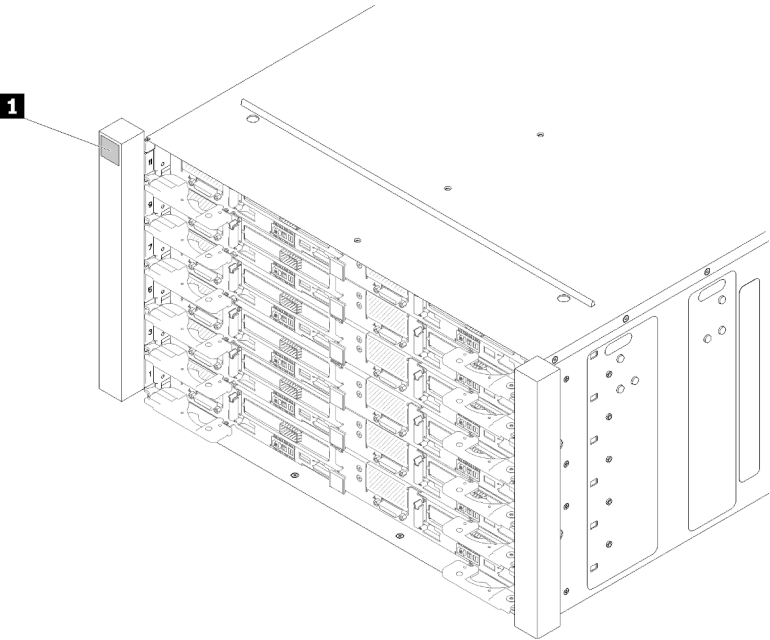


Figure 2. Enclosure label on the front of the enclosure

Table 4. Enclosure label on the front of the enclosure

<b>1</b> Enclosure label
--------------------------

The tray machine type, model number and serial number are on the tray label that can be found on the front of the tray, as shown in the following illustration.

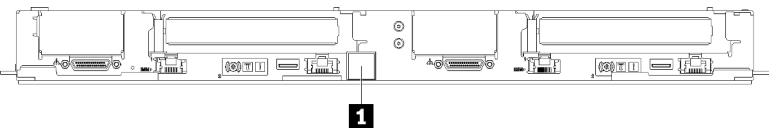


Figure 3. Tray label on the front of the tray

Table 5. Tray label on the front of the tray

<b>1</b> Tray label
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## QR code

In addition, the system Service Label is located on the inside surface of the tray cover, provides a quick reference (QR) code for mobile access to service information. You can scan the QR code with a mobile device using a QR code reader application and get quick access to the Service Information web page. The Service Information web page provides additional information for parts installation and replacement videos, and error codes for solution support.

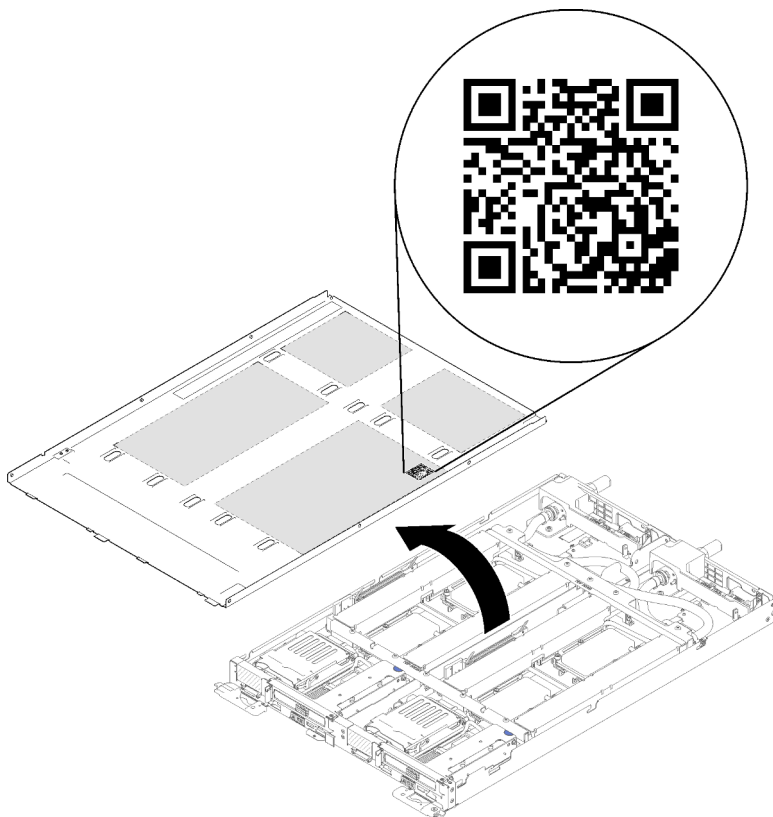


Figure 4. Service Label and QR code

## Network access tag

The Lenovo XClarity Controller network access information for both nodes can be found on the pull out information tag located at the front of the tray. You can use the information on the pull out tag to access the XCC MAC address and LLA for each node. The left node information is on the left side and the right node information is on the right side. You can also use the information tag for your own node labeling information such as the hostname, the system name and the inventory bar code.

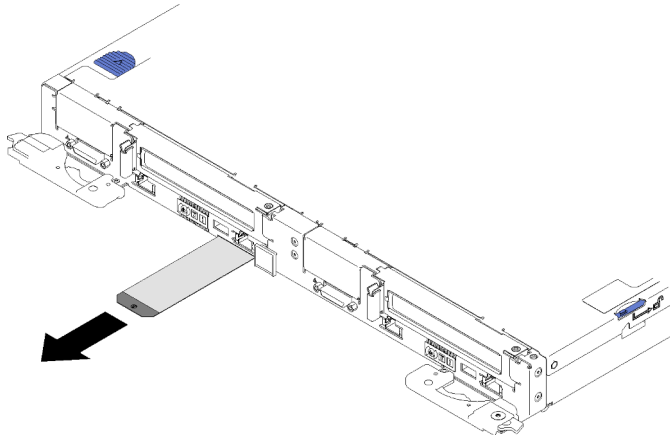


Figure 5. Network access information on the pull out tag

## Front view

The following illustration shows the controls, LEDs, and connectors on the front of the solution.

## Enclosure

**Note:** The illustrations in this document might differ slightly from your hardware.

The enclosure supports up to six trays.

The following illustration shows six trays installed in the enclosure.

The slot numbers are indicated on both sides of the enclosure.

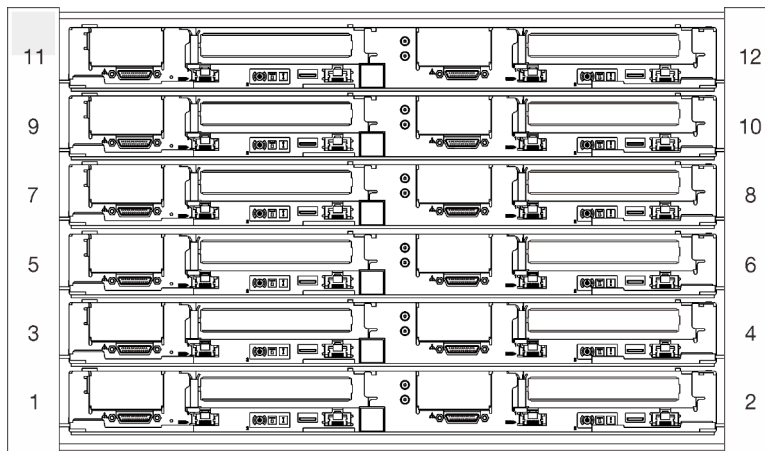


Figure 6. Enclosure

## Tray

The following illustrations show the controls, LEDs, and connectors on the front of each tray.

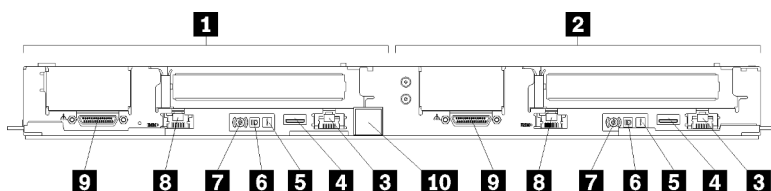


Figure 7. Tray

Table 6. Tray indicators, controls, and connectors

<b>1</b> Left node (odd bay numbers)	<b>6</b> Identification LED
<b>2</b> Right node (even bay numbers)	<b>7</b> Power button/LED
<b>3</b> Dedicated LAN RJ45 port for Lenovo XClarity Controller access	<b>8</b> Ethernet RJ45 port with share-NIC feature to access Lenovo XClarity Controller
<b>4</b> USB 3.0 connector	<b>9</b> KVM breakout cable connector
<b>5</b> System error LED	<b>10</b> Tray label

## Rear view

The following illustration shows the components on the rear of the enclosure.

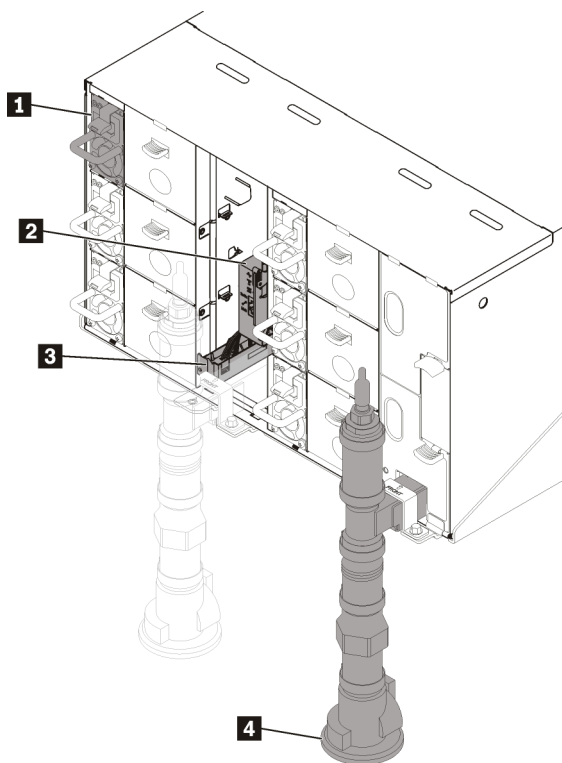


Figure 8. Rear view

Table 7. Rear view

<b>1</b> Power supply	<b>3</b> Drip sensor assembly
<b>2</b> Fan and power control module	<b>4</b> Manifold

## Fan power control (FPC) module

The following illustration shows the connectors and LEDs on the FPC module.

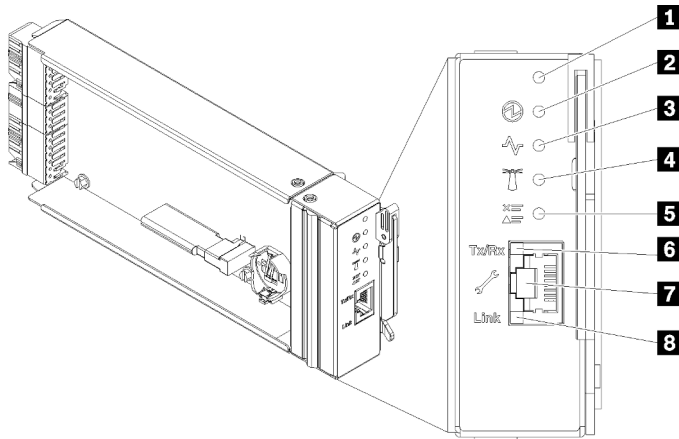


Figure 9. FPC connectors and LEDs

Table 8. FPC connectors and LEDs

<b>1</b> Reset button hole	<b>5</b> Check log LED (yellow)
<b>2</b> Power LED (green)	<b>6</b> Ethernet port activity (RJ-45) LED (green)
<b>3</b> Activity LED (green)	<b>7</b> Dedicated Ethernet port for FPC management access
<b>4</b> Identification LED (blue)	<b>8</b> Ethernet port link (RJ-45) LED (green)

**1 Reset button:** Press the button for 1 to 4 seconds, FPC reboots. Press over 4 seconds, FPC reboots and loads to the default settings.

**2 Power-on LED:** When this LED is lit (green), it indicates that the FPC has power.

**3 Activity LED:** When this LED is lit (green), it indicates that the FPC is actively controlling the enclosure.

**4 Identification LED:** When this LED is lit (blue), it indicates the enclosure location in a rack.

**5 Check log LED:** When this LED is lit (yellow), it indicates that a system error has occurred. Check the FPC event log for additional information.

**6 Ethernet port activity (RJ-45) LED:** When this LED is flashing (green), it indicates that there is activity through the remote management and console (Ethernet) port over the management network.

**7 Dedicated Ethernet port for FPC management access:** Use this connector to access FPC management.

**8 Ethernet port link (RJ-45) LED:** When this LED is lit (green), it indicates that there is an active connection through the remote management and console (Ethernet) port to the management network.

## Power supplies

The ThinkSystem DW612 Neptune® DWC Enclosure Type 7D1L supports six autoranging power supplies.

The power supplies get electrical power from a 200 - 240 V ac power source and convert the ac input into 12 V outputs. The power supplies are capable of autoranging within the input voltage range. There is one

common power domain for the enclosure that distributes power to each of the DWC tray and modules through the system midplane.

AC redundancy is achieved by distributing the ac power cord connections between independent ac circuits.

Each power supply has internal fans and a controller. The power supply controller can be powered by any installed power supply that is providing power through the midplane.

**Attention:** The power supplies contain internal cooling fans. Do not obstruct the fan exhaust vents.

You have to install all of the six power supplies regardless of the type of power supply, the enclosure power load, or selected enclosure power policy.

The ThinkSystem DW612 Neptune® DWC Enclosure Type 7D1L does not support mixing of low input voltage power supplies with high input voltage power supplies. For example, if you install a power supply with an input voltage of 100 - 127 V ac in a enclosure that is powered by 200 - 240 V ac power supplies, the 100 - 127 V power supply will not power on. The same restriction applies to a enclosure that is powered by 100 - 127 V ac power supplies. If you install a 200 - 240 V ac power supply in a enclosure that is powered by 100 - 127 V ac power supplies, the 200 - 240 V ac power supply will not power on.

The following illustration shows the power supply:

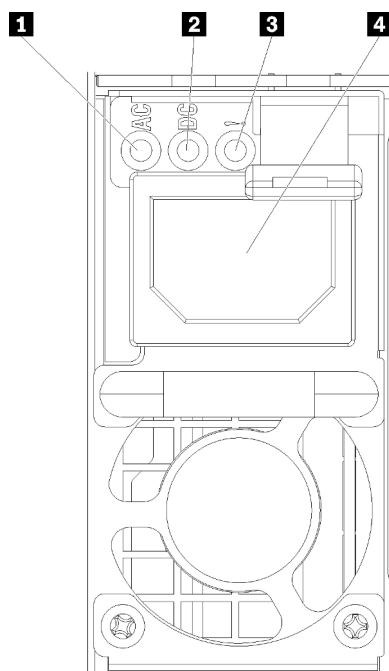


Figure 10. Power supply LEDs and connectors

<b>1</b> Input (AC) power LED (green)	<b>3</b> Power supply error LED (yellow)
<b>2</b> Output (DC) power LED (green)	

There are three LEDs on each power supply:

**1 AC power LED (green):** When this LED is lit (green), it indicates that ac power is being supplied to the power supply.

**2 DC power LED (green):** When this LED is lit (green), it indicates that dc power is being supplied from the power supply to the enclosure midplane.

**3 Power supply error LED (yellow):** When this LED is lit (yellow), it indicates that there is a fault with the power supply.

**Note:** Before unplugging the ac power cord from the power supply, or removing the power supply from the enclosure, verify that the capacity of the remaining power supplies are sufficient to meet the minimum power requirements for all components in the enclosure.

---

## System board layout

The illustrations in this section provide information about the connectors and switches that are available on the node system board.

### System-board internal connectors

The following illustration shows the internal connectors on the system board.

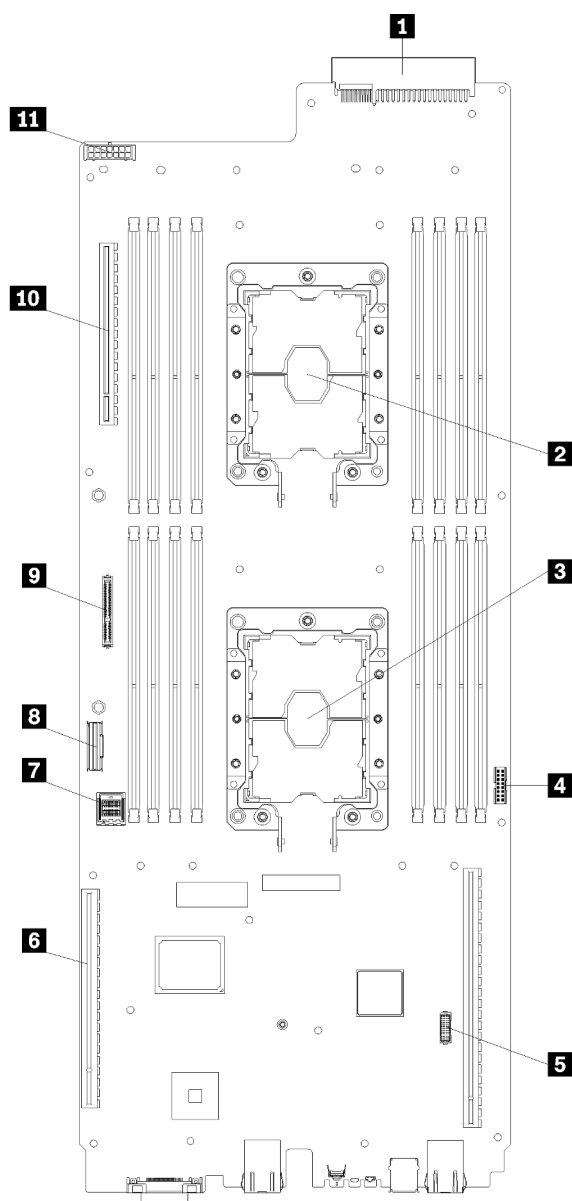


Figure 11. Internal connectors on the system board

Table 9. Internal connectors on the system board

<b>1</b> Power distribution board connector	<b>7</b> Backplane mini SAS connector
<b>2</b> Processor 2	<b>8</b> Backplane Slimline connector
<b>3</b> Processor 1	<b>9</b> M.2 connector
<b>4</b> Trusted cryptographic module (TCM) connector	<b>10</b> GPU card connector
<b>5</b> IFT adapter auxiliary connector	<b>11</b> Drive power connector
<b>6</b> ML2 PCIe slot connector	

The following illustration shows the location of the DIMM connectors on the system board.

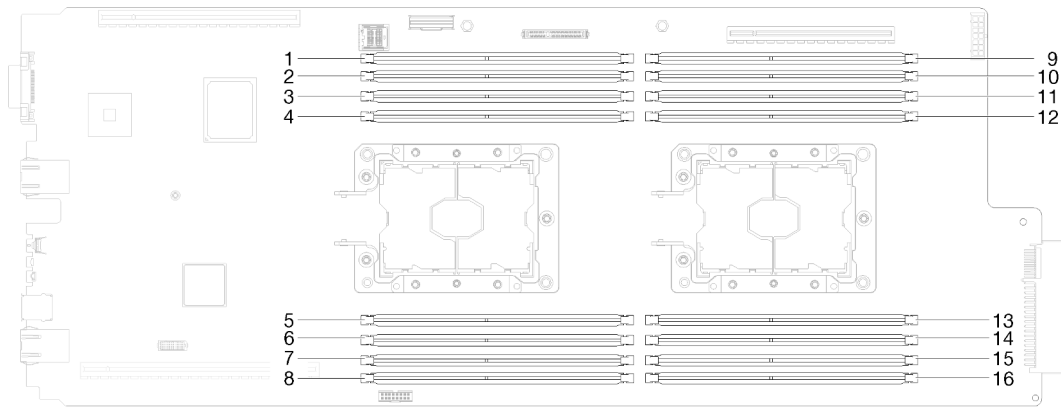


Figure 12. The location of the DIMM connectors on the system board

## System-board LEDs

The following illustration shows the light-emitting diodes (LEDs) on the system board.

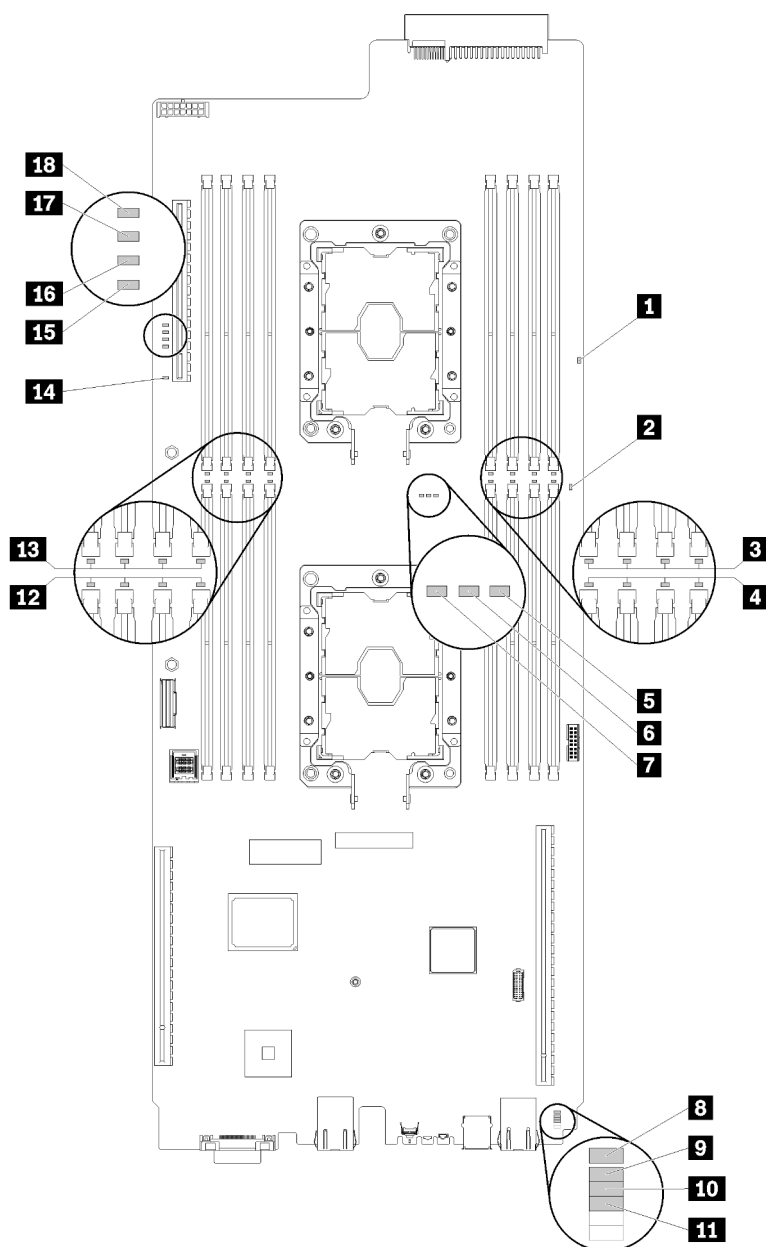


Figure 13. System-board LEDs

Table 10. System-board LEDs

<b>1</b> Light path power LED (green)	<b>10</b> LAN diagnostic LED (yellow)
<b>2</b> Node power LED (yellow)	<b>11</b> PCIe 1 error LED (yellow)
<b>3</b> DIMM 13-16 error LED (yellow)	<b>12</b> DIMM 1-4 error LED (yellow)
<b>4</b> DIMM 5-8 error LED (yellow)	<b>13</b> DIMM 9-12 error LED (yellow)
<b>5</b> Processor 2 LED (yellow)	<b>14</b> Slot 4 error LED (yellow)
<b>6</b> Processor mismatch LED (yellow)	<b>15</b> Drive 0 error LED (yellow)
<b>7</b> Processor 1 LED (yellow)	<b>16</b> Drive 1 error LED (Yellow)

Table 10. System-board LEDs (continued)

<b>8</b> Lenovo XClarity Controller 8051 heartbeat LED (green)	<b>17</b> Drive 2 error LED (yellow)
<b>9</b> Battery error LED (yellow)	<b>18</b> Drive 3 error LED (yellow)

## System-board switches

The following illustration shows the location and description of the switches.

### Important:

1. If there is a clear protective sticker on the switch blocks, you must remove and discard it to access the switches.
2. Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

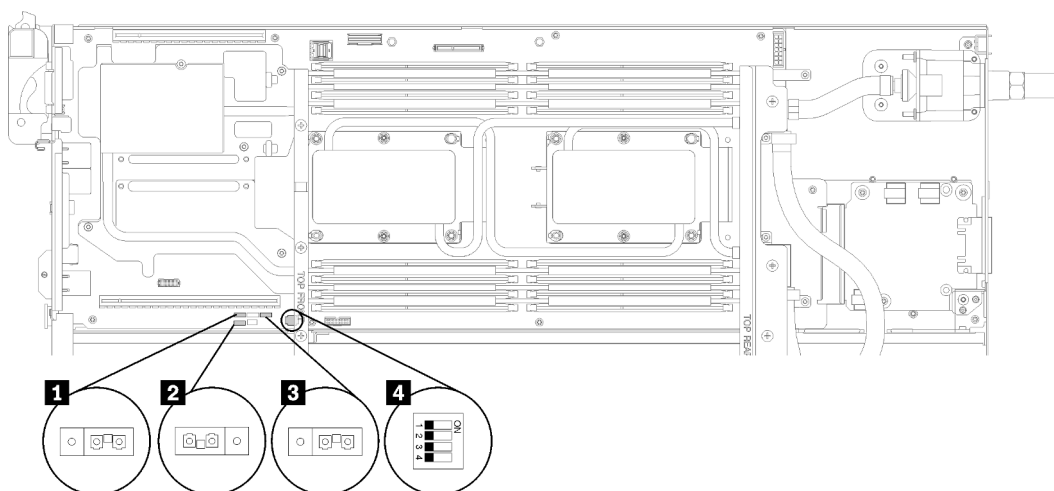


Figure 14. Location of the switches, jumpers, and buttons on the system board

The following table describes the jumpers on the system board.

Table 11. Jumper definition

Jumper name	Description
<b>1</b> Low security	<ul style="list-style-type: none"> <li>• Pins 1 and 2: Disable low security (default).</li> <li>• Pins 2 and 3: Enable low security.</li> </ul>
<b>2</b> Clear CMOS	<ul style="list-style-type: none"> <li>• Pins 1 and 2: Keep CMOS data (default).</li> <li>• Pins 2 and 3: Clear CMOS data.</li> </ul>
<b>3</b> Serial select	<ul style="list-style-type: none"> <li>• Pins 1 and 2: Send the serial input output (SIO) to the front serial port (default) .</li> <li>• Pins 2 and 3: Sends the XCC to the serial port.</li> </ul>

Table 12. Switch definition

Switch name	Switch number	Switch name	Usage description	
<b>4</b> PCH switch block - PCHSW1	1	Machine Engine (ME) firmware security override	ME update by jumper.	Normal (default)
	2	ME firmware update	Force update mode.	Normal (default)
	3	Password override	Overrides the power-on password.	Normal (default)
	4	Trusted Platform Module (TPM) physical presence	Indicates a physical presence to the system TPM.	Normal (default)

### Important:

1. Before you change any switch settings or move any jumpers, turn off the solution; then, disconnect all power cords and external cables. Review the information in [https://pubs.lenovo.com/safety\\_documentation/](https://pubs.lenovo.com/safety_documentation/), “Installation Guidelines” on page 35, “Handling static-sensitive devices” on page 38, and “Power off nodes” on page 13.
2. Any system-board switch or jumper block that is not shown in the illustrations in this document are reserved.

## Internal cable routing

Some of the components in the solution have internal cables and cable connectors.

**Note:** Disengage all latches, release tabs, or locks on cable connectors when you disconnect cables from the system board. Failing to release them before removing the cables will damage the cable sockets on the system board, which are fragile. Any damage to the cable sockets might require replacing the system board.

Some options, such as IFT processors, might require additional internal cabling. See the documentation that is provided for the option to determine any additional cabling requirements and instructions.

## 2.5-inch drive models

The following illustrations show the cable routing for 2.5-inch drive models.

### 1x2.5-inch drive model

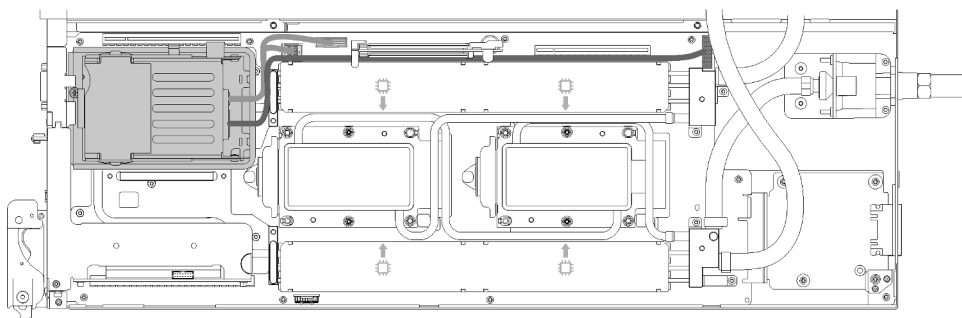


Figure 15. Cable routing - 1x2.5-inch drive model

## 2x2.5-inch drive model

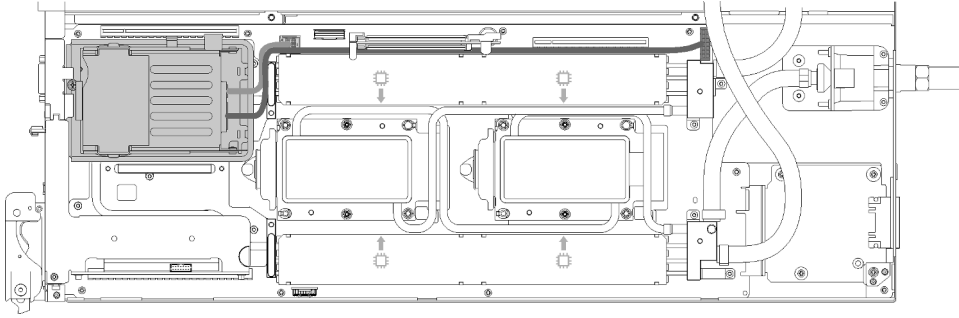


Figure 16. Cable routing - 2x2.5-inch drive model

## Internal Faceplate Transition (IFT) adapter

The following illustration shows the cable routing for the Internal Faceplate Transition (IFT) adapter.

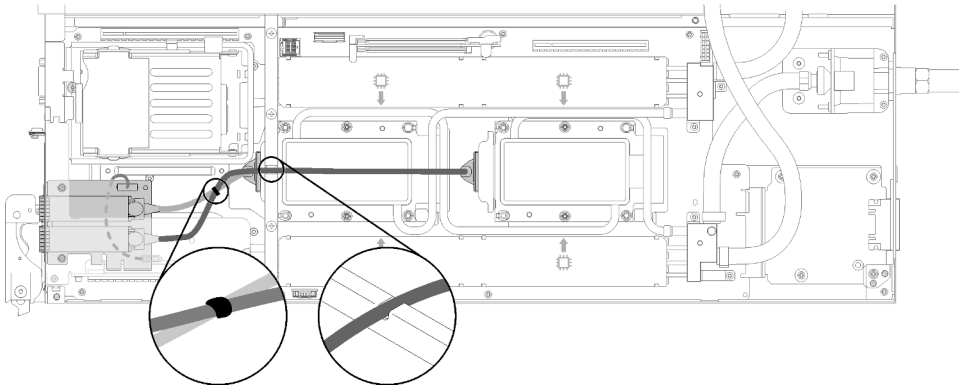


Figure 17. Cable routing - Internal Faceplate Transition (IFT) adapter

---

## Parts list

Use the parts list to identify each of the components that are available for your solution.

For more information about ordering the parts shown in [Figure 18 “Enclosure components” on page 28](#):

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your solution.
2. Click **Service Parts**.
3. Enter the serial number to view a list of parts for your solution.

**Note:** Depending on the model, your solution might look slightly different from the illustration.

- **Enclosure components**

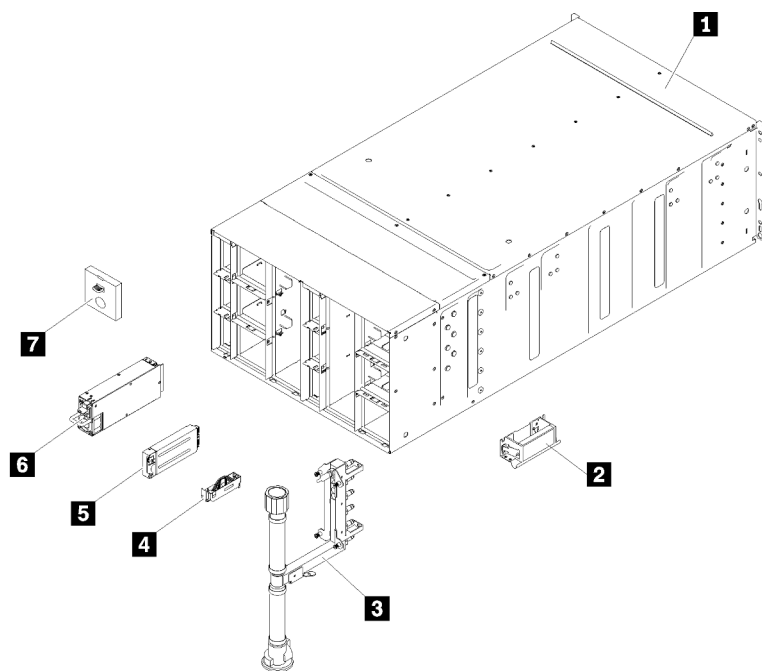


Figure 18. Enclosure components

The parts listed in the following table are identified as one of the following:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If Lenovo installs a Tier 1 CRU at your request with no service agreement, you will be charged for the installation.
- **Tier 2 customer replaceable unit (CRU):** You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your solution.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.
- **Consumable and Structural parts:** Purchase and replacement of consumable and structural parts (components, such as a cover or bezel) is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

Table 13. Parts list

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
<p>For more information about ordering the parts shown in <a href="#">Figure 18 “Enclosure components” on page 28</a>:</p> <p><a href="http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sd650-dwc-dual-node-tray/7x58/parts">http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sd650-dwc-dual-node-tray/7x58/parts</a></p> <p>It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.</p>					
<b>1</b>	6U enclosure assembly			✓	
<b>2</b>	Lift handle	✓			
<b>3</b>	Manifold assembly			✓	
<b>4</b>	Drip sensor assembly			✓	
<b>5</b>	Fan and power control module module	✓			

Table 13. Parts list (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
<b>6</b>	Power supply	√			
<b>7</b>	Fan module filler	√			

- DWC tray components

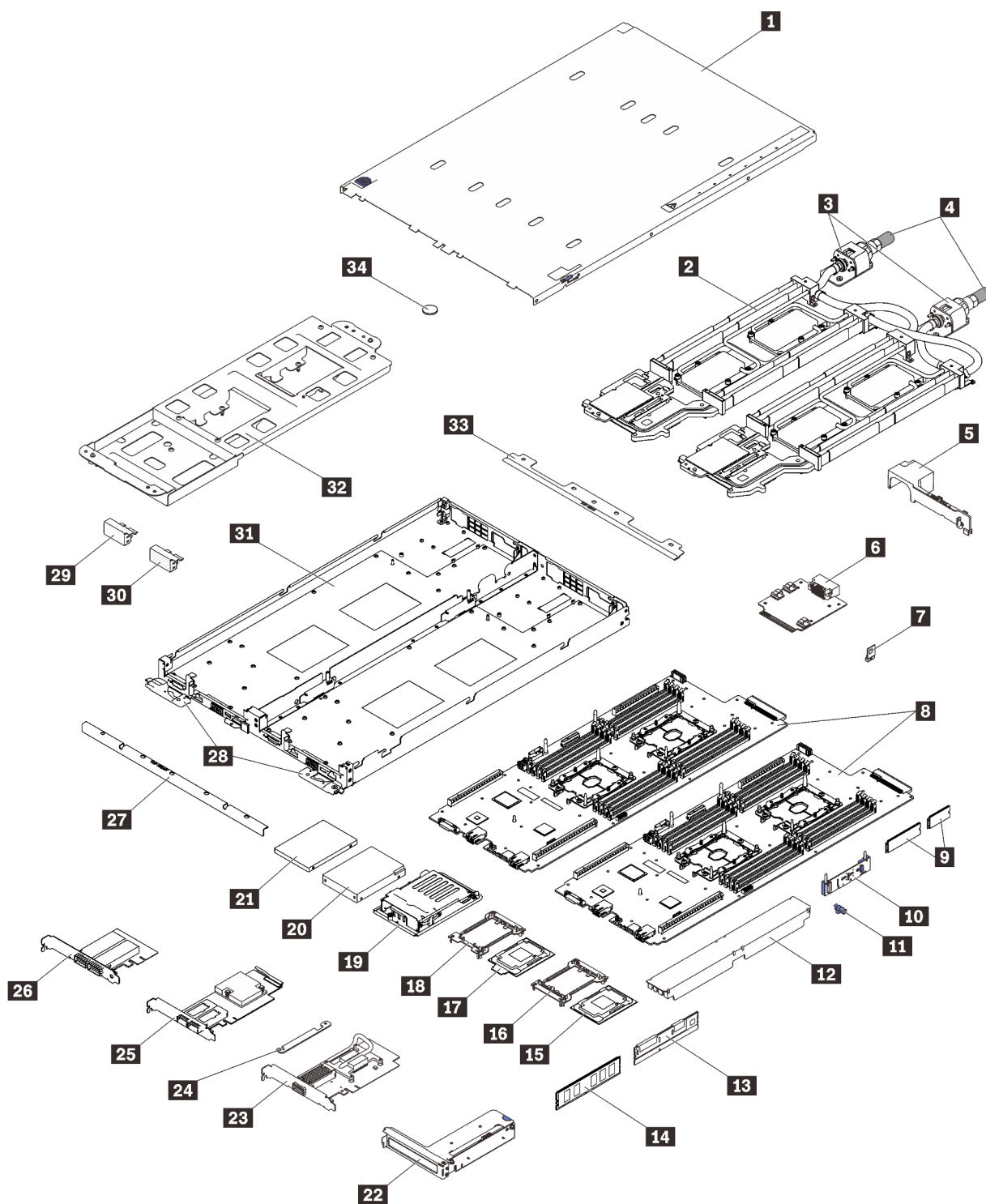


Figure 19. DWC tray components

Table 14. Parts list

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
<p>For more information about ordering the parts shown in Figure 19 “DWC tray components” on page 30:</p> <p><a href="http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sd650-dwc-dual-node-tray/7x58/parts">http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sd650-dwc-dual-node-tray/7x58/parts</a></p> <p>It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.</p>					
<b>1</b>	Tray cover			✓	
<b>2</b>	Water loop			✓	
<b>3</b>	Quick connects			✓	
<b>4</b>	Quick connect plug covers				✓
<b>5</b>	Air baffle				✓
<b>6</b>	Power distribution board			✓	
<b>7</b>	Trusted Cryptographic Module (TCM)			✓	
<b>8</b>	System board			✓	
<b>9</b>	M.2 drive (42 mm and 80 mm)			✓	
<b>10</b>	M.2 backplane			✓	
<b>11</b>	M.2 retainer clip			✓	
<b>12</b>	DIMM cover				✓
<b>13</b>	DCPMM		✓		
<b>14</b>	DIMM		✓		
<b>15</b>	Processor			✓	
<b>16</b>	Processor clip				✓
<b>17</b>	Fabric processor			✓	
<b>18</b>	Fabric processor clip				✓
<b>19</b>	Drive cage			✓	
<b>20</b>	2.5-inch drive (15mm)	✓			
<b>21</b>	2.5-inch drive (7mm)	✓			
<b>22</b>	PCIe riser-card assembly			✓	
<b>23</b>	CX5 EDR adapter			✓	
<b>24</b>	Retaining clamp				✓
<b>25</b>	OPA adapter			✓	
<b>26</b>	IFT adapter			✓	
<b>27</b>	Front cross brace				✓
<b>28</b>	DWC tray release latches			✓	

Table 14. Parts list (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
<b>29</b>	Blank bezel filler without perf holes				✓
<b>30</b>	Blank bezel filler with perf holes				✓
<b>31</b>	DWC tray			✓	
<b>32</b>	Water loop carrier			✓	
<b>33</b>	Rear cross brace				✓
<b>34</b>	CMOS battery (CR2032)				✓

## Power cords

Several power cords are available, depending on the country and region where the server is installed.

To view the power cords that are available for the server:

1. Go to:  
<http://dcsc.lenovo.com/#/>
2. Click **Preconfigured Model** or **Configure to order**.
3. Enter the machine type and model for your server to display the configurator page.
4. Click **Power** → **Power Cables** to see all line cords.

### Notes:

- For your safety, a power cord with a grounded attachment plug is provided to use with this product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.
- Power cords for this product that are used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).
- For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.
- For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.
- For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.
- Power cords for a specific country or region are usually available only in that country or region.



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## Chapter 3. Hardware replacement procedures

This section provides installation and removal procedures for all serviceable system components. Each component replacement procedure references any tasks that need to be performed to gain access to the component being replaced.

For more information about ordering parts:

<http://datacentersupport.lenovo.com/us/en/products/servers/thinksystem/sd650-dwc-dual-node-tray/7x58/parts>

**Note:** If you replace a part, such as an adapter, that contains firmware, you might also need to update the firmware for that part. For more information about updating firmware, see [“Firmware updates” on page 7](#).

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### Installation Guidelines

Before installing components in your server, read the installation guidelines.

Before installing optional devices, read the following notices carefully:

**Attention:** Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

- Read the safety information and guidelines to ensure your safety at work:
  - A complete list of safety information for all products is available at:  
[https://pubs.lenovo.com/safety\\_documentation/](https://pubs.lenovo.com/safety_documentation/)
  - The following guidelines are available as well: [“Handling static-sensitive devices” on page 38](#) and [“Working inside the solution with the power on” on page 37](#).
- Make sure the components you are installing are supported by your server. For a list of supported optional components for the server, see <https://serverproven.lenovo.com/>.
- When you install a new server, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to [ThinkSystem SD650 Neptune® DWC Trays and DW612 Neptune® DWC Enclosure Drivers and Software](#) to download firmware updates for your server.

**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the component is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

- It is good practice to make sure that the server is working correctly before you install an optional component.
- Keep the working area clean, and place removed components on a flat and smooth surface that does not shake or tilt.
- Do not attempt to lift an object that might be too heavy for you. If you have to lift a heavy object, read the following precautions carefully:
  - Make sure that you can stand steadily without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.

- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- Back up all important data before you make changes related to the disk drives.
- Have a small flat-blade screwdriver, a small Phillips screwdriver, and a T8 torx screwdriver available.
- To view the error LEDs on the system board and internal components, leave the power on.
- You do not have to turn off the server to remove or install hot-swap power supplies, hot-swap fans, or hot-plug USB devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables, and you must disconnect the power source from the server before you perform any steps that involve removing or installing a riser card.
- Blue on a component indicates touch points, where you can grip to remove a component from or install it in the server, open or close a latch, and so on.
- Terra-cotta on a component or an orange label on or near a component indicates that the component can be hot-swapped if the server and operating system support hot-swap capability, which means that you can remove or install the component while the server is still running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the server and operating system support hot-swap capability. This means that you can remove or install the drive while the server is still running.

**Note:** See the system specific instructions for removing or installing a hot-swap drive for any additional procedures that you might need to perform before you remove or install the drive.

- After finishing working on the server, make sure you reinstall all safety shields, guards, labels, and ground wires.

## Safety inspection checklist

Use the information in this section to identify potentially unsafe conditions with your solution. As each machine was designed and built, required safety items were installed to protect users and service technicians from injury.

**Note:** The product is not suitable for use at visual display workplaces according to §2 of the Workplace Regulations.

### CAUTION:

**This equipment must be installed or serviced by trained personnel, as defined by the NEC, IEC 62368-1 & IEC 60950-1, the standard for Safety of Electronic Equipment within the Field of Audio/Video, Information Technology and Communication Technology. Lenovo assumes you are qualified in the servicing of equipment and trained in recognizing hazards energy levels in products. Access to the equipment is by the use of a tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.**

**Important:** Electrical grounding of the solution is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Use the following checklist to verify that there are no potentially unsafe conditions:

1. Make sure that the power is off and the power cord is disconnected.
2. Check the power cord.
  - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.

- Make sure that the power cord is the correct type.

To view the power cords that are available for the server:

- a. Go to:

<http://dcsc.lenovo.com/#/>

- b. Click **Preconfigured Model** or **Configure to order**.

- c. Enter the machine type and model for your server to display the configurator page.

- d. Click **Power → Power Cables** to see all line cords.

- Make sure that the insulation is not frayed or worn.

3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
4. Check inside the solution for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
5. Check for worn, frayed, or pinched cables.
6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

## System reliability guidelines

Review the system reliability guidelines to ensure proper system cooling and reliability.

Make sure the following requirements are met:

- When the solution comes with redundant power, a power supply must be installed in each power-supply bay.
- Adequate space around the solution must be spared to allow solution cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the solution. Do not place any object in front of the fans.
- For proper cooling and airflow, refit the solution cover before you turn the power on. Do not operate the solution for more than 30 minutes with the solution cover removed, for it might damage solution components.
- Cabling instructions that come with optional components must be followed.
- A removed hot-swap drive must be replaced within two minutes after removal.
- A removed hot-swap power supply must be replaced within two minutes after removal.
- All processor sockets must contain either a socket cover or a processor with heat sink.
- When more than one processor is installed, fan population rules for each node must be strictly followed.

## Working inside the solution with the power on

You might need to keep the power on with the solution cover removed to look at system information on the display panel or to replace hot-swap components. Review these guidelines before doing so.

**Attention:** The solution might stop and data loss might occur when internal solution components are exposed to static electricity. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding systems when working inside the solution with the power on.

- Avoid loose-fitting clothing, particularly around your forearms. Button or roll up long sleeves before working inside the solution.
- Prevent your necktie, scarf, badge rope, or hair from dangling into the solution.
- Remove jewelry, such as bracelets, necklaces, rings, cuff links, and wrist watches.

- Remove items from your shirt pocket, such as pens and pencils, in case they fall into the solution as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

## Handling static-sensitive devices

Review these guidelines before you handle static-sensitive devices to reduce the possibility of damage from electrostatic discharge.

**Attention:** Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

- Limit your movement to prevent building up static electricity around you.
- Take additional care when handling devices during cold weather, for heating would reduce indoor humidity and increase static electricity.
- Always use an electrostatic-discharge wrist strap or other grounding system, particularly when working inside the solution with the power on.
- While the device is still in its static-protective package, touch it to an unpainted metal surface on the outside of the solution for at least two seconds. This drains static electricity from the package and from your body.
- Remove the device from the package and install it directly into the solution without putting it down. If it is necessary to put the device down, put it back into the static-protective package. Never place the device on the solution or on any metal surface.
- When handling a device, carefully hold it by the edges or the frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Keep the device from others' reach to prevent possible damages.

---

## Replace components in the enclosure

Use the following information to remove and install the enclosure components.

### Enclosure midplane replacement

Use the following procedures to remove and install the enclosure midplane.

#### Remove the enclosure midplane

Use this information to remove the enclosure midplane.

##### S002



#### **CAUTION:**

**The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

Before you remove the enclosure midplane:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Three people are needed to complete this task.
3. Record the machine type model, the enclosure serial number, and retrieve the existing universally unique identifier (UUID) information from the enclosure midplane that you are removing. The procedure for obtaining this data might require different steps depending on the functional state of the enclosure.
  - a. Enclosure is operating:
    - 1) Log onto the Lenovo XClarity Controller and access the command-line interface (CLI). You can access the XCC CLI through a direct serial or Ethernet connection to the XCC, or through a Secure Shell (SSH) connection to the XCC. You must authenticate with the XCC before issuing commands.
    - 2) Query for the machine type model, enclosure serial number, and the UUID values by using the CLI `info` command. Record this information before you proceed.
  - b. Enclosure is not operating:
    - 1) Obtain the enclosure serial number and the machine type model from one of the enclosure labels.
    - 2) Record the enclosure serial number, the machine type model, and the UUID before you proceed.
4. Shut down the operating system and turn off any compute nodes in the enclosure. See the documentation that comes with the compute node for detailed instructions.
5. Open the release handles on the compute nodes and the management node, if one is installed, to disengage the nodes from the enclosure midplane connectors.
6. Disconnect the enclosure from power.
7. Disconnect all cables from the modules in the rear of the enclosure.
8. Remove the components from rear and front of the enclosure.
9. Remove all trays in the front of the enclosure (see [“Remove a DWC tray from the enclosure” on page 244](#)).
10. Remove all EMC shields on both sides.

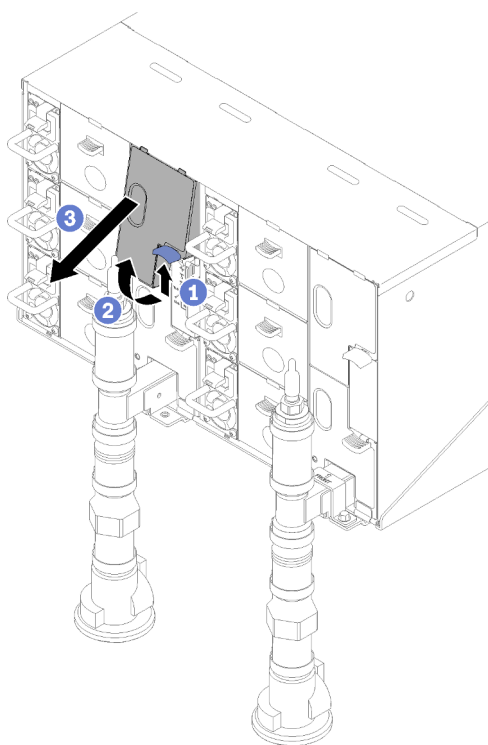


Figure 20. Upper EMC shields removal

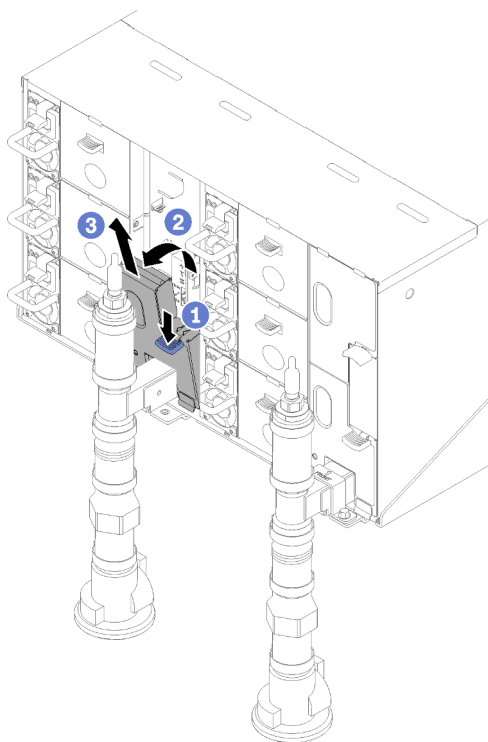
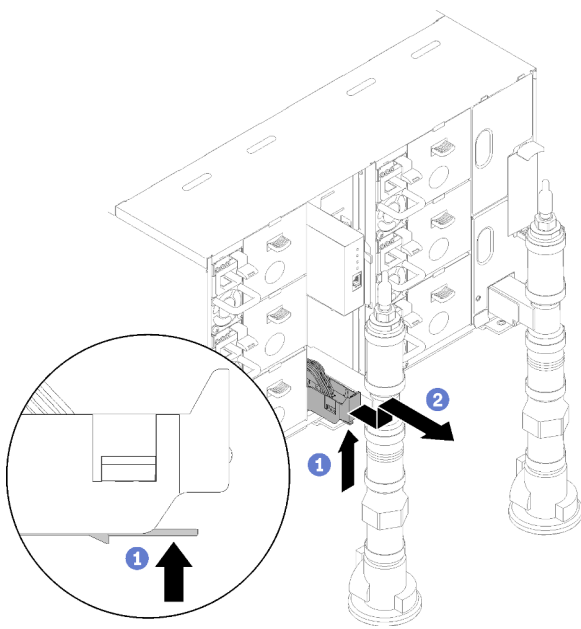


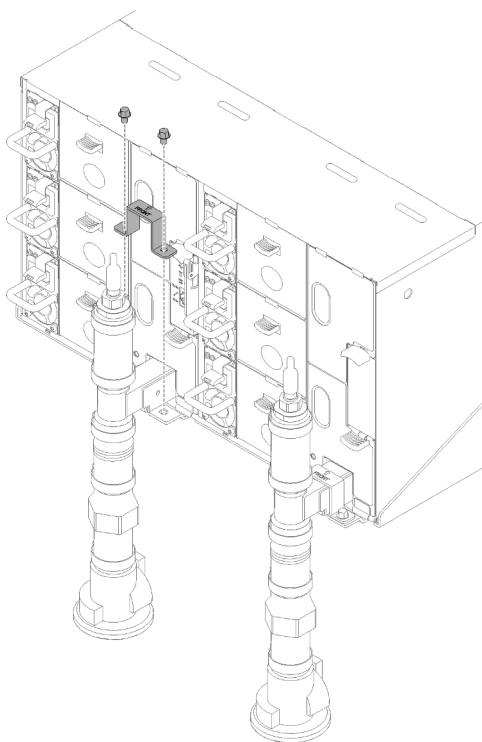
Figure 21. Lower EMC shields removal

11. Push the latch up upwards and slide the drip sensor assembly backwards, then; lift the drip sensor assembly up to clear sensor post and pull it out of the enclosure.



*Figure 22. Drip sensor assembly removal*

12. Remove manifold retention brackets that are retaining manifolds (top enclosure position only).



*Figure 23. Retention bracket removal*

13. Remove FPC card module and FPC card module support bracket.

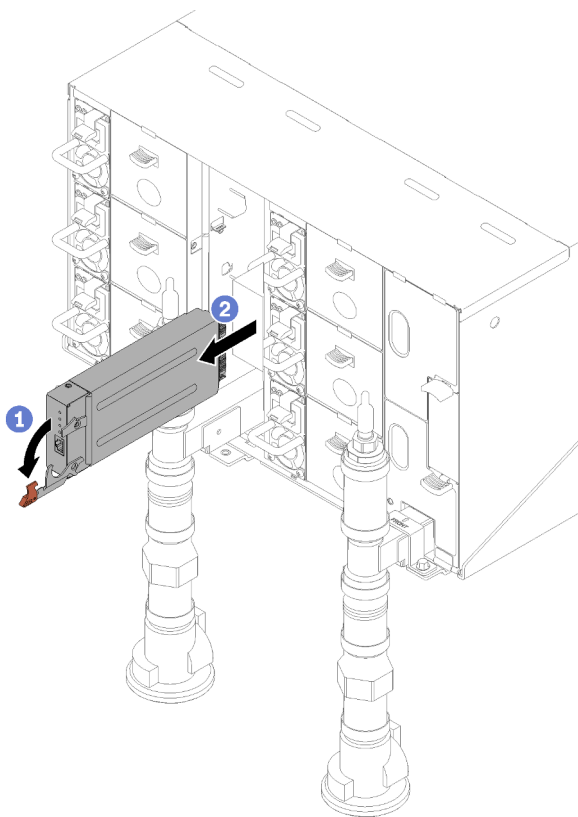


Figure 24. FPC card module removal

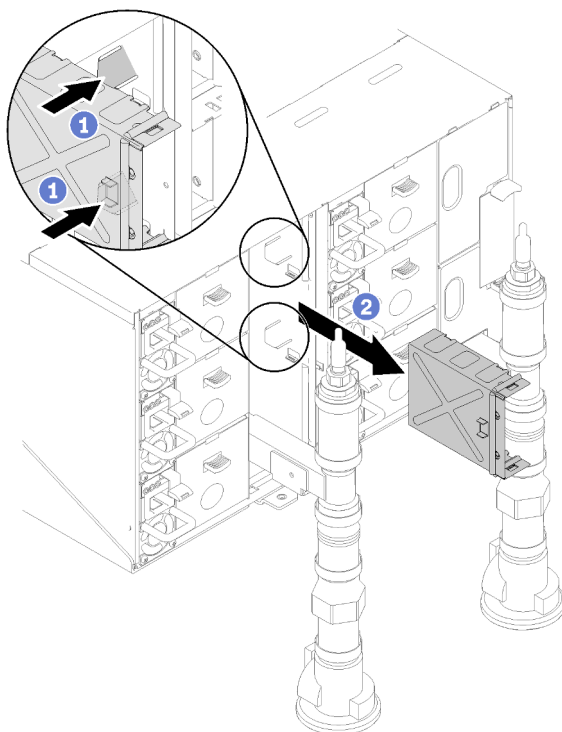


Figure 25. Support bracket removal

14. Remove the blank filler.

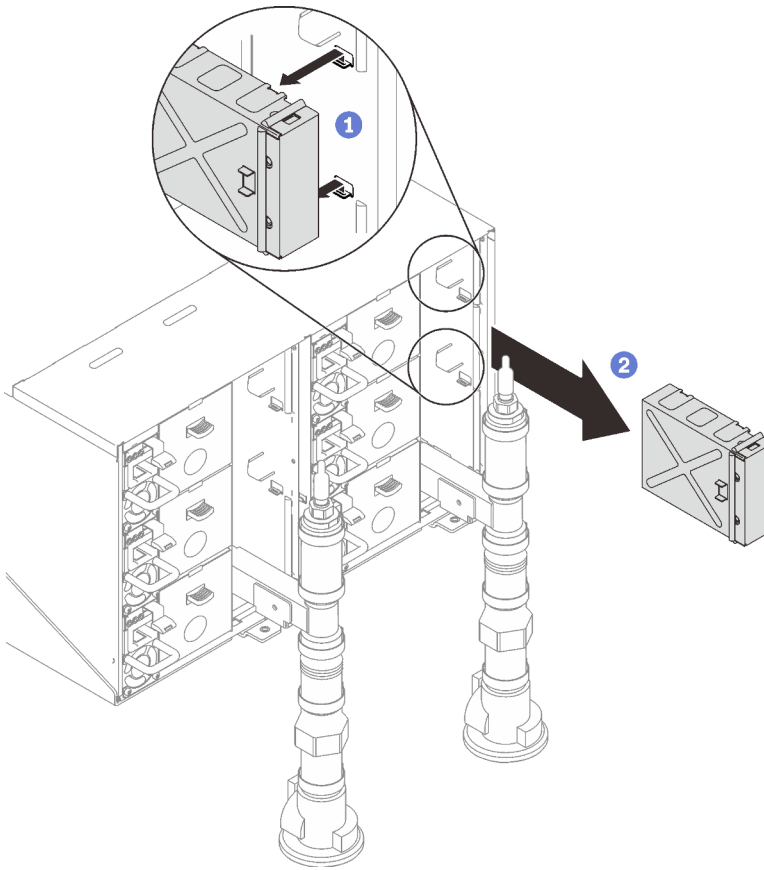


Figure 26. Blank filler removal

15. Remove all power supplies from the enclosure.

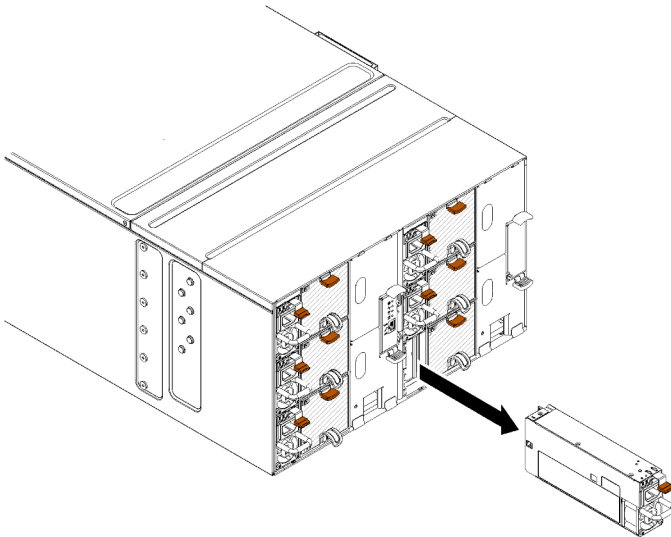


Figure 27. Power supply removal

16. Remove eight screws (using the screwdriver contained in the manifold repair kit) to loosen two manifolds from the enclosure.

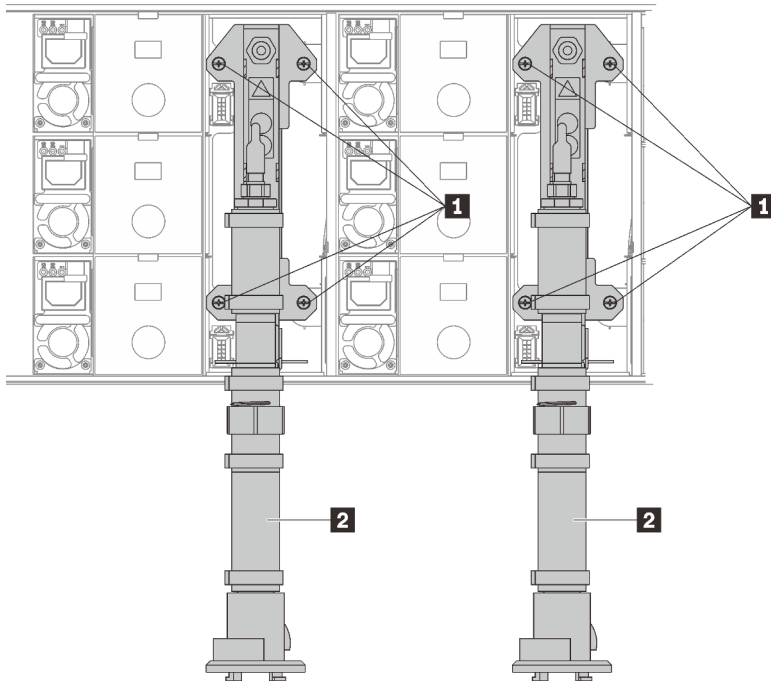
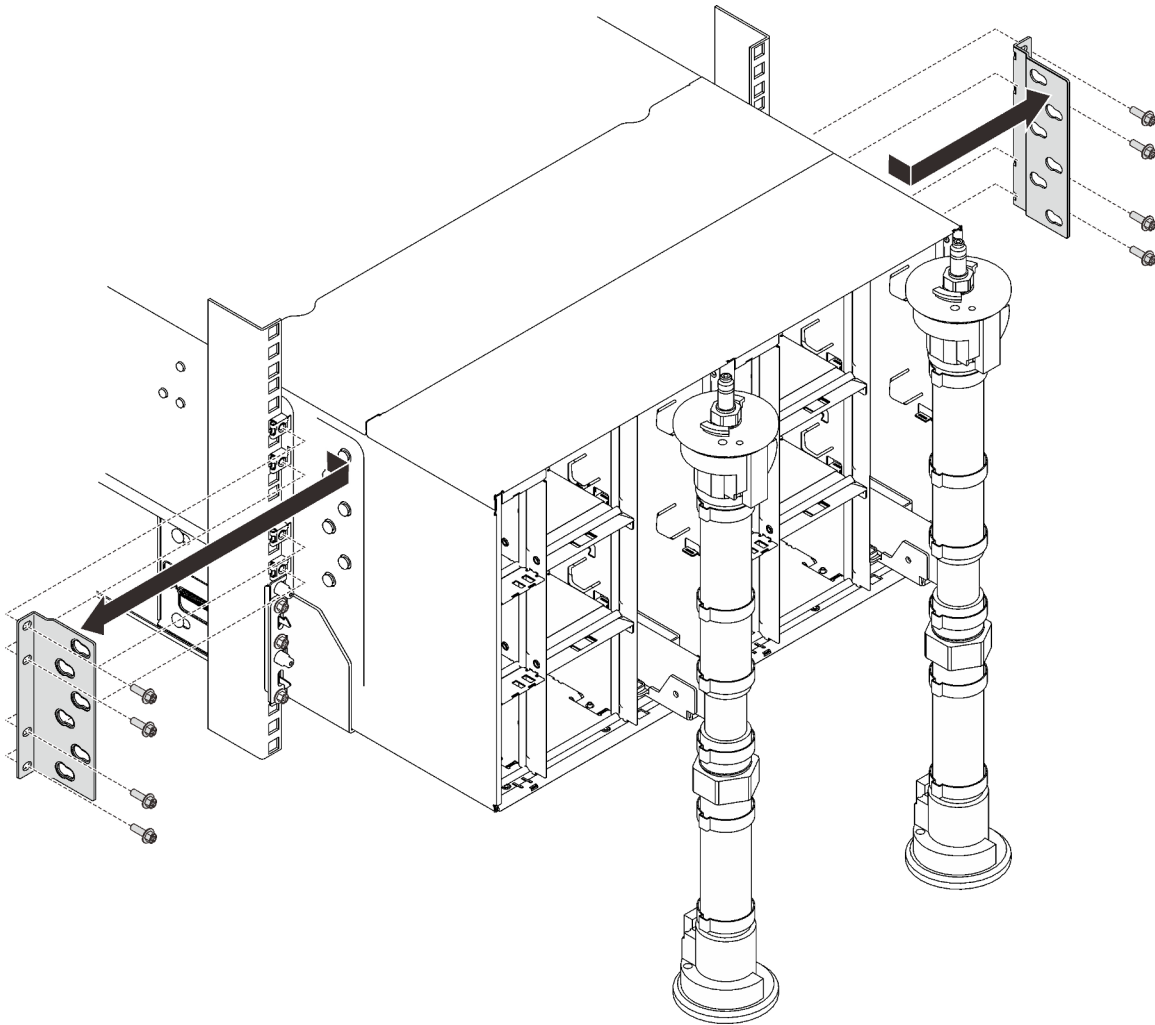


Figure 28. Manifold screw locations

Table 15. Manifold screw locations

<b>1</b> Screws	<b>2</b> Manifold
-----------------	-------------------

17. Remove eight screws to remove two support brackets on both sides.



*Figure 29. Support bracket removal*

18. Remove two EIA covers at the front of the enclosure, then, remove six screws.

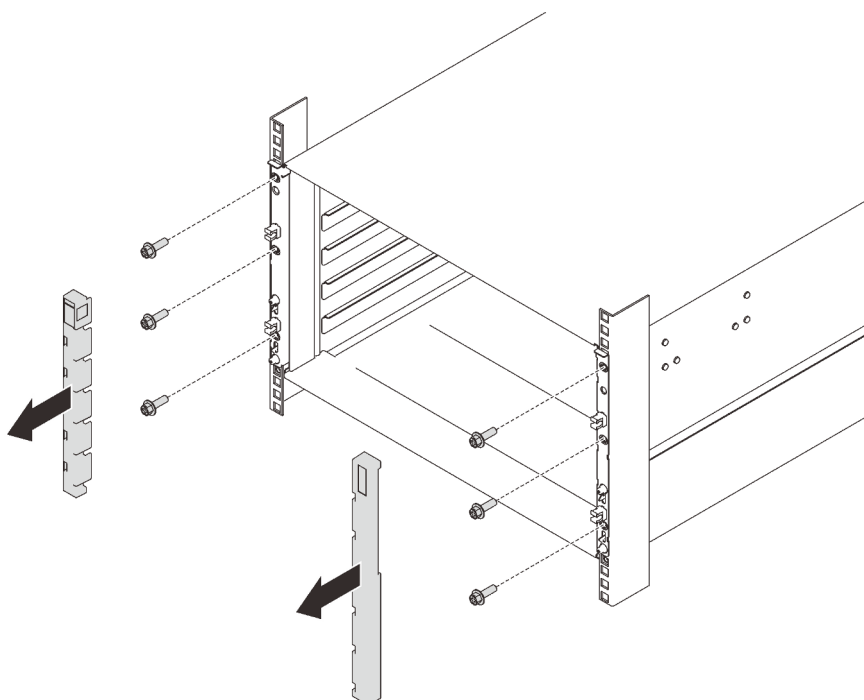
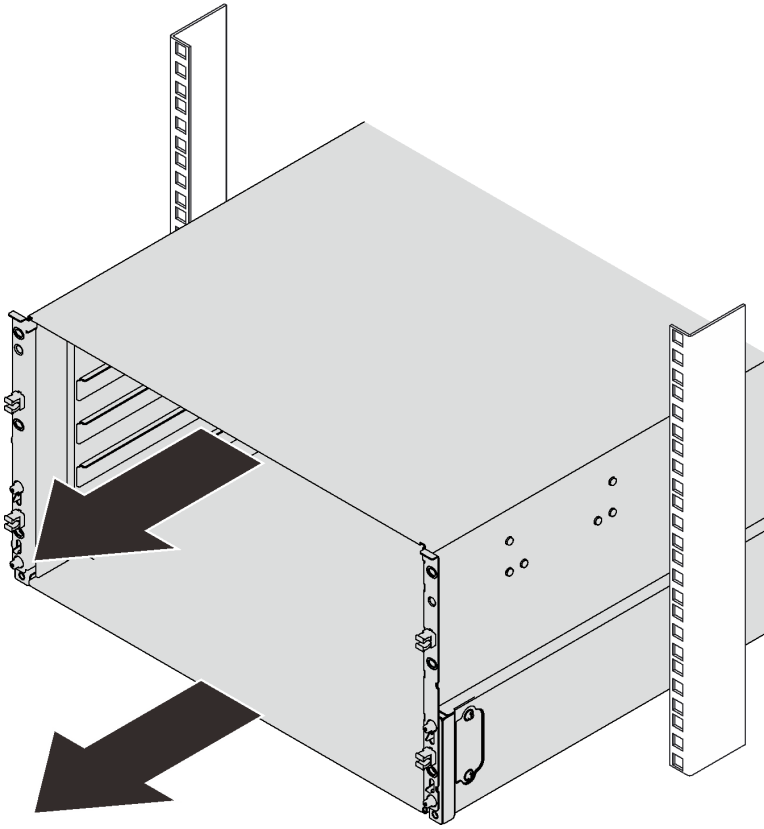


Figure 30. EIA cover removal

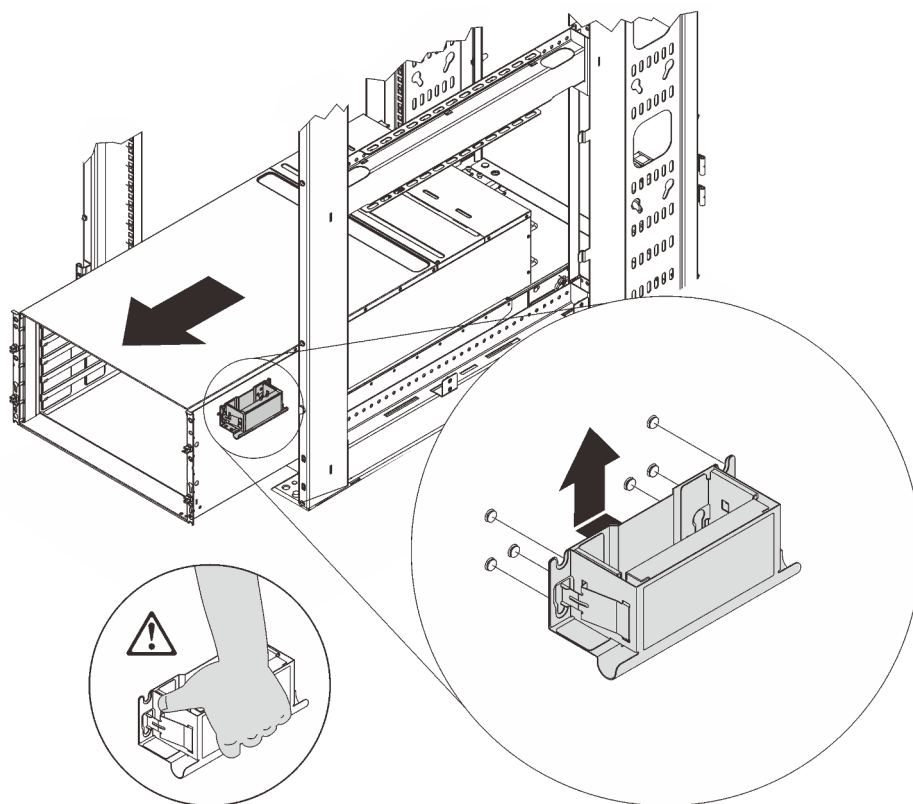
19. Slide the enclosure out until it allows you to attach front handles at both sides. Align slots on the handles with posts on the enclosure and slide handles up until they lock into places.

**Attention:** Three trained technicians are needed to complete the enclosure installation/removal task.

- Two technicians hold front and rear handles at both sides of the enclosure.
- One technician protects cables from damage.

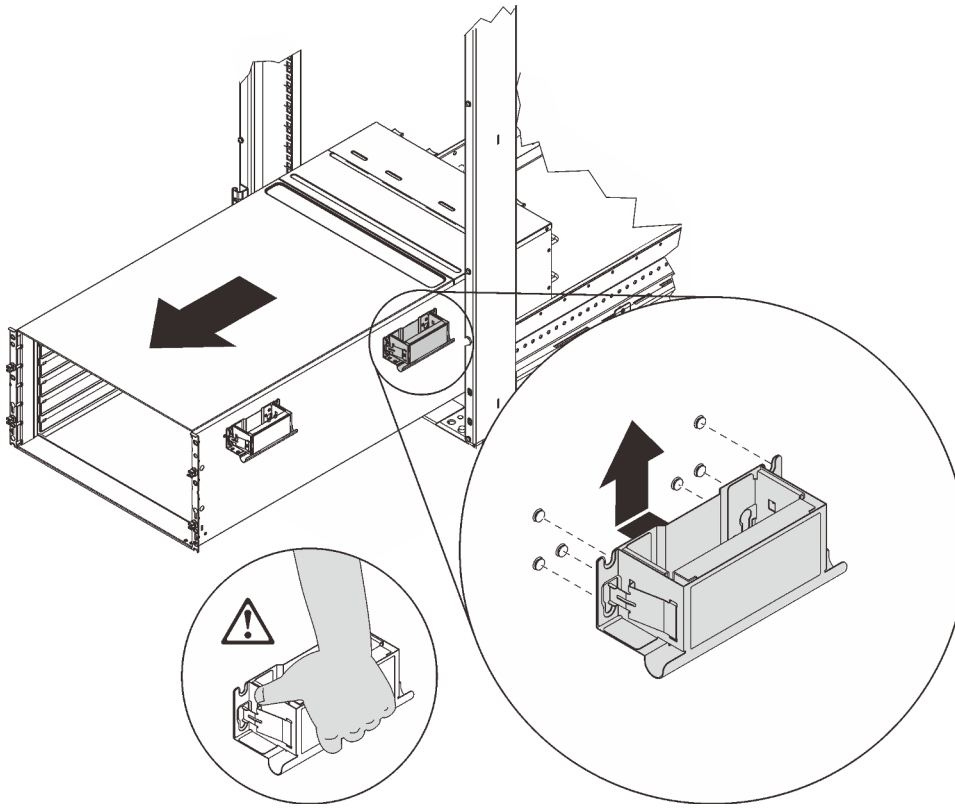


*Figure 31. Sliding the enclosure*



*Figure 32. Front handle installation*

20. Hold front handles at both sides and slide the enclosure out until you have enough space to install rear handles.



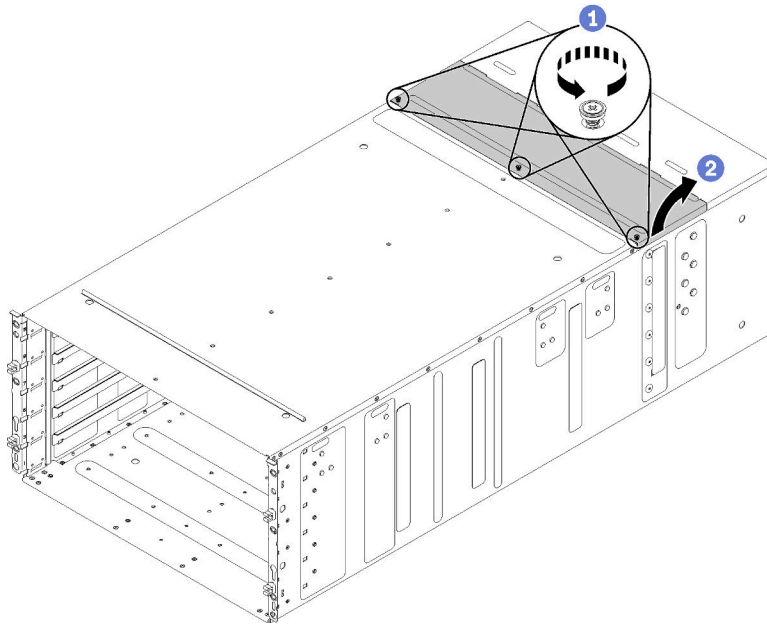
*Figure 33. Rear handle installation*

21. Carefully hold front and rear handles at both sides to slide the enclosure out of the rack; then, gently put the enclosure on a stable work surface.

Complete the following steps to remove the enclosure midplane.

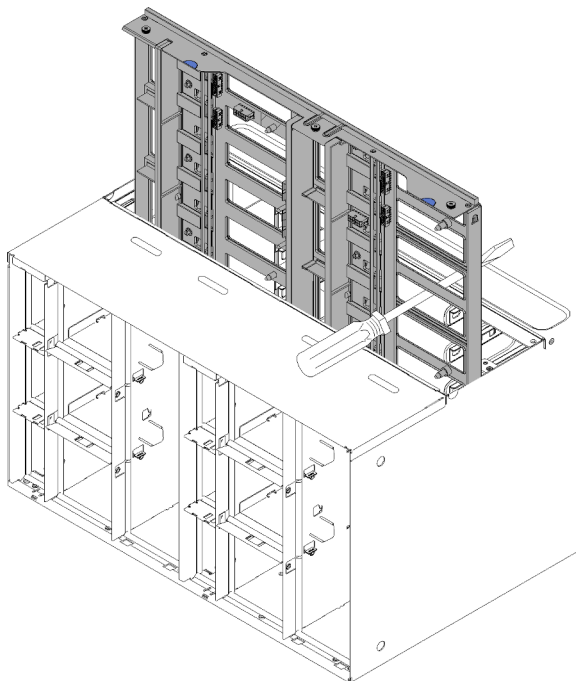
Step 1. Loosen the three captive screws on the top cover.

Step 2. Rotate the top cover outwards.



*Figure 34. Top cover outward rotation*

- Step 3. Loosen the three captive screws that secure the enclosure midplane to the enclosure.
- Step 4. Lift up the enclosure midplane half way. Put a screwdriver or a stick in the middle of the enclosure midplane so your hands are free.



*Figure 35. Removal of the enclosure midplane from an enclosure*

- Step 5. Unplug the two fan cables on enclosure midplane.
- Step 6. Carefully grasp the enclosure midplane and slide it away from the enclosure.

