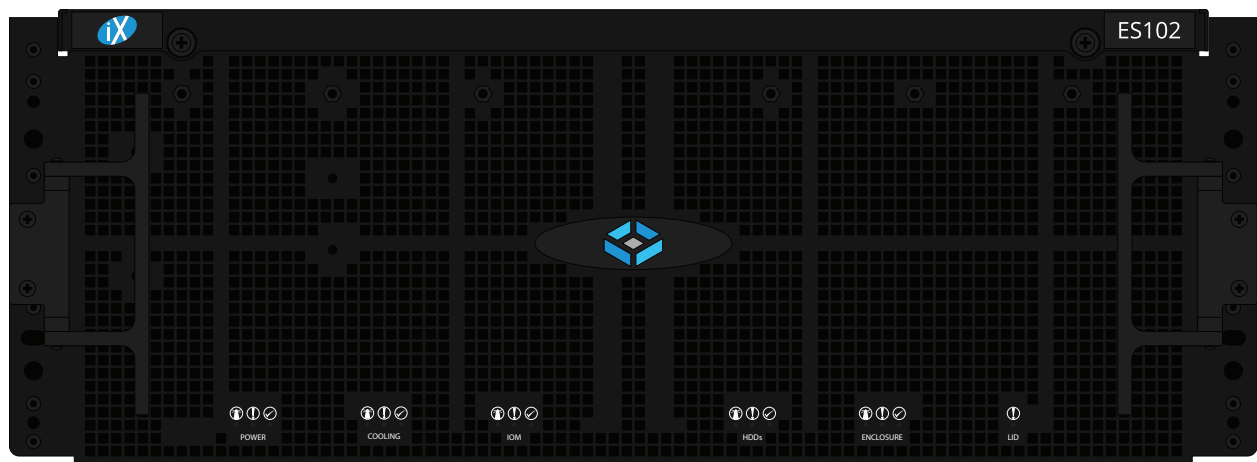


TrueNAS® ES102 Gen 2 User Manual

v.24071



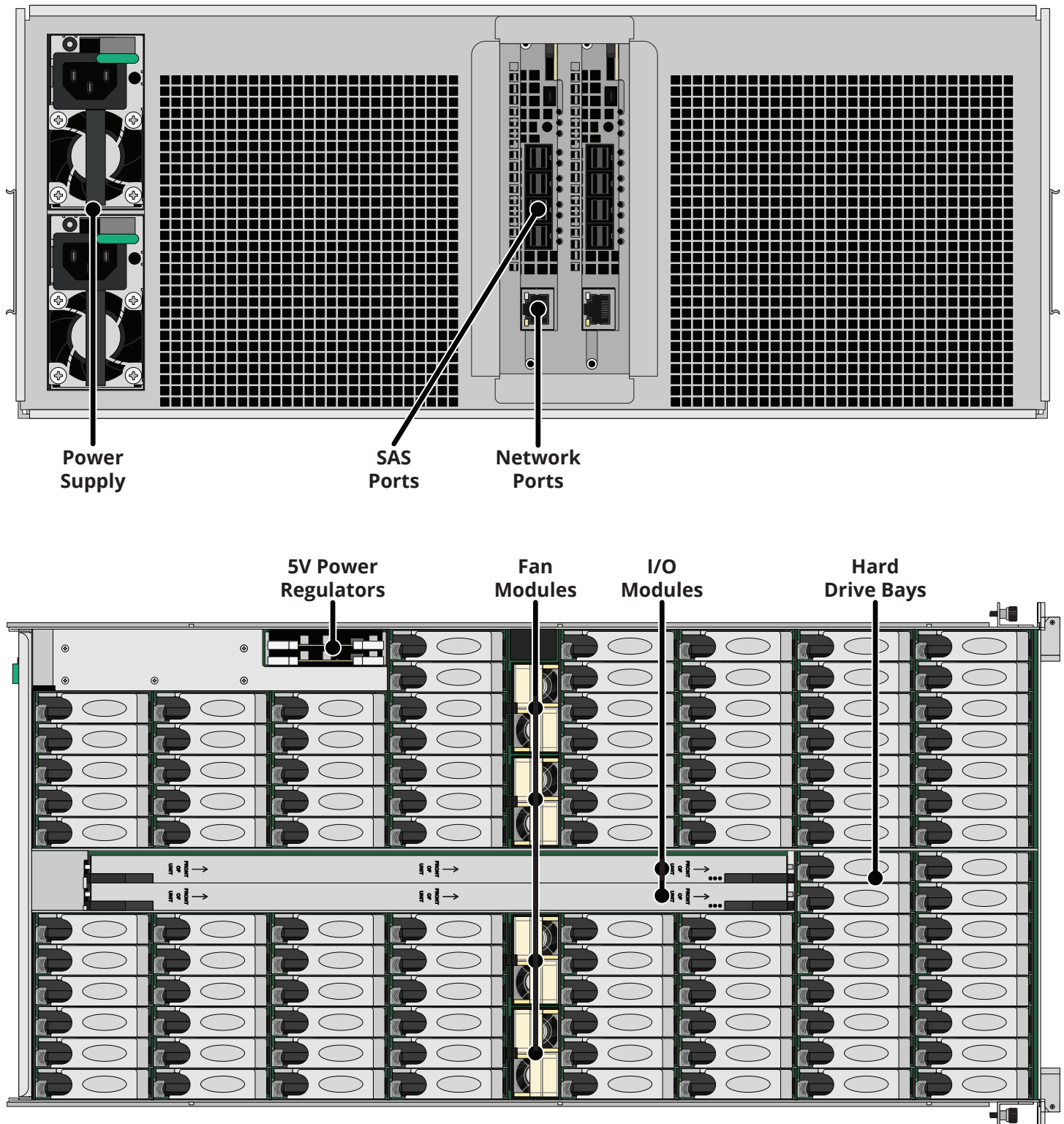
Contents

1 Introduction	1
2 Safety	2
2.2 Anti-Static Precautions	2
2.3 Personal Protective Equipment (PPE)	2
2.4 Handling the System	2
3 Specifications	3
4 Space Requirements	3
5 Recommended Tools	3
6 LED Indicators	4
6.1 Front Indicators	4
6.2 Rear Indicators	4
7 Racking Procedure	5
7.1 Attach the Rack Rail to the Rear Rack Post	5
7.2 Attach the Rack Rail to the Front Rack Post	6
7.3 Install the System into the Service Position	7
7.4 Install Hard Drives	8
7.5 Push the System into the Rack	9
7.6 Install Cable Management Brackets	10
7.7 Install Cable Management Arm (CMA)	11
7.8 Install Cables	12
7.8.1 SAS Cabling	13
9 Unracking Procedure	14
9.1 Remove Cable Management Arm (CMA)	14
9.2 Remove Cable Management Brackets	15
9.3 Pull the System Out into the Service Position	16
9.4 Remove Hard Drives	17
9.5 Remove the System from the Rack	18
9.6 Remove the Rack Rail to the Front Rack Post	19
12 SAS Connections	20
12.1 R50	20
12.2 M60 (HA)	22
13 Additional Resources	24
14 Contacting iXsystems	24

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.



2 Safety

2.2 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.

2.3 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.

2.4 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 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

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)	
I/O Modules	2	
5V Power Regulators	2	
Dimensions (H x W x L)	6.9" x 17.2" x 39.4"	172mm x 438mm x 1000mm
Net Weight (Fully Loaded)	256 lbs	116.12 kg
Operating Temperature	41°F ~ 95°F	5°C ~ 35°C
Non-Operating Temperature	41°F ~ 95°F	5°C ~ 35°C
Vibration	3G at 5 Hz to 500 Hz	

4 Space Requirements

The ES102 Gen 2 requires at least 4U of rack space in an EIA-310 compliant rack.

The system is up to 40.125" long with the CMA. The rack posts must be 27" to 32" (69cm to 81cm) apart to install the rail kit.

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

We recommend having at least 6 feet (1.8 meters) of space in front of the rack to account for the system fully extended on the rails and personnel servicing the front of the system.

We also recommend having at least 32 inches of space behind the rack to account for cable management and personnel serving the back of the system.

