TrueNAS® ES102 Gen 2 User Manual

v.24071
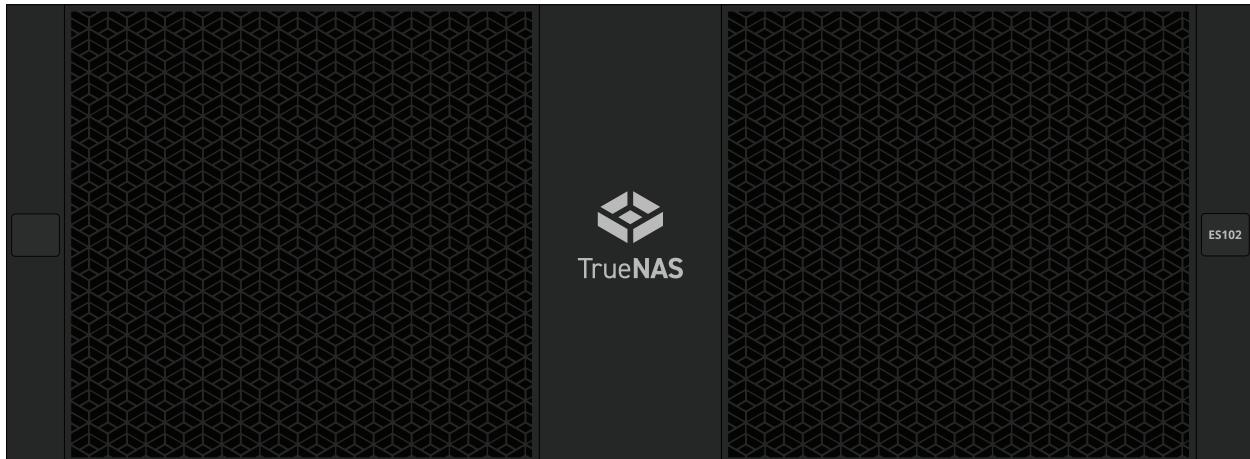
# Contents

1 Introduction

The TrueNAS ES102 Gen 2 is a 4U, 102-bay expansion shelf. It has redundant I/O modules, power modules and power supplies.

The ES102 is much larger than other Expansion Shelves sold by iXsystems. Take full safety precautions when installing or servicing the enclosure.

Power Supply   **SAS Ports**   **Network Ports**

5V Power Regulators   **Fan Modules**   **I/O Modules**   **Hard Drive Bays**
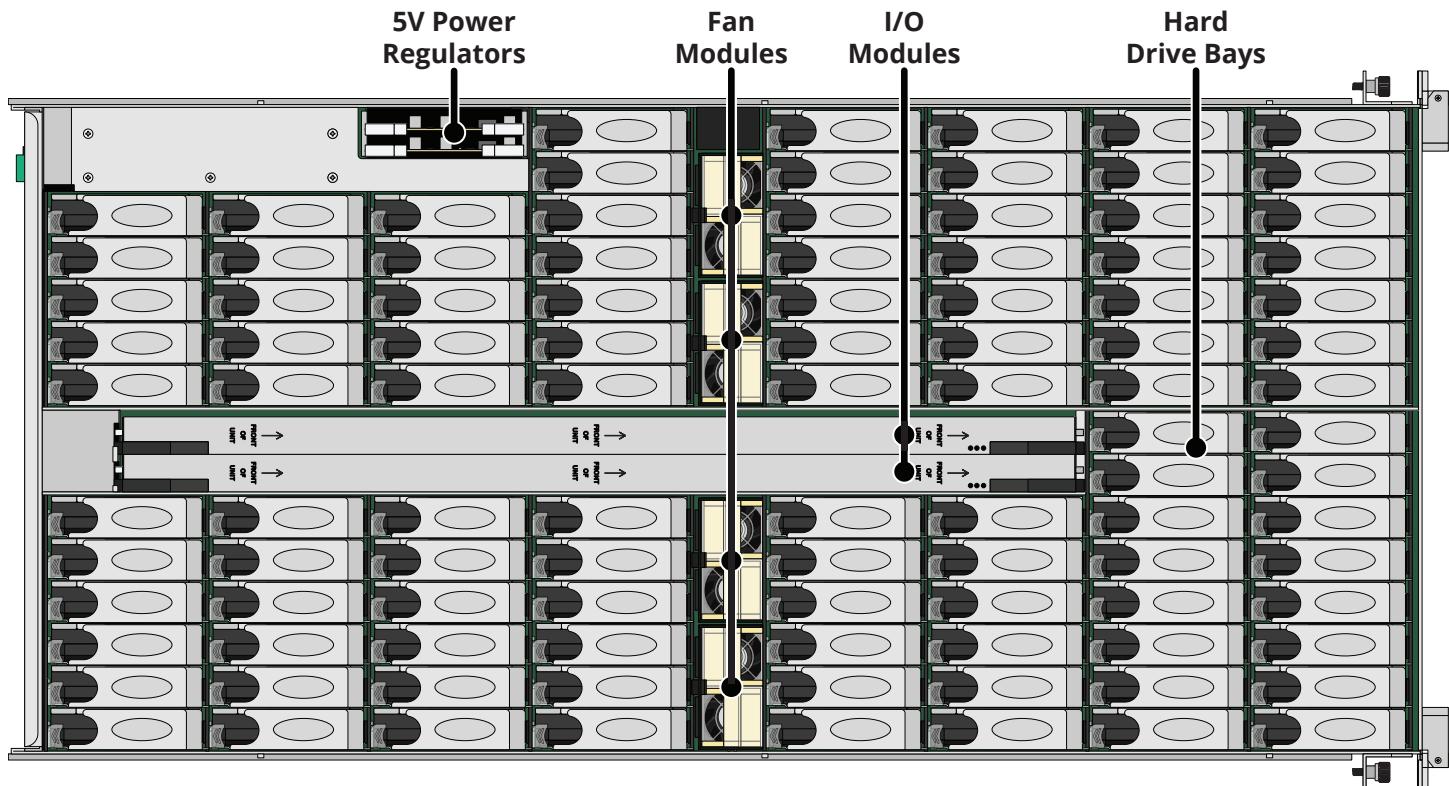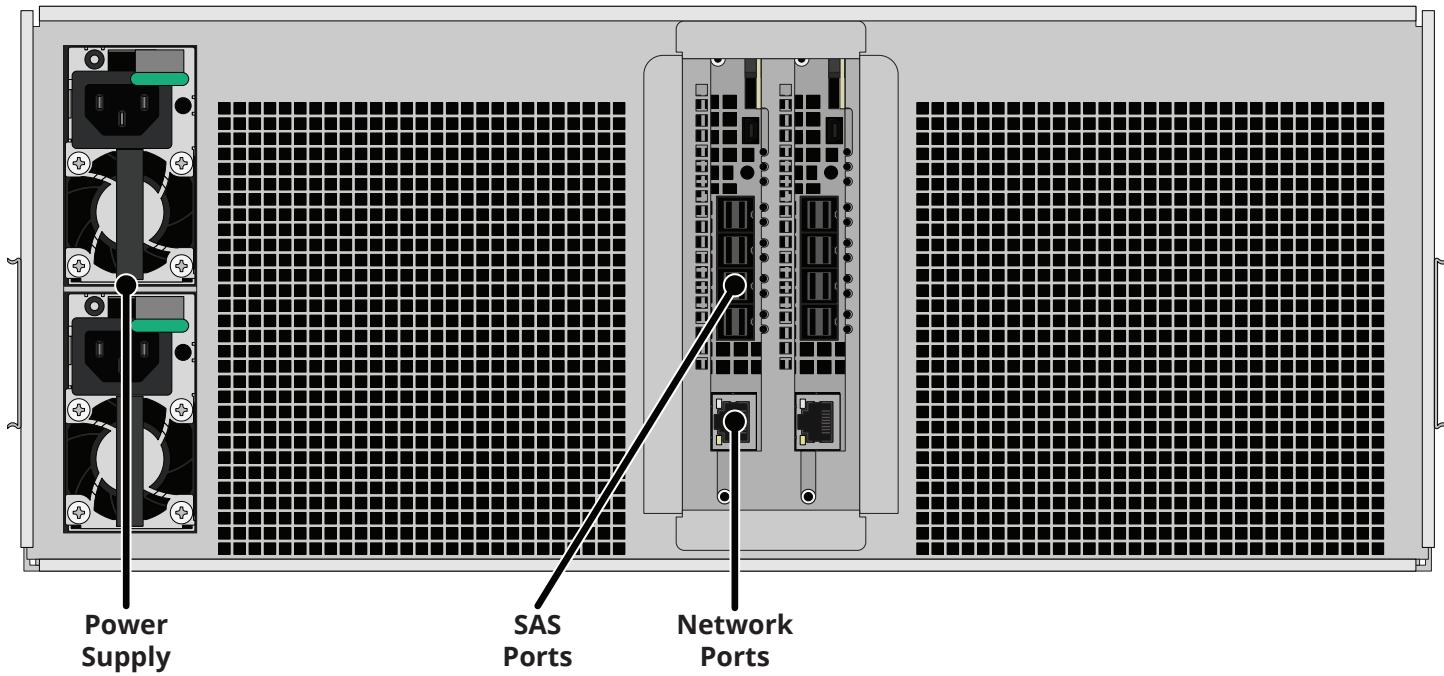
2 Safety

2.1 Anti-Static Precautions

> **🔥 Warning - Electrostatic Discharge (ESD)**
>
> Static electricity can build up in your body and discharge when touching conductive materials. Electrostatic Discharge (ESD) is harmful to sensitive electronic devices and components. Keep these safety recommendations in mind before opening the system case or handling non-hot-swappable system components.

- Turn off the system and remove power cables before opening the case or touching internal components.
- Place the system on a clean, hard work surface like a wooden tabletop. Use an ESD dissipative mat if possible to protect the internal components.
- Touch the metal chassis with your bare hand to dissipate static electricity in your body before handling any internal components, including components not yet installed in the system. We always recommend wearing an anti-static wristband and using a grounding cable.
- Store all system components in anti-static bags.

2.2 Personal Protective Equipment (PPE)

> **🔥 Warning - PPE**
>
> Wear proper PPE, like anti-static wrist straps and smocks before touching any sensitive equipment inside the chassis. If you are unsure how to properly replace any parts, contact iXsystems Support.

2.3 Handling the System

Hold the system from the sides or bottom whenever possible. Always be mindful of loose cabling or connectors, and avoid pinching or bumping these elements.

These instructions use "left" and "right" according to your perspective when facing the system or rack.

> **🔥 Warning**
>
> The ES102 weighs 256 lbs (116.12 kg) fully-loaded and requires a minimum of **two** people to lift.
>
> Use a lift table or server lift if possible.
>
> When handling rails, system components, or drives, never force movement if a component seems stuck. Gently remove the component and check for pinched cables or obstructing material before installing it again. Installing a component with excessive force can damage the system or cause personal injury.

3 Specifications

ES102 Components	
Drive Count	102 3.5-inch HDDs or 2.5-inch small form factor (SFF) HDDs or SSDs
Cooling Fans	4
Power Supplies (200V)	2
Power Distribution Requirements	200V - 240V
Power Draw	707W (typical), 1228 W (max)
IO Modules	2
5V Power Regulators	2

ES102 Dimensions and Weight	
Dimensions (H x W x L)	6.9 in x 17.2 in x 38.6 in (172 mm x 438 mm x 1000 mm)
Length with CMA	39 in (99 cm)
Net Weight (Fully Loaded)	256 lbs (116.12 kg)

ES102 Environmental Specifications	
Operating Temperature	41°F - 95°F (5°C - 35°C)
Non-Operating Temperature	40°F - 39°F (5°C - 45°C)
Operating Humidity (non-condensing)	20% - 80%
Vibration	3G at 5 Hz to 500 Hz
Supply Voltage	200-240V~,9/7.5A 50-60 Hz

TrueNAS

P/N: VDS41022-XX-XX   REV: XX   產品名稱 Product Name: TrueNAS ES102 Expansion Shelf 扩展架

S/N: CCMMM000YMDFPXXX

型號 MODEL: TrueNAS ES102 (GEN 2)
輸入電壓 Input Voltage: 200 - 240 V
輸入電流 Input Current: 9.0A - 7.5A(X2)
輸入頻率 Input Frequency: 50 / 60Hz

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

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme a lâ norme NMB-003 du Canada.
CANADA – ICES/NMB-003 CLASS/CLASSE A

c **UL** us
LISTED
E199770/I.T.E

VIKING ENTERPRISE SOLUTIONS
5385 MARK DABLING BLVD
COLORADO SPRINGS, CO 80918

製造商
Manufactured by Sanmina® Corp.

D43681
RoHS

警告：為避免電磁干擾，本產品不應安裝或使用於住宅環境

Made in Mexico
MFG:
LBL-00375-75-A   REV 01

The TrueNAS ES102 is a **storage expansion shelf** intended for use in **enterprise and data center environments**.

The apparatus is designed to be operated:
• In controlled IT environments, within the specified ranges for temperature, humidity, and supply voltage
• In properly grounded electrical installations, in accordance with local electrical codes
• In accordance with the TrueNAS software documentation, including configuration, operation, and maintenance instructions

This product is not designed or intended for:
• Use in life-support systems or other safety-critical applications where failure could result in injury or loss of life
• Use in residential consumer environments, unless explicitly installed and operated in a controlled, non-domestic IT setting
• Any application outside the conditions and purposes described in this manual and the TrueNAS software documentation

For detailed configuration and operational guidance, refer to the TrueNAS software documentation provided with the product and available from TrueNAS.

The ES102 is FCC/CE-marked and complies with:
• **FCC 47 CFR Part 15, Class A -** Radiated and conducted emissions limits for commercial IT equipment (EMI/EMC)
• **Low Voltage Directive (LVD) 2014/35/EU** - Electrical safety
• **Electromagnetic Compatibility (EMC) Directive 2014/30/EU -** Electromagnetic interference and immunity
• **RoHS Directive 2011/65/EU, as amended by (EU) 2015/863** - Restriction of hazardous substances
• **WEEE Directive 2012/19/EU -** Waste electrical and electronic equipment

For regulatory or compliance-related queries, contact compliance@truenas.com.
EU Authorized Representative: Obelis S.A. - Boulevard Général Wahis 53, B-1030 Brussels, BELGIUM

⊙ Important - Battery Information

This product contains a lithium coin cell (CMOS battery) used to maintain system settings. Do not dispose of the battery with household waste. Used batteries must be collected and disposed of separately in accordance with local regulations and the EU Battery Directive 2006/66/EC. The crossed-out wheeled bin symbol indicates that the battery must be taken to an appropriate collection facility for recycling.

4 Space Requirements

ⓘ Note - Rack Space

The ES102 requires 4U of rack space and a #2 Phillips head screwdriver to install in a rack.

The shelf is 38.9" long with the CMA. The rack posts must be between 30" and 37" apart to install the rail kit.

You must have at least 39" (99.06 cm) of space in front of the rack to safely install the ES102.

You must also have at least 30" (76.2) of space behind the rack to install the cables.

Review your rack setup to ensure the ES102 fits in the rack with any front or back rack doors closed.

ⓘ Note - PDU and Rack Space

If your rack uses a 0U PDU, you might have to temporarily remove it in order to install the screws for the CMA brackets. You might also need a longer screwdriver to properly tighten the screws.