**Note:** Make sure that you do not grasp the connectors on the enclosure midplane. You could damage the connectors.

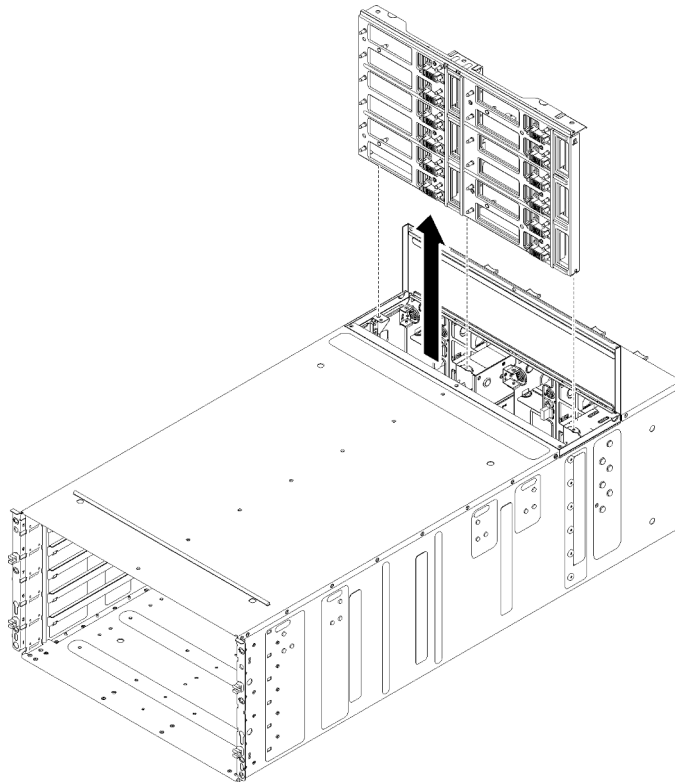


Figure 36. Removal of the enclosure midplane from an enclosure

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

#### Demo video

[Watch the procedure on YouTube](#)

### Install the enclosure midplane

(Trained service technician only) Use this information to install the enclosure midplane.

#### S002



#### **CAUTION:**

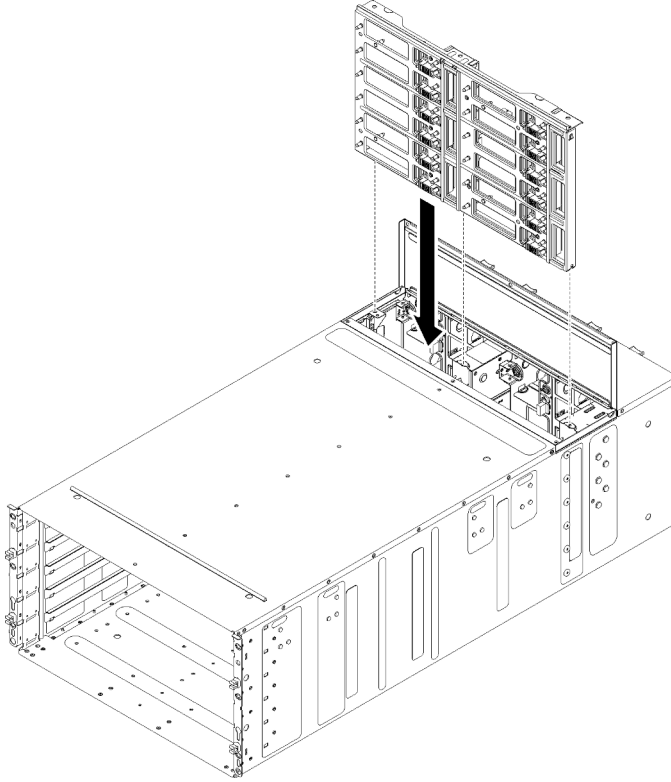
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Before you install the enclosure midplane:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Three people are needed to complete this task.

Complete the following steps to install the enclosure midplane.

Step 1. Carefully align the enclosure midplane with the guide pins in the enclosure.



*Figure 37. Enclosure midplane installation*

Step 2. Slide the enclosure midplane half way into the enclosure. Put a screwdriver or a stick in the middle of the enclosure midplane so your hands are free.

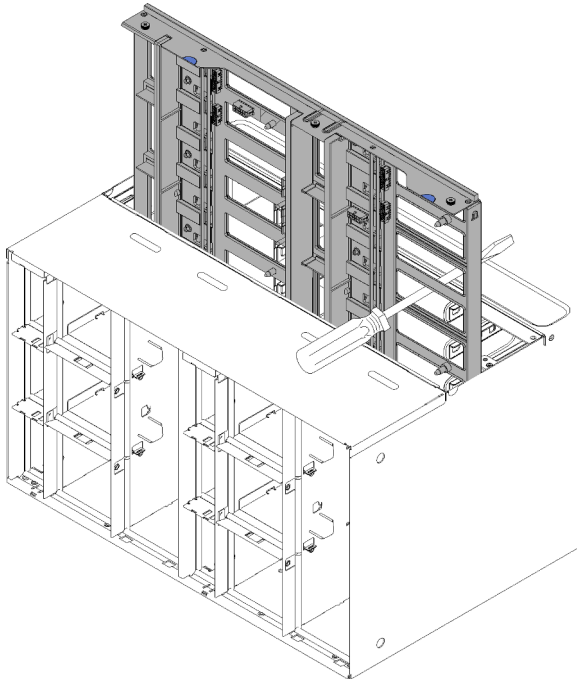
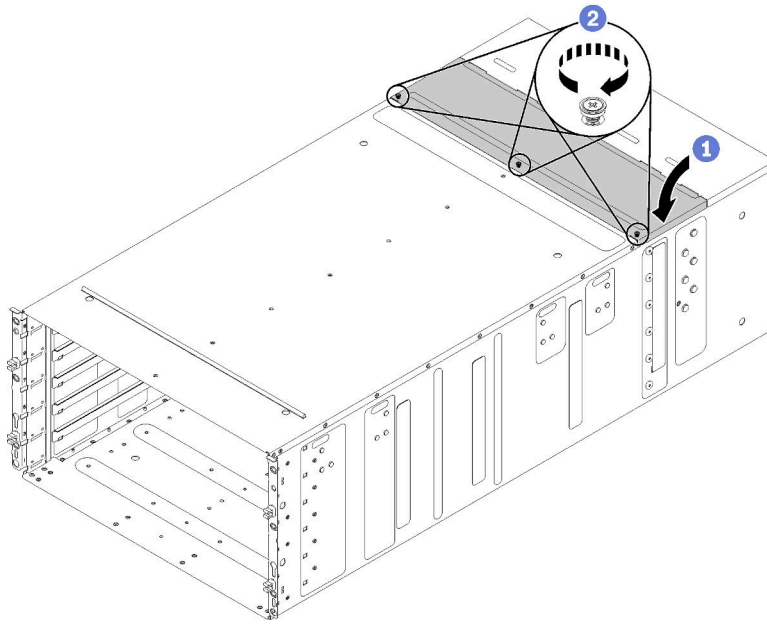


Figure 38. Enclosure midplane

**Attention:**

- You must hold the enclosure midplane up against the top inside of the enclosure shell and keep the enclosure midplane vertical during installation. If the enclosure midplane is not inserted correctly, the guide pins can contact the enclosure midplane connectors and damage the connector pins.
- Do not grasp the connectors on the enclosure midplane when you install it in the enclosure. Touching the connectors might damage the connector pins.
- Make sure that the fan and power controller cable is out of the way when you slide the enclosure midplane into the enclosure.

- Step 3. Connect the two cables back to fan power connectors and fan signal connectors back to the enclosure midplane.
- Step 4. Use one hand to lift the midplane slightly while carefully removing screw driver / stick holding the midplane in the half-in position, then; slide the midplane all the way into the enclosure until it stops.
- Step 5. Tighten the three captive screws that secure the enclosure midplane to the enclosure.
- Step 6. Rotate the top cover inwards.
- Step 7. Tighten the three captive screws on the top cover.



*Figure 39. Top cover inward rotation*

Reassemble the enclosure and program the vital product data (VPD) that is stored on the card. Complete the following steps:

**Attention:** Three trained technicians are needed to complete the enclosure installation/removal task.

- Two technicians hold front and rear handles at both sides of the enclosure.
  - One technician protects cables from damage.
1. Carefully put the enclosure into the rack and slide the enclosure until rear handles are near front rack rails; then, remove rear handles at both sides.

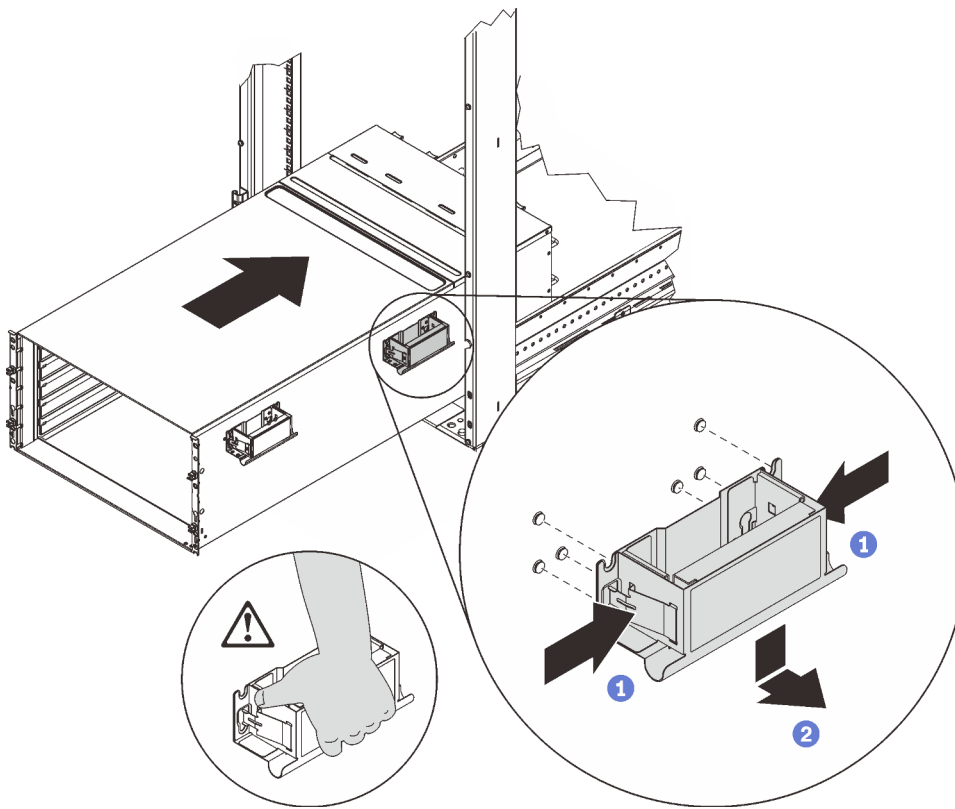


Figure 40. Rear handle removal

2. Slide the enclosure farther into the rack until front handles are near front rack rails; then, remove front handles at both sides.

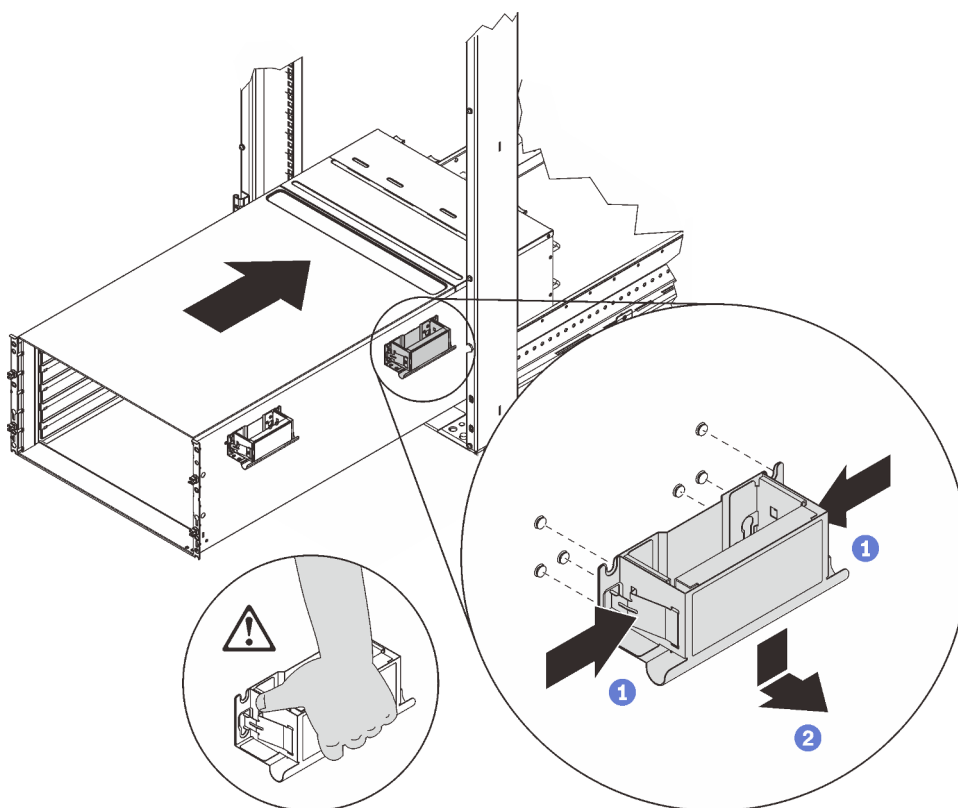


Figure 41. Front handle removal

3. Slide the enclosure all the way back to the rack.

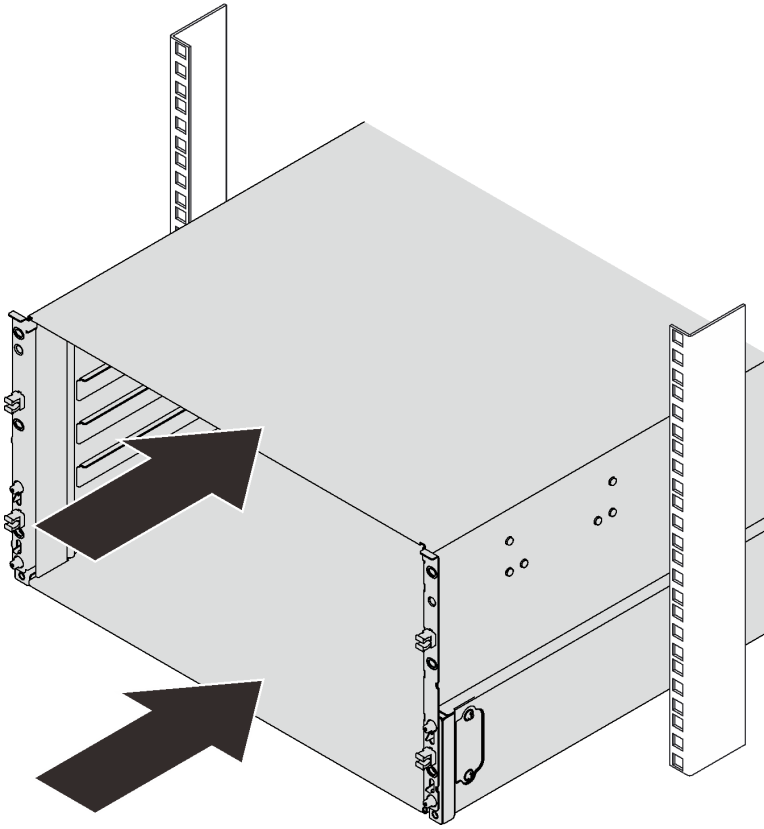


Figure 42. Sliding the rack

4. Reinstall two EIA covers at the front of the enclosure; then, reinstall six screws.

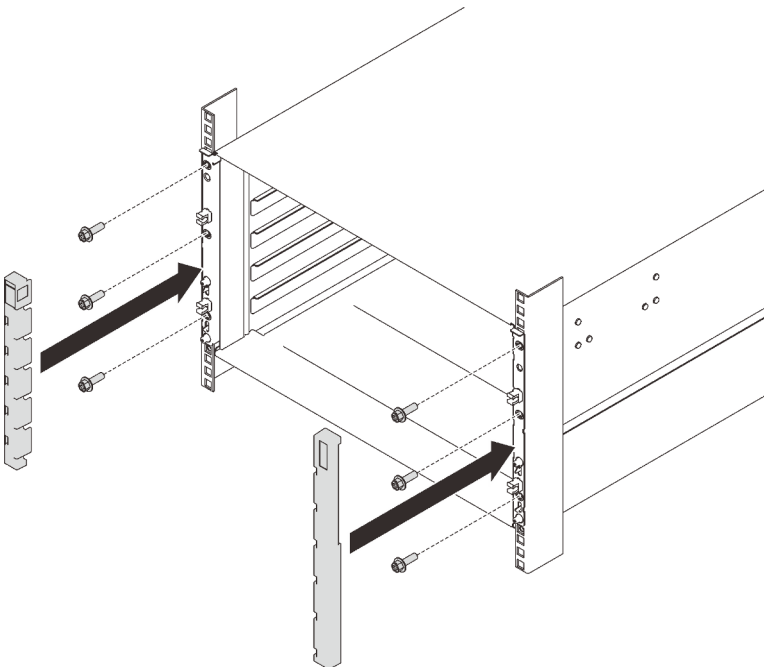
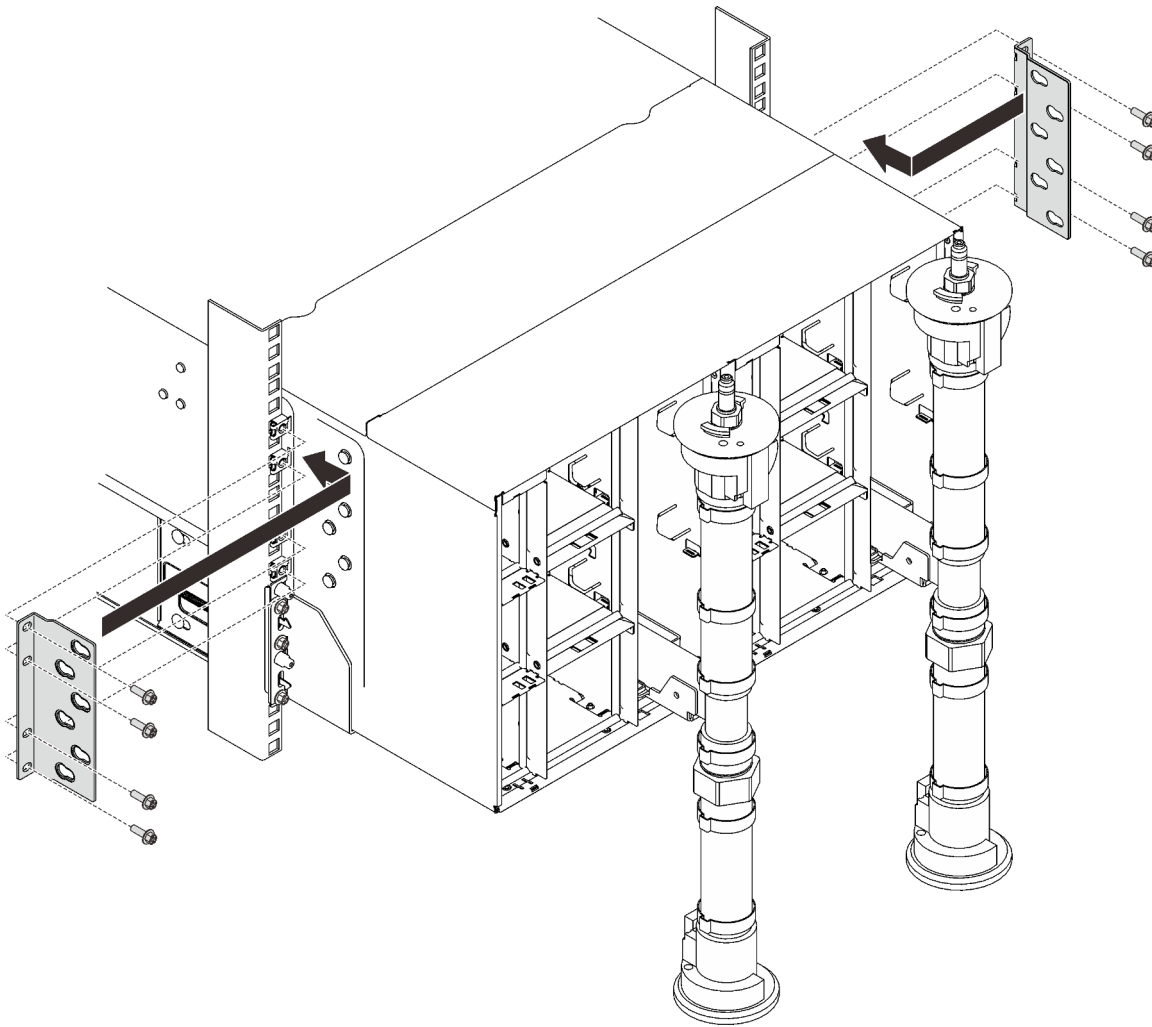


Figure 43. EIA cover installation

5. Reinstall eight screws to secure two support brackets on the rear enclosure.



*Figure 44. Support bracket installation*

6. Reinstall eight screws (using the screwdriver contained in the manifold repair kit) to secure two manifolds.

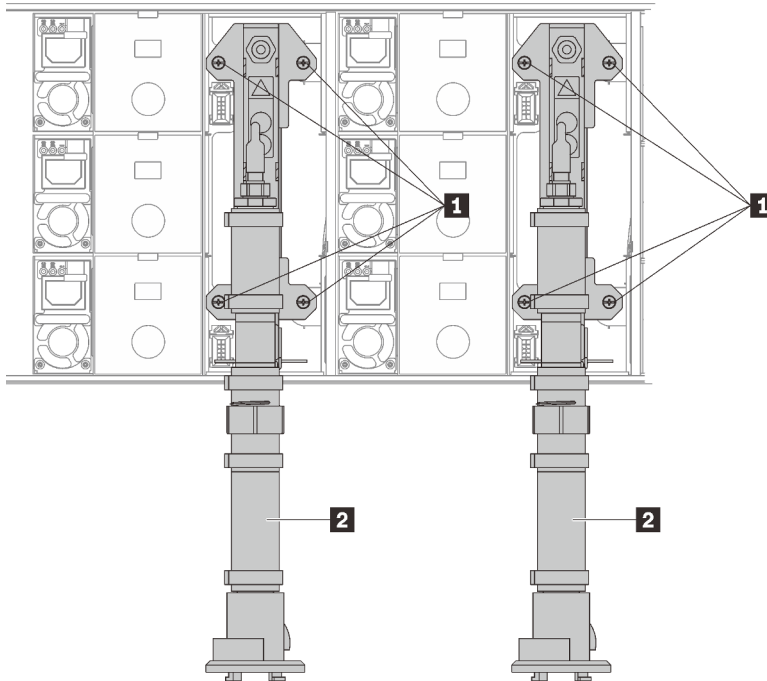


Figure 45. Manifold screw locations

Table 16. Manifold screw locations

1 Screws	2 Manifold
----------	------------

7. Reinstall all power supplies back to the enclosure.

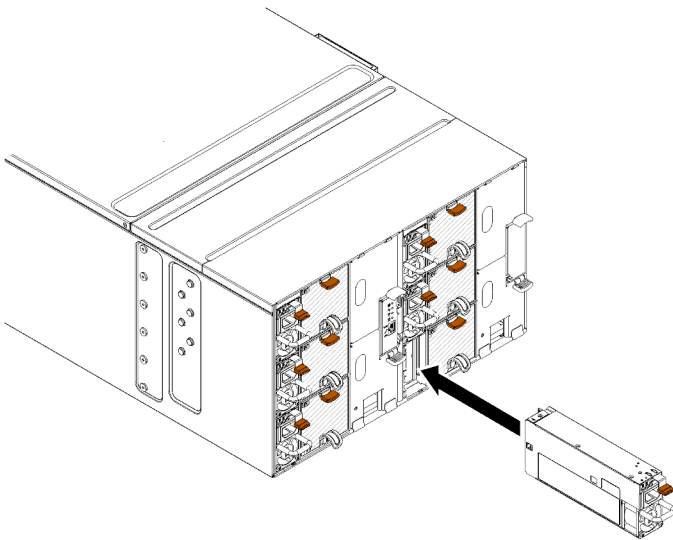


Figure 46. Power supply installation

8. Reinstall the blank filler.

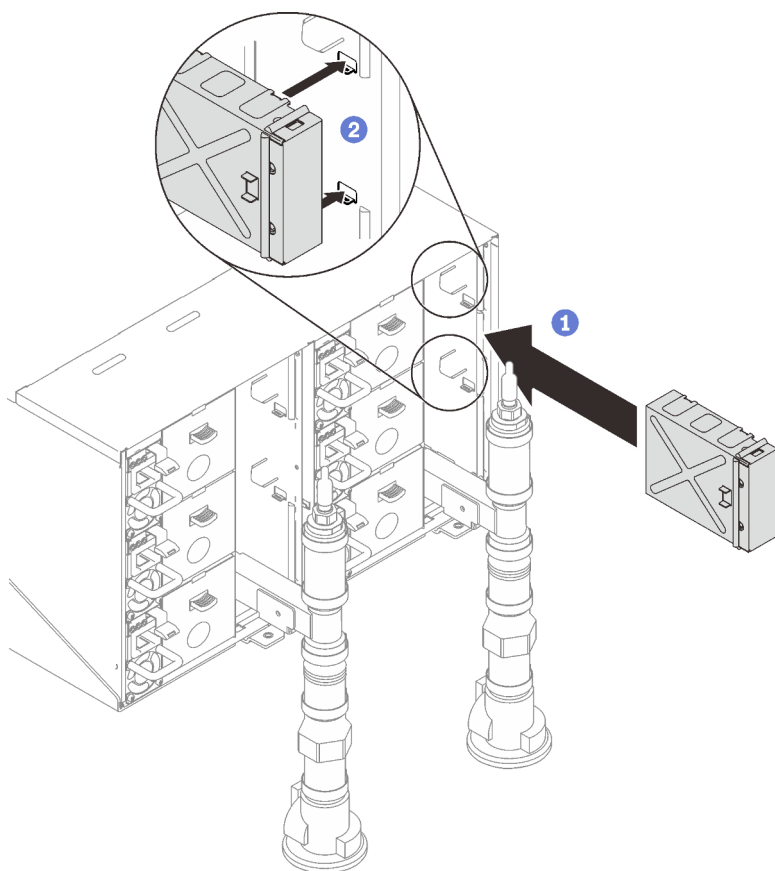


Figure 47. Blank filler installation

9. Reinstall FPC card module support bracket and FPC card module.

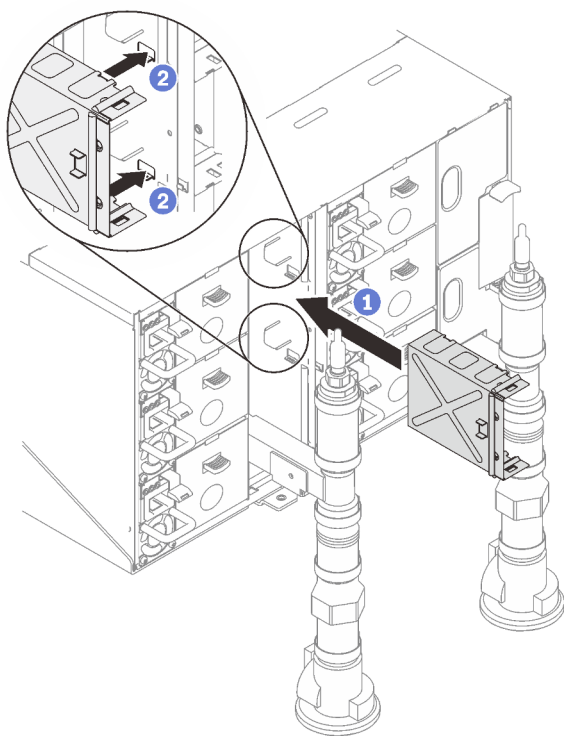


Figure 48. Support bracket installation

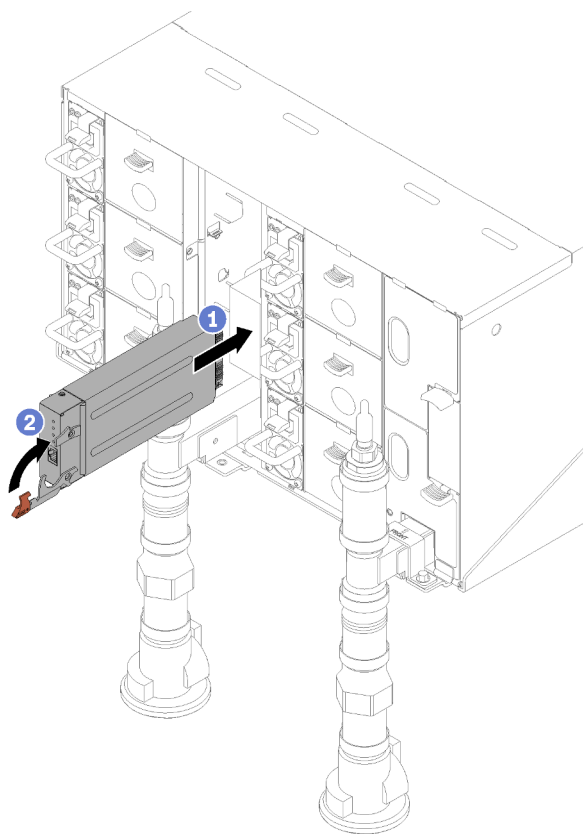
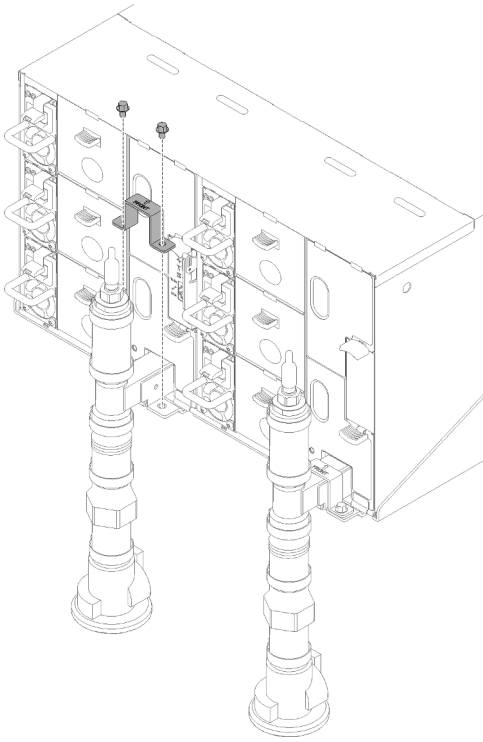


Figure 49. FPC card module installation

10. Reinstall manifold retention brackets that are retaining the manifolds (top enclosure position only).



*Figure 50. Retention bracket installation*

11. Align the drip sensor assembly with the enclosure and slide it into place.

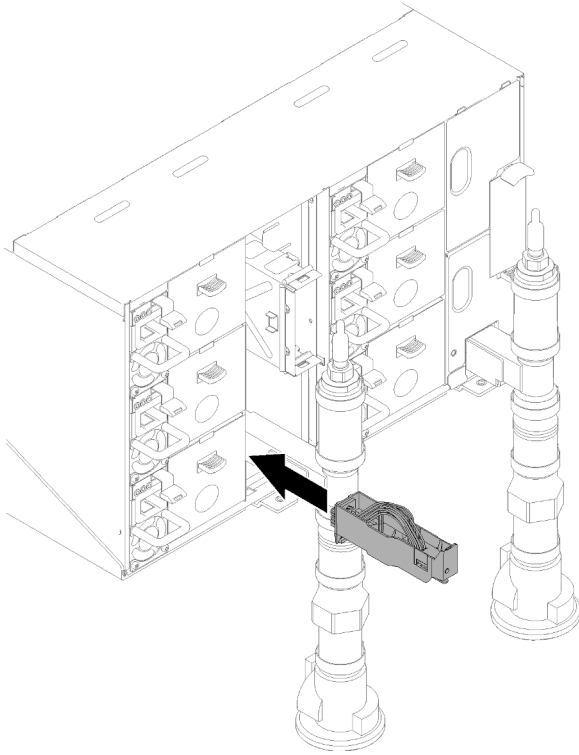


Figure 51. Drip sensor assembly installation

12. Reinstall all EMC shields.

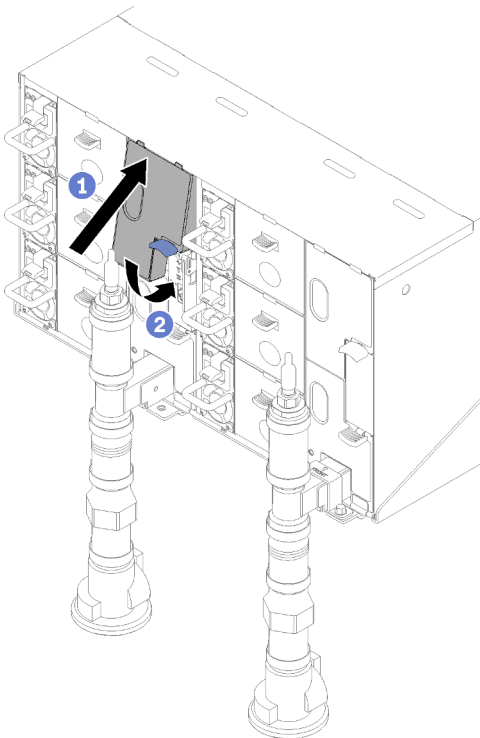


Figure 52. Upper EMC shields installation

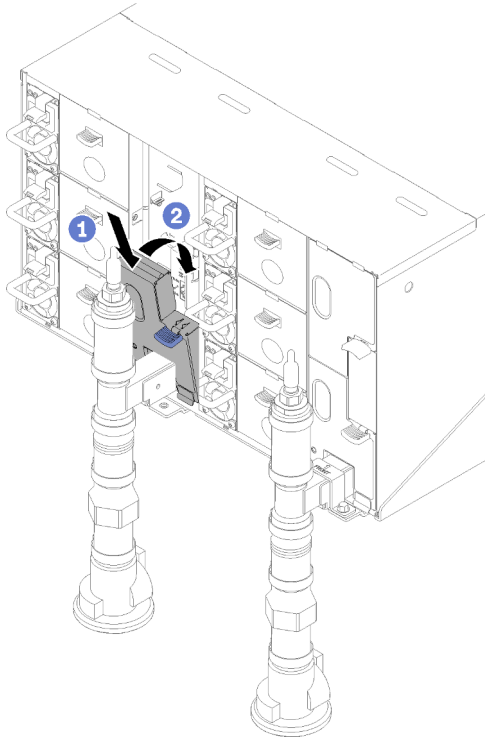


Figure 53. Lower EMC shield installation

13. Connect any cables that you disconnected from the modules in the rear of the enclosure.
14. Connect the enclosure to power (see n1200 Enclosure Installation and Service Guide).
15. Write down new enclosure midplane serial number (for example: **Y030UN34B063**) and UUID (for example: **2E2B686CC6B311E2907C6EAE8B16A49E**).
16. Update the solution firmware to the latest level (see n1200 Enclosure Installation and Service Guide).
17. Log in to the web interface (see n1200 Enclosure Installation and Service Guide).
18. Go to **System Information** section, click on the **Midplane VPD** tab.
19. Update the new enclosure midplane serial number and UUID onto the fan and power controller (see n1200 Enclosure Installation and Service Guide).
20. Close the release handles on the tray in order to seat the nodes in the enclosure midplane connectors.
21. Restart any nodes that you shut down. See the documentation that comes with the compute node for detailed instructions.
22. The fan and power controller is powered-on automatically.

#### Demo video

[Watch the procedure on YouTube](#)

## Drip sensor assembly replacement

Use the following procedures to remove and install the drip sensor assembly.

### Remove the drip sensor assembly

Use this information to remove the drip sensor assembly.

#### S002

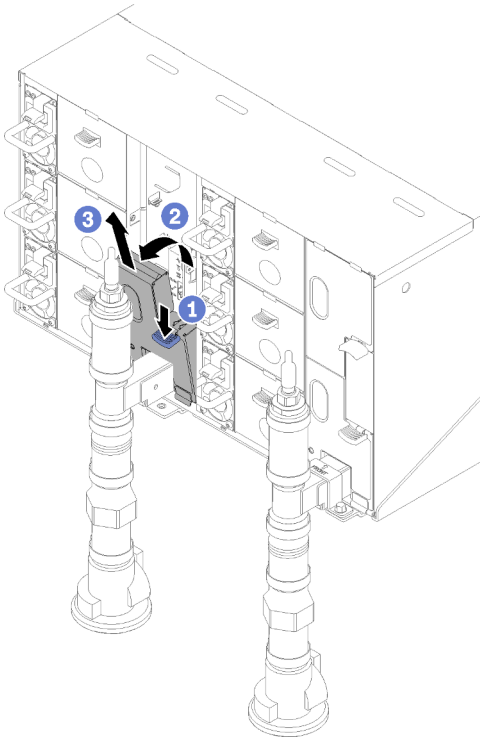


**CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Before you remove the drip sensor assembly:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Press down the blue latch and rotate the top of the shield rearward; then, lift the shield up to clear the manifold pipe that enters the enclosure.



*Figure 54. Lower left EMC shield removal*

**Note:** If there is a manifold vertical pipe in front of the EMC shield, you need to slide it sideways out from underneath the pipe.

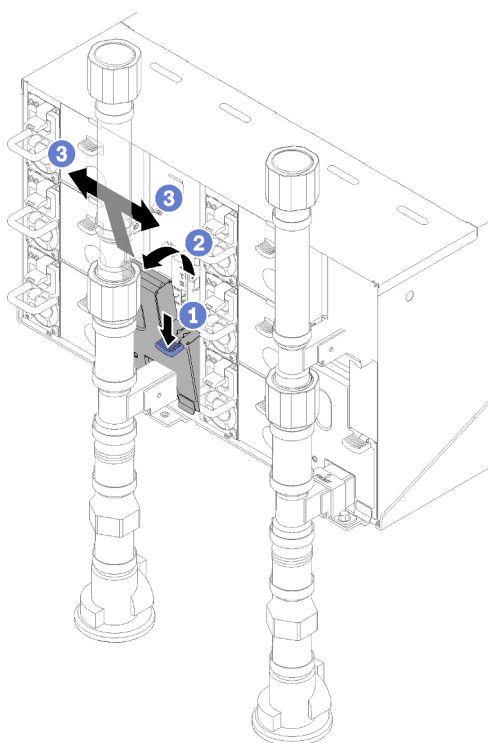


Figure 55. Lower left EMC shield removal

Complete the following steps to remove the drip sensor assembly.

Step 1. Push the latch up upwards and slide the drip sensor assembly backwards, then; lift the drip sensor assembly up to clear sensor post and pull it out of the enclosure.

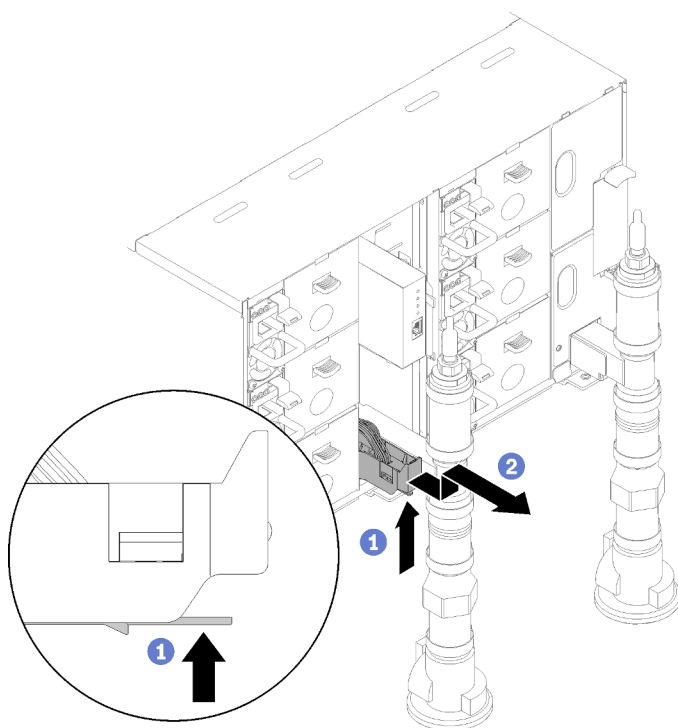


Figure 56. Drip sensor assembly removal

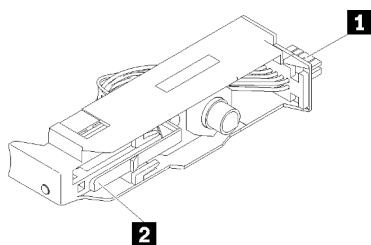


Figure 57. Drip sensor assembly

Table 17. Drip sensor assembly

<b>1</b> Connector	<b>2</b> Latch
--------------------	----------------

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

### Demo video

[Watch the procedure on YouTube](#)

### Install the drip sensor assembly

Use this information to install the drip sensor assembly.

#### S002



#### CAUTION:

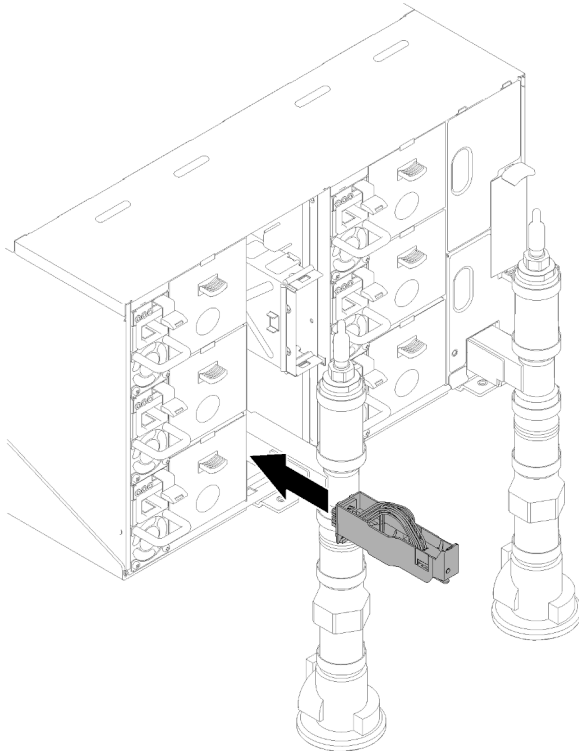
The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Before you install the drip sensor assembly:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.

Complete the following steps to install the drip sensor assembly.

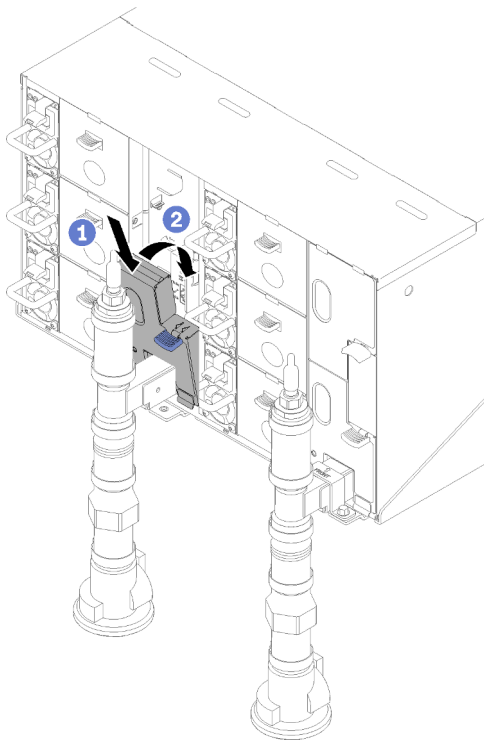
Step 1. Align the drip sensor assembly with the enclosure and slide it into place.



*Figure 58. Drip sensor assembly installation*

After you install the drip sensor assembly, complete the following steps:

1. Reinstall the EMC shield that you removed.



*Figure 59. Lower left EMC shield installation*

## Demo video

[Watch the procedure on YouTube](#)

## Fan power control (FPC) replacement

Use the following procedures to remove and install the FPC.

### Remove the FPC

Use this information to remove the FPC.

#### S002



#### **CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

#### S038



#### **CAUTION:**

Eye protection should be worn for this procedure.

Before you remove the FPC:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Remove EMC shields.

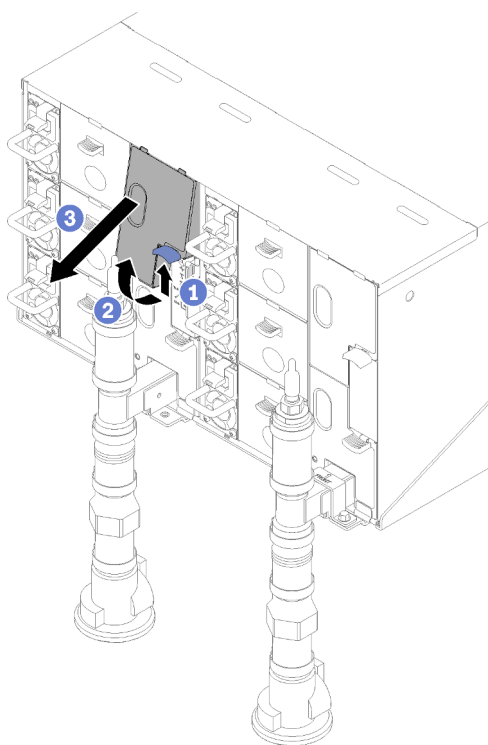


Figure 60. Upper EMC shield removal

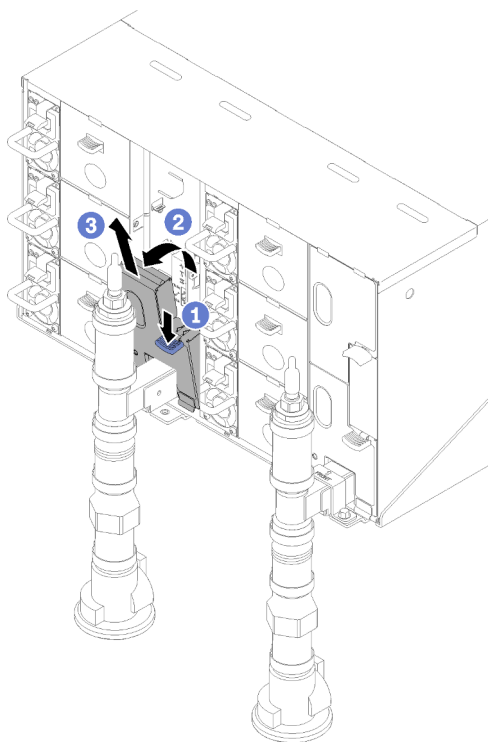


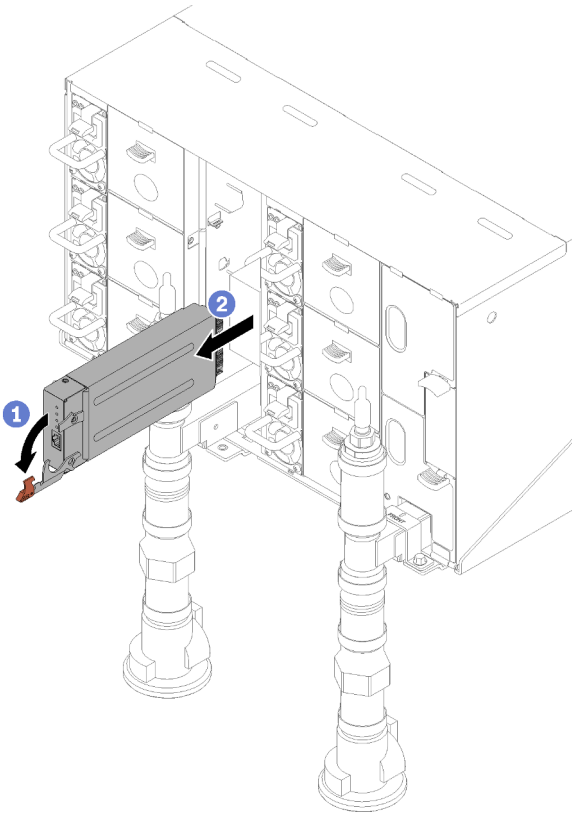
Figure 61. Lower left EMC shield removal

3. If you want to migrate current enclosure settings and the enclosure midplane VPD onto the new FPC, make sure you have done the following:

- a. You had performed FPC settings backup, the enclosure VPD backup, and the midplane VPD backup procedures.
- b. Keep the old USB key which is removed from the FPC and install it onto the new FPC.

Complete the following steps to remove the FPC.

Step 1. Rotate the latch and slide the FPC card module out of the support bracket.



*Figure 62. FPC card module removal*

Step 2. Press release tabs and slide the support bracket out of the enclosure.

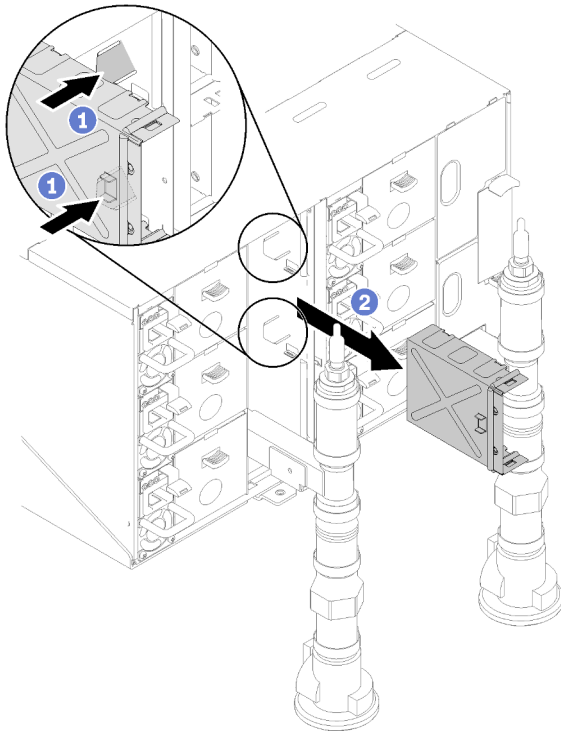


Figure 63. Support bracket removal

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Install the FPC

Use this information to install the FPC.

### S002



#### **CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

### S038

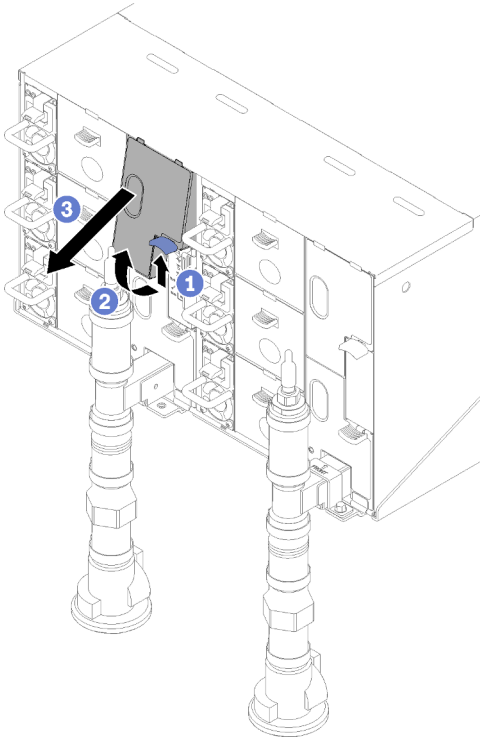


#### **CAUTION:**

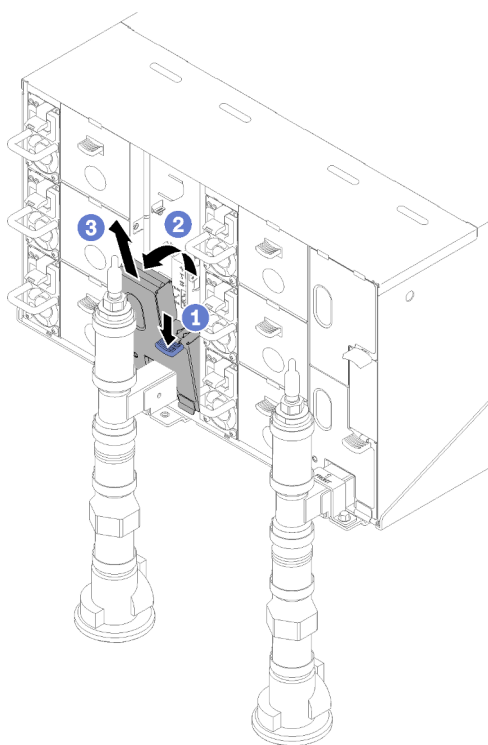
Eye protection should be worn for this procedure.

Before you install the FPC:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Remove EMC shields.



*Figure 64. Upper EMC shield removal*



*Figure 65. Lower left EMC shield removal*

Complete the following steps to install the FPC.

Step 1. Install the FPC module support bracket.

Step 2. Align the FPC module with the support bracket; then, slide the FPC module into place and rotate the latch.

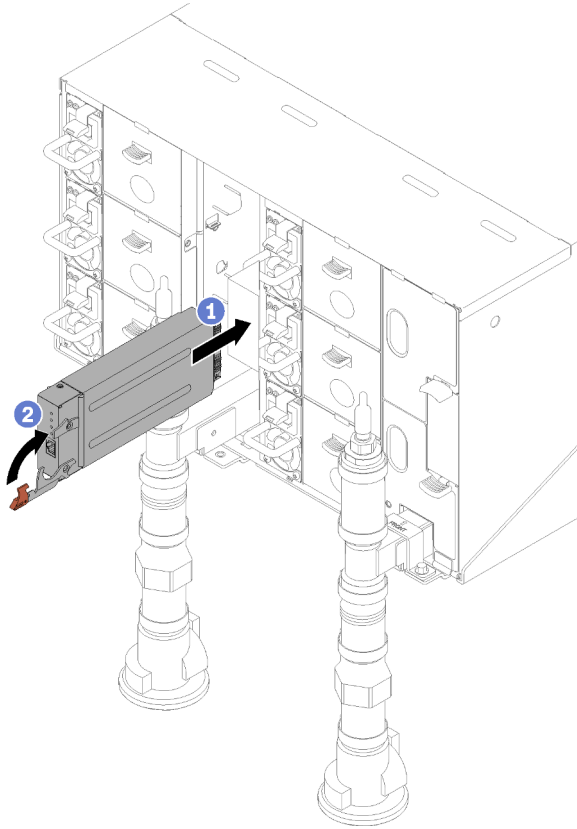


Figure 66. FPC module installation

## FPC battery replacement

Use the following procedures to remove and install the FPC battery.

### Remove the FPC battery

Use this information to remove the FPC battery.

#### S002



#### **CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

#### S004



**CAUTION:**

When replacing the lithium battery, use only Lenovo specified part number or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

*Do not:*

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

Dispose of the battery as required by local ordinances or regulations.

**S005****CAUTION:**

The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

Before you remove the FPC battery:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Remove the FPC (see [“Remove the FPC” on page 69](#)).
3. If you want to migrate current enclosure settings and the enclosure midplane VPD onto the new FPC, make sure you have done the following:
  - a. You had performed FPC settings backup, the enclosure VPD backup, and the midplane VPD backup procedures.
  - b. Keep the old USB key which is removed from the FPC and install it onto the new FPC.

Complete the following steps to remove the FPC battery.

Step 1. Locate the battery.

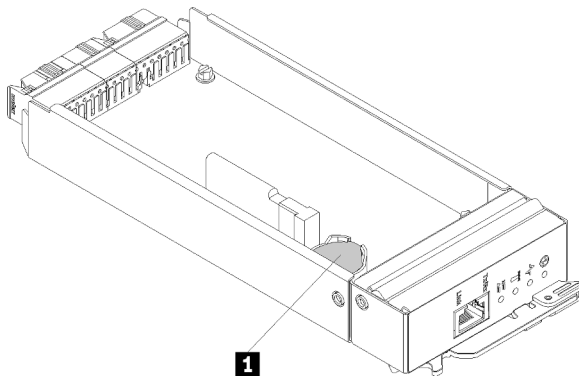


Figure 67. FPC battery location

Table 18. FPC battery location

**1** FPC battery

Step 2. Using your fingernail, press the battery retaining clip. The battery should pop free.

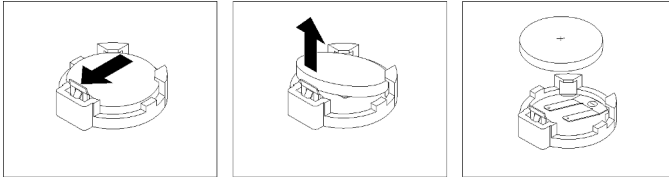


Figure 68. FPC battery removal

**Note:** Do not lift the battery by using excessive force. Failing to remove the battery properly may damage the socket on the FPC. Any damage to the socket may require replacing the FPC.

Step 3. Dispose of the battery as required by local ordinances or regulations. See *Environmental Notices* for more information.

Step 4. Store original FPC VPD back to new FPC for warranty remaining, if it is replaced.

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Install the FPC battery

Use this information to install the FPC battery.

### S002



#### CAUTION:

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

### S004



#### CAUTION:

When replacing the lithium battery, use only Lenovo specified part number or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

*Do not:*

- Throw or immerse into water

- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

#### S005



#### **CAUTION:**

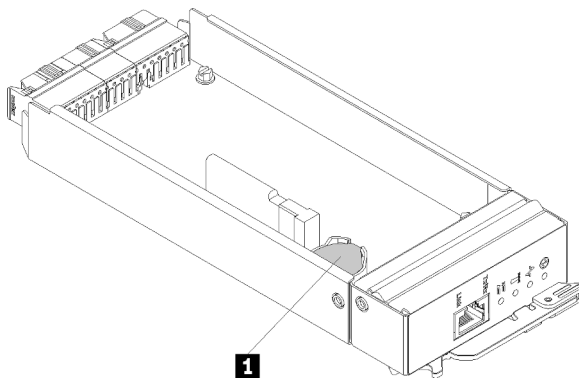
**The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.**

Before you install the FPC battery:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Remove the FPC (see [“Remove the FPC” on page 69](#)).
3. After you replace the battery, you must reconfigure the FPC settings.
4. When replacing the battery, you must replace it with a lithium battery of the same type from the same manufacturer.

Complete the following steps to install the FPC battery.

Step 1. Locate the battery.



*Figure 69. FPC battery location*

*Table 19. FPC battery location*

<b>1</b> FPC battery
----------------------

- Step 2. Follow any special handling and installation instructions that come with the battery.
- Step 3. Tilt the battery so that you can insert it into the socket.
- Step 4. As you slide the battery into place, press the battery down into the socket until it clicks into place.

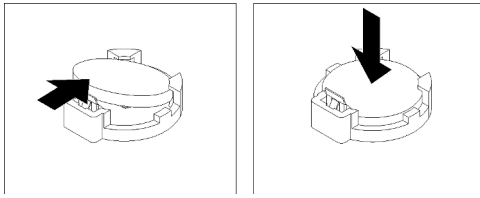


Figure 70. FPC battery installation

After you install the FPC battery, complete the following steps:

1. Reinstall the FPC into the enclosure (see [“Install the FPC” on page 72](#)).
2. Start the Setup utility and reset the configuration.

## Hot-swap power supply replacement

Use the following procedures to remove and install a hot-swap power supply.

### Remove a hot-swap power supply

Use this information to remove a hot-swap power supply.

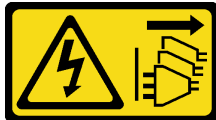
#### S001



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

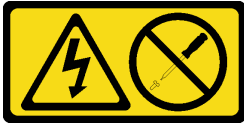
- Connect all power cords to a properly wired and grounded electrical outlet/source.
- Connect any equipment that will be attached to this product to properly wired outlets/sources.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

#### S002



#### **CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.



**CAUTION:**

Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Before you remove a hot-swap power supply:

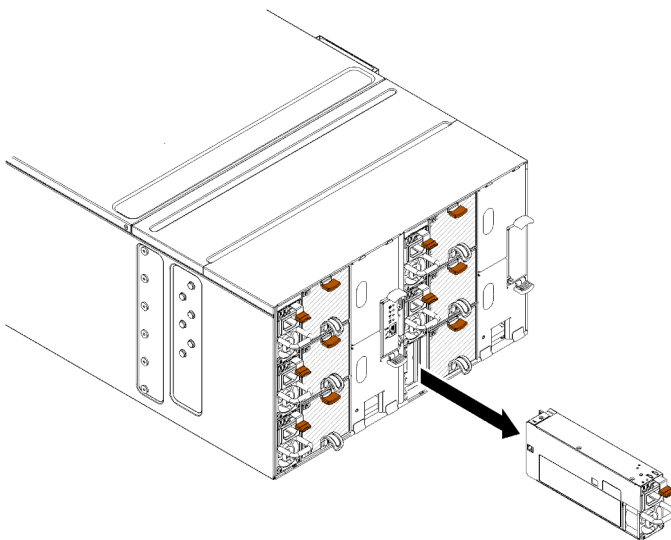
1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.

**Attention:** If only one hot-swap power supply is installed in the solution, you must turn off the solution before removing the power supply.

Complete the following steps to remove a hot-swap power supply.

Step 1. Disconnect the power cord from the connector on the back of the power supply.

Step 2. Press and hold the orange release tab.



*Figure 71. Hot-swap power supply removal*

Step 3. Grasp the handle and pull the power supply out of the bay.

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

**Demo video**

[Watch the procedure on YouTube](#)

**Install a hot-swap power supply**

Use this information to install a hot-swap power supply.

#### S001



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

- Connect all power cords to a properly wired and grounded electrical outlet/source.
- Connect any equipment that will be attached to this product to properly wired outlets/sources.
- 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.
- The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

#### S035



#### **CAUTION:**

Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

Before you install a hot-swap power supply:

1. Read the “[Installation Guidelines](#)” on page 35 to ensure that you work safely.
2. The following notes describe the type of power supply that the enclosure supports and other information that you must consider when you install a power supply:
  - For redundancy support, you must install an additional hot-swap power supply, if one is not installed in your model.
  - Make sure that the devices that you are installing are supported. For a list of supported optional devices for the enclosure, see <https://serverproven.lenovo.com/>.

Complete the following steps to install a hot-swap power supply.

Step 1. Slide the hot-swap power supply into the bay until the release latch clicks into place.

**Important:** During normal operation, each power-supply bay must contain either a power supply or power-supply filler panel for proper cooling.

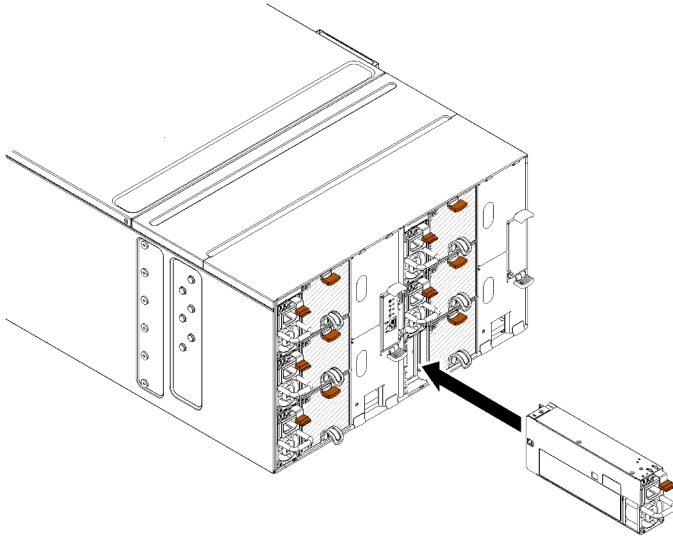


Figure 72. Hot-swap power supply installation

- Step 2. Connect one end of the power cord for the new power supply into the ac connector on the back of the power supply; then, connect the other end of the power cord into a properly grounded electrical outlet.
- Step 3. If the node is turned off, turn on the node.
- Step 4. Make sure that the ac power LED on the power supply is lit, indicating that the power supply is operating correctly. If the solution is turned on, make sure that the dc power LED on the power supply is lit also.

After you install a hot-swap power supply, complete the following steps:

- 1. Reconnect the power cords and any cables that you removed.
- 2. Turn on all compute nodes.

#### Demo video

[Watch the procedure on YouTube](#)

## Manifold replacement

Use the following procedures to remove and install the manifold.

### Remove the manifold

Use this information to remove the manifold.

#### CAUTION:

**The water might cause irritation to the skin and eyes. Avoid direct contact with the lubricant.**

#### S002



#### CAUTION:

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

**S038**



**CAUTION:**  
Eye protection should be worn for this procedure.

## L011



تحذير: يجب ارتداء النظارات الواقية لهذا الاجراء. (L011)

**AVISO:** Para este procedimento, são necessários óculos de proteção. (L011)

**ВНИМАНИЕ:** За тази процедура са необходими предпазни очила. (L011)

**ATTENTION :** Cette procédure requiert des lunettes de protection. (L011)

**警告:** 该过程需要护目镜。 (L011)

**警告：** 此程序需要護目鏡。 (L011)

**OPREZ:** Za izvođenje postupka su potrebne zaštitne naočale. (L011)

**POZOR:** K tomuto postupu jsou nutné ochranné brýle. (L011)

**Pas på!** Proceduren kræver beskyttelsesbriller. (L011)

**WAARSCHUWING:** Voor deze procedure is een beschermende bril vereist. (L011)

**CAUTION:** Protective eyewear is needed for the procedure. (L011)

**VAROITUS:** Toimet edellyttävät silmänsuojaimien käyttöä. (L011)

**Vorsicht:** Bei dieser Prozedur eine Schutzbrille tragen. (L011)

**ΠΡΟΣΟΧΗ:** Για τη συγκεκριμένη διαδικασία απαιτούνται προστατευτικά γυαλιά. (L011)

**VESZÉLY:** Az eljáráshoz védőszemüveget kell viselni. (L011)

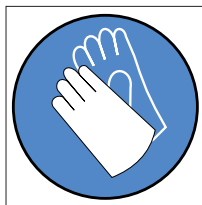
**ATTENZIONE:** per la procedura sono necessarie protezioni per gli occhi. (L011)

危険: この作業には目を保護する道具が必要です。  
(L011)

주의: 이 절차에는 보호용 안경이 필요합니다. (L011)

(L011)  
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## L014



تحذير: يجب ارتداء القفازات الكيميائية المقاومة لهذا الاجراء. (L014)

**AVISO:** Para este procedimento, são necessárias luvas com resistência química. (L014)

**ВНИМАНИЕ:** За тази процедура са необходими химически устойчиви ръкавици. (L014)

**ATTENTION :** Cette procédure requiert des gants de protection contre les produits chimiques. (L014)

**警告:** 该过程需要化学防护手套。 (L014)

**警告：** 此程序需要抗化學劑手套。 (L014)

**OPREZ:** Za ovaj postupak su potrebne kemijski otporne zaštitne rukavice. (L014)

**POZOR:** K tomuto postupu jsou nutné ochranné brýle. (L014)

**Pas på!** Bær handsker, der er modstandsdygtige over for kemikalier, når du skal udføre denne proces. (L014)

**WAARSCHUWING:** Voor deze procedure zijn tegen chemicaliën beschermende handschoenen vereist. (L014)

**CAUTION:** Chemical resistant gloves are needed for this procedure. (L014)

**VAROITUS:** Toimet edellyttävät kemiallisesti kestävästä materiaaleista valmistettujen suojakäsineiden käyttöä. (L014)

**Vorsicht:** Bei dieser Aktion müssen chemische Schutzhandschuhe getragen werden. (L014)

**ΠΡΟΣΟΧΗ:** Για τη συγκεκριμένη διαδικασία απαιτούνται ειδικά γάντια, ανθεκτικά στις χημικές ουσίες. (L014)

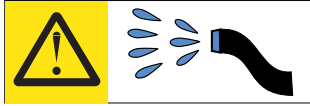
**VIGYÁZAT:** Az eljáráshoz vegyi anyagokkal szemben ellenálló védőszemüveget kell viselni. (L014)

**ATTENZIONE:** per questa procedura sono necessari guanti resistenti ad agenti chimici. (L014)

**危険:** この作業には化学耐性のあるグローブが必要です。 (L014)



## L016



خطر: قد يتم التعرض لخطر الصدمة الكهربائية بسبب الماء أو المحلول المائي الذي يوجد بهذا المنتج.  
تجنب العمل في أو بالقرب من أي جهاز فعال بأيدي مبللة أو عند وجود تسرب للماء. (L016)

**AVISO: Risco de choque elétrico devido à presença de água ou solução aquosa no produto. Evite trabalhar no equipamento ligado ou próximo a ele com as mãos molhadas ou quando houver a presença de água derramada. (L016)**

**ОПАСНО:** Риск от токов удар поради вода или воден разтвор, присъстващи в продукта.  
Избягвайте работа по или около оборудване под напрежение,  
докато сте с мокри ръце или когато наоколо има разляна вода.  
(L016)

**DANGER : Risque de choc électrique lié à la présence d'eau ou d'une solution aqueuse dans ce produit. Évitez de travailler avec ou à proximité d'un équipement sous tension avec des mains mouillées ou lorsque de l'eau est renversée. (L016)**

危险: 由于本产品中存在水或者水溶液, 因此存在电击风险。请避免使用潮湿的手在带电设备或者有水溅出的环境附近工作。 (L016)

危險: 本產品中有水或水溶液, 會造成電擊的危險。手濕或有潑濺的水花時, 請避免使用或靠近帶電的設備。 (L016)

**OPASNOST:** Rizik od električnog udara zbog vode ili tekućine koja postoji u ovom proizvodu.  
Izbjegavajte rad u  
blizini opreme pod naponom s mokrim rukama ili kad je u blizini prolivena  
tekućina.  
(L016)

**NEBEZPEČÍ:** Riziko úrazu elektrickým proudem v důsledku vody nebo vodního roztoku přítomného v tomto produktu. Dejte pozor, abyste při práci s aktivovaným vybavením nebo v jeho blízkosti neměli mokré ruce a vyvarujte se potřísnění nebo polití produktu vodou. (L016)

**Fare!** Risiko for stød på grund af vand eller en vandig opløsning i produktet. Undgå at arbejde med eller i nærheden af strømførende udstyr med våde hænder, eller hvis der er spildt vand. (L016)

**GEVAAR:** Risico op elektrische schok door water of waterachtige oplossing die aanwezig is in dit product. Vermijd werken aan of naast apparatuur die onder spanning staat als u natte handen hebt of als gemorst water aanwezig is. (L016)

**DANGER:** Risk of electric shock due to water or a water solution which is present in this product. Avoid working on or near energized equipment with wet hands or when spilled water is present. (L016)



**ОПАСНО: Риск поражения электрическим током вследствие присутствия в этом продукте воды или водного раствора. Избегайте выполнения работ на оборудовании, находящемся под напряжением, или рядом с таким оборудованием влажными руками или при наличии пролитой воды. (L016)**

NEBEZPEČENSTVO: Riziko úrazu elektrickým prúdom v dôsledku prítomnosti vody alebo vodného roztoku v tomto produkte. Vyhnite sa práci na zapnutom zariadení alebo v jeho blízkosti s vlhkými rukami, alebo keď je prítomná rozliata voda. (L016)

NEVARNOST: Nevarnost električnega udara zaradi vode ali vodne raztopine, prisotne v izdelku. Ne delajte na opremi ali poleg opreme pod energijo z mokrimi rokami ali ko je prisotna razlita voda. (L016)

**PELIGRO: Existe riesgo de choque eléctrico por agua o por una solución de agua que haya en este producto. Evite trabajar en equipos bajo tensión o cerca de los mismos con las manos húmedas o si hay agua derramada. (L016)**

**Fara: Risk för elektriska stötar på grund av vatten eller vattenbaserat medel i denna produkt. Arbeta inte med eller i närheten av elektriskt laddad utrustning om du har våta händer eller vid vattenspill. (L016)**

ཉེན་བརྒྱུ: རྩོམ་ཆས་འདིའི་ནང་དུ་ཆུ་འཕུང་བའི་གཞེར་གཟུགས་འདུས་ཡོད་པ་སྟེ་དེ་ལས་སློག་ཆུག་པའི་ཉེན་ཁ་ཡོད། ལག་པའི་སློག་ཆུ་ཡོད་པའམ་ཆུ་ཐིག་མར་བཞུར་བའི་གནས་ཚུལ་འོག་སློག་ཆས་པའི་སློག་ཆས་ལ་བཞོལ་སྤྱོད་བྱེད་མི་ཉེན་པོ་ཡོད། (L016)

خەتەرلىك: بۇ مەھسۇلاتتا سۇ ياكى ئېرىتمە بولغاچقا، شۇڭا توك سوقۇۋېتىش خەۋپى مەۋجۇتدۇر. قول ھۆل ھالەتتە ۋە ياكى سۇ سىرغىپ چىققان ھالەتتە، توكلۇق ئۆسكۈنىگە قارىتا ۋە ياكى توكلۇق ئۆسكۈنىنىڭ ئەتراپىدا مەشغۇلات ئېلىپ بارغىلى بولمايدۇ. (L016)

Yungyiemy: Youzyiz aen canjbinj miz raemx roxaeuz raemx yungzyiz, sojyij miz yungyiemy bungqden. Mboujndaej fwngz miz raemx seiz youq ndaw sezbi roxaeuz youq henzgyawj guhhong. (L016)

**Attention:** Ensure proper handling procedures are followed when working with any chemically treated water used in the compute rack cooling system. Ensure that material safety data sheets (MSDS) and safety information are provided by the water chemical treatment supplier and that proper personal protective equipment (PPE) is available as recommended by the water chemical treatment supplier. Protective gloves and eyewear may be recommended as a precaution.

Before you remove the manifold:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.

Complete the following steps to remove the manifold.

- Step 1. Slide all DWC trays in the entire rack out of the enclosure about 4-inch or 100 mm (see [“Remove a DWC tray from the enclosure” on page 244](#)).
- Step 2. At the front of the rack, close both Eaton ball valves.

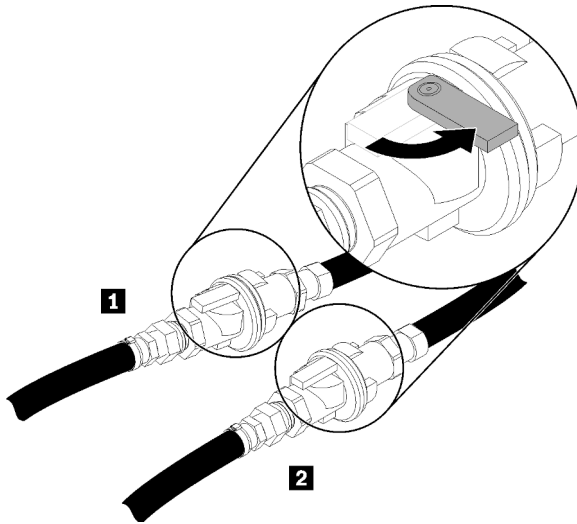


Figure 73. Eaton ball valves closed

Table 20. Eaton ball valves

<b>1</b> Rack supply	<b>2</b> Rack return
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Step 3. Remove EMC shields on both sides of the top enclosure.

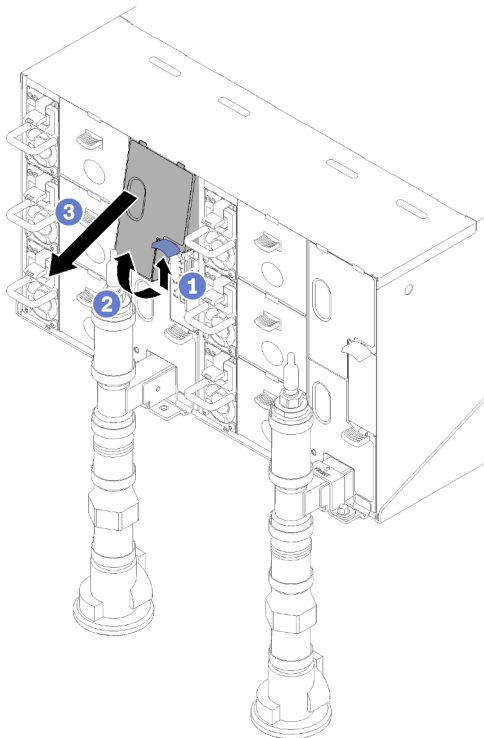
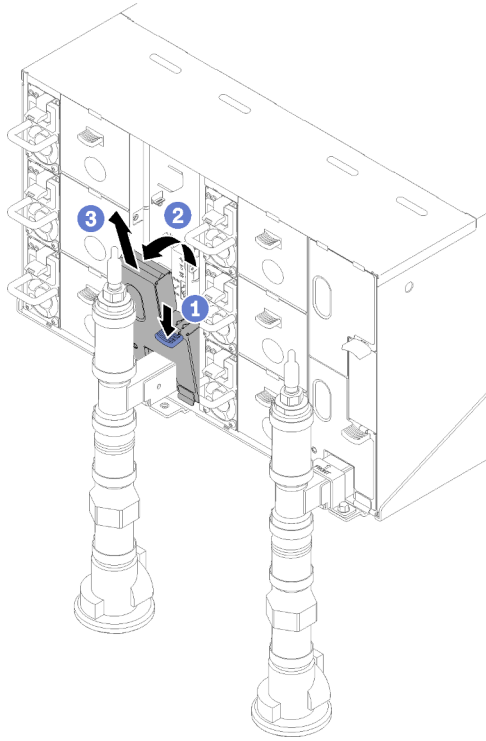
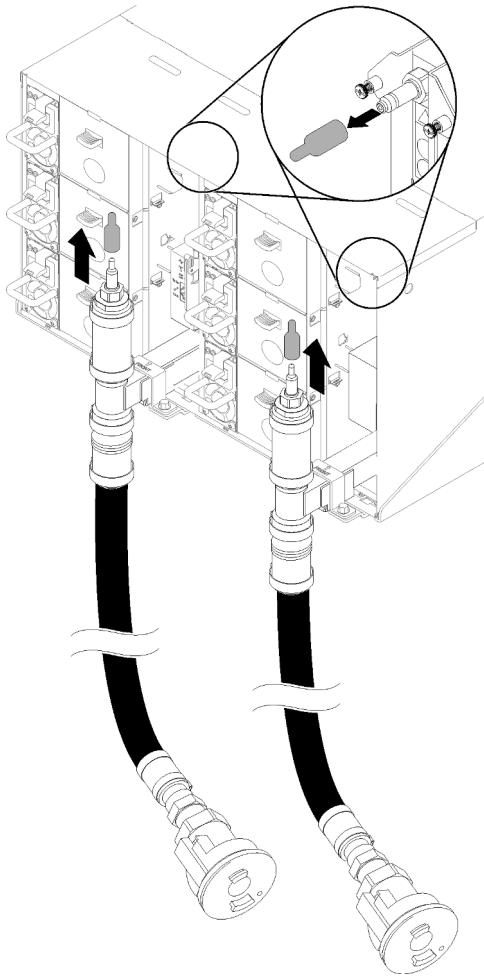


Figure 74. EMC shields removal



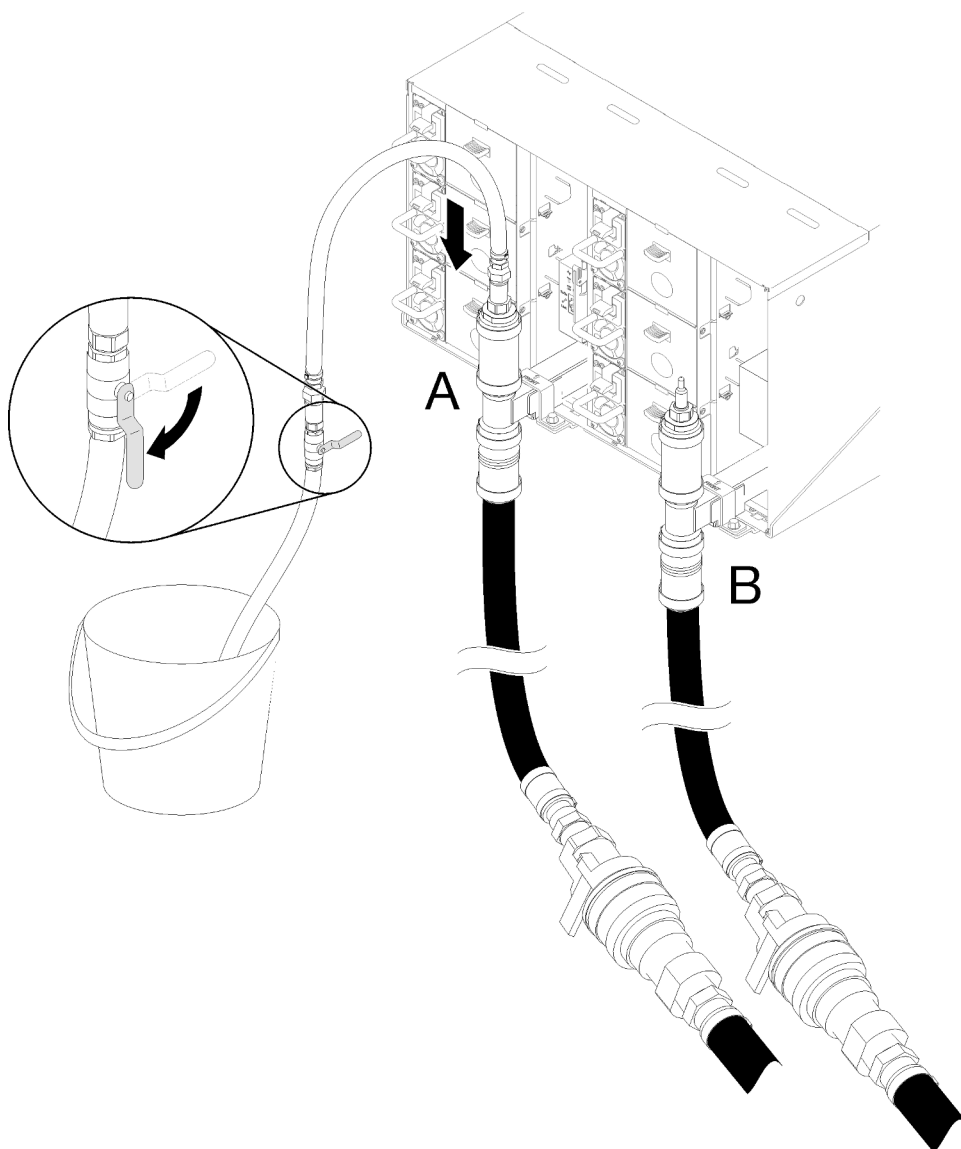
*Figure 75. EMC shields removal*

Step 4. Remove the red quick connect plug covers from the tops of each manifold.