ⓘ 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

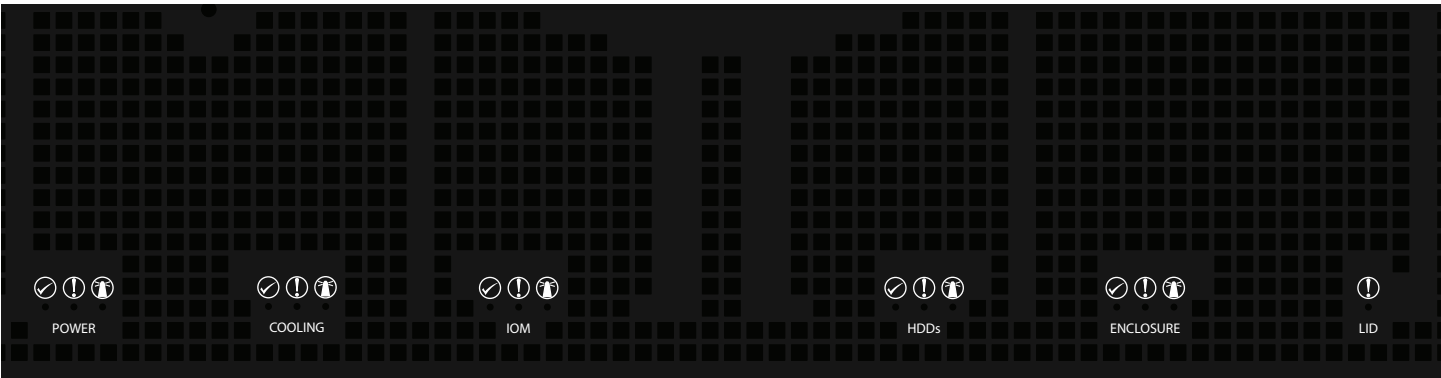
We recommend these tools when interacting with the TrueNAS ES102 Gen 2:

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

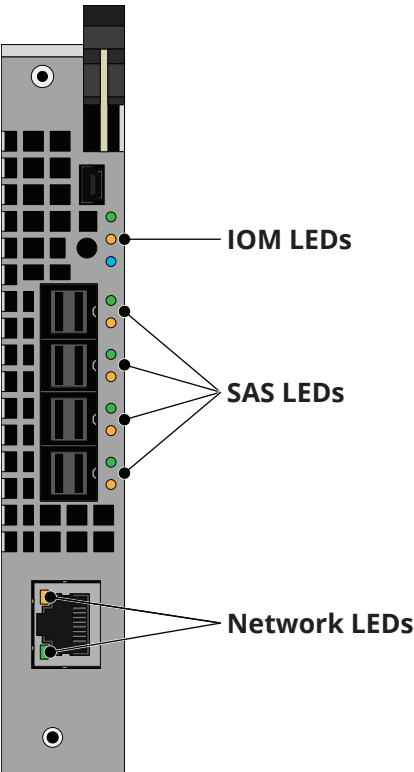
6 LED Indicators

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

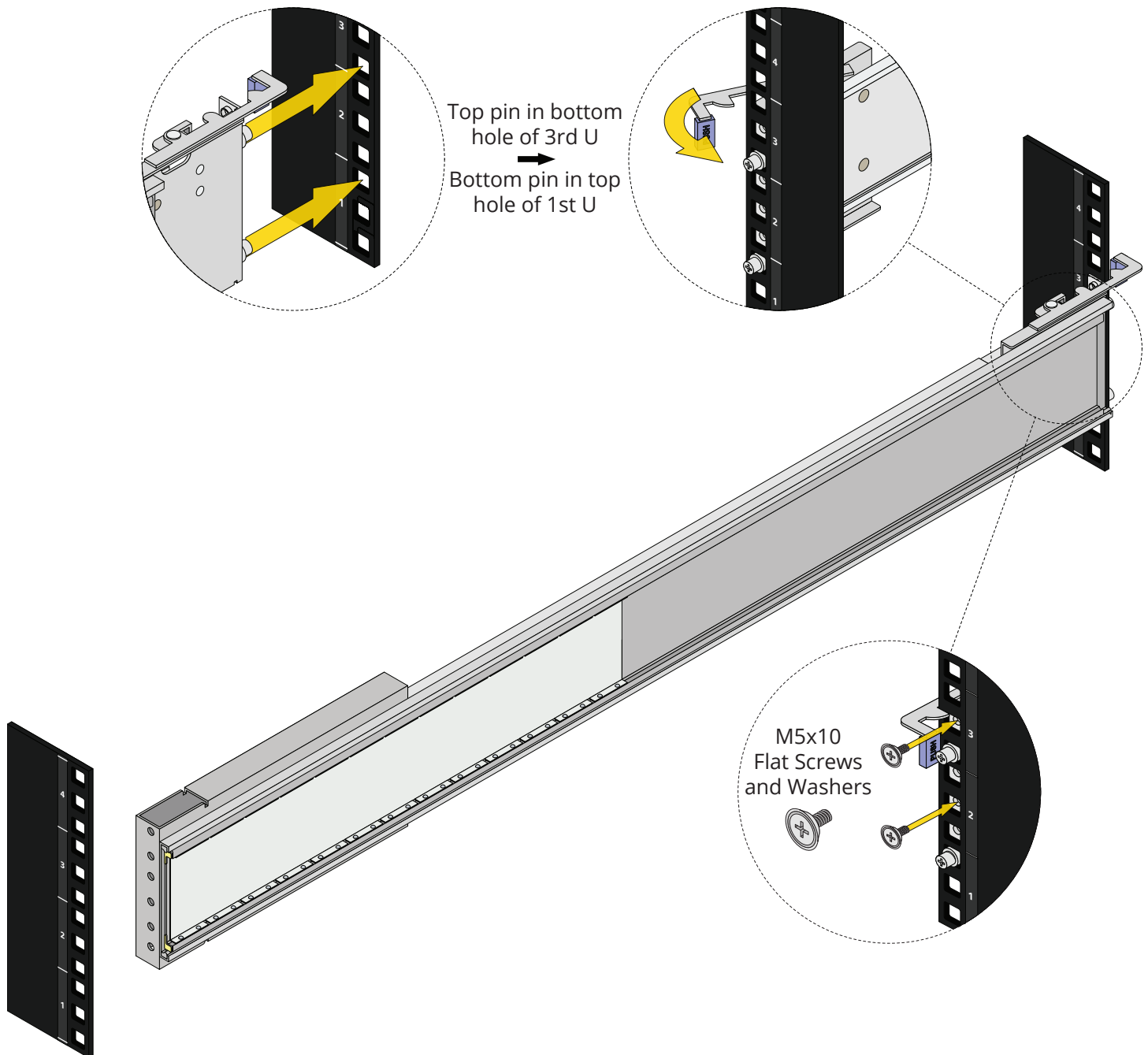
7 Racking Procedure

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.



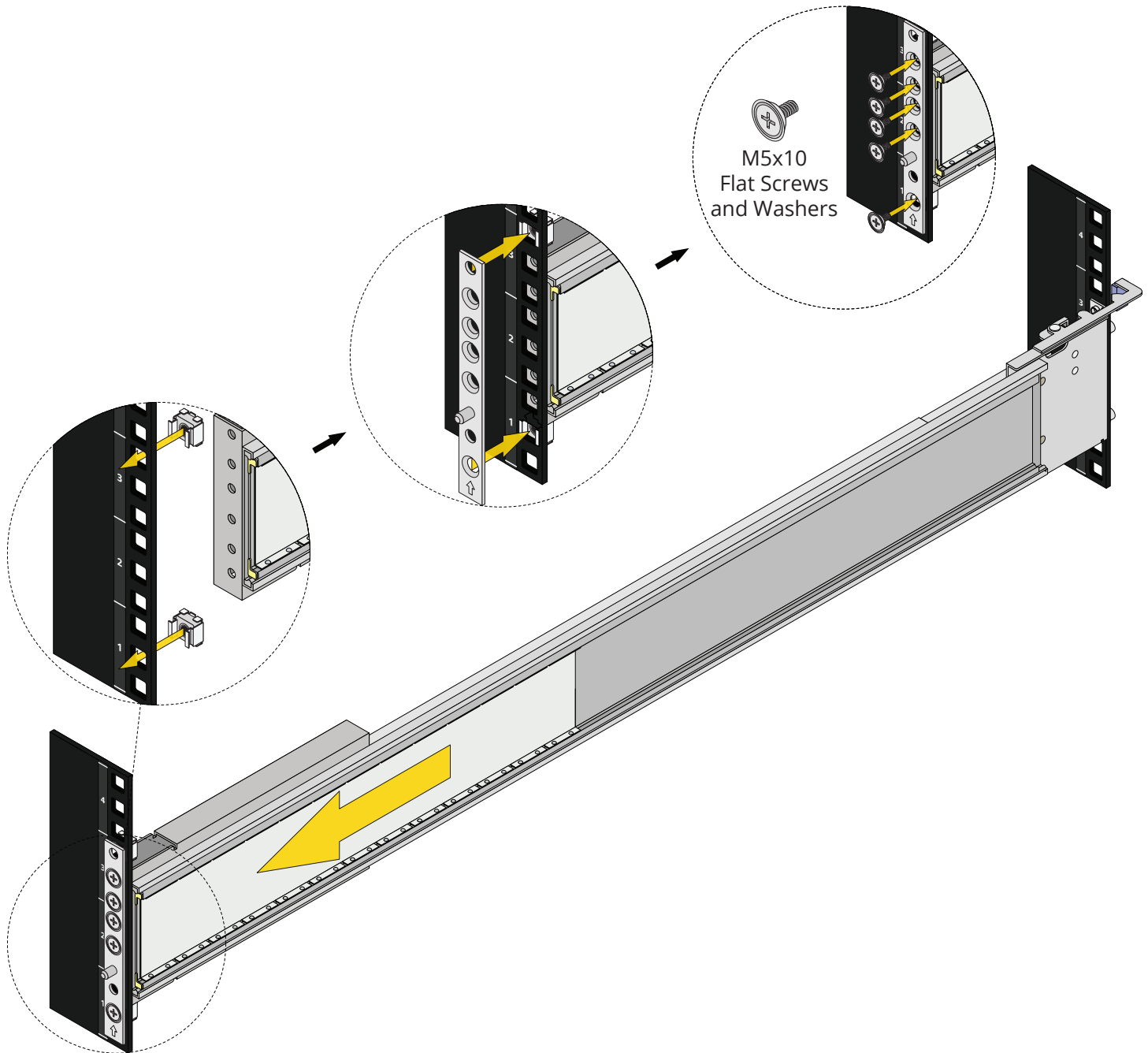
7.2 Attach the Rack Rail to the Front Rack Post

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.