5 Recommended Tools

We recommend these tools when interacting with the TrueNAS ES102 Gen 2:

- Long #2 Phillips head screwdriver
- Tape measure
- Level
- Table Lift or Server Lift

6 LED Indicators

6.1 Front Indicators

Light	Color and Indication
✓	Green (Solid): Component Ready
!	Amber (Solid): Component Fault
🔦	Blue (Solid): Locate ID Active
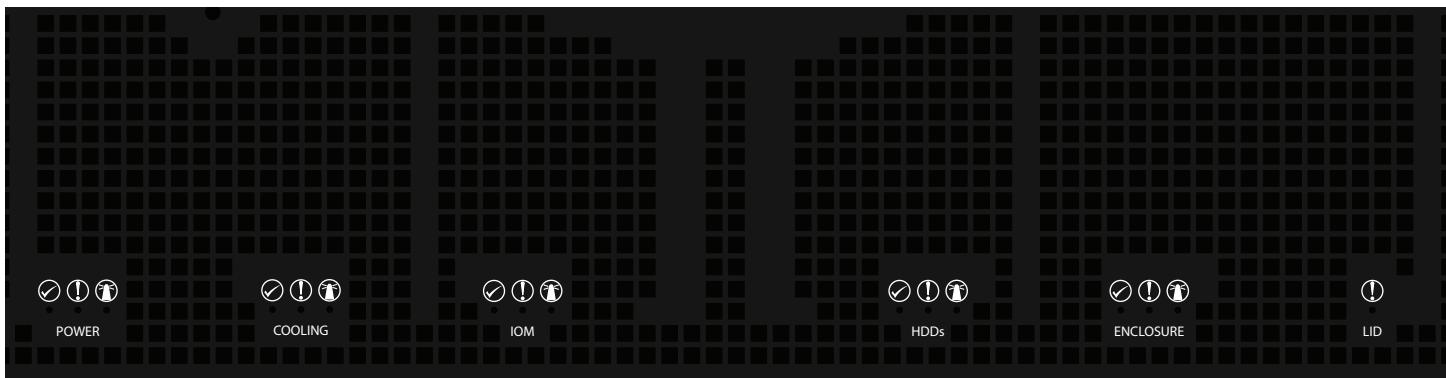
6.2 Rear Indicators
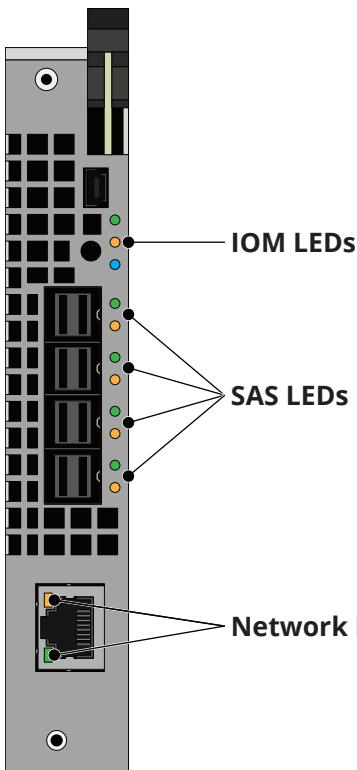
| Light	Color and Indication
IOM LEDs	Green (Solid): IOM Ready Amber (Solid): IOM Fault Amber (Flashing): IOM Predicted Fault Blue (Flashing): Locate ID Active
SAS LEDs	Green (Solid): SAS Ready Green (Flashing): System Starting Amber (Solid): System Fault Amber (Flashing): System Resetting
Network LEDs	Green (Solid): Network Port Ready Amber (Flashing): Link Active

7 Racking Procedure

7.1 Attach the Rack Rail to the Rear Rack Post

Place the rail in the rack with the "REAR" end at the rear of the rack and align the rail pins with the rack mounting holes. The top pin goes into the bottom hole of the 3rd U. The bottom pin goes into the top hole of the 1st U.

Swing the blue latch handle open and pull it to extend the rail until the rail pins are fully seated in the rack holes. Release the latch to lock the rail in place.

Secure the rail to the rear rack post using two M5 X 10 flat screws with washers. One in the top rail screw hole, and one in the 4th rail screw hole.

Top pin in bottom hole of 3rd U

Bottom pin in top hole of 1st U

M5x10 Flat Screws and Washers
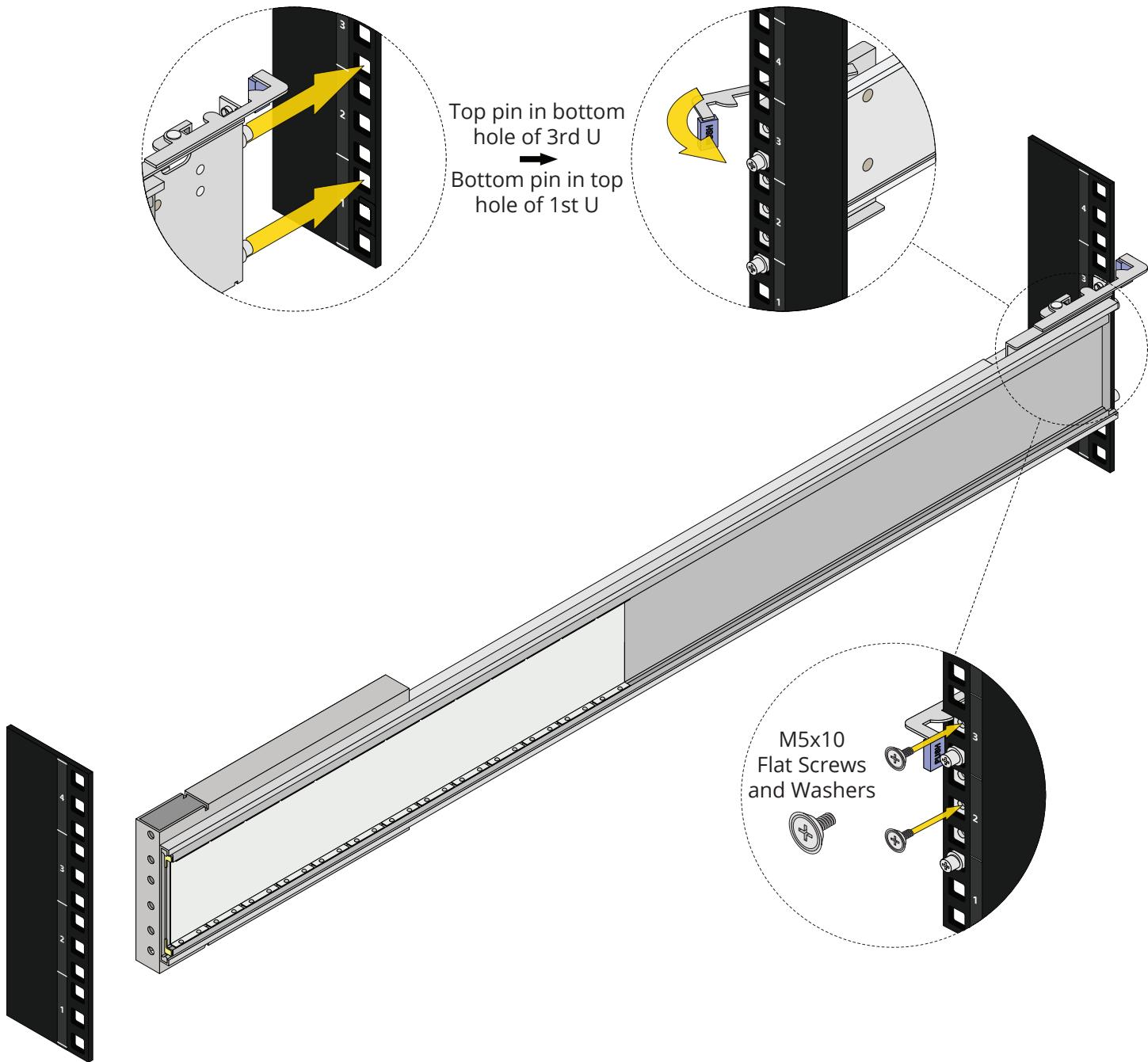
7.2 Attach the Rack Rail to the Front Rack Post

Extend the "FRONT" end of the rail to the front rack post and verify the rail is level.

Insert one M5 cage nut into the top hole of the 3rd U, then insert another cage nut in the middle hole of the 1st U.

Place the mounting plate onto the rack post, aligning the top and bottom screw holes with the cage nuts.

Secure the rail and mounting plate to the rack post using five M5 X 10 flat screws with washers. Repeat steps **1** and **2** to install the second rail in the rack.

M5x10
Flat Screws
and Washers
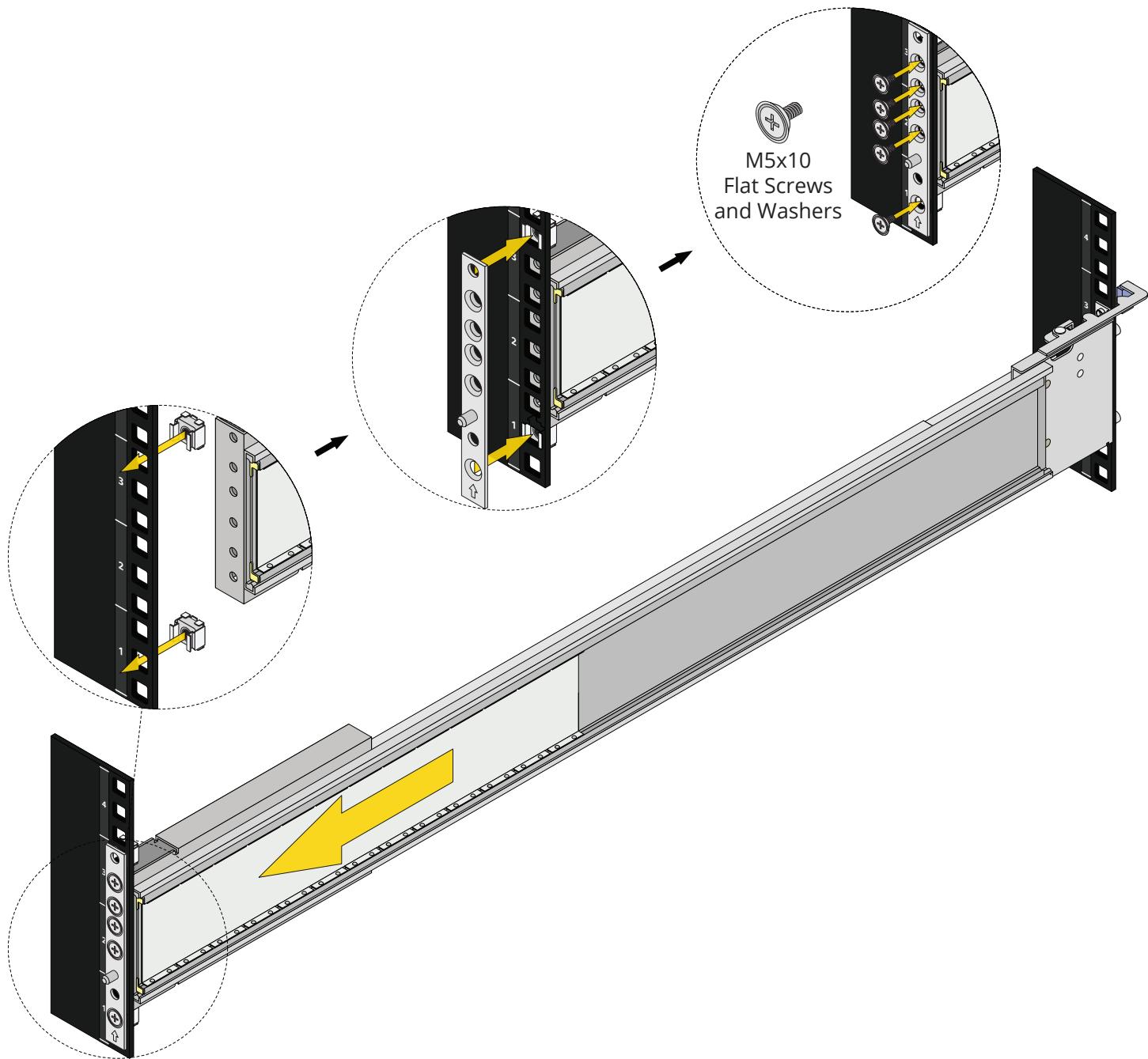
7.3 Install the System into the Service Position

> 🔥 **Warning - Team Lift**
>
> The ES102 requires two people to lift safely. Failure to follow safety recommendations can lead to severe system damage or personal injury.

Team-lift the system and align the chassis rails with the rack rails. Slide the ends of the chassis rails into the rack rails and push the system into the rack until the metal safeties click and lock the system into the service position.
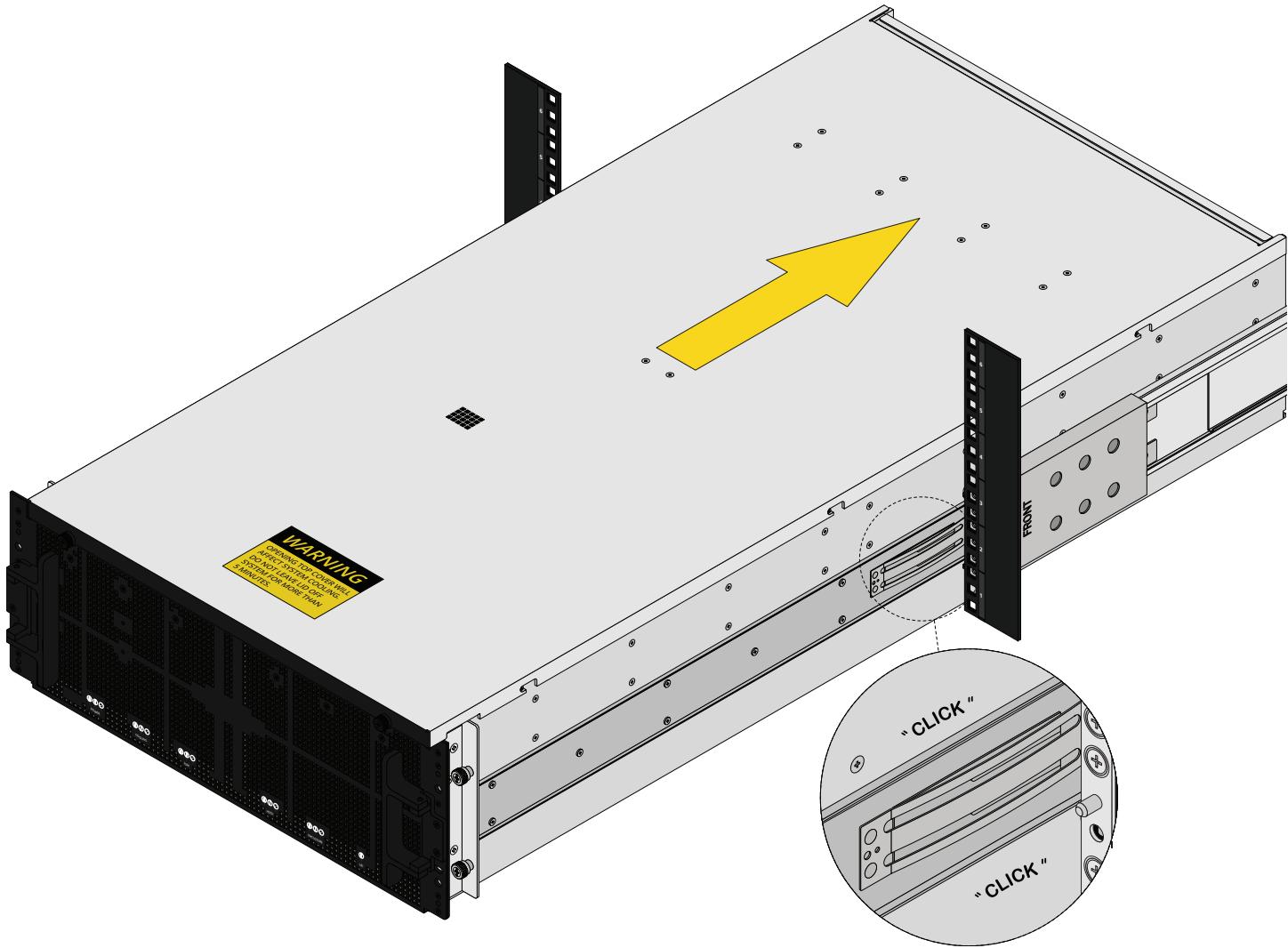
Loosen the thumbscrews on the ES102 lid and pull the lid toward the front of the system until it stops, then lift the lid up and away from the system.
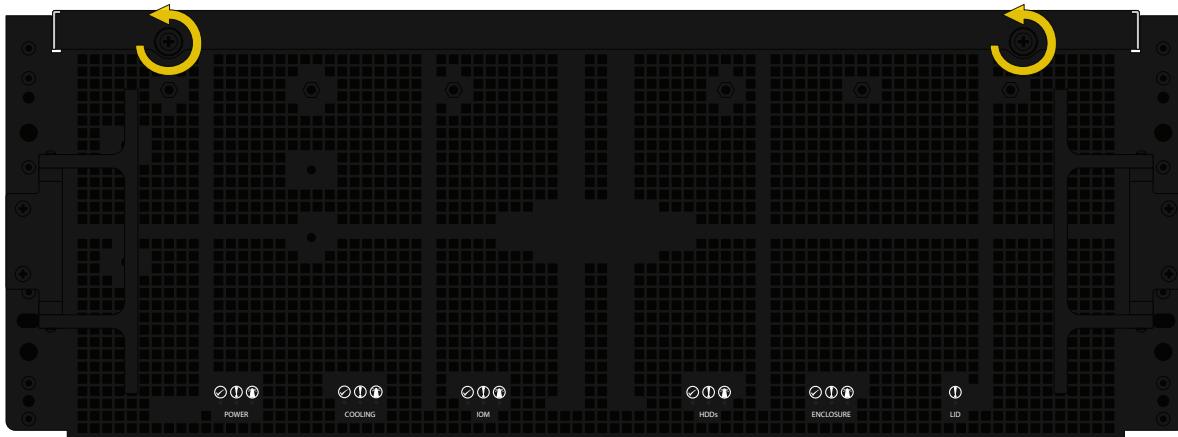
7.4 Install Hard Drives