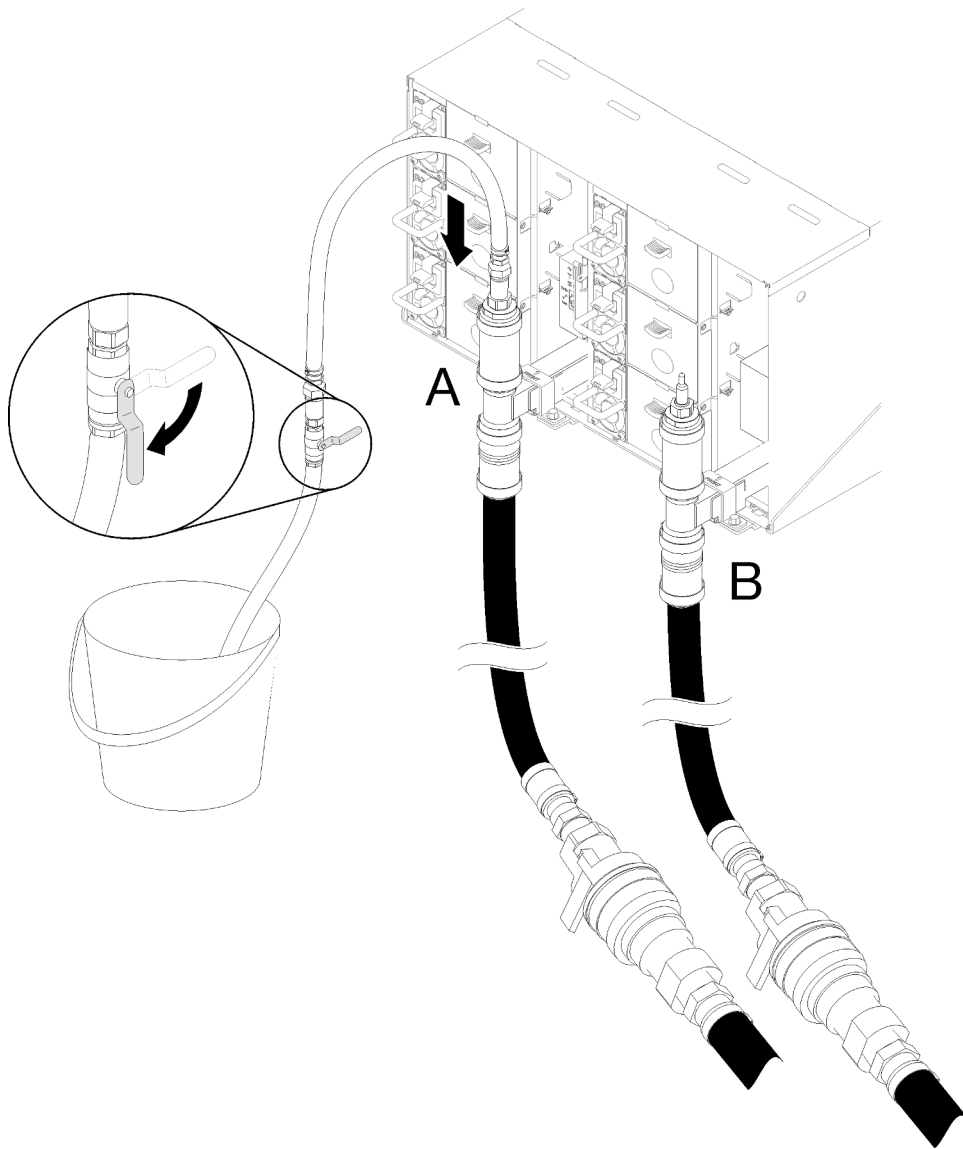
*Figure 76. Quick connect plug covers removal*

- Step 5. Place the open blue hose end of the drain hose (tool left at customer site) into a bucket. Make sure that the lever on the drain hose valve is closed (lever is pointed away from the hose).



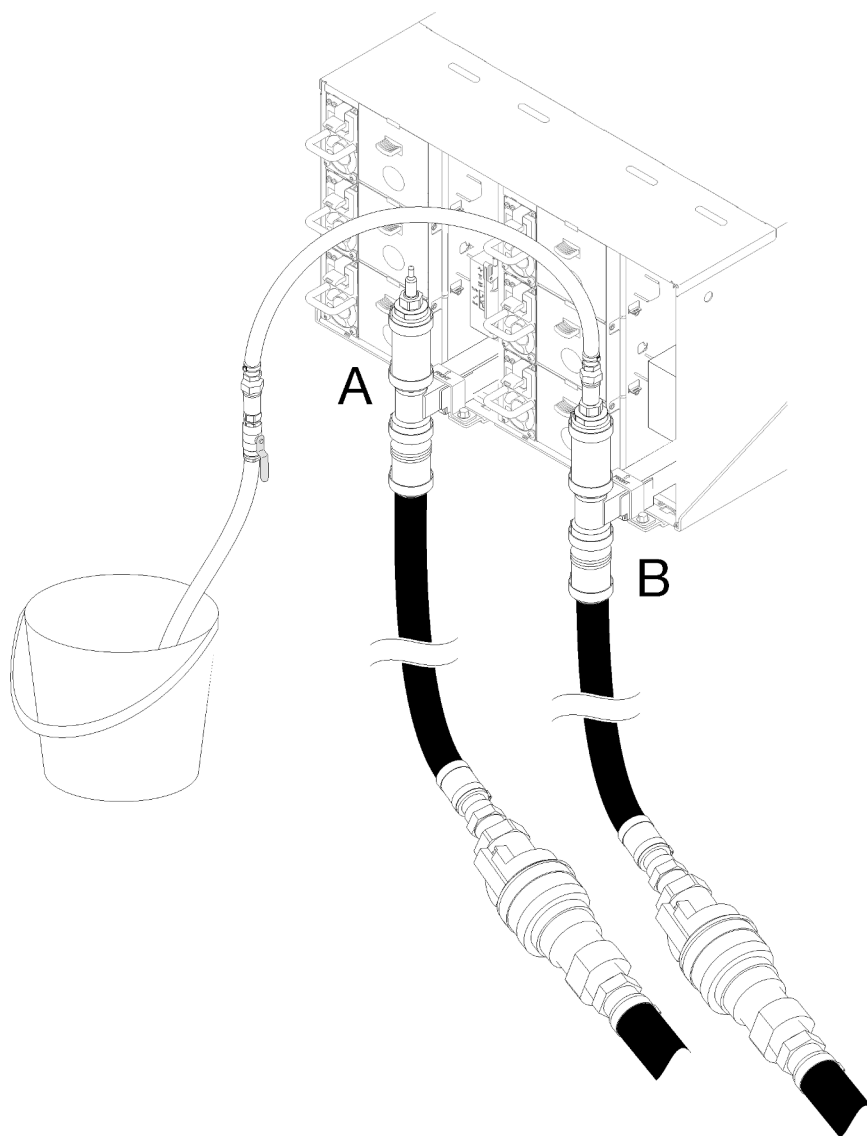
*Figure 77. Water draining*

- Step 6. Connect the Quick connect socket from the drain hose tool to the top of the return side manifold (position middle of the rack).



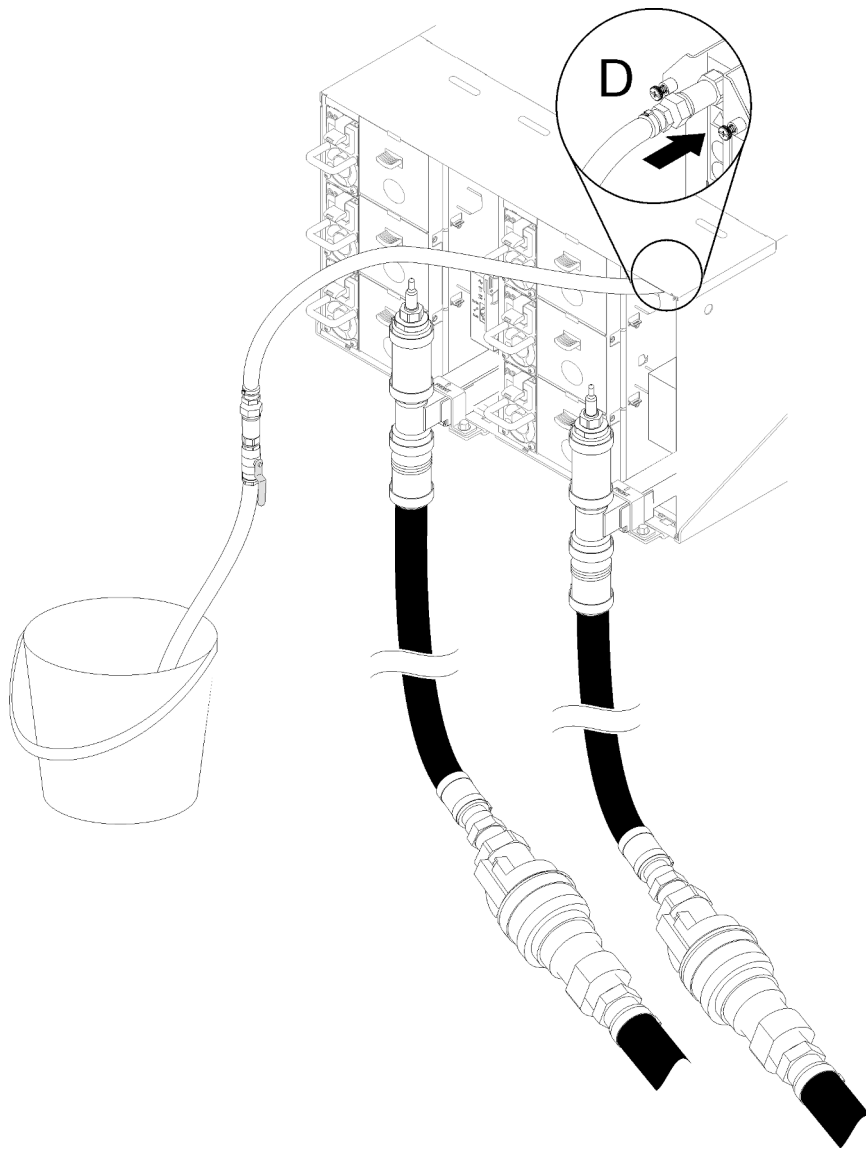
*Figure 78. Quick connect socket from the drain hose tool to the top of the return side manifold connection*

- Step 7. Once the quick connect is attached, slowly open the hose valve and allow water to drain until water stops flowing (approximately 1 minute).



*Figure 79. Water draining*

- Step 8. Move to the top position of the other manifold (position closest to the rack side wall). Leave the hose connected to the top of the manifold until water stops flowing. Disconnect quick connect from top of manifold.



*Figure 80. Quick connect socket from the drain hose tool to the top of the supply side manifold connection*

- Step 9. Continue to each enclosure from the top enclosure to the bottom enclosure by reaching into each enclosure Location C and Location D quick connects and allow for a steady stream of water to drain. Repeat drain process until all positions in the entire rack have been drained.
- Step 10. Re-attach the hose which should be put onto the manifold that has the section to be replaced to the top of the manifold before moving back around to the front of the rack.
- Step 11. At this point, the manifold should be properly drained to allow for service. Since there still can be some water left in the manifold, prepare work area with absorbent cloths to collect any water that may drain out.
- Step 12. Determine which manifold needs to be replaced.
- Step 13. Move to the rear of the rack. Remove manifold retention bracket that is retaining the manifold (top enclosure position only).

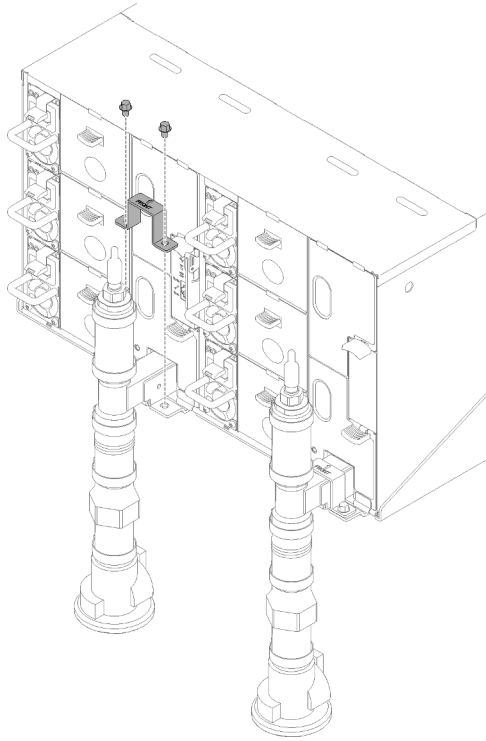


Figure 81. Retention bracket removal

Step 14. Push the latch up upwards and slide the drip sensor assembly backwards, then; lift the drip sensor assembly up to clear sensor post and pull it out of the enclosure.

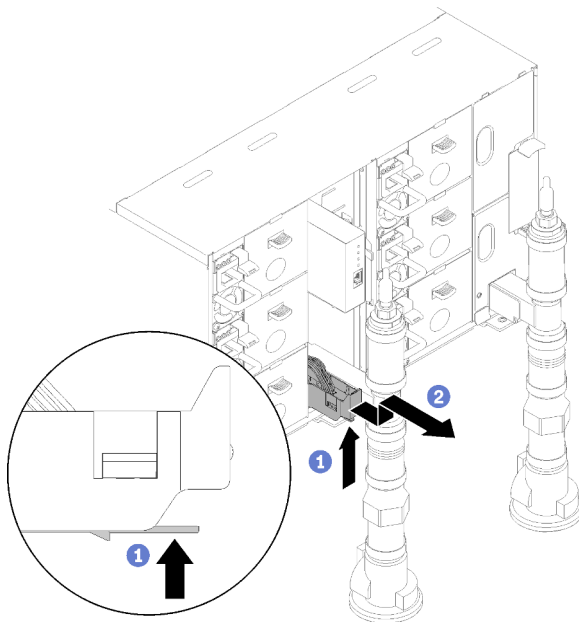


Figure 82. Drip sensor assembly removal

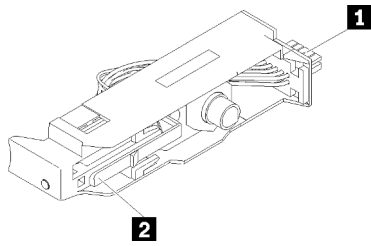


Figure 83. Drip sensor assembly

Table 21. Drip sensor assembly

<b>1</b> Connector	<b>2</b> Latch
--------------------	----------------

Step 15. Remove FPC card module and FPC card module support bracket if portion of left manifold is being replaced. If it is the right side manifold, remove blank filler.

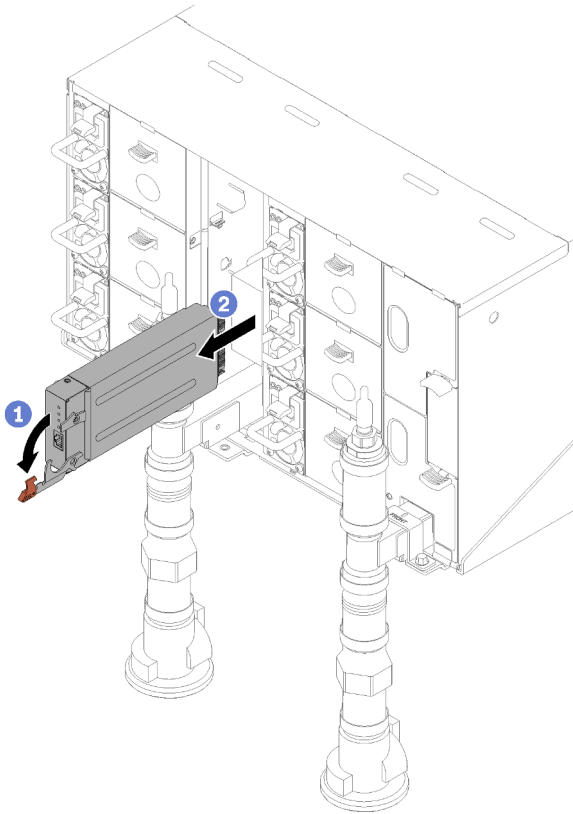


Figure 84. FPC card module removal

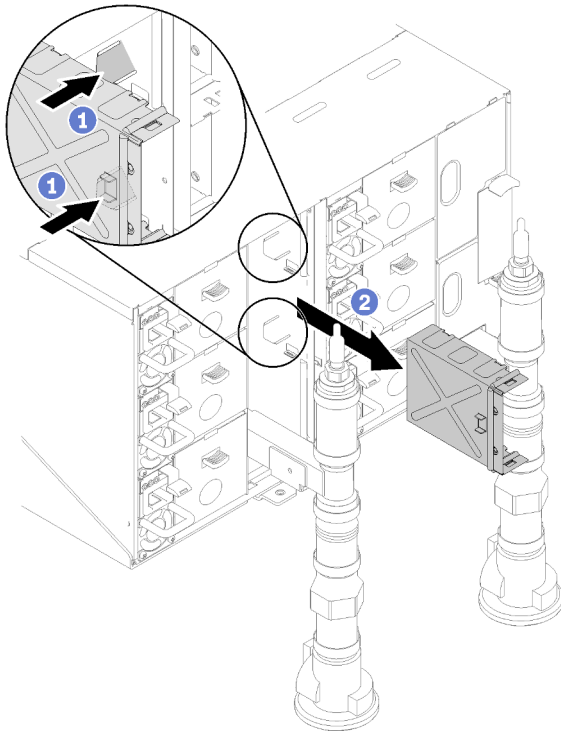


Figure 85. Support bracket removal

Step 16. Unscrew four screws (using the screwdriver contained in the manifold repair kit) to loosen the manifold bracket from the enclosure.

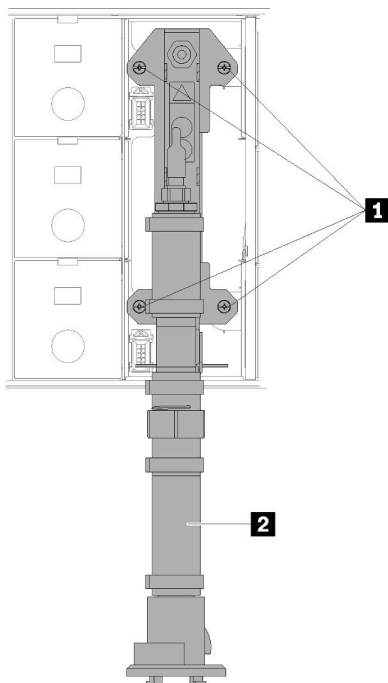


Figure 86. Manifold screw locations

Table 22. Manifold screw locations

<b>1</b> Screws	<b>2</b> Manifold
-----------------	-------------------

Step 17. Repeat steps 14-17 for all manifold sections until you can freely access the entire manifold to be replaced.

Step 18. Remove the entire manifold and lay it on the ground for the next steps.

Step 19. Place a pan under the section of the manifold to be removed.

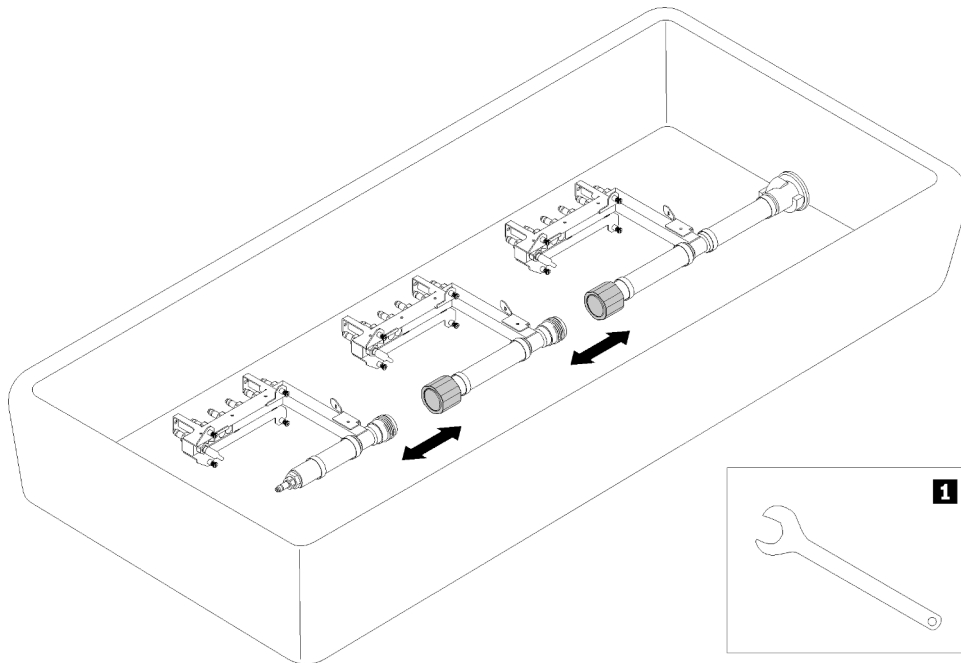


Figure 87. Manifold disassemble

Table 23. Manifold disassemble

<b>1</b> 41mm wrench
----------------------

Step 20. Disconnect manifold section to be replaced from the rest of the manifold by disconnecting the couplings. Use 41mm wrench supplied with replacement manifold section kit.

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Install the manifold

Use this information to install the manifold.

### CAUTION:

The water might cause irritation to the skin and eyes. Avoid direct contact with the lubricant.

### S002



**CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

**S038****CAUTION:**

Eye protection should be worn for this procedure.

**L011**

تحذير: يجب ارتداء النظارات الواقية لهذا الاجراء. (L011)

AVISO: Para este procedimento, são necessários óculos de proteção. (L011)

ВНИМАНИЕ: За тази процедура са необходими предпазни очила. (L011)

ATTENTION: Cette procédure requiert des lunettes de protection. (L011)

警告: 该过程需要护目镜。 (L011)

警告: 此程序需要護目鏡。 (L011)

OPREZ: Za izvođenje postupka su potrebne zaštitne naočale. (L011)

POZOR: K tomuto postupu jsou nutné ochranné brýle. (L011)

Pas på! Proceduren kræver beskyttelsesbriller. (L011)

WAARSCHUWING: Voor deze procedure is een beschermende bril vereist. (L011)

CAUTION: Protective eyewear is needed for the procedure. (L011)

VAROITUS: Toimet edellyttävät silmänsuojaimien käyttöä. (L011)

Vorsicht: Bei dieser Prozedur eine Schutzbrille tragen. (L011)

ΠΡΟΣΟΧΗ: Για τη συγκεκριμένη διαδικασία απαιτούνται προστατευτικά γυαλιά. (L011)

VESZÉLY: Az eljáráshoz védőszemüveget kell viselni. (L011)

ATTENZIONE: per la procedura sono necessarie protezioni per gli occhi. (L011)

危険: この作業には目を保護する道具が必要です。 (L011)

주의: 이 절차에는 보호용 안경이 필요합니다. (L011)

**ВНИМАНИЕ:** За изведывање на постапката потребни се заштитни очила. (L011)

تۆھپىسى :  
تۆھپىسى :  
تۆھپىسى :  
تۆھپىسى :  
تۆھپىسى :  
(101)

**ADVARSEL:** Vernebriller må benyttes for denne prosedyren. (L011)

**ZAGROŻENIE:** Procedura wymaga zastosowania okularów ochronnych. (L011)

**CUIDADO:** É necessário utilizar protecção ocular para a execução deste procedimento. (L011)

**ОСТОРОЖНО:** При выполнении этой операции необходимо надеть защитные очки. (L011)

**VÝSTRAHA:** Vykonanie tejto procedúry vyžaduje pomôcku na ochranu očí. (L011)

**POZOR:** Za ta postopek je potrebna zaščitna oprema za oči. (L011)

**PRECAUCIÓN:** Utilice protección ocular para llevar a cabo el procedimiento. (L011)

**Varning:** Skyddsglasögon krävs. (L011)

ཉེན་བརྒྱུད་ : བཞུགས་པའི་འདྲིའི་ཁྱེད་ཀྱི་མ་ལ་ལྷན་སྦྲེལ་ཐུགས་པ་ལྟན་པ་འི་མེག་ཤིལ་ཞིག་དགོས། (L011)

ئاگاھلاندۇرۇش : سز مەشغۇلات جەريانىدا كۆز ئاسراش كۈزەينىكى تاقىۋېلىشىڭىز كېرەك. (L011)

**Daezsingj:** Aen cauhcoz neix aeu yungh yenjiging baujhoh lwgda. (L011)

## L014



تحذير: يجب ارتداء القفازات الكيميائية المقاومة لهذا الإجراء. (L014)

**AVISO:** Para este procedimento, são necessárias luvas com resistência química. (L014)

**ВНИМАНИЕ:** За тази процедура са необходими химически устойчиви ръкавици. (L014)

**ATTENTION :** Cette procédure requiert des gants de protection contre les produits chimiques. (L014)

**警告:** 该过程需要化学防护手套。 (L014)

**警告:** 此程序需要抗化學劑手套。 (L014)

**OPREZ:** Za ovaj postupak su potrebne kemijski otporne zaštitne rukavice. (L014)

**POZOR:** K tomuto postupu jsou nutné ochranné brýle. (L014)

**Pas på!** Bær handsker, der er modstandsdygtige over for kemikalier, når du skal udføre denne proces. (L014)

**WAARSCHUWING:** Voor deze procedure zijn tegen chemicaliën beschermende handschoenen vereist. (L014)

**CAUTION:** Chemical resistant gloves are needed for this procedure. (L014)

**VAROITUS:** Toimet edellyttävät kemiallisesti kestävästä materiaaleista valmistettujen suojakäsineiden käyttöä. (L014)

**Vorsicht:** Bei dieser Aktion müssen chemische Schutzhandschuhe getragen werden. (L014)

**ΠΡΟΣΟΧΗ:** Για τη συγκεκριμένη διαδικασία απαιτούνται ειδικά γάντια, ανθεκτικά στις χημικές ουσίες. (L014)

**VIGYÁZAT:** Az eljáráshoz vegyi anyagokkal szemben ellenálló védőszemüveget kell viselni. (L014)

**ATTENZIONE:** per questa procedura sono necessari guanti resistenti ad agenti chimici. (L014)

**危険:** この作業には化学耐性のあるグローブが必要です。 (L014)

**주의:** 이 절차를 수행하려면 내화학적 장갑을 착용해야 합니다. (L014)

**ВНИМАНИЕ:** За изведуваче на оваа постапка потребни се ракавици за хемиска заштита.  
(L014)

[illegible]

**ADVARSEL:** Vernehansker av motstandsdyktig materiale må benyttes for denne prosedyren. (L014)

**ZAGROŻENIE:** Procedura wymaga użycia rękawic ochronnych. (L014)

**CUIDADO:** É necessária a utilização de luvas resistentes a químicos para a execução deste procedimento. (L014)

**ОСТОРОЖНО:** Для этой процедуры необходимы перчатки, устойчивые к химическим воздействиям. (L014)

**VÝSTRAHA:** Vykonanie tejto procedúry vyžaduje rukavice odolné chemikáliám. (L014)

POZOR: Za delo so potrebne proti kemičnim sredstvom odporne rokavice. (L014)

**PRECAUCIÓN:** Utilice guantes resistentes a los productos químicos para llevar a cabo el procedimiento. (L014)

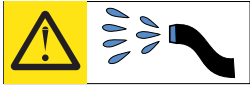
**Varning: Kemikalietålga handskar behövs. (L014)**

(L014) ཉེན་ཁག་: དགོང་ལྷོ་དྲ་འདིའི་སྐོར་ལ་ཡུལ་ལྷོ་བརྒྱུན་པ་དམུག་པའི་རྩལ་འཕྲུལ་རྟུང་པ་འགོག་པལ། རྩལ་སྤྱོད་དཀོན་པ་སྤྱོད།

ئاگاھلاندۇرۇش: بۇ مەشغۇلات جەريانىدا خىمىيىلىك چىرىشتىن ساقلىنىش پەللىنى كىيىۋېلىشىڭىز كېرەك. (L014)

Daezsingj: Aen cauhcoz neix aeu yungh madfwngz naih vayoz myaex. (L014)

## L016



خطر: قد يتم التعرض لخطر الصدمة الكهربائية بسبب الماء أو المحلول المائي الذي يوجد بهذا المنتج.  
تجنب العمل في أو بالقرب من أي جهاز فعال بإيدي مبللة أو عند وجود تسرب للماء. (L016)

**AVISO: Risco de choque elétrico devido à presença de água ou solução aquosa no produto. Evite trabalhar no equipamento ligado ou próximo a ele com as mãos molhadas ou quando houver a presença de água derramada. (L016)**

**ОПАСНО:** Риск от токов удар поради вода или воден разтвор, присъстващи в продукта.  
Избягвайте работа по или около оборудване под напрежение,  
докато сте с мокри ръце или когато наоколо има разляна вода.  
(L016)

**DANGER :** Risque de choc électrique lié à la présence d'eau ou d'une solution aqueuse dans ce produit. Évitez de travailler avec ou à proximité d'un équipement sous tension avec des mains mouillées ou lorsque de l'eau est renversée. (L016)

危险: 由于本产品中存在水或者水溶液, 因此存在电击风险。请避免使用潮湿的手在带电设备或者有水溅出的环境附近工作。 (L016)

危險: 本產品中有水或水溶液, 會造成電擊的危險。手濕或有潑濺的水花時, 請避免使用或靠近帶電的設備。 (L016)

**OPASNOST:** Rizik od električnog udara zbog vode ili tekućine koja postoji u ovom proizvodu.  
Izbjegavajte rad u blizini opreme pod naponom s mokrim rukama ili kad je u blizini prolivena tekućina.  
(L016)

**NEBEZPEČÍ:** Riziko úrazu elektrickým proudem v důsledku vody nebo vodního roztoku přítomného v tomto produktu. Dejte pozor, abyste při práci s aktivovaným vybavením nebo v jeho blízkosti neměli mokré ruce a vyvarujte se potřísnění nebo polití produktu vodou. (L016)

**Fare!** Risiko for stød på grund af vand eller en vandig opløsning i produktet. Undgå at arbejde med eller i nærheden af strømforende udstyr med våde hænder, eller hvis der er spildt vand. (L016)

**GEVAAR:** Risco op elektrische schok door water of waterachtige oplossing die aanwezig is in dit product. Vermijd werken aan of naast apparatuur die onder spanning staat als u natte handen hebt of als gemorst water aanwezig is. (L016)

**DANGER:** Risk of electric shock due to water or a water solution which is present in this product. Avoid working on or near energized equipment with wet hands or when spilled water is present. (L016)

**VAARA:** Tässä tuotteessa oleva vesi tai vettä sisältävä liuos voi aiheuttaa sähköiskuvaaran. Vältä työskentelyä jännitteellisen laitteen ääressä tai sen läheisyydessä märin käsin tai jos laitteessa tai sen läheisyydessä on vesiroiskeita. (L016)

**Gefahr:** Aufgrund von Wasser oder wässriger Lösung in diesem Produkt besteht die Gefahr eines elektrischen Schlags. Nicht mit nassen Händen oder in der Nähe von Wasserlachen an oder in unmittelbarer Nähe von Bauteilen arbeiten, die unter Strom stehen. (L016)

**ΚΙΝΔΥΝΟΣ:** Κίνδυνος ηλεκτροπληξίας εξαιτίας της παρουσίας νερού ή υγρού διαλύματος στο εσωτερικό του προϊόντος. Αποφύγετε την εργασία με ενεργό εξοπλισμό ή κοντά σε ενεργό εξοπλισμό με βρεγμένα γέρια ή όταν υπάρχει διαρροή νερού. (L016)

**VESZÉLY:** A víz vagy a termékben lévő vizes alapú hűtőfolyadék miatt fennáll az elektromos áramütés veszélye. Ne dolgozzon áram alatt lévő berendezésen és közelében nedves kézzel, illetve amikor folyadék kerül a berendezésre.

**PERICOLO:** rischio di scossa elettrica a causa di presenza nel prodotto di acqua o soluzione acquosa. Evitare di lavorare su o vicino l'apparecchiatura accesa con le mani bagnate o in presenza di acqua. (I.016)

危険：この製品内に存在する水または水溶液によって、電気ショックの危険があります。手が濡れている場合やこぼれた水が周囲にある場合は、電圧が印加された装置またはその周辺での作業は行わないでください。(L016)

**위험:** 이 제품에는 물 또는 수용액으로 인한 전기 쇼크 위험이 있습니다. 젖은 손으로 또는 욕조, 찌꺼기, 물이 있는 상태에서 전력이 공급되는 장비나 그 주변에서 작업하지 마십시오. (L016)

**ОПАСНОСТ:** Опасност од струен удар поради присуство на вода или на воден раствор во овој производ. Избегнувајте работење на опрема вклучена во струја или во близина на опрема вклучена во струја со влажни раце или кога има истурено вода.

[illegible]

**FARE:** Fare for elektrisk støt på grunn av vann eller en vandig oppløsning som finnes i dette produktet. Unngå å arbeide med eller i nærheten av strømførende utstyr med våte hender eller ved eventuelt vannsøl. (L016)

**NIEBEZPIECZEŃSTWO:** Ryzyko porażenia prądem elektrycznym z powodu występowania w produkcie wody lub roztworu wodnego. Nie należy pracować przy podłączonym do źródła zasilania urządzeniu lub w jego pobliżu z mokrymi dłońmi lub kiedy rozlano wodę. (L016)

**PERIGO:** Risco de choque eléctrico devido à presença de água ou líquidos no produto. Evite trabalhar com equipamento com energia, ou na sua proximidade, com mãos molhadas ou caso exista água derramada. (L016)

**ОПАСНО:** Риск поражения электрическим током вследствие присутствия в этом продукте воды или водного раствора. Избегайте выполнения работ на оборудовании, находящемся под напряжением, или рядом с таким оборудованием влажными руками или при наличии пролитой воды. (L016)

**NEBEZPEČENSTVO:** Riziko úrazu elektrickým prúdom v dôsledku prítomnosti vody alebo vodného roztoku v tomto produkte. Vyhnite sa práci na zapnutom zariadení alebo v jeho blízkosti s vlhkými rukami, alebo keď je prítomná rozliata voda.  
(L016)

**NEVARNOST:** Nevarnost električnega udara zaradi vode ali vodne raztopine, prisotne v izdelku.  
Ne delajte na opremi ali poleg opreme pod energijo z mokrimi rokami ali ko je prisotna razlita voda.  
(L016)

**PELIGRO:** Existe riesgo de choque eléctrico por agua o por una solución de agua que haya en este producto. Evite trabajar en equipos bajo tensión o cerca de los mismos con las manos húmedas o si hay agua derramada. (L016)

**Fara:** Risk för elektriska stötar på grund av vatten eller vattenbaserat medel i denna produkt. Arbeta inte med eller i närheten av elektriskt laddad utrustning om du har våta händer eller vid vattenspill. (L016)

ཉིན་པར། རྟོག་ཆས་འདི་ནང་དུ་ཆུ་མཛུ་བྱ་གཞི་གཏུགས་འདུག་ཡོད་པས། དེ་ལས་སློག་ཆུག་པའི་ཉིན་ཁ་ཡོད་  
ལག་པའི་ཐོག་ཆུ་ཡོད་པ་མཛུ་བྱ་གཞི་མར་བཞུར་པའི་གནས་ཆུ་ལ་འོག་སློག་ཡོད་པའི་ཚུག་ཆས་ལ་བོ་ལུང་ཕྱོད་ཕྱོད་མི་  
ན། (L016)

خەتەرلىك: بۇ مەھسۇلاتتا سۇ ياكى ئېرىتمە بولغاچقا، شۇڭا توك سوقۇۋېتىش خەۋىرى مەۋجۇتدۇر. قول ھۆل ھالەتتە ۋە ياكى سۇ سىرغىپ چىققان ھالەتتە، توكلۇق ئۈسكۈنىگە قارىتا ۋە ياكى توكلۇق ئۈسكۈنىنىڭ ئەتراپىدا مەشغۇلات ئېلىپ بارغىلى بولىدۇ. (L016)

Yungyiemi: Youzyiz aen canjbinj miz raemx roxnaeuz raemx yungzyiz, sojyij miz yungyiemi bungqden. Mboujndaej fwngz miz raemx seiz youq ndaw sezbi roxnaeuz youq henzgyawj guhhong. (L016)

**Attention:** Ensure proper handling procedures are followed when working with any chemically treated water used in the compute rack cooling system. Ensure that material safety data sheets (MSDS) and safety information are provided by the water chemical treatment supplier and that proper personal protective equipment (PPE) is available as recommended by the water chemical treatment supplier. Protective gloves and eyewear may be recommended as a precaution.

Before you install the manifold:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Make sure the DWC tray(s) are removed from the enclosure (see [“Remove a DWC tray from the enclosure” on page 244](#)).

Complete the following steps to install the manifold.

Step 1. Install new manifold section into the manifold and connect couplings.

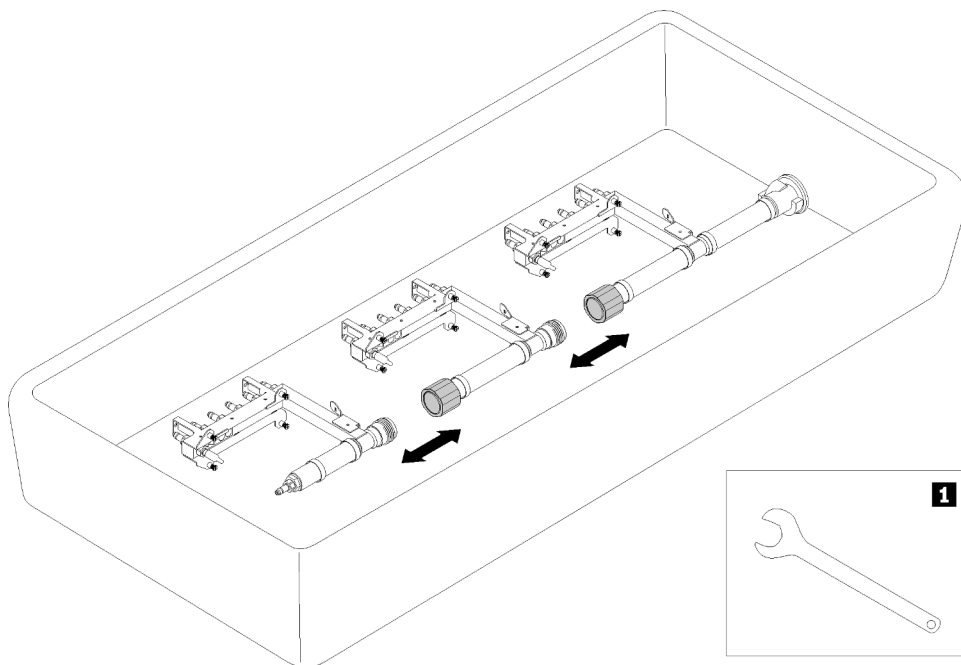


Figure 88. Manifold disassemble

Table 24. Manifold disassemble

<b>1</b> 41mm wrench
----------------------

Step 2. Tighten four screws (using the screwdriver contained in the manifold repair kit) between manifold bracket and enclosure.

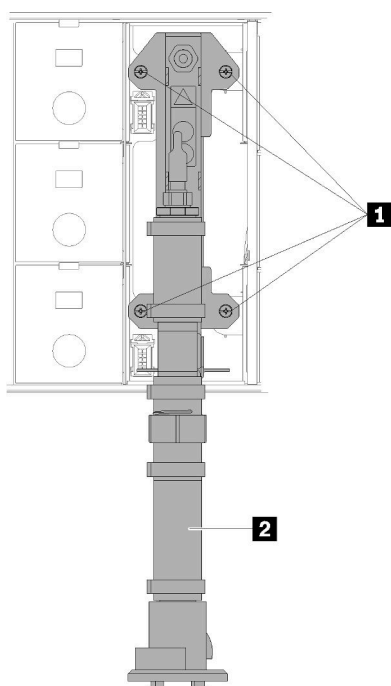


Figure 89. Manifold screw locations

Table 25. Manifold screw locations

1 Screws	2 Manifold
----------	------------

- Step 3. Starting from the top, connect the manifold bracket for the top manifold section into the top enclosure.
- Step 4. Continue to connect the other manifold sections working from the top down to the bottom.
- Step 5. Reinstall all drip sensor assemblies into enclosure.

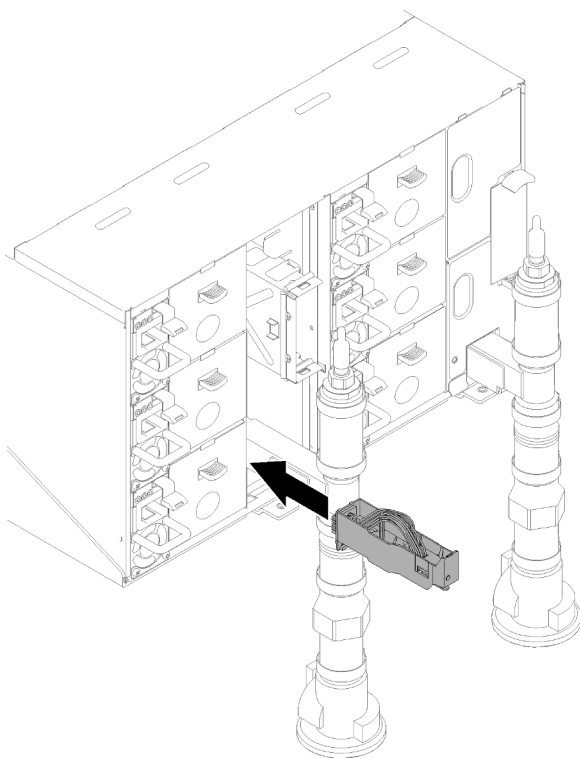


Figure 90. Drip sensor assembly installation

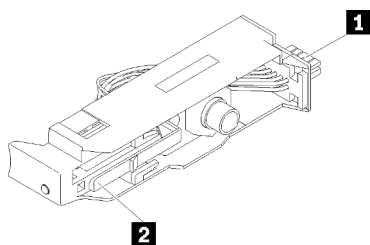


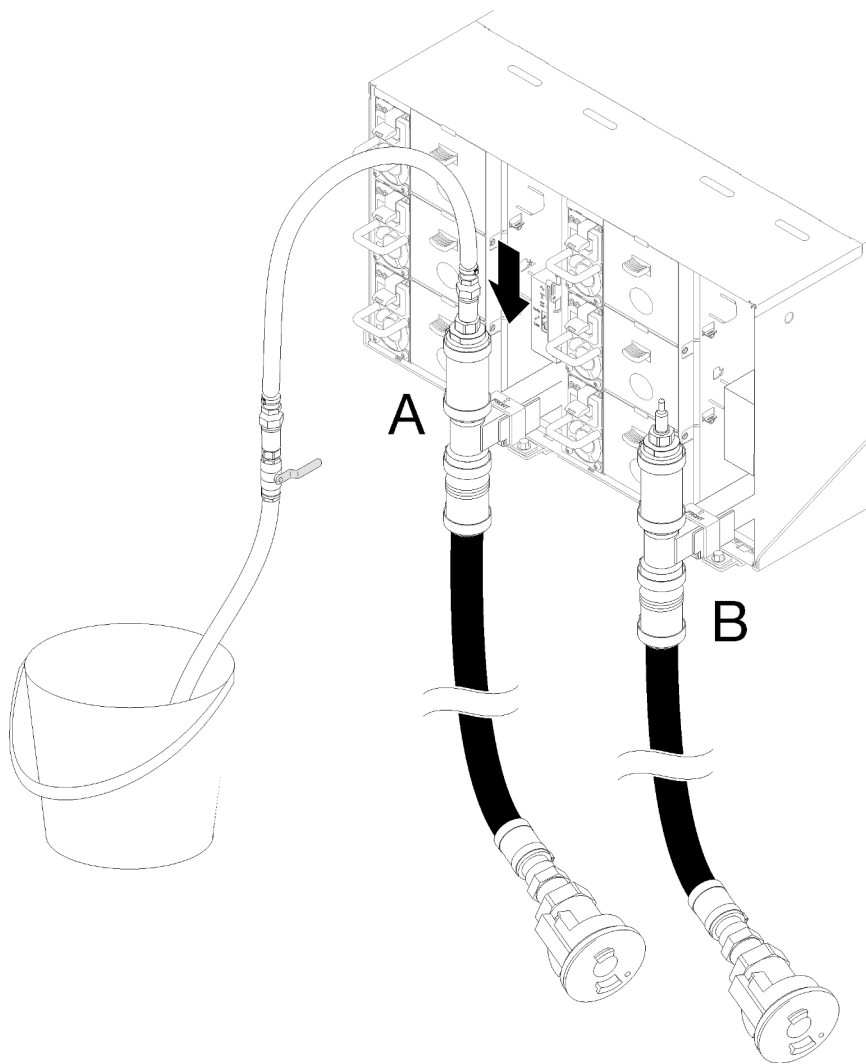
Figure 91. Drip sensor assembly

Table 26. Drip sensor assembly

<b>1</b> Connector	<b>2</b> Latch
--------------------	----------------

- Step 6. For the manifold water fill/refill process, at the rear of the rack, connect the blue hose assembly (supplied to customer installation site) to the top quick connect at the top of the rack (location A). Make sure the hose still remains in the bucket with the valve closed (valve handle perpendicular to the hose).

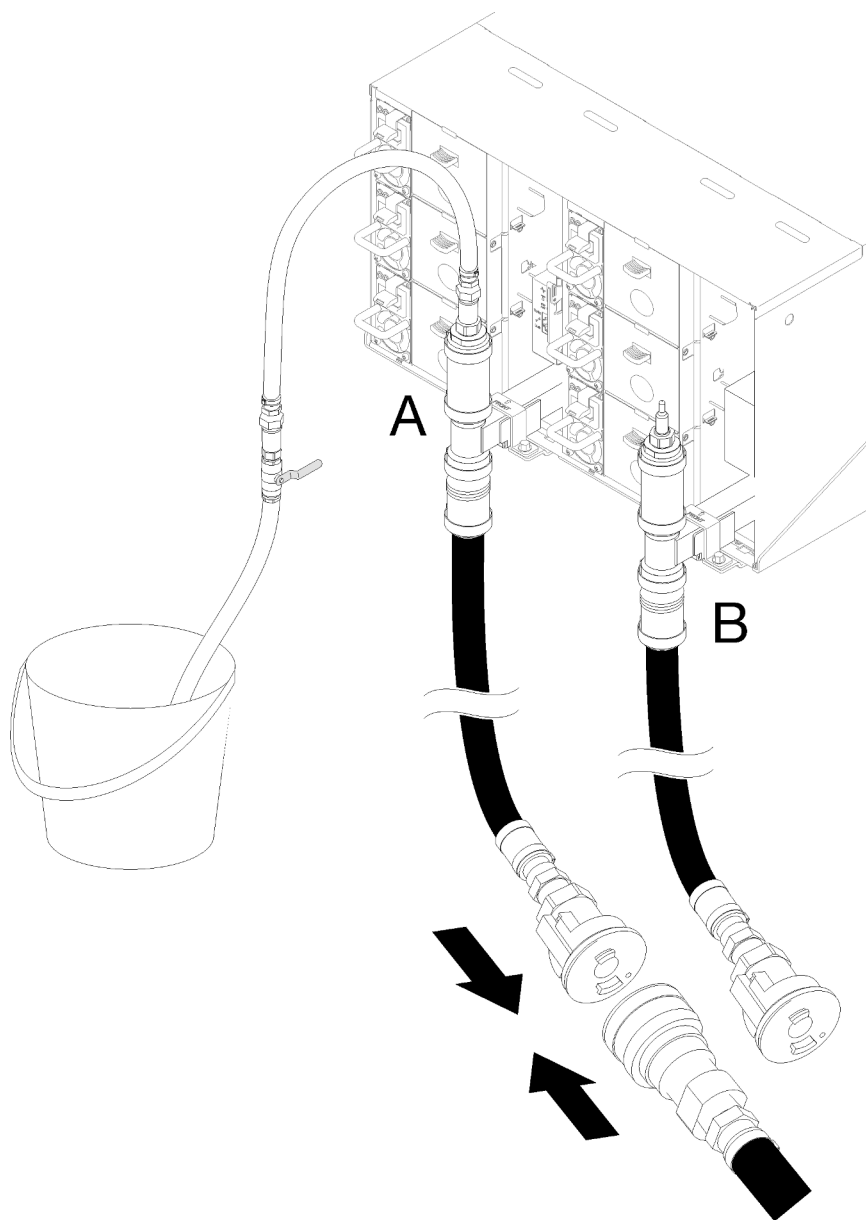
**Note:** The red plug cover will need to be removed at all positions first in order to plug to the quick connects.



*Figure 92. Blue hose assembly to top quick connect connection*

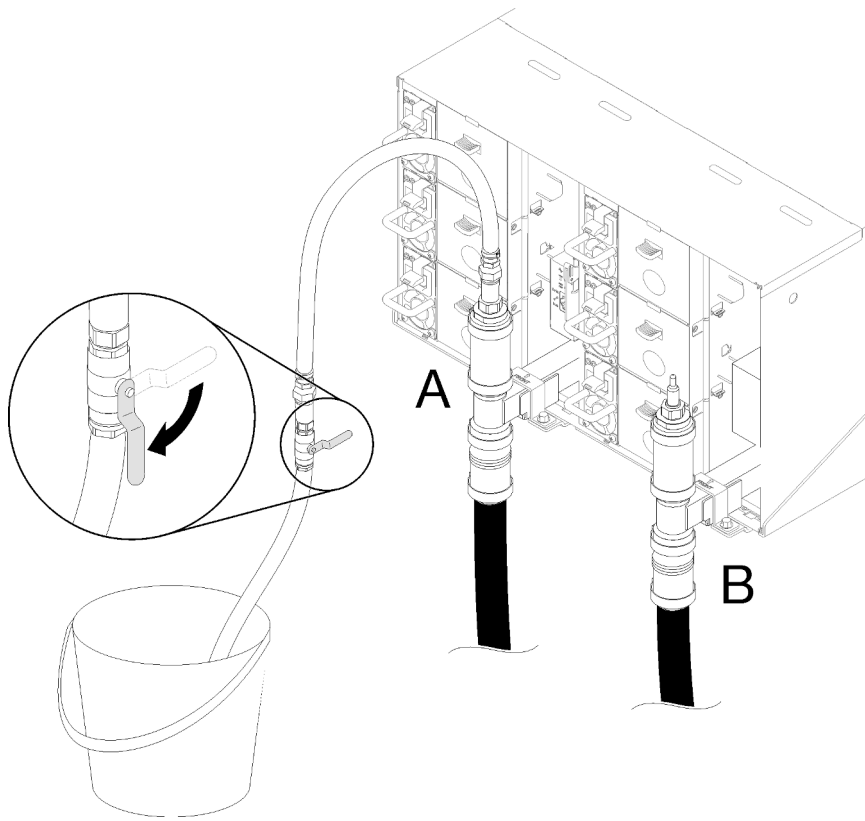
Step 7. At the front of the rack, connect the facility supply hose to the rack return hose. Partially open the supply hose, about 1/4 of the way.

**Note:** Do not fully open the facility ball valve or you will reduce your ability to control the flow as you fill the rack.



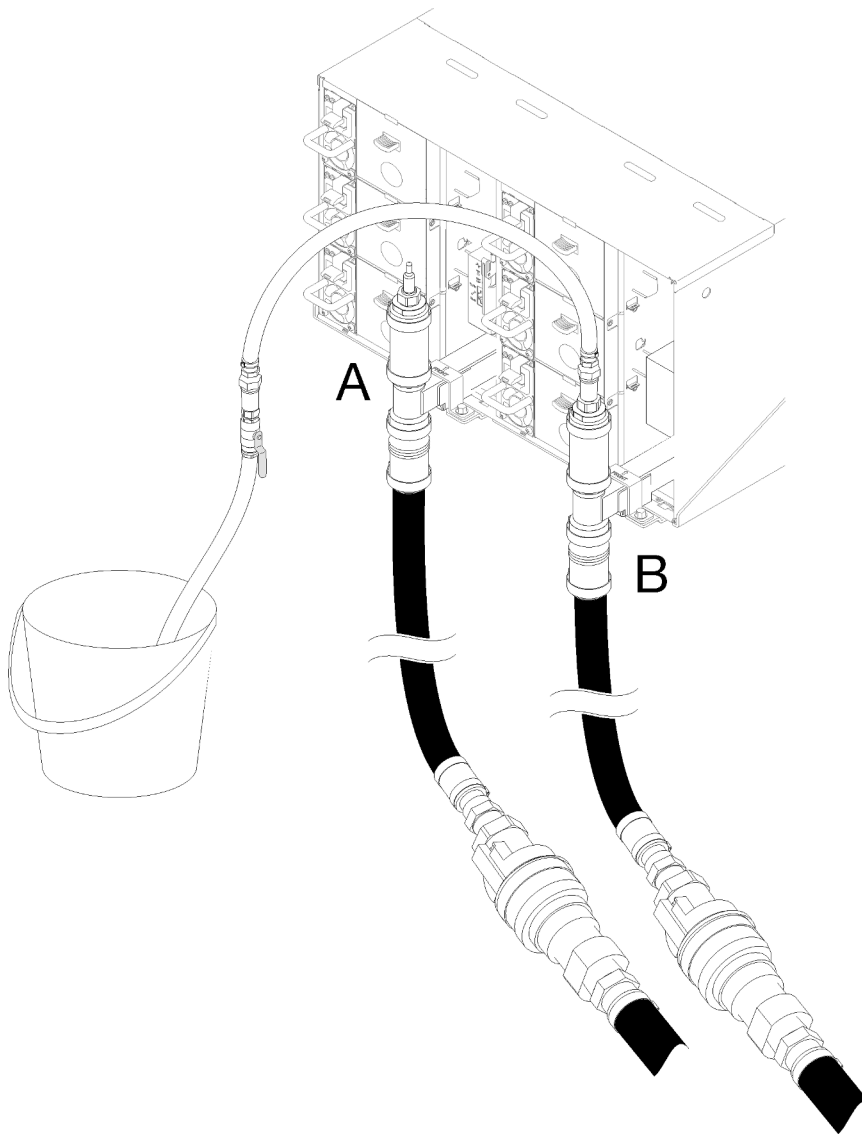
*Figure 93. Facility supply hose to rack return hose connection*

- Step 8. At the back of the rack, slowly open the valve on the blue hose part of the way allowing air to flow out of the hose. Allow this to take place until a steady stream of water flows into the bucket or there are minimal bubbles in the sight-glass. It may take approximately one to two minutes for air bubbles to clear the hose.



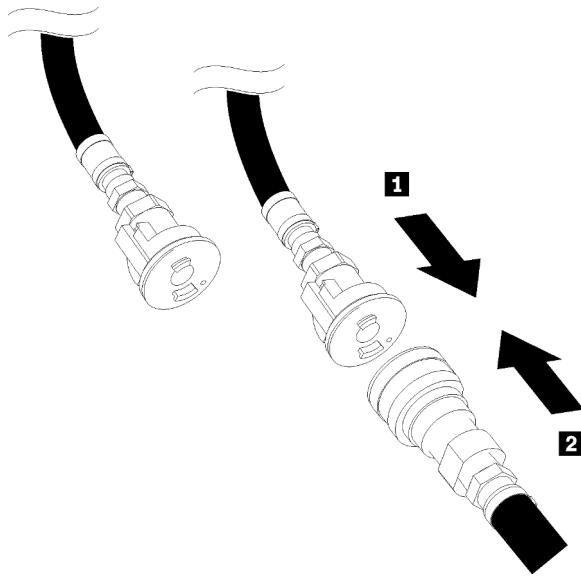
*Figure 94. Blue hose valve opening*

- Step 9. Close the valve on the blue hose. Then disconnect the blue hose assembly from Location A and move to Location B. Slowly open the valve and allow this to stay in place until a steady stream of water flows into the bucket or there are minimal bubbles in the sight-glass. Close the valve on the blue hose again.



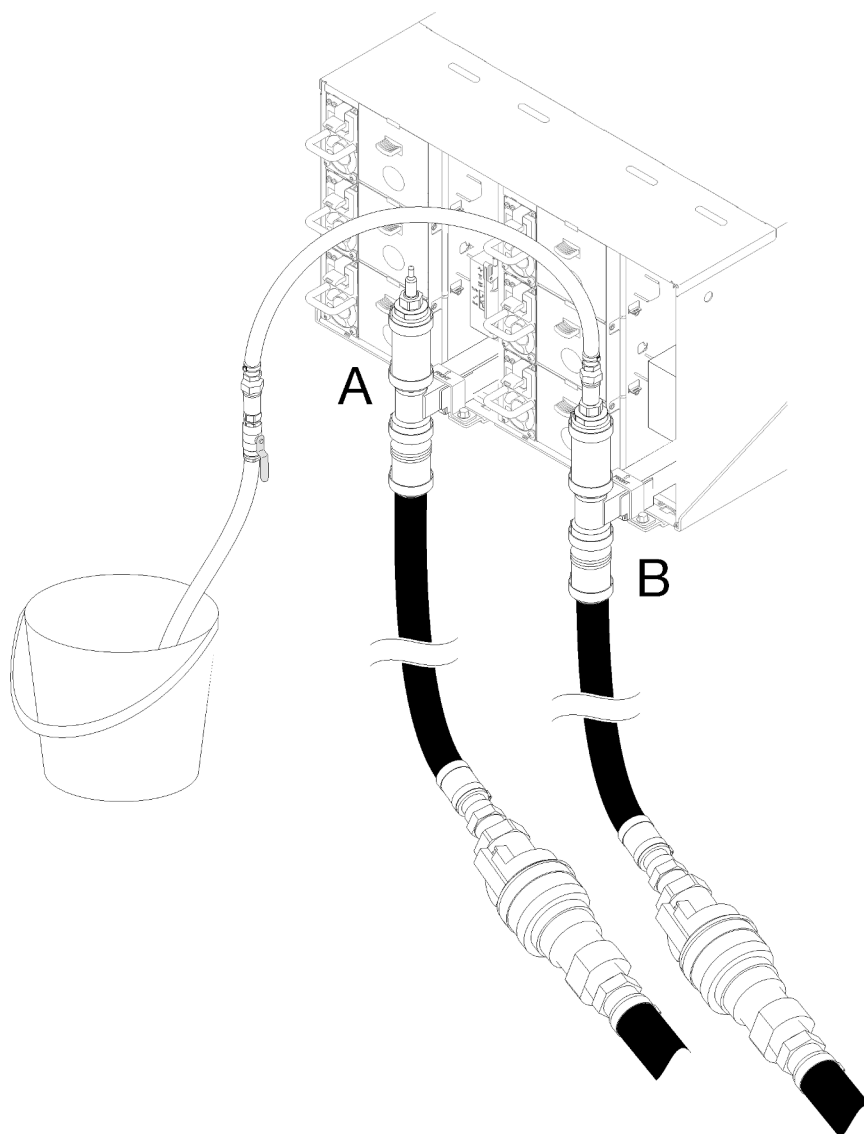
*Figure 95. Hose assembly movement*

Step 10. Go back to the front of the rack, disconnect the facility supply hose from the rack return hose and connect the facility supply hose to the rack supply hose.



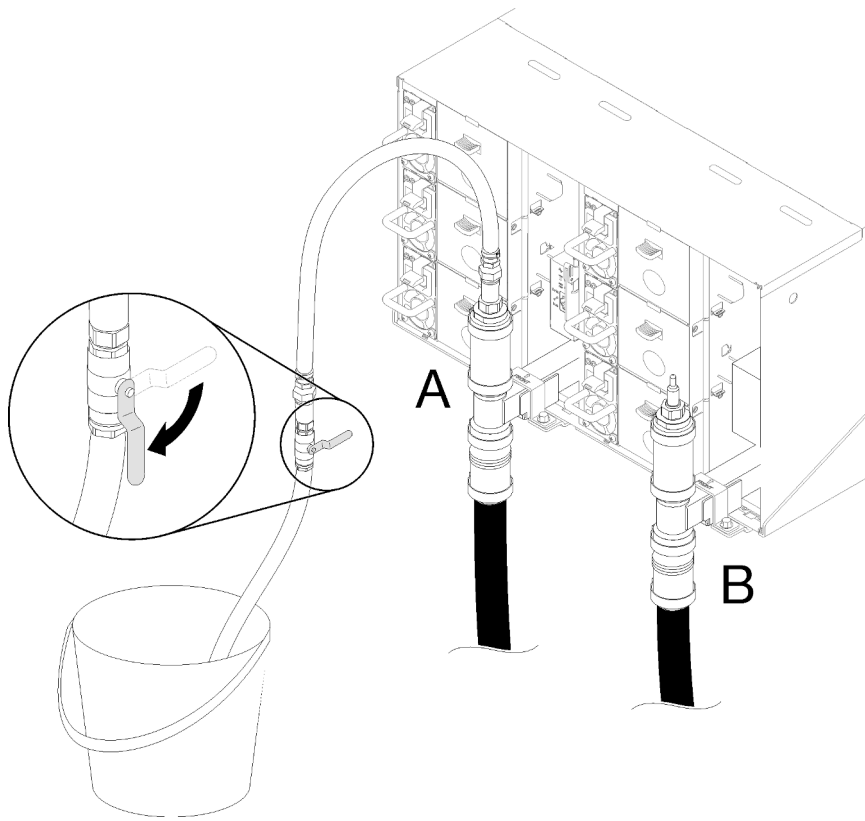
*Figure 96. Facility supply hose to the rack supply hose connection*

Step 11. Again, at the back of the rack, ensure the blue hose still remains connected to Location B. Open the valve on the blue hose and leave in place until a steady stream of water flows into the bucket or there are minimal bubbles in the sight-glass.



*Figure 97. Hose assembly movement*

Step 12. Close the valve on the blue hose. Then remove blue hose assembly from Location B and move to Location A. Open the valve on the blue hose and allow this to stay in place until a steady stream of water flows into the bucket or there are minimal bubbles in the sight-glass.

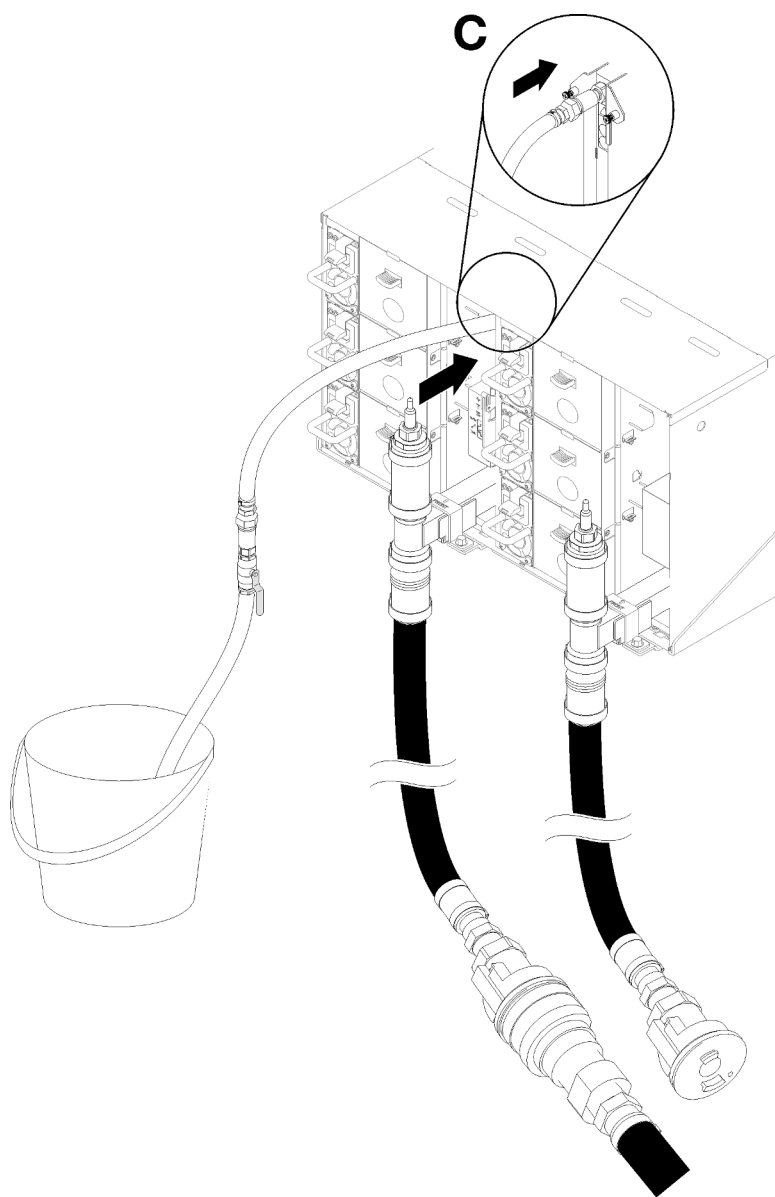


*Figure 98. Blue hose valve opening*

Step 13. Close the valve on the blue hose. Disconnect and move to Location C and open the valve slowly. Leave in place until a steady stream of water flows or minimal bubbles are in the sight-glass. Approximate time 10-15 seconds.

**Notes:**

- Top position EMC shields on all enclosure positions will need to be removed in order to access the quick connects.
- The red plug covers will need to be removed first in order to access the quick connects.



*Figure 99. Hose assembly movement*

Step 14. Close the valve on the blue hose. Disconnect and move the blue hose to Location D and repeat the process down the full rack ensuring each enclosure has minimal air bubbles in the sight glass.

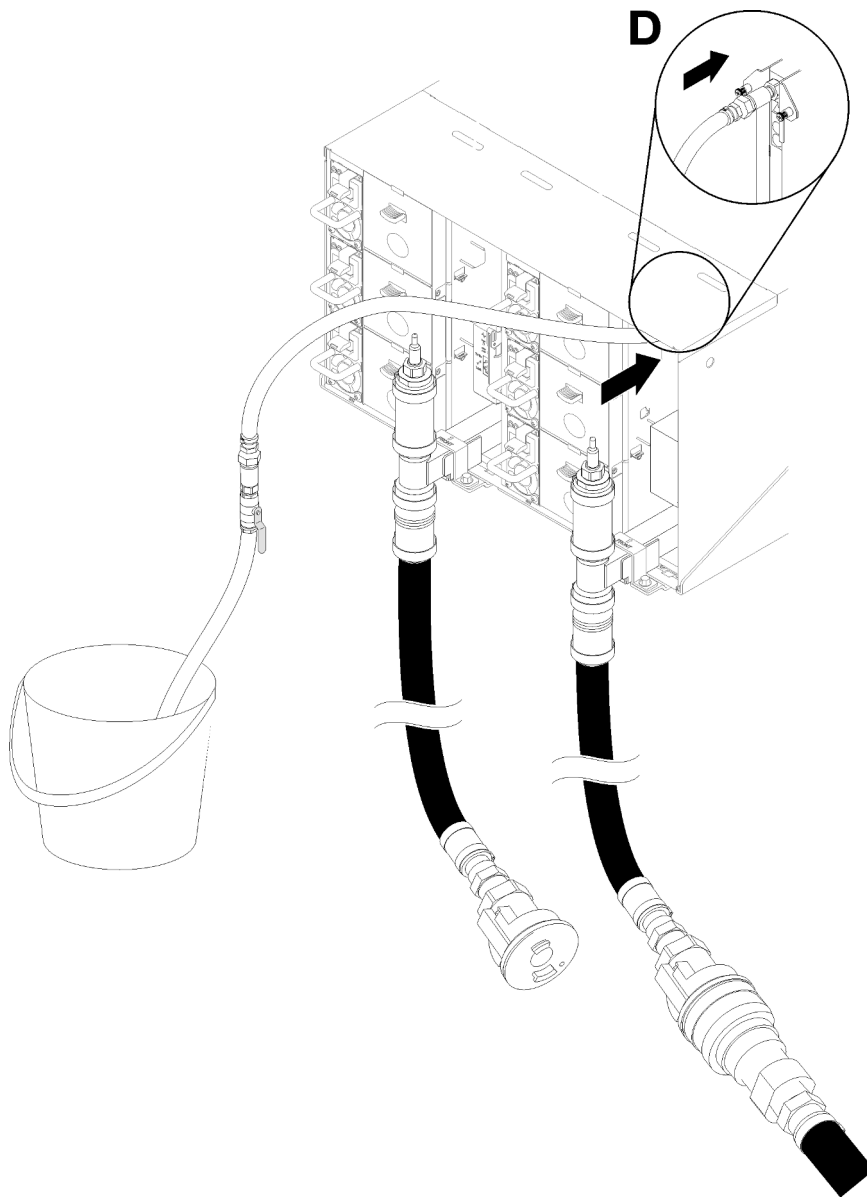


Figure 100. Hose assembly movement

- Step 15. Continue to each enclosure from the top enclosure to the bottom enclosure by reaching into each enclosure Location C and Location D quick connects and allow for a steady stream of water to flow. There should be minimal air present in the sight glass.

**Note:** Be sure to always close the valve on the blue hose before disconnecting it from one of the enclosure locations as you work your way down the rack.

- Step 16. Once complete, go back to the front and connect the facility return hose to the rack return hose. Fully open all connections on both the supply and return side. The manifold should be completely filled.

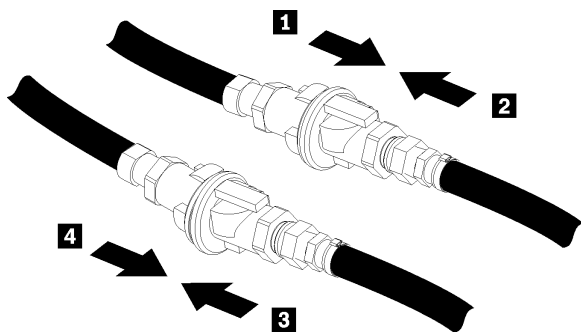


Figure 101. Facility return hose to the rack return hose connection

Step 17. Check for leaks at the rear or the rack.

Step 18. Install the FPC support bracket.

Step 19. Reinstall all FPC card modules and fillers.

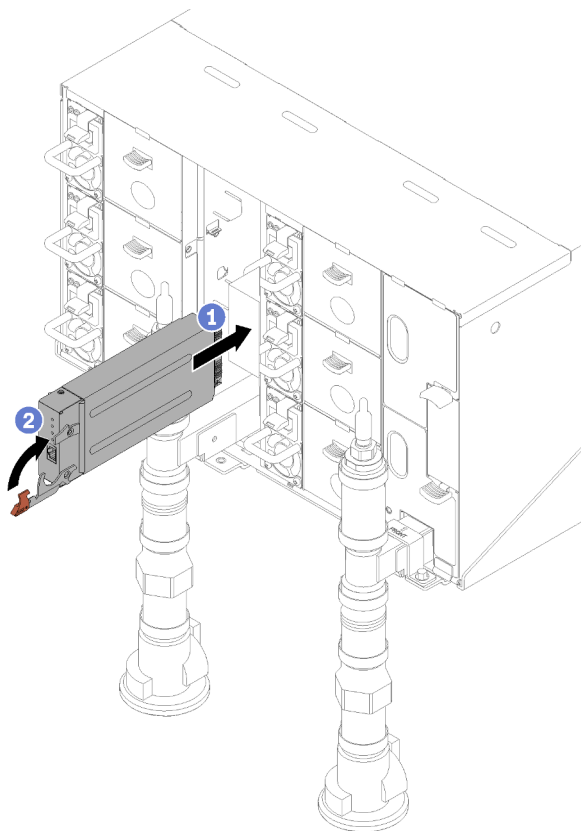


Figure 102. FPC card module installation

Step 20. Reinstall all EMC shields.

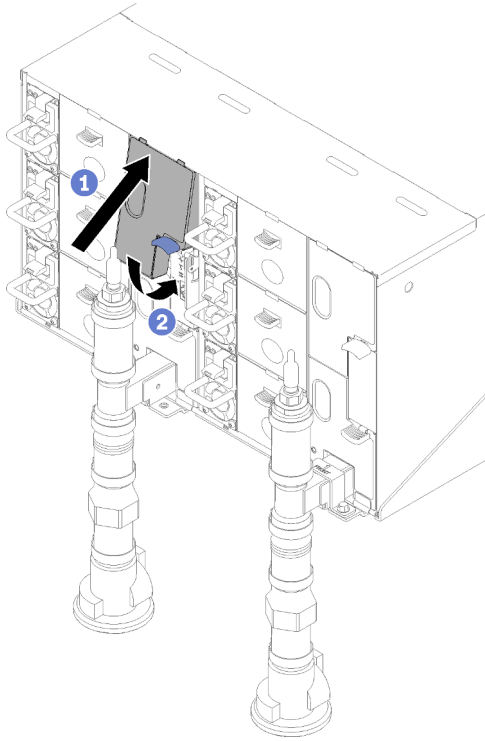


Figure 103. EMC shields installation

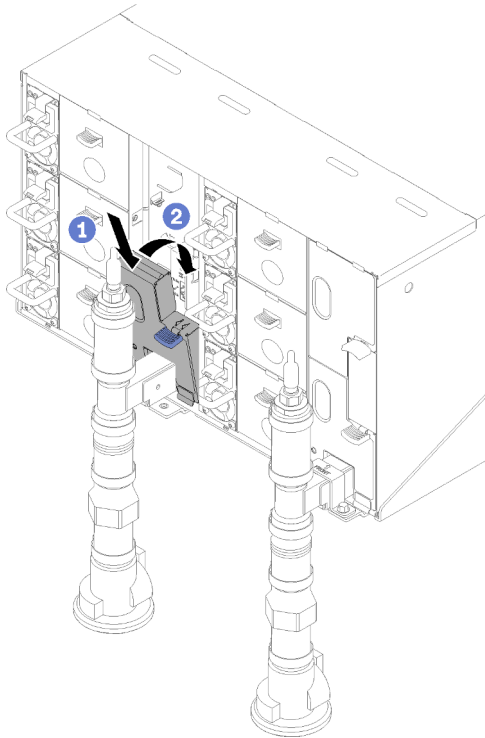


Figure 104. EMC shields installation

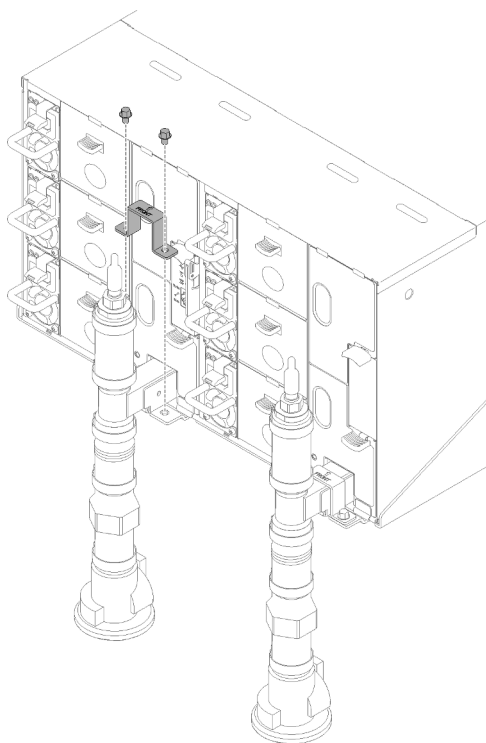


Figure 105. Retention bracket installation

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## Replace components in the tray

Use the following information to remove and install tray components.

### CMOS battery (CR2032) replacement

Use the following procedures to remove and install the CMOS battery (CR2032).

#### Remove the CMOS battery

Use this information to remove the CMOS battery.

To avoid possible danger, read and follow the following safety statement.

- **S004**



#### CAUTION:

When replacing the lithium battery, use only Lenovo specified part number or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

*Do not:*

- **Throw or immerse into water**

- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

- **S005**



**CAUTION:**

The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

Before you remove the CMOS battery:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Turn off the corresponding DWC tray that you are going to perform the task on.
3. Remove the tray (see [“Remove a DWC tray from the enclosure” on page 244](#)).
4. Remove the tray cover (see [“Remove the tray cover” on page 210](#)).
5. Remove the PCIe riser-cage assembly (see [“Remove an adapter” on page 149](#) or [“Remove an Internal Faceplate Transition \(IFT\) adapter” on page 155](#)).

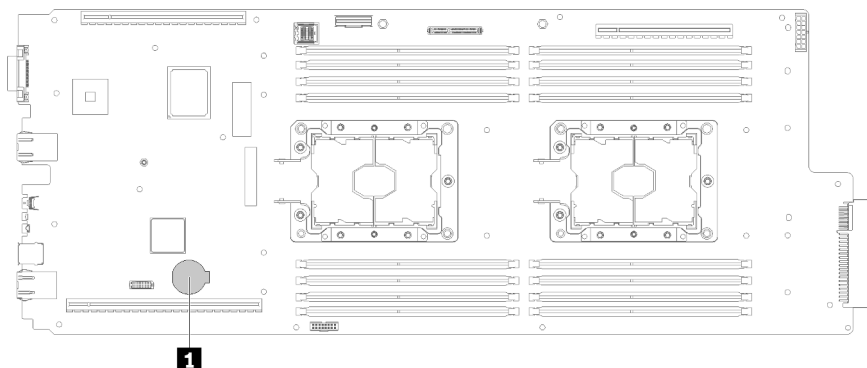


Figure 106. CMOS battery location

Table 27. CMOS battery location

<b>1</b> CMOS battery	
-----------------------	--

The following notes describe information that you must consider when replacing the battery.

- Lenovo has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.
- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.
- After you replace the battery, you must reconfigure the solution and reset the system date and time.

Complete the following steps to remove the CMOS battery.