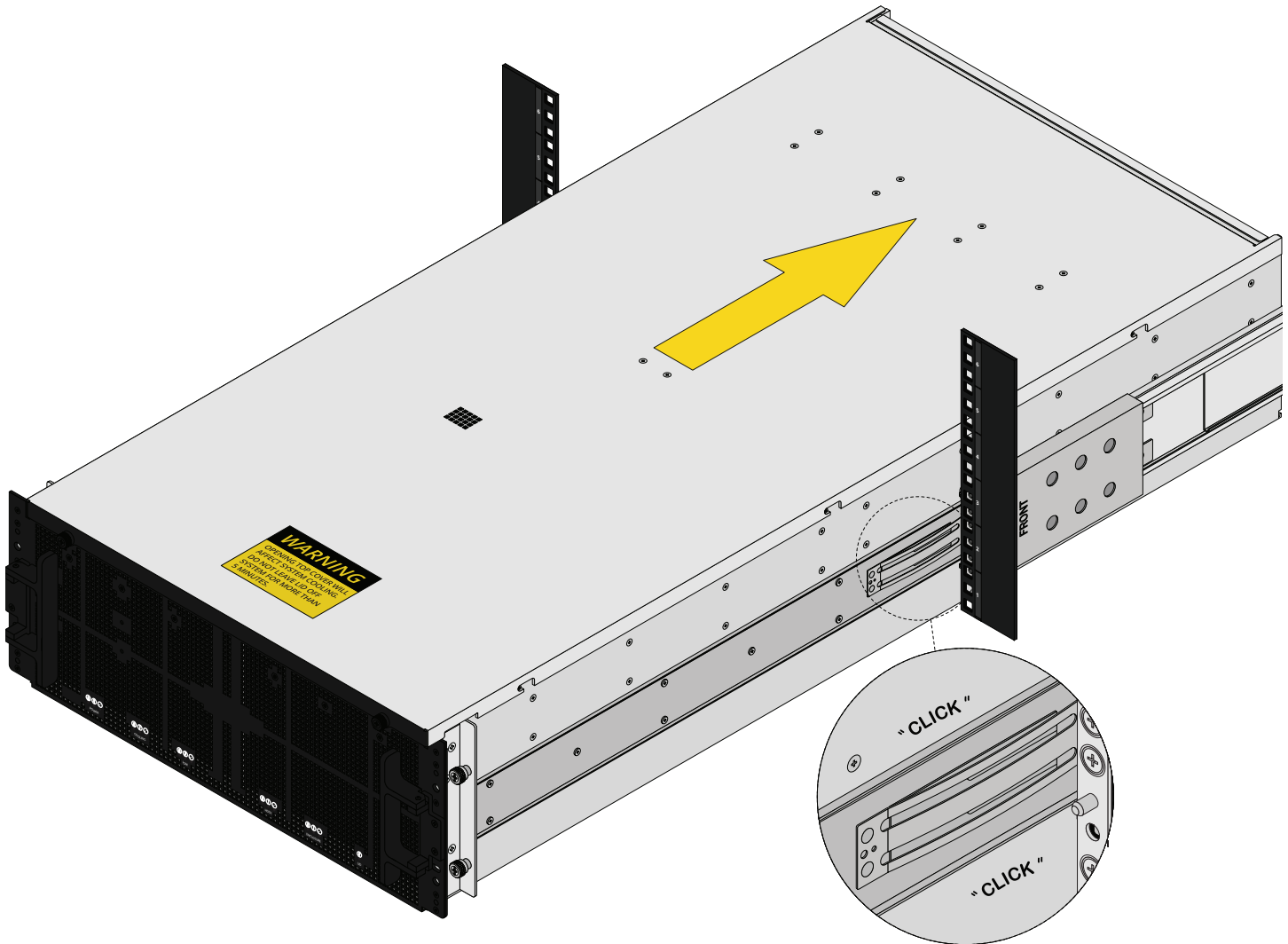


7.3 Install the System into the Service Position

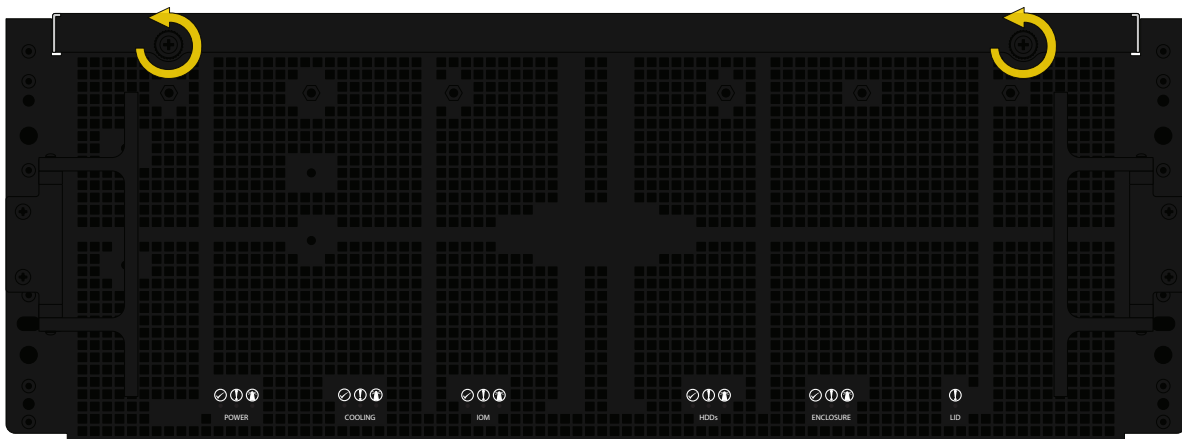
⚠ Warning - Team Lift

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.