The ES102 ships with all the drives and blanks you need to fully populate the enclosure, packaged separately. Drives ship attached to the drive carriers.

Open a drive latch by **gently** pressing the clear plastic button on the direction of the arrows. Insert the drive carrier into a slot inside the system with the arrows on the clear plastic button pointing towards the back of the system.

Gently lower the carrier into the system until the latch begins to close, then push the latch down until it clicks and locks the drive carrier into the system.

Repeat for all remaining carriers and blanks.
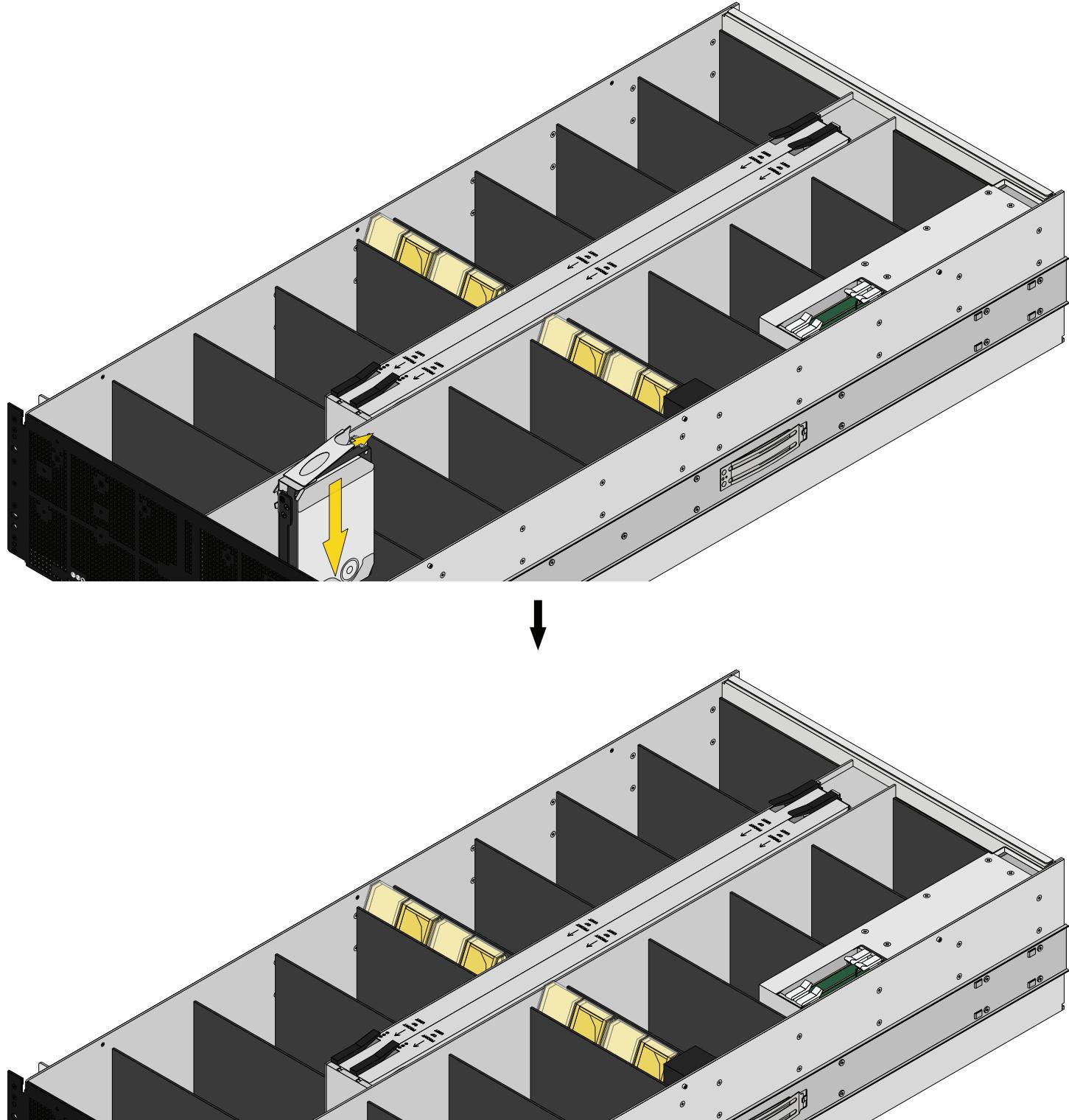
7.5 Push the System into the Rack

Replace the lid on the system and tighten the thumbscrews.

Press the metal safety catches on each chassis rail into the system and push the system all the way into the rack.
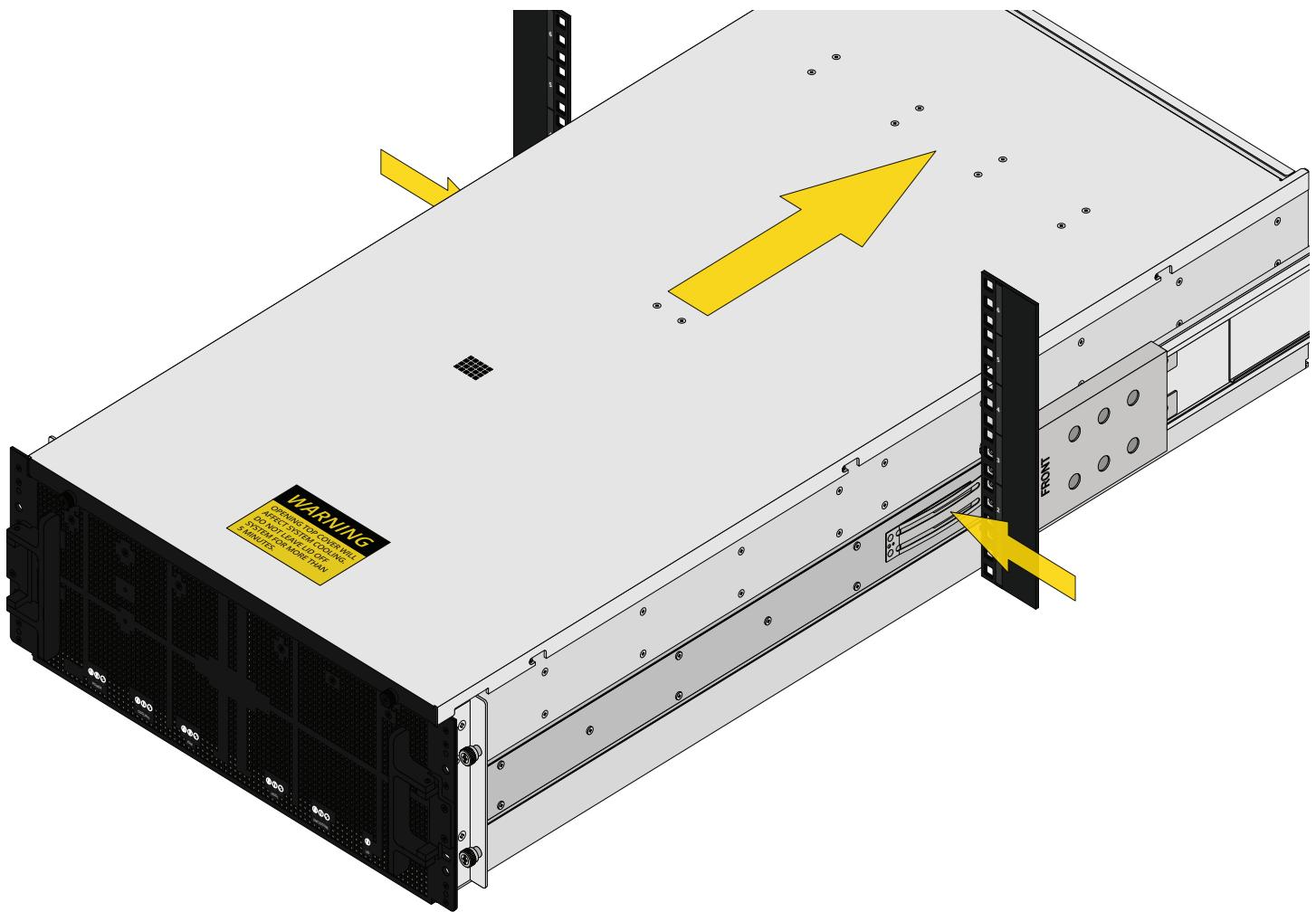
> 🔥 **Warning - Pinch Point**
>
> The ES102 can pinch or crush fingers when sliding the rail sleeves onto the rack rails.

Secure the system to the rack by tightening the two thumbscrews on each chassis ear.

7.6 Install Cable Management Brackets

Align the right bracket with the right rear rack post and fit the top and bottom holes over the rack rail pegs.

Secure the bracket to the rack post using two M5 x 10 flat screws with washers.

Repeat for the left bracket.

> ⊘ **Tip - Adjustment Screws**
>
> You may find it helpful to loosen the depth adjustment thumbscrews on each cable management bracket to make initial cabling easier.
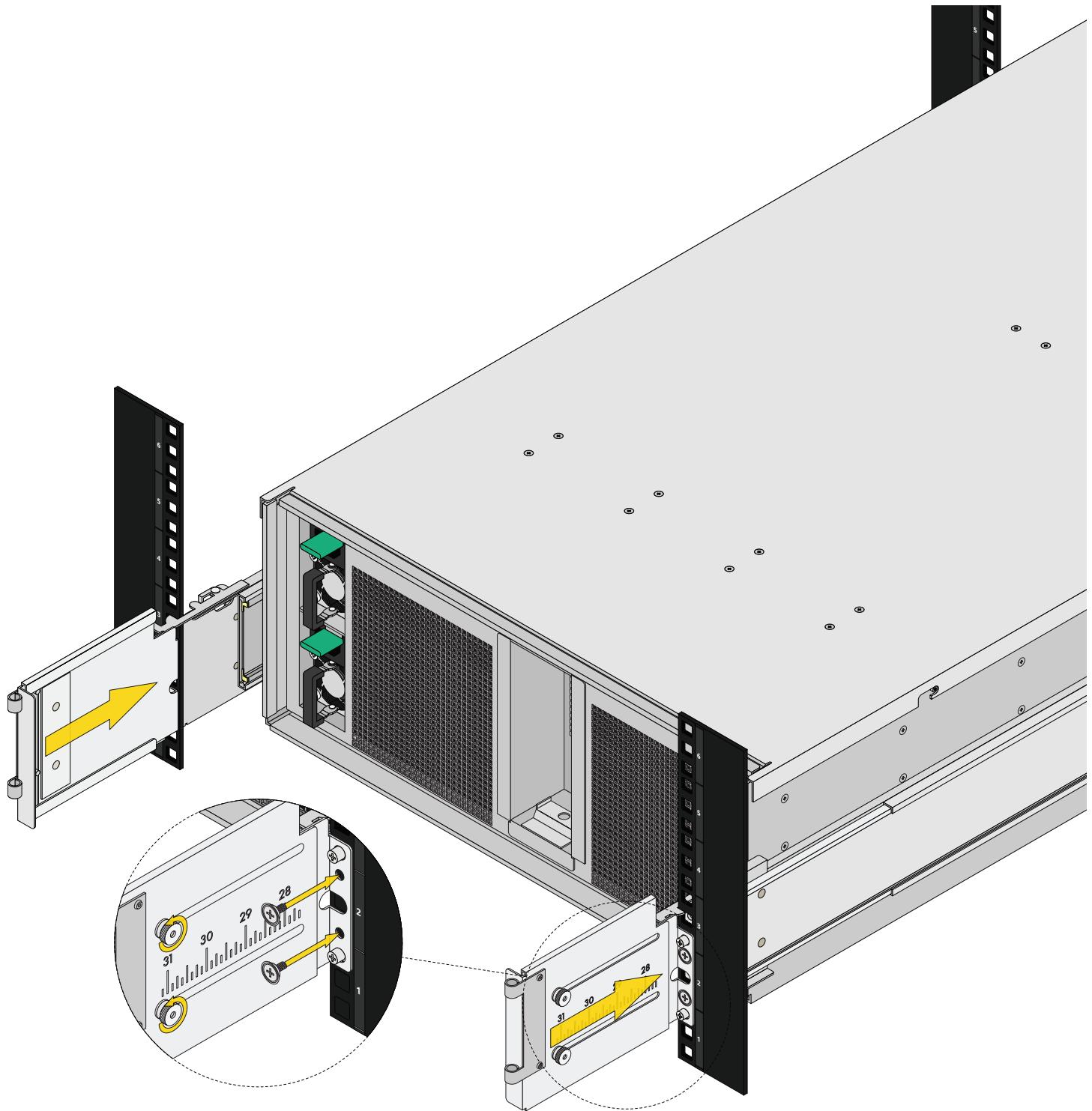
7.7 Install Cable Management Arm (CMA)

Align the right hinge on cable management arm (CMA) with the right hinge on the cable management brackets.