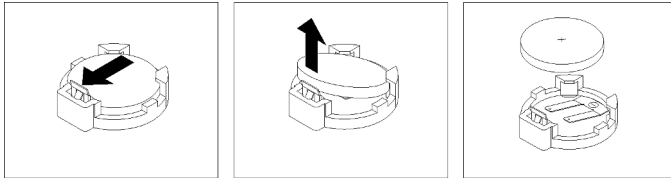


Figure 107. CMOS battery removal

Step 1. Remove the CMOS battery:

- a. Use a fingernail to press the top of the battery clip away from the battery. The battery pops up when it is released.
- b. Use your thumb and index finger to lift the battery from the socket.

**Attention:** Do not lift the battery by using excessive force. Failing to remove the battery properly may damage the socket on the system board. Any damage to the socket may require replacing the system board.

Step 2. Dispose of the CMOS battery as required by local ordinances or regulations.

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

#### Demo video

[Watch the procedure on YouTube](#)

### Install the CMOS battery (CR2032)

Use this information to install the CMOS battery.

To avoid possible danger, read and follow the following safety statement.

- **S004**



**CAUTION:**

When replacing the lithium battery, use only Lenovo specified part number or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

*Do not:*

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

Dispose of the battery as required by local ordinances or regulations.

- **S005**



**CAUTION:**

The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

Before you install the CMOS battery:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.

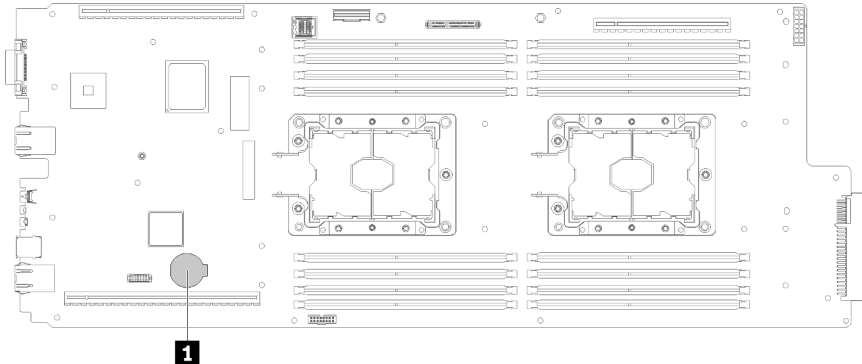


Figure 108. CMOS battery location

Table 28. CMOS battery location

1 CMOS battery	
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The following notes describe information that you must consider when replacing the system battery in the node.

- When replacing the system battery, you must replace it with a lithium battery of the same type from the same manufacturer.
- After you replace the system-board battery, you must reconfigure the node and reset the system date and time.
- To avoid possible danger, read and follow the following safety statement.

Complete the following steps to install the CMOS battery.

Step 1. Follow any special handling and installation instructions that come with the CMOS battery.

Step 2. Insert the new CMOS battery:

- a. Orient the battery so that the positive side faces up.
- b. Tilt the battery so that you can insert it into the socket on the side opposite the battery clip.

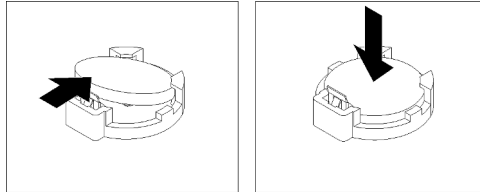


Figure 109. CMOS battery installation

- c. Press the battery down into the socket until it clicks into place. Make sure that the battery clip holds the battery securely.

After you install a CMOS battery, complete the following steps:

1. Reinstall the PCIe riser-cage assembly (see [“Install an adapter” on page 151](#) or [“Install an Internal Faceplate Transition \(IFT\) adapter” on page 157](#)).
2. Reinstall the tray cover (see [“Install the tray cover” on page 211](#)).
3. Reinstall the tray (see [“Install a DWC tray in the enclosure” on page 245](#)).
4. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.

## Demo video

[Watch the procedure on YouTube](#)

## DIMM replacement

Use the following procedures to remove and install a DIMM.

### Remove a DIMM

Use this information to remove a memory module.

Before you remove a DIMM:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. If you are removing a DCPMM in App Direct or Mixed Memory Mode, make sure to:
  - a. Back up the stored data.
  - b. If the App Direct capacity is interleaved:
    - 1) Delete all the created namespaces and filesystems in the operating system.
    - 2) Perform secure erase on all the DCPMMs that are installed. Go to **Intel Optane DCPMMs → Security → Press to Secure Erase** to perform secure erase.

**Note:** If one or more DCPMMs are secured with passphrase, make sure security of every unit is disabled before performing secure erase. In case the passphrase is lost or forgotten, contact Lenovo service.

If the App Direct capacity is not interleaved:

- 1) Delete the namespace and filesystem of the DCPMM unit to be replaced in the operating system.
  - 2) Perform secure erase on the DCPMM unit that is to be replaced. Go to **Intel Optane DCPMMs → Security → Press to Secure Erase** to perform secure erase.
3. Turn off the corresponding DWC tray that you are going to perform the task on.

4. Remove the tray (see [“Remove a DWC tray from the enclosure” on page 244](#)).
5. Remove the tray cover (see [“Remove the tray cover” on page 210](#)).

You can find the DIMM tool attached to the air baffle.

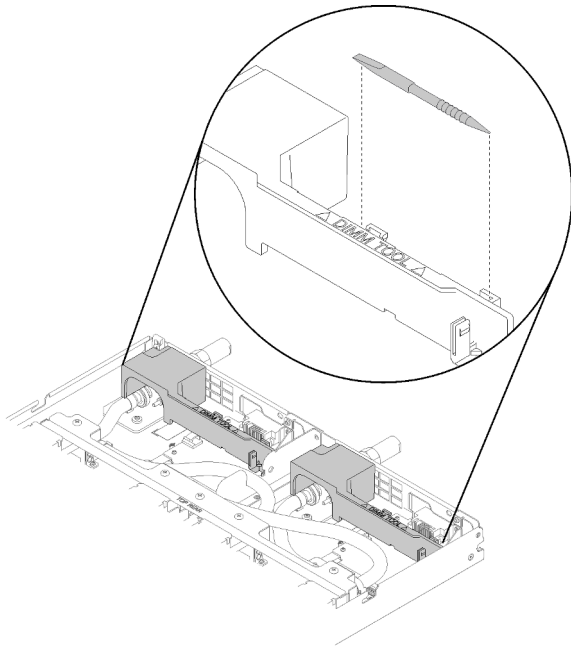


Figure 110. DIMM tool

**Attention:** Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for [Handling static-sensitive devices](#):

- Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
- Never hold two or more memory modules together so that they touch. Do not stack memory modules directly on top of each other during storage.
- Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory-module connector housing.
- Handle memory modules with care: never bend, twist, or drop a memory module.

Complete the following steps to remove a DIMM.

Step 1. Remove the DIMM cover.

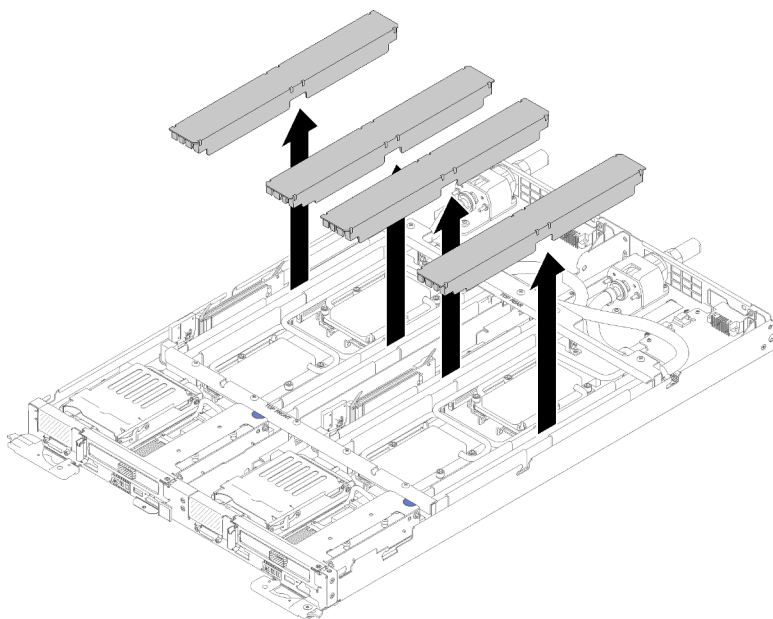


Figure 111. DIMM cover removal

Step 2. Carefully use the DIMM tool to press the retaining clips outward on each end of the DIMM connector.

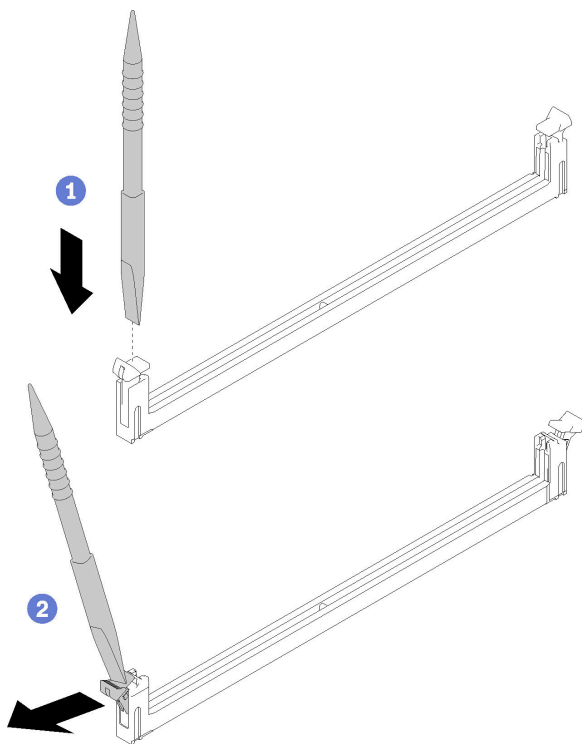


Figure 112. DIMM removal

**Attention:** To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.

Step 3. Carefully remove the DIMM.

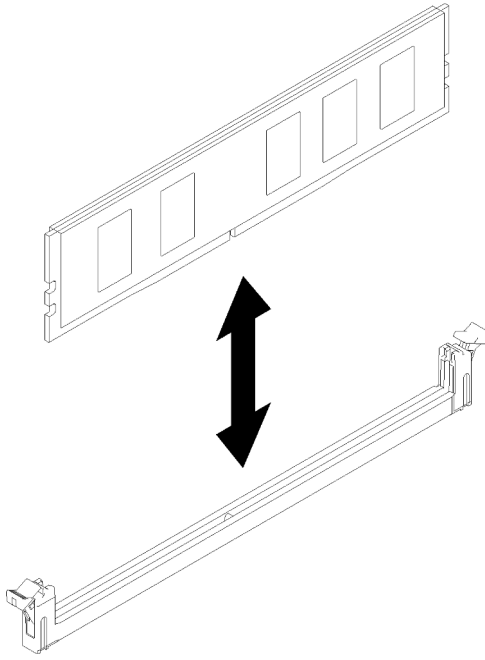


Figure 113. DIMM removal

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

### Demo video

[Watch the procedure on YouTube](#)

### Install a DIMM

Use this information to install a DIMM.

See “Memory module installation order” in *Setup Guide* for detailed information about memory configuration and setup.

Before you install a DIMM:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. If you are installing DCPMMs for the first time, follow the instructions in “DC Persistent Memory Module (DCPMM) setup” in *Setup Guide* so that the system supports DCPMMs.

**Attention:** Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for [“Handling static-sensitive devices” on page 38](#):

- Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
- Never hold two or more memory modules together so that they touch. Do not stack memory modules directly on top of each other during storage.
- Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory-module connector housing.
- Handle memory modules with care: never bend, twist, or drop a memory module.

- Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
- Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.

You can find the DIMM tool attached to the air baffle.

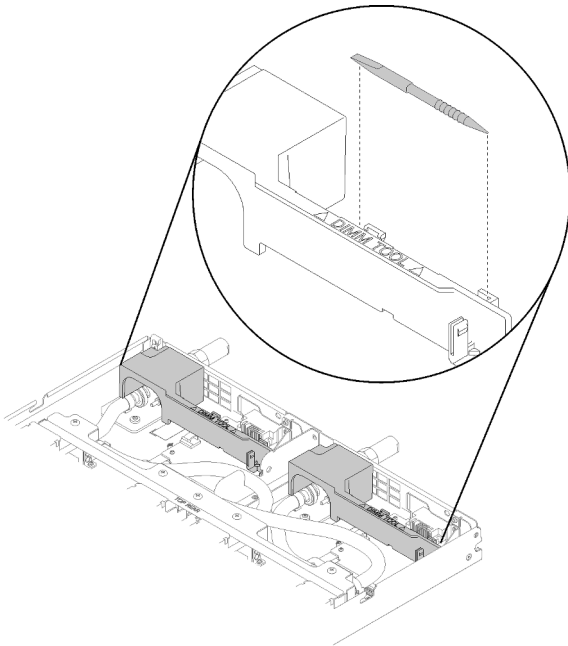


Figure 114. DIMM tool

The following illustration shows the location of the DIMM connectors on the system board.

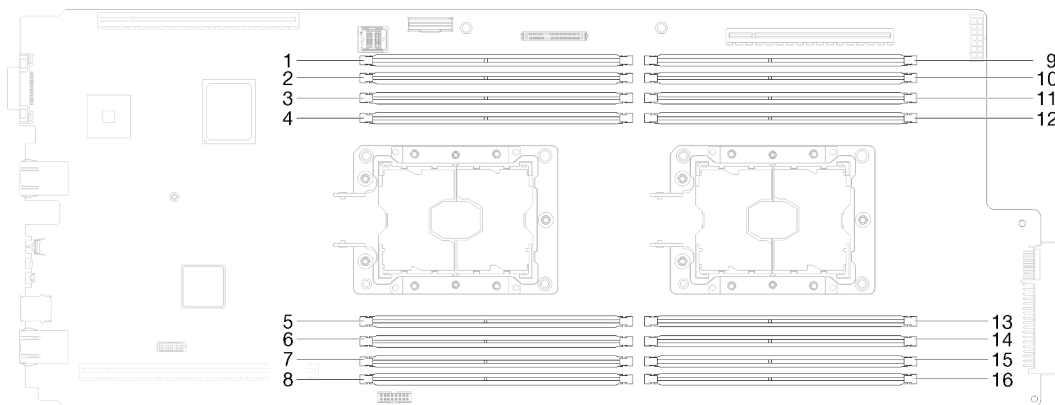


Figure 115. The location of the DIMM connectors on the system board

Complete the following steps to install a DIMM.

**Important:** Before installing a memory module, make sure that you understand the required installation order, depending on whether you are implementing memory mirroring, memory rank sparing, or independent memory mode. See “Installation order” in *Setup Guide* for the required installation order.

Step 1. Remove the DIMM cover.

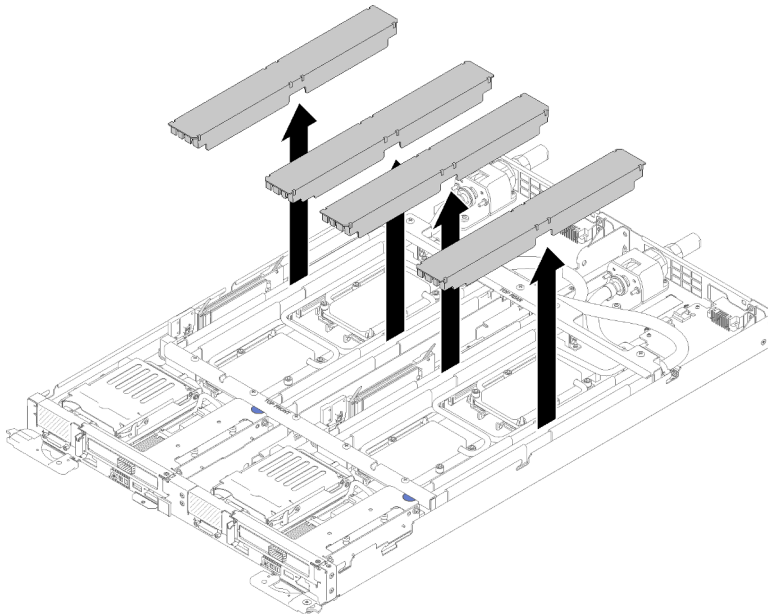


Figure 116. DIMM cover removal

Step 2. Carefully use the DIMM tool to press down the retaining clips on each end of the DIMM connector.

**Note:** DIMM tool is recommended due to space limitations caused by location of water loop tubes through the memory section.

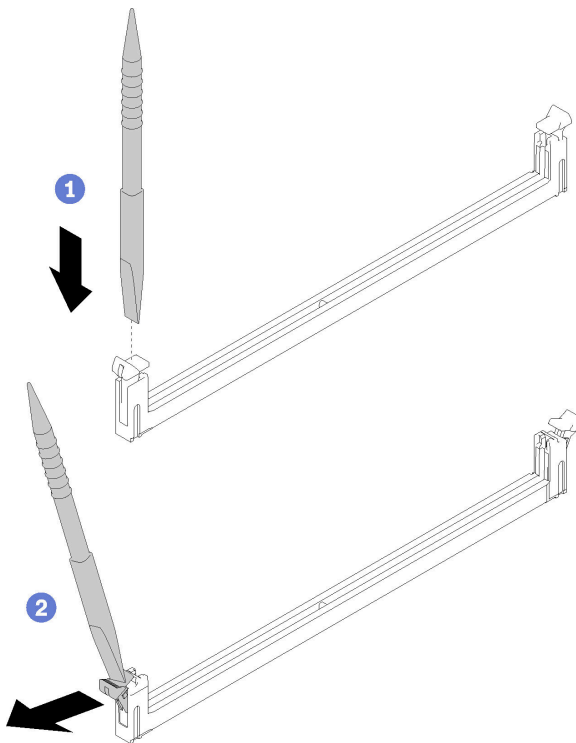


Figure 117. DIMM removal

**Attention:**

- DIMMs are static-sensitive devices. The package must be grounded before it is opened.
- To avoid breaking the retaining clips or damaging the DIMM connectors, open and close the clips gently.

- Step 3. Touch the static-protective package that contains the DIMM to any unpainted metal surface on the outside of the node. Then, remove the DIMM from the package.
- Step 4. Align the DIMM with the slot, and gently place the DIMM on the slot with both hands.
- Step 5. Firmly press both ends of the DIMM straight down into the slot until the retaining clips snap into the locked position.

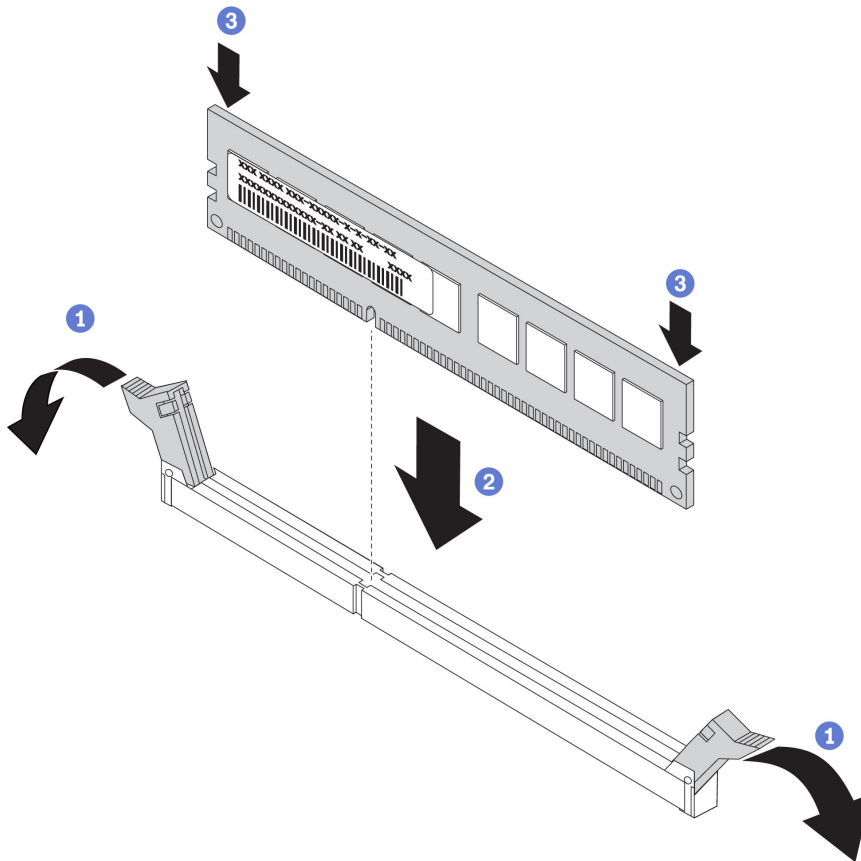


Figure 118. DIMM installation

**Note:** If there is a gap between the DIMM and the retaining clips, the DIMM has not been correctly inserted; open the retaining clips, remove the DIMM, and then reinsert it.

- Step 6. Reinstall the DIMM cover.

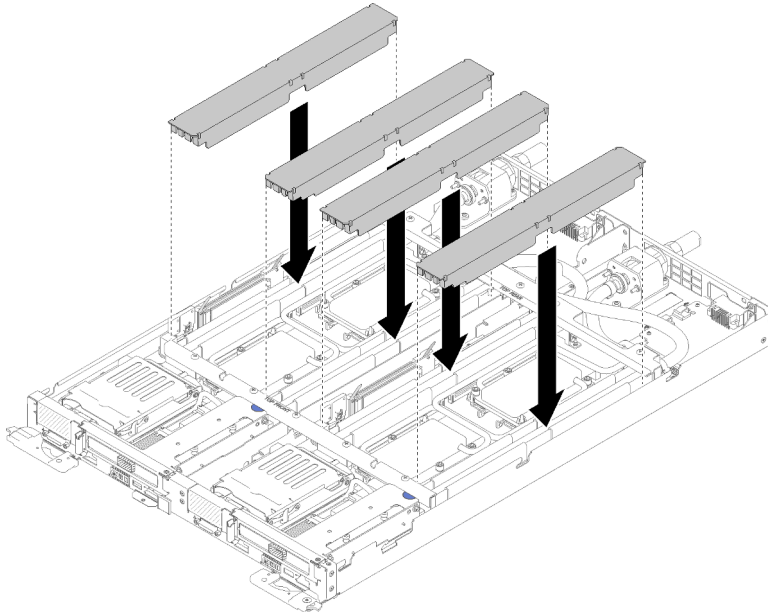


Figure 119. DIMM cover installation

After you install a DIMM, complete the following steps:

1. Reinstall the tray cover (see [“Install the tray cover” on page 211](#)).
2. Reinstall the tray (see [“Install a DWC tray in the enclosure” on page 245](#)).
3. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.
4. If you have installed a DCPMM:
  - a. Update the system firmware to the latest version (see “Update the firmware” in *Setup Guide* ).
  - b. Make sure the firmware of all the DCPMM units is the latest version. If not, update it to the latest version (see [https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update\\_fw.html](https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html)).
  - c. Configure DCPMMs and DRAM DIMMs (see “Configure DC Persistent Memory Module (DCPMM)” in *Setup Guide*).
  - d. Restore the data that have been backed up if necessary.

### Demo video

[Watch the procedure on YouTube](#)

## Drive replacement

Use the following procedures to remove and install a drive.

### Remove a drive

Use this information to remove a drive.

Before you remove a drive:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Turn off the corresponding DWC tray that you are going to perform the task on.
3. Remove the tray (see [“Remove a DWC tray from the enclosure” on page 244](#)).

4. Remove the tray cover (see [“Remove the tray cover” on page 210](#)).

Complete the following steps to remove a drive.

Step 1. Squeeze the spring steel latches on sides while lifting up on the top portion of drive cage.

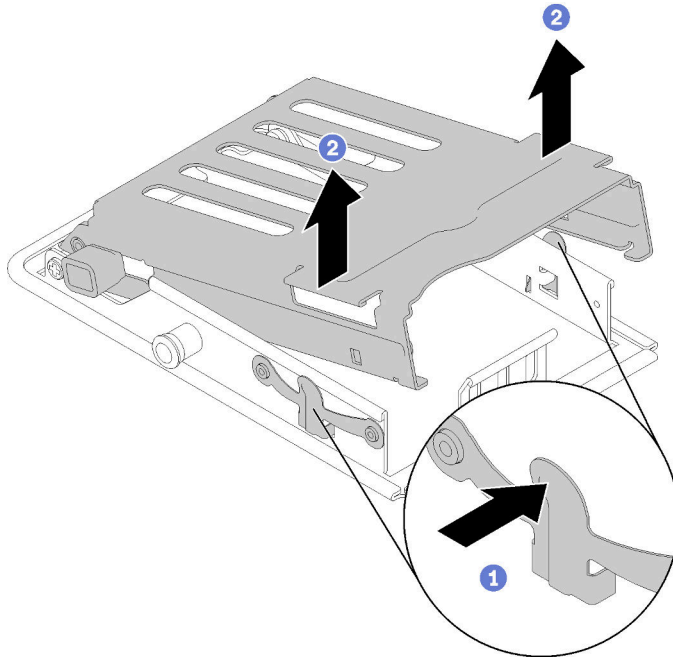


Figure 120. Releasing the drive cage

Step 2. Push the release latch forward to release the drive; then, slide the drive out of the drive cage.

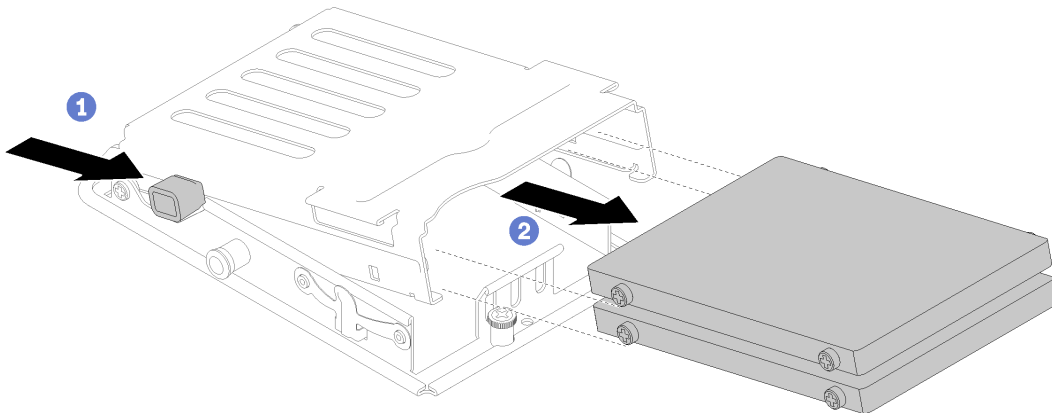
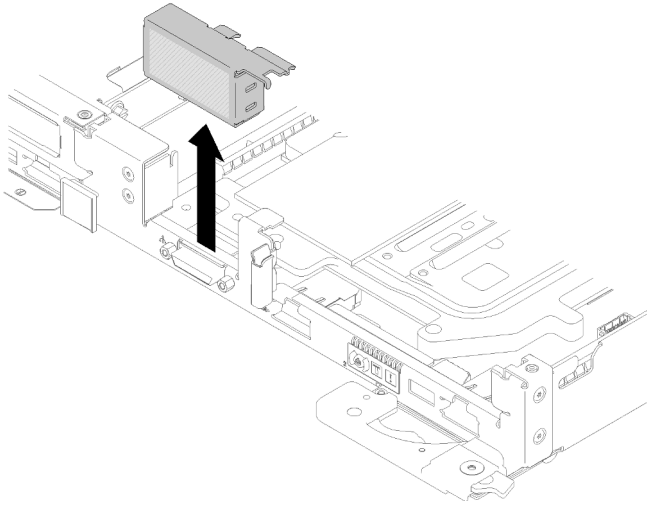


Figure 121. Drive removal

**Note:** For individuals with large fingers, it may be useful to remove the blank bezel filler to provide more access to drives.



*Figure 122. Blank bezel filler removal*

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

#### **Demo video**

[Watch the procedure on YouTube](#)

#### **Install a drive**

Use this information to install a drive.

Before you install a drive:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.

Complete the following steps to install a drive.

Step 1. Squeeze two release latches to release the drive cage.

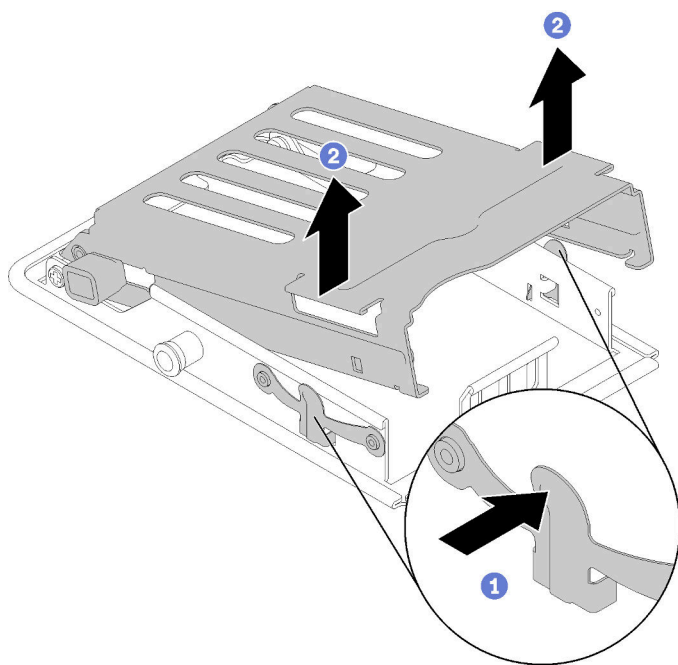


Figure 123. Releasing the drive cage

Step 2. Align the drive with drive cage and carefully slide the drive into the drive cage.

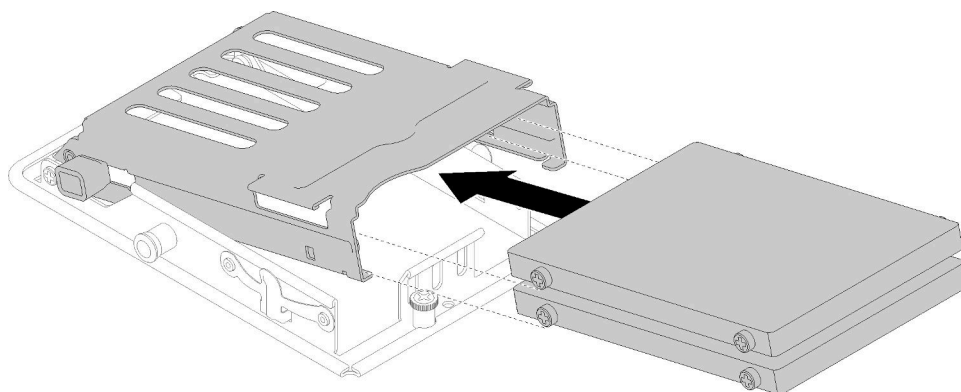


Figure 124. Drive installation

Step 3. Pull the blue retention latch and rotate the drive cage down. Carefully push down on the top of drive cage to make sure it is correctly seated.

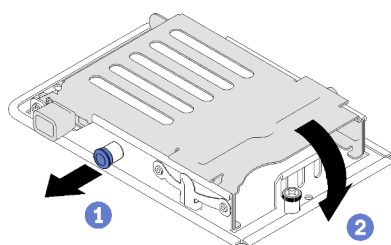


Figure 125. Drive cage installation

After you install a drive, complete the following steps:

1. Reinstall the tray cover (see [“Install the tray cover” on page 211](#)).
2. Reinstall the tray (see [“Install a DWC tray in the enclosure” on page 245](#)).
3. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.

### Demo video

[Watch the procedure on YouTube](#)

## Drive cage assembly replacement

Use the following procedures to remove and install a drive cage assembly.

### Remove a drive cage assembly

Use this information to remove a drive cage assembly.

Before you remove a drive cage assembly:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Turn off the corresponding DWC tray that you are going to perform the task on.
3. Remove the tray (see [“Remove a DWC tray from the enclosure” on page 244](#)).
4. Remove the tray cover (see [“Remove the tray cover” on page 210](#)).
5. Remove the existing drive (if it is installed) and place the drive on the static protective surface (see [“Remove a drive” on page 133](#)).
6. Remove the front and the rear cross braces (10x P2 screws).

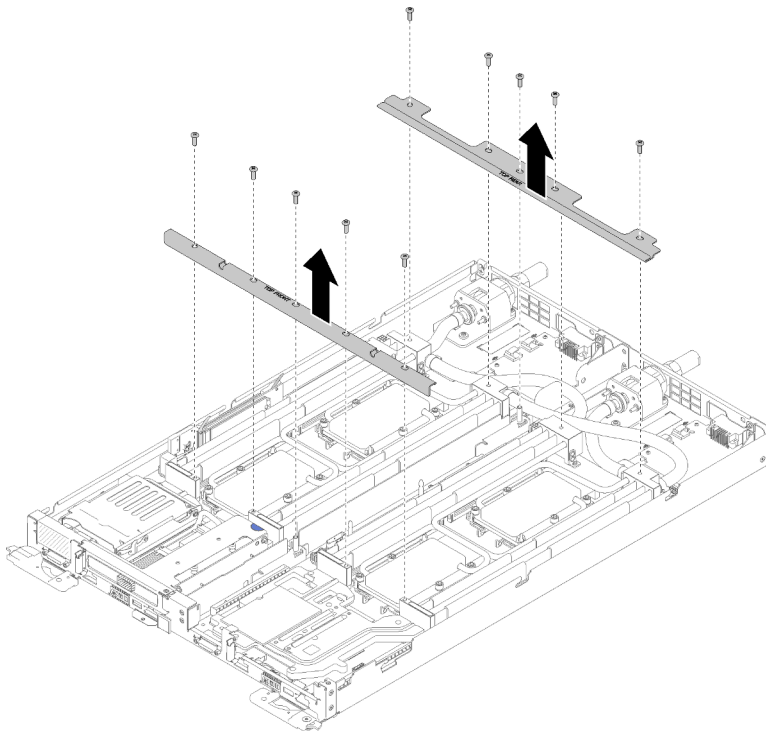
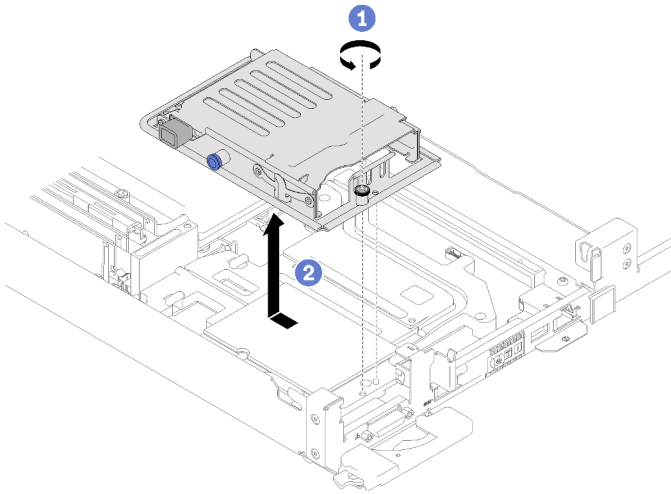


Figure 126. Cross brace removal

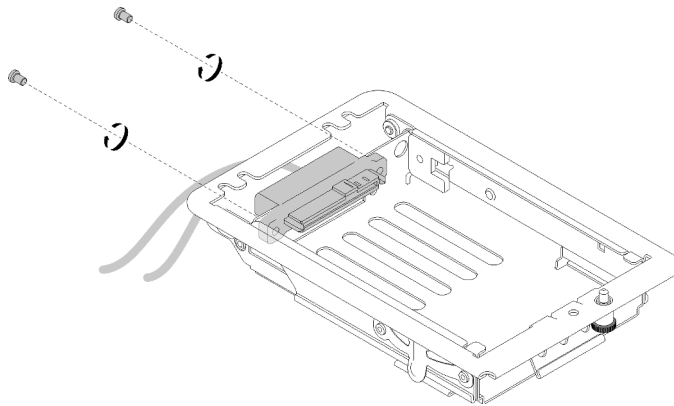
Complete the following steps to remove a drive cage assembly.

- Step 1. Loosen the captive screw and slide the drive cage assembly backward; then, remove the drive cage assembly out of the node.



*Figure 127. Drive cage assembly removal*

- Step 2. Disconnect the cables if needed.
- Disconnect cables from the system board.
  - Turn the drive cage over to the upside down orientation.
  - Remove screws and connectors.
    - 1x2.5-inch drive model



*Figure 128. Screws removal - 1x2.5-inch drive model*

- 2x2.5-inch drive model

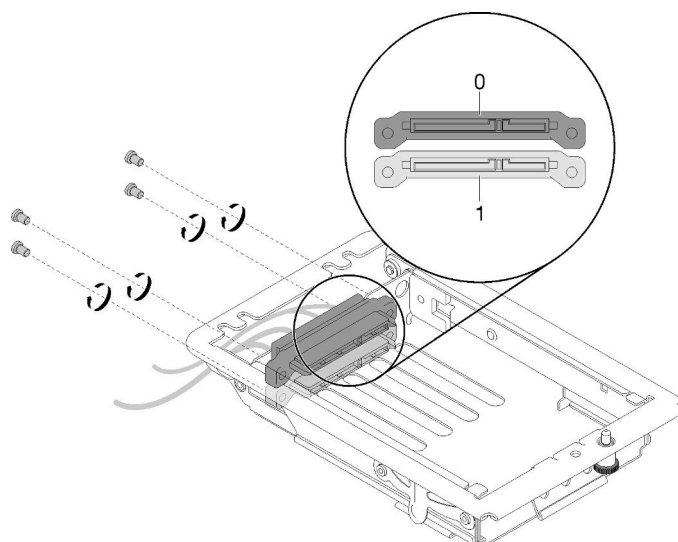


Figure 129. Screws removal - 2x2.5-inch drive model

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

#### Demo video

[Watch the procedure on YouTube](#)

### Install a drive cage assembly

Use this information to install a drive cage assembly.

Before you install a drive cage assembly:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Ensure the drive cage assembly is empty without any drive installed.

Complete the following steps to install a drive cage assembly.

Step 1. Install the connector into the drive cage if needed.

- a. Turn the drive cage over to the upside down orientation.
- b. Insert connectors into the drive cage and tighten screws..
  - 1x2.5-inch drive model

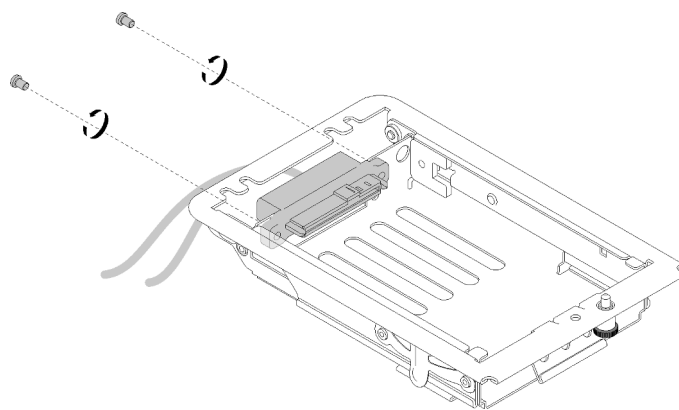


Figure 130. Connector installation - 1x2.5-inch drive model

- 2x2.5-inch drive model

Ensure drive 0 and drive 1 connectors are installed correctly according to the following illustration.

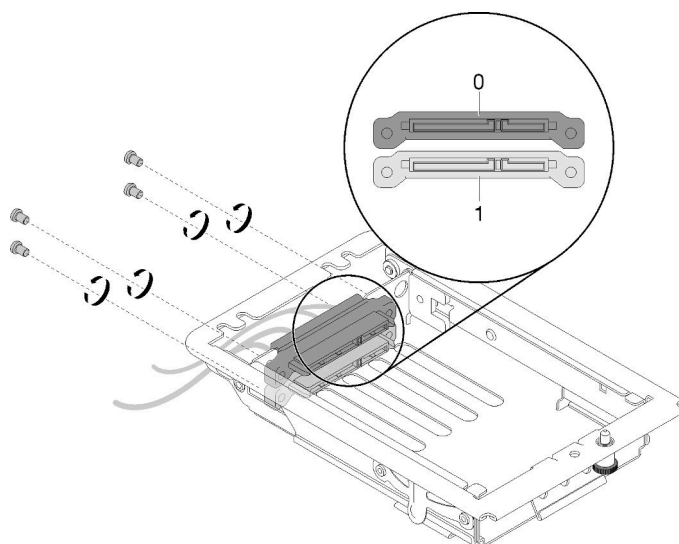


Figure 131. Connector installation - 2x2.5-inch drive model

- Step 2. Align two tabs on the drive cage assembly with two holes; then, push the drive cage assembly forward.
- Step 3. Tighten the captive screw.

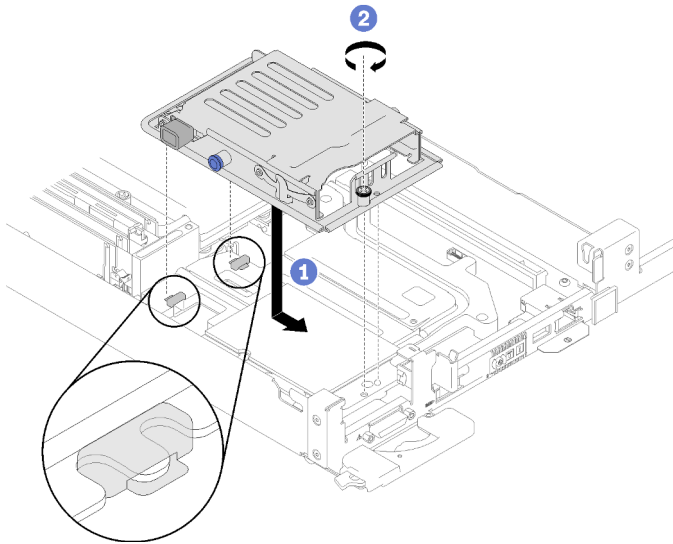


Figure 132. Drive cage assembly installation

Step 4. Route cables as illustrated.

- 1x2.5-inch drive model

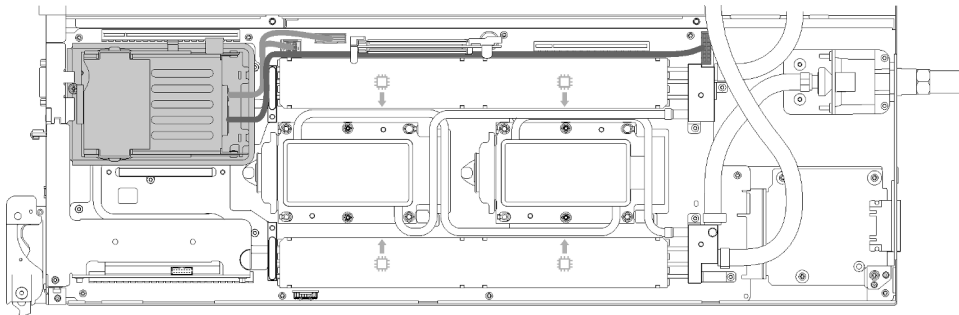


Figure 133. Cable routing - 1x2.5-inch drive model

- 2x2.5-inch drive model

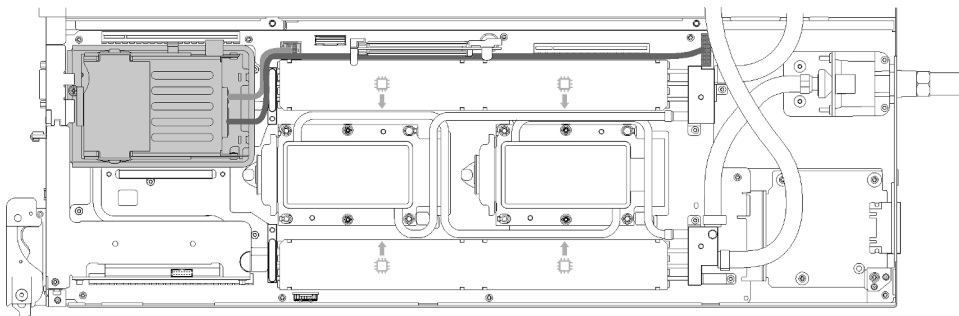


Figure 134. Cable routing - 2x2.5-inch drive model

After you install a drive cage assembly, complete the following steps:

1. Reinstall the blank bezel filler.

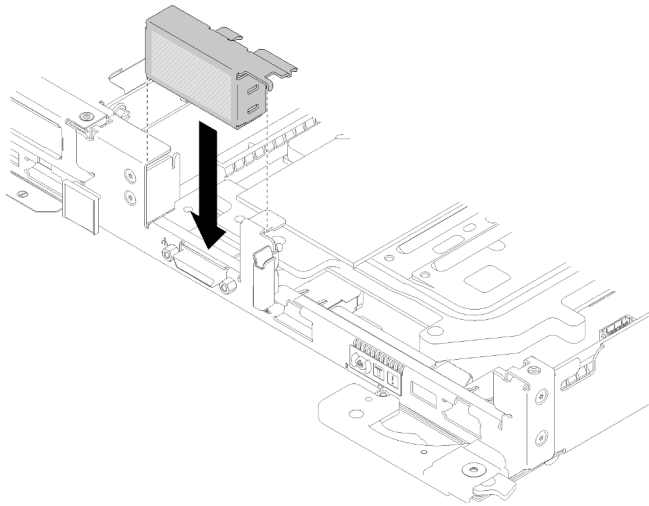


Figure 135. Blank bezel filler installation

2. Reinstall the front and the rear cross braces (10x P2 screws).

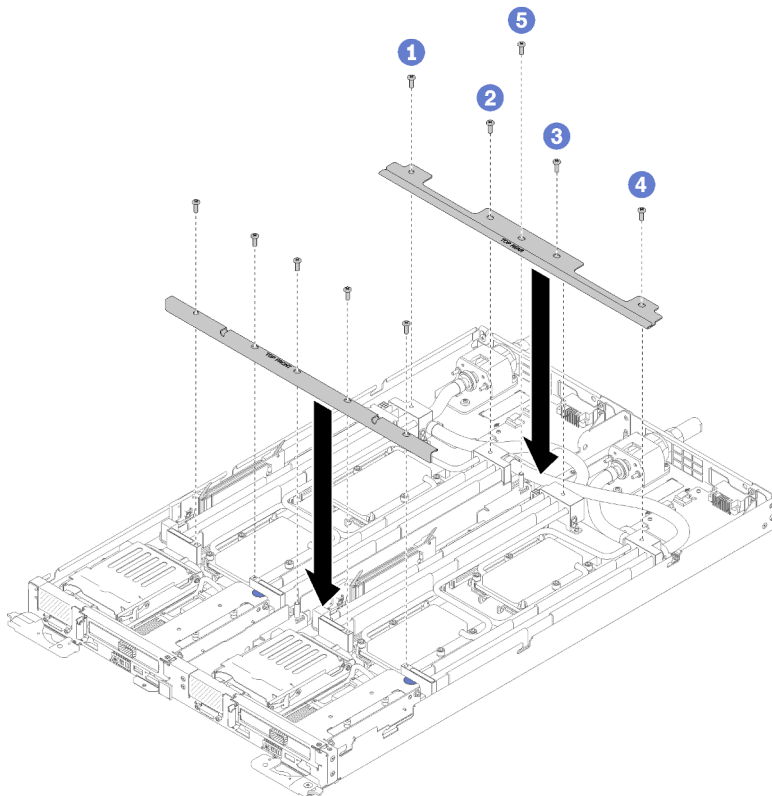


Figure 136. Cross brace installation

3. Reinstall the tray cover (see [“Install the tray cover” on page 211](#)).
4. Reinstall the tray (see [“Install a DWC tray in the enclosure” on page 245](#)).
5. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.

## Demo video

[Watch the procedure on YouTube](#)

## M.2 backplane replacement

Use the following procedures to remove and install the M.2 backplane.

### Remove the M.2 backplane

Use this information to remove the M.2 backplane.

#### S001



**Electrical current from power, telephone, and communication cables is hazardous.**

**To avoid a shock hazard:**

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **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.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

Before you remove the M.2 backplane:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Turn off the corresponding DWC tray that you are going to perform the task on.
3. Remove the tray (see [“Remove a DWC tray from the enclosure” on page 244](#)).
4. Remove the tray cover (see [“Remove the tray cover” on page 210](#)).

Complete the following steps to remove the M.2 backplane.

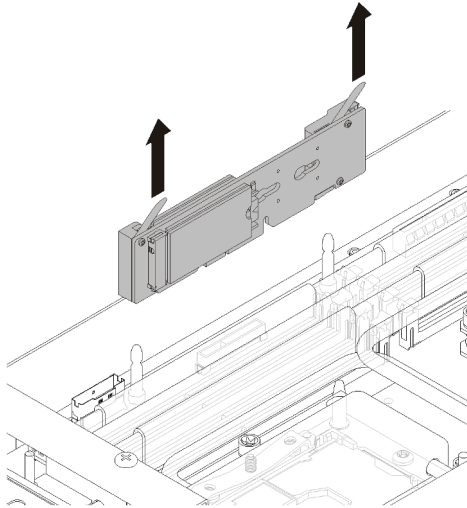


Figure 137. M.2 backplane removal

Step 1. Remove the M.2 backplane from the system board by pulling up on both ends of the backplane at the same time.

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

#### Demo video

[Watch the procedure on YouTube](#)

### Install the M.2 backplane

Use this information to install the M.2 backplane.

#### S001



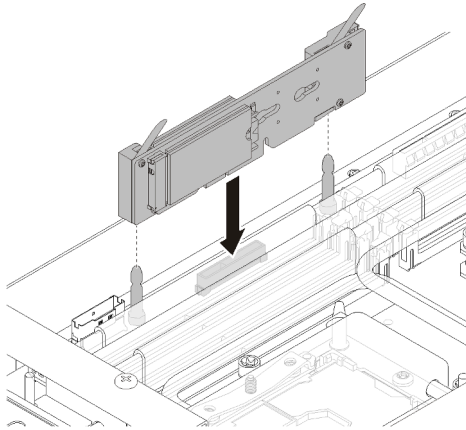
**Electrical current from power, telephone, and communication cables is hazardous.  
To avoid a shock hazard:**

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **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.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

Before you install the M.2 backplane:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.

Complete the following steps to install the M.2 backplane.



*Figure 138. M.2 backplane installation*

- Step 1. Align the openings located at the bottom of the blue plastic supports at each end of the M.2 backplane with the guide pins on the system board; then, insert the backplane in the system board connector. Press down on the M.2 backplane to fully seat it.

After you install the M.2 backplane, complete the following steps:

1. Reinstall the tray cover (see [“Install the tray cover” on page 211](#)).
2. Reinstall the tray (see [“Install a DWC tray in the enclosure” on page 245](#)).
3. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.

#### **Demo video**

[Watch the procedure on YouTube](#)

## **M.2 drive replacement**

Use the following procedures to remove and install M.2 drives.

### **Remove an M.2 drive from the M.2 backplane**

Use this information to remove an M.2 drive from the M.2 backplane.

#### **S001**





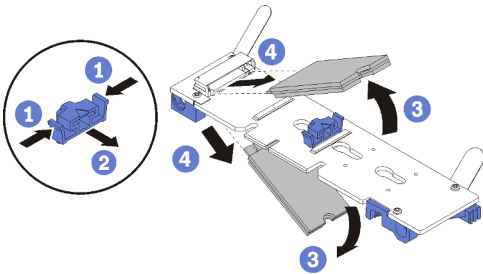
**Electrical current from power, telephone, and communication cables is hazardous.  
To avoid a shock hazard:**

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **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.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

Before you remove an M.2 drive from the M.2 backplane:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Turn off the corresponding DWC tray that you are going to perform the task on.
3. Remove the tray (see [“Remove a DWC tray from the enclosure” on page 244](#)).
4. Remove the tray cover (see [“Remove the tray cover” on page 210](#)).
5. Remove the M.2 backplane (see [“Remove the M.2 backplane” on page 143](#)).

Complete the following steps to remove an M.2 drive from the M.2 backplane.



*Figure 139. M.2 drive removal*

- Step 1. Press both sides of the retainer and slide it backward to loosen the M.2 drive from the M.2 backplane.

**Note:** If your M.2 backplane has two M.2 drives, they will both release outward when you slide the retainer backward.

- Step 2. Remove the M.2 drive by rotating it away from the M.2 backplane and pulling away from the connector at an angle (approximately 30 degrees).

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## Install an M.2 drive into the M.2 backplane

Use this information to install an M.2 drive in the M.2 backplane.

## S001



**Electrical current from power, telephone, and communication cables is hazardous.**

**To avoid a shock hazard:**

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **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.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

Before you install an M.2 drive into the M.2 backplane:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.

See the following table for supported M.2 drive configurations.

Table 29. M.2 drive configuration

M.2 drive configuration	Support status
Single 32 GB M.2 drive (42 mm long)	Supported
Single 128 GB M.2 drive (80 mm long)	Supported
Dual 32 GB M.2 drives (42 mm long) with RAID backplane	Supported
Dual 128 GB M.2 drives (80mm long) with RAID backplane	Only supported in certain environments. Contact Lenovo Services for additional details.

Complete the following steps to install an M.2 drive in the M.2 backplane.

Step 1. Locate the connector on each side of the M.2 backplane.

**Notes:**

- Some M.2 backplanes support two identical M.2 drives. When two drives are installed, align and support both drives when sliding the retainer forward to secure the drives.

Step 2. Insert the M.2 drive at an angle (approximately 30 degrees) into the connector and rotate it until the notch catches on the lip of the retainer; then, slide the retainer forward (toward the connector) to secure the M.2 drive in the M.2 backplane.

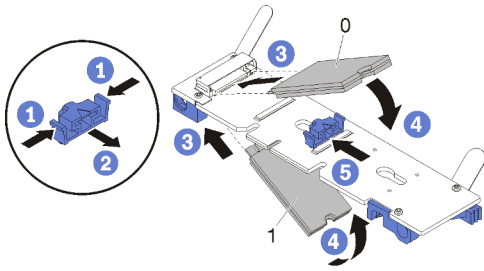


Figure 140. M.2 drive installation

**Attention:** When sliding the retainer forward, make sure the two nubs on the retainer enter the small holes on the M.2 backplane. Once they enter the holes, you will hear a soft “click” sound.

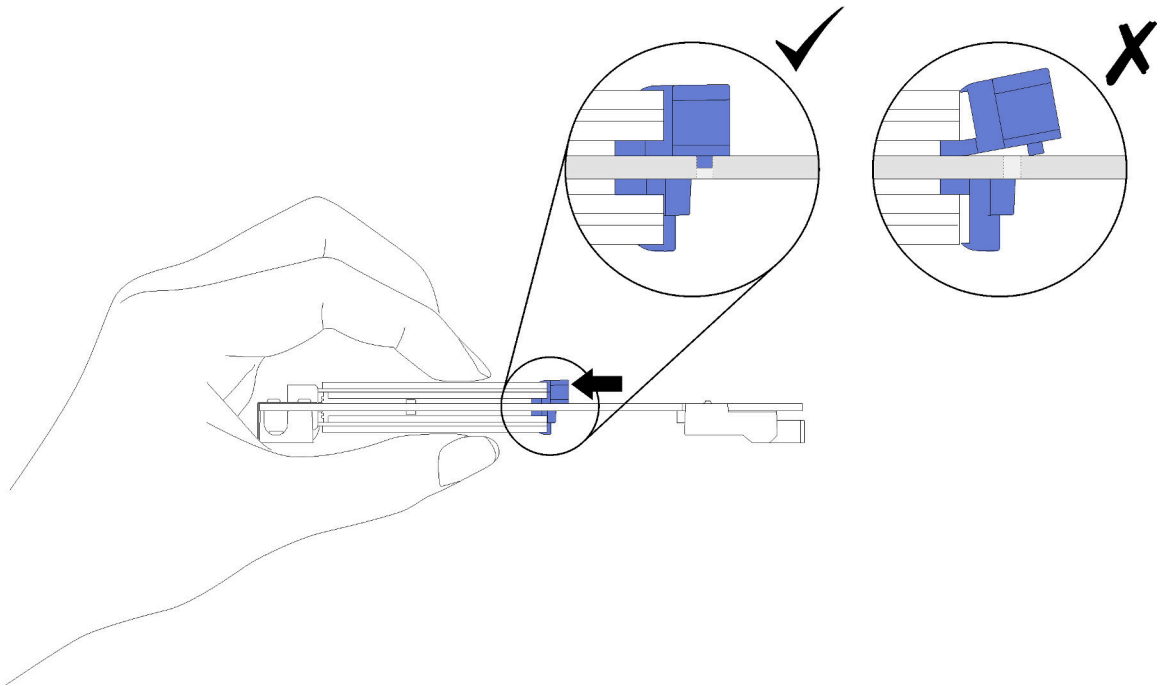


Figure 141. M.2 drive installation

After you install an M.2 drive into the M.2 backplane, complete the following steps:

1. Reinstall the M.2 backplane (see [“Install the M.2 backplane” on page 144](#)).
2. Reinstall the tray cover (see [“Install the tray cover” on page 211](#)).
3. Reinstall the tray (see [“Install a DWC tray in the enclosure” on page 245](#)).
4. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.

#### Demo video

[Watch the procedure on YouTube](#)

#### How to adjust the position of the retainer on the M.2 backplane

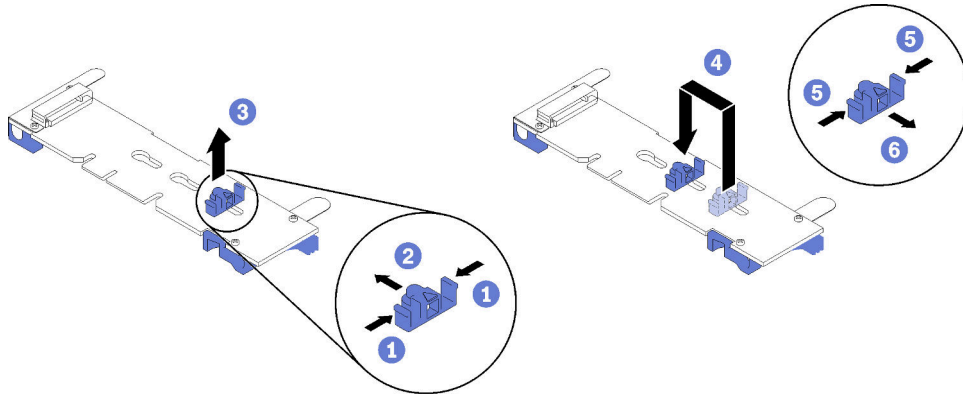
Use this information to adjust the position of the retainer on the M.2 backplane.

Before you adjust the position of the retainer on the M.2 backplane, complete the following steps:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.

To adjust the position of the retainer on the M.2 backplane, complete the following steps.

- Step 1. Locate the correct keyhole that the retainer should be installed into to accommodate the particular size of the M.2 drive you wish to install.
- Step 2. Press both sides of the retainer and move it forward until it is in the large opening of the keyhole; then, remove it from the backplane.
- Step 3. Insert the retainer into the correct keyhole and slide it backwards until the nubs are in the holes.



## PCIe adapter replacement

Use the following procedures to remove and install a PCIe adapter.

### Remove an adapter

Use this information to remove an adapter.

Before you remove an adapter:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Turn off the corresponding DWC tray that you are going to perform the task on.
3. Remove the tray (see [“Install a DWC tray in the enclosure” on page 245](#)).
4. Remove the tray cover (see [“Remove the tray cover” on page 210](#)).
5. Remove the front cross brace.

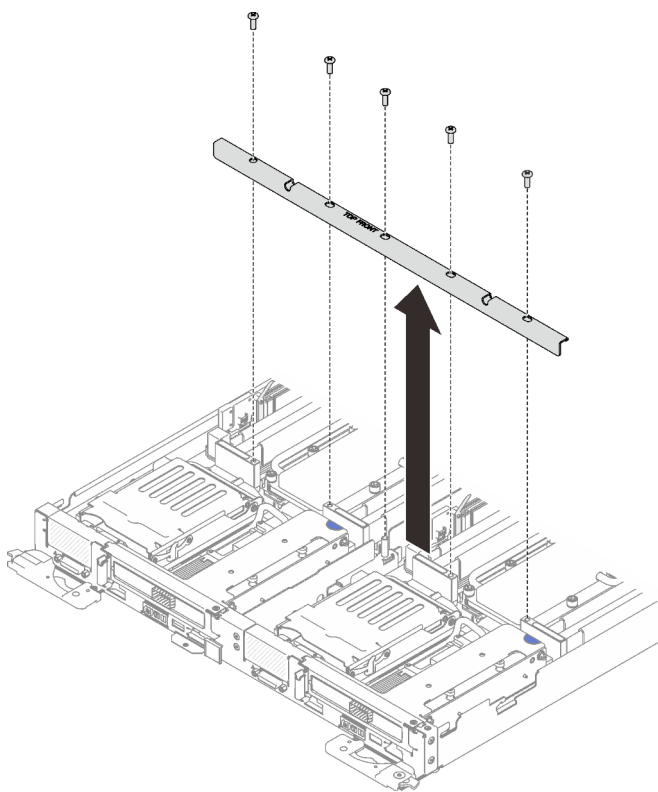


Figure 142. Front cross brace removal

Complete the following steps to remove an adapter.

Step 1. Remove two silver Torx T10 screws; then, remove the retaining clamp.

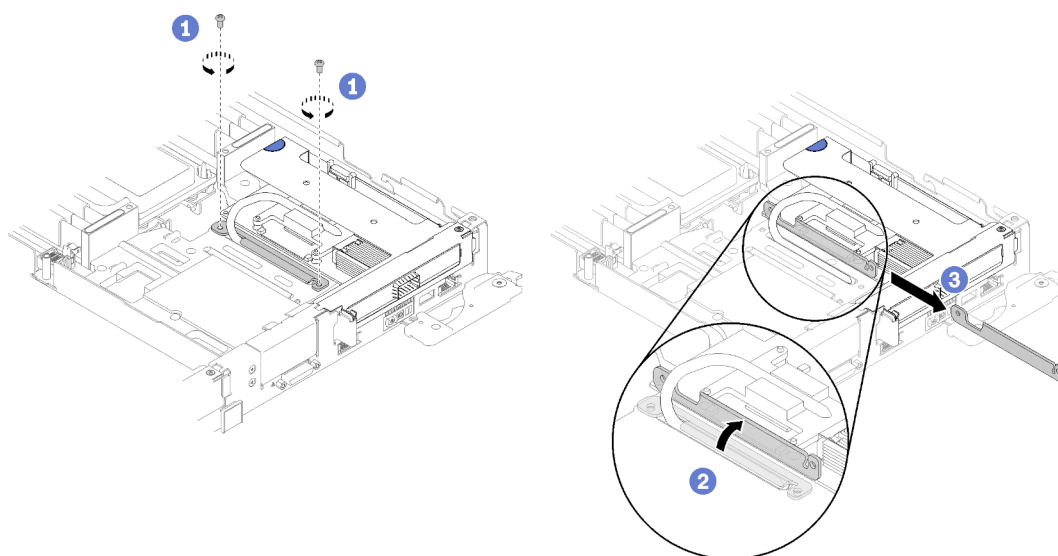
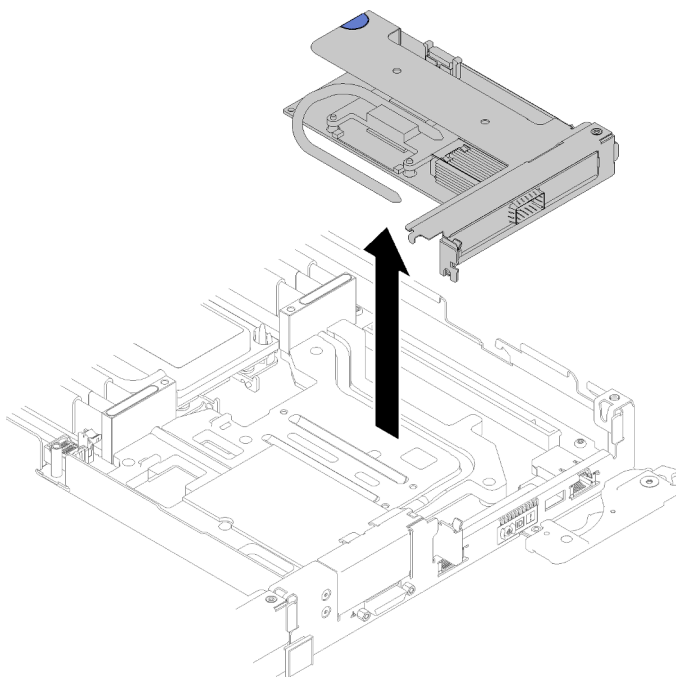


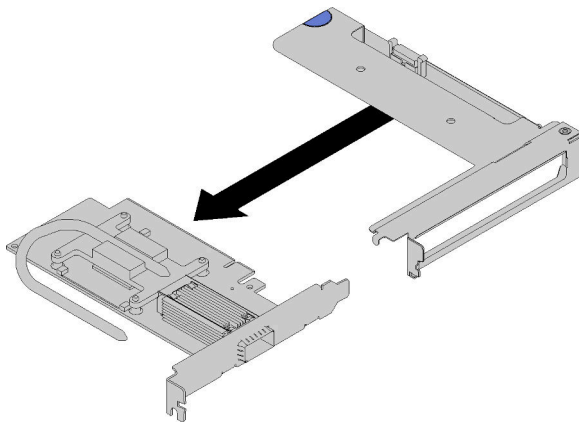
Figure 143. Screws and retaining clamp removal

Step 2. Carefully grasp the PCIe riser-cage assembly by its edges and remove it out of the node.



*Figure 144. PCIe riser-cage assembly removal*

Step 3. Grasp the adapter by its edges and carefully pull it out of the PCIe riser-cage.



*Figure 145. Adapter removal*

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

### **Demo video**

[Watch the procedure on YouTube](#)

### **Install an adapter**

Use this information to install an adapter.

Before you install an adapter:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.

**Note:** If the ThinkSystem Mellanox ConnectX-6 HDR/200GbE QSFP56 1-port PCIe VPI Adapter (Shared IO) is installed, make sure that you install the adapters correctly as the following illustration.

There are two cables come with the Auxiliary adapter, make sure that you connect these two cables to the Shared IO adapter as the following illustration.

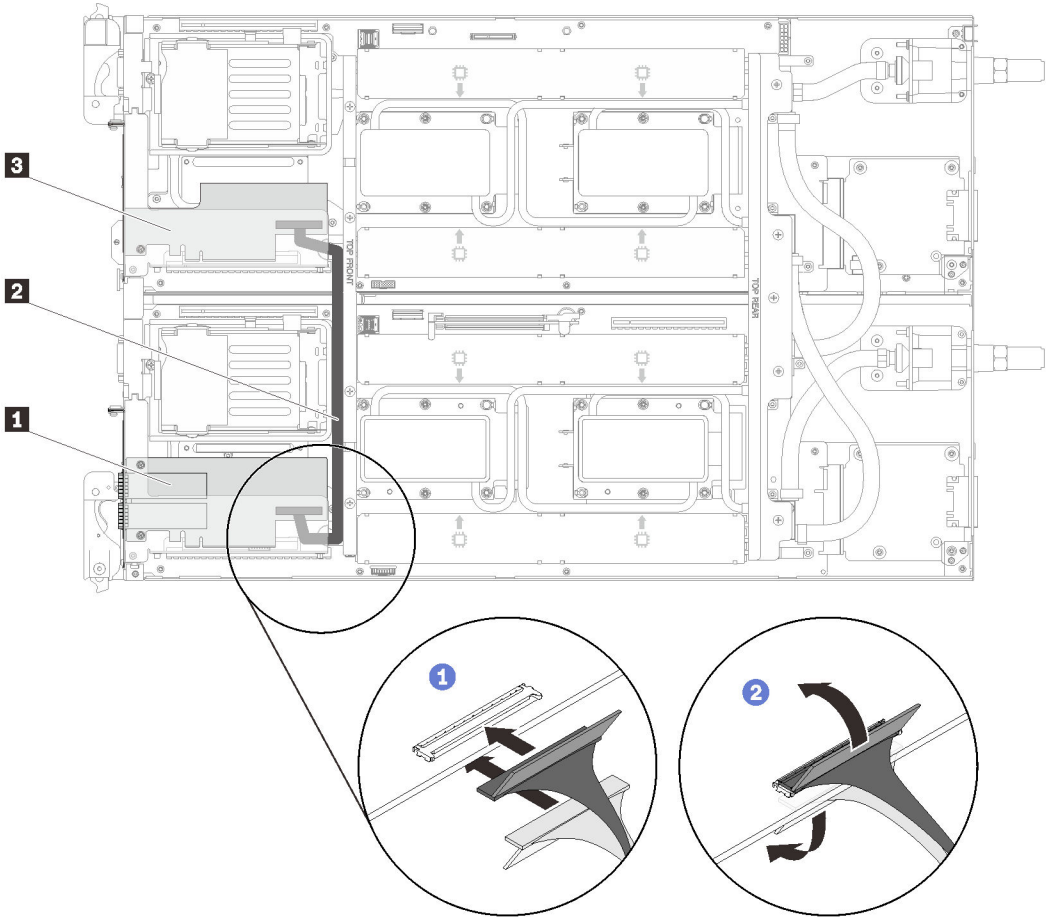
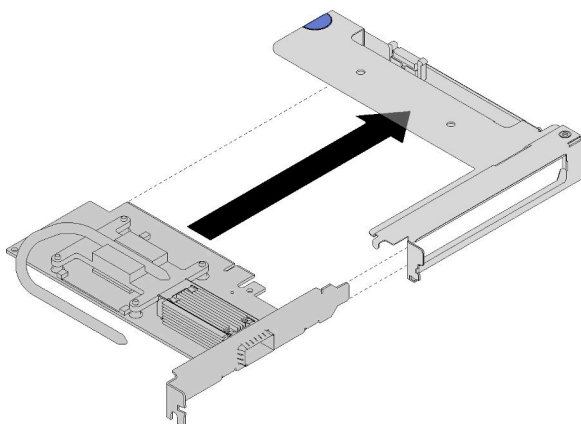


Figure 146. ConnectX-6 adapter (Shared IO)

<b>1 Shared IO adapter</b>	<b>3 Auxiliary adapter</b>
<b>2 Slim-Line 8I SAS cable</b>	

Complete the following steps to remove an adapter.

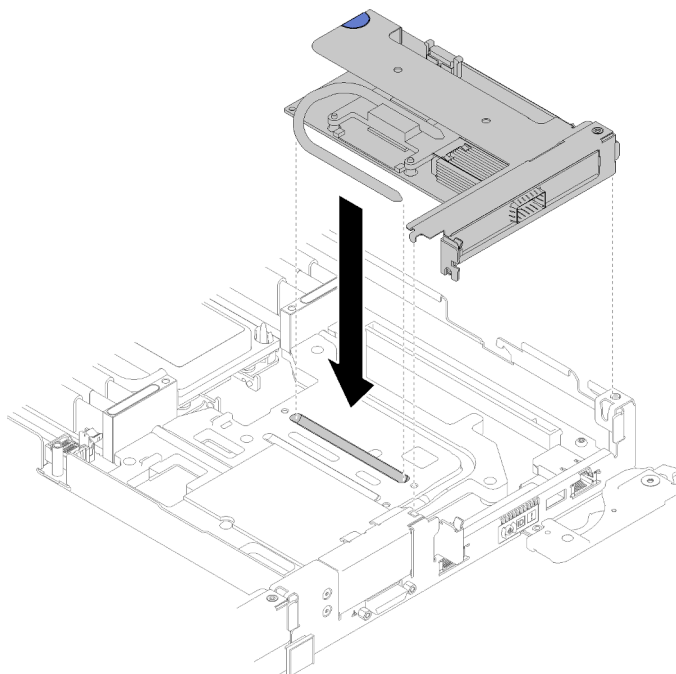
Step 1. Align the adapter with the PCIe slot on the riser-cage. Then, carefully press the adapter straight into the slot until it is securely seated.



*Figure 147. Adapter installation*

Step 2. Install the PCIe riser assembly.

- a. Align the heat pipe extending from the PCIe riser assembly with the trough in the conduction plate.
- b. Orient the PCIe riser assembly above the connector.
- c. Press the PCIe riser assembly firmly into the node.



*Figure 148. PCIe riser-cage assembly installation*

- d. Slide the retaining clamp underneath the heat pipe; then, rotate the clamp over the heat pipe in the trough.
- e. Secure the clamp by inserting and tightening two silver Torx T10 screws.

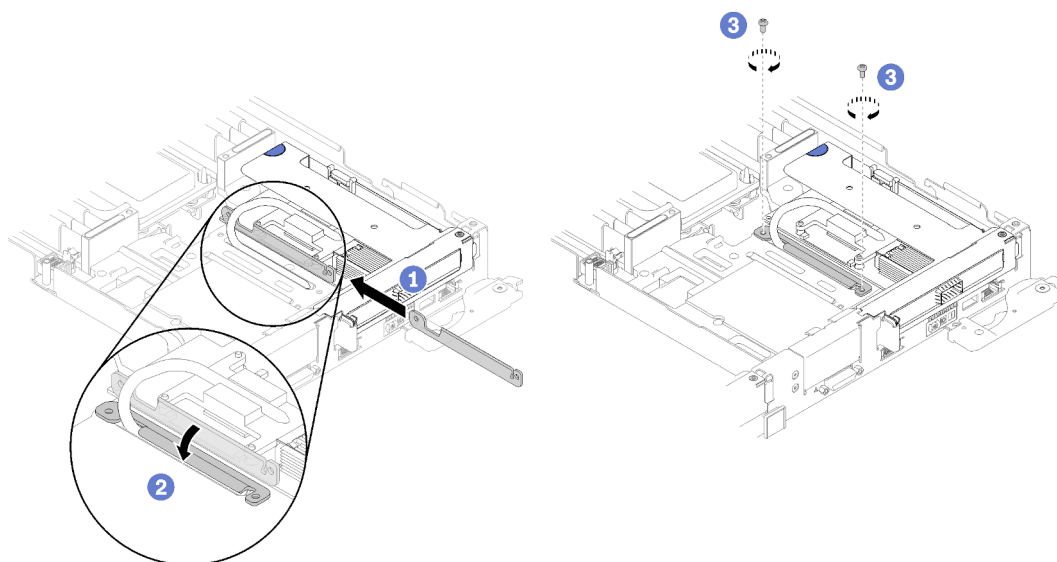


Figure 149. Screws and retaining clamp installation

After you install an adapter, complete the following steps:

1. Reinstall the front cross brace.

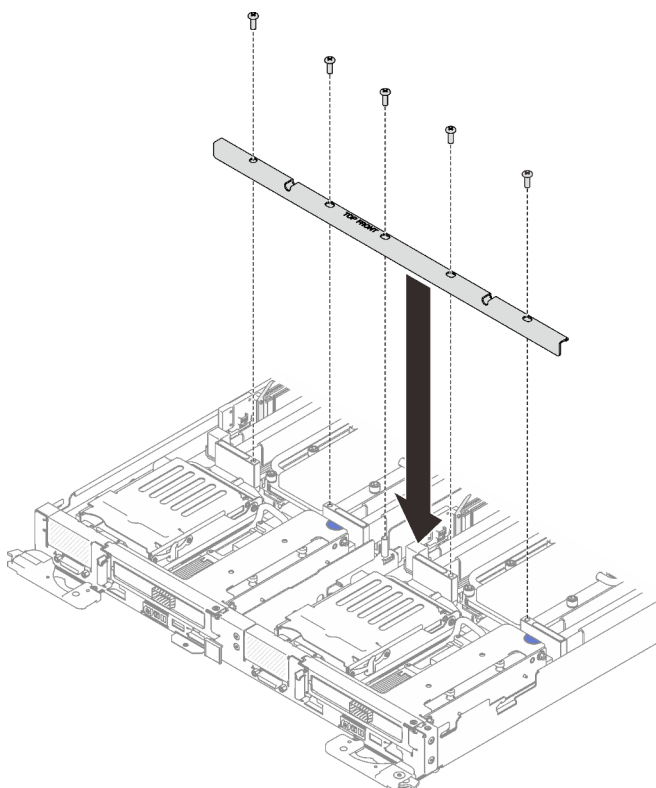


Figure 150. Front cross brace installation

2. Reinstall the tray cover (see [“Install the tray cover”](#) on page 211).
3. Reinstall the tray (see [“Install a DWC tray in the enclosure”](#) on page 245).

4. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.

### Demo video

[Watch the procedure on YouTube](#)

## Remove an Internal Faceplate Transition (IFT) adapter

Use this information to remove an IFT adapter.

Before you remove an IFT adapter:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Turn off the corresponding DWC tray that you are going to perform the task on.
3. Remove the tray (see [“Install a DWC tray in the enclosure” on page 245](#)).
4. Remove the tray cover (see [“Remove the tray cover” on page 210](#)).
5. Remove the front cross brace.

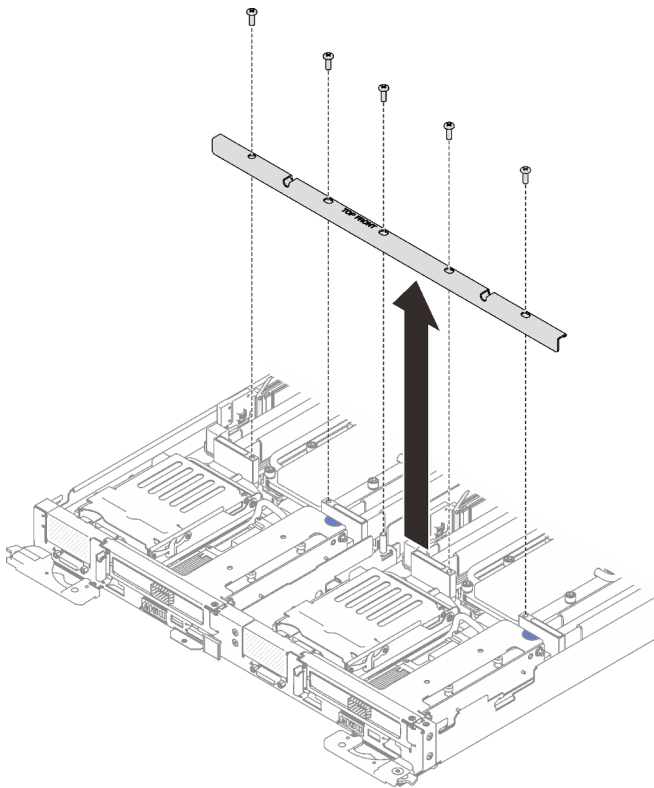


Figure 151. Front cross brace removal

6. Remove the drive cage (see [“Remove a drive cage assembly” on page 137](#)) if it is installed.

Complete the following steps to remove an IFT adapter.

- Step 1. Rotate the IFT connector release spring up and away from the cable side of the connector; then, disconnect the IFT connector.

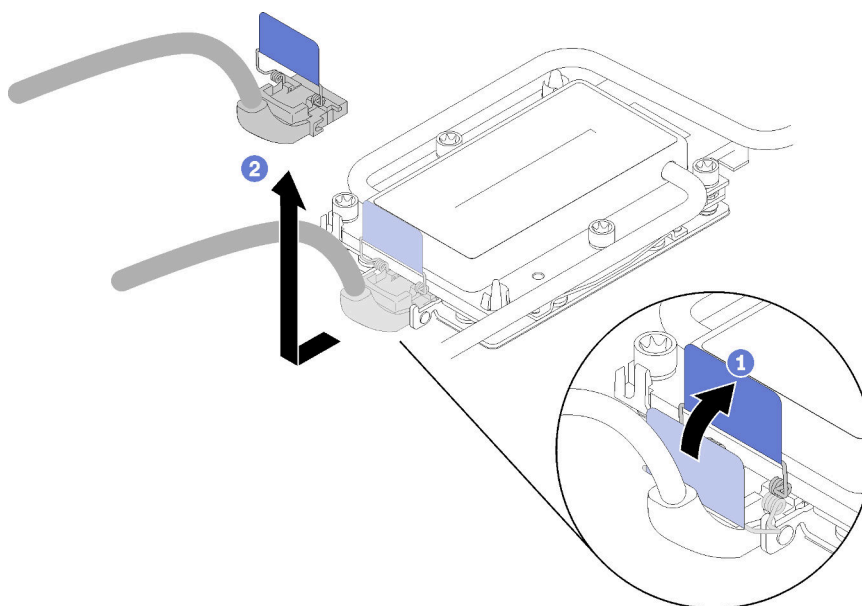


Figure 152. Disconnecting the IFT connector

- Step 2. Disconnect the other connector from the system board.
- Step 3. Carefully grasp the PCIe riser-cage assembly by its edges and remove it out of the node; then, disconnect the connector.