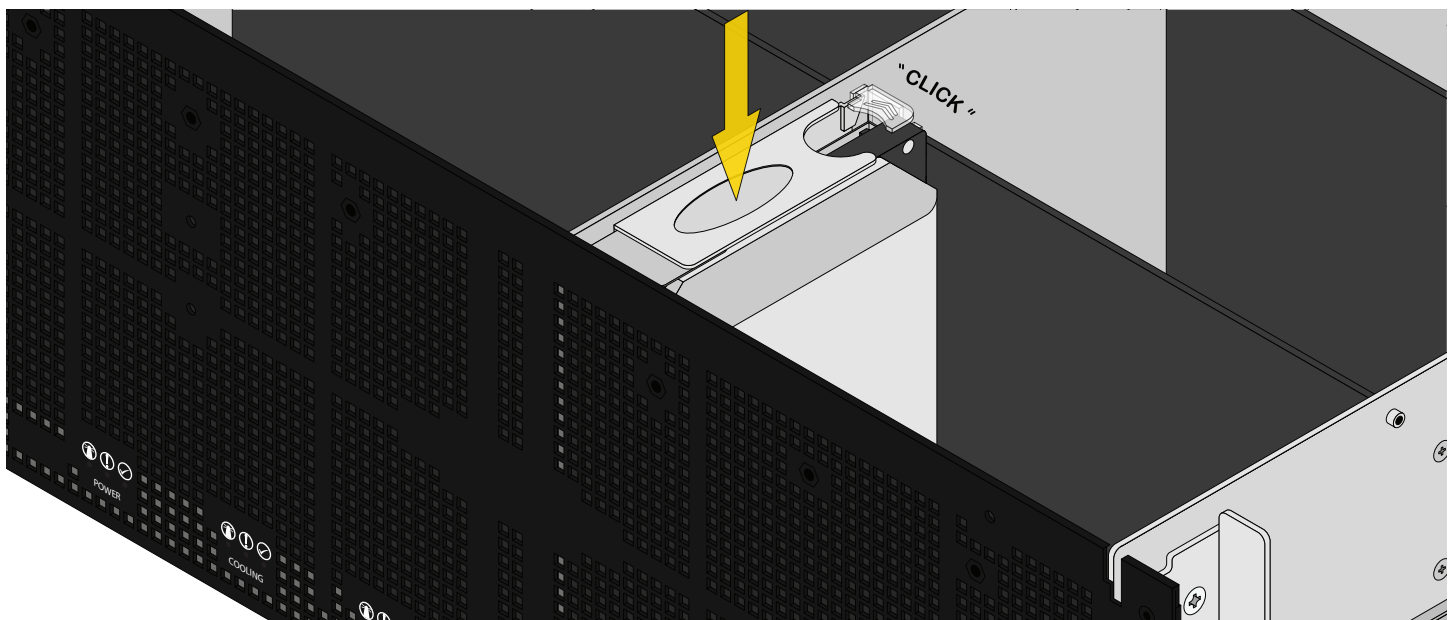
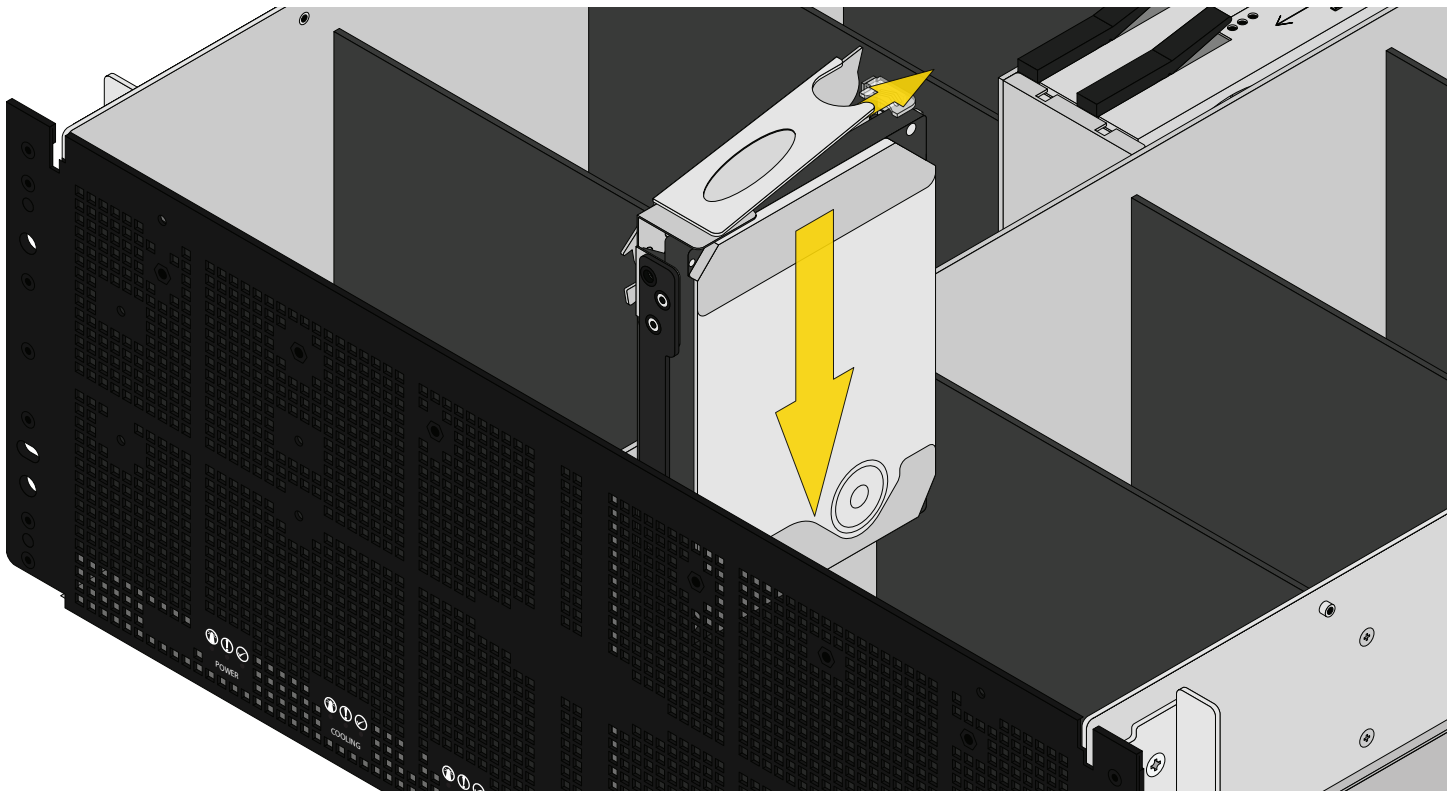
7.4 Install Hard Drives

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.

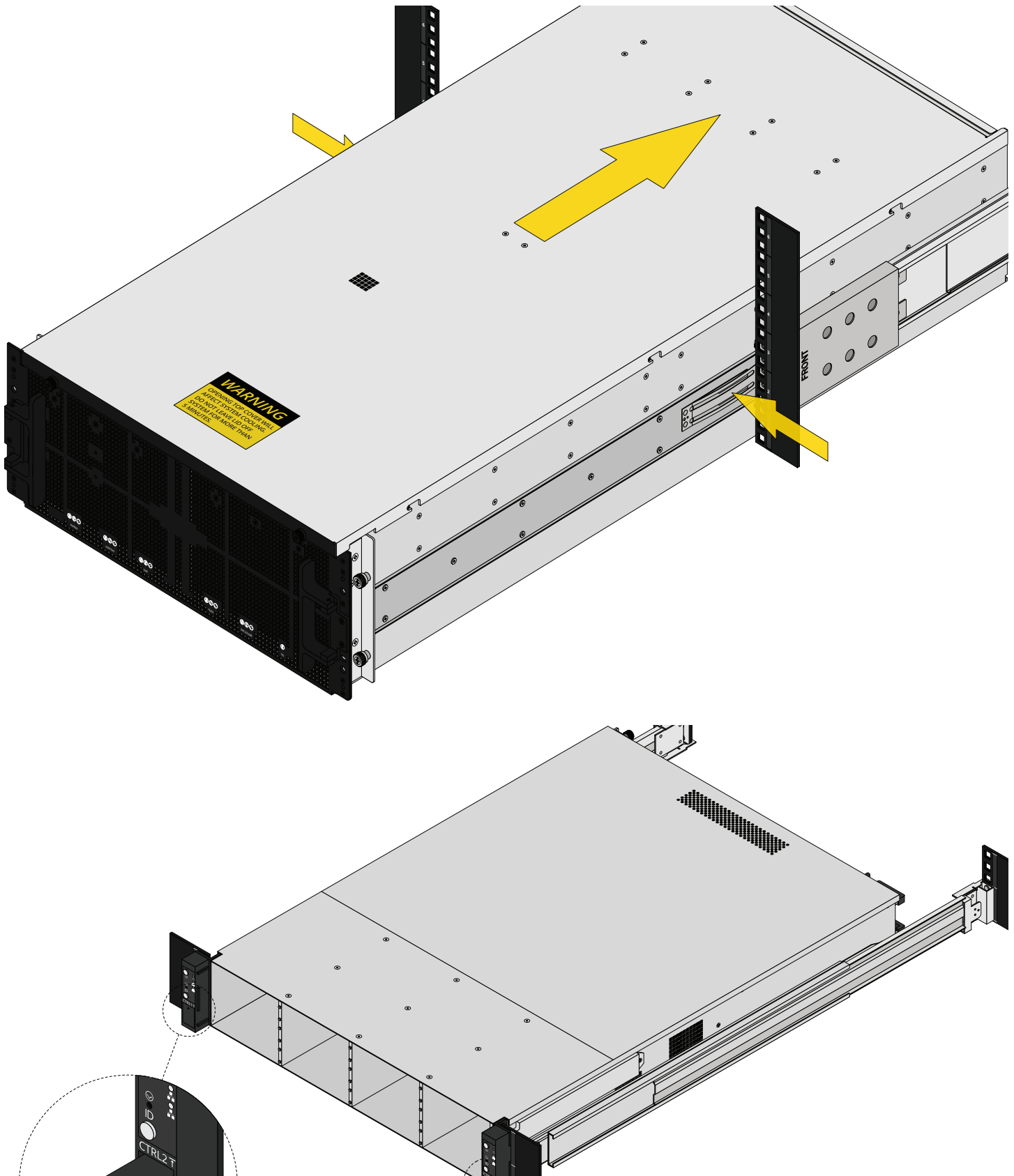


7.5 Push the System into the Rack

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.