Pinch the spring pegs on the CMA hinge together and insert the CMA hinge into the bracket hinge, then release the spring pegs to lock the hinges together. Repeat for the other side.
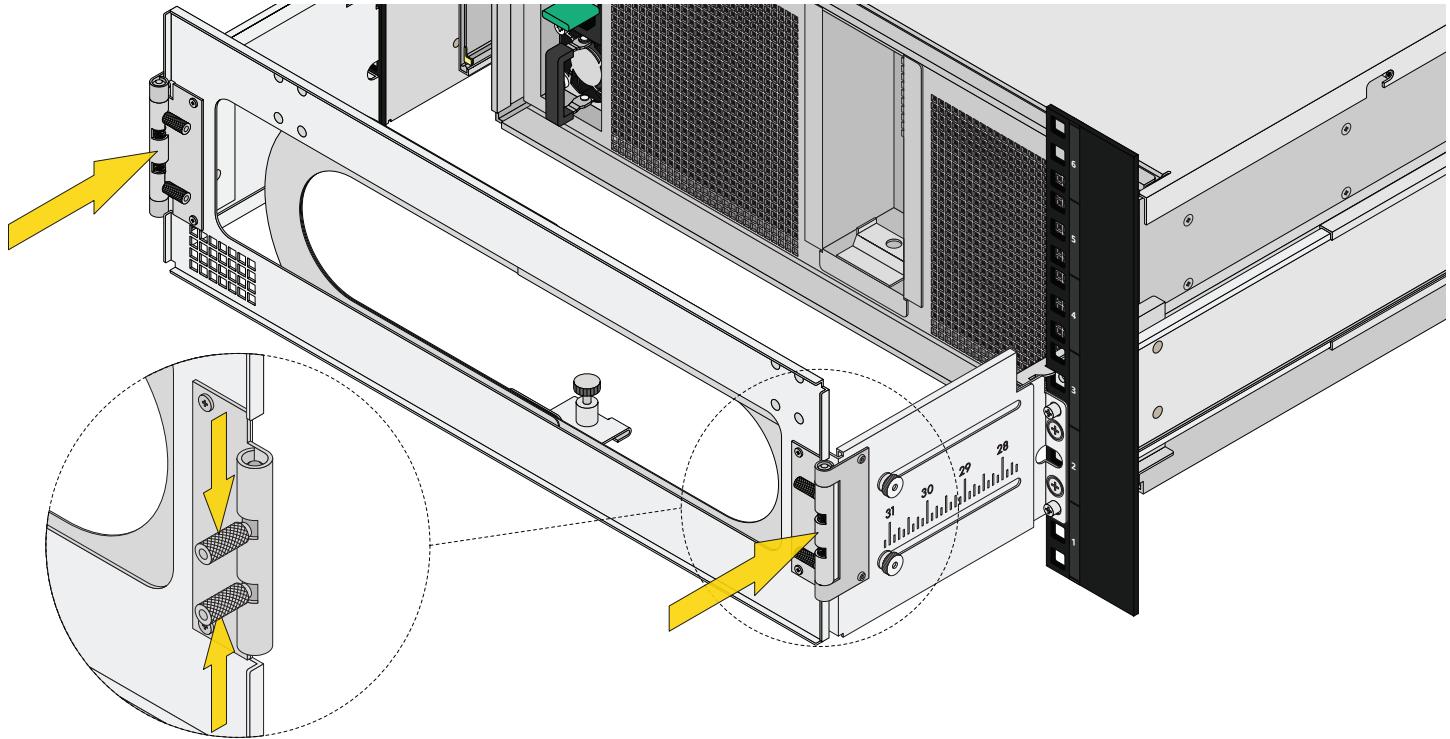
Pull the CMA attachment pin up and move the pin assembly toward the CMA attachment bracket on the chassis. Fit the pin assembly lip over the CMA attachment bracket on the chassis, then pull it back and release the pin to lock the CMA to the system chassis.
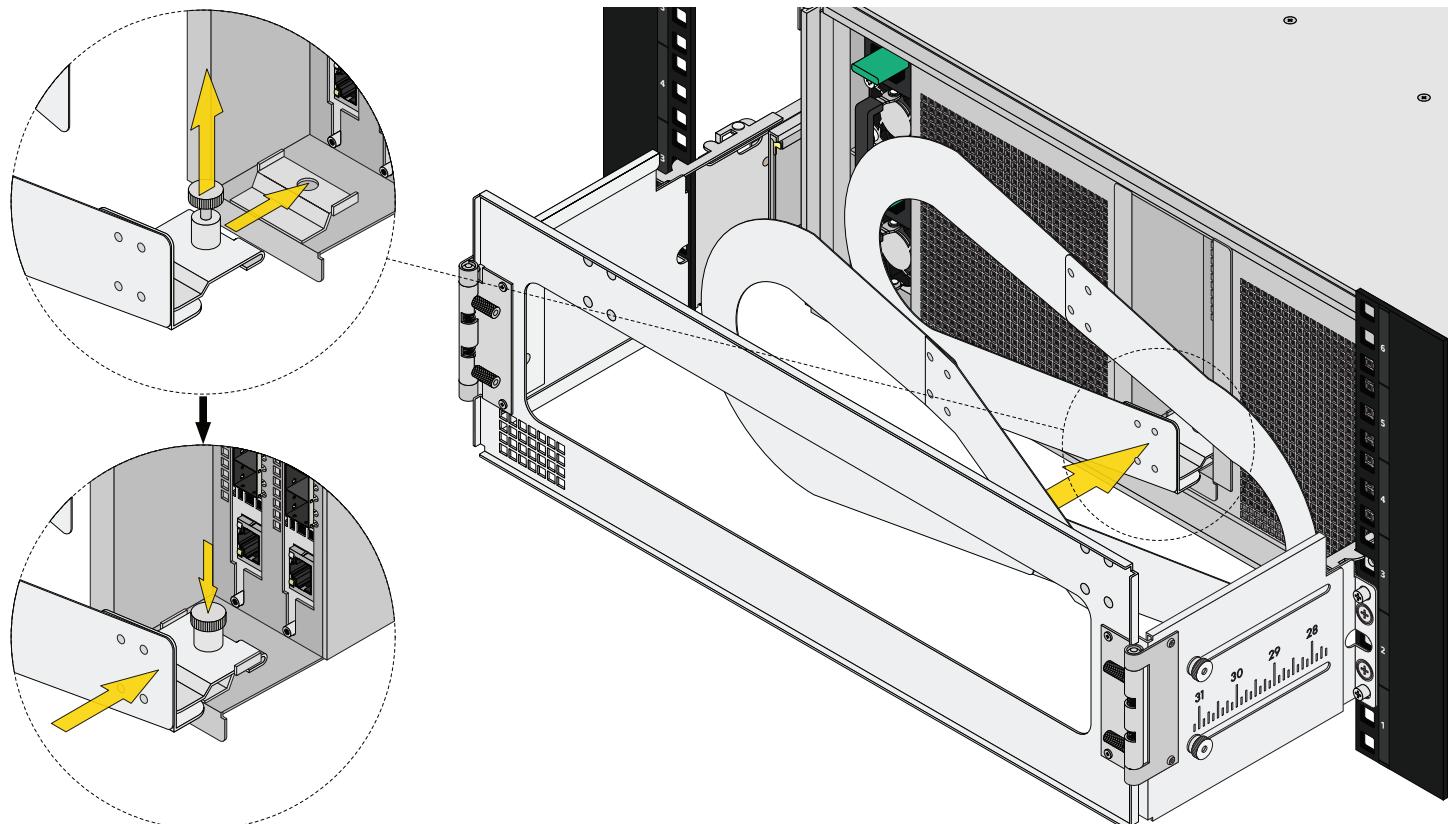
7.8 Install Cables

Route the cables around the CMA loop starting at the top where the loop meets the CMA. Ensure the power and SAS cables have enough slack through the CMA loop to account for the CMA loop extending and retracting.

We recommend that the PSU cables have at least 12 inches of slack between the system and the CMA. The SAS cables should have at least 10 inches of slack between the system and the CMA. All cables going through the CMA should be at least six feet long overall.

> ⊙ **Important - Cable Damage**
>
> To avoid cable damage, ensure the cables have plenty of slack before and after the CMA. Routing the cables around the CMA loop too tightly can damage the cables.

≥ 12"

PSU Cables
SAS Cables

≥ 6'

≥ 10"
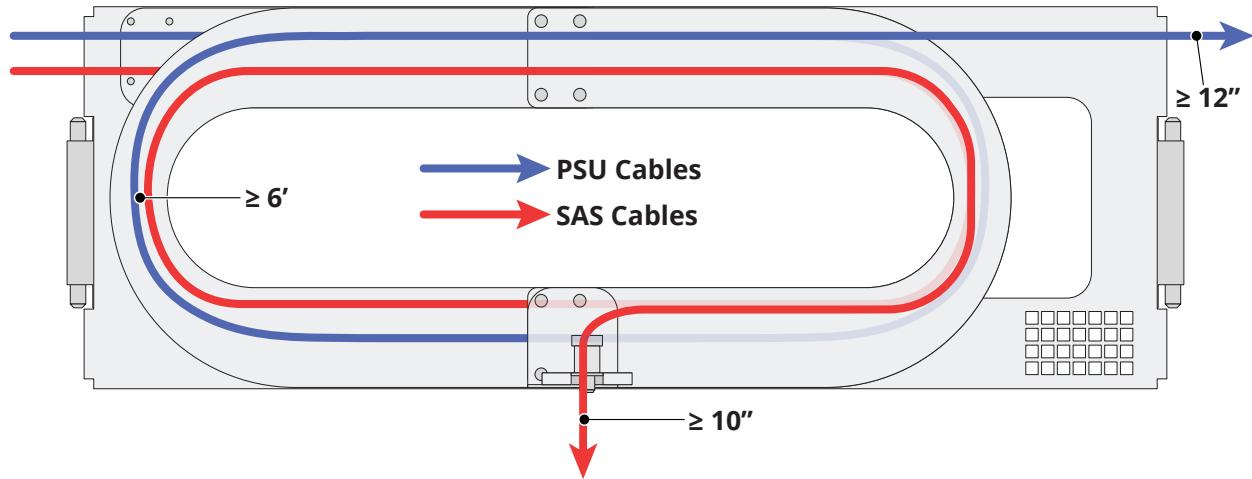
Connect ethernet cables from your local switch or management network to the network ports on both IOMs.

Next, connect the power cables to both power supplies, but don't plug them in until after connecting all SAS cables.

> 🔥 **Warning - Grounded Connection**
>
> Always connect power cords to properly grounded connections.

Power Supply   **SAS Ports**   **Network Ports**
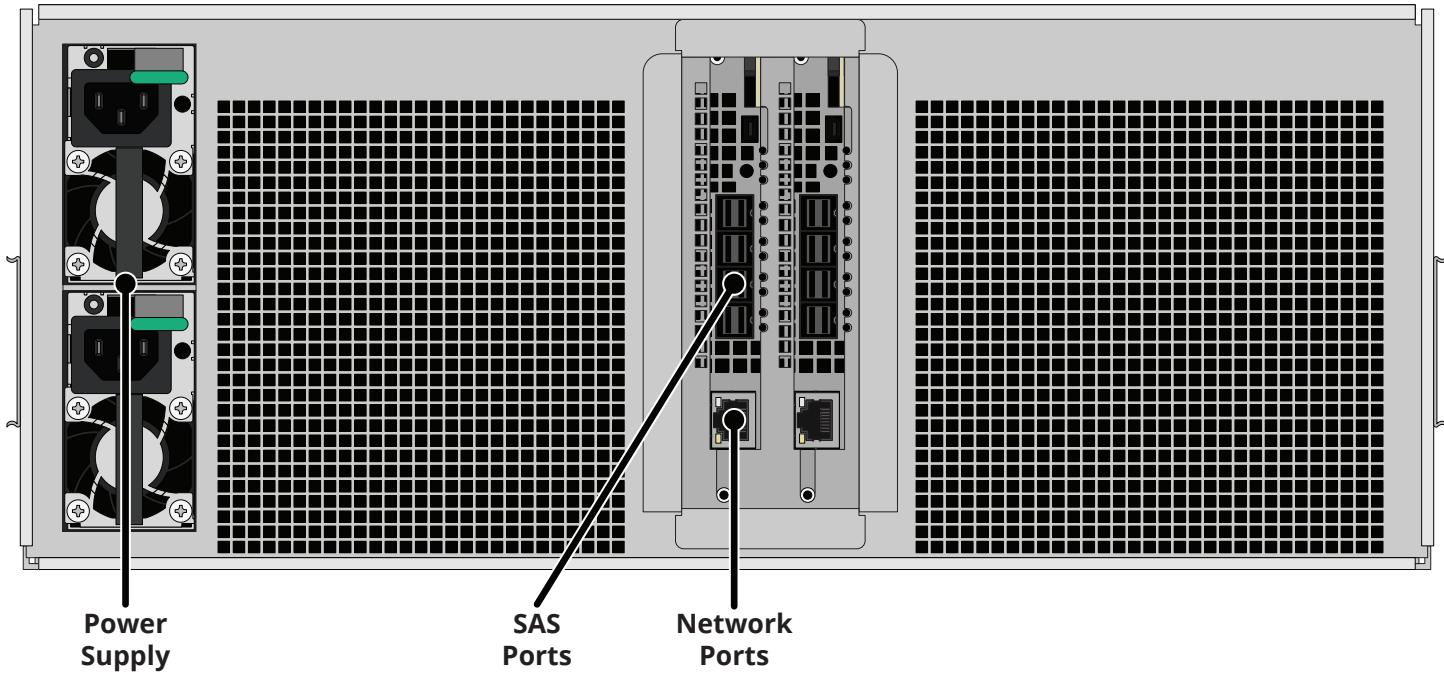
> ⊘ **Tip - Cable Management**
>
> Before continuing, test your cable setup by sliding the system out of the rack. The cables should move freely with the CMA without pinching or coming loose.

7.8.1 SAS Cabling

To set up SAS between your TrueNAS system and expansion shelves, cable the first port on the first TrueNAS controller to the first port on the first expansion shelf controller. High Availability (HA) systems require another cable from the first port on the second TrueNAS controller to the first port on the second expansion shelf controller.

Line the SAS3 cable connector up with the SAS port on the back of the system. Ensure the blue tab on the SAS cable is facing toward the left (toward the PSUs). Gently push the connector into the port until it clicks.