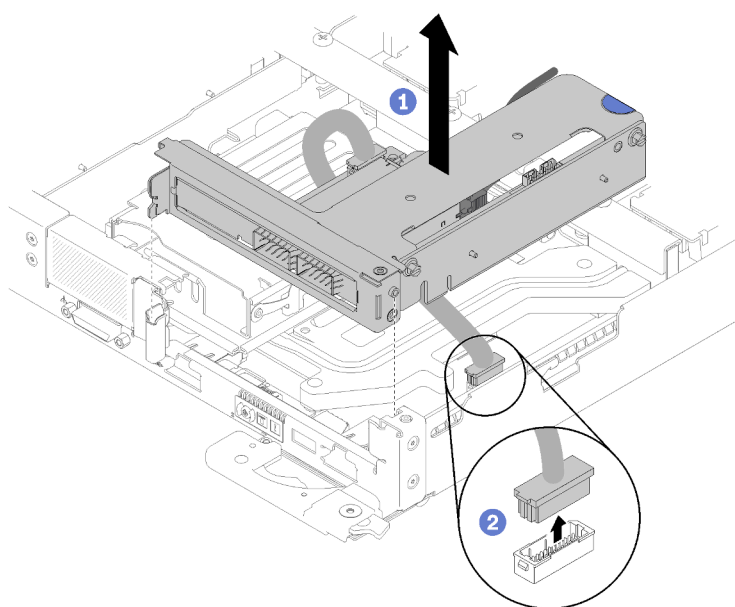


Figure 153. PCIe riser-cage assembly removal

- Step 4. Grasp the adapter by its edges and carefully pull it out of the PCIe riser-cage.

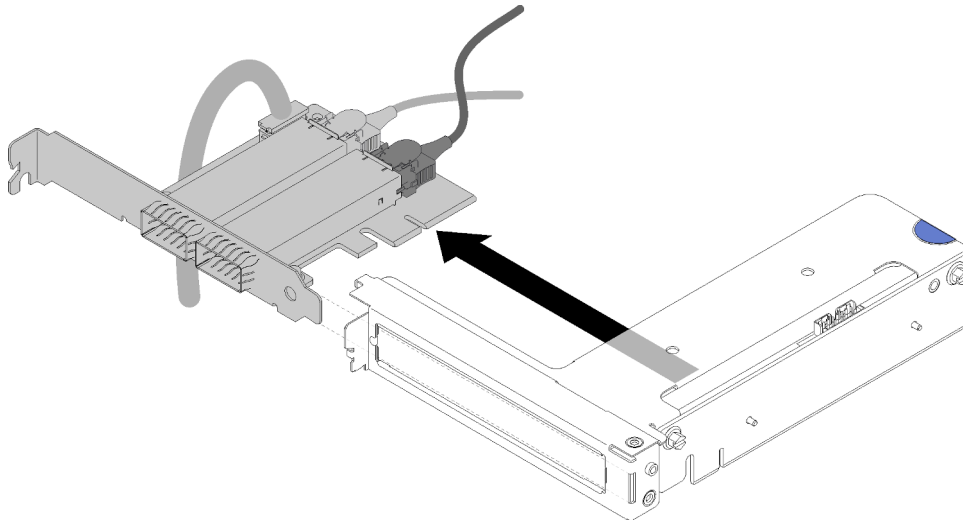


Figure 154. IFT adapter removal

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Install an Internal Faceplate Transition (IFT) adapter

Use this information to install an IFT adapter.

Before you install an IFT adapter:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.

Complete the following steps to install an IFT adapter.

Step 1. Connect the IFT cable.

- a. Rotate the IFT connector release spring up and away from the cable side of the connector.
- b. Connect the IFT connector.
- c. Rotate the IFT connector release spring toward the cable side of the connector; then, press it down until it engages the clips on the processor retainer.

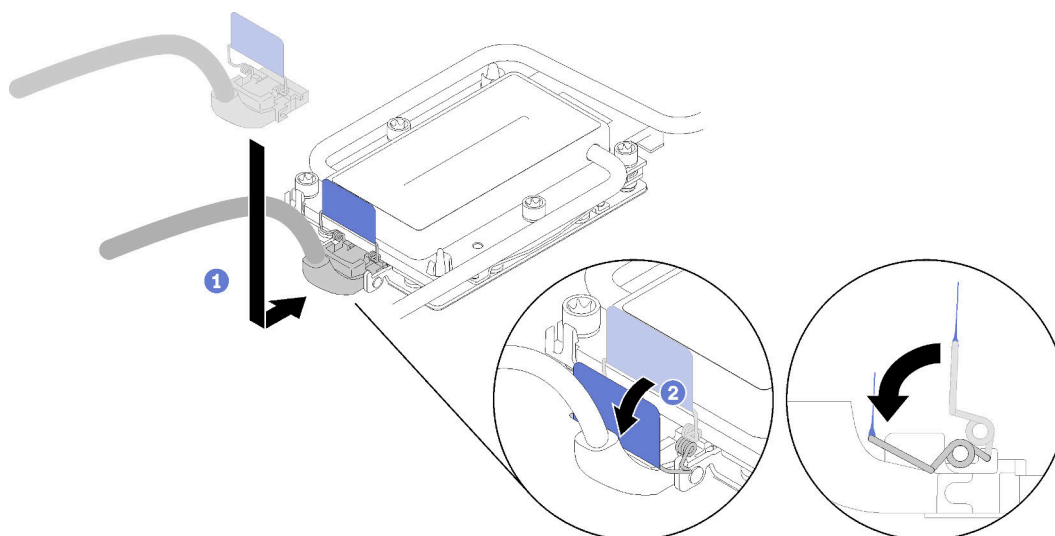


Figure 155. IFT connector connection

Step 2. Connect three connectors as illustrated.

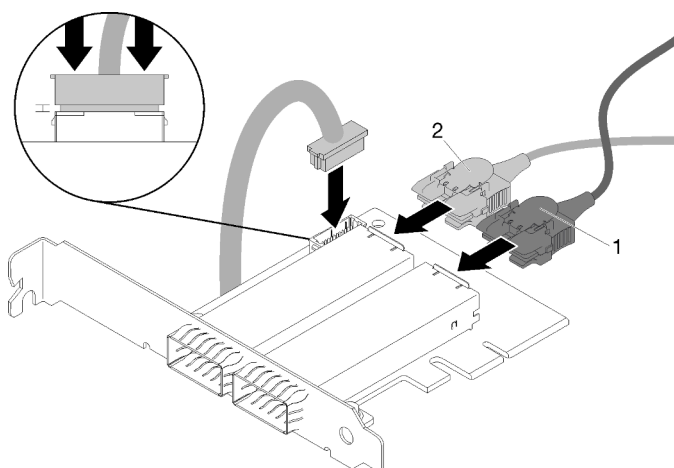
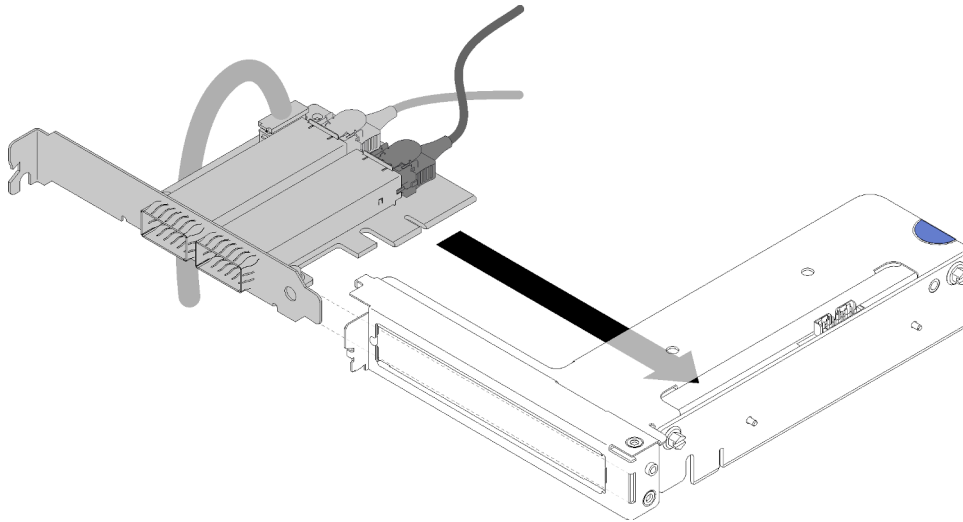


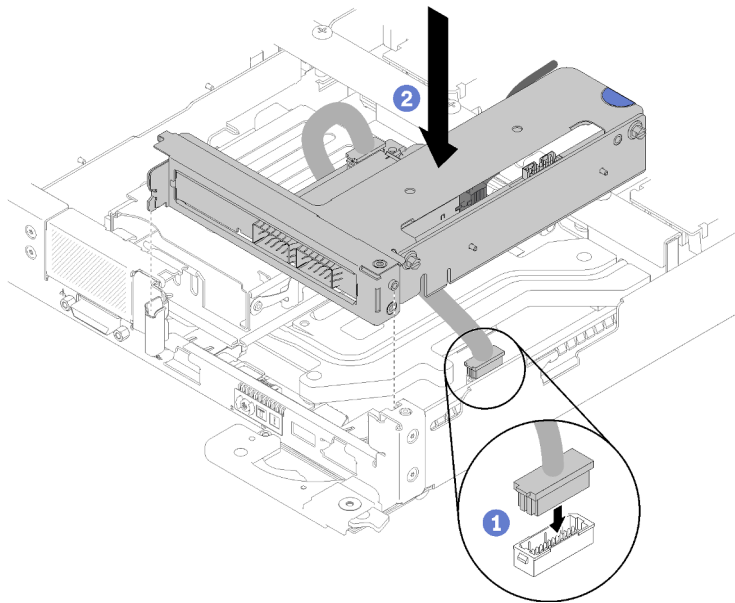
Figure 156. Connector connection

Step 3. Align the adapter with the PCIe slot on the riser-cage. Then, carefully press the adapter straight into the slot until it is securely seated.



*Figure 157. Adapter installation*

- Step 4. Connect the connector; then, align the PCI riser-cage assembly with slots and press the PCI riser-cage assembly firmly into the node.



*Figure 158. PCIe riser-cage assembly installation*

- Step 5. Carefully route cables as illustrated.

**Note:** Ensure the IFT cable is routed in the notch and use the cable tie to collect cables.

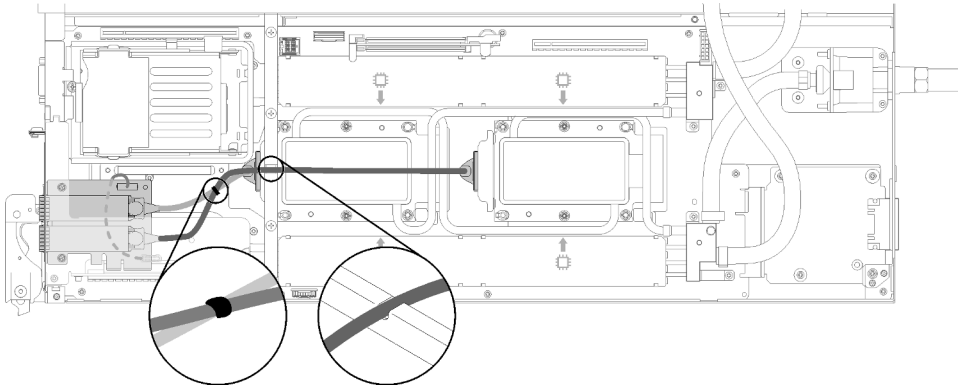


Figure 159. Cable routing

After you install an IFT adapter, complete the following steps:

1. Reinstall the drive cage if needed (see [“Install a drive cage assembly” on page 139](#)).
2. Reinstall the front cross brace.

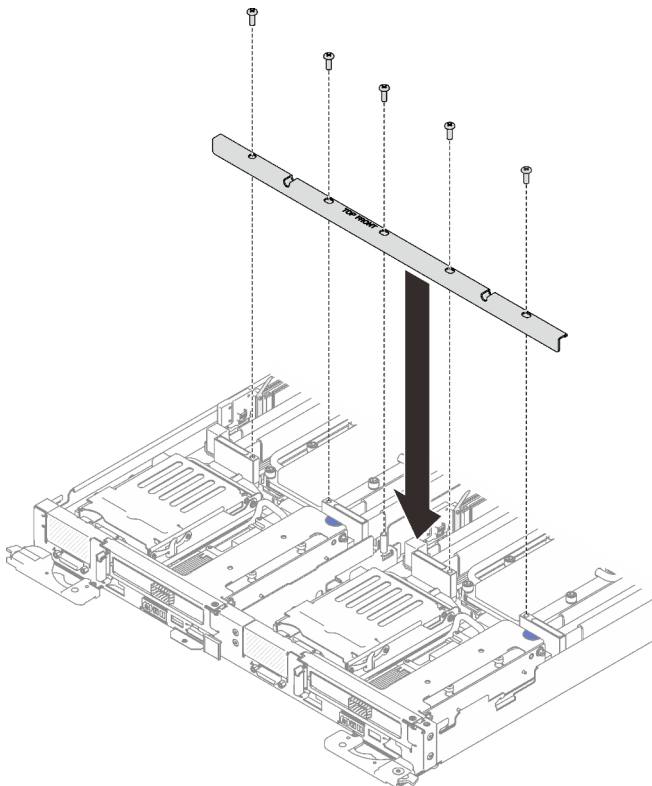


Figure 160. Front cross brace installation

3. Reinstall the tray cover (see [“Install the tray cover” on page 211](#)).
4. Reinstall the tray (see [“Install a DWC tray in the enclosure” on page 245](#)).
5. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.

## Power distribution board replacement

Use the following procedures to remove and install the power distribution board.

### Remove the power distribution board

Use this information to remove the power distribution board.

#### S001



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

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **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.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

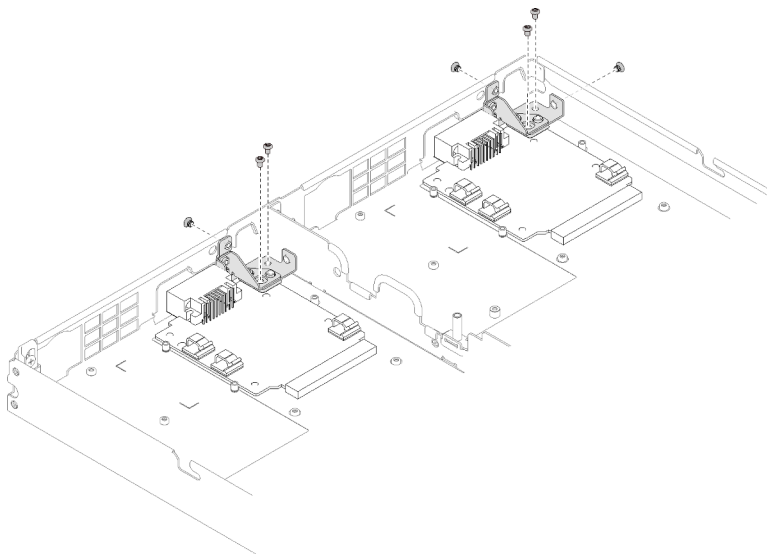
Before you remove the power distribution board:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Turn off the corresponding DWC tray that you are going to perform the task on.
3. Remove the tray (see [“Install a DWC tray in the enclosure” on page 245](#)).
4. Remove the tray cover (see [“Remove the tray cover” on page 210](#)).
5. Remove the water loop ( [“Remove the water loop” on page 229](#)).

Complete the following steps to remove the power distribution board.

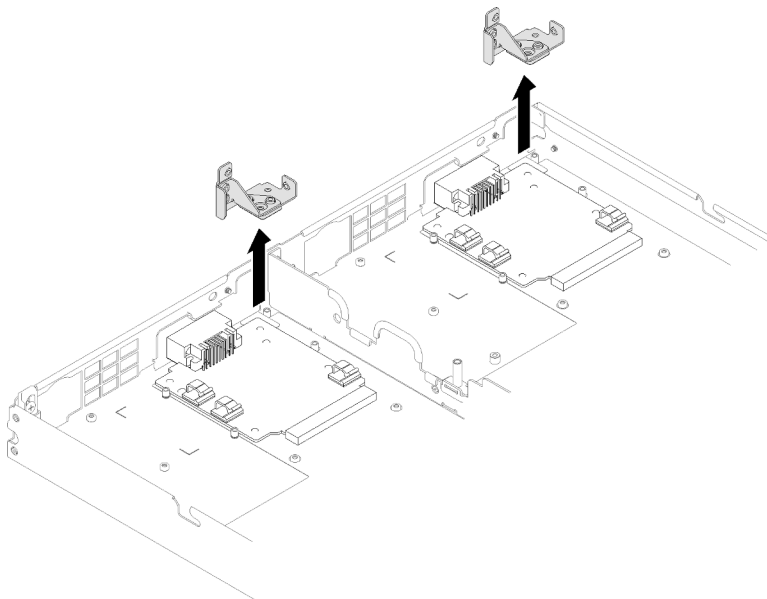
- Step 1. Remove the screws on the rear bulkhead bracket. The screw on the rear is a T8 Torx screw while the other screws are T10 Torx.

**Note:** Use L-Shaped Torx T10 drivers to remove the screw on the left quick connect.



*Figure 161. Screws removal*

Step 2. Remove rear bulkhead brackets.



*Figure 162. Rear bulkhead bracket removal*

Step 3. Remove the three screws that secure the power distribution board to the DWC tray and keep them for future use.

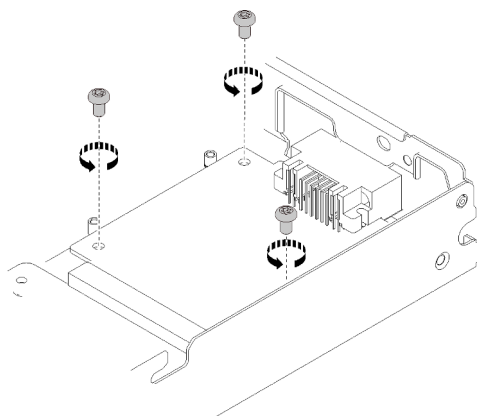


Figure 163. Screws removal

Step 4. Remove the power distribution board out of the DWC tray with an angle.

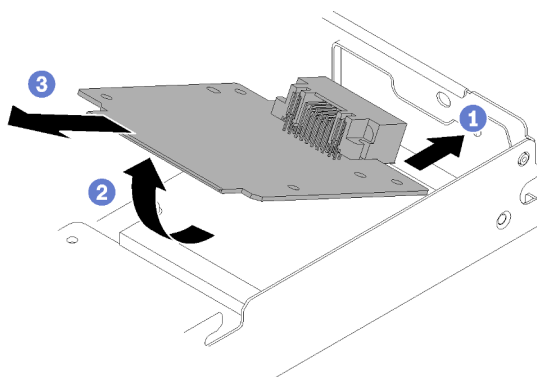


Figure 164. Power distribution board removal

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

#### Demo video

[Watch the procedure on YouTube](#)

#### Install the power distribution board

Use this information to install the power distribution board.

#### S001





**DANGER**

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

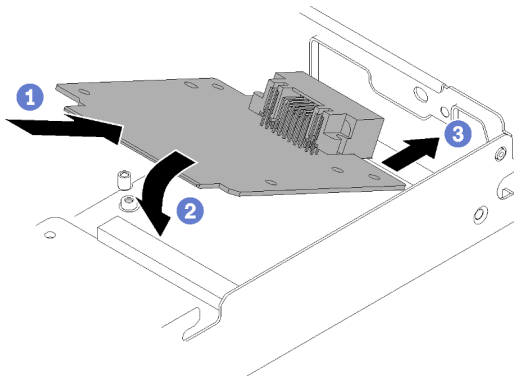
- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

Before you install the power distribution board:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.

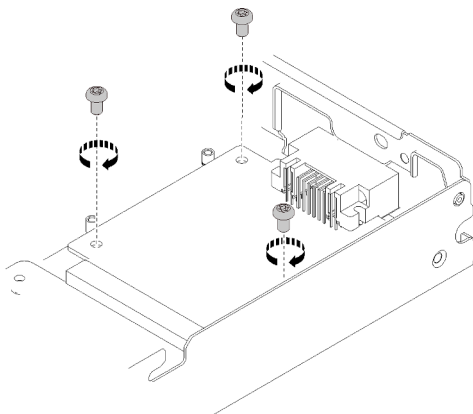
Complete the following steps to install the power distribution board.

Step 1. Place the power distribution board on the mounting studs in the DWC tray with an angle.



*Figure 165. Power distribution board installation*

Step 2. Install the three screws that secure the power distribution board to the DWC tray.



*Figure 166. Screws installation*

Step 3. Install the rear bulkhead bracket.

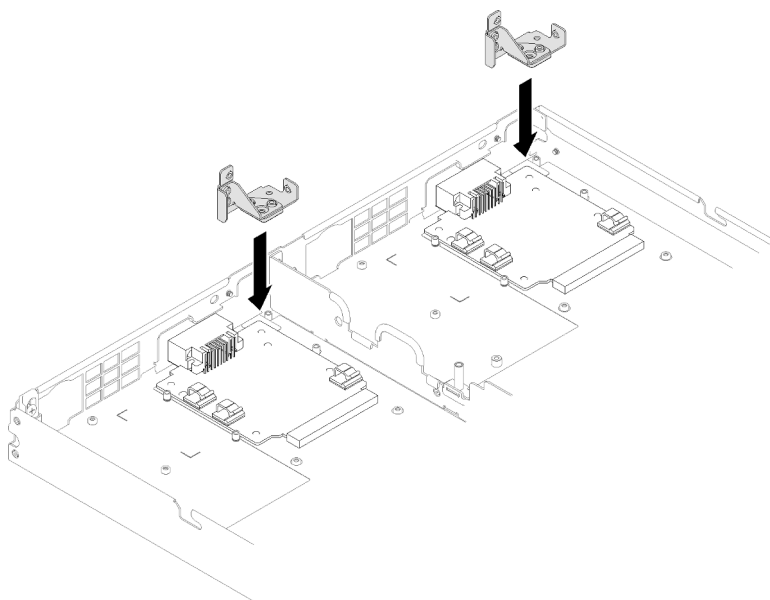


Figure 167. Rear bulkhead bracket installation

Step 4. Install the screws on the rear bulkhead bracket.

**Note:** Use L-Shaped Torx T10 driver to install the screw on the left quick connect.

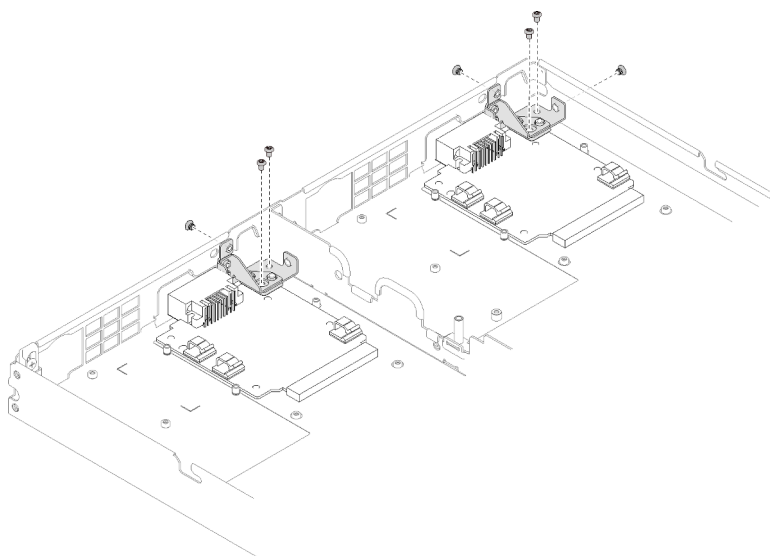


Figure 168. Screw installation

After you install the power distribution board, complete the following steps:

1. Reinstall the water loop ( [“Install the water loop” on page 236](#)).
2. Reinstall the tray cover (see [“Install the tray cover” on page 211](#)).
3. Reinstall the tray (see [“Install a DWC tray in the enclosure” on page 245](#)).
4. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.

## Demo video

[Watch the procedure on YouTube](#)

## Processor replacement

Use the following procedures to replace an assembled processor.

**Attention:** Before you begin replacing a processor, make sure that you have an alcohol cleaning pad (part number 00MP352) and gray thermal grease (part number 41Y9292).

**Important:** The processor in your solution can throttle in response to thermal conditions, temporarily lowering its speed to reduce heat output. In instances where a few processor cores are throttled for an extremely short time period (100 ms or less), the only indication might be an entry in the operating system event log with no corresponding entry in the system XCC event log. If this situation occurs, the event can be ignored and processor replacement is not required.

### Remove a processor

This task has instructions for removing an assembled processor. This task requires a Torx T30 driver.

#### Attention:

- Each processor socket must always contain a cover. When removing or installing a processor, protect empty processor sockets with a cover.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or water loop to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as electrical connectors in the processor socket. Do not remove the grease cover from the cold plate until you are instructed to do so.
- To avoid damaging the water loop, always use the water loop carrier when removing, installing or folding the water loop.
- To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed 2 years. Otherwise, wipe off the existing thermal grease and apply the new grease onto it for optimal thermal performance.

Before you remove a processor:

**Note:** The processor and processor retainer for your system might be different than those shown in the illustrations.

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Turn off the corresponding DWC tray that you are going to perform the task on.
3. Remove the tray (see [“Remove a DWC tray from the enclosure” on page 244](#)).
4. Remove the tray cover (see [“Remove the tray cover” on page 210](#)).
5. Remove both air baffles.

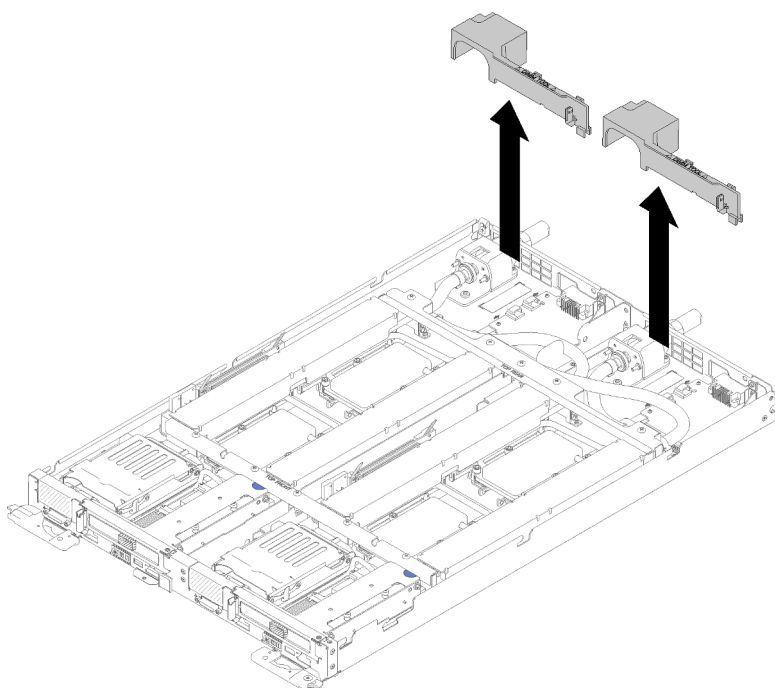


Figure 169. Air baffle removal

6. Remove the front and the rear cross braces (10x P2 screws).

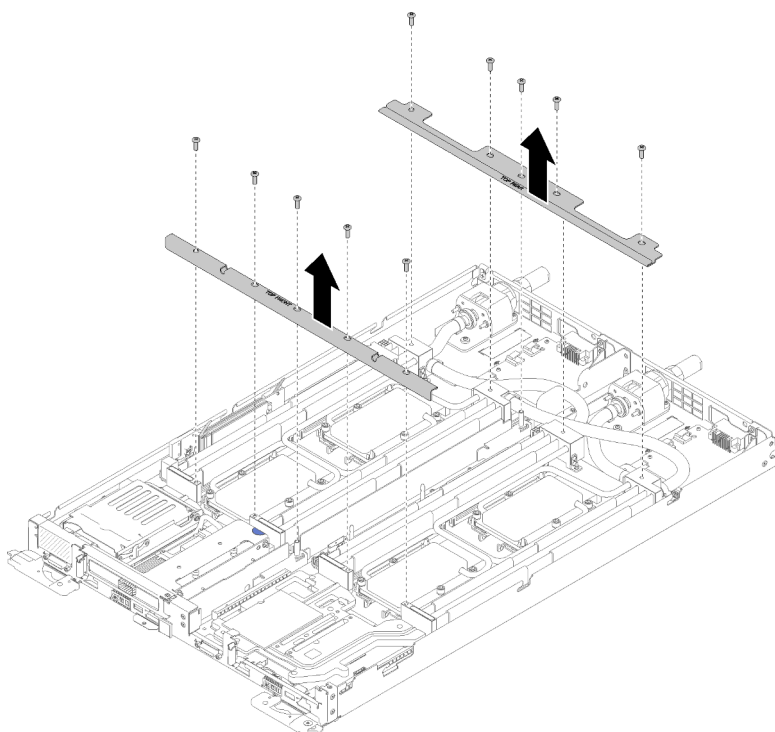
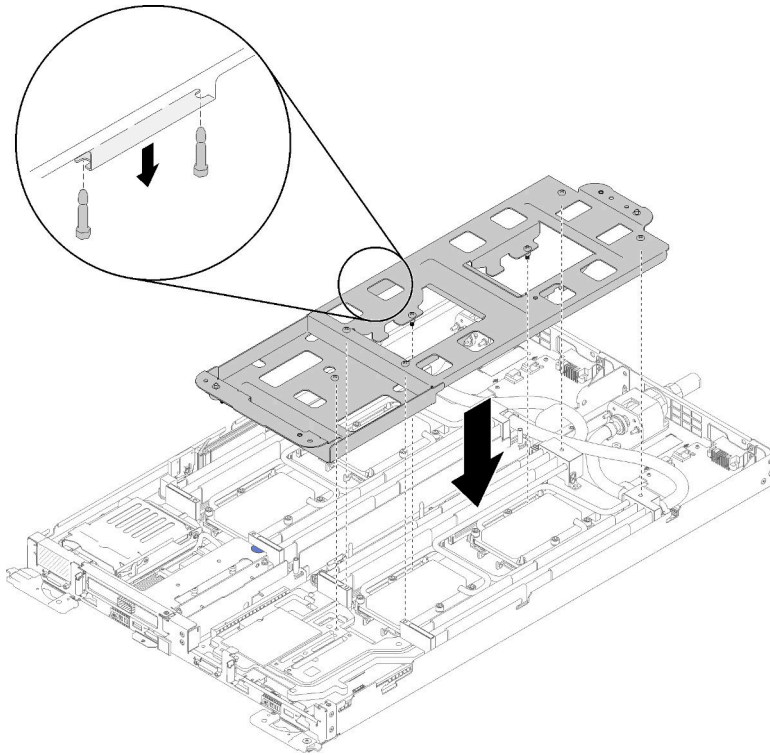


Figure 170. Cross brace removal

7. Remove all four DIMM covers and DIMMs for both nodes (see [“Remove a DIMM” on page 126](#)).
8. Remove M.2 Backplanes from both nodes (see [“Remove the M.2 backplane” on page 143](#)).

9. Remove drive cage assemblies from the node (see [“Remove a drive cage assembly” on page 137](#)).
10. Remove PCIe riser assemblies from the node if applicable (see [“Remove an adapter” on page 149](#) or [“Remove an Internal Faceplate Transition \(IFT\) adapter” on page 155](#) depending on your configuration).
11. Fold the water loop.
  - a. Orient the water loop carrier with two M.2 backplane guide pins; then, gently put the water loop carrier down and ensure it is seated firmly on the water loop.



*Figure 171. Water loop carrier installation*

- b. Remove water loop screws (15x silver Torx T10 screws per node).

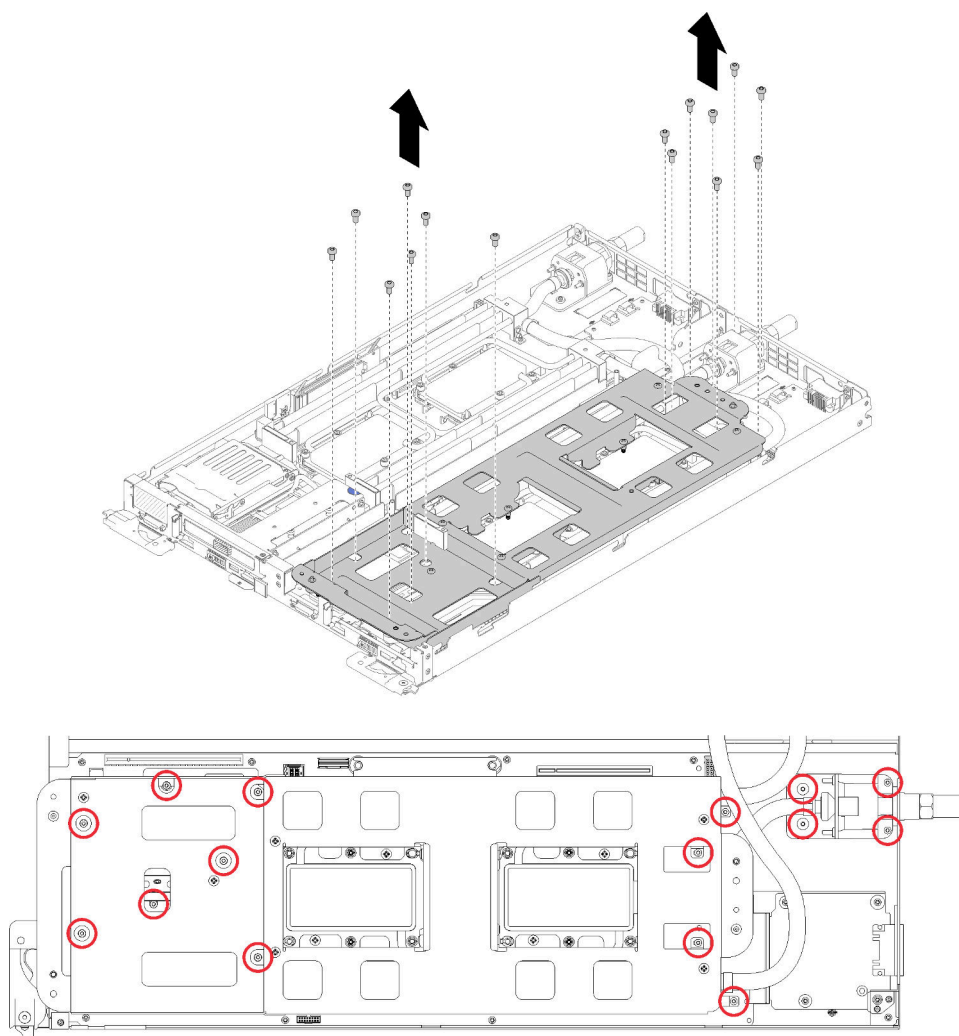


Figure 172. Silver T10 screw removal

- c. Fully loosen all Torx T30 captive fasteners (8x Torx T30 captive fasteners per node) on cold plates in the removal sequence shown on the cold plate label.

**Attention:** To prevent damage to components, make sure that you follow the indicated loosening sequence.

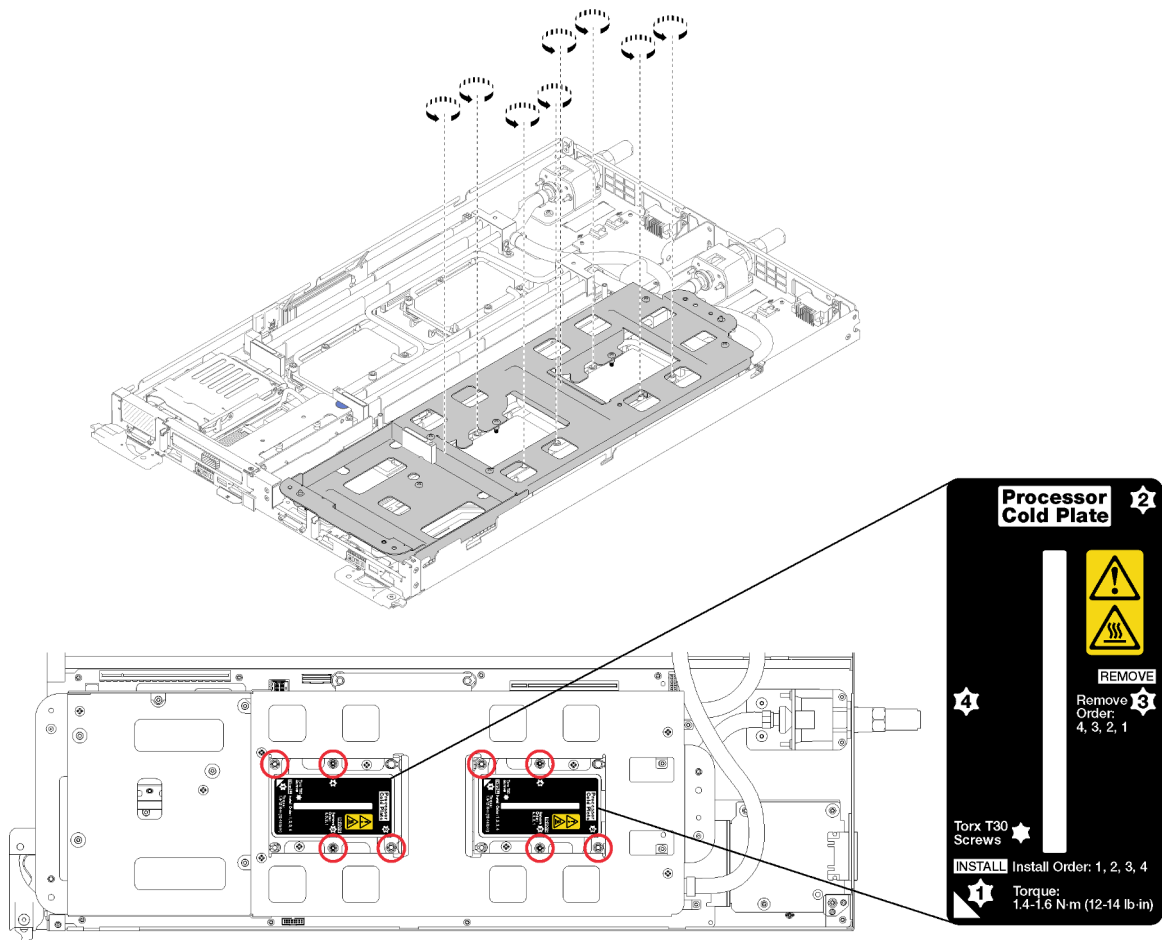


Figure 173. Loosening Torx T30 captive fasteners

- d. Tighten water loop carrier screws (10x P2 screws per node).

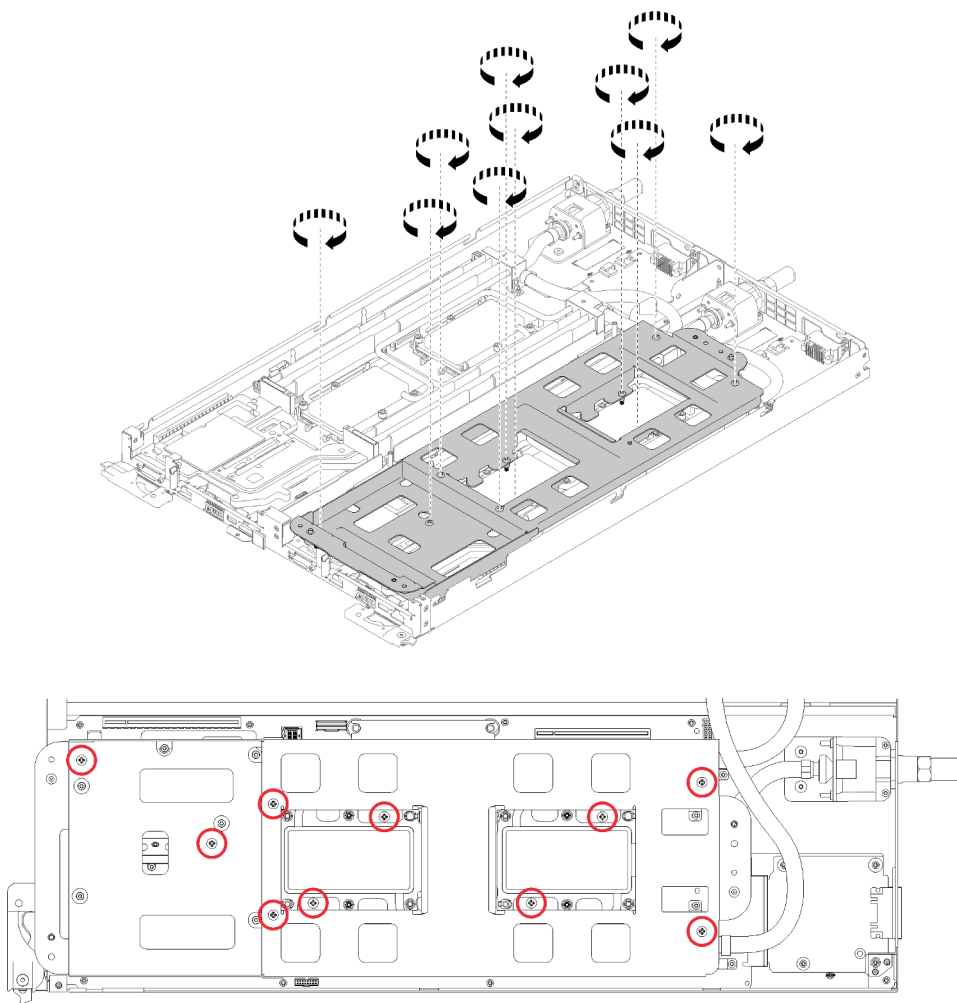


Figure 174. Tightening captive P2 screws

- e. Fold the water loop.
  - 1) Carefully lift the water loop up off the system board, then unhook the quick connect from the four alignment posts and slide the quick connect out of the opening in the rear of the tray.
  - 2) Carefully rotate the water loop so one half is sitting on top of the other half.

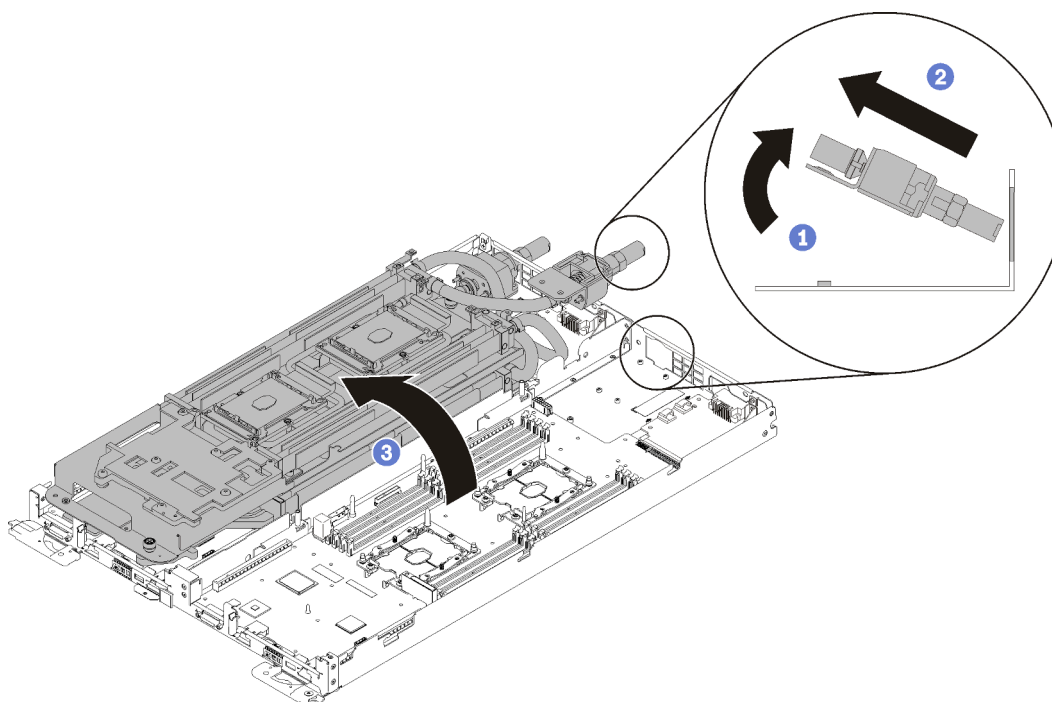


Figure 175. Folding the water loop

Complete the following steps to remove a processor.

Step 1. If the processor has an Internal Faceplate Transition (IFT) Carrier connector, disconnect the cable.

Rotate the IFT connector release spring up and away from the cable side of the connector; then, disconnect the IFT connector.

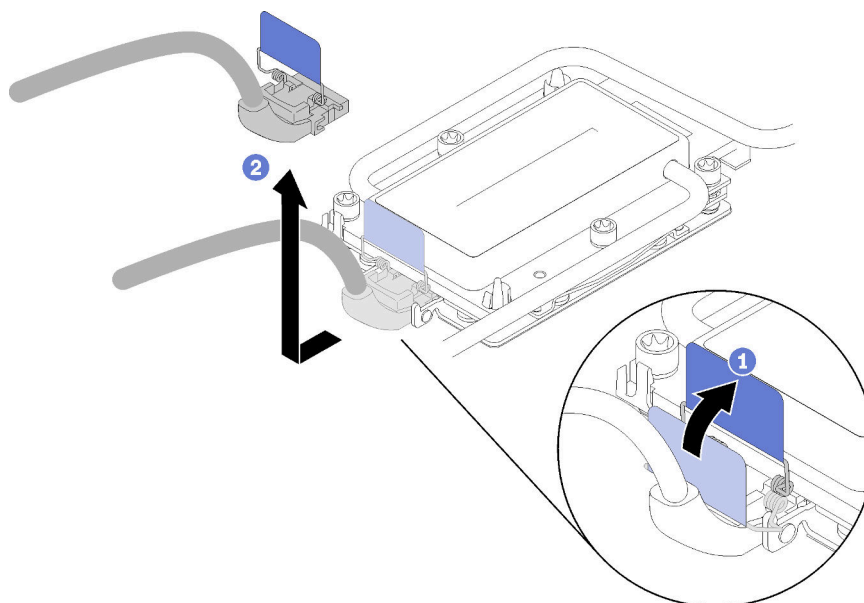


Figure 176. Screws and retaining clamp removal

Step 2. Remove the processor from the underside of the cold plate.

- If you are replacing the processor, separate the processor from its retainer.

1. Press the retaining clip at the corner of the processor retainer closest to the pry point; then, gently pry this corner of the retainer away from the heat sink with a flat-bladed screwdriver, using a twisting motion to break the processor-to-cold-plate seal.
2. Release the remaining retaining clips and lift the processor retainer from the underside of the cold plate.
3. After separating the processor and retainer from the cold plate, hold the processor and retainer with the thermal-grease side down and the processor-contact side up to prevent the processor from falling out of the retainer.

**Note:** The processor retainer will be removed and discarded in a later step and replaced with a new one.

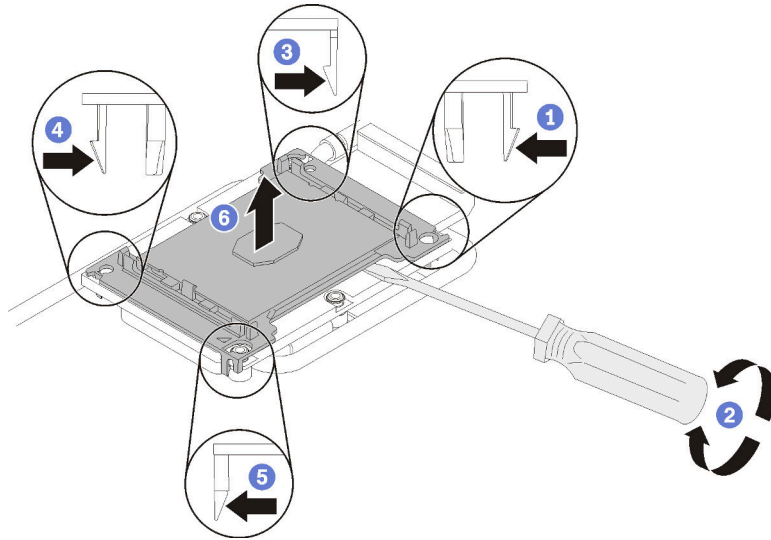


Figure 177. Remove processor and processor retainer from underside of cold plate

- If you are replacing the processor, you will be reusing the water loop. Wipe the thermal grease from the bottom of the water loop using an alcohol cleaning pad.
- If you are replacing the water loop, you will be reusing the processor. Wipe the thermal grease from the top of the processor using an alcohol cleaning pad.

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

#### Demo video

[Watch the procedure on YouTube](#)

## Install a processor

This task has instructions for installing a processor. This task requires a Torx T30 driver.

### Attention:

- Each processor socket must always contain a cover. When removing or installing a processor, protect empty processor sockets with a cover.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or water loop to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as electrical connectors in the processor socket. Do not remove the grease cover from the cold plate until you are instructed to do so.
- To avoid damaging the water loop, always use the water loop carrier when removing, installing or folding the water loop.
- To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed 2 years. Otherwise, wipe off the existing thermal grease and apply the new grease onto it for optimal thermal performance.

### Notes:

- Processors are keyed for the socket where they can be installed and for their orientation in the socket.
- See <https://serverproven.lenovo.com/> for a list of processors supported for your system. All processors on the system board must have the same speed, number of cores, and frequency.
- Before you install a new or replace a processor, update your system firmware to the latest level. See “Update the firmware” in the *ThinkSystem SD650 Neptune® DWC Trays and DW612 Neptune® DWC Enclosure Setup Guide*.
- Optional devices available for your system might have specific processor requirements. See the documentation that comes with the optional device for information.

Before you install a processor:

**Note:** The processor and processor retainer for your system might be different than those shown in the illustrations.

1. Read the “[Installation Guidelines](#)” on page 35 to ensure that you work safely.
2. Remove the existing processor, if one is installed. See “[Remove a processor](#)” on page 167.

**Note:** Replacement processors come with both rectangular and square processor retainers. A rectangular retainer comes attached to the processor. The square retainer can be discarded as it doesn't fit on the underside of the water loop cold plates.

3. If you are replacing a processor, replace the processor retainer. *Processor retainers should not be reused once they have been pried away from water loop cold plates..*
  - a. Remove the old processor retainer.

**Note:** Retainer removal is slightly different for Internal Faceplate Transition (IFT) Carrier and non-IFT processors.

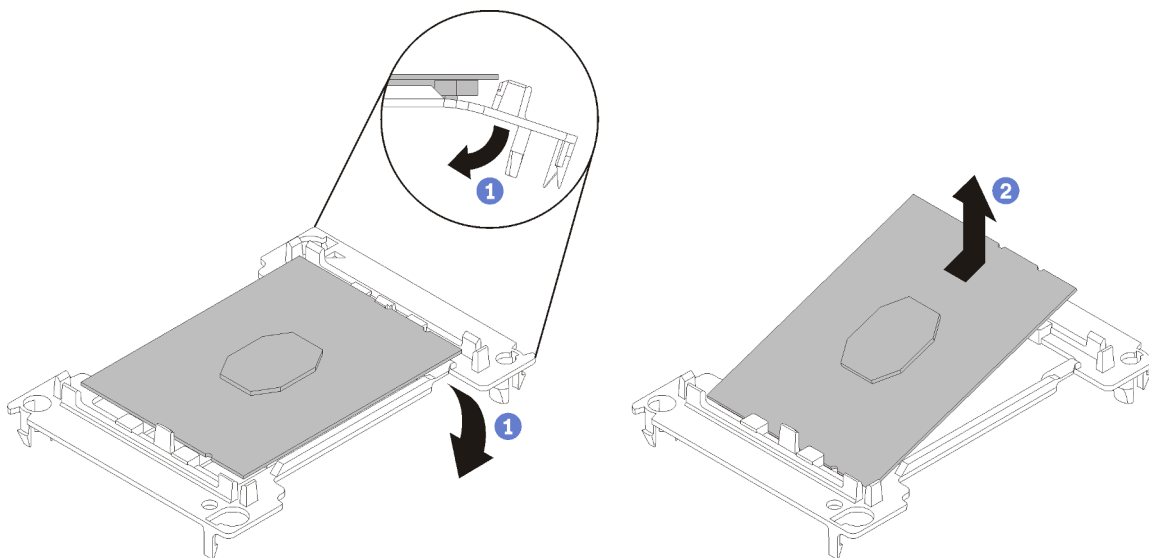


Figure 178. Removing a non-IFT processor retainer

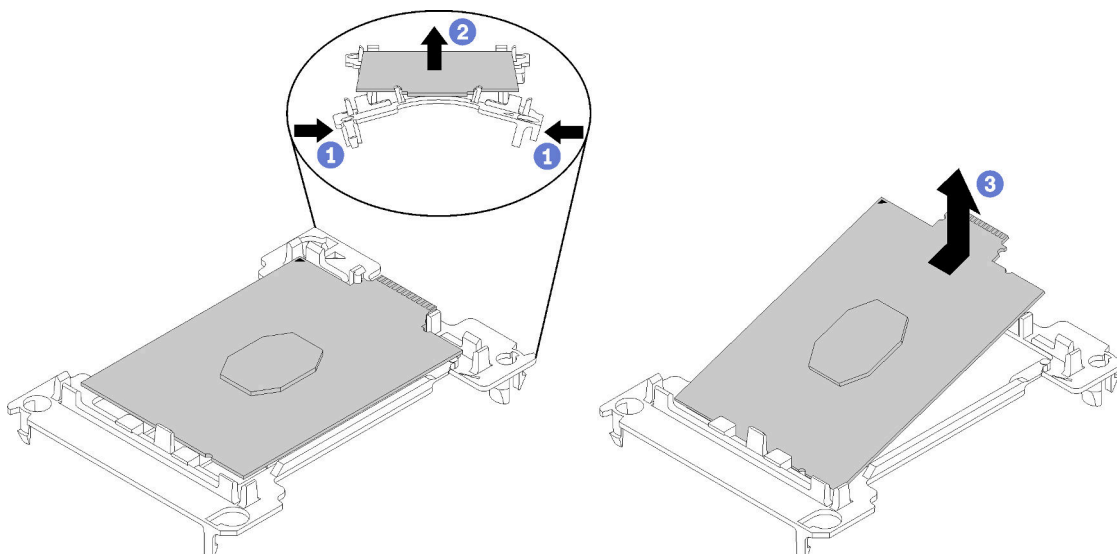


Figure 179. Removing an IFT processor retainer

**Note:** When the processor is out of its retainer, hold the processor by the long edges to prevent touching the contacts or the thermal grease, if it is applied.

With the processor-contact side of the non-IFT processor up, flex the ends of the retainer down and away from the processor to release the retaining clips; then, remove the processor from the retainer. Discard the old retainer.

- b. Install the processor into the new processor retainer.

**Note:** Retainer installation is slightly different for non-IFT and IFT processors.

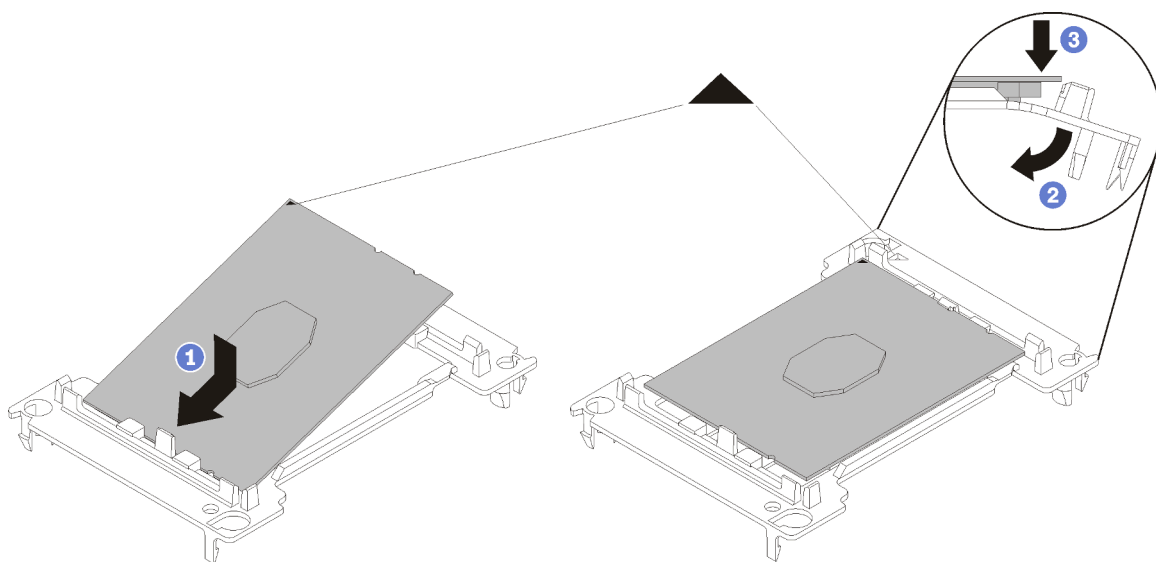


Figure 180. Installing a non-IFT processor retainer

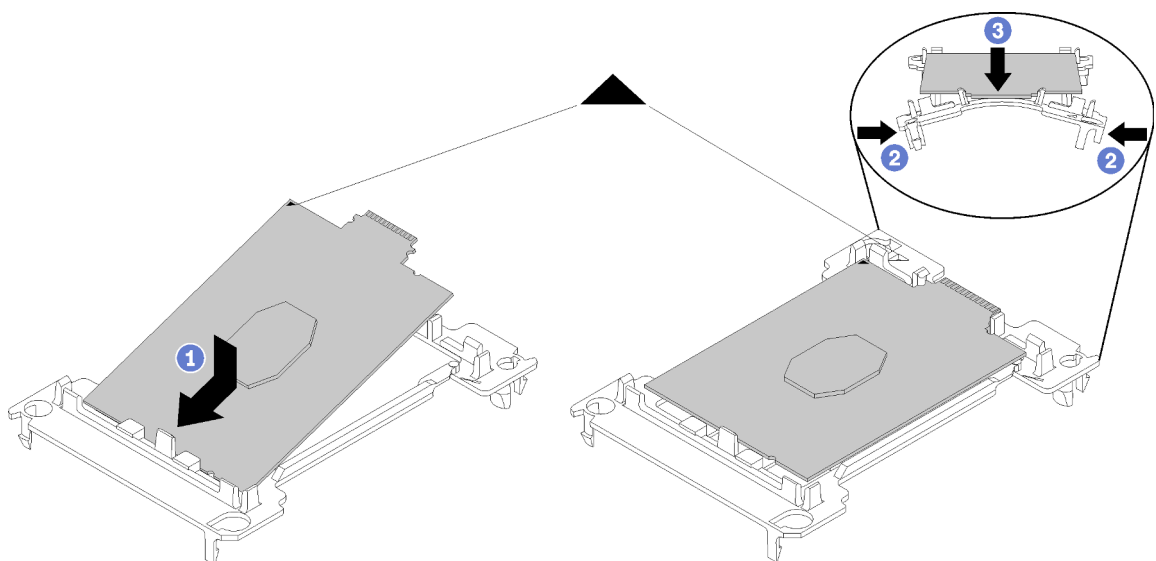


Figure 181. Installing an IFT processor retainer

- 1) Position the processor on the new retainer so that the triangular marks align; then, insert the unmarked end of the processor into the retainer.
- 2) Holding the inserted end of the non-IFT processor in place, flex the opposite end of the retainer down and away from the processor until you can press the processor under the clip on the retainer.

To prevent the processor from falling out of the retainer after it is inserted, keep the processor-contact side up and hold the processor-retainer assembly by the sides of the retainer.

- 3) If there is any old thermal grease on the processor, gently clean the top of the processor using an alcohol cleaning pad.

**Note:** If you are applying new thermal grease on the top of the processor, make sure to do it after the alcohol has fully evaporated.

4. If you are replacing a processor:

- a. Remove the processor identification label from the water loop and replace it with the new label that comes with the replacement processor.
- b. To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed 2 years. Otherwise, wipe off the existing thermal grease and apply the new grease onto it for optimal thermal performance.
- c. Apply new thermal grease (0.65 g) to the top of the new processor. If you have cleaned the top of the processor with an alcohol cleaning pad, make sure to apply the new thermal grease after the alcohol has fully evaporated.

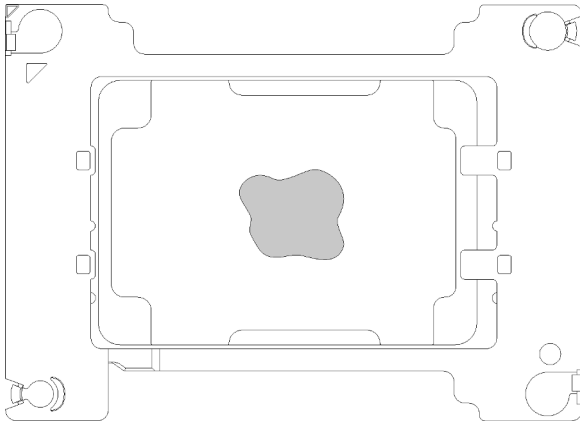


Figure 182. Thermal grease application

- 1) Carefully place the processor and retainer on a flat surface with the processor-contact side down.
  - 2) Apply approximately 0.65 g of thermal grease to the center of the processor top.
5. If you are replacing the water loop, remove the processor identification label from the old water loop and place it on the new water loop in the same location.

If you are unable to remove the label and place it on the new water loop, or if the label is damaged during transfer, write the processor serial number from the processor identification label on the new water loop in the same location as the label would be placed using a permanent marker.

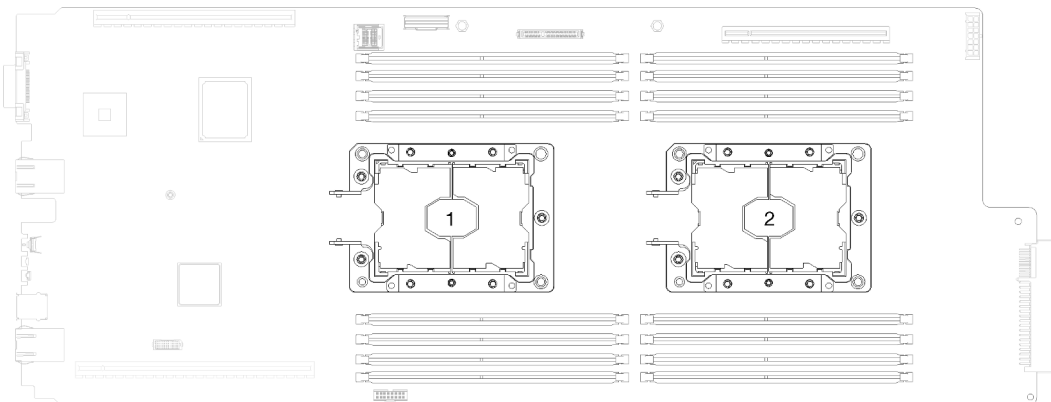


Figure 183. Processor locations

Complete the following steps to install a processor.

Step 1. Remove plastic grease covers from underside of water loop cold plates.

Step 2. Install processors to underside of water loop cold plates.

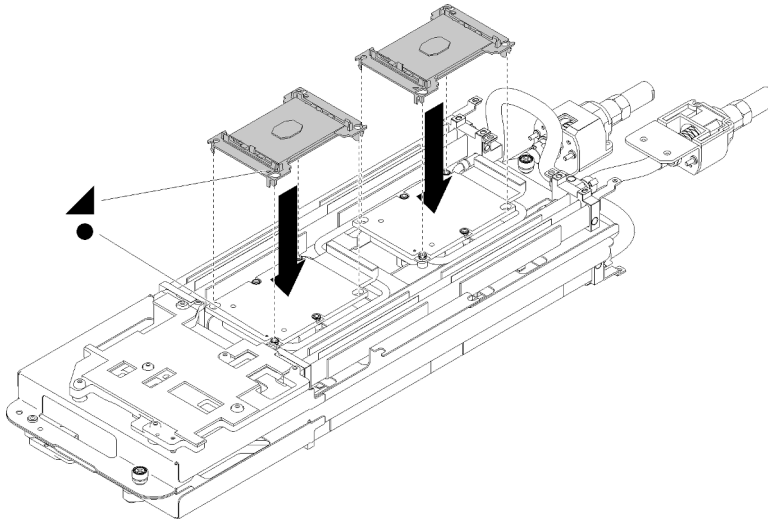
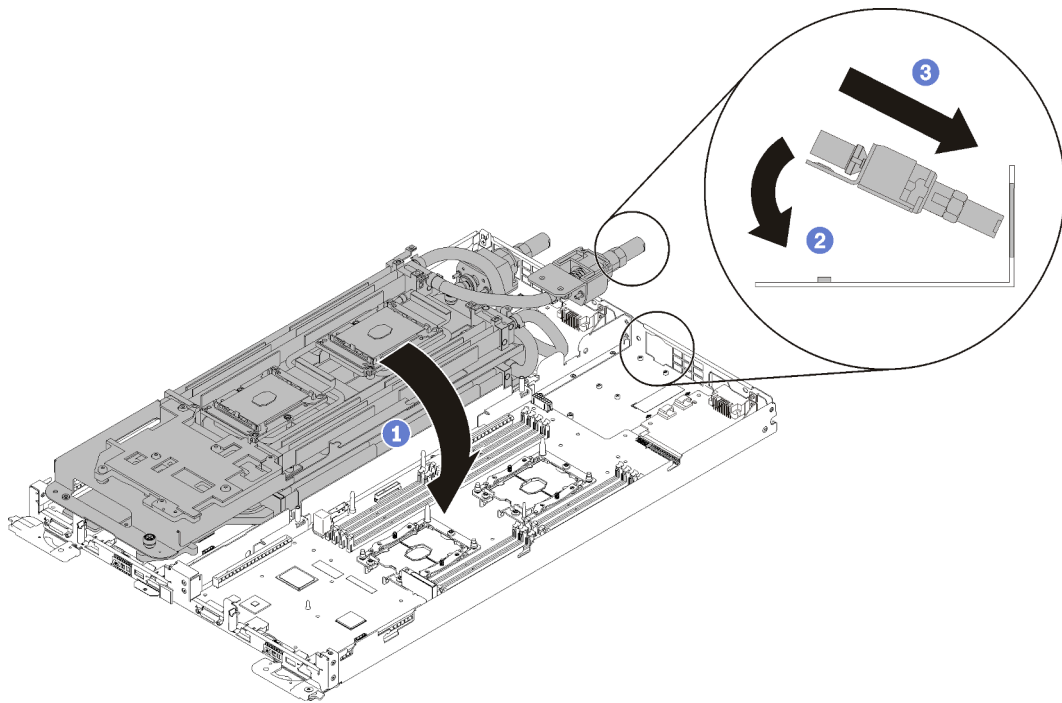


Figure 184. Installing a processor

- a. Align the triangular mark on the processor retainer with the guide hole on the underside of the water loop cold plate; then, attach the processor to the underside of the water loop cold plate by inserting the processor retainer posts and clips features into the openings at the four corners of the cold plate.
- b. Remove the processor socket cover, if one is installed on the processor socket, by placing your fingers in the half-circles at each end of the cover and lifting it from the cold plate.
- c. If the processor has an IFT connector, make sure that the IFT cable is correctly routed and connected. See [“Internal cable routing” on page 26](#).

Step 3. Fold the water loop.

- a. Carefully rotate the top side of the water loop.
- b. Carefully insert the quick connect into the tray opening as shown.
- c. Lower and orient the water loop carrier over the M.2 backplane planes; then, ensure the processor socket guide pins fit correctly through holes in the water loop cold plates.
- d. Gently put the other side of the water loop down and ensure it is seated firmly on the system board.



*Figure 185. Water loop installation*

- e. Hook two quick connects.
- f. Secure the water loop and the quick connect to the tray by carefully inserting 15 silver Torx T10 screws.

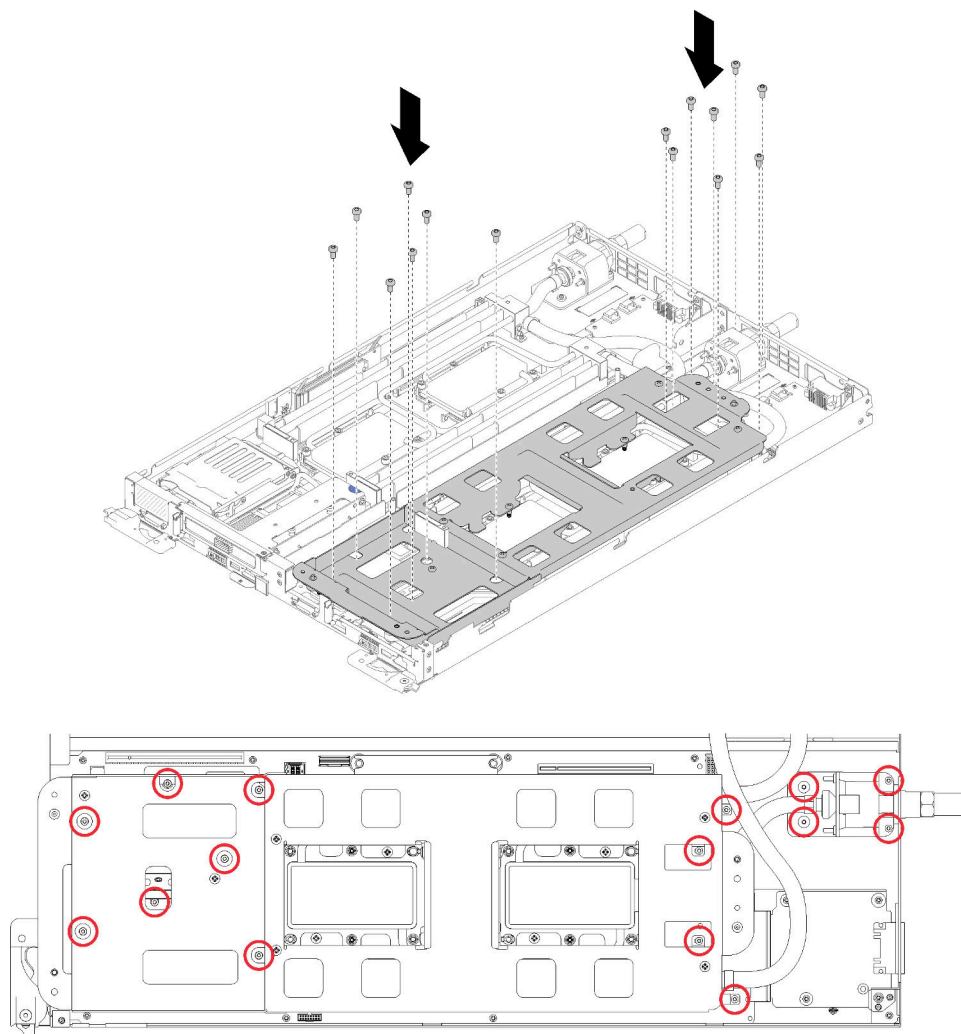


Figure 186. Silver T10 screw installation

- g. Loosen water loop carrier screws (10x P2 screws per node).

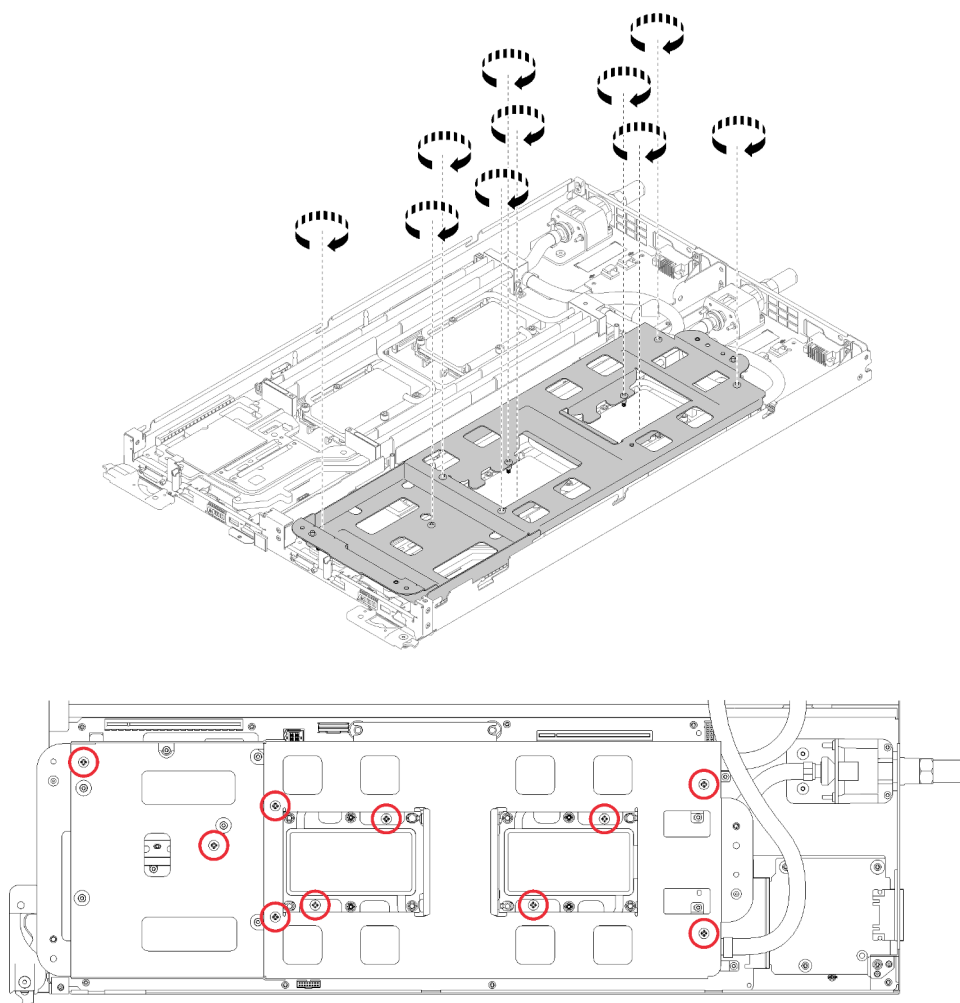


Figure 187. Loosening captive P2 screws

- h. Fully tighten the Torx T30 captive fasteners *in the installation sequence shown* on the label. Tighten the screws until they stop. (For reference, the torque required for the nuts to fully tighten is 1.4 — 1.6 newton-meters, 12 — 14 inch-pounds).

**Attention:** To prevent damage to components, make sure that you follow the indicated tightening sequence.

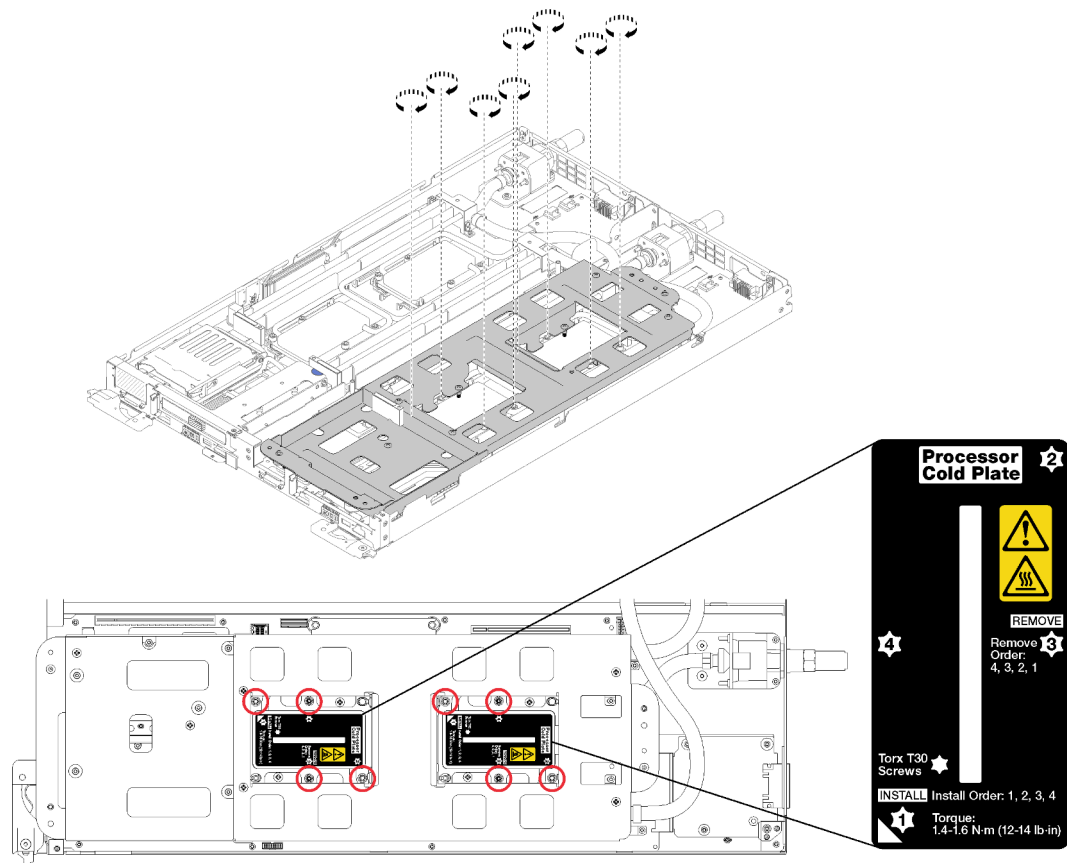


Figure 188. Tightening screws

After you install a processor:

1. Carefully lift the water loop carrier up and away from the water loop.

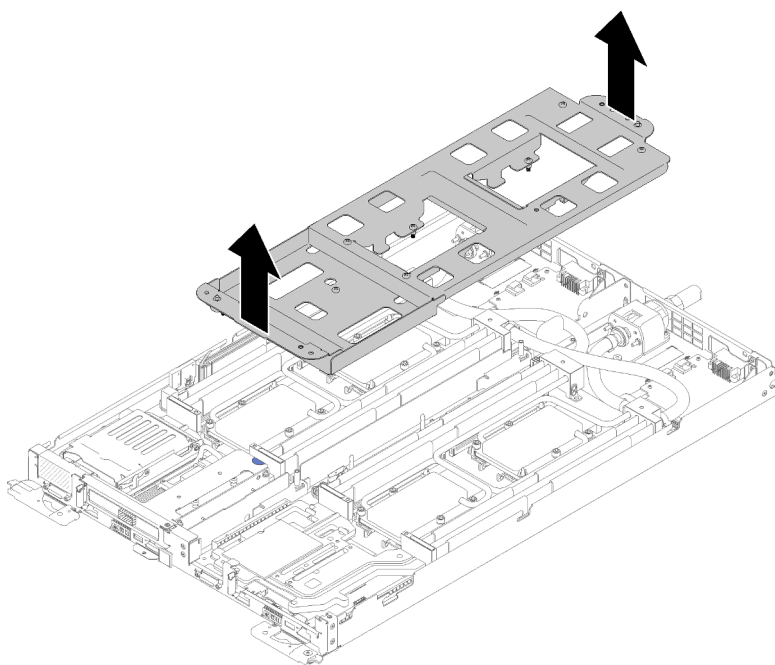


Figure 189. Water loop carrier removal

2. Reinstall all four DIMM covers and DIMMs for both nodes (see [“Install a DIMM” on page 129](#)).
3. Reinstall M.2 backplanes for both nodes (see [“Install the M.2 backplane” on page 144](#)).
4. Reinstall drive cage assemblies if applicable (see [“Install a drive cage assembly” on page 139](#)).
5. Reinstall PCIe rise assemblies if applicable (see [“Install an adapter” on page 151](#) or [“Install an Internal Faceplate Transition \(IFT\) adapter” on page 157](#) depending on your configuration).
6. Reinstall both air baffles.