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



7.6 Install Cable Management Brackets

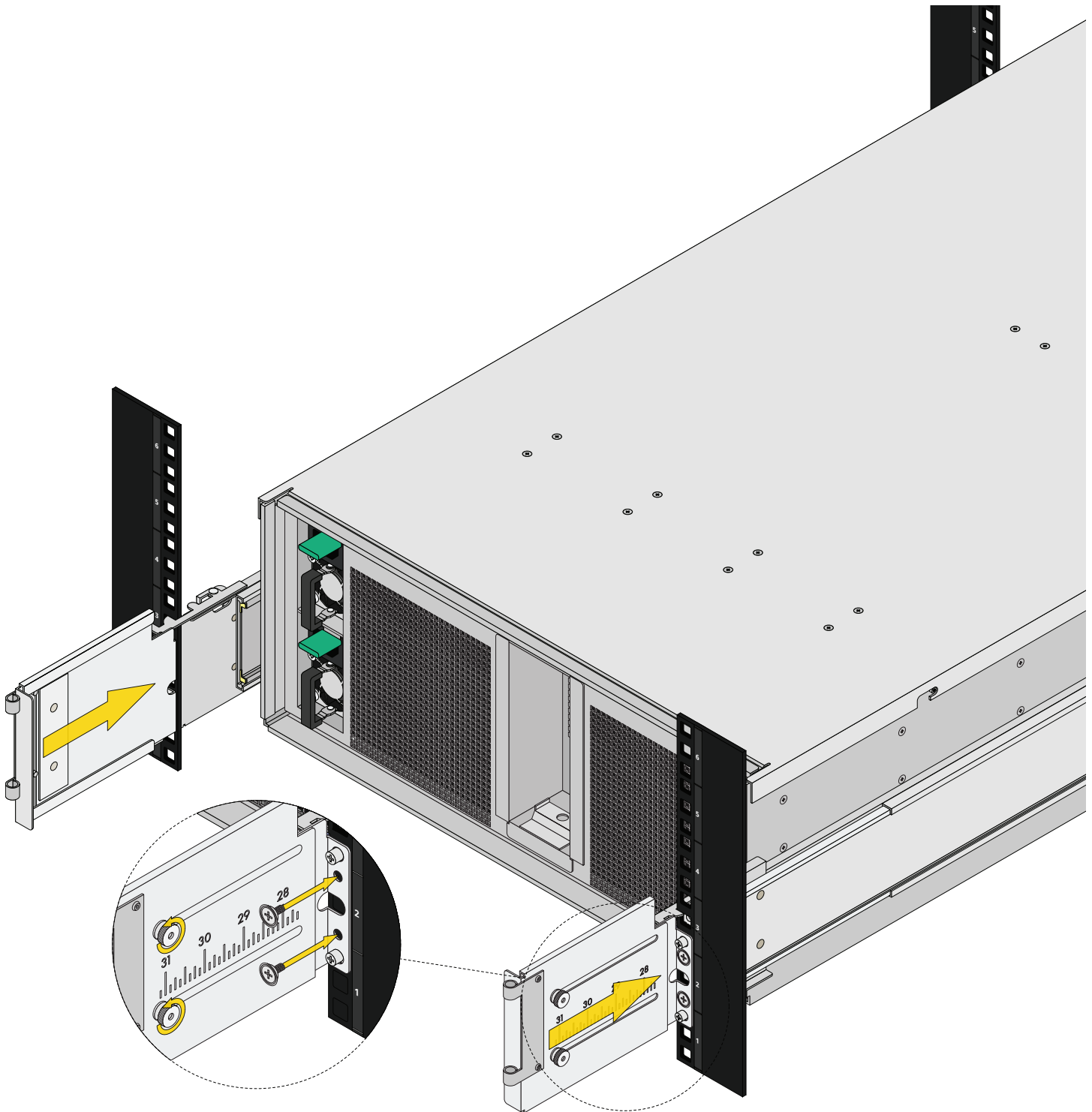
Align the right bracket with the right rear rack post and fit the top and bottom holes over the rack rail pegs.

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

Repeat for the left bracket.

✓ Tip - Adjustment Screws

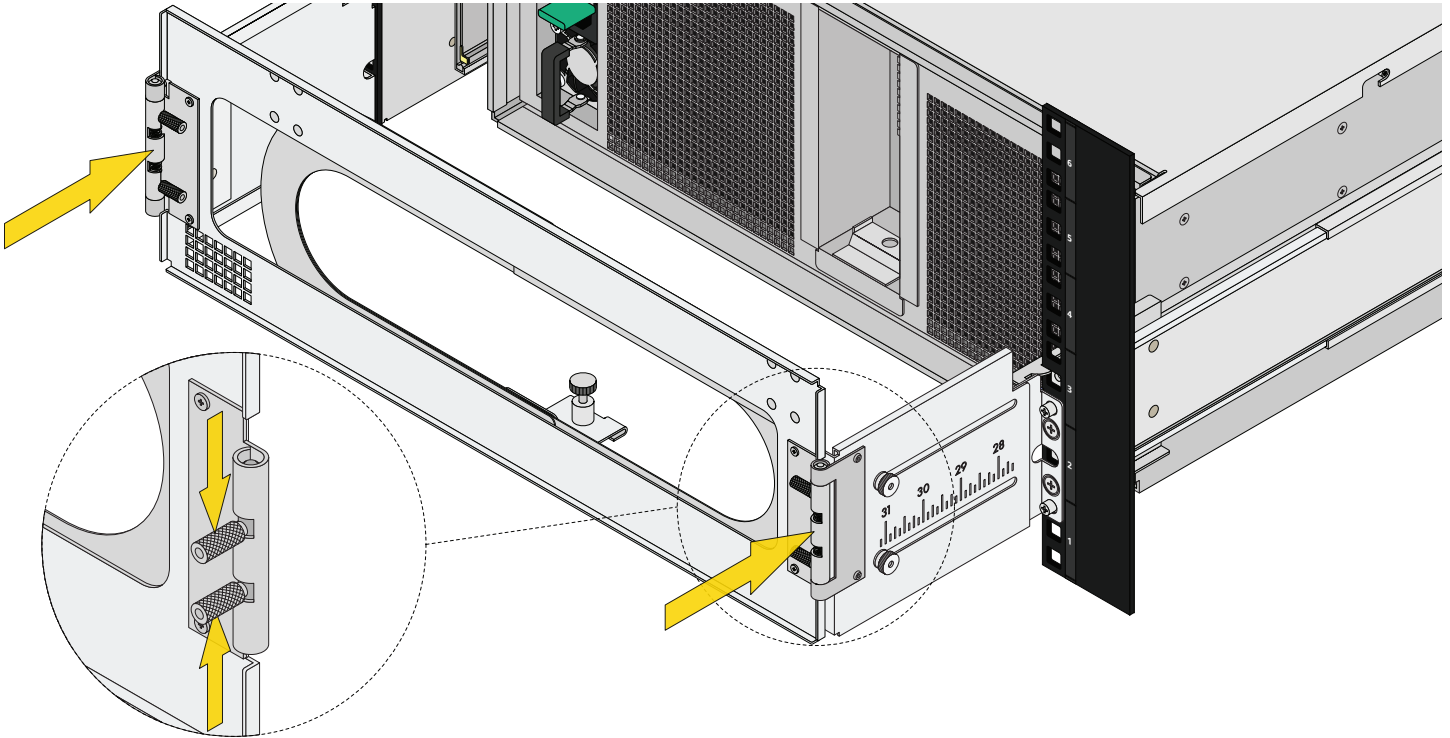
You may find it helpful to loosen the depth adjustment thumbscrews on each cable management bracket to make initial cabling easier.