For more specific SAS configurations, refer to "9 Storage Expansion" on page 24.
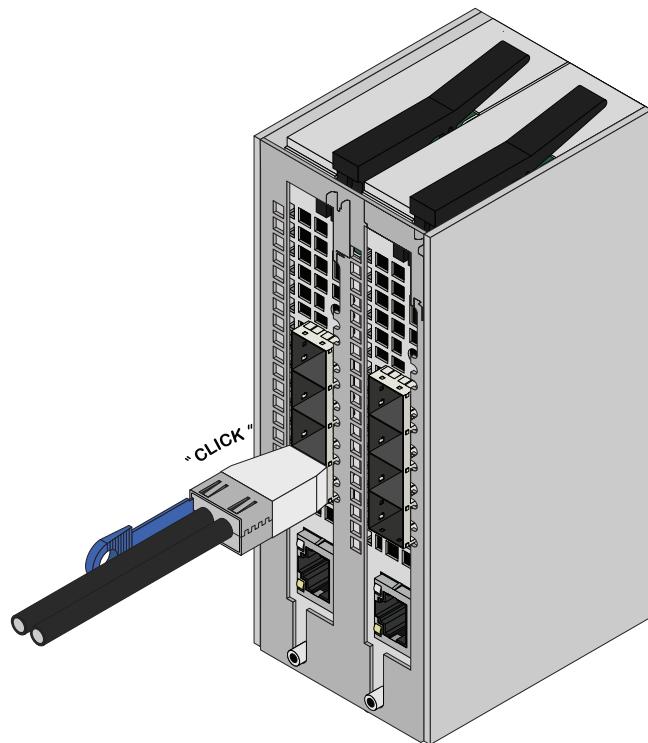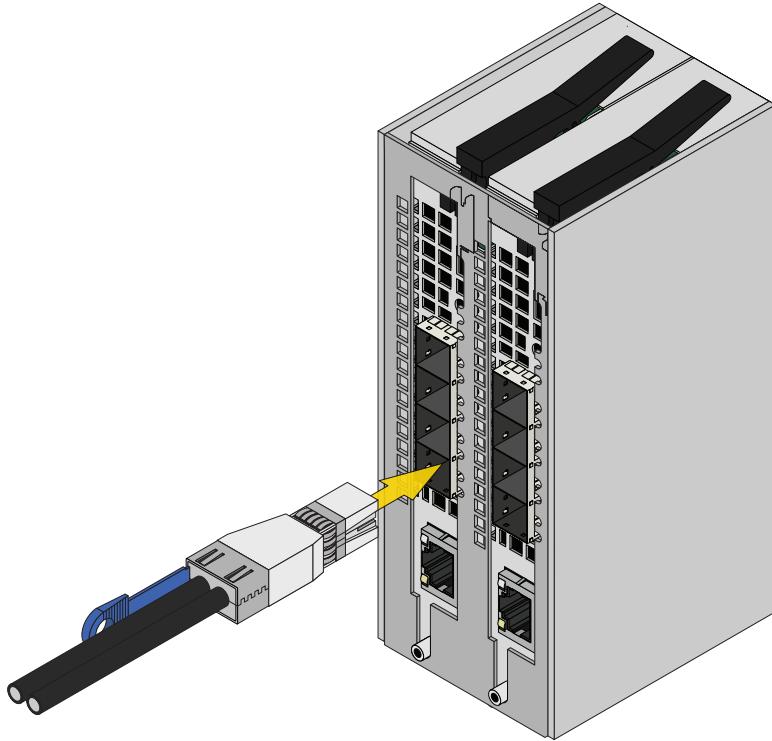
8 Unracking Procedure

Unplug all PSU, networking, and SAS cables, then open the straps on the CMA and remove all the cables.
If you plan to re-install the system in the rack, label the cables so you can easily cable the system again.

8.1 Remove Cable Management Arm (CMA)

Pull the CMA attachment pin up and move the pin assembly toward the system until it clears the bracket, then pull
the pin assembly away from the system.
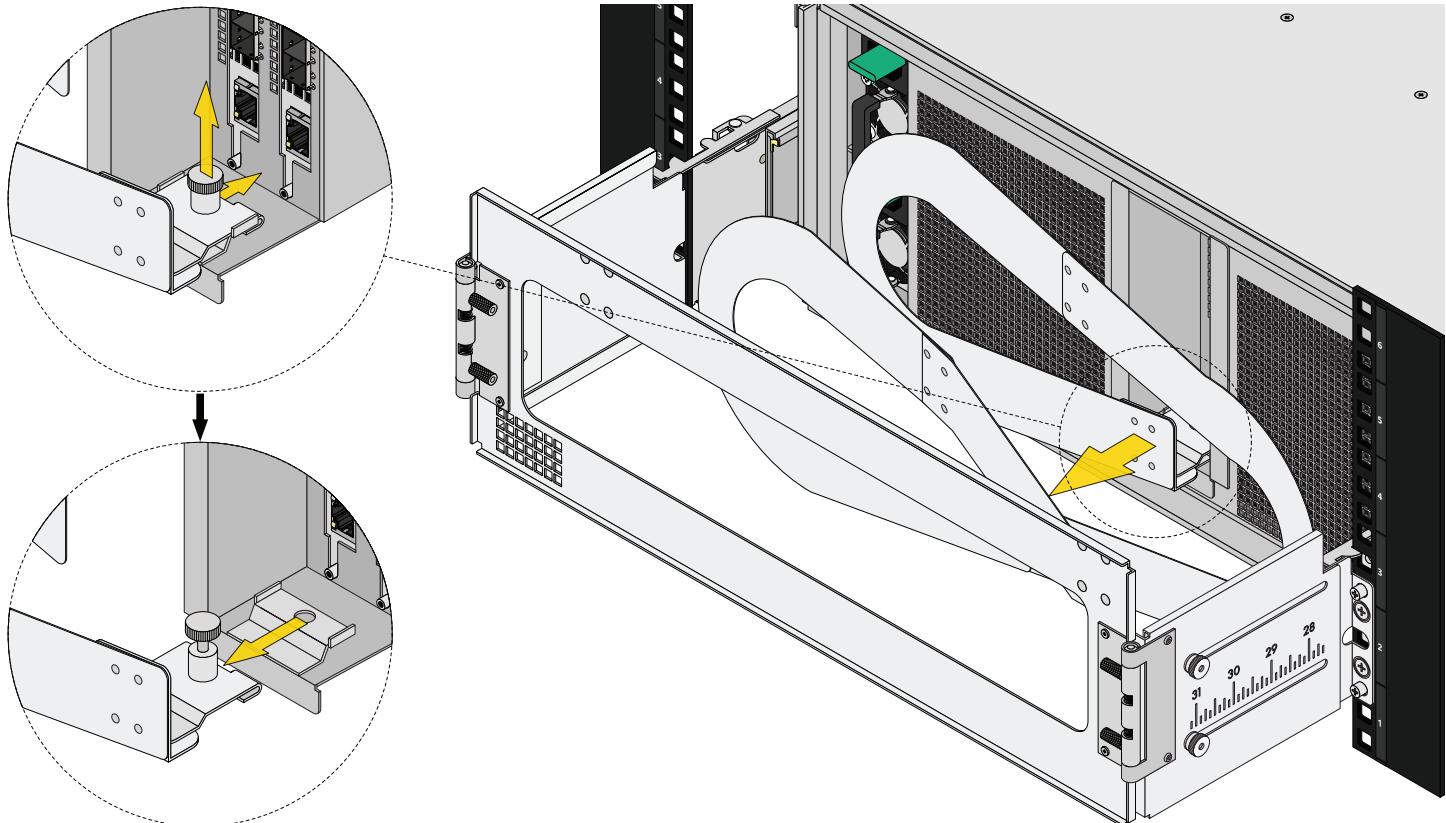
Pinch the spring pegs on the CMA hinge together and pull it away from the bracket. Repeat for the other side.
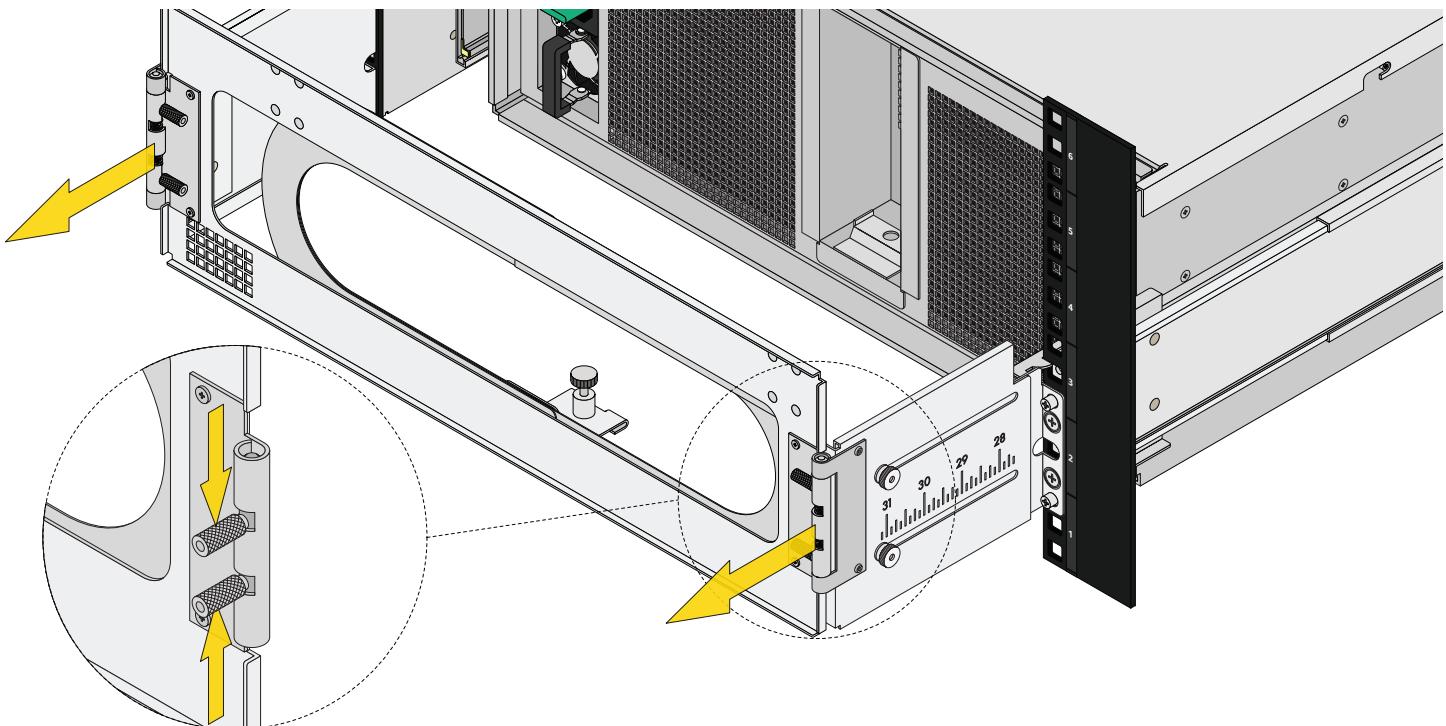
8.2 Remove Cable Management Brackets

> **ⓘ Note - PDU and Rack Space**
>
> If your rack uses a 0U PDU, you might have to temporarily remove it in order to remove the screws for the CMA brackets. You might also need a longer screwdriver to properly access the screws.

Remove both M5 X 10 flat screws with washers and pull the bracket away from the rack post.

Repeat for the other bracket.
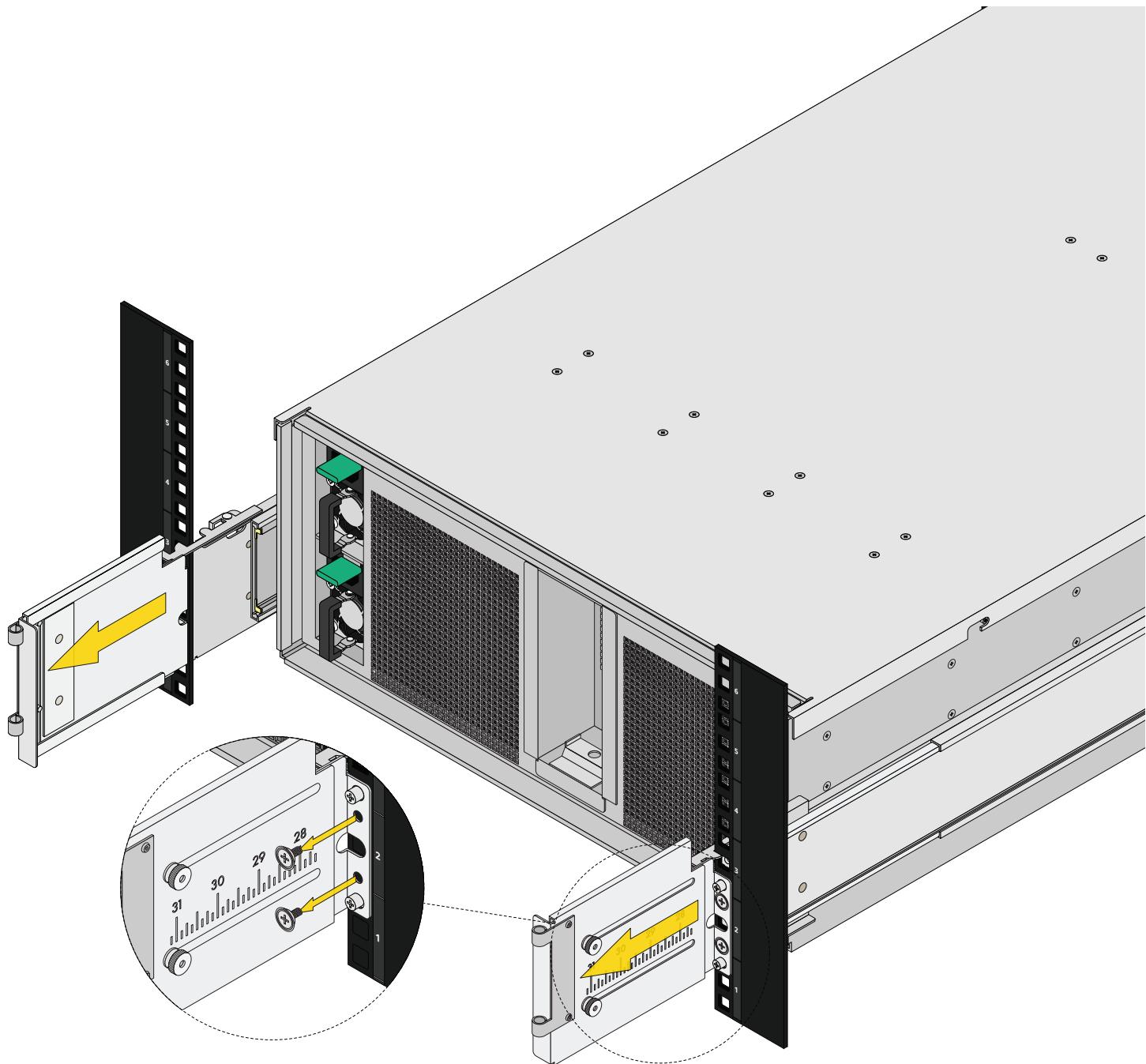
8.3 Pull the System Out into the Service Position

Loosen both thumbscrews on each chassis ear.

Pull the system out of the rack until the metal safeties click and lock the system into the service position.
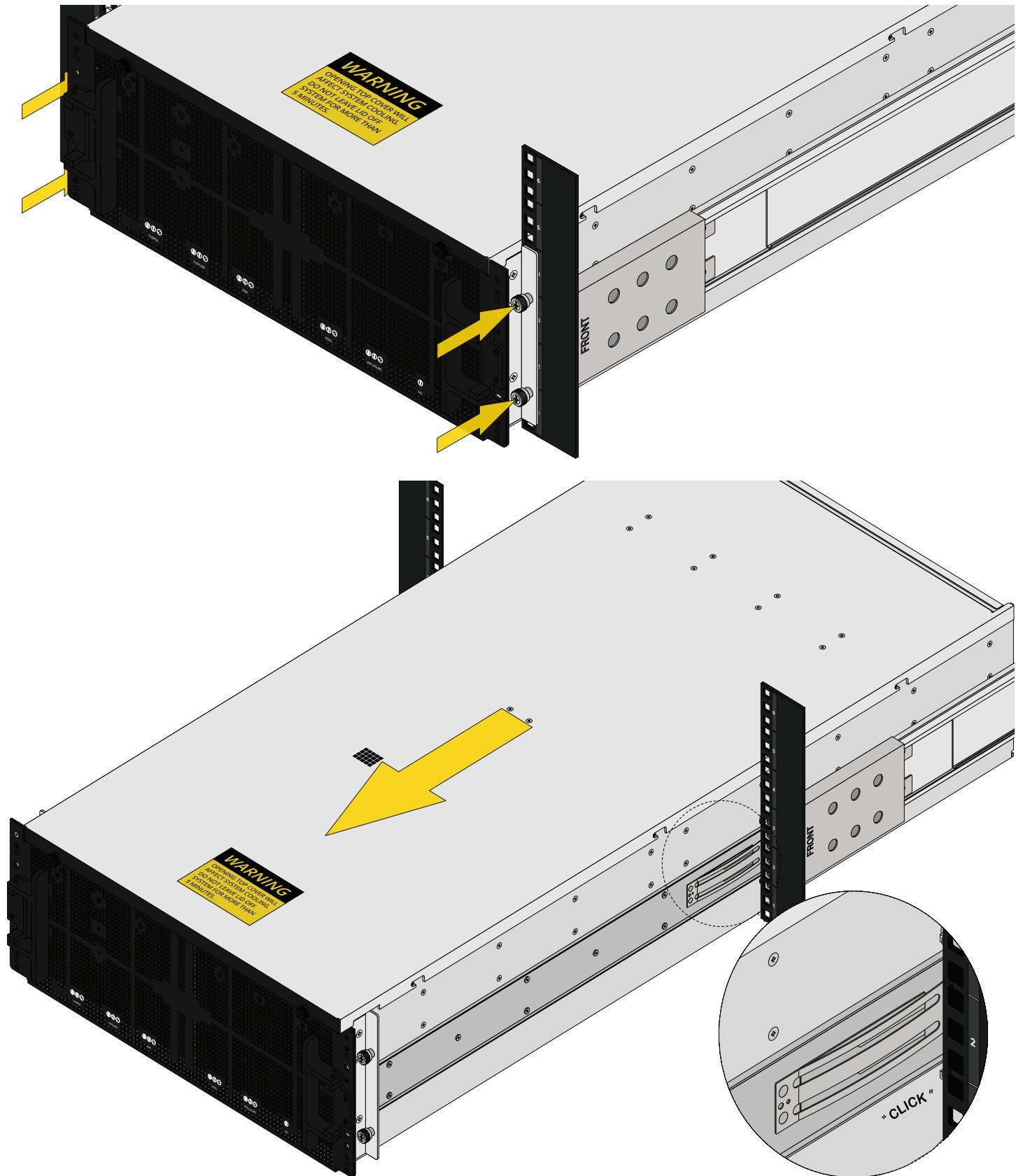
8.4 Remove Hard Drives

Remove the system lid by loosening the two thumbscrews, then pull the lid towards the front of the system and lift it away.