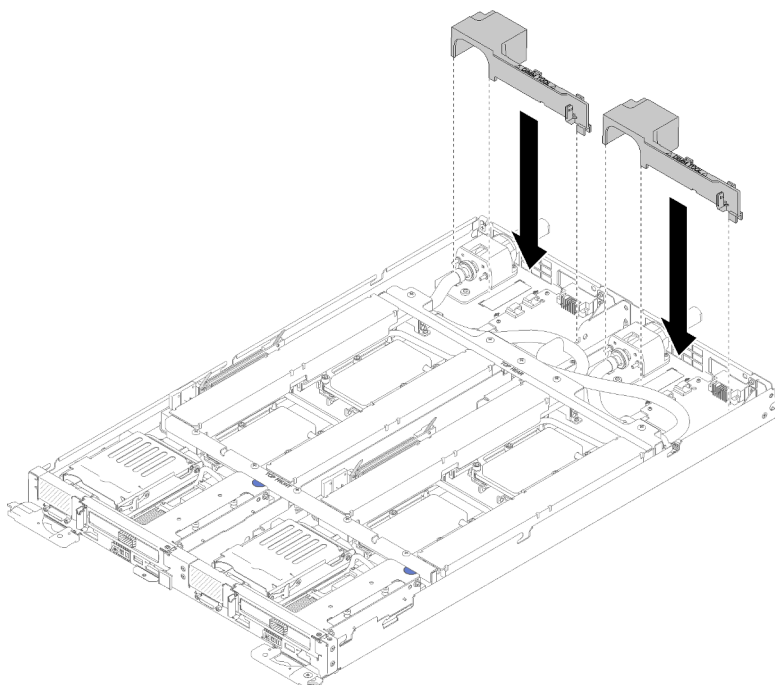


Figure 190. Air baffle installation

7. Reinstall the front and the rear cross braces (10x P2 screws).

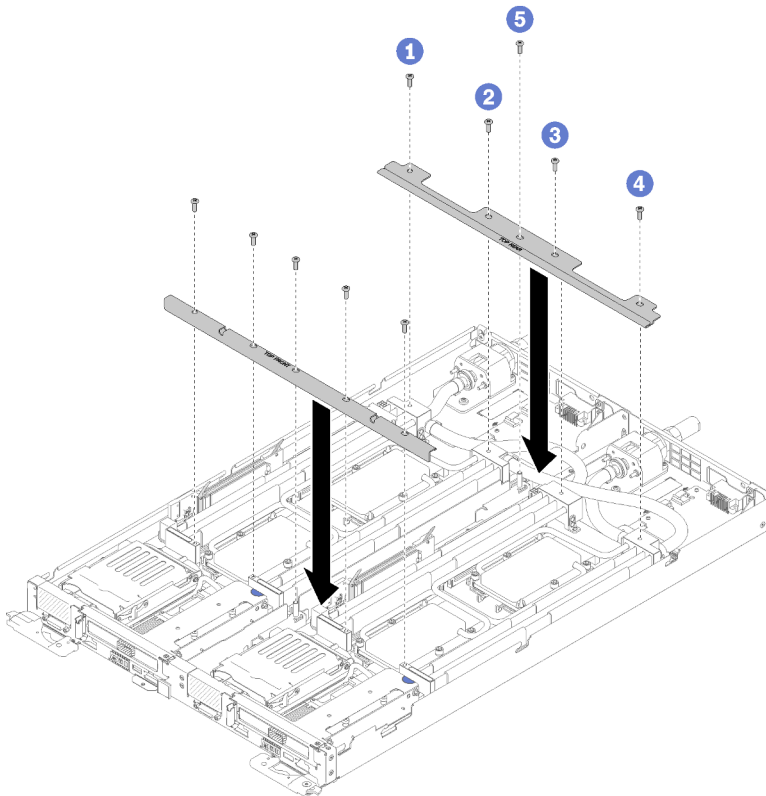


Figure 191. Cross brace installation

8. Reinstall the tray cover (see [“Install the tray cover”](#) on page 211).
9. Reinstall the tray (see [“Install a DWC tray in the enclosure”](#) on page 245).
10. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.

### Demo video

[Watch the procedure on YouTube](#)

## System board replacement

Use the following procedures to remove and install a system board.

**Important:** Before you return the system board, make sure that you install the CPU socket dust covers from the new system board. To replace a CPU socket dust cover:

1. Take a dust cover from the CPU socket assembly on the new system board and orient it correctly above the CPU socket assembly on the removed system board.
2. Gently press down the dust cover legs to the CPU socket assembly, pressing on the edges to avoid damage to the socket pins. You might hear a click on the dust cover is securely attached.
3. **Make sure** that the dust cover is securely attached to the CPU socket assembly.

### Remove a system board

Use this information to remove a system board.

## S001



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

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **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.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

**Attention:** To avoid damaging the water loop, always use the water loop carrier when removing, installing or folding the water loop.

Before you remove a system board:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Turn off the corresponding DWC tray that you are going to perform the task on.
3. Remove the tray (see [“Remove a DWC tray from the enclosure” on page 244](#)).
4. Remove the tray cover (see [“Remove the tray cover” on page 210](#)).
5. Remove both air baffles.

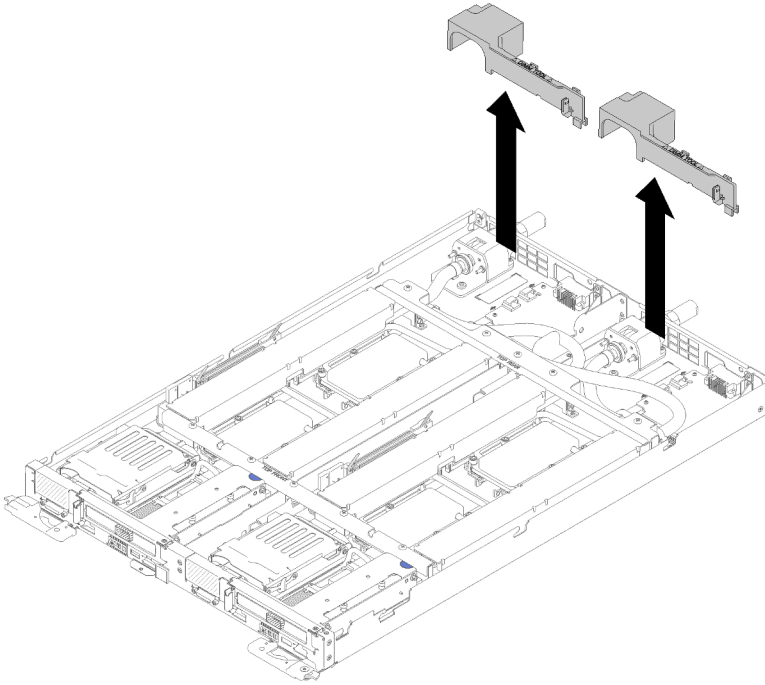


Figure 192. Air baffle removal

6. Remove the front and the rear cross braces (10x P2 screws).

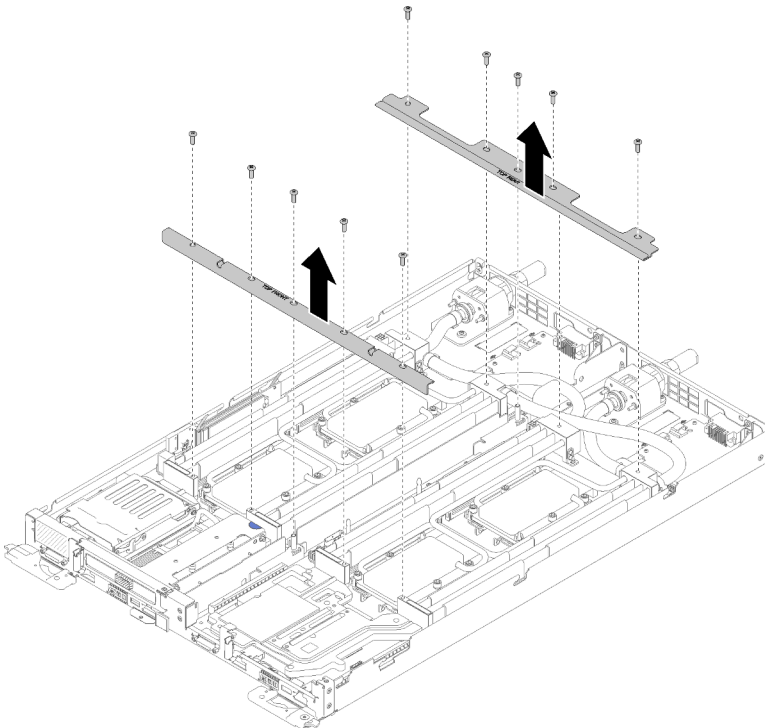
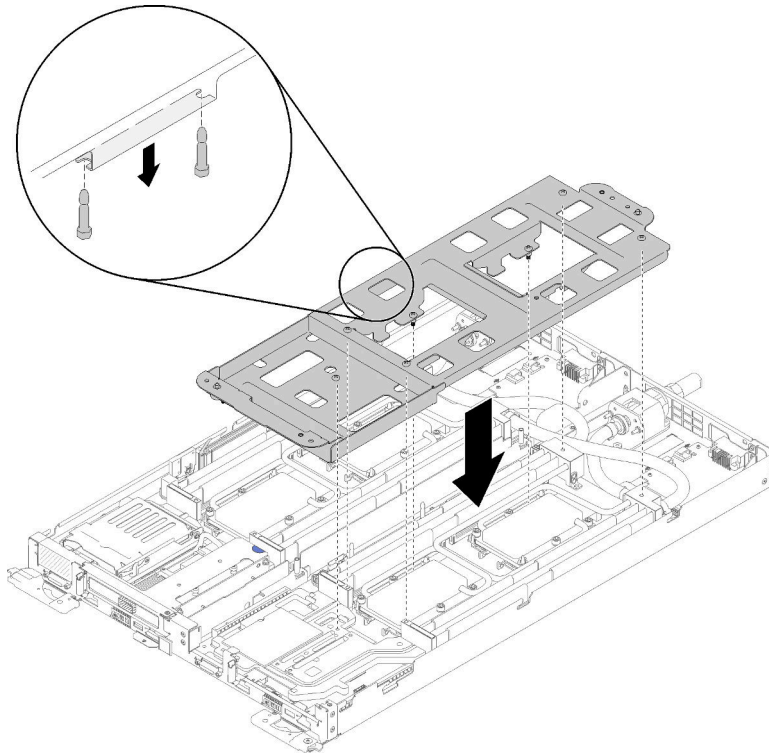


Figure 193. Cross brace removal

7. Remove all four DIMM covers and DIMMs for both nodes (see [“Remove a DIMM” on page 126](#)).
8. Remove M.2 Backplanes from both nodes (see [“Remove the M.2 backplane” on page 143](#)).

9. Remove drive cage assemblies from the node (see [“Remove a drive cage assembly” on page 137](#)).
10. Remove PCIe riser assemblies from the node if applicable (see [“Remove an adapter” on page 149](#) or [“Remove an Internal Faceplate Transition \(IFT\) adapter” on page 155](#) depending on your configuration).
11. Fold the water loop.
  - a. Orient the water loop carrier with two M.2 backplane guide pins; then, gently put the water loop carrier down and ensure it is seated firmly on the water loop.



*Figure 194. Water loop carrier installation*

- b. Remove water loop screws (15x silver Torx T10 screws per node).

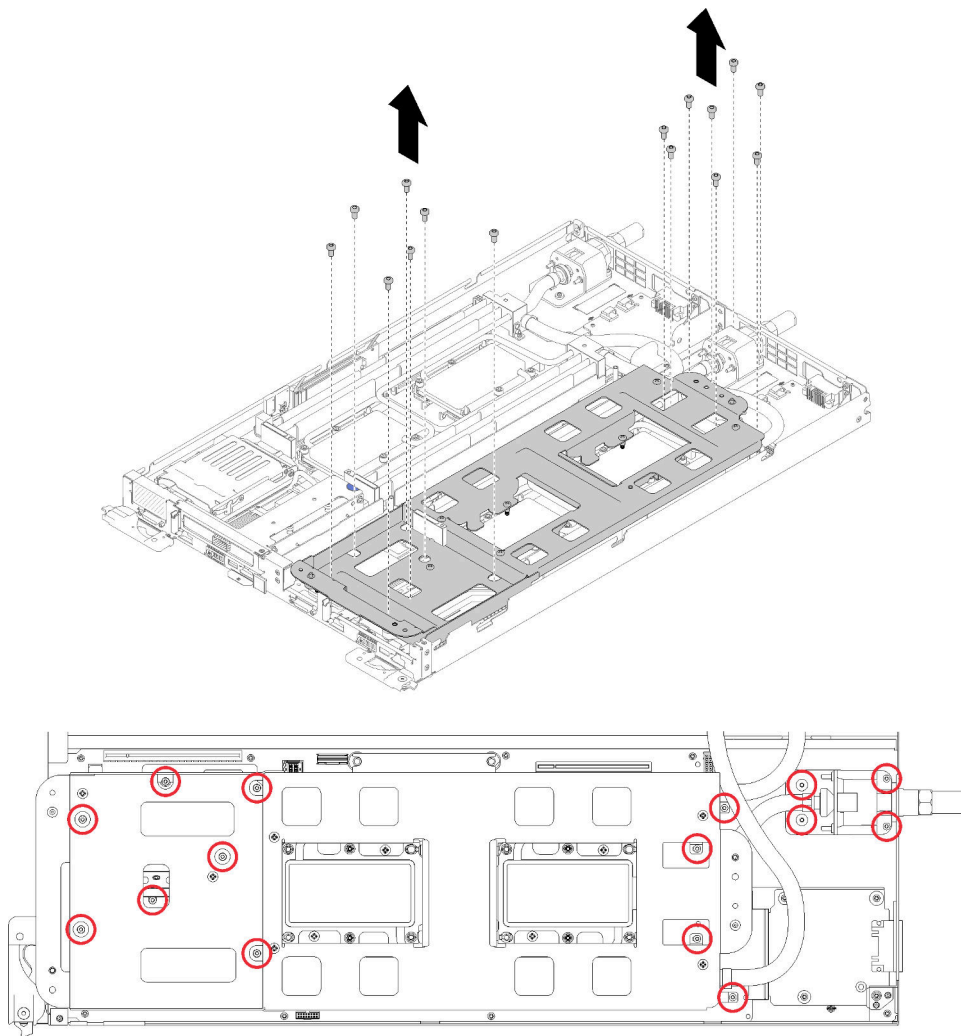


Figure 195. Silver T10 screw removal

- c. Fully loosen all Torx T30 captive fasteners (8x Torx T30 captive fasteners per node) on cold plates in the removal sequence shown on the cold plate label.

**Attention:** To prevent damage to components, make sure that you follow the indicated loosening sequence.



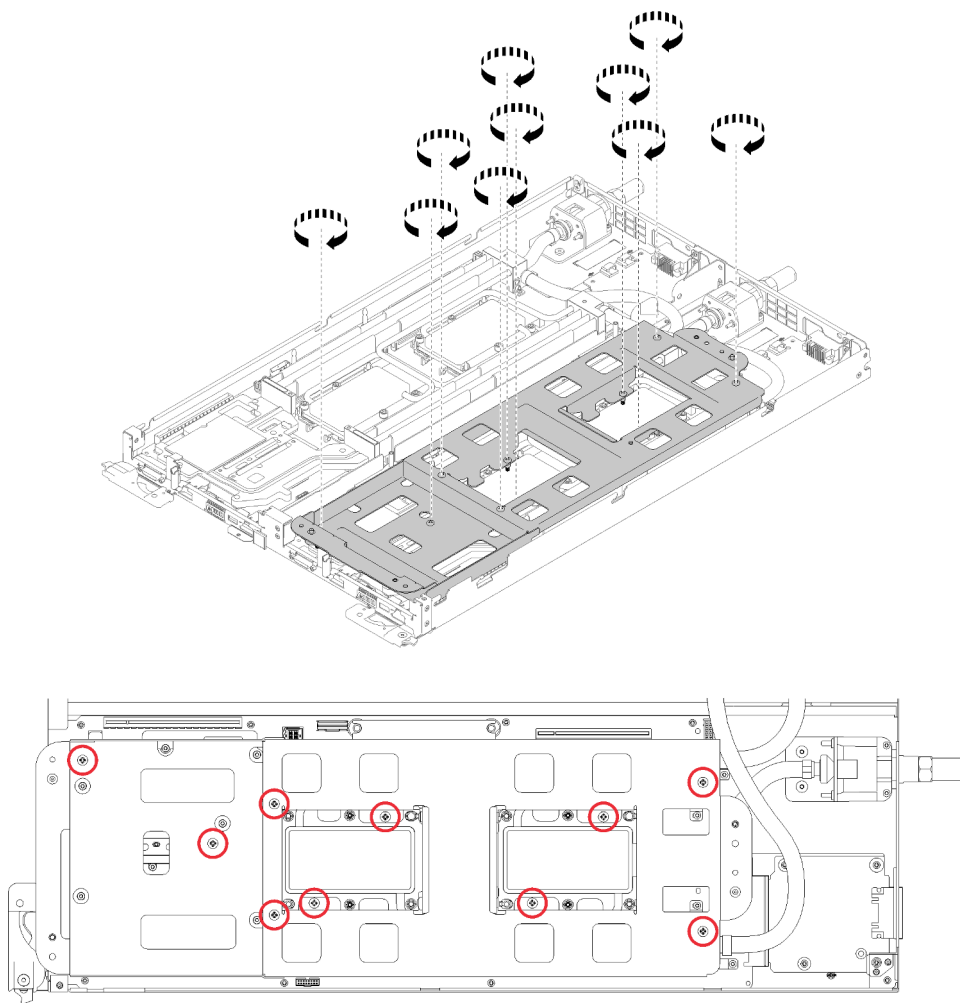


Figure 197. Tightening captive P2 screws

e. Fold the water loop.

- 1) Carefully lift the water loop up off the system board, then unhook the quick connect from the four alignment posts and slide the quick connect out of the opening in the rear of the tray.
- 2) Carefully rotate the water loop so one half is sitting on top of the other half.

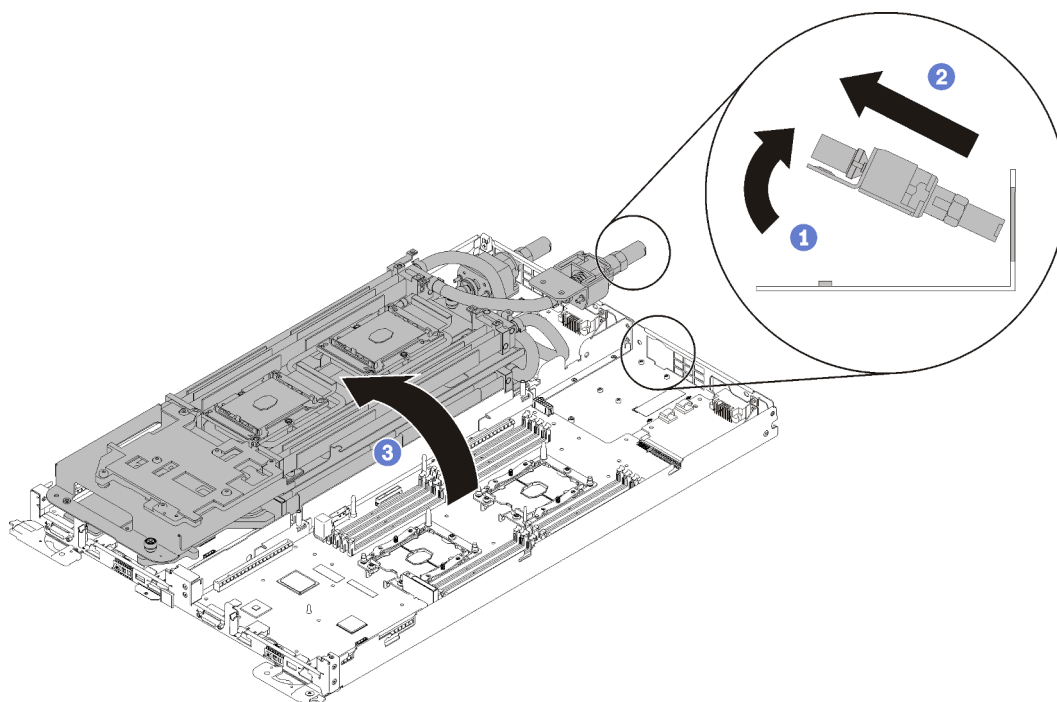


Figure 198. Folding the water loop

12. Remove the power distribution board (see [“Remove the power distribution board”](#) on page 161).
13. Remove the blank bezel filler.

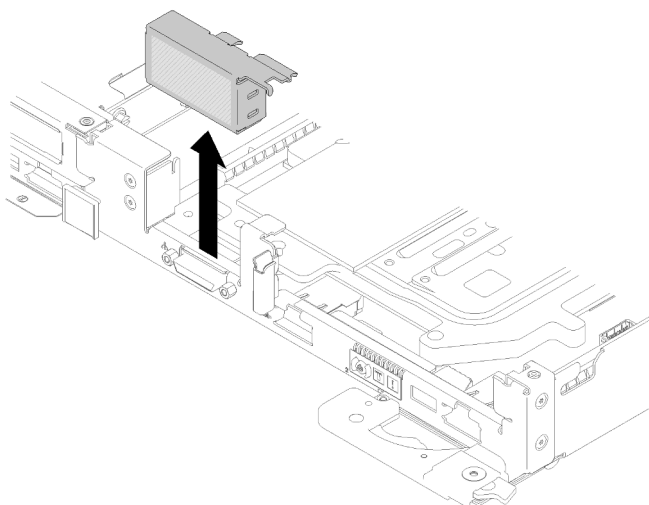


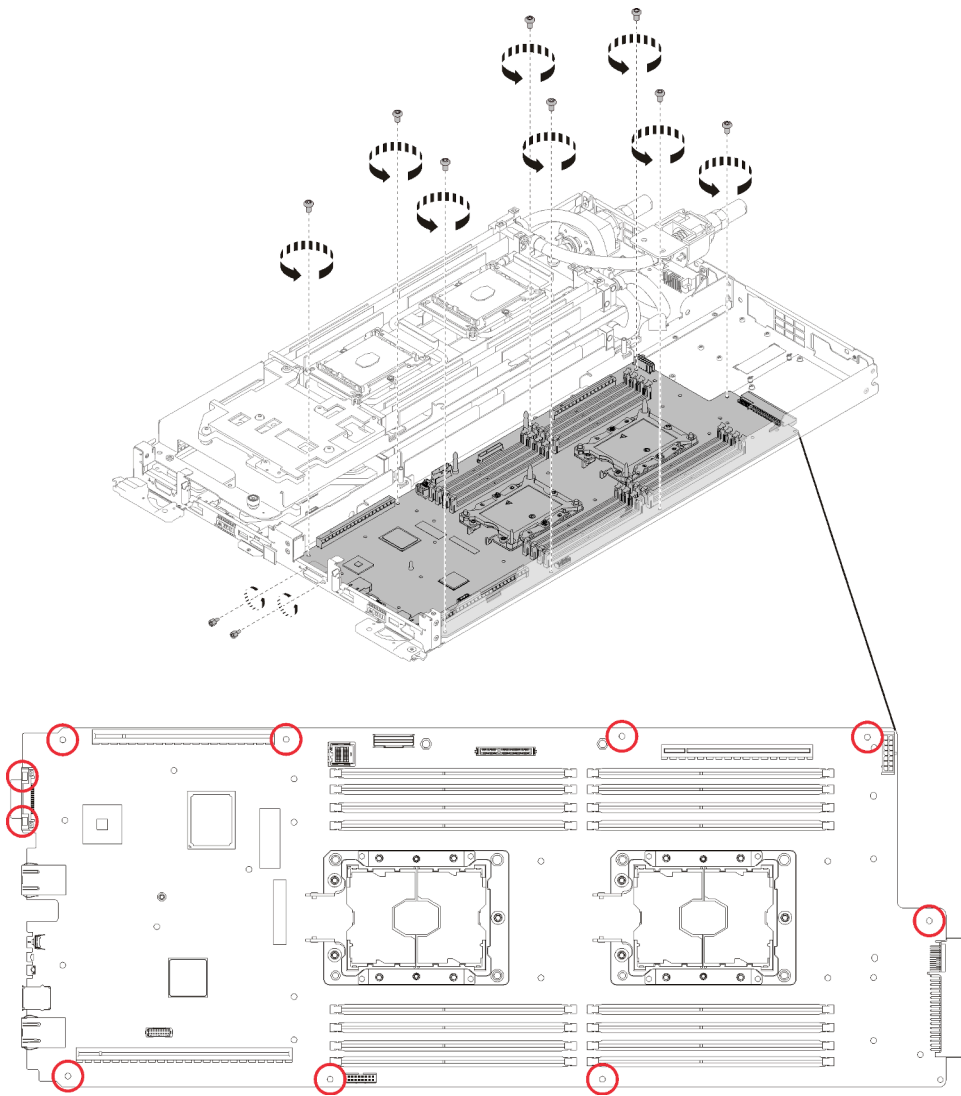
Figure 199. Blank bezel filler removal

Complete the following steps to remove a system board.

Step 1. Remove the following screws.

- Eight black Torx T10 screws per node on the system board.
- Two 3/16" hex head screws at the front of the node.

**Note:** Use a 3/16" hex head driver to ensure proper removal.



*Figure 200. Screws removal*

Step 2. Remove the system board.

- a. Carefully hold the front Ethernet connector and tilt the system board with an angle.
- b. Gently slide the system board backward.
- c. Carefully lift and remove the system board from the node.

**Note:** When you remove the system board from the node, avoid touching the connectors on the system board. Be careful not to damage any surrounding components inside the node.

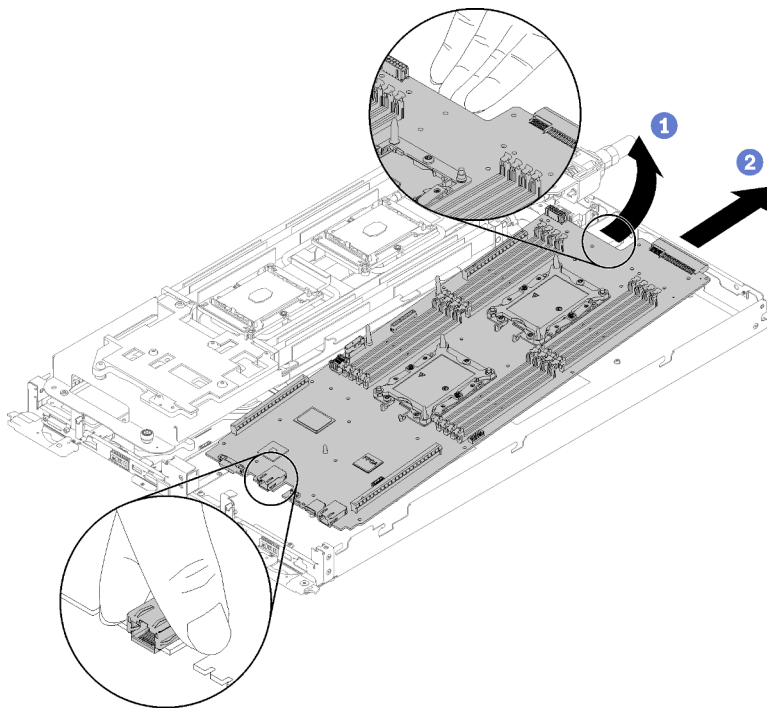


Figure 201. System board removal

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

**Important:** Before you return the system board, make sure that you install the CPU socket dust covers from the new system board. To replace a CPU socket dust cover:

1. Take a dust cover from the CPU socket assembly on the new system board and orient it correctly above the CPU socket assembly on the removed system board.
2. Gently press down the dust cover legs to the CPU socket assembly, pressing on the edges to avoid damage to the socket pins. You might hear a click on the dust cover is securely attached.
3. **Make sure** that the dust cover is securely attached to the CPU socket assembly.

#### Demo video

[Watch the procedure on YouTube](#)

#### Install a system board

Use this information to install a system board.

#### S001





## DANGER

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

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **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.**
- **The device might have more than one power cord, to remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

**Attention:** To avoid damaging the water loop, always use the water loop carrier when removing, installing or folding the water loop.

Before you install a system board:

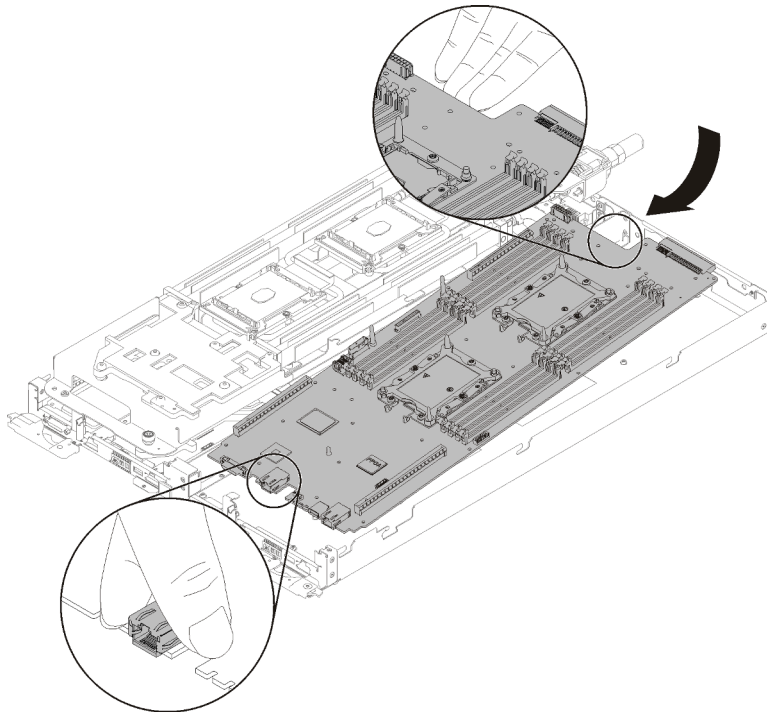
1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.

Complete the following steps to remove a system board.

Step 1. Install the system board.

- a. Carefully hold the front Ethernet connector and tilt the system board with an angle.
- b. Align the Ethernet connector with the hole and gently slide the system board forward.
- c. Carefully insert the system board into the node.

**Note:** When you install the system board from the node, avoid touching the connectors on the system board. Be careful not to damage any surrounding components inside the node.

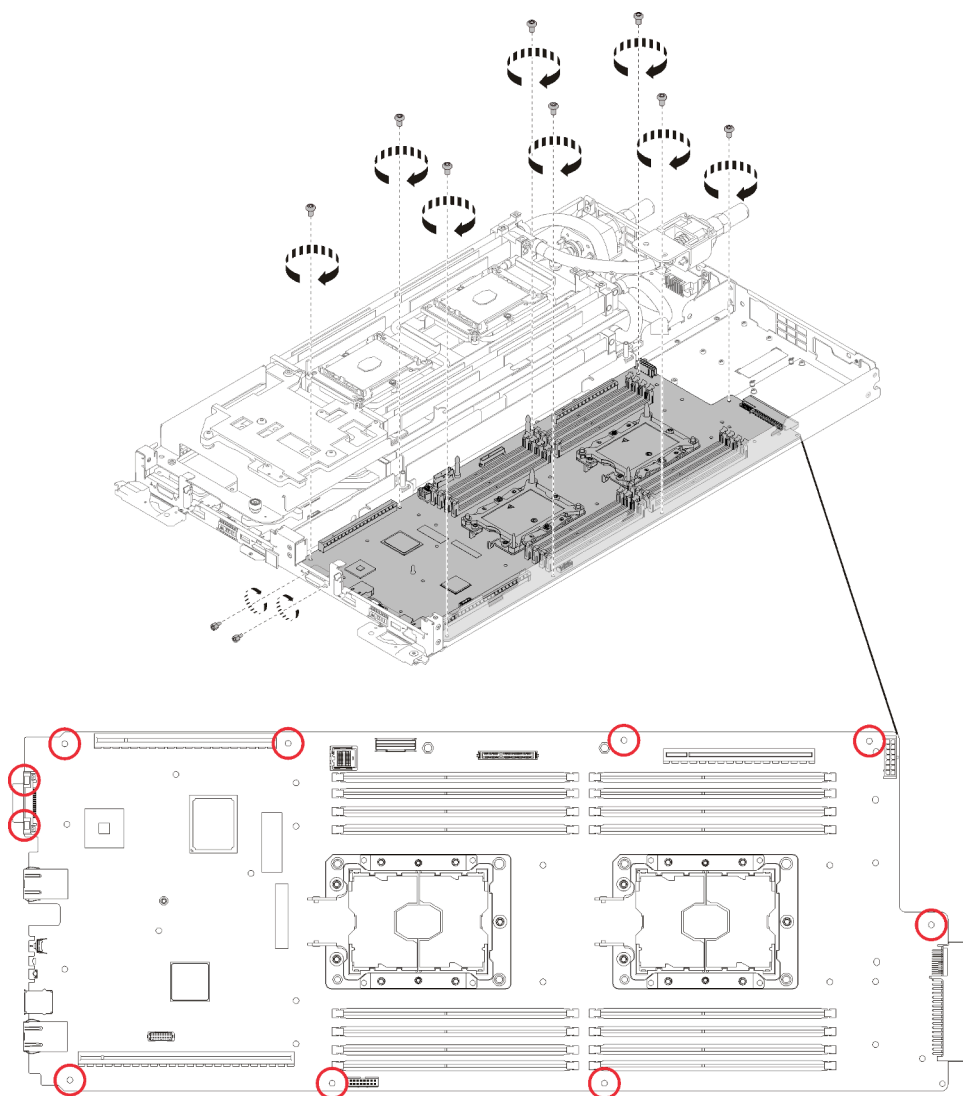


*Figure 202. System board installation*

Step 2. Tighten the following screws.

- Eight black Torx T10 screws per node on the system board.
- Two 3/16" hex head screws at the front of the node.

**Note:** Use a 3/16" hex head driver to ensure proper installation.



*Figure 203. Screws installation*

After you install a system board, complete the following steps:

1. Reinstall the blank bezel filler.

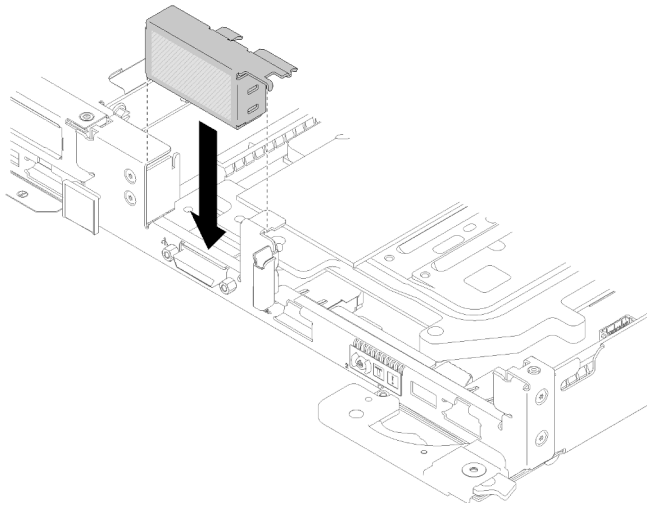


Figure 204. Blank bezel filler installation

2. Reinstall the power distribution board (see [“Install the power distribution board” on page 163](#)).
3. Reinstall the water loop.
  - a. Carefully rotate the top side of the water loop.
  - b. Carefully insert the quick connect into the tray opening as shown.
  - c. Lower and orient the water loop carrier over the M.2 backplane planes; then, ensure the processor socket guide pins fit correctly through holes in the water loop cold plates.
  - d. Gently put the other side of the water loop down and ensure it is seated firmly on the system board.

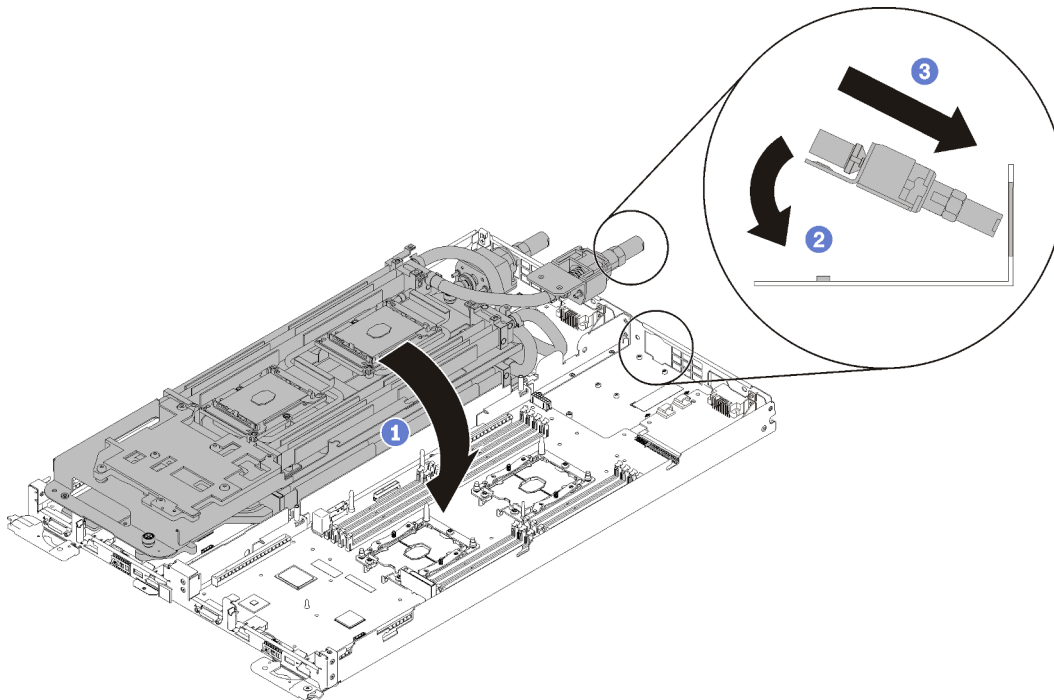
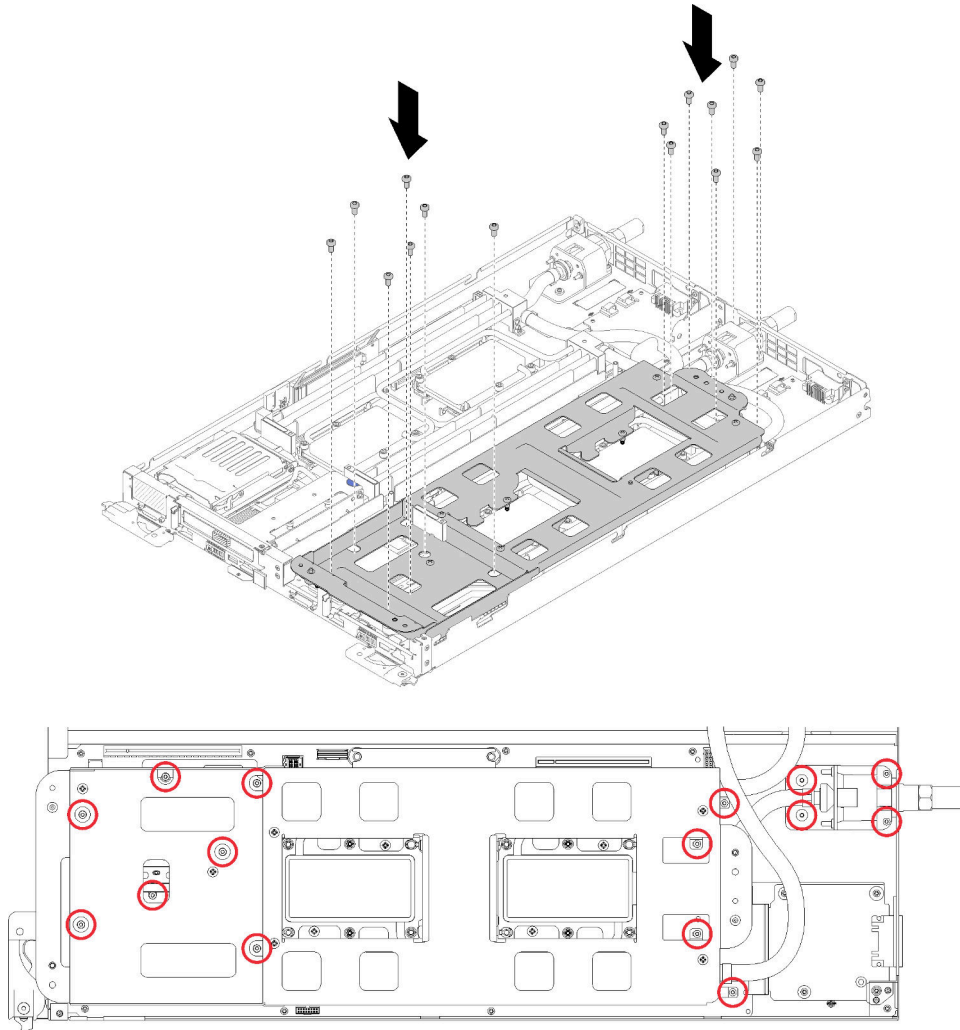


Figure 205. Water loop installation

- e. Hook two quick connects.

- f. Secure the water loop and the quick connect to the tray by carefully inserting 15 silver Torx T10 screws.



*Figure 206. Silver T10 screw installation*

- g. Loosen water loop carrier screws (10x P2 screws per node).

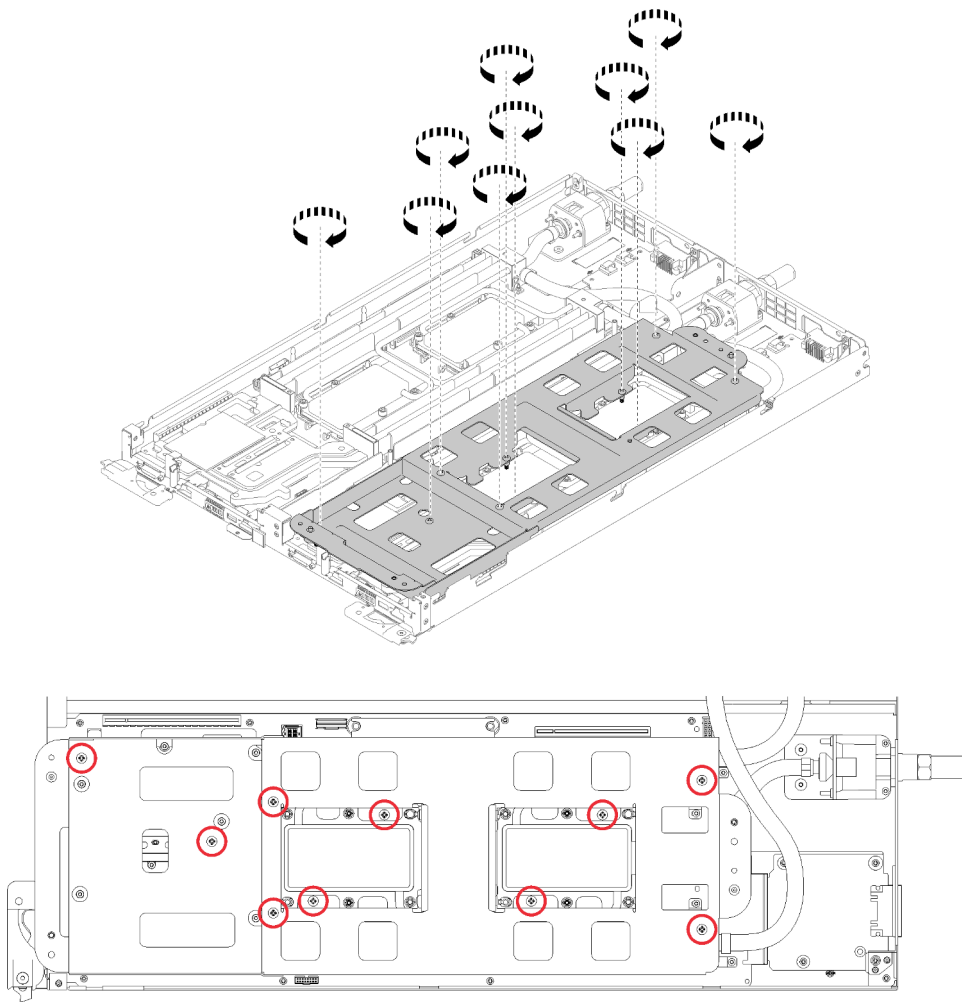


Figure 207. Loosening captive P2 screws

- h. Fully tighten all Torx T30 captive fasteners (8x Torx T30 captive fasteners per node) on cold plates in the installation sequence shown on the cold plate label.

**Attention:** To prevent damage to components, make sure that you follow the indicated tightening sequence.

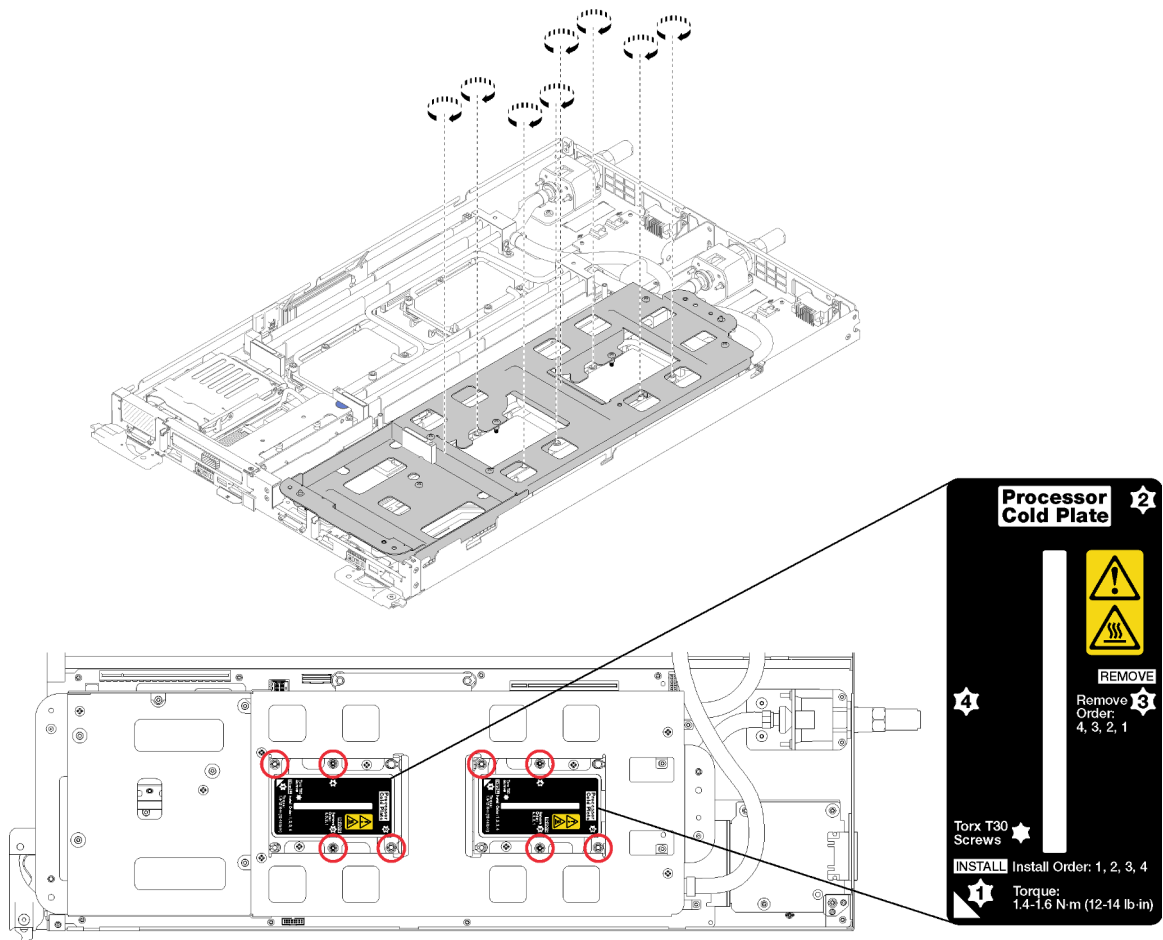


Figure 208. Tightening screws

- i. Carefully lift the water loop carrier up and away from the water loop.

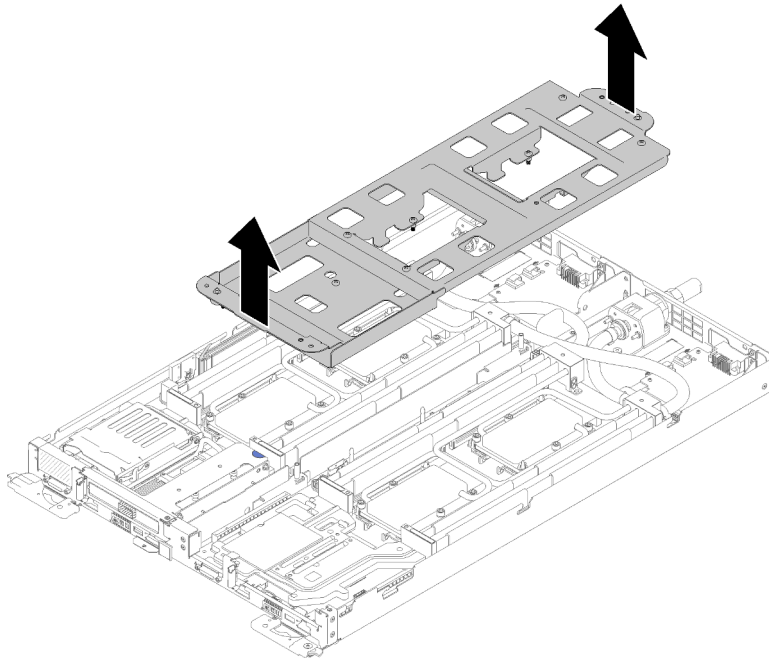


Figure 209. Water loop carrier removal

4. Reinstall all four DIMM covers and DIMMs for both nodes (see [“Install a DIMM” on page 129](#)).
5. Reinstall M.2 backplanes for both nodes (see [“Install the M.2 backplane” on page 144](#)).
6. Reinstall drive cage assemblies if applicable (see [“Install a drive cage assembly” on page 139](#)).
7. Reinstall PCIe rise assemblies if applicable (see [“Install an adapter” on page 151](#) or [“Install an Internal Faceplate Transition \(IFT\) adapter” on page 157](#) depending on your configuration).
8. Reinstall both air baffles.

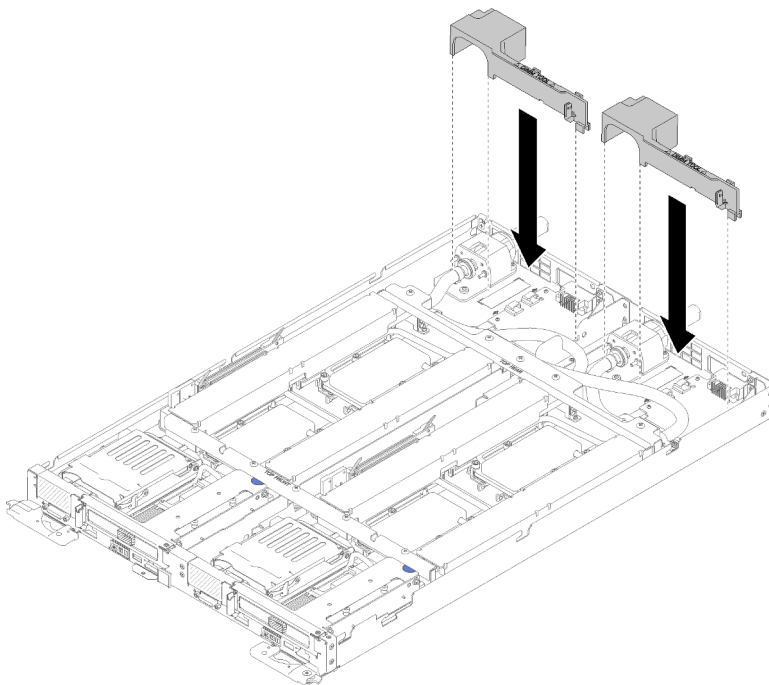


Figure 210. Air baffle installation

9. Reinstall the front and the rear cross braces (10x P2 screws).

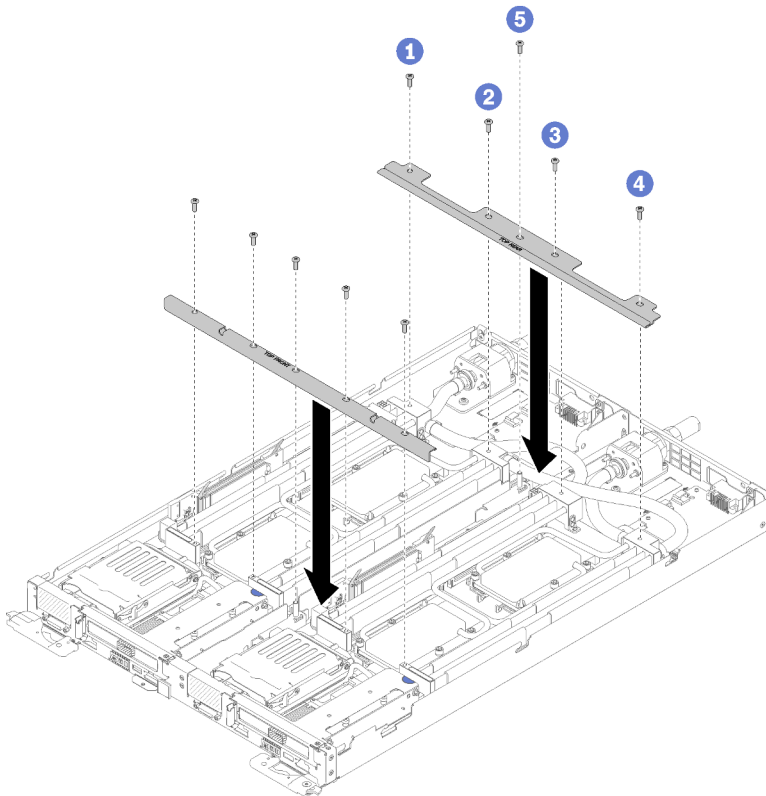


Figure 211. Cross brace installation

10. Reinstall the tray cover (see [“Install the tray cover”](#) on page 211).
11. Reinstall the tray (see [“Install a DWC tray in the enclosure”](#) on page 245).
12. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.
13. Update the machine type and serial number with new vital product data (VPD). Use the Lenovo XClarity Provisioning Manager to update the machine type and serial number. See [“Update the machine type and serial number”](#) on page 203.
14. Enable TPM/TCM. See [“Enable TPM/TCM”](#) on page 205
15. Optionally, enable Secure Boot.

### Demo video

[Watch the procedure on YouTube](#)

### Update the machine type and serial number

After the system board is replaced by trained service technicians, the machine type and serial number must be updated.

There are two methods available to update the machine type and serial number:

- From Lenovo XClarity Provisioning Manager

To update the machine type and serial number from Lenovo XClarity Provisioning Manager:

1. Start the server and press the key according to the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface.
2. If the power-on Administrator password is required, enter the password.
3. From the System Summary page, click **Update VPD**.
4. Update the machine type and serial number.

- From Lenovo XClarity Essentials OneCLI

Lenovo XClarity Essentials OneCLI sets the machine type and serial number in the Lenovo XClarity Controller. Select one of the following methods to access the Lenovo XClarity Controller and set the machine type and serial number:

- Operate from the target system, such as LAN or keyboard console style (KCS) access
- Remote access to the target system (TCP/IP based)

To update the machine type and serial number from Lenovo XClarity Essentials OneCLI:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Copy and unpack the OneCLI package, which also includes other required files, to the server. Make sure that you unpack the OneCLI and the required files to the same directory.
3. After you have Lenovo XClarity Essentials OneCLI in place, type the following commands to set the machine type and serial number:

```
onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> [access_method]
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override [access_method]
```

Where:

*<m/t\_model>*

The server machine type and model number. Type xxxxyyyyyy, where xxxx is the machine type and yyyyyy is the server model number.

*<s/n>*

The serial number on the server. Type zzzzzzzz (length 8-10 characters), where zzzzzzzz is the serial number.

*<system model>*

The system model. Type system yyyyyyyy, where yyyyyyyy is the product identifier.

*[access\_method]*

The access method that you select to use from the following methods:

- Online authenticated LAN access, type the command:  
[--bmc-username <xcc\_user\_id> --bmc-password <xcc\_password>]

Where:

*xcc\_user\_id*

The BMC/IMM/XCC account name (1 of 12 accounts). The default value is USERID.

*xcc\_password*

The BMC/IMM/XCC account password (1 of 12 accounts).

Example commands are as follows:

```

onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> --bmc-username <xcc_user_id>
--bmc-password <xcc_password>
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> --bmc-username <xcc_user_id> --bmc-
password <xcc_password>
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> --bmc-username xcc_user_
id --bmc-password xcc_password
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override --bmc-
username xcc_user_id --bmc-password xcc_password

```

- Online KCS access (unauthenticated and user restricted):

You do not need to specify a value for *access\_method* when you use this access method.

Example commands are as follows:

```

onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model>
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n>
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model>
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override

```

**Note:** The KCS access method uses the IPMI/KCS interface, which requires that the IPMI driver be installed.

- Remote LAN access, type the command:

```
[--bmc <xcc_user_id>:<xcc_password>@<xcc_external_ip>]
```

Where:

*xcc\_external\_ip*

The BMC/IMM/XCC IP address. There is no default value. This parameter is required.

*xcc\_user\_id*

The BMC/IMM/XCC account (1 of 12 accounts). The default value is USERID.

*xcc\_password*

The BMC/IMM/XCC account password (1 of 12 accounts).

**Note:** BMC, IMM, or XCC internal LAN/USB IP address, account name, and password are all valid for this command.

Example commands are as follows:

```

onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> --bmc <xcc_user_id>:<xcc_
password>@<xcc_external_ip>
onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> --bmc <xcc_user_id>:<xcc_
password>@<xcc_external_ip>

```

```

onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> --bmc xcc_user_id:xcc_
password@xcc_external_ip
onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override --bmc xcc_
user_id:xcc_password@xcc_external_ip

```

4. Reset the Lenovo XClarity Controller to the factory defaults. See “Resetting the BMC to Factory Default” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

## Enable TPM/TCM

The server supports Trusted Platform Module (TPM), Version 1.2 or Version 2.0

**Note:** For customers in Chinese Mainland, integrated TPM is not supported. However, customers in Chinese Mainland can install a Trusted Cryptographic Module (TCM) adapter or a TPM adapter (sometimes called a daughter card).

When a system board is replaced, you must make sure that the TPM/TCM policy is set correctly.

**CAUTION:**

**Take special care when setting the TPM/TCM policy. If it is not set correctly, the system board can become unusable.**

**Set the TPM policy**

By default, a replacement system board is shipped with the TPM policy set to **undefined**. You must modify this setting to match the setting that was in place for the system board that is being replaced.

There are two methods available to set the TPM policy:

- From Lenovo XClarity Provisioning Manager

To set the TPM policy from Lenovo XClarity Provisioning Manager:

1. Start the server and press the key according to the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface.
2. If the power-on Administrator password is required, enter the password.
3. From the System Summary page, click **Update VPD**.
4. Set the policy to one of the following settings.
  - **NationZ TPM 2.0 enabled - China only**. Customers in the Chinese Mainland should choose this setting if a NationZ TPM 2.0 adapter is installed.
  - **TPM enabled - ROW**. Customers outside of the Chinese Mainland should choose this setting.
  - **Permanently disabled**. Customers in the Chinese Mainland should use this setting if no TPM adapter is installed.

**Note:** Although the setting **undefined** is available as a policy setting, it should not be used.

- From Lenovo XClarity Essentials OneCLI

**Note:** Please note that a Local IPMI user and password must be setup in Lenovo XClarity Controller for remote accessing to the target system.

To set the TPM policy from Lenovo XClarity Essentials OneCLI:

1. Read TpmTcmPolicyLock to check whether the TPM\_TCM\_POLICY has been locked:

```
OneCli.exe config show imm.TpmTcmPolicyLock --override --imm <userid>:<password>@<ip_address>
```

**Note:** The imm.TpmTcmPolicyLock value must be 'Disabled', which means TPM\_TCM\_POLICY is NOT locked and changes to the TPM\_TCM\_POLICY are permitted. If the return code is 'Enabled' then no changes to the policy are permitted. The planar may still be used if the desired setting is correct for the system being replaced.

2. Configure the TPM\_TCM\_POLICY into XCC:

- For customers in Chinese Mainland with no TPM, or customers that require to disable TPM:

```
OneCli.exe config set imm.TpmTcmPolicy "NeitherTpmNorTcm" --override --imm <userid>:<password>@<ip_address>
```

- For customers in Chinese Mainland that require to enable TPM:

```
OneCli.exe config set imm.TpmTcmPolicy "NationZTPM200Only" --override --imm <userid>:<password>@<ip_address>
```

- For customers outside Chinese Mainland that require to enable TPM:

```
OneCli.exe config set imm.TpmTcmPolicy "TpmOnly" --override --imm <userid>:<password>@<ip_address>
```

3. Issue reset command to reset system:

```
OneCli.exe misc ospower reboot --imm <userid>:<password>@<ip_address>
```

4. Read back the value to check whether the change has been accepted:

```
OneCli.exe config show imm.TpmTcmPolicy --override --imm <userid>:<password>@<ip_address>
```

**Notes:**

- If the read back value is matched it means the TPM\_TCM\_POLICY has been set correctly.

imm.TpmTcmPolicy is defined as below:

- Value 0 use string “Undefined” , which means UNDEFINED policy.
- Value 1 use string “NeitherTpmNorTcm”, which means TPM\_PERM\_DISABLED.
- Value 2 use string “TpmOnly”, which means TPM\_ALLOWED.
- Value 4 use string “NationZTPM20Only”, which means NationZ\_TPM20\_ALLOWED.
- Below 4 steps must also be used to ‘lock’ the TPM\_TCM\_POLICY when using OneCli/ASU commands:

5. Read TpmTcmPolicyLock to check whether the TPM\_TCM\_POLICY has been locked , command as below:

```
OneCli.exe config show imm.TpmTcmPolicyLock --override --imm <userid>:<password>@<ip_address>
```

The value must be 'Disabled', it means TPM\_TCM\_POLICY is NOT locked and must be set.

6. Lock the TPM\_TCM\_POLICY:

```
OneCli.exe config set imm.TpmTcmPolicyLock "Enabled"--override --imm <userid>:<password>@<ip_address>
```

7. Issue reset command to reset system, command as below:

```
OneCli.exe misc ospower reboot --imm <userid>:<password>@<ip_address>
```

During the reset, UEFI will read the value from imm.TpmTcmPolicyLock, if the value is 'Enabled' and the imm.TpmTcmPolicy value is valid, UEFI will lock the TPM\_TCM\_POLICY setting.

**Note:** The valid values for imm.TpmTcmPolicy include 'NeitherTpmNorTcm', 'TpmOnly', and 'NationZTPM20Only'.

If the imm.TpmTcmPolicyLock is set as 'Enabled' but imm.TpmTcmPolicy value is invalid, UEFI will reject the 'lock' request and change imm.TpmTcmPolicyLock back to 'Disabled'.

8. Read back the value to check whether the ‘Lock’ is accepted or rejected. command as below:

```
OneCli.exe config show imm.TpmTcmPolicy --override --imm <userid>:<password>@<ip_address>
```

**Note:** If the read back value is changed from 'Disabled' to 'Enabled' that means the TPM\_TCM\_POLICY has been locked successfully. There is no method to unlock a policy once it has been set other than replacing system board.

imm.TpmTcmPolicyLock is defined as below:

Value 1 uses string “Enabled” , which means lock the policy. Other values are not accepted.

## Assert Physical Presence

Before you can assert Physical Presence, the Physical Presence Policy must be enabled. By default, the Physical Presence Policy is enabled with a timeout of 30 minutes.

There are two ways to assert the Physical Presence:

1. If the Physical Presence Policy is enabled, you can assert Physical Presence through the Lenovo XClarity Provisioning Manager or through the Lenovo XClarity Controller.

2. Switch the hardware jumpers on the system board.

**Notes:** If the Physical Presence Policy has been disabled:

1. Set the hardware Physical Presence jumper on the system board to assert Physical Presence.
2. Enable the Physical Presence Policy using either F1 (UEFI Settings) or Lenovo XClarity Essentials OneCLI.

### Assert Physical Presence through the Lenovo XClarity Controller

Complete the following steps to assert Physical Presence through the Lenovo XClarity Controller:

1. Log in to the Lenovo XClarity Controller interface.

For information about logging in to the Lenovo XClarity Controller, see the “Opening and Using the XClarity Controller Web Interface” section in the XCC documentation version compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

2. Click **BMC Configuration → Security** and verify that Physical Presence is set to **assert**.

### Assert Physical Presence through the hardware

You can also assert hardware Physical Presence through the use of a jumper on the system board. For more information about asserting hardware Physical Presence through the use of a jumper, see:

[“System-board switches” on page 25](#)

### Set the TPM version

To be able to set the TPM version, Physical Presence must be asserted.

The Lenovo XClarity Provisioning Manager or the Lenovo XClarity Essentials OneCLI can be used to set the TPM version.

To set the TPM version:

1. Download and install Lenovo XClarity Essentials OneCLI.
  - a. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
  - b. Click **Drivers & Software**.
  - c. Navigate to the version of Lenovo XClarity Essentials OneCLI for your operating system and download the package.
2. Run the following command to set the TPM version:

**Note:** You can change the TPM version from 1.2 to 2.0 and back again. However, you can toggle between versions a maximum of 128 times.

#### To set the TPM version to version 2.0:

```
OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM2.0 compliant"  
--bmc userid:password@ip_address
```

#### To set the TPM version to version 1.2:

```
OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM1.2 compliant"  
--bmc userid:password@ip_address
```

where:

- `<userid>:<password>` are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSWORD (zero, not an uppercase o)
- `<ip_address>` is the IP address of the BMC.

For more information about the Lenovo XClarity Essentials OneCLI `set` command, see:

[https://pubs.lenovo.com/lxce-onecli/onecli\\_r\\_set\\_command](https://pubs.lenovo.com/lxce-onecli/onecli_r_set_command)

3. Alternatively, you can use the following Advanced Settings Utility (ASU) commands:

**To set the TPM version to version 2.0:**

```
asu64 set TPMVersion.TPMVersion "Update to TPM2.0 compliant" --host <ip_address>
--user <userid> --password <password> --override
```

**To set the TPM version to version 1.2:**

```
asu64 set TPMVersion.TPMVersion "Update to TPM1.2 compliant" --host <ip_address>
--user <userid> --password <password> --override
```

where:

- `<userid>` and `<password>` are the credentials used to the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSWORD (zero, not an uppercase o)
- `<ip_address>` is the IP address of the BMC.

## Enable UEFI Secure Boot

Optionally, you can enable UEFI Secure Boot.

There are two methods available to enable UEFI Secure Boot:

- From Lenovo XClarity Provisioning Manager

To enable UEFI Secure Boot from Lenovo XClarity Provisioning Manager:

1. Start the server and press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
2. If the power-on Administrator password is required, enter the password.
3. From the UEFI Setup page, click **System Settings** → **Security** → **Secure Boot**.
4. Enable Secure Boot and save the settings.

- From Lenovo XClarity Essentials OneCLI

To enable UEFI Secure Boot from Lenovo XClarity Essentials OneCLI:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Run the following command to enable Secure Boot:

```
OneCli.exe config set SecureBootConfiguration.SecureBootSetting Enabled
--bmc <userid>:<password>@<ip_address>
```

where:

- `<userid>:<password>` are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSWORD (zero, not an uppercase o)
- `<ip_address>` is the IP address of the BMC.

For more information about the Lenovo XClarity Essentials OneCLI `set` command, see:

[https://pubs.lenovo.com/lxce-onecli/onecli\\_r\\_set\\_command](https://pubs.lenovo.com/lxce-onecli/onecli_r_set_command)

## Tray cover replacement

Use the following procedures to remove and install the tray cover.

### Remove the tray cover

Use this information to remove the tray cover.

#### S014



#### **CAUTION:**

**Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.**

#### S033



#### **CAUTION:**

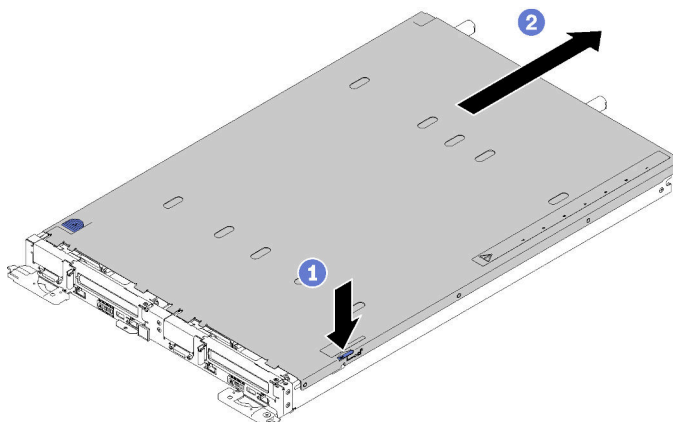
**Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.**

Before you remove the tray cover:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Turn off the corresponding DWC tray that you are going to perform the task on.
3. Remove the tray out of the enclosure (see [“Remove a DWC tray from the enclosure” on page 244](#)).

Complete the following steps to remove the tray cover.

Step 1. Press on the release latch and the push point at the same time and slide the cover toward the rear of the DWC tray.



*Figure 212. Tray cover removal*

Step 2. Lift the cover off the DWC tray and set it aside.

**Note:** Service label instructions are located on the underside of each tray cover.

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

### Demo video

[Watch the procedure on YouTube](#)

## Install the tray cover

Use this information to install the tray cover.

Before you install the tray cover:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Reinstall the blank bezel filler if you have removed it.

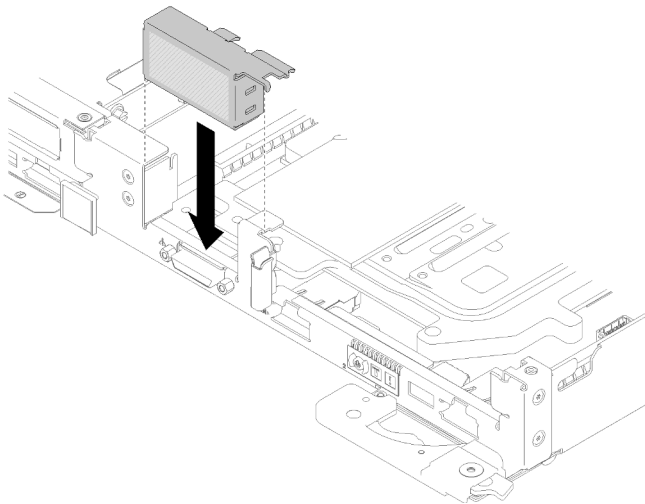


Figure 213. Blank bezel filler installation

Complete the following steps to install the tray cover.

Step 1. Position the cover on top of the tray.

Step 2. Slide the cover toward the front of the tray.

**Important:** Before you slide the cover forward, make sure that all the tabs on the front, rear, and side of the cover engage the enclosure correctly. If all the tabs do not engage the enclosure correctly, it will be very difficult to remove the cover later.

Step 3. Make sure that the cover correctly engages all the insert tabs on the tray.

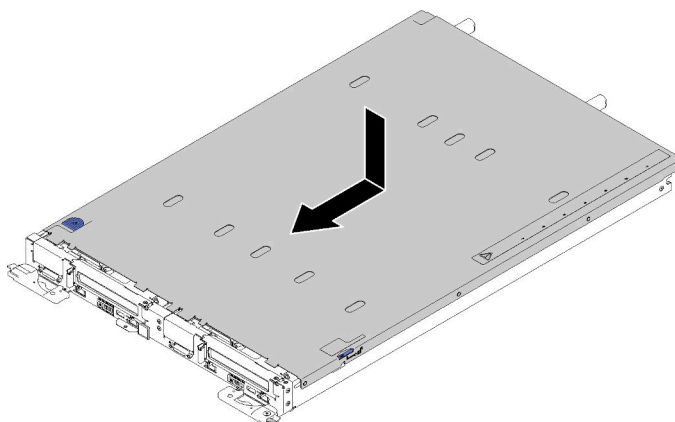


Figure 214. Tray cover installation

After you install the tray cover, complete the following steps:

1. Reinstall the tray into the enclosure (see [“Install a DWC tray in the enclosure” on page 245](#)).

#### Demo video

[Watch the procedure on YouTube](#)

## TCM/TPM adapter replacement (for Chinese Mainland only)

Use this information to remove and install the TCM/TPM adapter (sometimes called a daughter card).

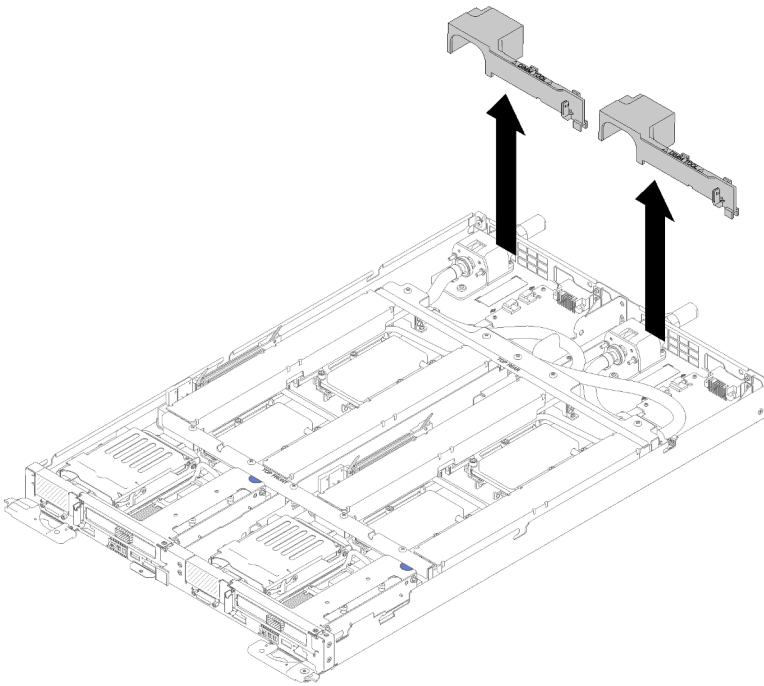
### Remove the TCM/TPM adapter (for Chinese Mainland only)

Use this information to remove the TCM/TPM adapter.

Before you remove the TCM/TPM adapter:

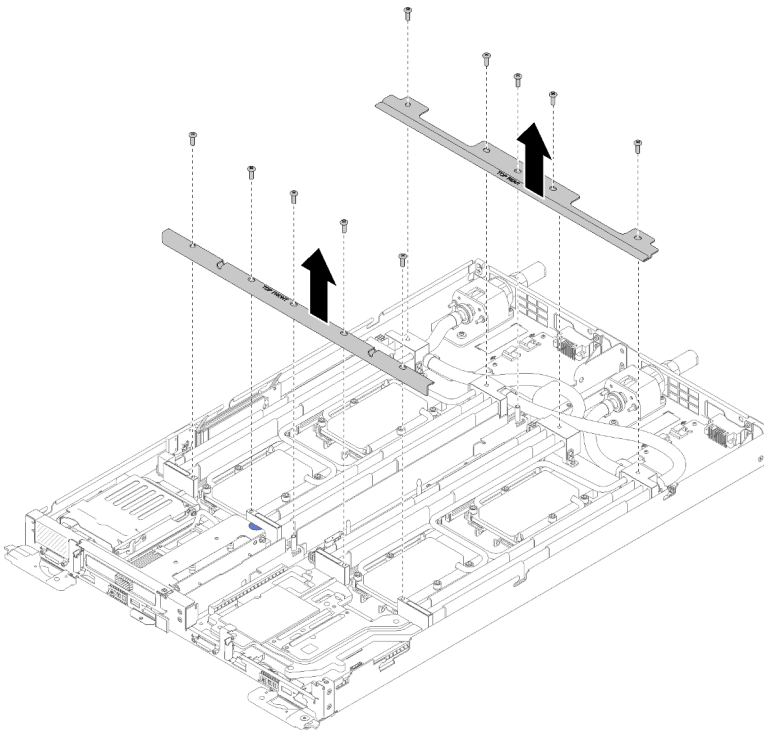
1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Turn off the corresponding DWC tray that you are going to perform the task on.
3. Remove the tray (see [“Remove a DWC tray from the enclosure” on page 244](#)).
4. Remove the tray cover (see [“Remove the tray cover” on page 210](#)).

5. Remove both air baffles.



*Figure 215. Air baffle removal*

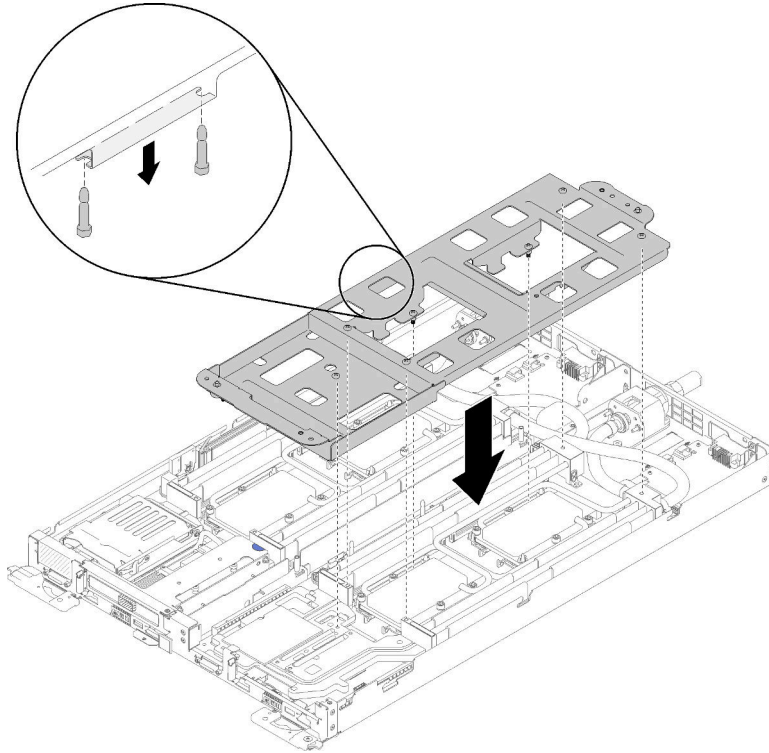
6. Remove the front and the rear cross braces (10x P2 screws).