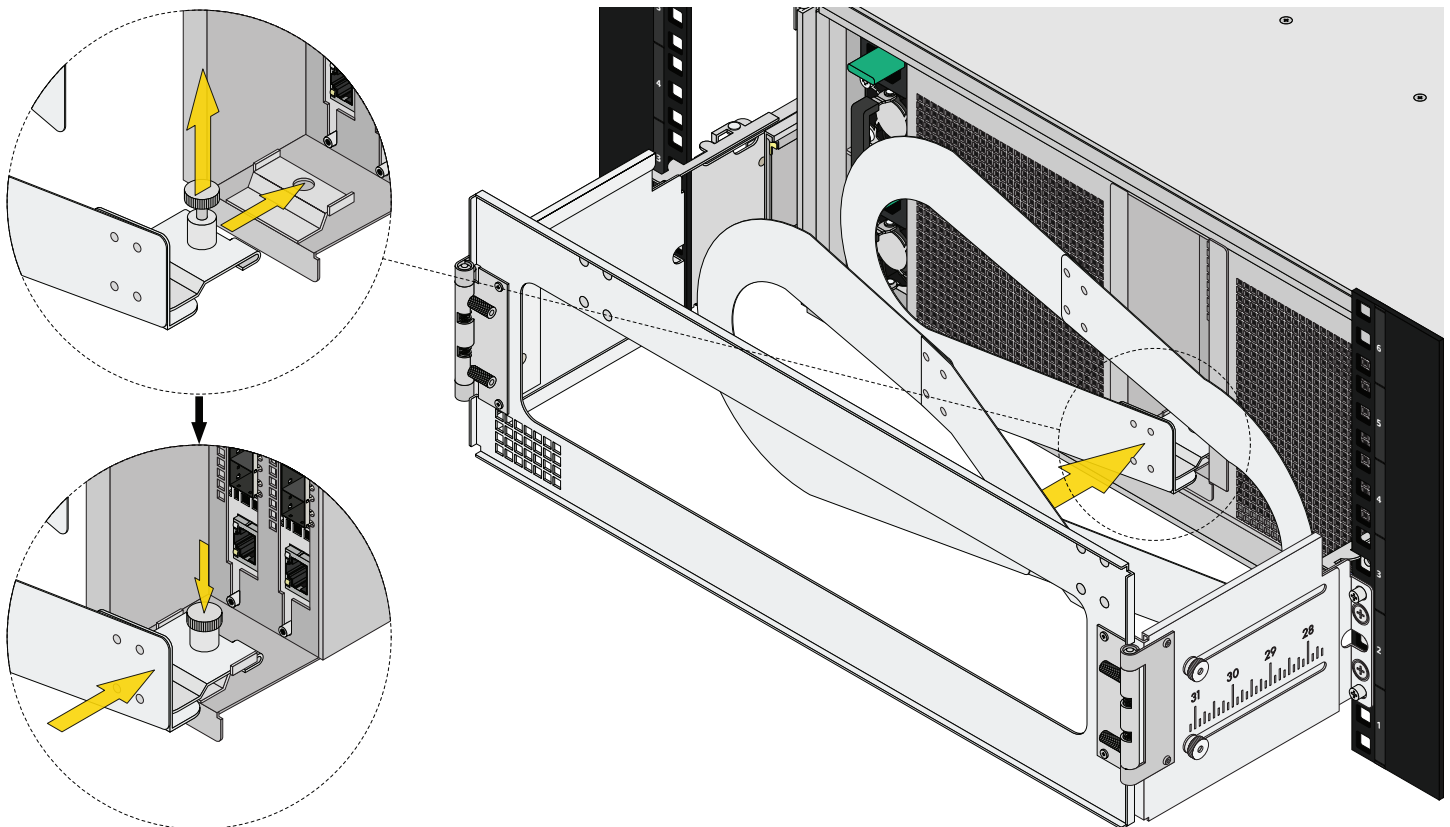
7.7 Install Cable Management Arm (CMA)

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.



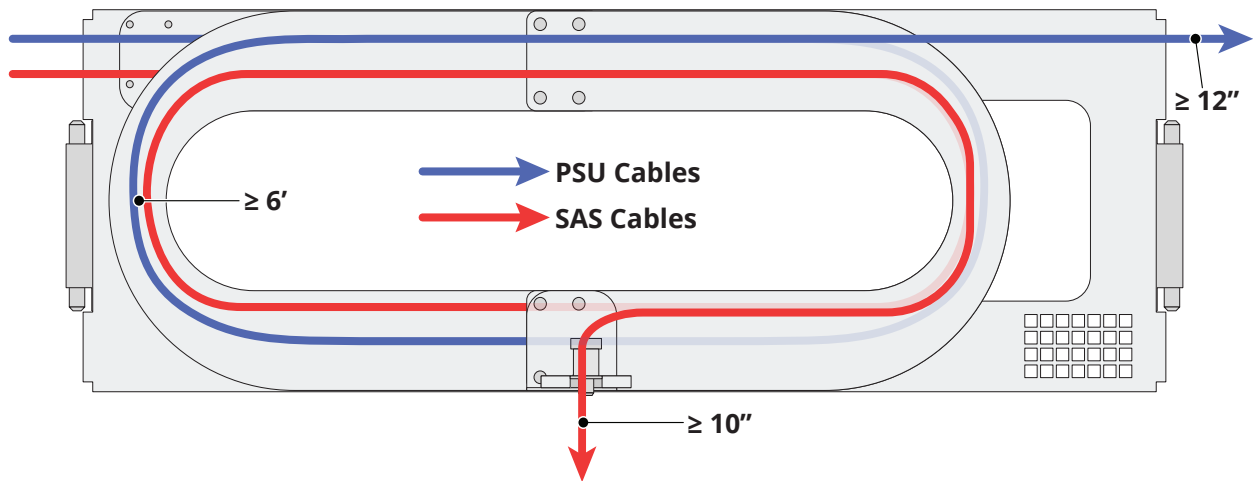
7.8 Install Cables

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.

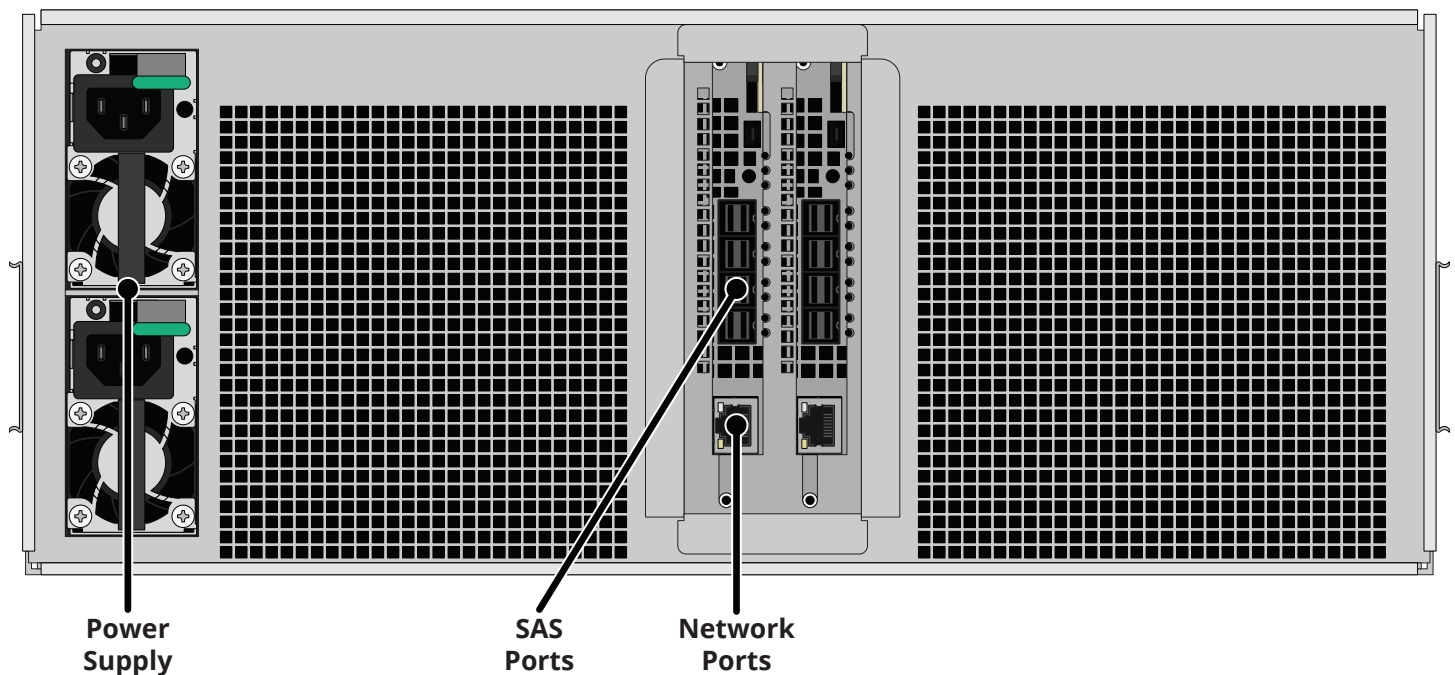
ⓘ Important - Cable Damage

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.



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.