Open a drive latch by pressing the clear plastic button on the direction of the arrows, then gently pull the drive carrier up out of the slot

Repeat for all remaining carriers and blanks.
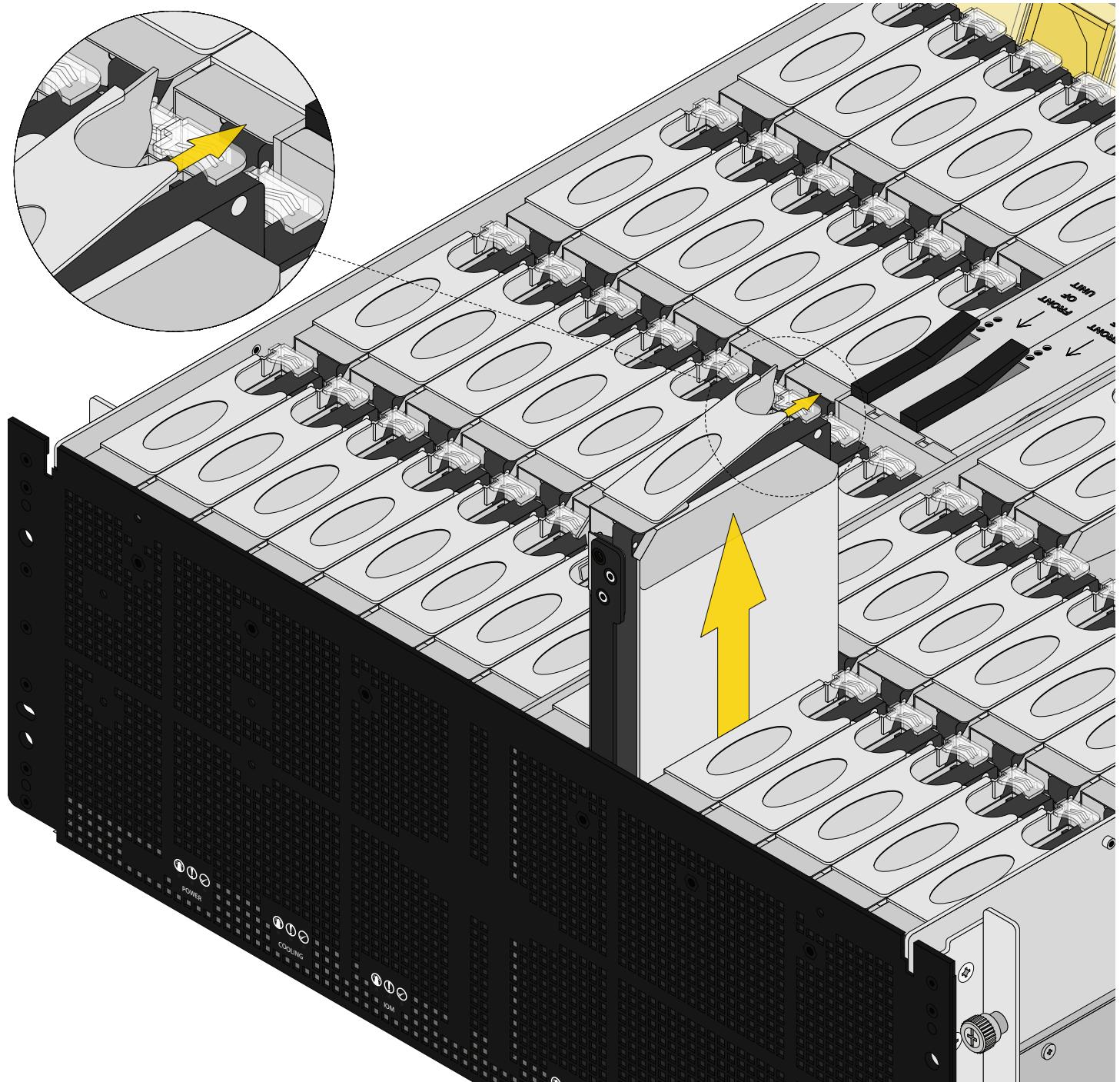
8.5 Remove the System from the Rack

> **🔥 Warning - Team Lift**
> The ES102 requires two people to lift safely. Failure to follow safety recommendations can lead to severe system damage or personal injury.

Replace the lid on the system and tighten the thumbscrews.

Press the metal safety catches on each chassis rail into the system and pull the system all the way out of the rack.
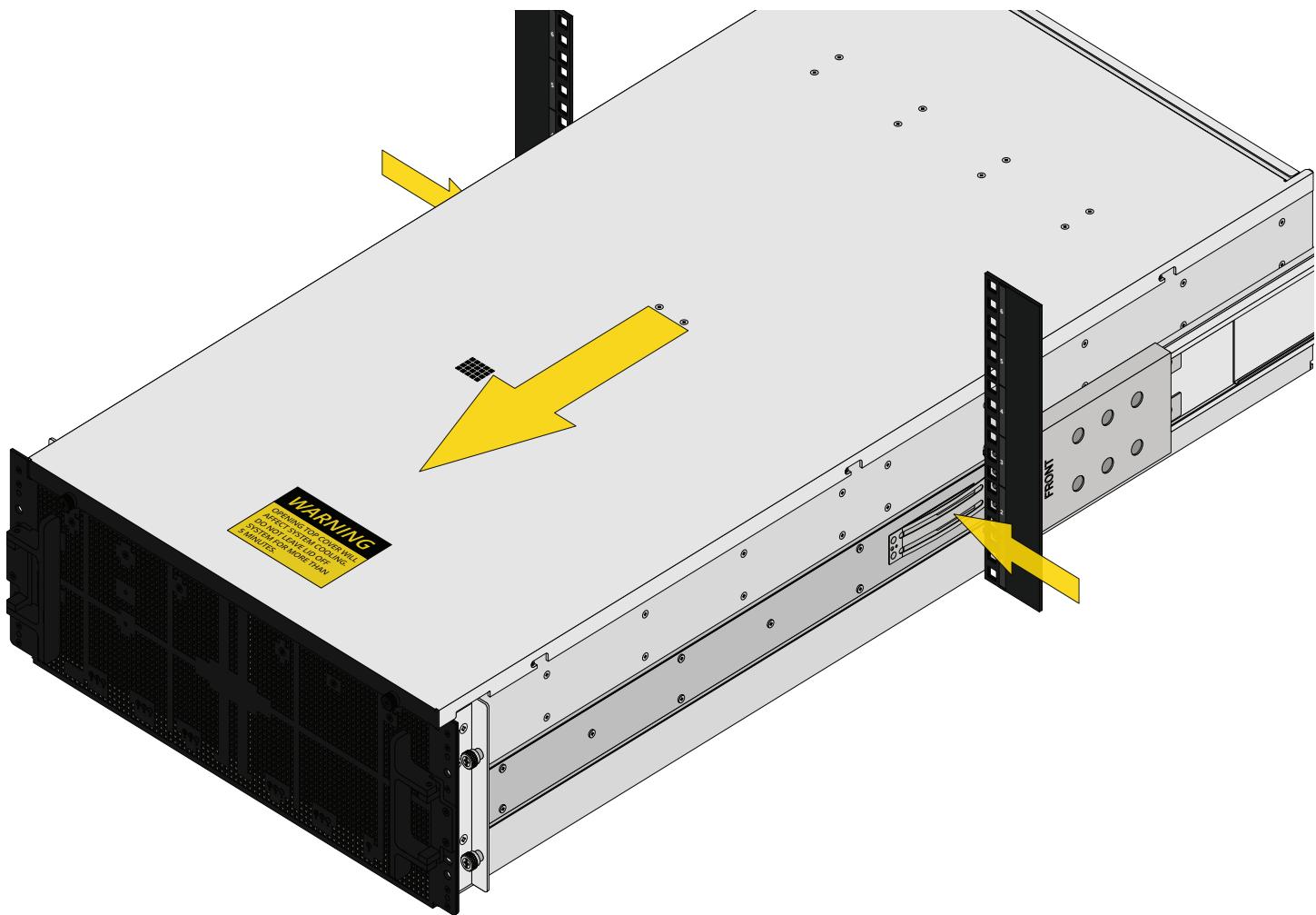
8.6 Remove the Rack Rail to the Front Rack Post

At the front of the rack, remove the five M5 X 10 flat screws with washers that hold the mounting plate to the rack post, then extend the "FRONT" end of the rail away from the rack post.
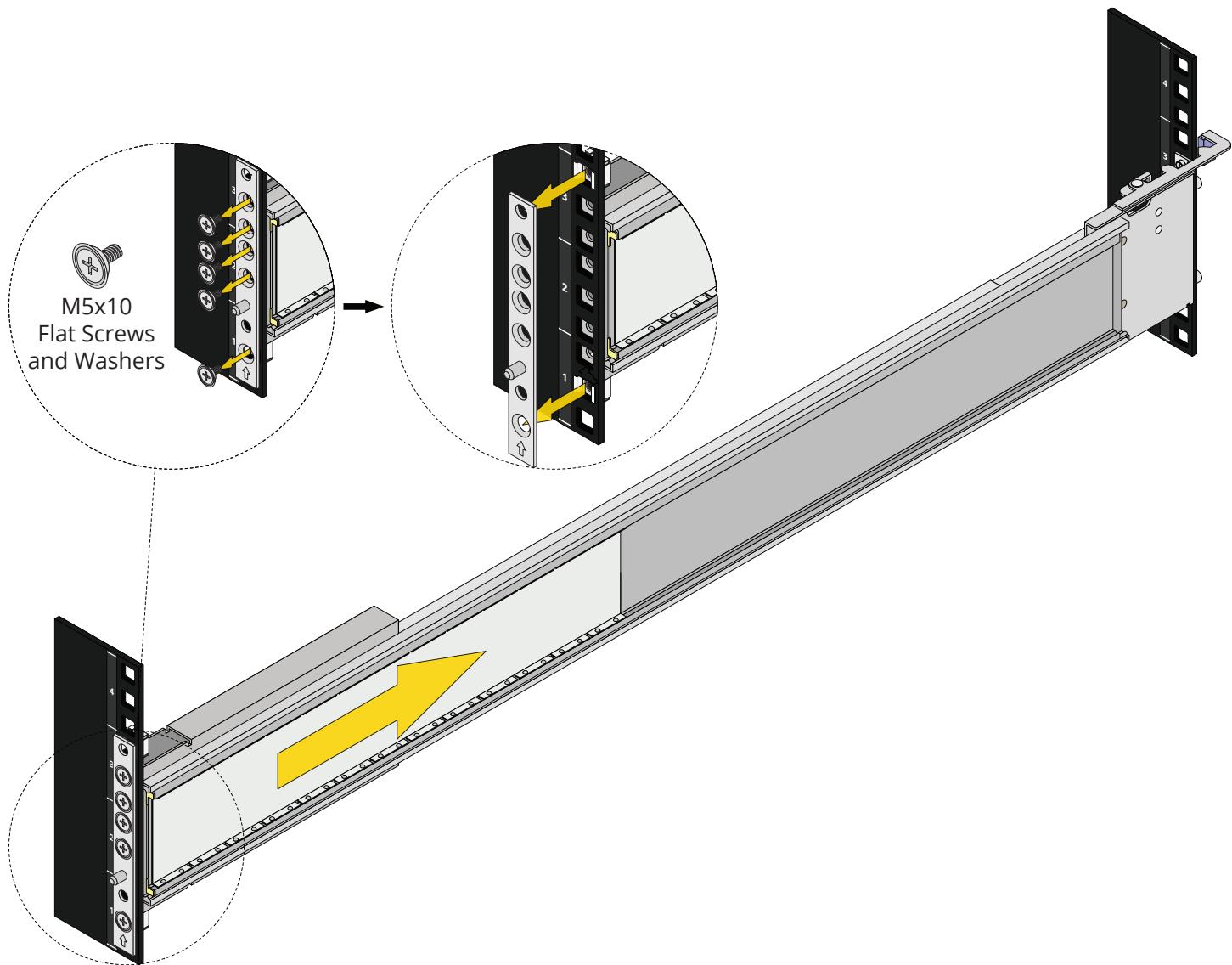
At the rear, remove both M5 X 10 flat screws with washers, then swing the blue latch handle open and extend the rail away from the rack post. Repeat this process for the other rail.
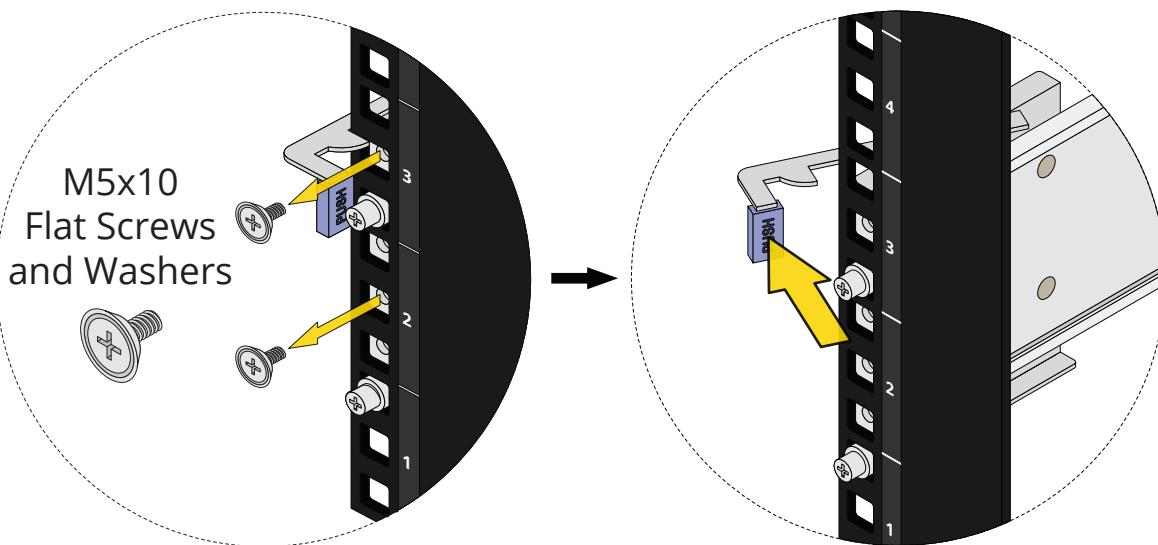
9 Storage Expansion

To set up SAS between your TrueNAS system and expansion shelves, cable the first port on the first TrueNAS controller to the first port on the first expansion shelf IOM/expander. High Availability (HA) systems require another cable from the first port on the second TrueNAS controller to the first port on the second expansion shelf controller.