*Figure 216. Cross brace removal*

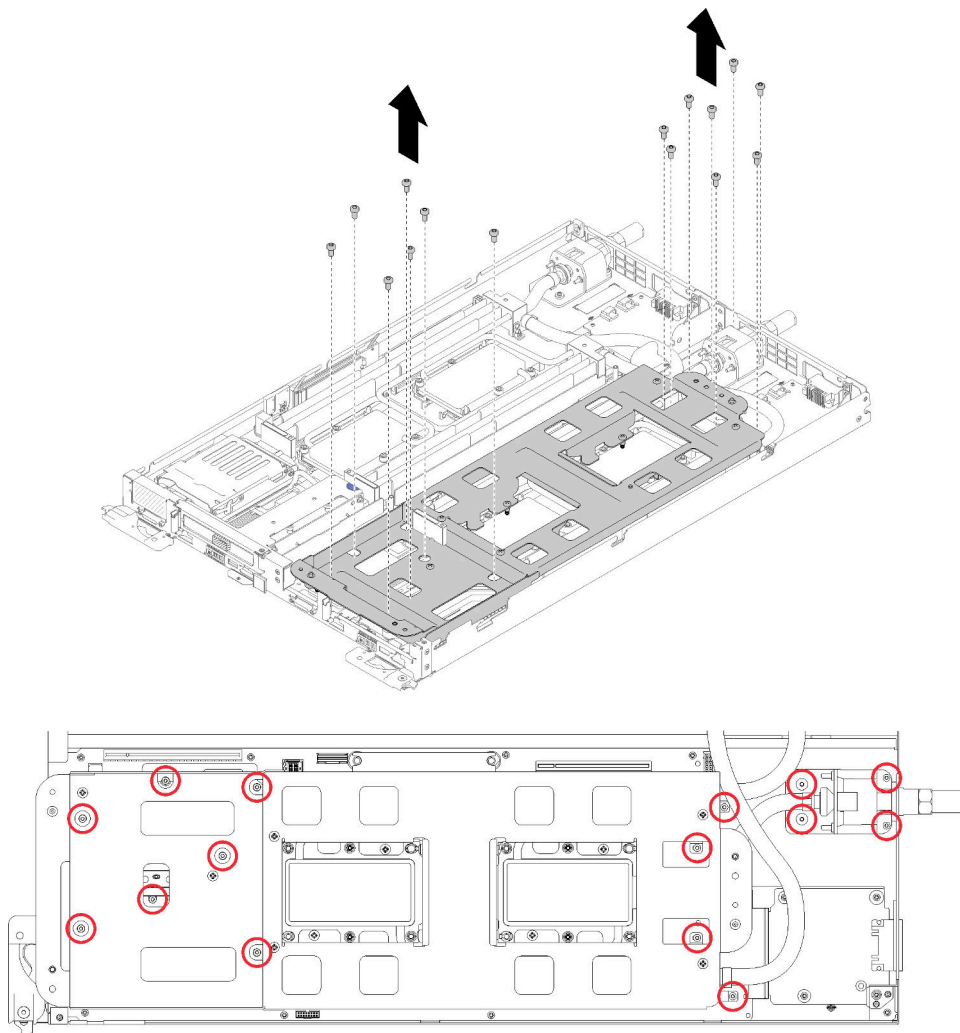
7. Remove all four DIMM covers and DIMMs for both nodes (see [“Remove a DIMM” on page 126](#)).

8. Remove M.2 Backplanes from both nodes (see [“Remove the M.2 backplane” on page 143](#)).
9. Remove drive cage assemblies from the node (see [“Remove a drive cage assembly” on page 137](#)).
10. Remove PCIe riser assemblies from the node if applicable (see [“Remove an adapter” on page 149](#) or [“Remove an Internal Faceplate Transition \(IFT\) adapter” on page 155](#) depending on your configuration).
11. Fold the water loop.
  - a. Orient the water loop carrier with two M.2 backplane guide pins; then, gently put the water loop carrier down and ensure it is seated firmly on the water loop.



*Figure 217. Water loop carrier installation*

- b. Remove water loop screws (15x silver Torx T10 screws per node).



*Figure 218. Silver T10 screw removal*

- c. Fully loosen all Torx T30 captive fasteners (8x Torx T30 captive fasteners per node) on cold plates in the removal sequence shown on the cold plate label.

**Attention:** To prevent damage to components, make sure that you follow the indicated loosening sequence.

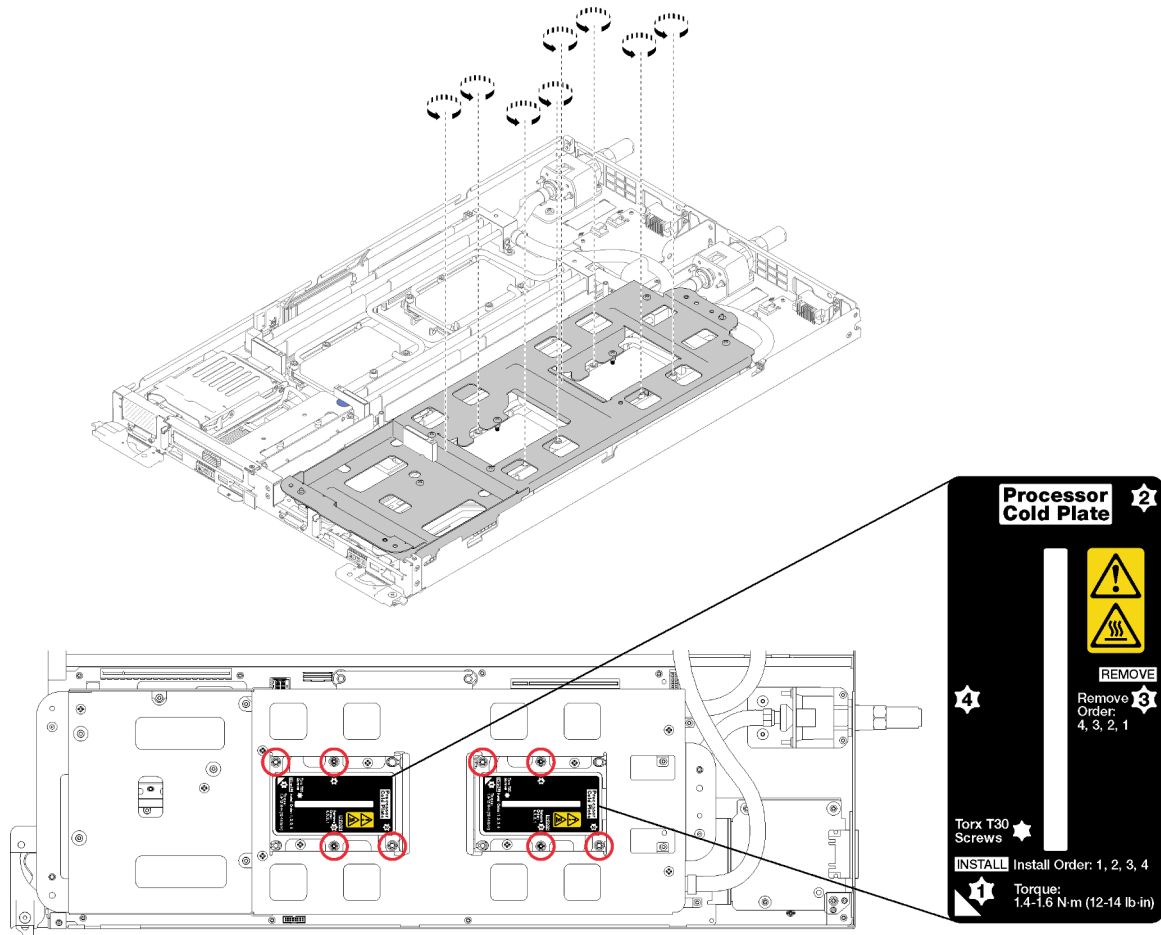


Figure 219. Loosening Torx T30 captive fasteners

d. Tighten water loop carrier screws (10x P2 screws per node).

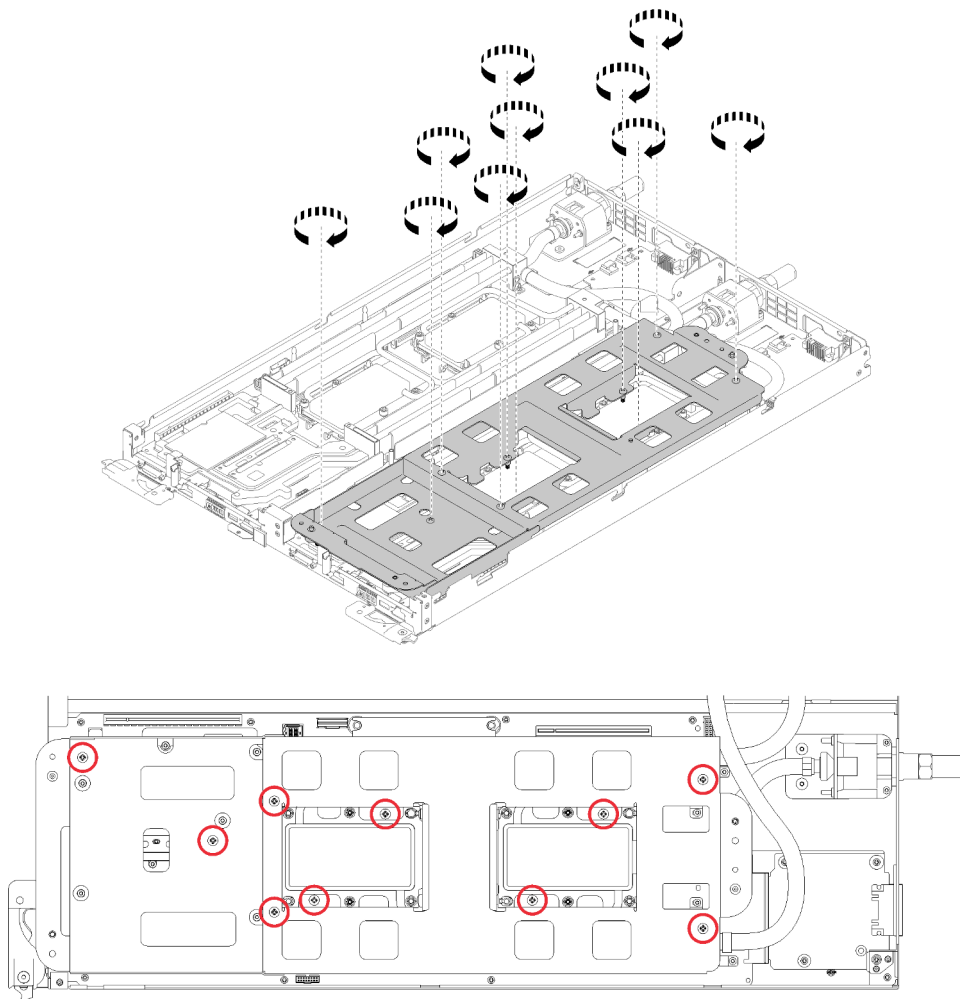


Figure 220. Tightening captive P2 screws

e. Fold the water loop.

- 1) Carefully lift the water loop up off the system board, then unhook the quick connect from the four alignment posts and slide the quick connect out of the opening in the rear of the tray.
- 2) Carefully rotate the water loop so one half is sitting on top of the other half.

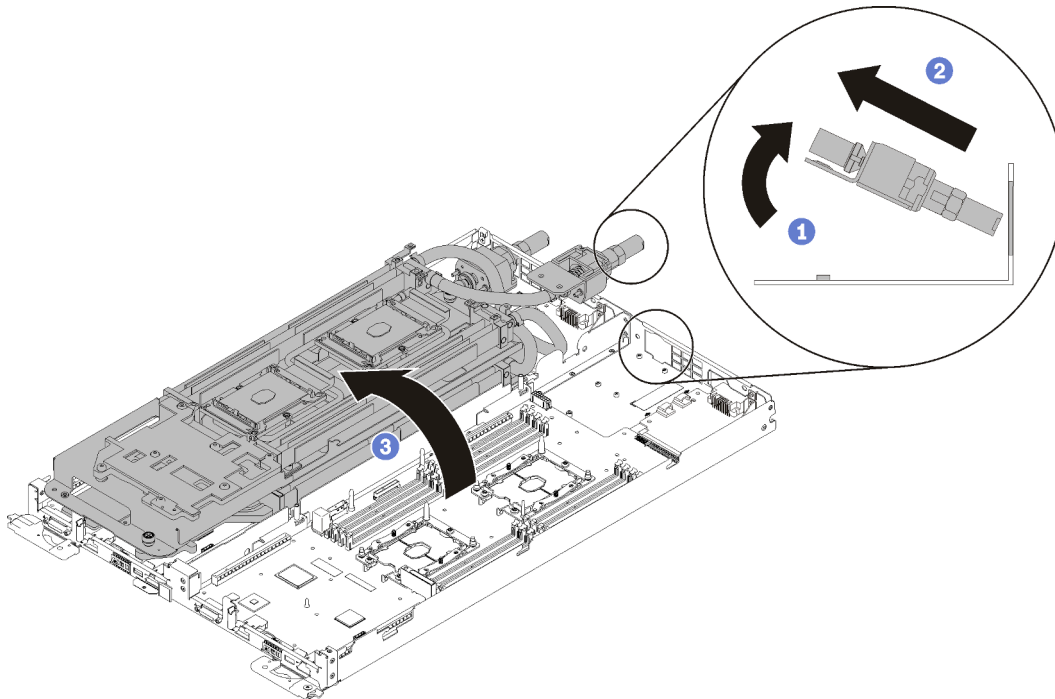


Figure 221. Folding the water loop

12. Remove the power distribution board (see [“Remove the power distribution board” on page 161](#)).
13. Remove the blank bezel filler.

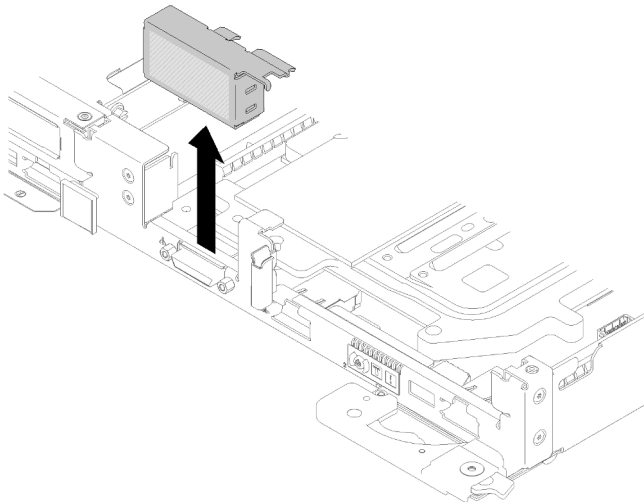


Figure 222. Blank bezel filler removal

14. Remove the system board (see [“Remove a system board” on page 185](#)).

**Attention:**

- TCM/TPM adapter is the unique component for the nodes that are sold in Chinese Mainland.
- When the TCM/TPM adapter is removed, all TCM/TPM functions will be disabled.

Complete the following steps to remove TCM/TPM adapter.

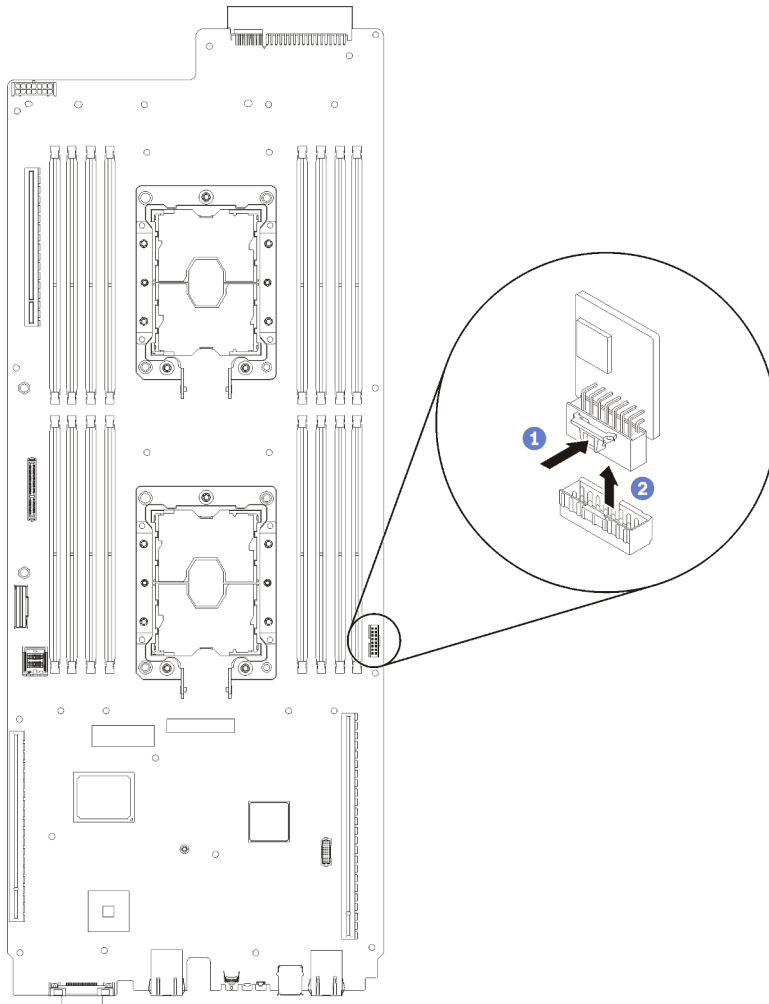


Figure 223. TCM/TPM adapter removal

- Step 1. Locate the TCM/TPM connector on the system board (see [“System-board internal connectors”](#) on page 21).
- Step 2. Carefully hold the TCM/TPM adapter by its edges; then, gently press on the latch, and lift it from the system board.

**Notes:**

- Carefully handle the TCM/TPM adapter by its edges.
- Your TCM/TPM adapter might look slightly different from the illustration.

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

**Demo video**

[Watch the procedure on YouTube](#)

## **Install the TCM/TPM adapter (for Chinese Mainland only)**

Use this information to install the TCM/TPM adapter.

Before installing the TCM/TPM adapter, touch the static-protective package that contains the new TCM/TPM adapter to any unpainted surface on the outside of the server. Then, take the new TCM/TPM adapter out of the package and place it on a static-protective surface.

**Attention:** To avoid damaging the water loop, always use the water loop carrier when removing, installing or folding the water loop.

Before you install the TCM/TPM:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.

### **Attention:**

- TCM/TPM adapter is the unique component for the nodes that are sold in Chinese Mainland.
- When the TCM/TPM adapter is removed, all TCM/TPM functions will be disabled.

Complete the following steps to install the TCM/TPM adapter.

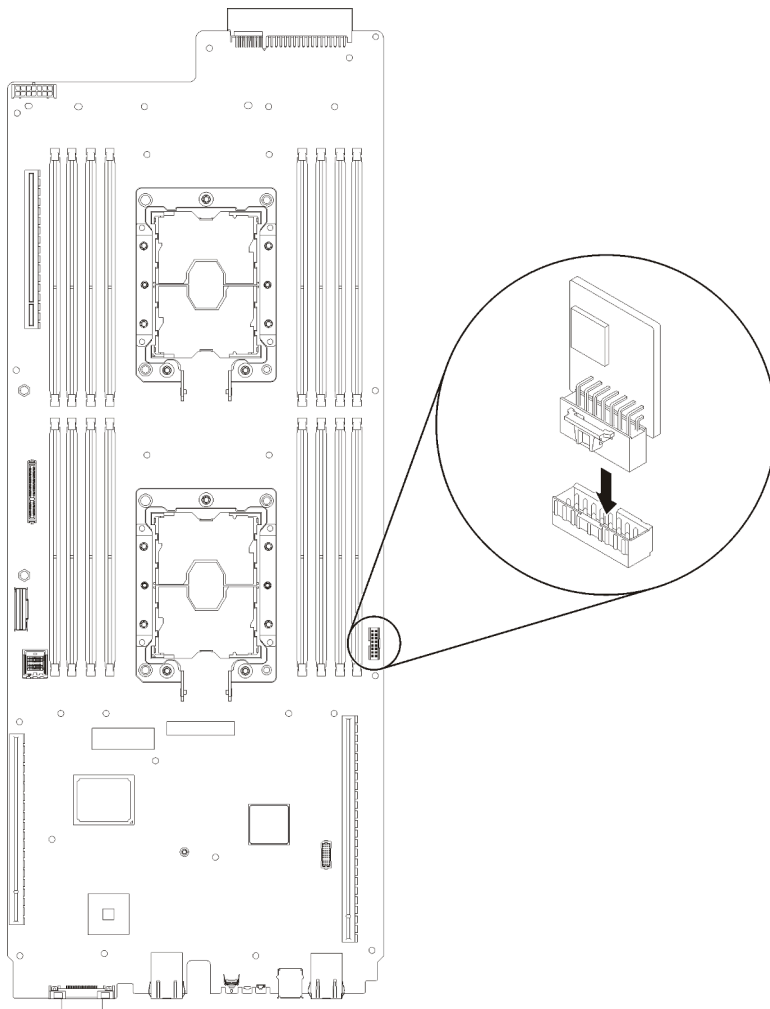


Figure 224. TCM/TPM adapter installation

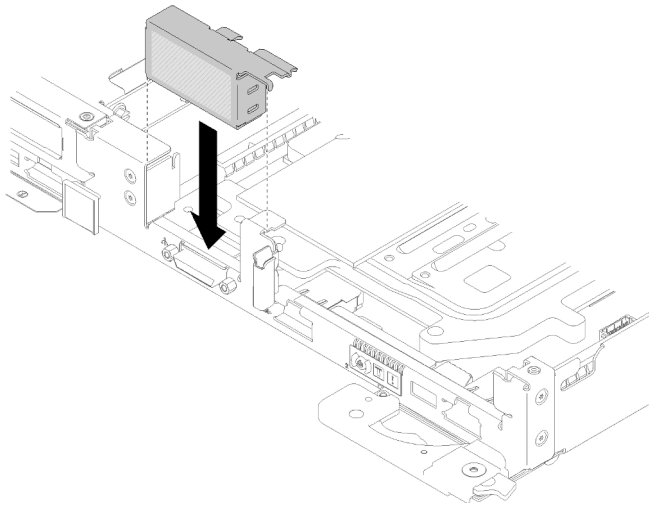
- Step 1. Touch the static-protective package that contains the TCM/TPM to any *unpainted* metal surface on the chassis or any *unpainted* metal surface on any other grounded rack component; then, remove the TCM/TPM from the package.
- Step 2. Carefully hold the TCM/TPM adapter by its edges and insert it into the TCM/TPM adapter connector on the system board.
- Step 3. Carefully hold the TCM/TPM adapter by its edges and insert it into the TCM/TPM connector on the system board.

**Notes:**

- Carefully handle the TCM/TPM adapter by its edges.
- Your TCM/TPM adapter might look slightly different from the illustration.

After you install the TCM/TPM, complete the following steps:

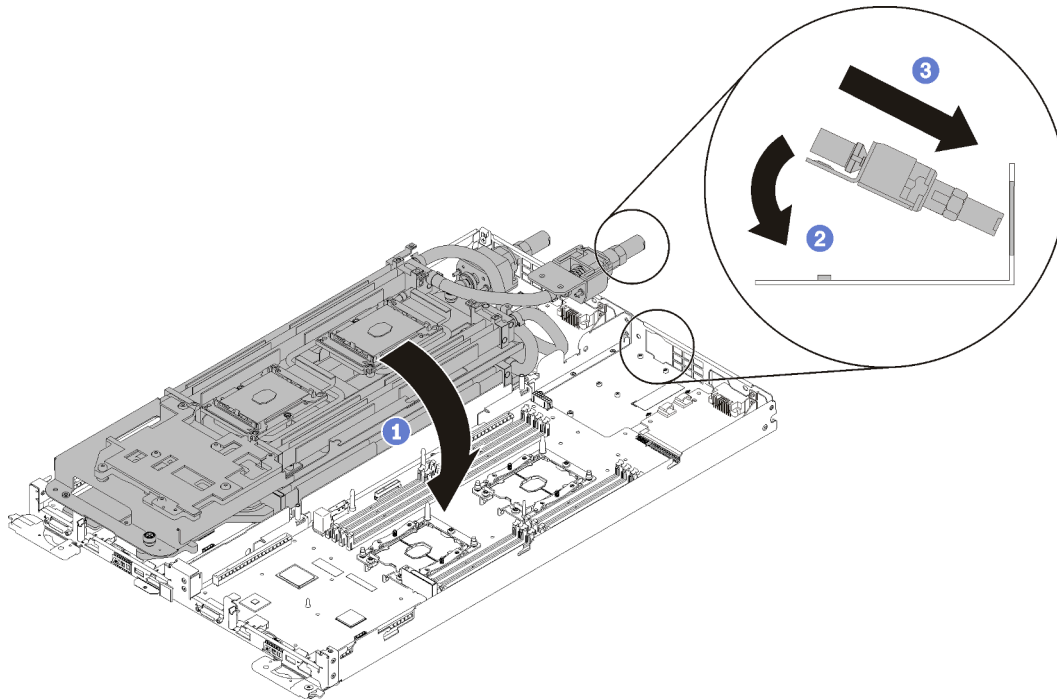
1. Reinstall the system board (see [“Install a system board” on page 194](#)).
2. Reinstall the blank bezel filler.



*Figure 225. Blank bezel filler installation*

3. Reinstall the power distribution board (see [“Install the power distribution board” on page 163](#)).
4. Reinstall the water loop.
  - a. Carefully rotate the top side of the water loop.
  - b. Carefully insert the quick connect into the tray opening as shown.
  - c. Lower and orient the water loop carrier over the M.2 backplane planes; then, ensure the processor socket guide pins fit correctly through holes in the water loop cold plates.

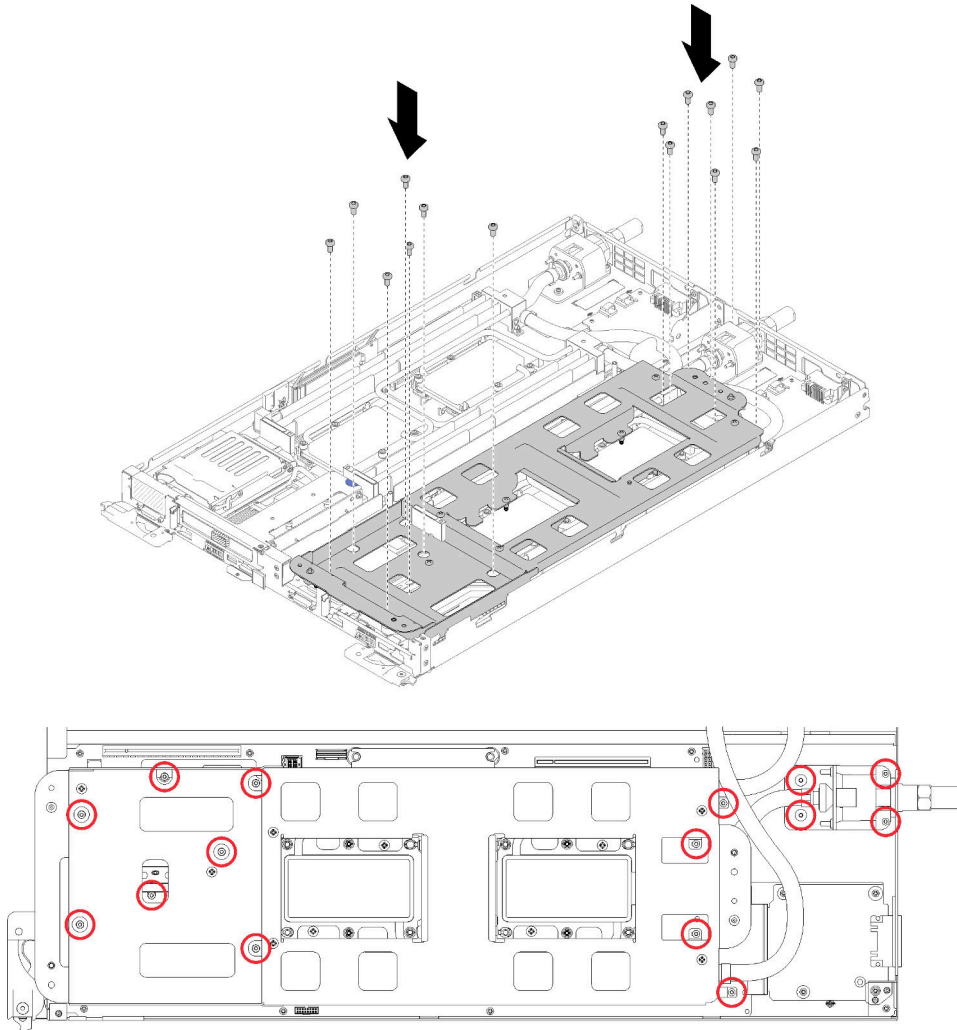
- d. Gently put the other side of the water loop down and ensure it is seated firmly on the system board.



*Figure 226. Water loop installation*

- e. Hook two quick connects.

- f. Secure the water loop and the quick connect to the tray by carefully inserting 15 silver Torx T10 screws.



*Figure 227. Silver T10 screw installation*

g. Loosen water loop carrier screws (10x P2 screws per node).

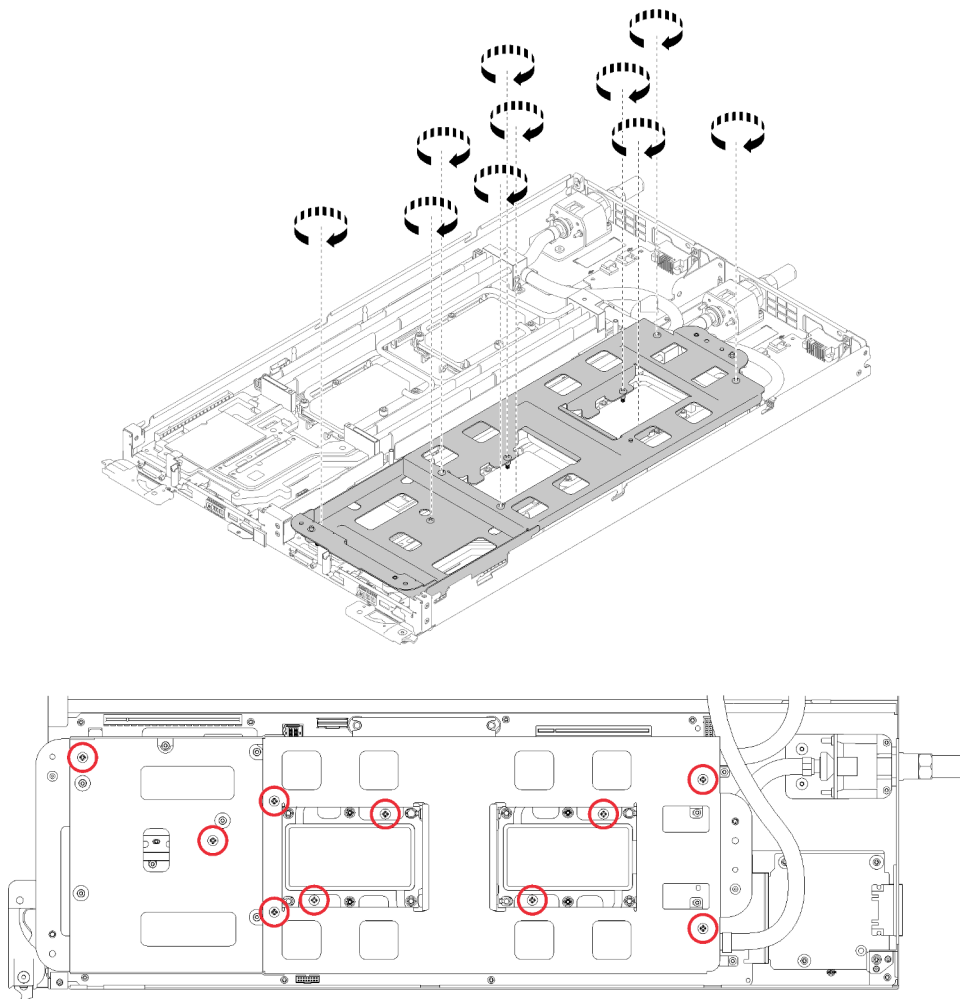


Figure 228. Loosening captive P2 screws

- h. Fully tighten all Torx T30 captive fasteners (8x Torx T30 captive fasteners per node) on cold plates in the installation sequence shown on the cold plate label.

**Attention:** To prevent damage to components, make sure that you follow the indicated tightening sequence.

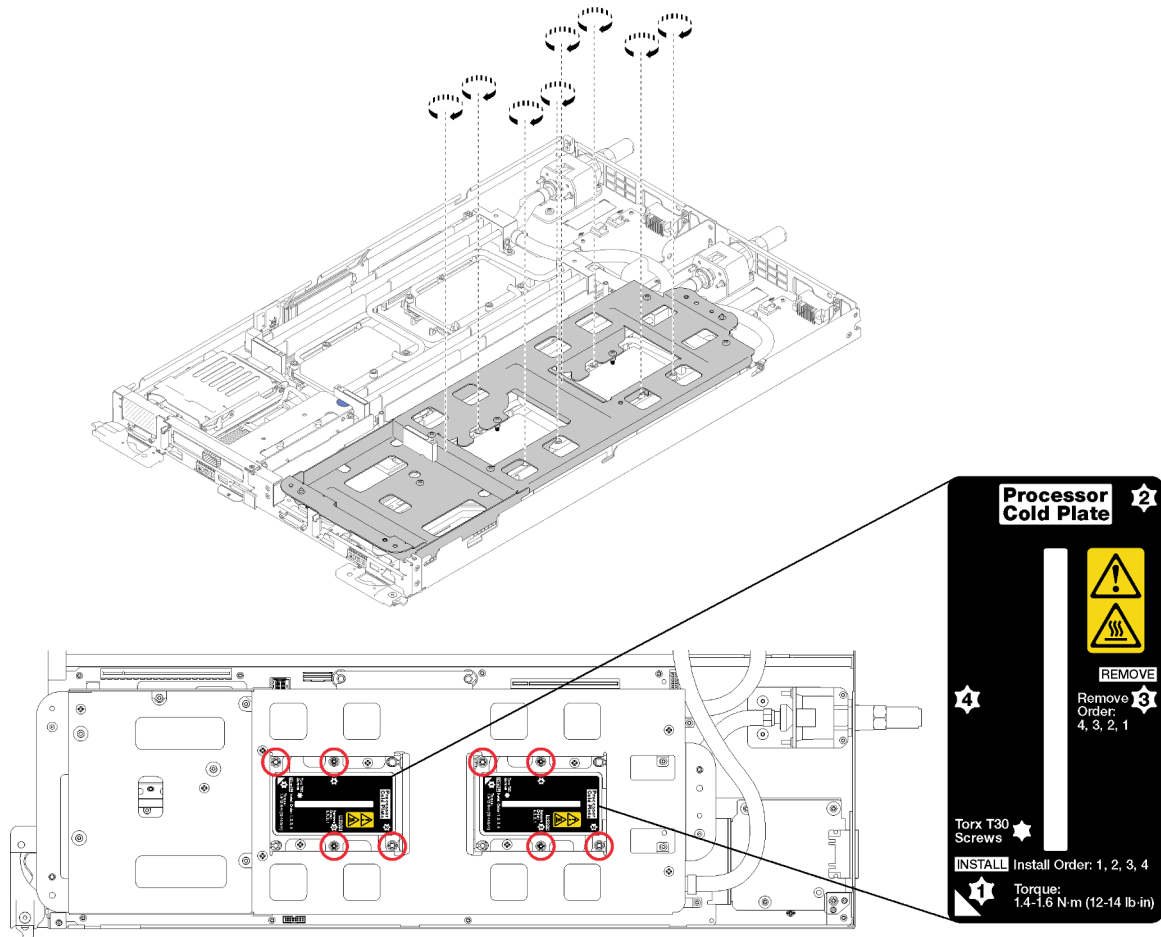
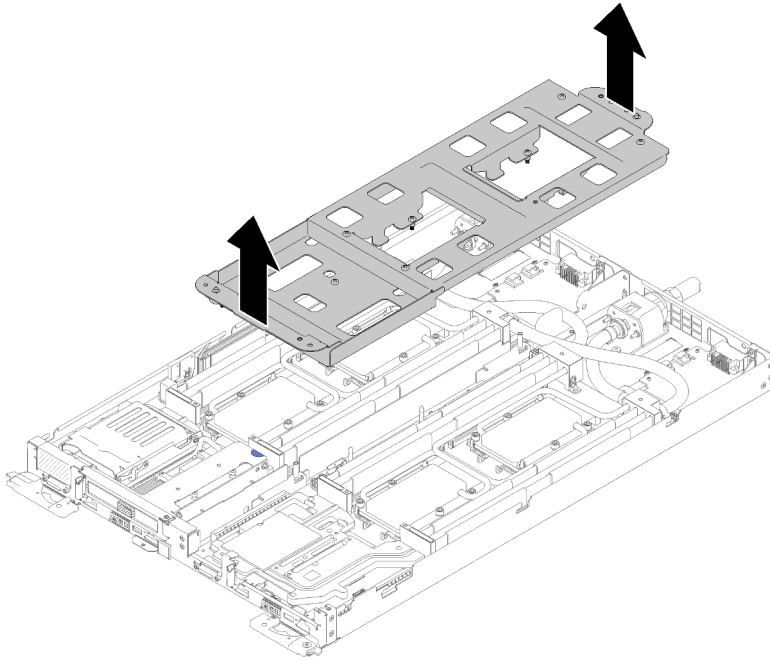


Figure 229. Tightening screws

- i. Carefully lift the water loop carrier up and away from the water loop.



*Figure 230. Water loop carrier removal*

5. Reinstall all four DIMM covers and DIMMs for both nodes (see [“Install a DIMM” on page 129](#)).
6. Reinstall M.2 backplanes for both nodes (see [“Install the M.2 backplane” on page 144](#)).
7. Reinstall drive cage assemblies if applicable (see [“Install a drive cage assembly” on page 139](#)).
8. Reinstall PCIe rise assemblies if applicable (see [“Install an adapter” on page 151](#) or [“Install an Internal Faceplate Transition \(IFT\) adapter” on page 157](#) depending on your configuration).
9. Reinstall both air baffles.

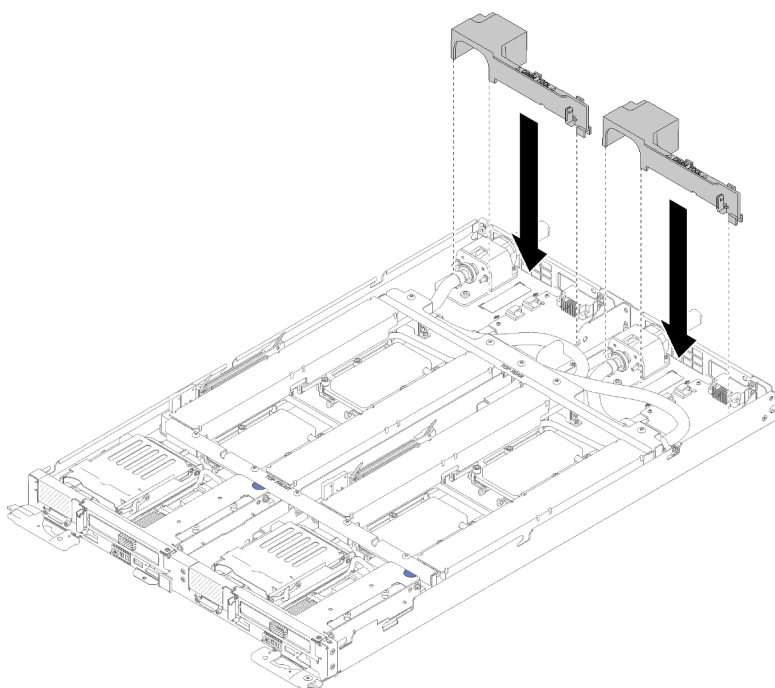


Figure 231. Air baffle installation

10. Reinstall the front and the rear cross braces (10x P2 screws).

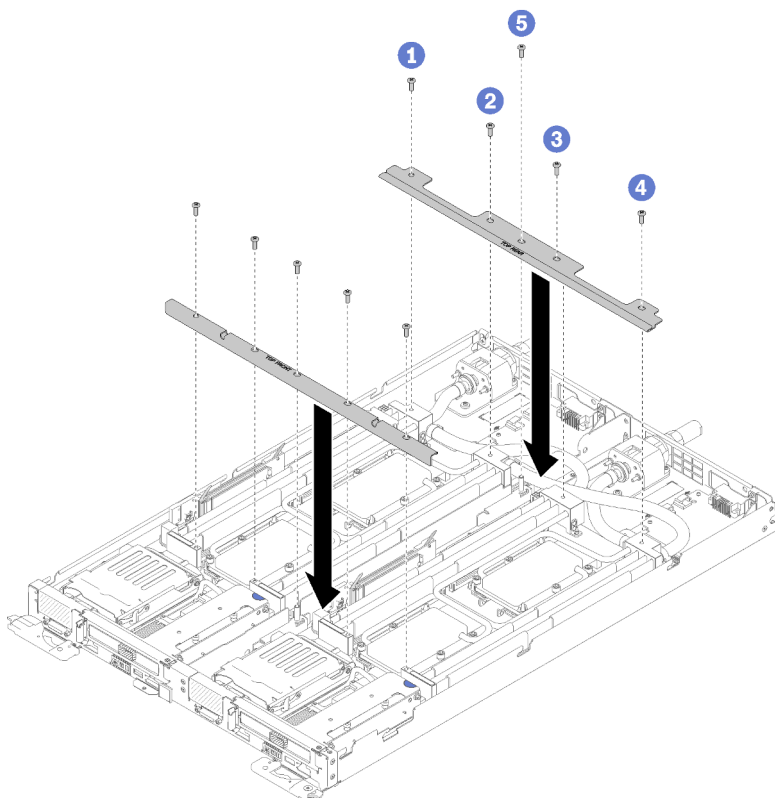


Figure 232. Cross brace installation

11. Reinstall the tray cover (see [“Install the tray cover”](#) on page 211).

12. Reinstall the tray (see [“Install a DWC tray in the enclosure” on page 245](#)).
13. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.

### Demo video

[Watch the procedure on YouTube](#)

## Water loop replacement

Use the following procedures to remove and install the water loop.

### Remove the water loop

Use this information to remove the water loop.

**Attention:** To avoid damaging the water loop, always use the water loop carrier when removing, installing or folding the water loop.

Before you remove the water loop:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Turn off the corresponding DWC tray that you are going to perform the task on.
3. Remove the tray (see [“Remove a DWC tray from the enclosure” on page 244](#)).
4. Remove the tray cover (see [“Remove the tray cover” on page 210](#)).
5. Remove both air baffles.

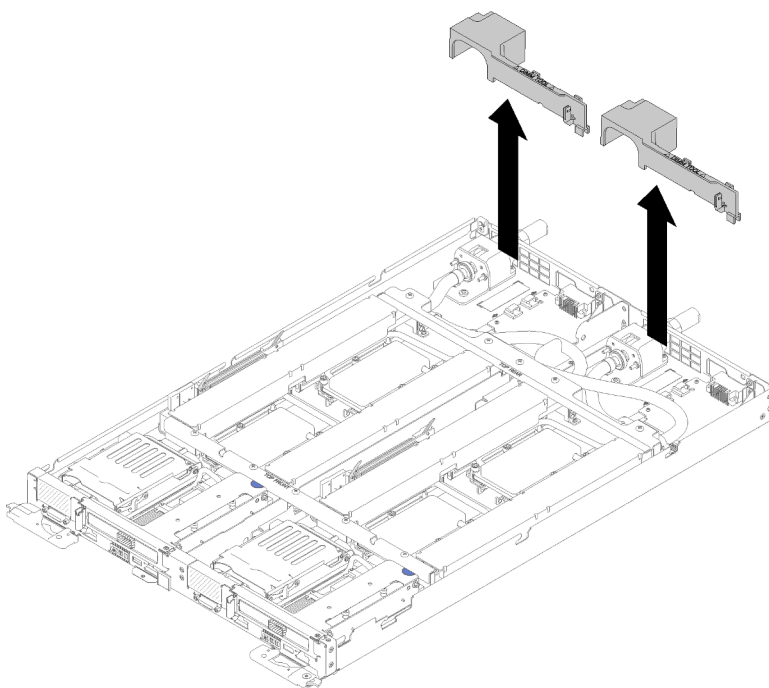


Figure 233. Air baffle removal

6. Remove the front and the rear cross braces (10x P2 screws).

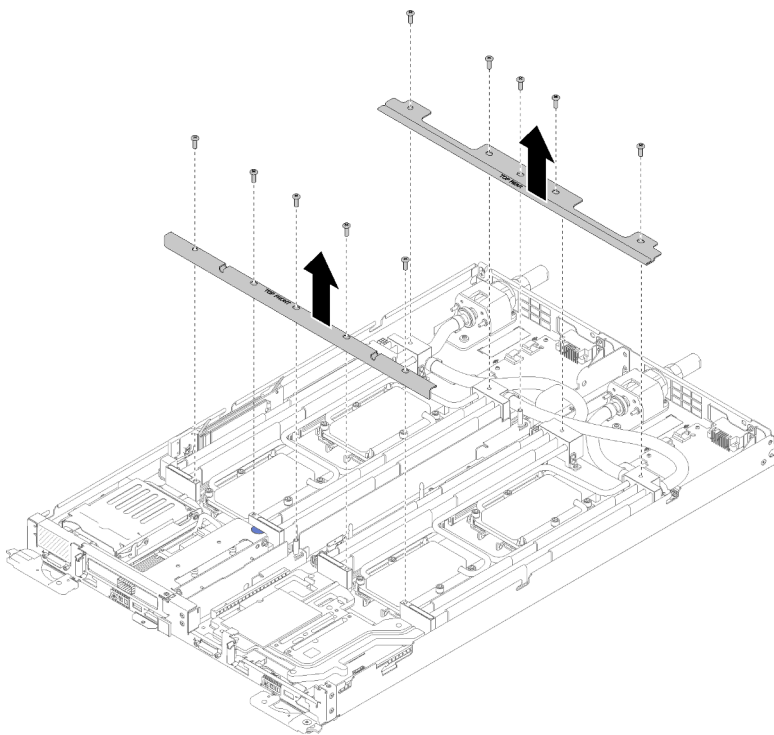
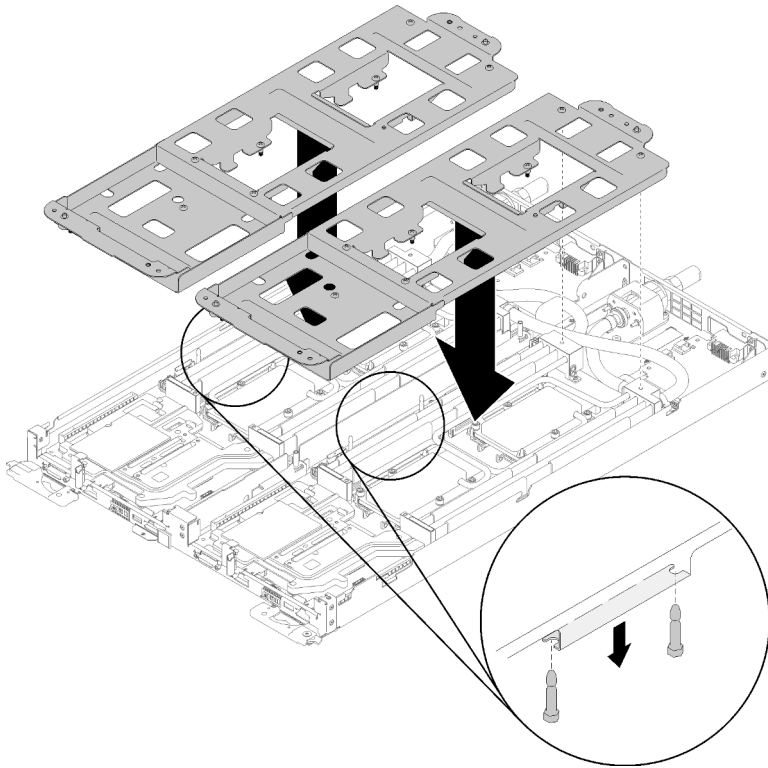


Figure 234. Cross brace removal

7. Remove all four DIMM covers and DIMMs for both nodes (see [“Remove a DIMM” on page 126](#)).
8. Remove M.2 Backplanes from both nodes (see [“Remove the M.2 backplane” on page 143](#)).
9. Remove drive cage assemblies from both nodes (see [“Remove a drive cage assembly” on page 137](#)).
10. Remove PCIe riser assemblies from both nodes if applicable (see [“Remove an adapter” on page 149](#) or [“Remove an Internal Faceplate Transition \(IFT\) adapter” on page 155](#) depending on your configuration).

Complete the following steps to remove the water loop.

- Step 1. Carefully place each water loop carrier down on the water loop one at a time and ensure they are seated firmly on the water loop.



*Figure 235. Water loop carrier installation*

Step 2. Remove water loop screws (30x silver Torx T10 screws).

**Note:** The following illustration shows screw locations for one node. The screw locations are identical for two nodes.

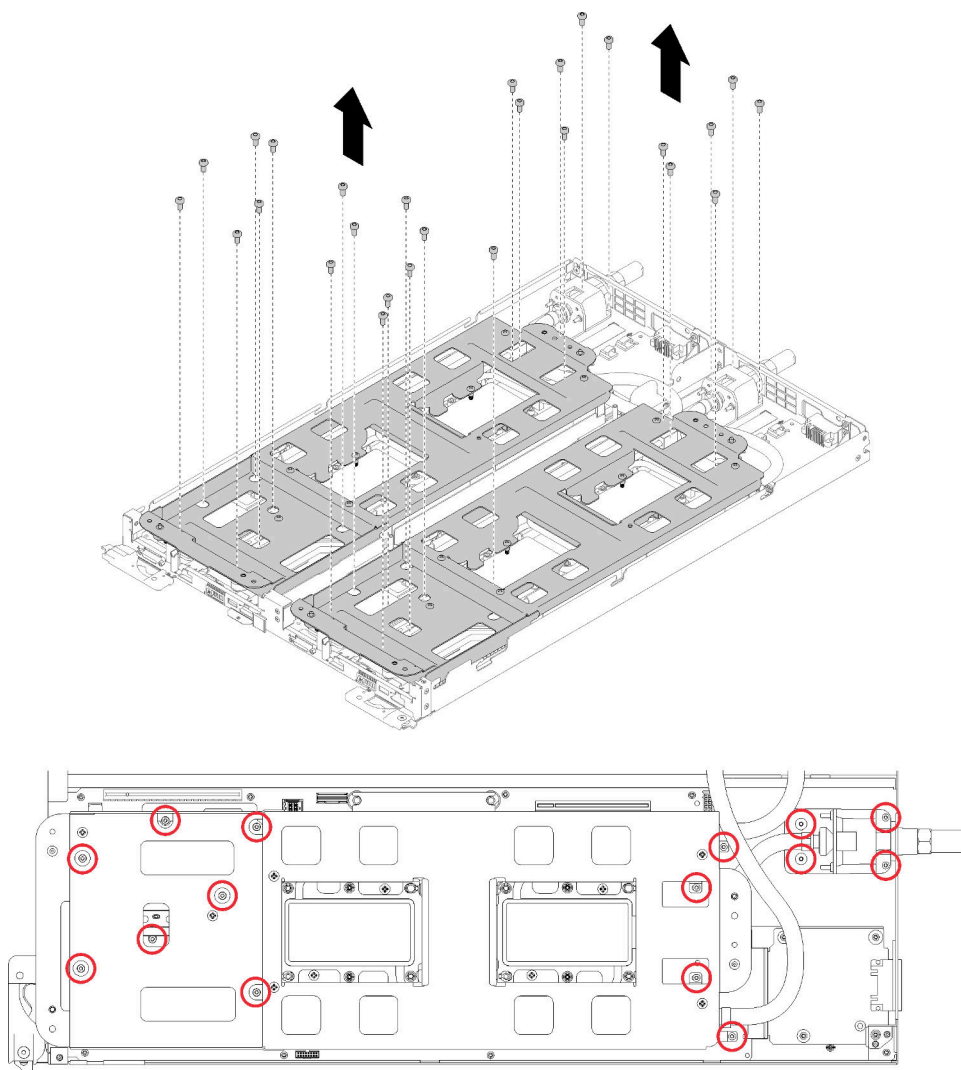


Figure 236. Silver T10 screw removal

Step 3. Fully loosen all Torx T30 captive fasteners (entire water loop has 16 total Torx T30 captive fasteners) on cold plates in the removal sequence shown on the cold plate label.

**Attention:** To prevent damage to components, make sure that you follow the indicated loosening sequence.

**Note:** The following illustration shows screw locations for one node. The screw locations are identical for two nodes.

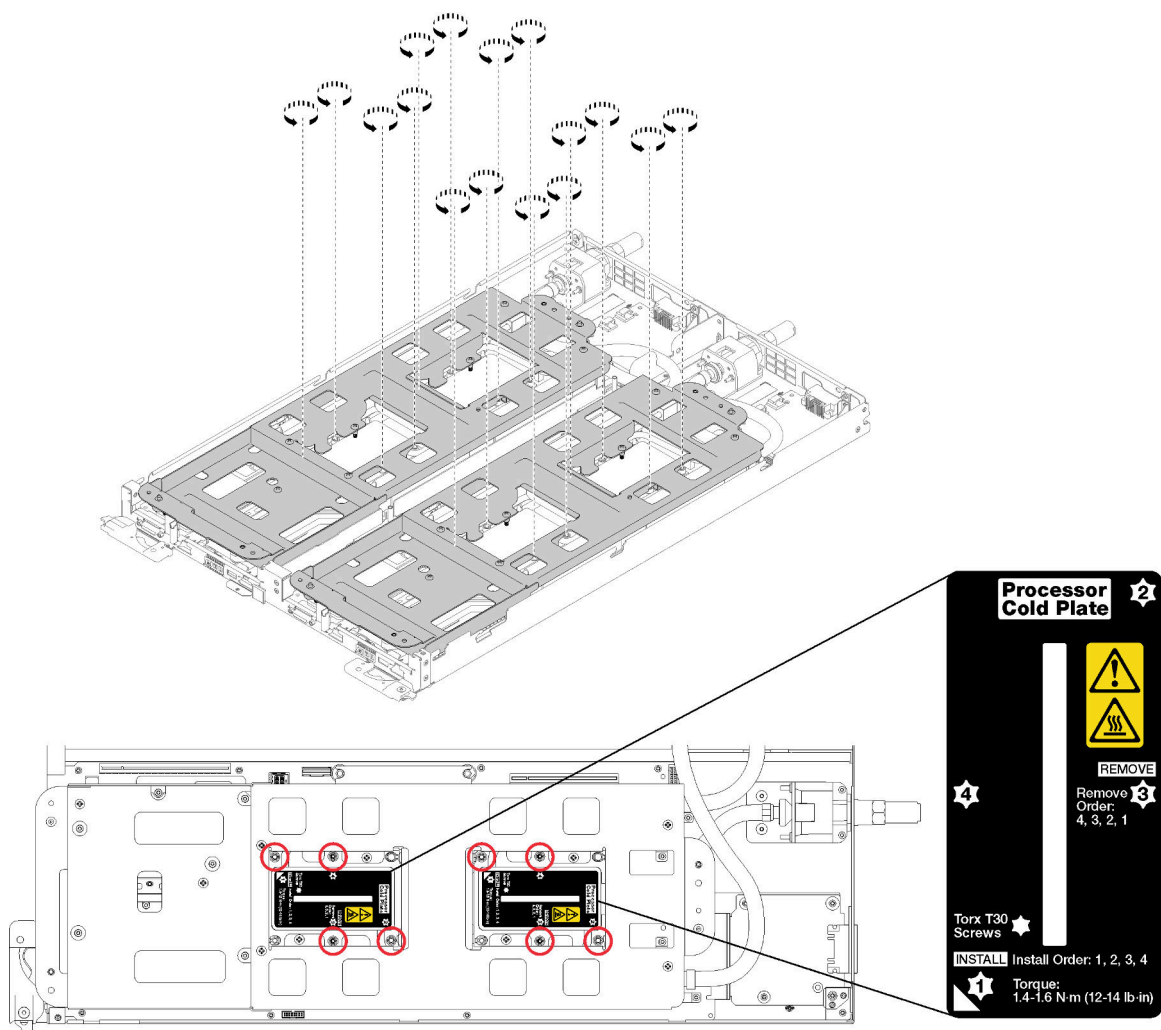


Figure 237. Loosening Torx T30 captive fasteners

Step 4. Tighten captive water loop carrier screws (20x P2 screws) to secure the carrier to the water loop.

**Note:** The following illustration shows screw locations for one node. The screw locations are identical for two nodes.

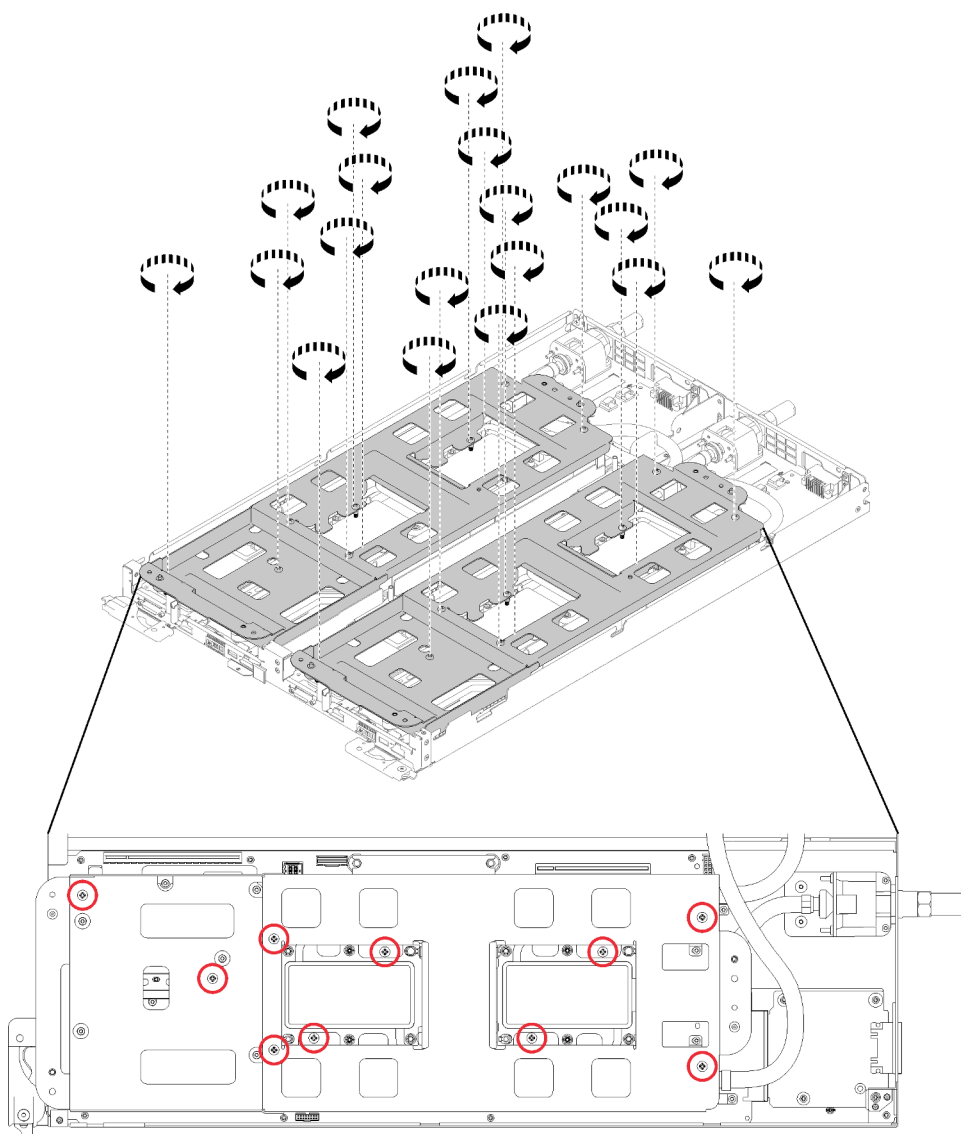


Figure 238. Tightening captive P2 screws

**Step 5. Fold the water loop.**

- a. Carefully lift the water loop up off the system board, then unhook the quick connect from the four alignment posts and slide the quick connect out of the opening in the rear of the tray.
- b. Carefully rotate the water loop so one half is sitting on top of the other half. There are dimples and openings at the ends of the water loop carriers that nest when two carriers are aligned back to back.
- c. Fasten two captive thumbscrews to secure water loop carriers to each other.

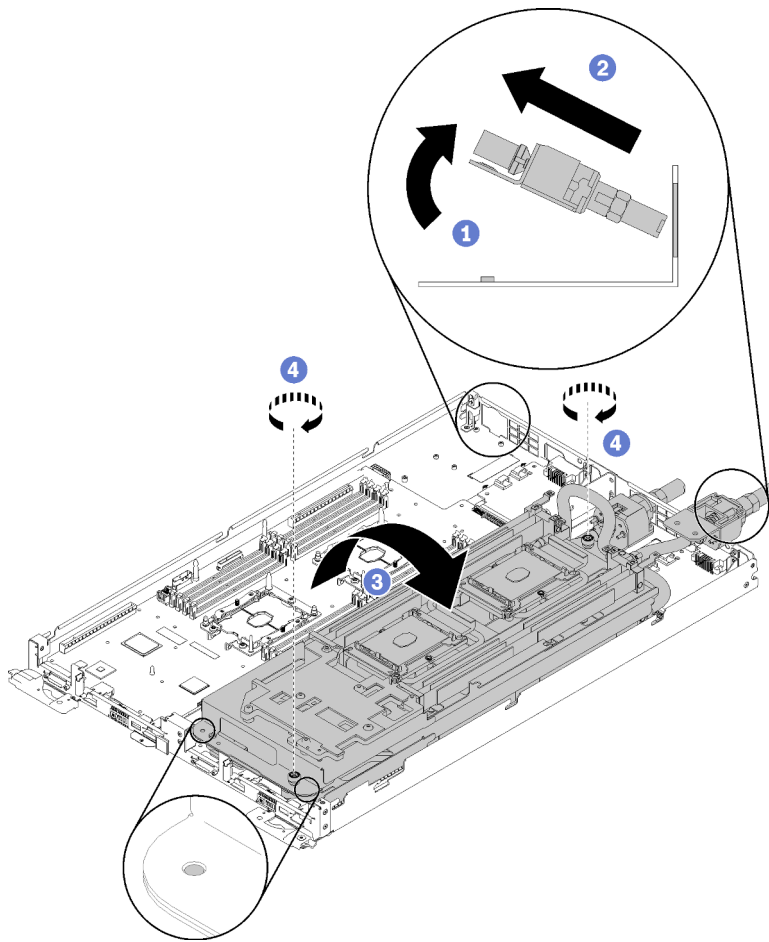


Figure 239. Water loop rotation

Step 6. Remove the water loop.

- a. Carefully lift the water loop up off the system board.
- b. Unhook the quick connect from the four alignment posts and slide the quick connect out of the opening in the rear of the tray.
- c. Lift the water loop out of the node.

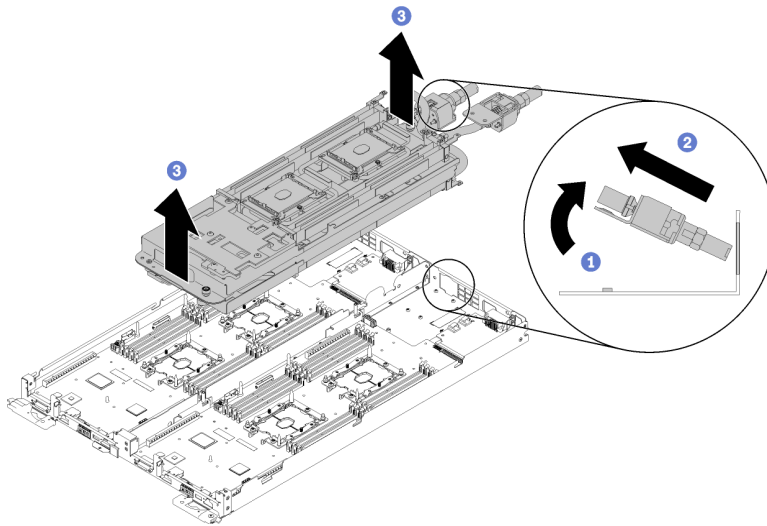


Figure 240. Water loop removal

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

### Demo video

[Watch the procedure on YouTube](#)

### Install the water loop

Use this information to install the water loop.

**Attention:** To avoid damaging the water loop, always use the water loop carrier when removing, installing or folding the water loop.

Before you install the water loop:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Make sure all processors are installed properly on all four water loop cold plates (see [“Install a processor” on page 175](#)).
3. Loosen only one set of water loop carrier thumb screws; then, flip over water loop.

Complete the following steps to install the water loop.

Step 1. Install the water loop.

- a. Orient the water loop with the quick connect facing up that correlates to side of water loop you are installing first.
- b. While holding the water loop with both hands, angle rear downward and insert the quick connect tip through the opening in the rear of the tray.
- c. Orient the water loop with two M.2 backplane guide pins.
- d. Gently put the water loop down and ensure it is seated firmly on the system board.

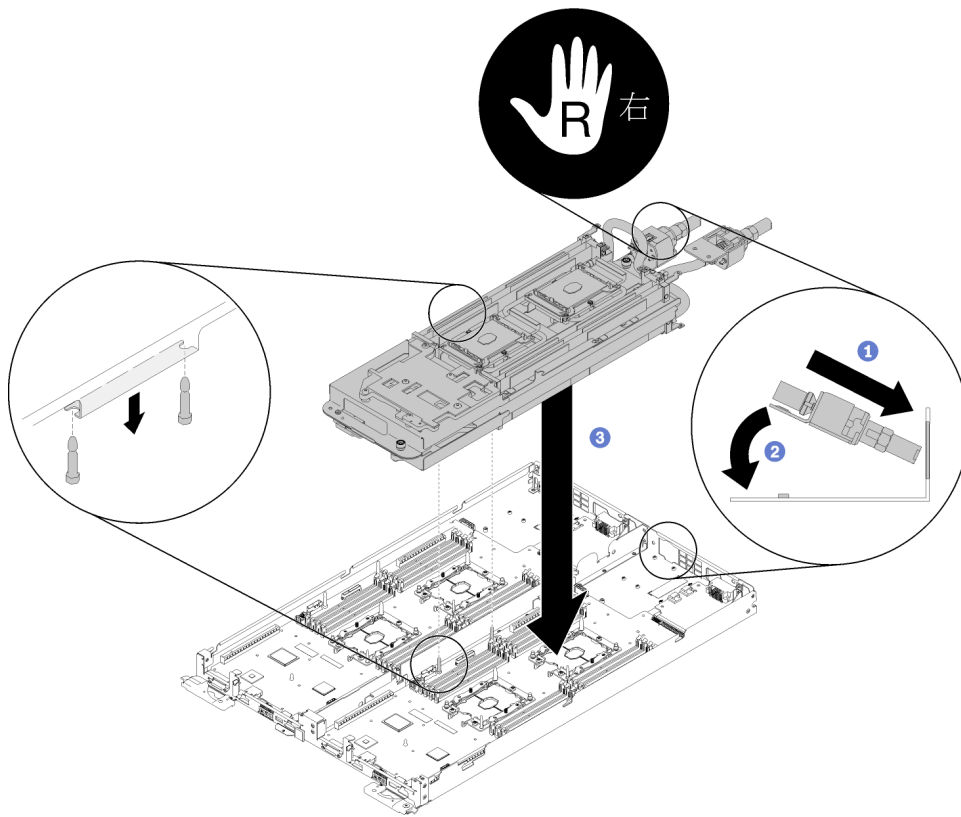


Figure 241. Water loop carrier installation

Step 2. Loosen two captive thumbscrews located at each end of the water loop carrier.

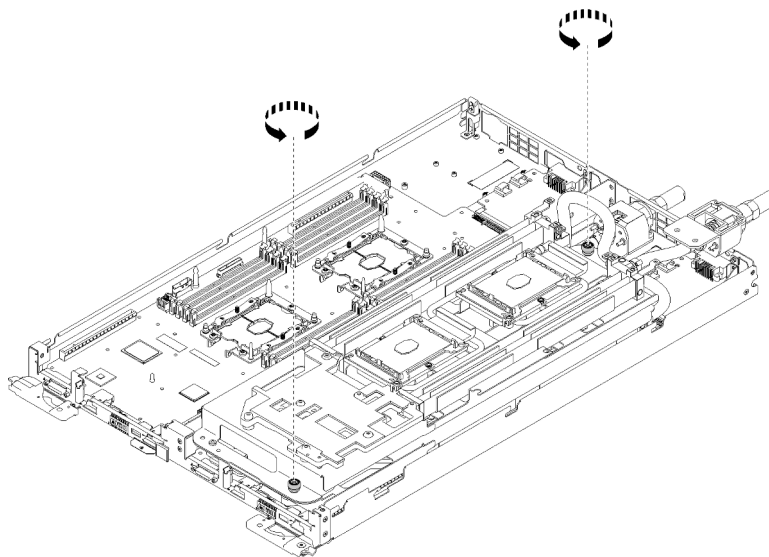
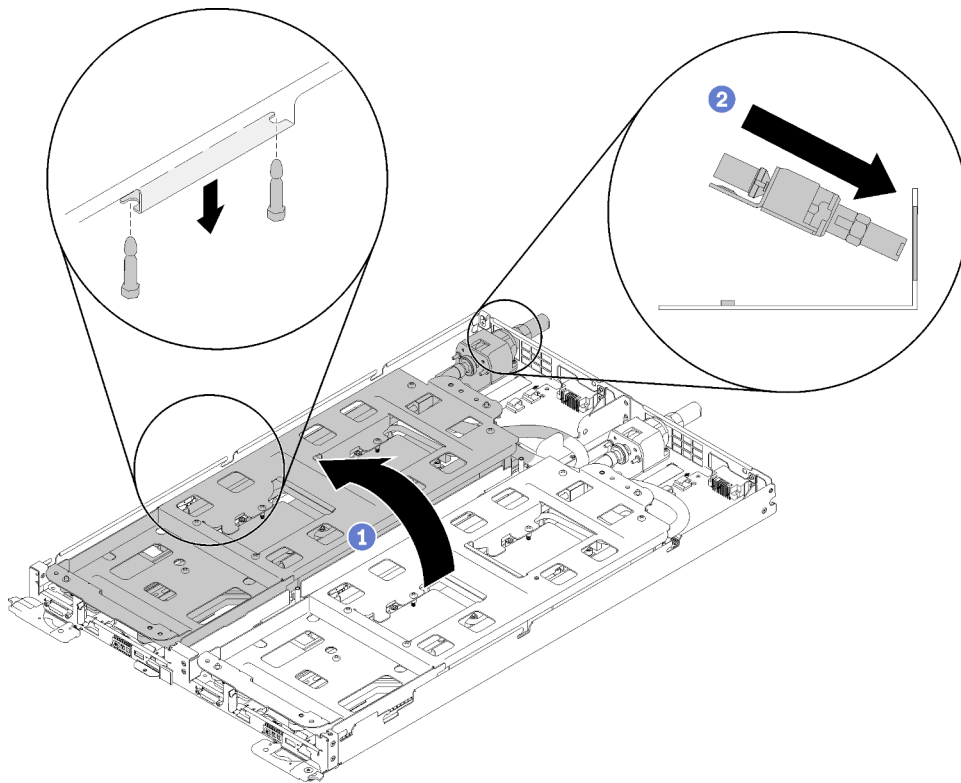


Figure 242. Loosening captive thumbscrews

Step 3. Install the other side of the water loop.

- Carefully lift top side of the water loop and rotate it to the other half of the tray.
- Carefully insert the quick connect into the tray opening as shown.

- c. Lower and orient the water loop carrier over the M.2 backplane guide pins; then, ensure the processor socket guide pins fit correctly through holes in the water loop cold plates.
- d. Gently lower the water loop down and ensure it is seated firmly on the system board.



*Figure 243. Second half water loop rotation and initial placement*

- Step 4. Make sure quick connects are seated correctly over the four threaded pins for each node.
- Step 5. Secure the entire water loop and both quick connects to the tray by carefully inserting and tightening 30 silver Torx T10 screws.

**Note:** The following illustration shows screw locations for one node. The screw locations are identical for two nodes.

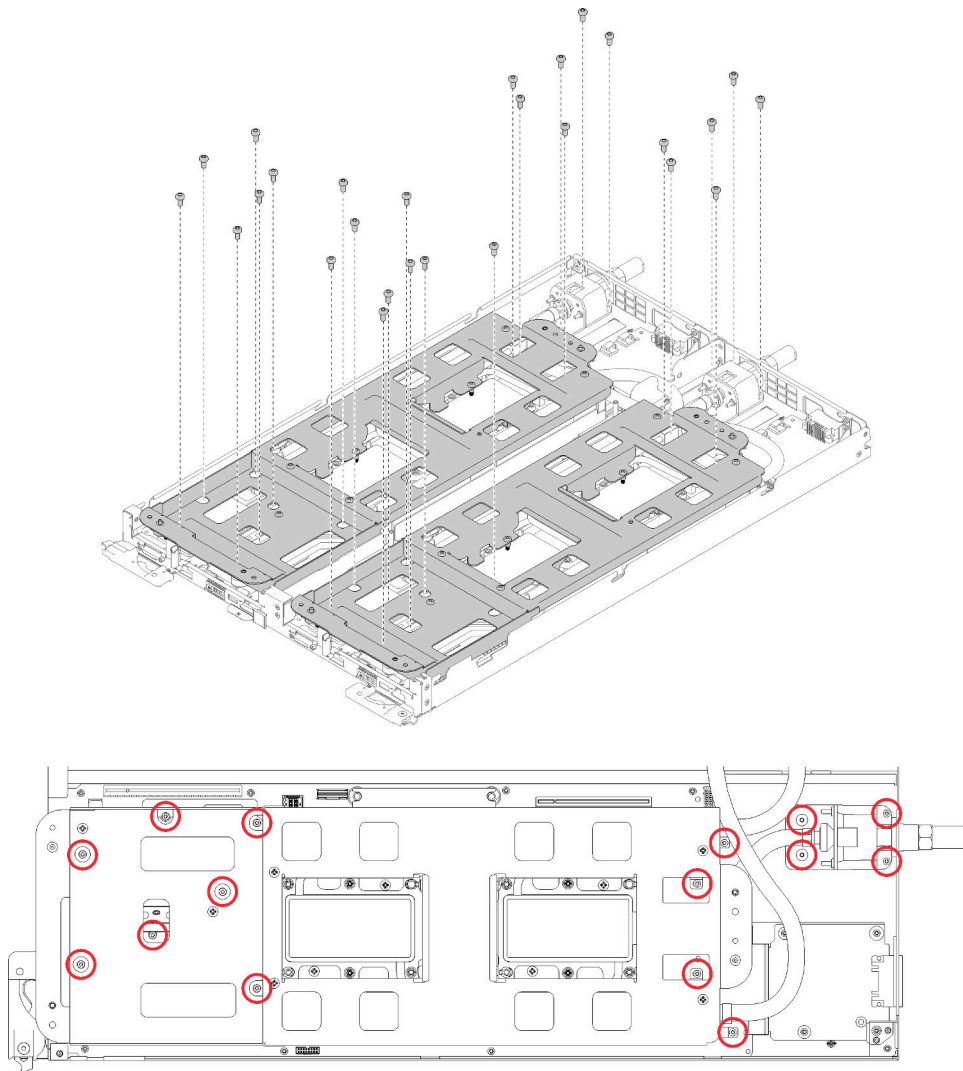
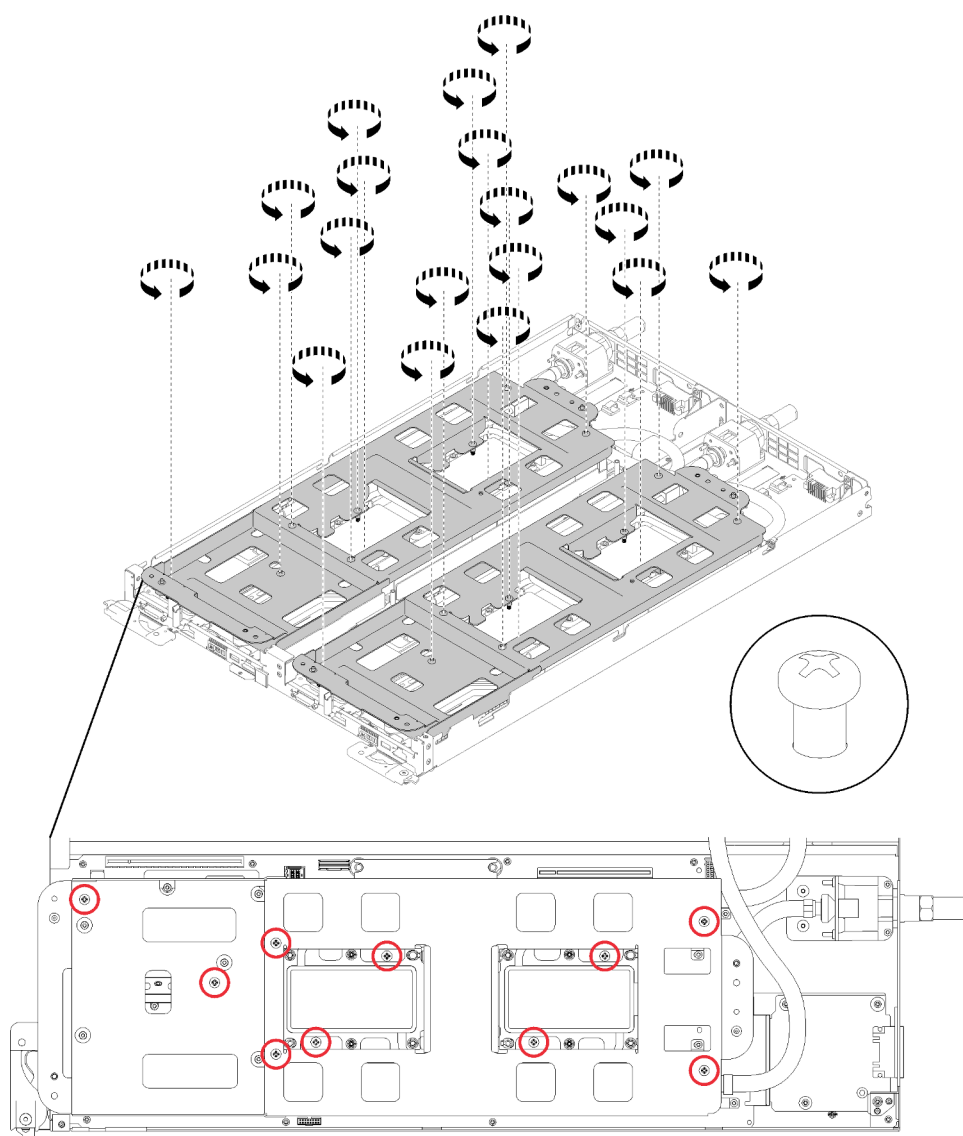


Figure 244. Locations of silver Torx T10 screws used to secure the water loop

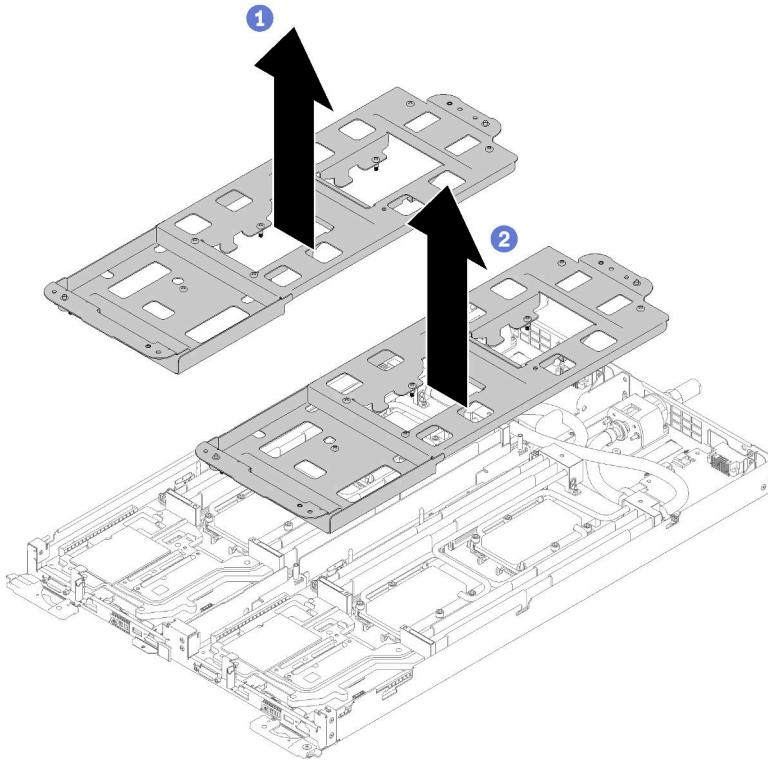
Step 6. Loosen water loop carrier screws (20x P2 screws).