✓ Tip - Cable Management

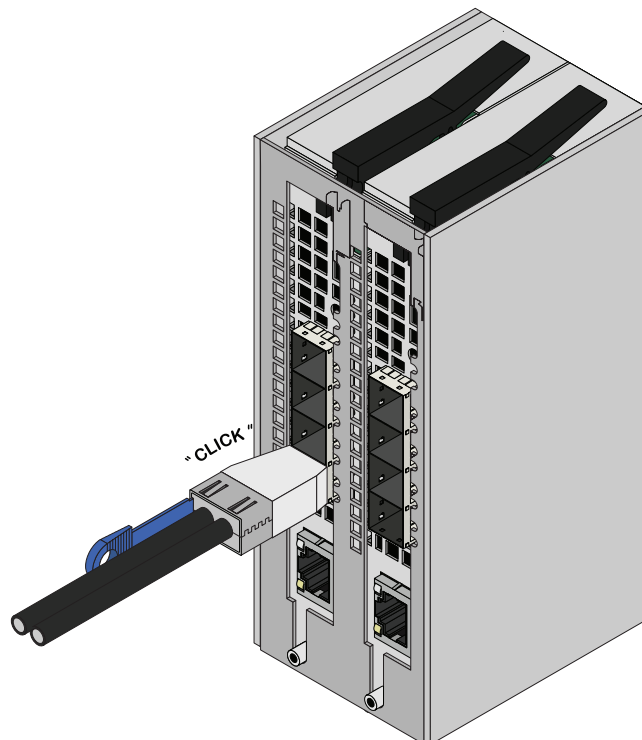
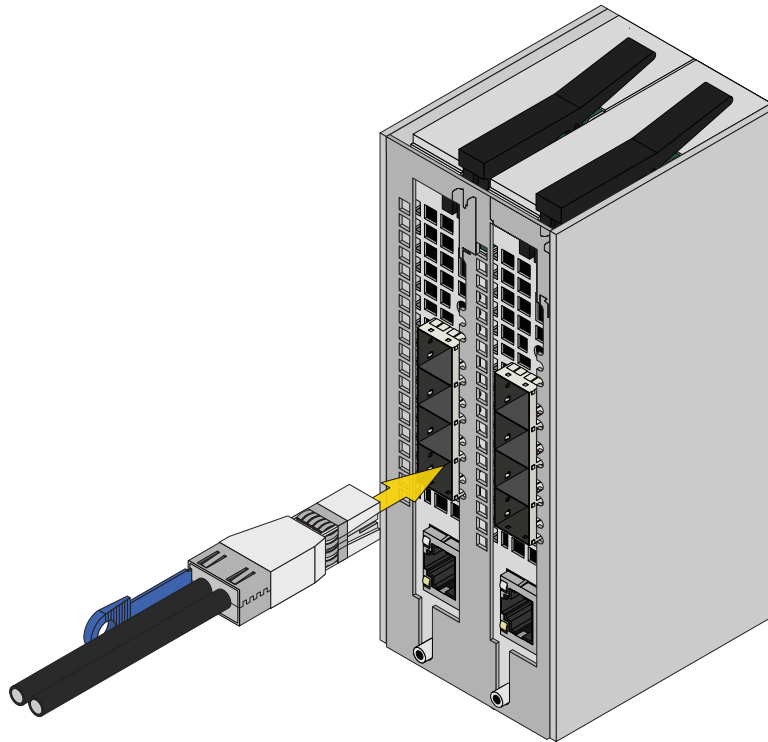
Before continuing, test your cable setup by sliding the system out of the rack. The cables should move freely with the CMA without pinching or coming loose.

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 [“12 SAS Connections”](#) on page 20.

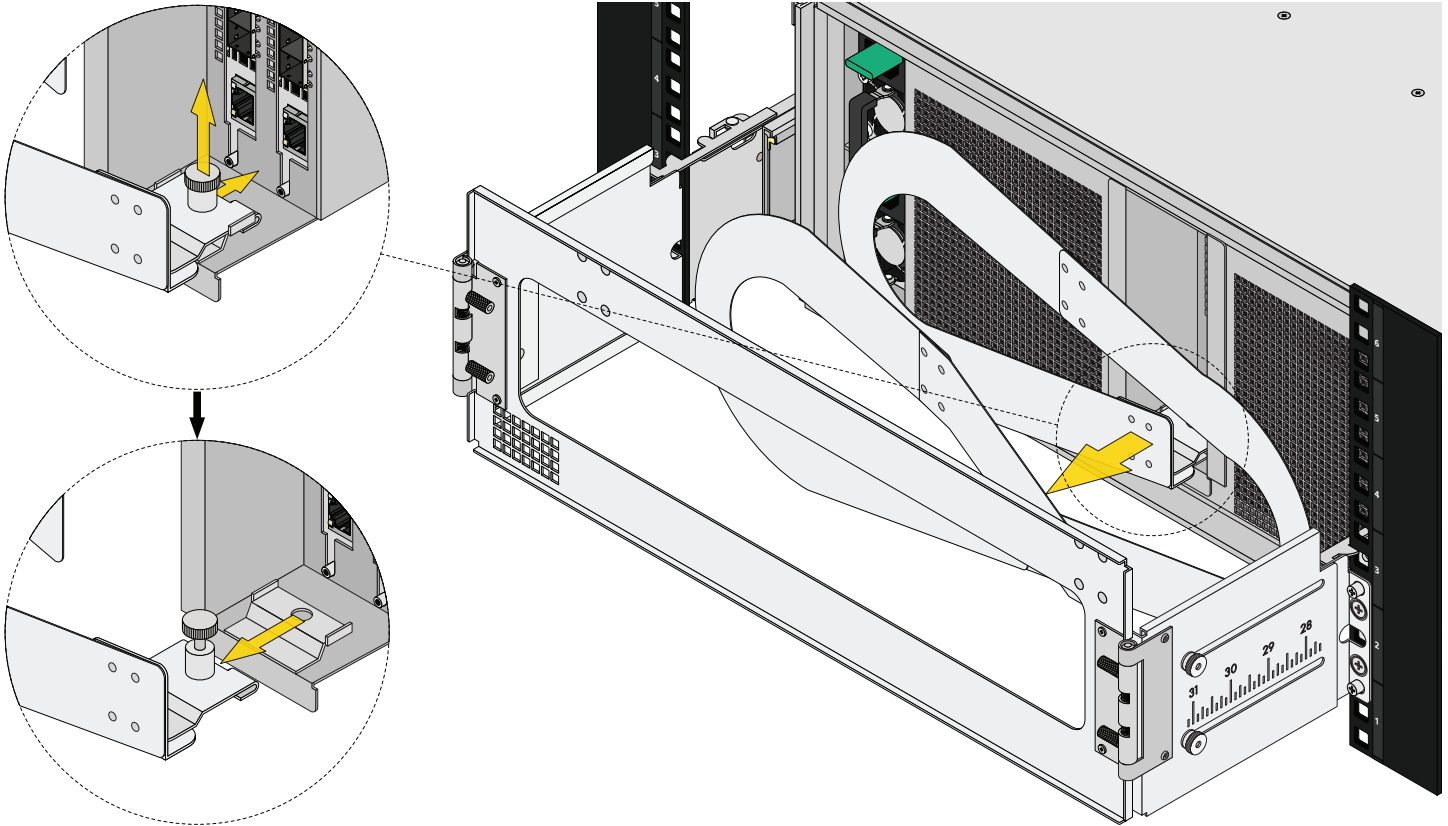


9 Unracking Procedure

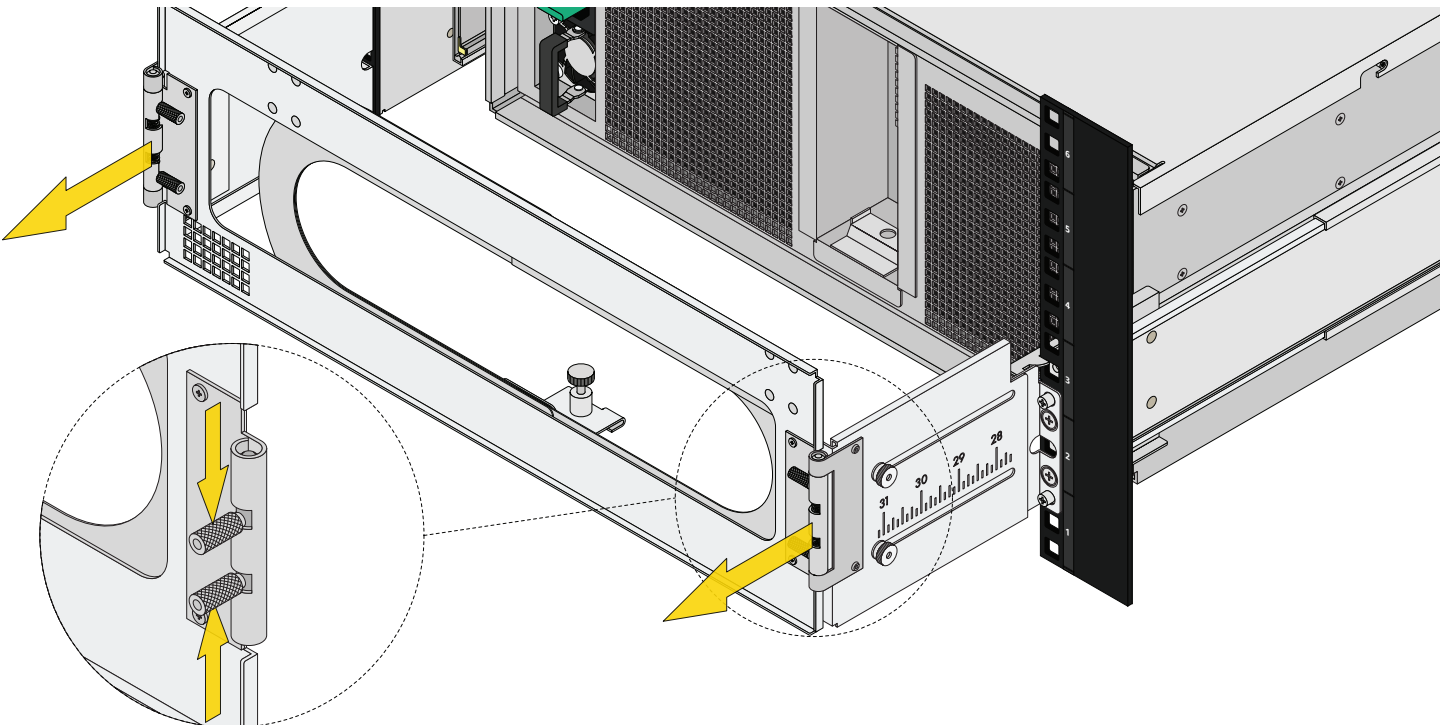
Unplug all PSU, networking, and SAS cables, then open the straps on the CMA and remove all the cables. If you plan to re-install the system in the rack, label the cables so you can easily cable the system again.