We do not recommend other cabling configurations. Contact iX Support if you need other cabling methods.

If your TrueNAS system has HA, reboot or failover after connecting SAS cables to sync drives between controllers.

> ⓘ **Important - SAS Configuration**
>
> When setting up SAS connections, please adhere to the wiring example below. Connecting Expansion Shelves incorrectly causes errors. Never cable a single controller to different IOMs/expanders on the same shelf.

## 9.1 R50

R50 with a single ES102 Gen 2 Expansion Shelf:
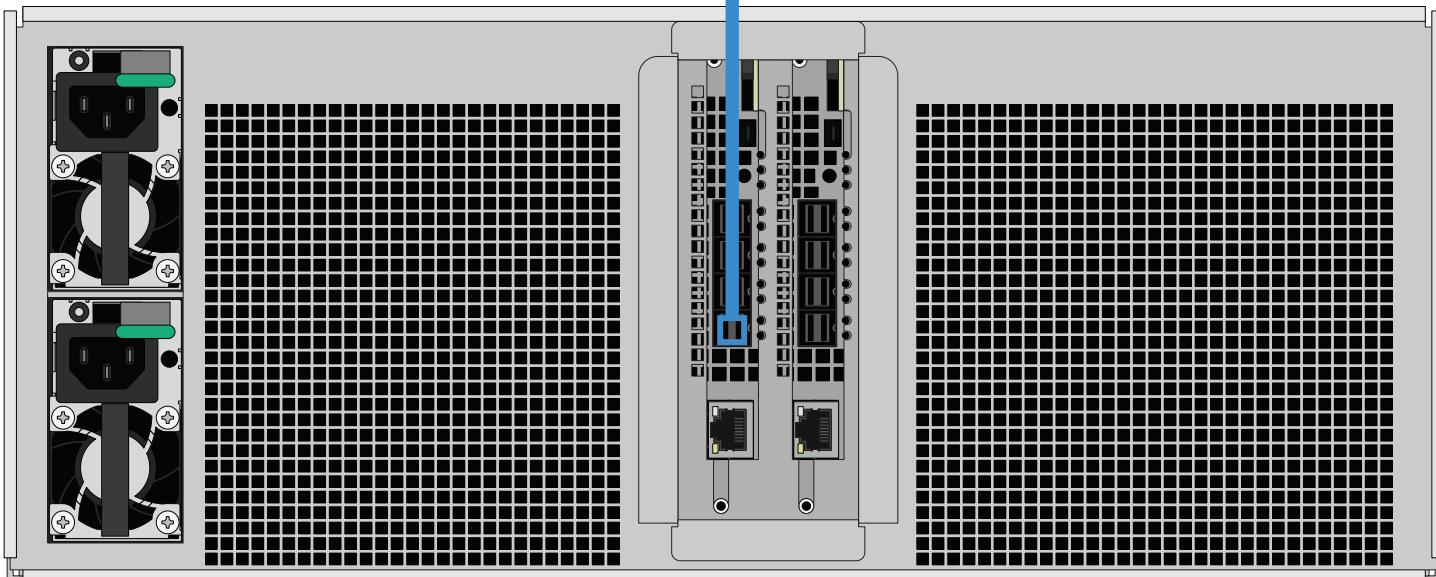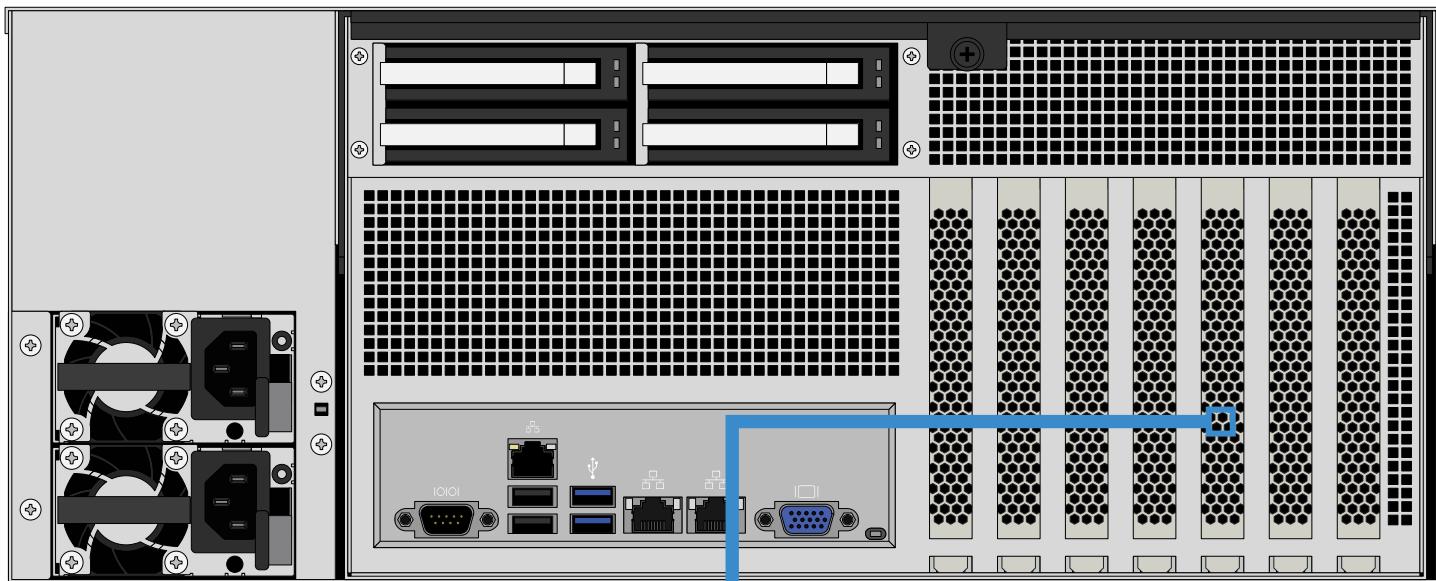
R50 with two ES102 Gen 2 Expansion Shelves:
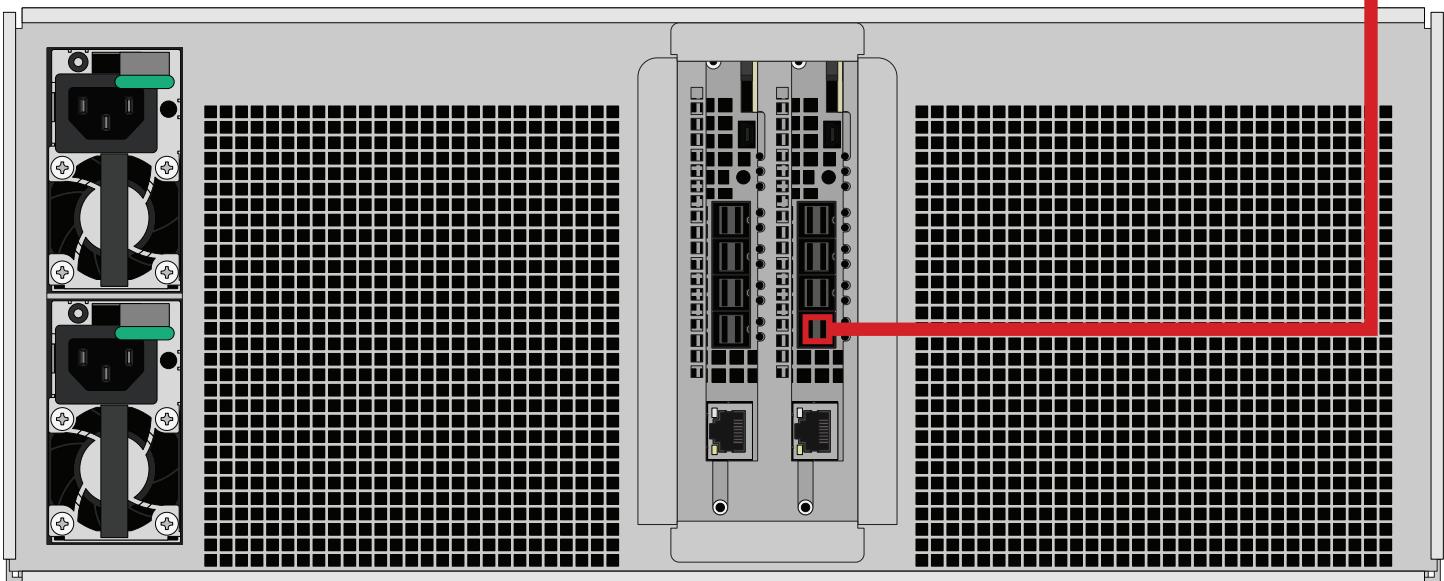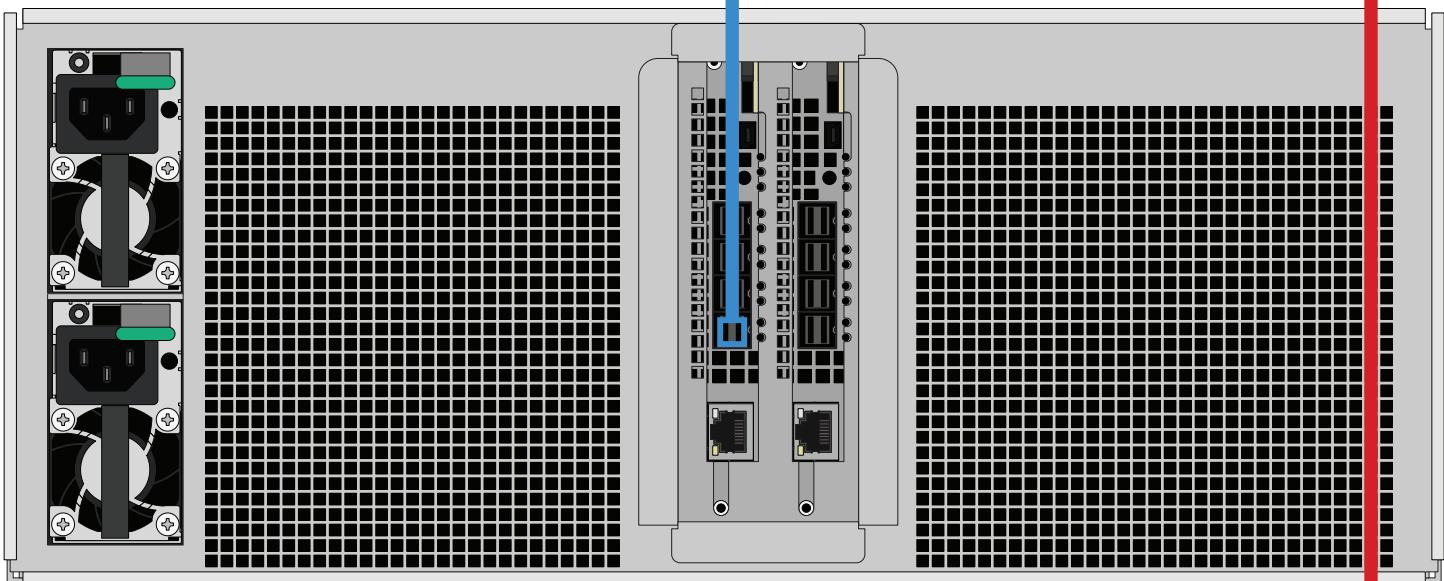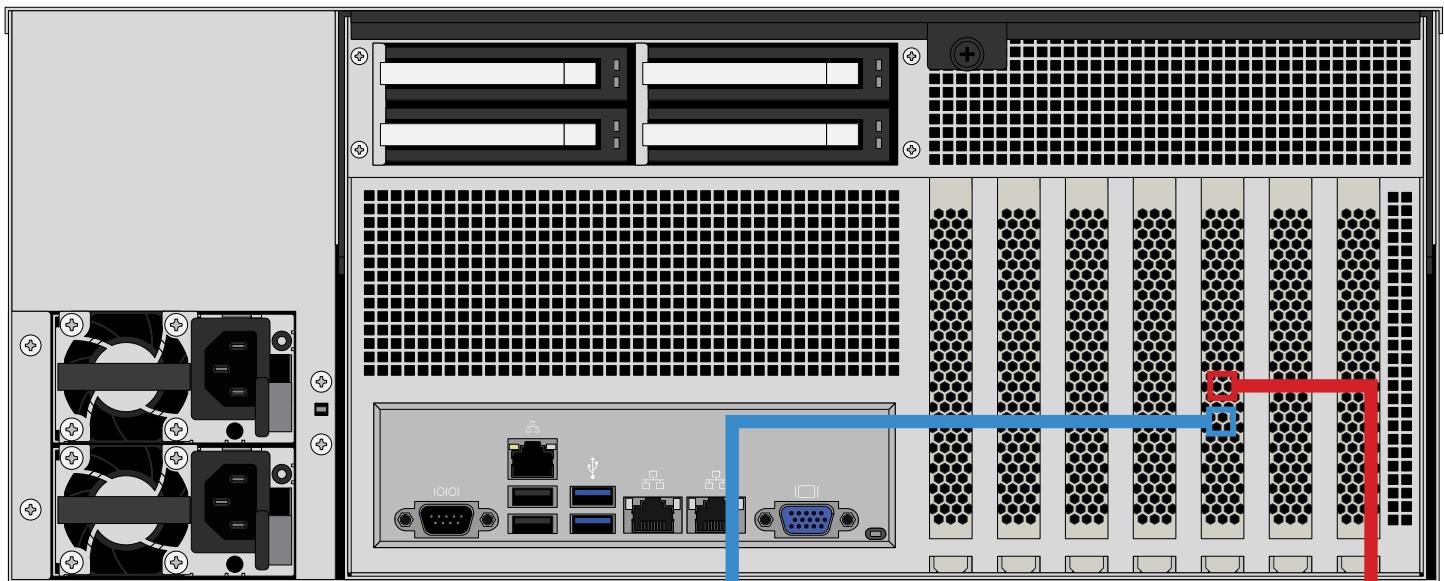
9.2 M60 (HA)