**Note:** The following illustration shows screw locations for one node. The screw locations are identical for two nodes.



*Figure 245. Loosening captive P2 screws to release carriers from the water loop*

Step 7. Carefully lift each water loop carrier up and away from the water loop one at a time.



*Figure 246. Water loop carriers removal*

- Step 8. Fully tighten all Torx T30 captive fasteners (entire water loop has 16 total Torx T30 captive fasteners) on cold plates in the installation sequence shown on the cold plate label.

**Attention:** To prevent damage to components, make sure that you follow the indicated tightening sequence.

**Note:** The following illustration shows screw locations for one node. The screw locations are identical for two nodes.

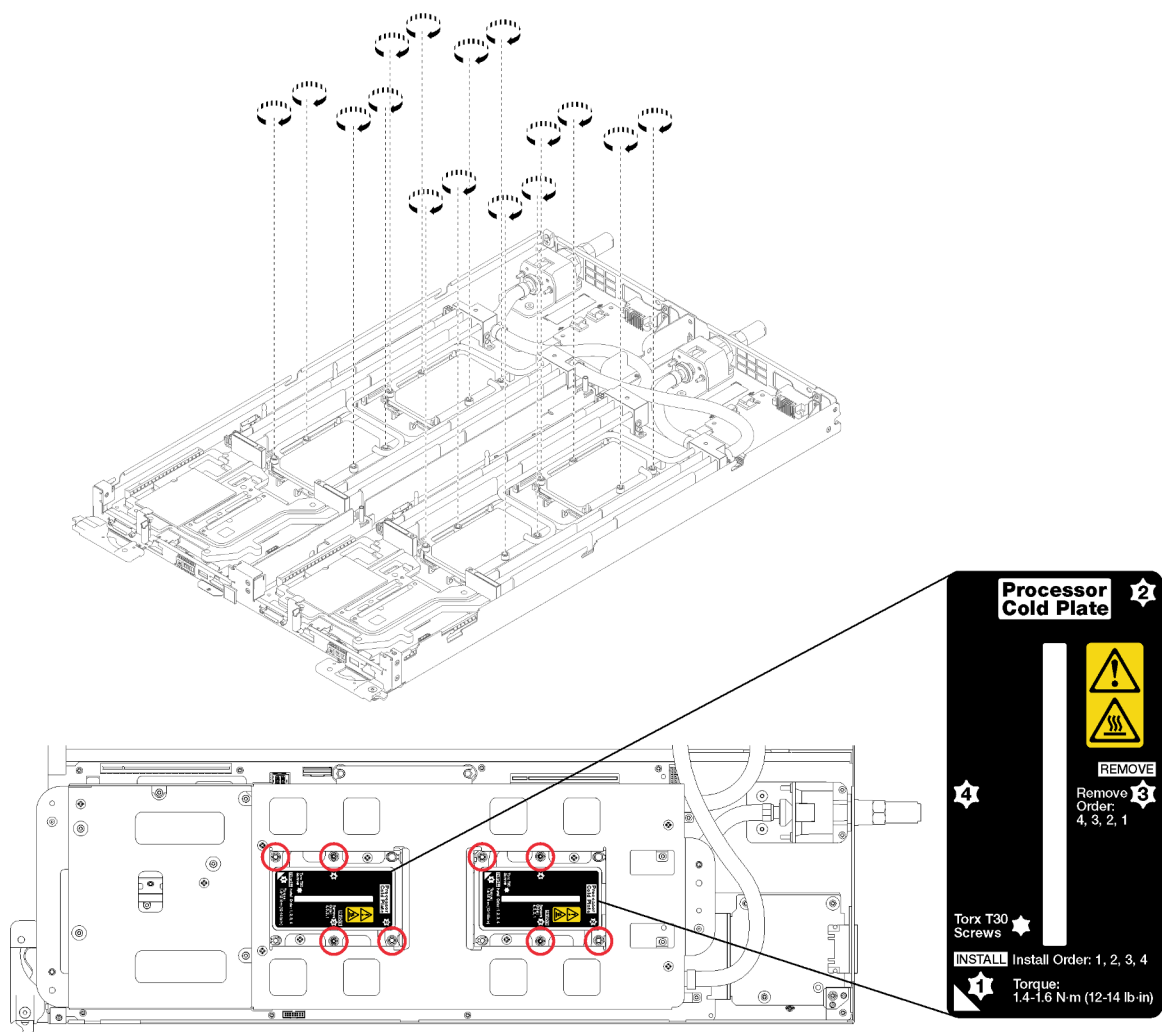
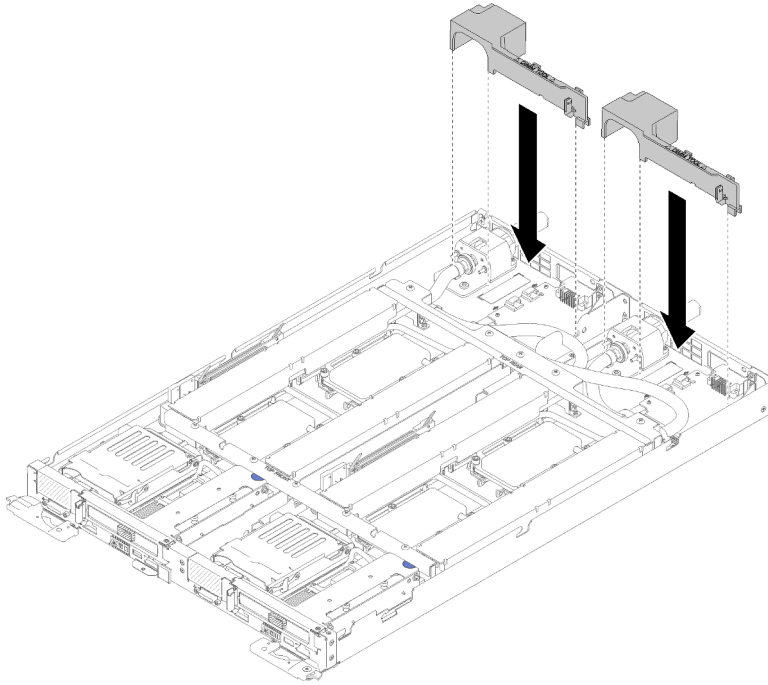


Figure 247. Tightening Torx T30 captive fasteners

Step 9. Install both air baffles.



*Figure 248. Air baffle installation*

After you install the water loop, complete the following steps:

1. Reinstall all four DIMM covers and DIMMs for both nodes (see [“Install a DIMM” on page 129](#)).
2. Reinstall M.2 backplanes for both nodes (see [“Install the M.2 backplane” on page 144](#)).
3. Reinstall drive cage assemblies for both nodes (see [“Install a drive cage assembly” on page 139](#)).
4. Reinstall PCIe rise assemblies for both nodes if applicable (see [“Install an adapter” on page 151](#) or [“Install an Internal Faceplate Transition \(IFT\) adapter” on page 157](#) depending on your configuration).
5. Install the front and the rear cross braces (10x P2 screws) as shown below.

**Note:** Install the center screw last.

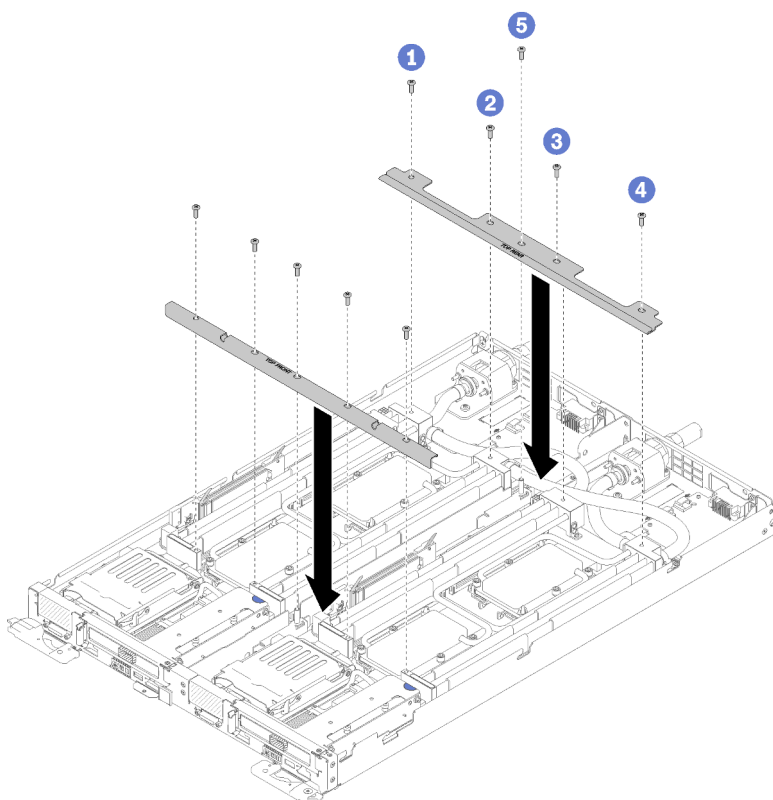


Figure 249. Cross brace installation

6. Reinstall the tray cover (see “Install the tray cover” on page 211).
7. Reinstall the tray (see “Install a DWC tray in the enclosure” on page 245).
8. Check the power LED on each node to make sure it changes from fast blink to slow blink to indicate both nodes are ready to be powered on.

#### Demo video

[Watch the procedure on YouTube](#)

## DWC tray replacement

Use the following procedures to remove and install a DWC tray.

### Remove a DWC tray from the enclosure

Use this information to remove a DWC tray from the enclosure.

#### S002



#### CAUTION:

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To

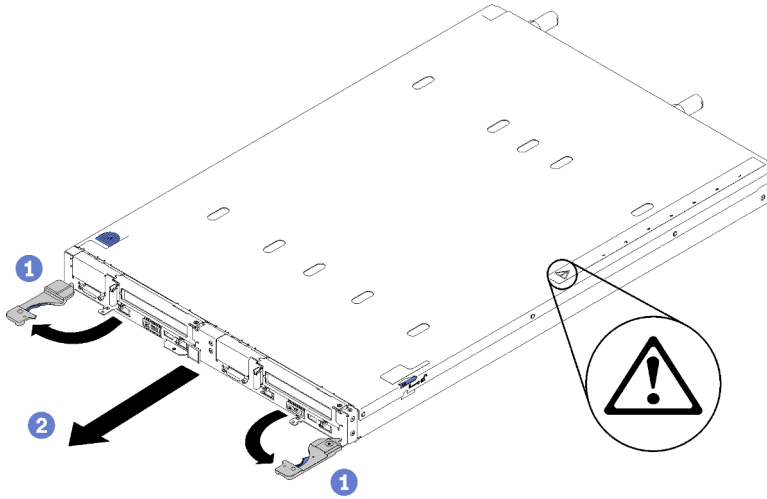
**remove all electrical current from the device, ensure that all power cords are disconnected from the power source.**

Before you remove a DWC tray from the enclosure:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.
2. Turn off the corresponding DWC tray that you are going to perform the task on.

Complete the following steps to remove a DWC tray from the enclosure.

Step 1. Rotate the release latches as shown in the illustration. The DWC tray moves out of the tray bay approximately 0.6 cm (0.25 inch).



*Figure 250. DWC tray removal*

**Attention:**

- To maintain proper system cooling, do not operate the ThinkSystem DW612 Neptune® DWC Enclosure Type 7D1L without a DWC tray or tray bay filler installed in each tray bay.
- When you remove the DWC tray, note the tray bay number. Reinstalling a DWC tray into a different tray bay from the one it was removed from can have unintended consequences. Some configuration information and update options are established according to tray bay number. If you reinstall the DWC tray into a different tray bay, you might have to reconfigure the DWC tray.

- Step 2. Pull the DWC tray out of the DW612 Enclosure until you see the warning icon in the right side of the cover; then, adjust hands and grip tray (~38lb) at sides to carefully pull out of enclosure.
- Step 3. Once the DWC tray has been serviced, place the tray back into the original position as soon as possible.

If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

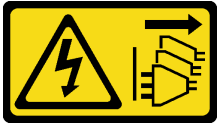
**Demo video**

[Watch the procedure on YouTube](#)

**Install a DWC tray in the enclosure**

Use this information to install a DWC tray in the enclosure.

**S002**



**CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

Before you install a DWC tray in the enclosure:

1. Read the [“Installation Guidelines” on page 35](#) to ensure that you work safely.

Complete the following steps to install a DWC tray in the enclosure.

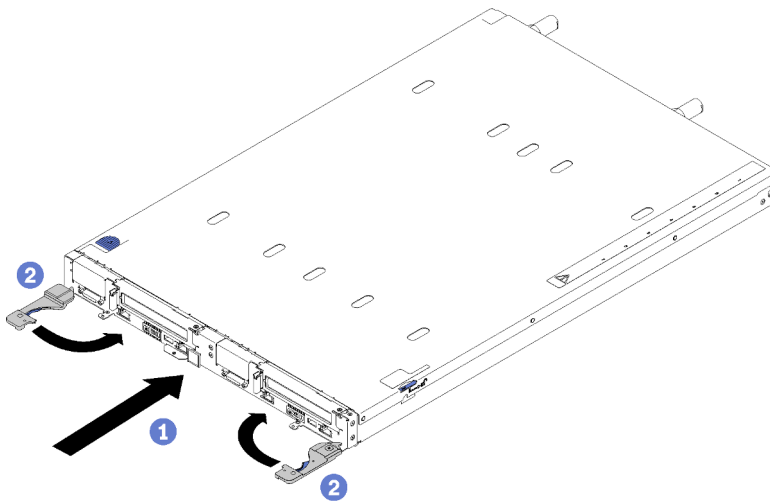


Figure 251. DWC tray installation

Step 1. Select the tray bay.

**Attention:**

- To maintain proper system cooling, do not operate the ThinkSystem DW612 Neptune® DWC Enclosure Type 7D1L without a DWC tray or tray bay filler installed in each tray bay.
- If you are reinstalling a DWC tray that you removed, you must install it in the same tray bay from which you removed it. Some DWC tray configuration information and update options are established according to tray bay number. Reinstalling a DWC tray into a different tray bay can have unintended consequences. If you reinstall the DWC tray into a different tray bay, you might have to reconfigure the DWC nodes in the tray.

Step 2. Make sure that the front handles on the DWC tray are in the open position.

Step 3. Insert the DWC tray into the tray bay until it stops.

Step 4. Rotate the front handles on the front of the DWC tray to the closed position to secure the tray in the enclosure.

**Note:** After the DWC tray is installed, the XCC in the DWC tray initializes. This process takes approximately 110 seconds. The power LED flashes rapidly, and the power button on the DWC tray does not respond until this process is complete.

- Step 5. Press the power buttons to turn on both nodes in the DWC tray.
- Step 6. Make sure that the power LED on the node control panel is lit continuously, indicating that the each node is receiving power and is turned on.
- Step 7. If you have other trays to install, do so now.

If this is the initial installation of the DWC tray in the enclosure, you must configure the DWC tray through the Setup utility and install the DWC tray operating system.

If you have changed the configuration of the DWC tray or if you are installing a different DWC tray from the one that you removed, you must configure the DWC tray through the Setup utility, and you might have to install the DWC tray operating system.

### Demo video

[Watch the procedure on YouTube](#)

---

## Complete the parts replacement

Use this information to complete the parts replacement.

To complete the parts replacement, do the following:

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your solution.
2. Properly route and secure the cables in the solution. Refer to the cable connecting and routing information for each component.
3. If you have removed the solution cover, reinstall it. See [“Install the tray cover” on page 211](#).
4. Reconnect external cables and power cords to the solution.

**Attention:** To avoid component damage, connect the power cords last.

5. Update the solution configuration.
  - Download and install the latest device drivers: <http://datacentersupport.lenovo.com>
  - Update the system firmware. See [“Firmware updates” on page 7](#).
  - Update the UEFI configuration.
  - Reconfigure the disk arrays if you have installed or removed a hot-swap drive or a RAID adapter. See the Lenovo XClarity Provisioning Manager User Guide, which is available for download at: <http://datacentersupport.lenovo.com>

**Note:** Make sure the latest version of ThinkSystem M.2 with Mirroring Enablement Kit Firmware is applied to avoid virtual disk/array missing after system board replacement.



---

## Chapter 4. Problem determination

Use the information in this section to isolate and resolve issues that you might encounter while using your solution.

Lenovo solutions and servers can be configured to automatically notify Lenovo Support if certain events are generated. You can configure automatic notification, also known as Call Home, from management applications, such as the Lenovo XClarity Administrator. If you configure automatic problem notification, Lenovo Support is automatically alerted whenever a solution encounters a potentially significant event.

To isolate a problem, you should typically begin with the event log of the application that is managing the solution:

- If you are managing the solution from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
- If you are using some other management application, begin with the Lenovo XClarity Controller event log.

---

### Event logs

An *alert* is a message or other indication that signals an event or an impending event. Alerts are generated by the Lenovo XClarity Controller or by UEFI in the servers. These alerts are stored in the Lenovo XClarity Controller Event Log. If the server is managed by the Chassis Management Module 2 or by the Lenovo XClarity Administrator, alerts are automatically forwarded to those management applications.

**Note:** For a listing of events, including user actions that might need to be performed to recover from an event, see the *Messages and Codes Reference*, which is available at: [http://thinksystem.lenovofiles.com/help/topic/SD650/pdf\\_files.html](http://thinksystem.lenovofiles.com/help/topic/SD650/pdf_files.html)

#### Lenovo XClarity Administrator event log

If you are using Lenovo XClarity Administrator to manage server, network, and storage hardware, you can view the events from all managed devices through the XClarity Administrator.

## Logs

Severity	Serviceability	Date and Time	System	Event	System Type	Source ID
Warning	Support	Jan 30, 2017, 7:48:07 AM	Chassis114:...	Node Node 08 device	Chassis	Jan 30, 20
Warning	Support	Jan 30, 2017, 7:48:07 AM	Chassis114:...	Node Node 02 device	Chassis	Jan 30, 20
Warning	User	Jan 30, 2017, 7:48:07 AM	Chassis114:...	I/O module IO Module	Chassis	Jan 30, 20
Warning	User	Jan 30, 2017, 7:48:07 AM	Chassis114:...	Node Node 08 incom	Chassis	Jan 30, 20

Figure 252. Lenovo XClarity Administrator event log

For more information about working with events from XClarity Administrator, see:

[http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/events\\_vieweventlog.html](http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/events_vieweventlog.html)

## SMM2 event log

The SMM2 event log contains all events received from all nodes in the enclosure. In addition, it includes events related to power and cooling.

**Note:** New SMM2 events are appended to the end of the event log. The log can store up to 4,096 events; you must clear the log to add additional events.

**Event Log**  
To sort system event logs, click the 'Date/Time'.

System Event Count (Current / Maximum) 8 / 4090

Event ID	Severity	Date/Time	Description
0x21070841	Warning	2017-04-18 13:30:42 (UTC+0000)	NODE2_PRESENT Slot Or Connector sensor, Informational was asserted
0x080707a5	Warning	2017-04-18 13:30:42 (UTC+0000)	PS2_EPOW: Power Supply sensor, Monitor was asserted
0x080701aa	Warning	2017-04-18 13:30:42 (UTC+0000)	PSU_Policy_Last: Power Supply sensor, transition to Non-Critical from OK was asserted
0x086f03e1	Warning	2017-04-18 13:30:42 (UTC+0000)	PS2: Power Supply sensor, Power Supply input lost (AC/DC) was asserted
0x086f00e1	Warning	2017-04-18 13:30:42 (UTC+0000)	PS2: Power Supply sensor, Presence detected was asserted
0x086f00e0	Warning	2017-04-18 13:30:42 (UTC+0000)	PS1: Power Supply sensor, Presence detected was asserted
0x1d6f0030	Warning	2017-04-18 13:30:42 (UTC+0000)	SMM_POWER_ON: System Boot Initiated sensor, Initiated by power up was asserted
0x106f0202	Warning	2017-04-18 13:29:41 (UTC+0000)	EvLogDisabled: Event Logging Disabled sensor, Log Area Reset/Cleared was asserted

Figure 253. SMM2 event log

## Lenovo XClarity Controller event log

The Lenovo XClarity Controller monitors the physical state of the server and its components using sensors that measure internal physical variables such as temperature, power-supply voltages, fan speeds, and component status. The Lenovo XClarity Controller provides various interfaces to systems management software and to system administrators and users to enable remote management and control of a server.

The Lenovo XClarity Controller monitors all components of the server and posts events in the Lenovo XClarity Controller event log.

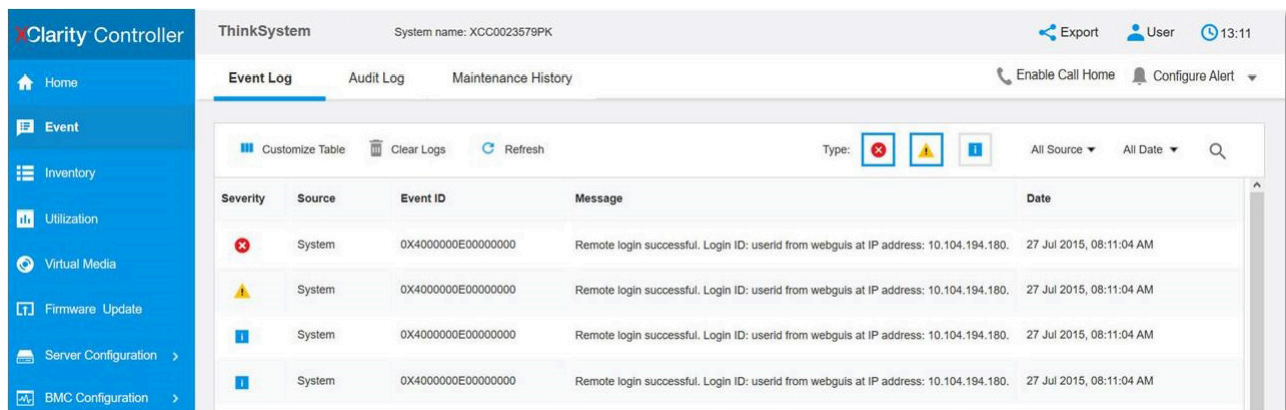


Figure 254. Lenovo XClarity Controller event log

For more information about accessing the Lenovo XClarity Controller event log, see:

“Viewing Event Logs” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxccc-overview/>

## Collecting event logs

Complete the following steps to collect event logs.

### Collecting event logs with KVM breakout module/cable

1. Press F1 to display Lenovo XClarity Provisioning Manager system setup interface and check XCC’s IP address.

**Note:** The default XCC’s IP address is 192.168.70.125

2. Connect XCC.
3. Use the following command to enable SMM network.
 

```
ipmitool -I lanplus -H <XCC's IP> -U USERID -P PASSWORD raw 0x3A 0xF1 0x01
```
4. Use the portable Lenovo XClarity Essentials OneCLI to download FFDC logs.
5. (Trained service technicians only) Upload FFDC logs to <https://servicetools.lenovo.com/index.shtml>.
6. (Trained service technicians only) Diagnose the log data to find out the problems and follow instructions in [Chapter 4 “Problem determination” on page 249](#).

### Collecting event logs without KVM breakout module/cable

1. Check the DHCP server for IP address.

**Note:** If there is no DHCP server, ensure the defective node is installed in the enclosure and disengage other nodes from the enclosure.

2. Connect the XCC with dedicated IP or static IP via SMM RJ45 or share NIC.

**Note:** By default, RJ45 port on the SMM communicates to XCC directly.

3. Press F1 to display Lenovo XClarity Provisioning Manager system setup interface and check XCC’s IP address.

**Note:** All default XCC’s IP address is 192.168.70.125, please make sure there is only one XCC with default IP connecting to the SMM RJ45 port.

4. Connect XCC.

5. Use the following command to enable SMM network.

```
ipmitool -I lanplus -H <XCC's IP> -U USERID -P PASSWORD raw 0x3A 0xF1 0x01
```

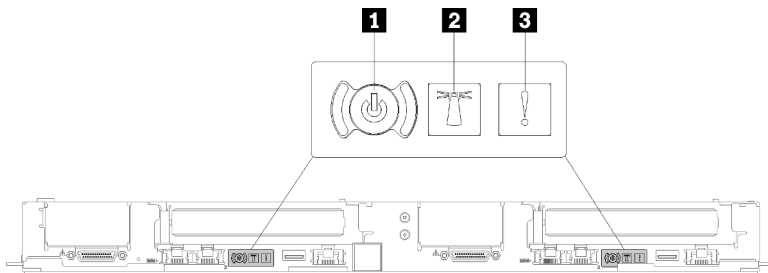
6. Use the portable Lenovo XClarity Essentials OneCLI to download FFDC logs.
7. (Trained service technicians only) Upload FFDC logs to <https://servicetools.lenovo.com/index.shtml>.
8. (Trained service technicians only) Diagnose the log data to find out the problems and follow instructions in [Chapter 4 “Problem determination” on page 249](#).

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## Light path diagnostics

Light path diagnostics is a system of LEDs on various external and internal components of the tray that leads you to the failed component. When an error occurs, LEDs are lit on the front operator panel on the front of the tray, then on the failed component. By viewing the LEDs in a particular order, you can often identify the source of the error.

The following illustration shows the light path diagnostic LEDs for the tray, which are located on the operator information panel.



*Figure 255. Operator information panel*

Table 30. Light path diagnostics: LED status and actions

LED	Description	Action
<b>1</b> Power button/LED (green)	<p><b>Off:</b> No power supply is properly installed, or the LED itself has failed.</p> <p><b>Flashing rapidly (4 times per second):</b> The node is turned off and is not ready to be turned on. The power-control button is disabled. This will last approximately 5 to 10 seconds.</p> <p><b>Flashing slowly (once per second):</b> The node is turned off and is ready to be turned on. You can press the power-control button to turn on the node.</p> <p><b>Lit:</b> The node is turned on.</p>	Press the power button to turn the server on and off manually.
<b>2</b> System-locator LED (blue)	This LED is used as a presence detection LED. You can use Systems Director or Lenovo XClarity Controller to light this LED remotely.	Use this LED to locate the solution among other trays visually.
<b>3</b> System-error LED (amber)	LED on: An error has occurred.	<ol style="list-style-type: none"> <li>1. Check the system-locator LED and check log LED and follow the instructions.</li> <li>2. Check the Lenovo XClarity Controller event log and the system-error log for information about the error.</li> <li>3. Save the log if necessary and clear the log afterward.</li> </ol>

## Power supply LEDs

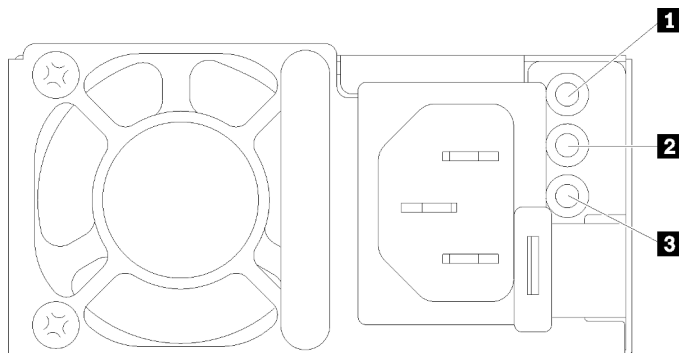


Figure 256. AC power-supply LEDs

<b>1</b> AC power LED (green)	<b>3</b> Power supply error LED (yellow)
<b>2</b> DC power LED (green)	

The following table describes the problems that are indicated by various combinations of the power-supply LEDs on an AC power supply and suggested actions to correct the detected problems.

AC power-supply LEDs			Description	Action	Notes
AC	DC	Error (!)			
On	On/ Blinking	Off	Normal operation.		When the DC LED is blinking as a 1Hz rate, the PSU is at Zero-Output mode, i.e. no DC power output from this PSU
Off	Off	Off	No AC power to the solution or a problem with the AC power source.	<ol style="list-style-type: none"> <li>1. Check the AC power to the solution.</li> <li>2. Make sure that the power cord is connected to a functioning power source.</li> <li>3. Restart the solution. If the error remains, check the power-supply LEDs.</li> <li>4. If the problem remains, replace the power-supply</li> </ol>	This is a normal condition when no AC power is present.
Off	Off	On	The power supply has failed.	Replace the power supply.	
Off	On/ Blinking	Off	The power supply has failed.	Replace the power supply.	
Off	On/ Blinking	On	The power supply has failed.	Replace the power supply.	
On	Off	Off	Power-supply not fully seated, faulty system board, or the power supply has failed.	<ol style="list-style-type: none"> <li>1. Reseat the power supply.</li> <li>2. Use the Power Configurator utility to ensure current system power consumption is under limitation.</li> <li>3. Check the error LEDs on the system board and the Lenovo XClarity Controller error messages.</li> </ol>	Typically indicates a power-supply is not fully seated.
On	Off	On	The power supply has failed.	Replace the power supply.	
On	On/ Blinking	On	The power supply has failed.	Replace the power supply.	

## System-board LEDs

The following illustration shows the light-emitting diodes (LEDs) on the system board.

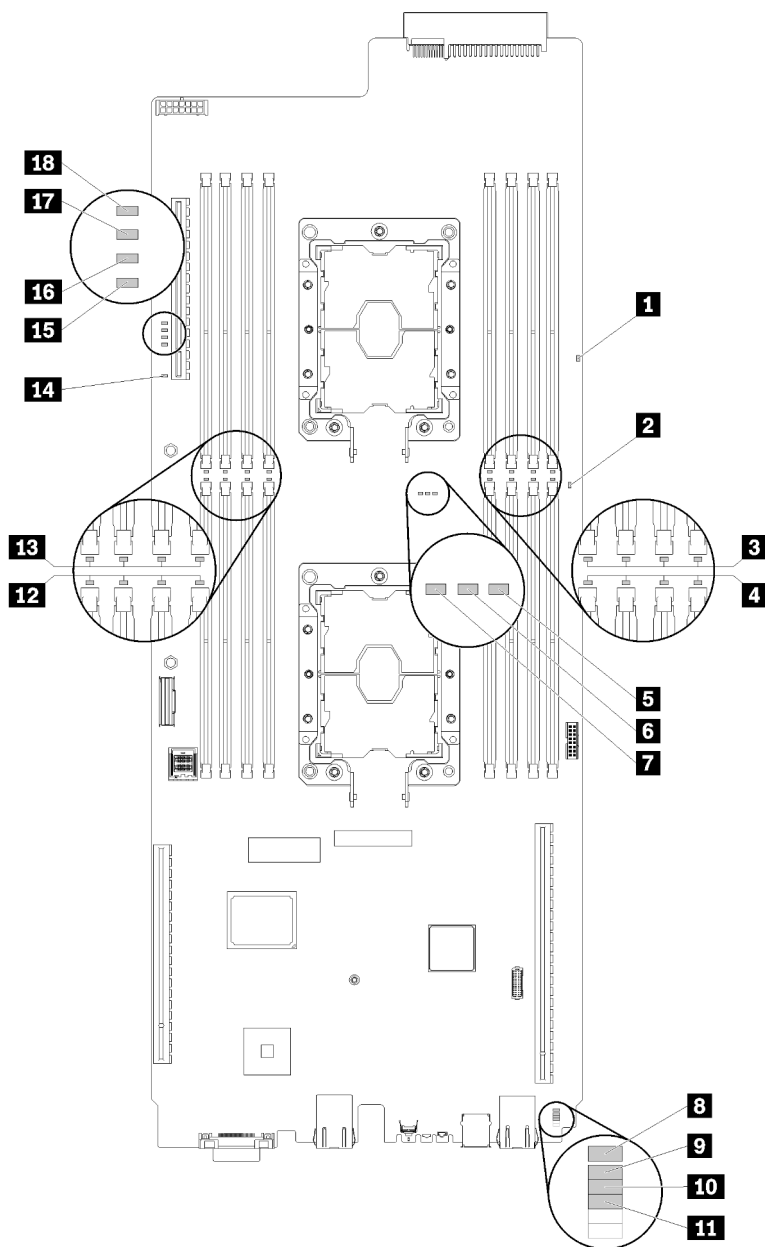


Figure 257. System-board LEDs

Table 31. System-board LEDs

<b>1</b> Light path power LED (green)	<b>10</b> LAN diagnostic LED (yellow)
<b>2</b> Node power LED (yellow)	<b>11</b> PCIe 1 error LED (yellow)
<b>3</b> DIMM 13-16 error LED (yellow)	<b>12</b> DIMM 1-4 error LED (yellow)
<b>4</b> DIMM 5-8 error LED (yellow)	<b>13</b> DIMM 9-12 error LED (yellow)
<b>5</b> Processor 2 LED (yellow)	<b>14</b> Slot 4 error LED (yellow)
<b>6</b> Processor mismatch LED (yellow)	<b>15</b> Drive 0 error LED (yellow)
<b>7</b> Processor 1 LED (yellow)	<b>16</b> Drive 1 error LED (Yellow)

Table 31. System-board LEDs (continued)

<b>8</b> Lenovo XClarity Controller 8051 heartbeat LED (green)	<b>17</b> Drive 2 error LED (yellow)
<b>9</b> Battery error LED (yellow)	<b>18</b> Drive 3 error LED (yellow)

## Fan power control (FPC) module

The following illustration shows the connectors and LEDs on the FPC module.

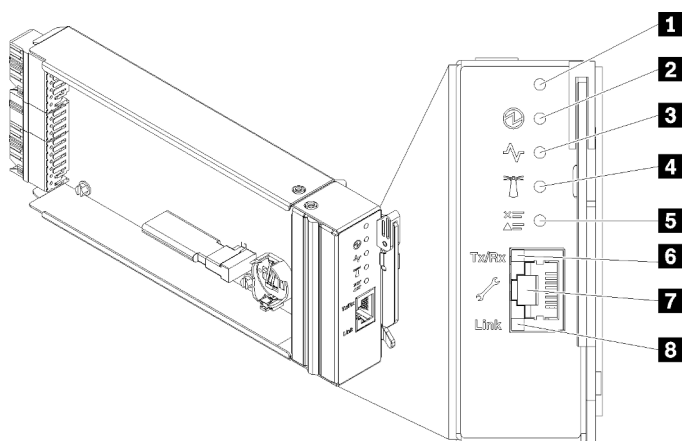


Figure 258. FPC connectors and LEDs

Table 32. FPC connectors and LEDs

<b>1</b> Reset button hole	<b>5</b> Check log LED (yellow)
<b>2</b> Power LED (green)	<b>6</b> Ethernet port activity (RJ-45) LED (green)
<b>3</b> Activity LED (green)	<b>7</b> Dedicated Ethernet port for FPC management access
<b>4</b> Identification LED (blue)	<b>8</b> Ethernet port link (RJ-45) LED (green)

**1 Reset button:** Press the button for 1 to 4 seconds, FPC reboots. Press over 4 seconds, FPC reboots and loads to the default settings.

**2 Power-on LED:** When this LED is lit (green), it indicates that the FPC has power.

**3 Activity LED:** When this LED is lit (green), it indicates that the FPC is actively controlling the enclosure.

**4 Identification LED:** When this LED is lit (blue), it indicates the enclosure location in a rack.

**5 Check log LED:** When this LED is lit (yellow), it indicates that a system error has occurred. Check the FPC event log for additional information.

**6 Ethernet port activity (RJ-45) LED:** When this LED is flashing (green), it indicates that there is activity through the remote management and console (Ethernet) port over the management network.

**7 Dedicated Ethernet port for FPC management access:** Use this connector to access FPC management.

**8 Ethernet port link (RJ-45) LED:** When this LED is lit (green), it indicates that there is an active connection through the remote management and console (Ethernet) port to the management network.

## Drip sensor LED

The following illustration shows the light-emitting diodes (LEDs) on the drip sensor.

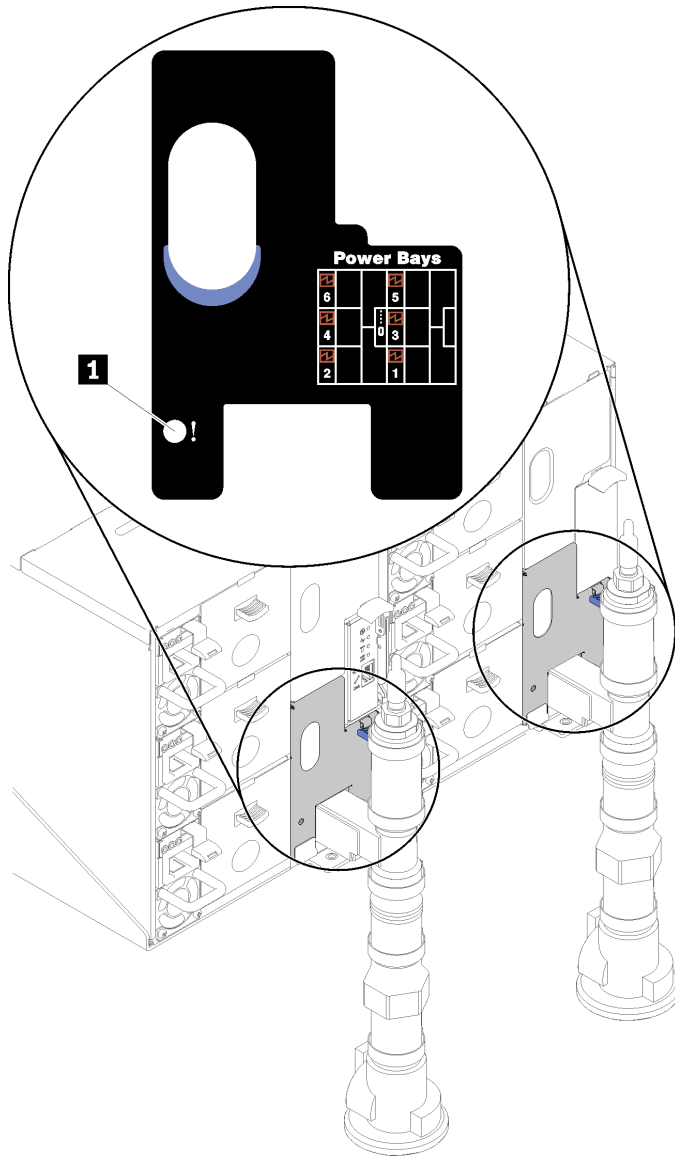


Figure 259. Drip sensor LED

Table 33. Drip sensor LED

<b>1</b> Drip sensor LED (yellow)
-----------------------------------

**1 Drip sensor LED:** When this LED is lit (yellow), it indicates that the drip sensor detects water in its respective catch basin.

---

## General problem determination procedures

Use the information in this section to resolve problems if the event log does not contain specific errors or the solution is inoperative.

If you are not sure about the cause of a problem and the power supplies are working correctly, complete the following steps to attempt to resolve the problem:

1. Power off the solution.
2. Make sure that the solution is cabled correctly.
3. Remove or disconnect the following devices if applicable, one at a time, until you find the failure. Power on and configure the solution each time you remove or disconnect a device.
  - Any external devices.
  - Surge-suppressor device (on the solution).
  - Printer, mouse, and non-Lenovo devices.
  - Each adapter.
  - Hard disk drives.
  - Memory modules until you reach the minimum configuration that is supported for the solution.

See [“Specifications” on page 1](#) to determine the minimum configuration for your server.

**Note:** The minimum configuration required for the node to start is one processor and one 2 GB DIMM.

4. Power on the solution.

If the problem is solved when you remove an adapter from the solution, but the problem recurs when you install the same adapter again, suspect the adapter. If the problem recurs when you replace the adapter with a different one, try a different PCIe slot.

If the problem appears to be a networking problem and the solution passes all system tests, suspect a network cabling problem that is external to the server.

## Resolving suspected power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition.

Complete the following steps to diagnose and resolve a suspected power problem.

Step 1. Check the event log and resolve any errors related to the power.

**Note:** Start with the event log of the application that is managing the solution. For more information about event logs, see [“Event logs” on page 249](#)

Step 2. Check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.

Step 3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the solution is at the minimum configuration that is required for the solution to start. See [“Specifications” on page 1](#) to determine the minimum configuration for your solution.

Step 4. Reconnect all ac power cords and turn on the solution. If the solution starts successfully, reseal the adapters and devices one at a time until the problem is isolated.

If the solution does not start from the minimum configuration, see [“Power supply LEDs” on page 253](#) to replace the components in the minimum configuration one at a time until the problem is isolated.

## Resolving suspected Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Complete the following steps to attempt to resolve suspected problems with the Ethernet controller.

- Step 1. Make sure that the correct device drivers, which come with the server are installed and that they are at the latest level.
- Step 2. Make sure that the Ethernet cable is installed correctly.
- The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
  - Make sure that the cable rating is applicable for the network speed selected. For example, an SFP+ cable is only suitable for 10G operation. An SFP25 cable is needed for 25G operation. Likewise for Base-T operation, a CAT5 cable is required for 1G Base-T operation while a CAT6 cable is required for 10G Base-T operation.
- Step 3. Set both the adapter port and the switch port to auto-negotiation. If auto-negotiation is not supported on one of the ports, try configuring both ports manually to match each other.
- Step 4. Check the Ethernet controller LEDs on the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.
- Although some adapters may vary, when installed vertically the adapter link LED is typically on the left of the port and the activity LED is typically on the right.
- The Ethernet link status LED is lit when the Ethernet controller receives a link indication from the switch. If the LED is off, there might be a defective connector or cable or a problem with the switch.
  - The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Step 5. Check the Network activity LED on the rear of the server. The Network activity LED is lit when data is active on the Ethernet network. If the Network activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.
- Step 6. Check for operating-system-specific causes of the problem, and also make sure that the operating system drivers are installed correctly.
- Step 7. Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

---

## Troubleshooting by symptom

Use this information to find solutions to problems that have identifiable symptoms.

To use the symptom-based troubleshooting information in this section, complete the following steps:

1. Check the event log of the application that is managing the solution and follow the suggested actions to resolve any event codes.
  - If you are managing the solution from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
  - If you are using some other management application, begin with the Lenovo XClarity Controller event log.

For more information about event logs, see [“Event logs” on page 249](#)

2. Review this section to find the symptoms that you are experiencing and follow the suggested actions to resolve the issue.
3. If the problem persists, contact support (see [“Contacting Support” on page 277](#)).

## Power on and power off problems

Use this information to resolve issues when powering on or powering off the solution.

- [“Embedded hypervisor is not in the boot list” on page 260](#)
- [“Solution does not power on” on page 260](#)
- [“Solution does not power off” on page 260](#)

### Embedded hypervisor is not in the boot list

Complete the following steps until the problem is resolved:

1. Make sure that the optional embedded hypervisor flash device is selected on the boot manager <F12> Select Boot Device at startup.
2. See the documentation that comes with the optional embedded hypervisor flash device to validate that the device is configured correctly.
3. Make sure that other software works on the solution.

### Solution does not power on

Complete the following steps until the problem is resolved:

1. Check XCC web page can be logged in via out-of-band network interface.
2. Check the power button LED. If the power button LED is flashing slowly, press the power button to turn on the solution.
3. Check power supplies are installed correctly and power supply LEDs are lit normally.
4. If the error recurs, check FFDC logs for more details.

**Note:** To collect FFDC logs, see [“Collecting event logs” on page 251](#) for more details.

### Solution does not power off

Complete the following steps until the problem is resolved:

1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:
  - a. Press Ctrl+Alt+Delete.
  - b. Turn off the solution by pressing the power button and holding it down for 5 seconds.
  - c. Restart the solution.
  - d. If the solution fails POST and the power button does not work, disconnect the power cord for 20 seconds; then, reconnect the power cord and restart the solution.
2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board.

## Memory problems

Use this information to resolve issues related to memory.

- [“Displayed system memory less than installed physical memory” on page 260](#)
- [“Multiple memory modules in a channel identified as failing” on page 262](#)
- [“Attempt to change to another DCPMM mode fails” on page 262](#)
- [“Extra namespace appears in an interleaved region” on page 262](#)

### Displayed system memory less than installed physical memory

Complete the following steps until the problem is solved:

**Note:** Each time you install or remove a memory module, you must disconnect the solution from the power source; then, wait 10 seconds before restarting the solution.

1. Make sure that:

- No error LEDs are lit on the operator information panel.
- Memory mirrored channel does not account for the discrepancy.
- The memory modules are seated correctly.
- You have installed the correct type of memory module (see “Specifications” on page 1 for requirements).
- If you changed the memory, you updated the memory configuration in the Setup utility.
- All banks of memory are enabled. The solution might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
- There is no memory mismatch when the solution is at the minimum memory configuration.
- When DCPMMs are installed:
  - a. If the memory is set in App Direct or Mixed Memory Mode, all the saved data have been backed up, and created namespaces are deleted before any DCPMM is replaced.
  - b. Refer to “Intel Optane DC Persistent Memory Module (DCPMM) setup” in *Setup Guide* and see if the displayed memory fits the mode description.
  - c. If DCPMMs are recently set in Memory Mode, turn it back to App Direct Mode and examine if there is namespace that has not been deleted (see “Intel Optane DC Persistent Memory Module (DCPMM) setup” in *Setup Guide*).
  - d. Go to the Setup Utility, select **System Configuration and Boot Management → Intel Optane DCPMMs → Security**, and make sure all the DCPMM units are unlocked.

2. Reseat the memory modules, and then restart the solution.

3. Check the POST error log:

- If a memory module was disabled by a systems-management interrupt (SMI), replace the memory module.
- If a memory module was disabled by the user or by POST, reseat the memory module; then, run the Setup utility and enable the memory module.

4. Run memory diagnostics. When you start a solution and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your solution at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform memory diagnostics with this interface. From the Diagnostic page, go to **Diagnostics → Run Diagnostic → Memory test or DCPMM test**.

When DCPMMs are installed, run diagnostics based on the current DCPMM mode:

- App Direct Mode
  - Run **DCPMM Test** for DCPMMs.
  - Run **Memory Test** for DRAM DIMMs.
- Memory Mode and Mixed Memory Mode
  - Run **DCPMM Test** for App Direct capacity of DCPMMs.
  - Run **Memory Test** for memory capacity of DCPMMs.

**Note:** DRAM DIMMs in these two modes act as cache, and are not applicable to memory diagnostics.

5. Reverse the modules between the channels (of the same processor), and then restart the solution. If the problem is related to a memory module, replace the failing memory module.

**Note:** When DCPMMs are installed, only adopt this method in Memory Mode.

6. Re-enable all memory modules using the Setup Utility, and restart the system.
7. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
8. (Trained technician only) Replace the node.

### Multiple memory modules in a channel identified as failing

**Note:** Each time you install or remove a memory module, you must disconnect the solution from the power source; then, wait 10 seconds before restarting the solution.

1. Reseat the memory modules; then, restart the solution.
2. Remove the highest-numbered memory module of those that are identified and replace it with an identical known good memory module; then, restart the solution. Repeat as necessary. If the failures continue after all identified memory modules are replaced, go to step 4.
3. Return the removed memory modules, one at a time, to their original connectors, restarting the solution after each memory module, until a memory module fails. Replace each failing memory module with an identical known good memory module, restarting the solution after each memory module replacement. Repeat step 3 until you have tested all removed memory modules.
4. Replace the highest-numbered memory module of those identified; then, restart the solution. Repeat as necessary.
5. Reverse the memory modules between the channels (of the same processor), and then restart the solution. If the problem is related to a memory module, replace the failing memory module.
6. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
7. (Trained technician only) Replace the system board.

### Attempt to change to another DCPMM mode fails

After the DCPMM mode is changed and the system is successfully restarted, if the DCPMM mode stays the same instead of being changed, check the DRAM DIMMs and DCPMM capacity to see if it meets the requirement of the new mode (see “DC Persistent Memory Module (DCPMM) setup” in *Setup Guide*).

### Extra namespace appears in an interleaved region

If there are two created namespaces in one interleaved region, VMware ESXi ignores the created namespaces and creates an extra new namespace during system booting. To solve this problem, delete the created namespaces in either the Setup Utility or the operating system before the first booting with ESXi.

## Hard disk drive problems

Use this information to resolve issues related to the hard disk drives.

- [“Solution cannot recognize a hard drive” on page 262](#)

### Solution cannot recognize a hard drive

Complete the following steps until the problem is solved.

1. Verify that the drive is supported for the solution. See <https://serverproven.lenovo.com/> for a list of supported hard drives.
2. Make sure that the drive is seated in the drive bay properly and that there is no physical damage to the drive connectors.
3. Run the diagnostics tests for the SAS/SATA adapter and hard disk drives. When you start a solution and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For

more information, see the “Startup” section in the LXPM documentation compatible with your solution at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform hard drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Disk Drive Test**.

Based on those tests:

- If the adapter passes the test but the drives are not recognized, replace the backplane signal cable and run the tests again.
- Replace the backplane.
- If the adapter fails the test, disconnect the backplane signal cable from the adapter and run the tests again.
- If the adapter fails the test, replace the adapter.

## Water leak problems

Use this information to resolve issues related to water leaks.

The SD650 design is robust, and is unlikely to leak. If the water is observed outside of the enclosure, make sure the both enclosure and rack power supplies have been disconnected. If no water is observed outside of the enclosure, but there is a suspicion of a water leak in the enclosure or in one of the six compute trays, complete the following steps to determine the source of the leak. The enclosure is equipped with a pair of drip sensor assemblies to help detect any water leaks.

**Note:** A small leak may not reach either of the drip sensors to trigger a warning. Visual confirmation of a small leak may be required.

### Suspicious leakage symptoms

The following situations might occur due to leakage problems:

- **Processor over temperature error indicated by the System Error "!" LED being solid ON at the front of the node**
- **One or more of the nodes shut down unexpectedly**
- **Enclosure FPC management may report the following events:**
  - Leak\_Snsr1\_FAULT
  - Leak\_Snsr2\_FAULT
  - LeakSnr1\_Missing
  - LeakSnr2\_Missing

Possible causes of a leak:

- **Leak at quick connects during installation or removal procedures**
- **Leak in the water loop tubing**

Complete the following steps in order until you are able to isolate the cause of the potential leak:

1. Check enclosure FPC messages to see if any leakage warnings have been reported. See *Messages and Codes Reference* for more information.
2. Walk to the rear of the rack and visually check the status of each enclosure's left and right side drip sensor LEDs.

Users usually have multiple enclosures per rack. Each enclosure has two drip sensors.

**Note:** Each enclosure has two drip sensors that should turn on a yellow LED visible through a hole located in the lower left leg of the lower EMC shield if the sensor detects moisture in its drip sensor catch basin.

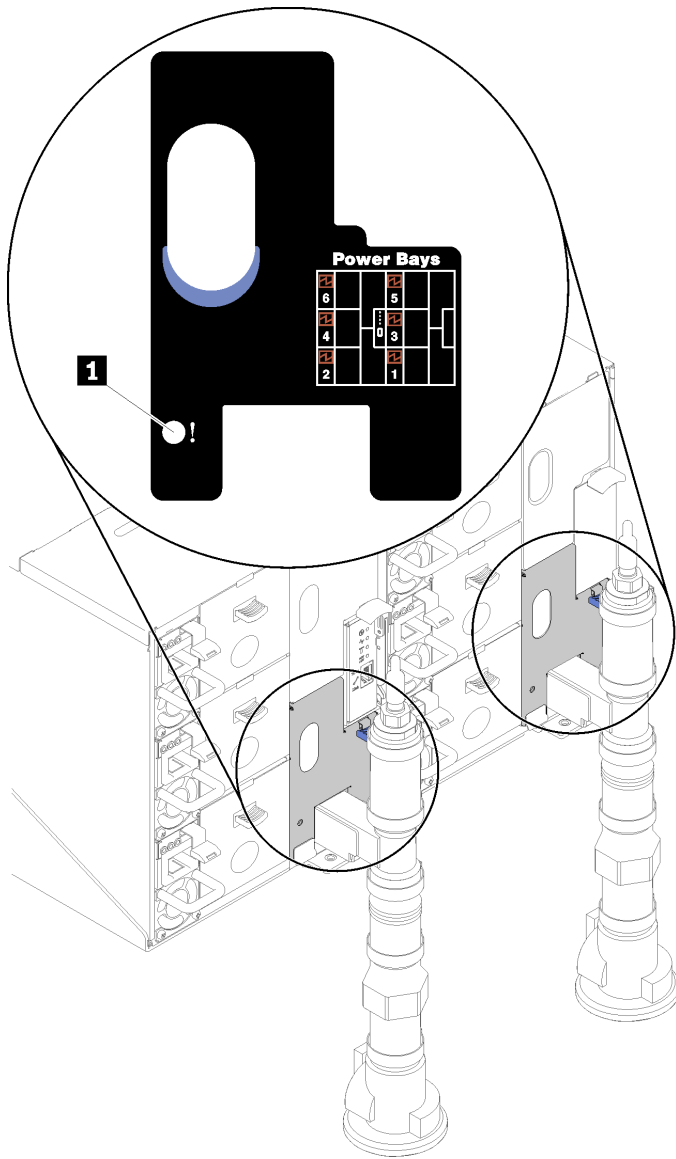
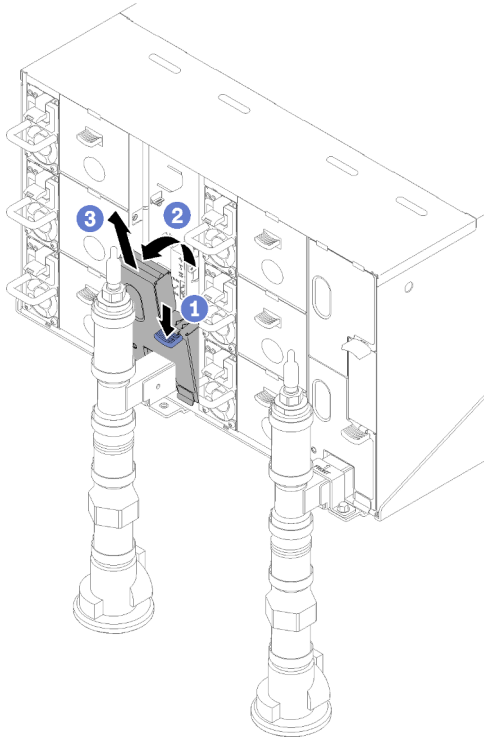


Figure 260. Drip sensor LED

Table 34. Drip sensor LED

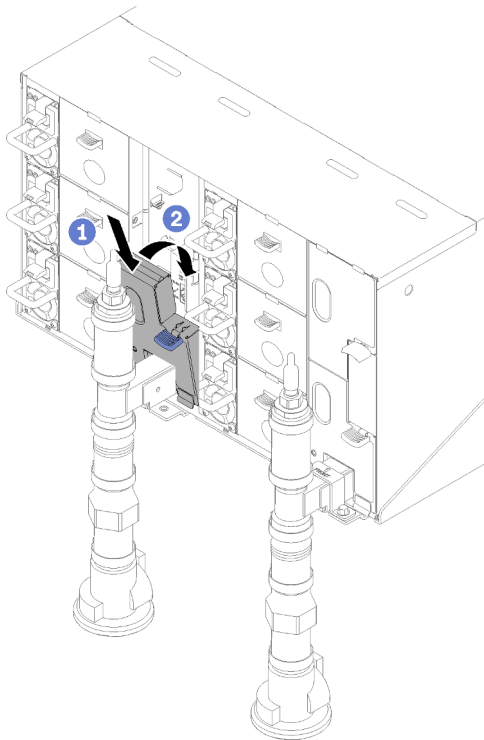
1 Drip sensor LED (yellow)
----------------------------

3. Visually check the drip sensor catch basin for any moisture.
  - a. Remove the lower left EMC shield in the front of the left drip sensor.



*Figure 261. Lower left EMC shield removal*

- b. Use a flashlight to visually inspect the plastic catch basin for any moisture.
- c. Re-install the EMC shield.



*Figure 262. Lower left EMC shield installation*

- d. Repeat steps for the right side drip sensor catch basin.
4. Power down all nodes either through the OS or by pressing and holding the power button for five seconds.

**Note:** Green Power LED for each node (two per compute tray) should be blinking to indicate the nodes are in standby state.

5. Disconnect power cords from all six enclosure power supplies.

**Important:** Fully disconnect the power to the entire enclosure prior to attempting to identify a leak within an enclosure.

6. Check the water loop for any moisture.
  - a. Remove the top node (bays 11&12) from the enclosure (see [“Remove a DWC tray from the enclosure” on page 244](#)), place it on a stable work surface, remove the cover (see [“Remove the tray cover” on page 210](#)), and carefully inspect the entire water loop (both rubber and copper tubing) for any signs of moisture. Re-install the compute tray into enclosure (see [“Install a DWC tray in the enclosure” on page 245](#)).
  - b. Repeat steps for the tray in bays 9 and 10.
  - c. Repeat steps for the tray in bays 7 and 8.
  - d. Repeat steps for the tray in bays 5 and 6.
  - e. Repeat steps for the tray in bays 3 and 4.
  - f. Repeat steps for the tray in bays 1 and 2.

**Note:** It is important to visually inspect the bottom of the enclosure with a flashlight prior to re-installing the bottom most tray (bays 1 and 2) into the enclosure.

7. If you are unable to identify the problem in the steps above, then you may need to replace one or more of the tray water loops (see [“Water loop replacement” on page 229](#)). Contact Product Engineer for the further assistance.

**Important:** The procedures above only cover the Lenovo DWC solution (from the Eaton Ball valves up through the manifold and into the enclosures and compute trays). If your datacenter Cooling Distribution Unit experiences repeated or frequent low water alerts then you should inspect the data center plumbing between the cooling distribution unit and the Lenovo DWC solution (rack).

## Monitor and video problems

Use this information to solve problems related to a monitor or video.

- [“Screen is blank” on page 266](#)
- [“Screen goes blank when you start some application programs” on page 267](#)
- [“The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.” on page 267](#)

### Screen is blank

1. If the solution is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the solution.
2. The management controller remote presence function is disabled if you install an optional video adapter. To use the management controller remote presence function, remove the optional video adapter.
3. If the solution installed with the graphical adapters while turning on the solution, the Lenovo logo displays on the screen after approximately 3 minutes. This is normal operation while the system loads.
4. Make sure that:
  - The solution is turned on. If there is no power to the solution.

- The monitor cables are connected correctly.
  - The monitor is turned on and the brightness and contrast controls are adjusted correctly.
5. Make sure that the correct solution is controlling the monitor, if applicable.
  6. Make sure that corrupted solution firmware is not affecting the video; see [“Firmware updates” on page 7](#).
  7. Observe the LEDs on the system board; if the codes are changing, go to step 6.
  8. Replace the following components one at a time, in the order shown, restarting the solution each time:
    - a. Monitor
    - b. Video adapter (if one is installed)
    - c. (Trained technician only) System board.

### **Screen goes blank when you start some application programs**

1. Make sure that:
  - The application program is not setting a display mode that is higher than the capability of the monitor.
  - You installed the necessary device drivers for the application.

### **The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted.**

1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescents, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor.

**Attention:** Moving a color monitor while it is turned on might cause screen discoloration.

Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor.

#### **Notes:**

- a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.).
  - b. Non-Lenovo monitor cables might cause unpredictable problems.
2. Reseat the monitor cable.
  3. Replace the components listed in step 2 one at a time, in the order shown, restarting the solution each time:
    - a. Monitor cable
    - b. Video adapter (if one is installed)
    - c. Monitor
    - d. (Trained technician only) System board.

## **Keyboard, mouse, KVM switch or USB-device problems**

Use this information to solve problems related to a keyboard, mouse, KVM switch or USB-device problems.

- [“All or some keys on the keyboard do not work” on page 268](#)
- [“Mouse does not work” on page 268](#)
- [“KVM switch problems” on page 268](#)
- [“USB-device does not work” on page 268](#)

### All or some keys on the keyboard do not work

1. Make sure that:
  - The keyboard cable is securely connected.
  - The solution and the monitor are turned on.
2. If you are using a USB keyboard, run the Setup utility and enable keyboardless operation.
3. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the solution.
4. Try to install the USB keyboard into a different USB port as available.
5. Replace the keyboard.

### Mouse does not work

1. Make sure that:
  - The mouse cable is securely connected to the solution.
  - The mouse device drivers are installed correctly.
  - The solution and the monitor are turned on.
  - The mouse option is enabled in the Setup utility.
2. If you are using a USB mouse and it is connected to a USB hub, disconnect the mouse from the hub and connect it directly to the solution.
3. Try to install the USB mouse into a different USB port as available.
4. Replace the mouse.

### KVM switch problems

1. Make sure that the KVM switch is supported by your solution.
2. Make sure that the KVM switch is powered on correctly.
3. If the keyboard, mouse or monitor can be operated normally with direct connection to the solution, then replace the KVM switch.

### USB-device does not work

1. Make sure that:
  - The correct USB device driver is installed.
  - The operating system supports USB devices.
2. Make sure that the USB configuration options are set correctly in system setup.

Restart the solution and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your solution at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **System Settings** → **Devices and I/O Ports** → **USB Configuration**.

3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the solution.

### Optional-device problems

Use this information to solve problems related to optional devices.

- “Insufficient PCIe resources are detected.” on page 269
- “A Lenovo optional device that was just installed does not work.” on page 269
- “A Lenovo optional device that worked previously does not work now.” on page 269

### **Insufficient PCIe resources are detected.**

If you see an error message stating “Insufficient PCI Resources Detected,” complete the following steps until the problem is resolved:

1. Remove one of the PCIe adapters.
2. Restart the system and press F1 to display the Lenovo XClarity Provisioning Manager system setup interface.
3. Click **UEFI Setup → System Settings → Devices and I/O Ports → MM Config Base**; then, modify the setting to the lower memory capacity. For example, modify 3 GB to 2 GB or modify 2 GB to 1 GB.
4. Save the settings and restart the system.
5. The action for this step will differ based on whether or not the reboot is successful.
  - If the reboot is successful, shutdown the solution and reinstall the PCIe card you removed.
  - If the reboot failed, repeat step 2 to step 5.

### **A Lenovo optional device that was just installed does not work.**

1. Make sure that:
  - The device is supported for the solution (see <https://serverproven.lenovo.com/>).
  - You followed the installation instructions that came with the device and the device is installed correctly.
  - You have not loosened any other installed devices or cables.
  - You updated the configuration information in the Setup utility. Whenever memory or any other device is changed, you must update the configuration.
2. Reseat the device that you just installed.
3. Replace the device that you just installed.

### **A Lenovo optional device that worked previously does not work now.**

1. Make sure that all of the cable connections for the device are secure.
2. If the device comes with test instructions, use those instructions to test the device.
3. If the failing device is a SCSI device, make sure that:
  - The cables for all external SCSI devices are connected correctly.
  - Any external SCSI device is turned on. You must turn on an external SCSI device before you turn on the solution.
4. Reseat the failing device.
5. Replace the failing device.

## **Serial-device problems**

Use this information to solve problems related to serial devices.

- “Number of serial ports identified by the operating system is less than the number of installed ports” on page 269
- “Serial device does not work” on page 270

### **Number of serial ports identified by the operating system is less than the number of installed ports**

1. Make sure that:
  - Each port is assigned a unique address in the Setup utility and none of the serial ports is disabled.
  - The serial-port adapter (if one is present) is seated correctly.
2. Reseat the serial port adapter.
3. Replace the serial port adapter.

## Serial device does not work

1. Make sure that:
  - The device is compatible with the solution.
  - The serial port is enabled and is assigned a unique address.
  - The device is connected to the correct connector (see “[System-board internal connectors](#)” on page 21).
2. Reseat the following components:
  - a. Failing serial device
  - b. Serial cable
3. Replace the following components one at a time, restarting the solution each time:
  - a. Failing serial device
  - b. Serial cable
4. (Trained technician only) Replace the system board.

## Intermittent problems

Use this information to solve intermittent problems.

- “[Intermittent external device problems](#)” on page 270
- “[Intermittent KVM problems](#)” on page 270
- “[Intermittent unexpected reboots](#)” on page 271

### Intermittent external device problems

Complete the following steps until the problem is solved.

1. Make sure that the correct device drivers are installed. See the manufacturer's website for documentation.
2. For a USB device:
  - a. Make sure that the device is configured correctly.

Restart the solution and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your solution at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **System Settings → Devices and I/O Ports → USB Configuration**.

- b. Connect the device to another port. If using a USB hub, remove the hub and connect the device directly to the compute node. Make sure that the device is configured correctly for the port.

### Intermittent KVM problems

Complete the following steps until the problem is solved.

#### Video problems:

1. Make sure that all cables and the console breakout cable are properly connected and secure.
2. Make sure that the monitor is working properly by testing it on another compute node.
3. Test the console breakout cable on a working compute node to ensure that it is operating properly. Replace the console breakout cable if it is defective.

#### Keyboard problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

## Mouse problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

## Intermittent unexpected reboots

**Note:** Some correctable errors require that the solution reboot so that it can disable a device, such as a memory DIMM or a processor to allow the machine to boot up properly.

1. See the management controller event log to check for an event code that indicates a reboot. See [“Event logs” on page 249](#) for information about viewing the event log.

## Network problems

Use this information to resolve issues related to networking.

- [“Cannot wake solution using Wake on LAN” on page 271](#)
- [“Could not log in using LDAP account with SSL enabled” on page 271](#)

### Cannot wake solution using Wake on LAN

Complete the following steps until the problem is resolved:

1. If you are using the dual-port network adapter and the solution is connected to the network using Ethernet 5 connector, check the system-error log or IMM2 system event log (see [“Event logs” on page 249](#)), make sure:
  - a. Fan 3 is running in standby mode, if Emulex dual port 10GBase-T embedded adapter is installed.
  - b. The room temperature is not too high (see [“Specifications” on page 1](#)).
  - c. The air vents are not blocked.
  - d. The air baffle is installed securely.
2. Reseat the dual-port network adapter.
3. Turn off the solution and disconnect it from the power source; then, wait 10 seconds before restarting the solution.
4. If the problem still remains, replace the dual-port network adapter.

### Could not log in using LDAP account with SSL enabled

Complete the following steps until the problem is resolved:

1. Make sure that the license key is valid.
2. Generate a new license key and log in again.

## Observable problems

Use this information to solve observable problems.

- [“The solution immediately displays the POST Event Viewer when it is turned on” on page 272](#)
- [“Solution is unresponsive \(POST is complete and operating system is running\)” on page 272](#)
- [“Solution is unresponsive \(POST failed and cannot start System Setup\)” on page 272](#)
- [“Voltage planar fault is displayed in the event log” on page 273](#)
- [“Unusual smell” on page 273](#)
- [“Solution seems to be running hot” on page 273](#)
- [“Cracked parts or cracked enclosure” on page 273](#)
- [“Cannot enter legacy mode after installing a new adapter” on page 273](#)

- “Collecting service data” on page 273

### **The solution immediately displays the POST Event Viewer when it is turned on**

Complete the following steps until the problem is solved.

1. Correct any errors that are indicated by the light path diagnostics LEDs.
2. Make sure that the solution supports all the processors and that the processors match in speed and cache size.

You can view processor details from system setup.

To determine if the processor is supported for the solution, see <https://serverproven.lenovo.com/>.

3. (Trained technician only) Make sure that processor 1 is seated correctly
4. (Trained technician only) Remove processor 2 and restart the solution.
5. Replace the following components one at a time, in the order shown, restarting the solution each time:
  - a. (Trained technician only) Processor
  - b. (Trained technician only) System board

### **Solution is unresponsive (POST is complete and operating system is running)**

Complete the following steps until the problem is solved.

- If you are in the same location as the compute node, complete the following steps:
  1. If you are using a KVM connection, make sure that the connection is operating correctly. Otherwise, make sure that the keyboard and mouse are operating correctly.
  2. If possible, log in to the compute node and verify that all applications are running (no applications are hung).
  3. Restart the compute node.
  4. If the problem remains, make sure that any new software has been installed and configured correctly.
  5. Contact your place of purchase of the software or your software provider.
- If you are accessing the compute node from a remote location, complete the following steps:
  1. Make sure that all applications are running (no applications are hung).
  2. Attempt to log out of the system and log back in.
  3. Validate the network access by pinging or running a trace route to the compute node from a command line.
    - a. If you are unable to get a response during a ping test, attempt to ping another compute node in the enclosure to determine whether it is a connection problem or compute node problem.
    - b. Run a trace route to determine where the connection breaks down. Attempt to resolve a connection issue with either the VPN or the point at which the connection breaks down.
  4. Restart the compute node remotely through the management interface.
  5. If the problem remains, verify that any new software has been installed and configured correctly.
  6. Contact your place of purchase of the software or your software provider.

### **Solution is unresponsive (POST failed and cannot start System Setup)**

Configuration changes, such as added devices or adapter firmware updates, and firmware or application code problems can cause the solution to fail POST (the power-on self-test).

If this occurs, the solution responds in either of the following ways:

- The solution restarts automatically and attempts POST again.

- The solution hangs, and you must manually restart the solution for the solution to attempt POST again.

After a specified number of consecutive attempts (automatic or manual), the solution reverts to the default UEFI configuration and starts System Setup so that you can make the necessary corrections to the configuration and restart the solution. If the solution is unable to successfully complete POST with the default configuration, there might be a problem with the system board. You can specify the number of consecutive restart attempts in System Setup. Click **System Settings → Recovery → POST Attempts → POST Attempts Limit**. Available options are 3, 6, 9, and 255.

### **Voltage planar fault is displayed in the event log**

Complete the following steps until the problem is solved.

1. Revert the system to the minimum configuration. See [“Specifications” on page 1](#) for the minimally required number of processors and DIMMs.
2. Restart the system.
  - If the system restarts, add each of the items that you removed one at a time, restarting the system each time, until the error occurs. Replace the item for which the error occurs.
  - If the system does not restart, replace the system board.

### **Unusual smell**

Complete the following steps until the problem is solved.

1. An unusual smell might be coming from newly installed equipment.
2. If the problem remains, contact Lenovo Support.

### **Solution seems to be running hot**

Complete the following steps until the problem is solved.

Multiple compute nodes or enclosure:

1. Make sure that the room temperature is within the specified range (see [“Specifications” on page 1](#)).
2. Check the management processor event log for rising temperature events. If there are no events, the compute node is running within normal operating temperatures. Note that you can expect some variation in temperature.

### **Cannot enter legacy mode after installing a new adapter**

Complete the following procedure to solve the problem.

1. Go to **UEFI Setup → Devices and I/O Ports → Set Option ROM Execution Order**.
2. Move the RAID adapter with operation system installed to the top of the list.
3. Select **Save**.
4. Reboot the system and auto boot to operation system.

### **Cracked parts or cracked enclosure**

Contact Lenovo Support.

### **Collecting service data**

See *FPC User's Guide* for more information.

## **Software problems**

Use this information to solve software problems.

1. To determine whether the problem is caused by the software, make sure that:
  - The solution has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software.

**Note:** If you have just installed an adapter or memory, the solution might have a memory-address conflict.

- The software is designed to operate on the solution.
  - Other software works on the solution.
  - The software works on another solution.
2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
  3. Contact your place of purchase of the software.

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## Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support are available at:

<http://datacentersupport.lenovo.com>

**Note:** IBM is Lenovo's preferred service provider for ThinkSystem.

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### Before you call

Before you call, there are several steps that you can take to try and solve the problem yourself. If you decide that you do need to call for assistance, gather the information that will be needed by the service technician to more quickly resolve your problem.

#### Attempt to resolve the problem yourself

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

You can find the product documentation for your ThinkSystem products at <https://pubs.lenovo.com/>

You can take these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check <https://serverproven.lenovo.com/> to make sure that the hardware and software are supported by your product.
- Go to <http://datacentersupport.lenovo.com> and check for information to help you solve the problem.
  - Check the Lenovo forums at [https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv\\_eg](https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg) to see if someone else has encountered a similar problem.

#### Gathering information needed to call Support

If you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare the appropriate information before you call. You can also go to <http://datacentersupport.lenovo.com/warrantylookup> for more information about your product warranty.

Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier)
- Model number
- Serial number
- Current system UEFI and firmware levels
- Other pertinent information such as error messages and logs

As an alternative to calling Lenovo Support, you can go to <https://support.lenovo.com/servicerequest> to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to the service technicians. The Lenovo service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

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## Collecting service data

To clearly identify the root cause of a server issue or at the request of Lenovo Support, you might need collect service data that can be used for further analysis. Service data includes information such as event logs and hardware inventory.

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

Use the Collect Service Data function of Lenovo XClarity Provisioning Manager to collect system service data. You can collect existing system log data or run a new diagnostic to collect new data.

- **Lenovo XClarity Controller**

You can use the Lenovo XClarity Controller web interface or the CLI to collect service data for the server. The file can be saved and sent to Lenovo Support.

- For more information about using the web interface to collect service data, see the “Downloading service data” section in the XCC documentation version compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.
- For more information about using the CLI to collect service data, see the “ffdc command” section in the XCC documentation version compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

- **Lenovo XClarity Administrator**

Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to Lenovo Support when certain serviceable events occur in Lenovo XClarity Administrator and the managed endpoints. You can choose to send diagnostic files to Lenovo Support using Call Home or to another service provider using SFTP. You can also manually collect diagnostic files, open a problem record, and send diagnostic files to the Lenovo Support Center.

You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at [http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/admin\\_setupcallhome.html](http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/admin_setupcallhome.html).

- **Lenovo XClarity Essentials OneCLI**

Lenovo XClarity Essentials OneCLI has inventory application to collect service data. It can run both in-band and out-of-band. When running in-band within the host operating system on the server, OneCLI can collect information about the operating system, such as the operating system event log, in addition to the hardware service data.

To obtain service data, you can run the `getinfor` command. For more information about running the `getinfor`, see [https://pubs.lenovo.com/lxce-onecli/onecli\\_r\\_getinfor\\_command](https://pubs.lenovo.com/lxce-onecli/onecli_r_getinfor_command).

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## Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to <https://datacentersupport.lenovo.com/serviceprovider> and use filter searching for different countries. For Lenovo support telephone numbers, see <https://datacentersupport.lenovo.com/supportphonelist> for your region support details.



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## Appendix B. Notices

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area.

Any reference to a Lenovo product, program, or service is not intended to state or imply that only that Lenovo product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any Lenovo intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any other product, program, or service.

Lenovo may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document is not an offer and does not provide a license under any patents or patent applications. You can send inquiries in writing to the following:

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## Important notes

Processor speed indicates the internal clock speed of the processor; other factors also affect application performance.

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1 024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

Maximum memory might require replacement of the standard memory with an optional memory module.

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as total bytes written (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. Lenovo is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

Lenovo makes no representations or warranties with respect to non-Lenovo products. Support (if any) for the non-Lenovo products is provided by the third party, not Lenovo.

Some software might differ from its retail version (if available) and might not include user manuals or all program functionality.

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## Particulate contamination

**Attention:** Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the device that is described in this document.

Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the device to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If Lenovo determines that the levels of particulates or gases in your environment have caused damage to the device, Lenovo may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 35. Limits for particulates and gases

Contaminant	Limits
Reactive gases	<p>Severity level G1 as per ANSI/ISA 71.04-1985<sup>1</sup>:</p> <ul style="list-style-type: none"> <li>The copper reactivity level shall be less than 200 Angstroms per month (<math>\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour weight gain}</math>).<sup>2</sup></li> <li>The silver reactivity level shall be less than 200 Angstroms per month (<math>\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour weight gain}</math>).<sup>3</sup></li> <li>The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher.</li> </ul>
Airborne particulates	<p>Data centers must meet the cleanliness level of ISO 14644-1 class 8.</p> <p>For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods:</p> <ul style="list-style-type: none"> <li>The room air might be continuously filtered with MERV 8 filters.</li> <li>Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters.</li> </ul> <p>For data centers with airside economizers, the choice of filters to achieve ISO class 8 cleanliness depends on the specific conditions present at that data center.</p> <ul style="list-style-type: none"> <li>The deliquescent relative humidity of the particulate contamination should be more than 60% RH.<sup>4</sup></li> <li>Data centers must be free of zinc whiskers.<sup>5</sup></li> </ul>
<p><sup>1</sup> ANSI/ISA-71.04-1985. <i>Environmental conditions for process measurement and control systems: Airborne contaminants</i>. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.</p> <p><sup>2</sup> The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in <math>\text{\AA}/\text{month}</math> and the rate of weight gain assumes that <math>\text{Cu}_2\text{S}</math> and <math>\text{Cu}_2\text{O}</math> grow in equal proportions.</p> <p><sup>3</sup> The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in <math>\text{\AA}/\text{month}</math> and the rate of weight gain assumes that <math>\text{Ag}_2\text{S}</math> is the only corrosion product.</p> <p><sup>4</sup> The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.</p> <p><sup>5</sup> Surface debris is randomly collected from 10 areas of the data center on a 1.5 cm diameter disk of sticky electrically conductive tape on a metal stub. If examination of the sticky tape in a scanning electron microscope reveals no zinc whiskers, the data center is considered free of zinc whiskers.</p>	

## Water quality requirement

**Attention:** The water required to initially fill the system side cooling loop must be reasonably clean, bacteria-free water ( $<100 \text{ CFU}/\text{ml}$ ) such as de-mineralized water, reverse osmosis water, de-ionized water, or distilled water. The water must be filtered with an in-line 50 micron filter (approximately 288 mesh). The water must be

treated with anti-biological and anti-corrosion measures. Environment quality must be maintain over the lifetime of the system to receive warranty and support on affecting components. For more information please see [Lenovo Neptune Direct Water-Cooling Standards](#).

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## **Telecommunication regulatory statement**

This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact a Lenovo representative or reseller for any questions.

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## **Electronic emission notices**

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

Additional electronic emissions notices are available at:

[https://pubs.lenovo.com/important\\_notices/](https://pubs.lenovo.com/important_notices/)

## Taiwan BSMI RoHS declaration

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (Pb)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr <sup>6+</sup> )	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組零件	—	○	○	○	○	○
空氣傳動設備	—	○	○	○	○	○
冷卻組零件	—	○	○	○	○	○
內存模塊	—	○	○	○	○	○
處理器模塊	—	○	○	○	○	○
電纜組零件	—	○	○	○	○	○
電源	—	○	○	○	○	○
儲備設備	—	○	○	○	○	○
電路卡	—	○	○	○	○	○
光碟機	—	○	○	○	○	○
雷射器	—	○	○	○	○	○
備考1. “超出0.1 wt %” 及 “超出0.01 wt %” 係指限用物質之百分比含量超出百分比含量基準值。 Note1 : “exceeding 0.1wt%” and “exceeding 0.01 wt%” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.  備考2. “○” 係指該項限用物質之百分比含量未超出百分比含量基準值。 Note2 : “○” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.  備考3. “—” 係指該項限用物質為排除項目。 Note3 : The “-” indicates that the restricted substance corresponds to the exemption.						

## Taiwan import and export contact information

Contacts are available for Taiwan import and export information.

委製商/進口商名稱: 台灣聯想環球科技股份有限公司  
 進口商地址: 台北市南港區三重路 66 號 8 樓  
 進口商電話: 0800-000-702



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