M60 with a single ES102 Gen 2 Expansion Shelf:
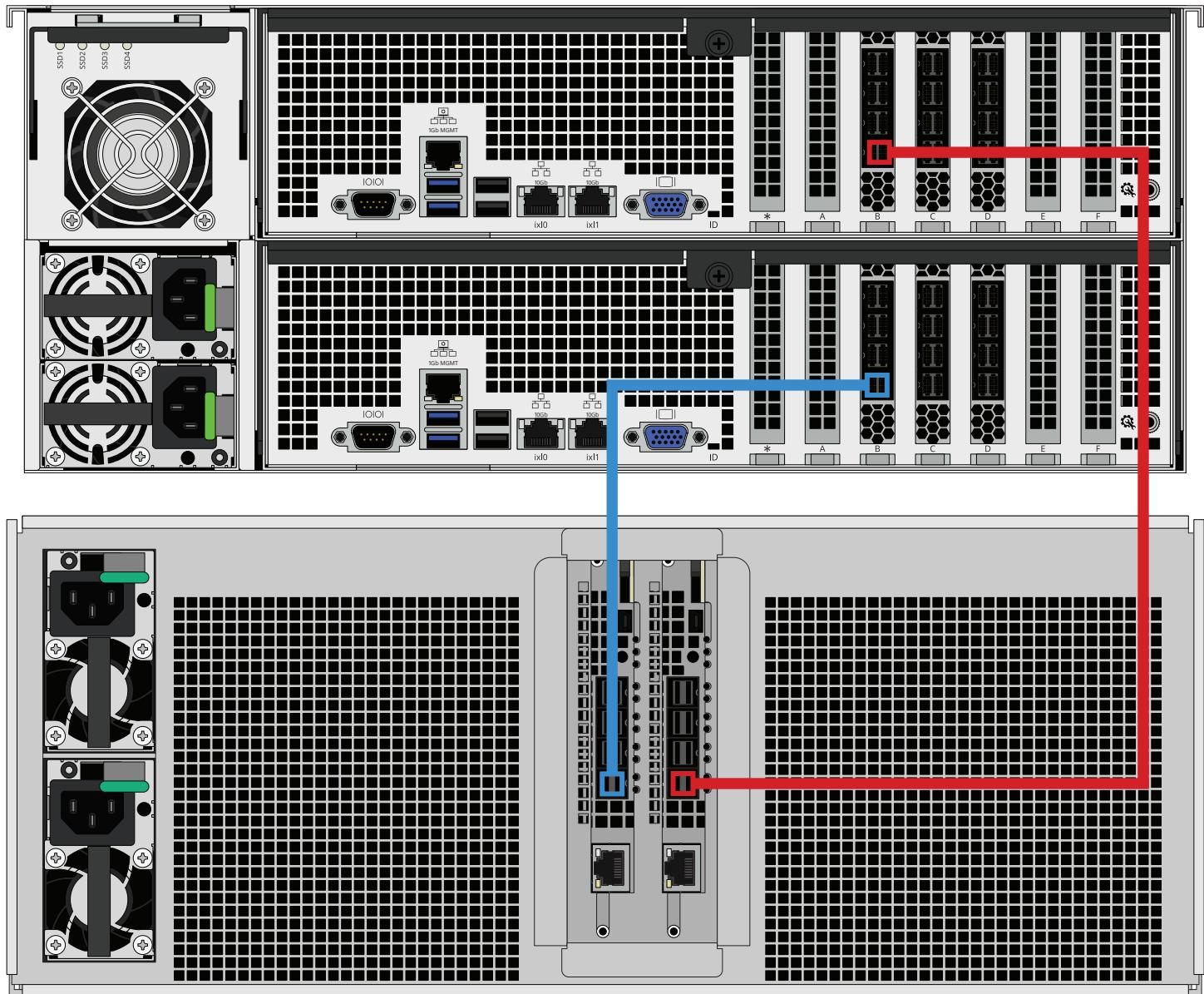
9.3 F-Series

F-Series with a single ES102 Gen 2 Expansion Shelf:
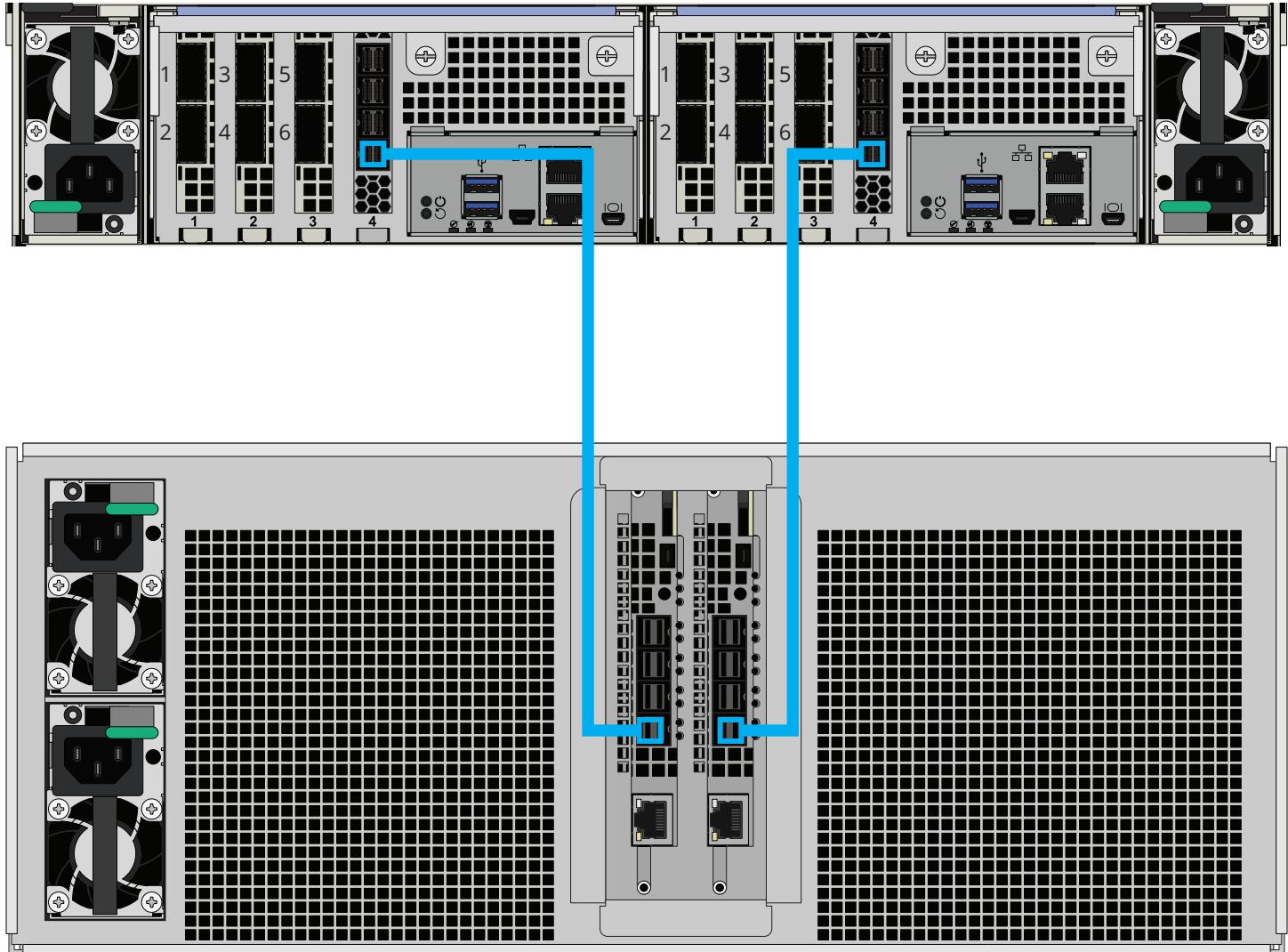
F-Series with three ES102 Gen 2 Expansion Shelf:
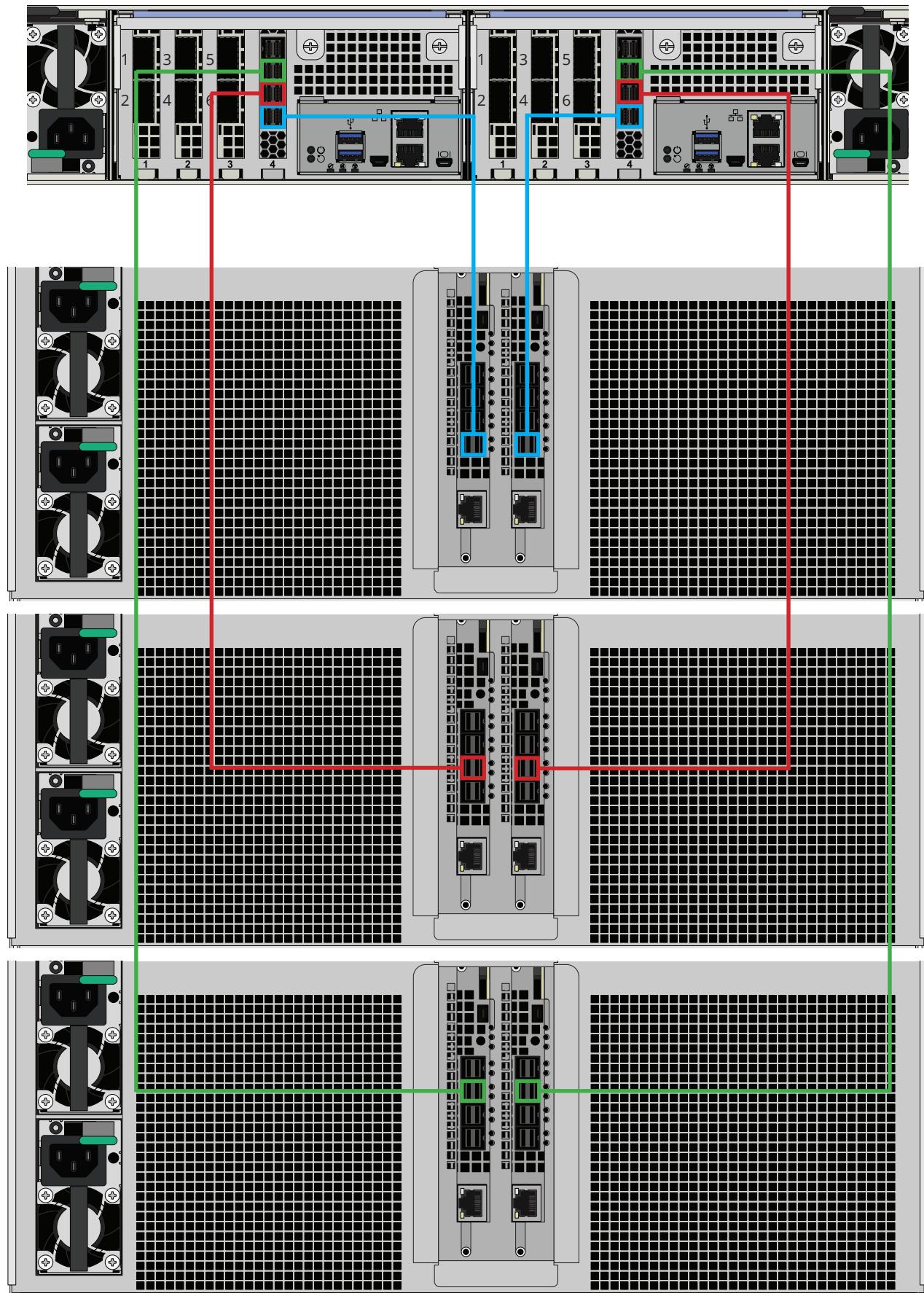
M60 with three ES102 Expansion Shelves. The M60 supports up to 12 Expansion Shelves using additional SAS cards.
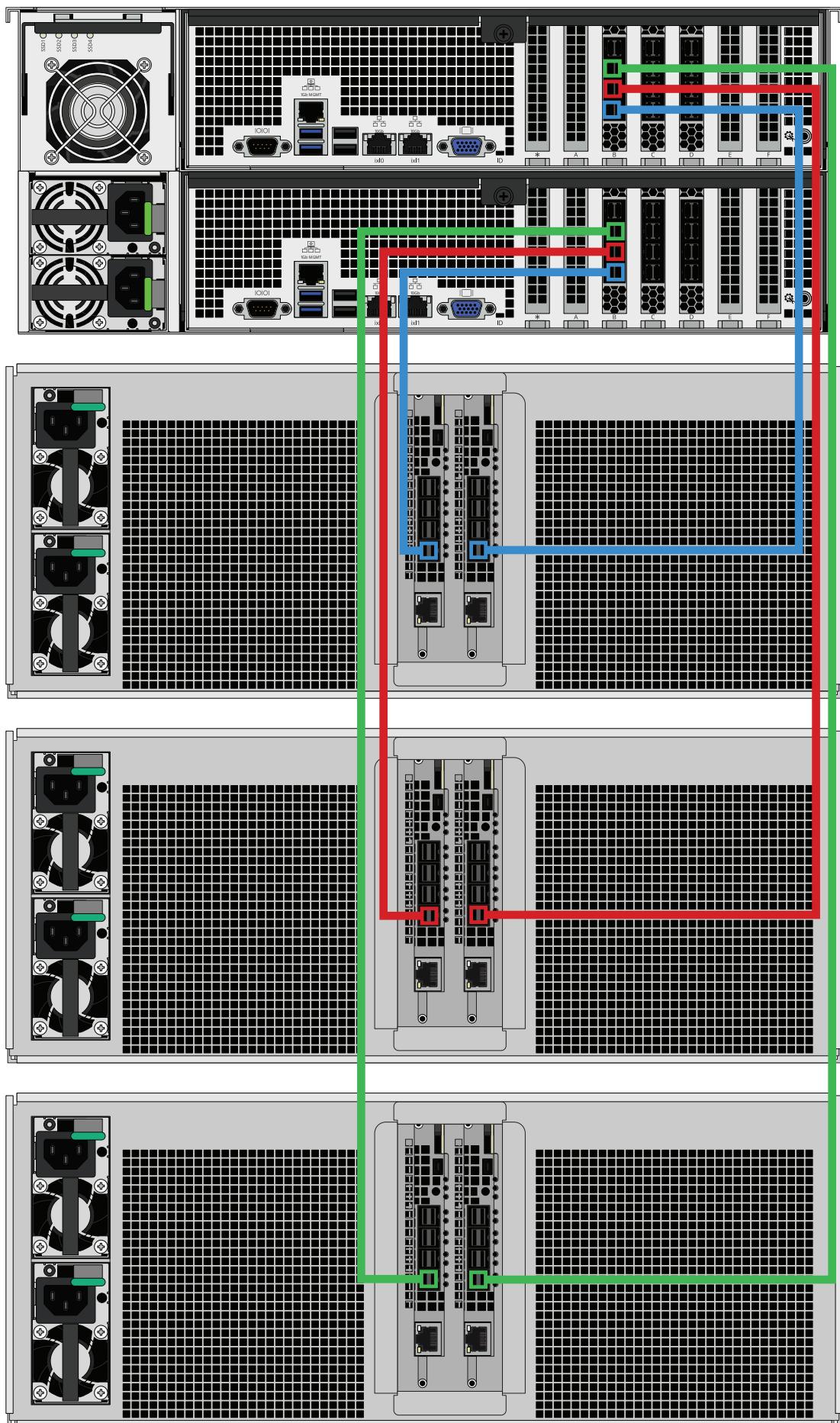
10 Additional Resources

The TrueNAS Documentation Hub has complete software configuration and usage instructions. Click **Guide** in the TrueNAS web interface or go directly to:

https://www.truenas.com/docs

Additional hardware guides and articles are in the Documentation Hub's Hardware section:

https://www.truenas.com/docs/hardware

The TrueNAS Forums provide opportunities to interact with other TrueNAS users and discuss their configurations:

https://forums.truenas.com/

11 Contact Us

Having issues? Please contact TrueNAS Enterprise Support to ensure a smooth resolution.

Contact Method	Contact Options
Web	https://www.truenas.com/support
Email	support@truenas.com
Telephone	Monday-Friday, 6:00AM to 6:00PM Pacific Standard Time: • US-only toll-free: **1-855-473-7449** option 2 • Local and international: **1-408-943-4100** option 2
Telephone	Telephone After Hours (24x7 Gold Level Support only): • US-only toll-free: **1-855-499-5131** • International: **1-408-878-3140** (International calling rates will apply)
Address	iXsystems, Inc. dba TrueNAS - 541 Division St, Campbell, CA 95008, USA