9.1 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.



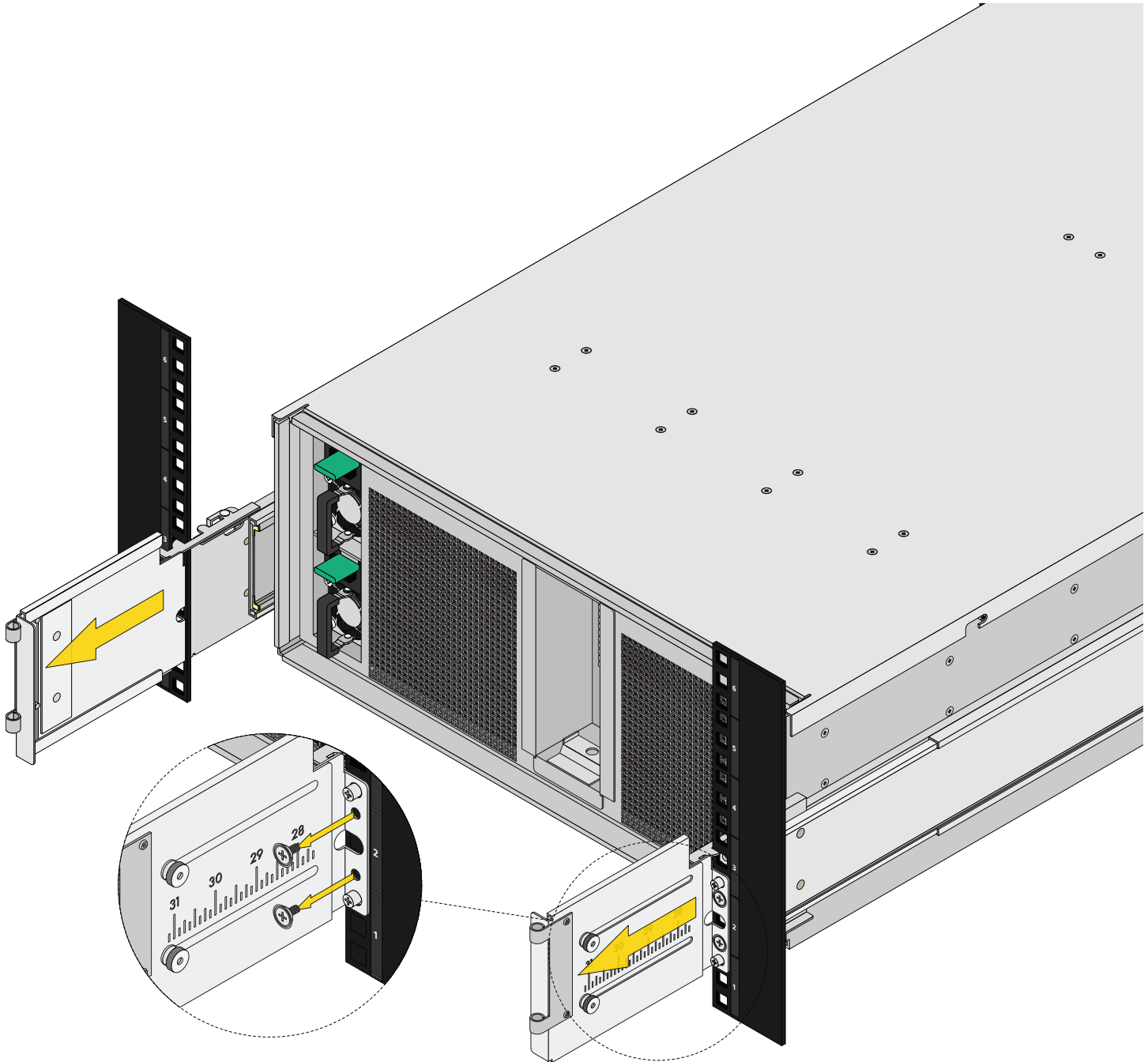
9.2 Remove Cable Management Brackets

ⓘ 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.

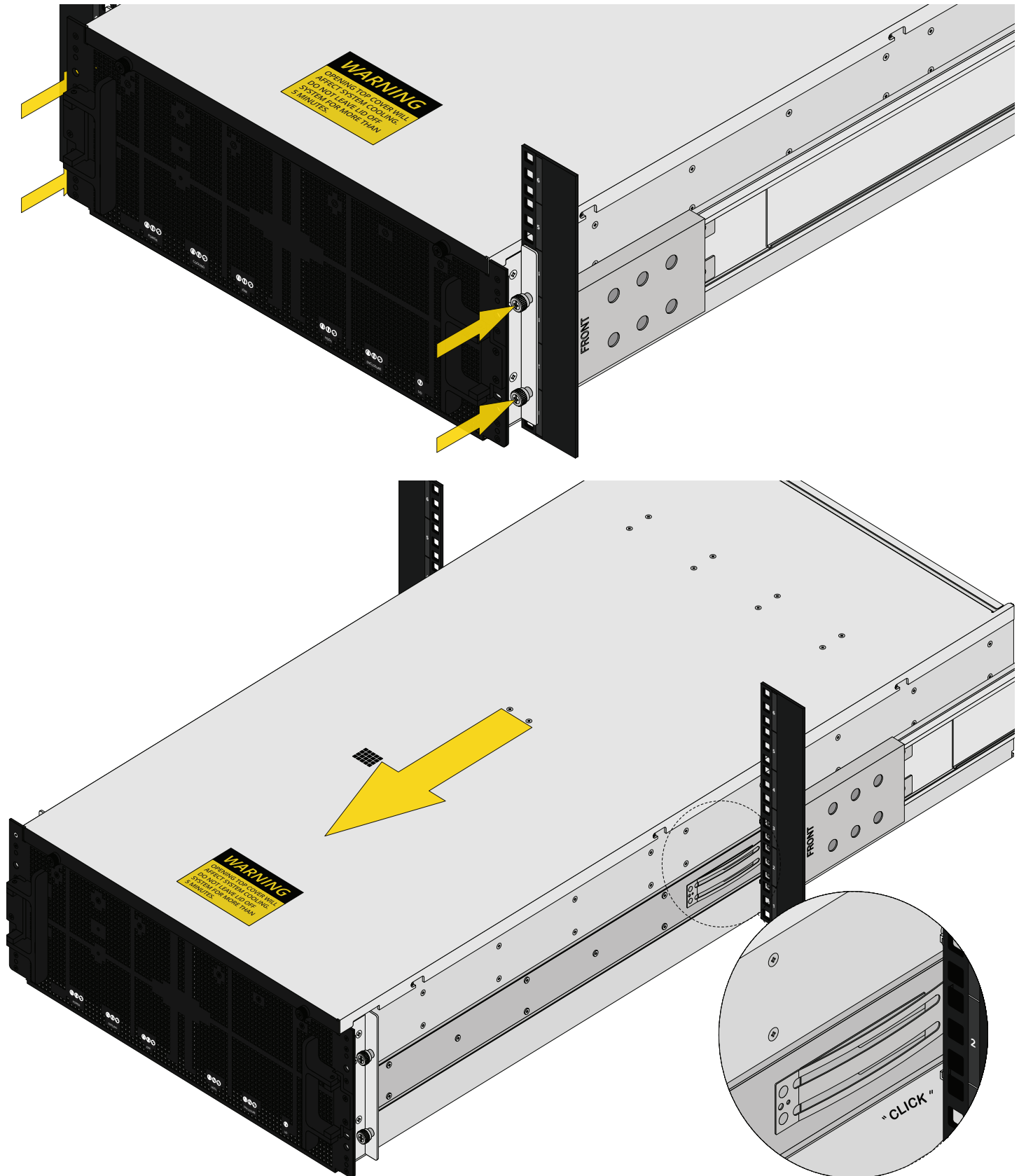
Repeat for the other bracket.



9.3 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.

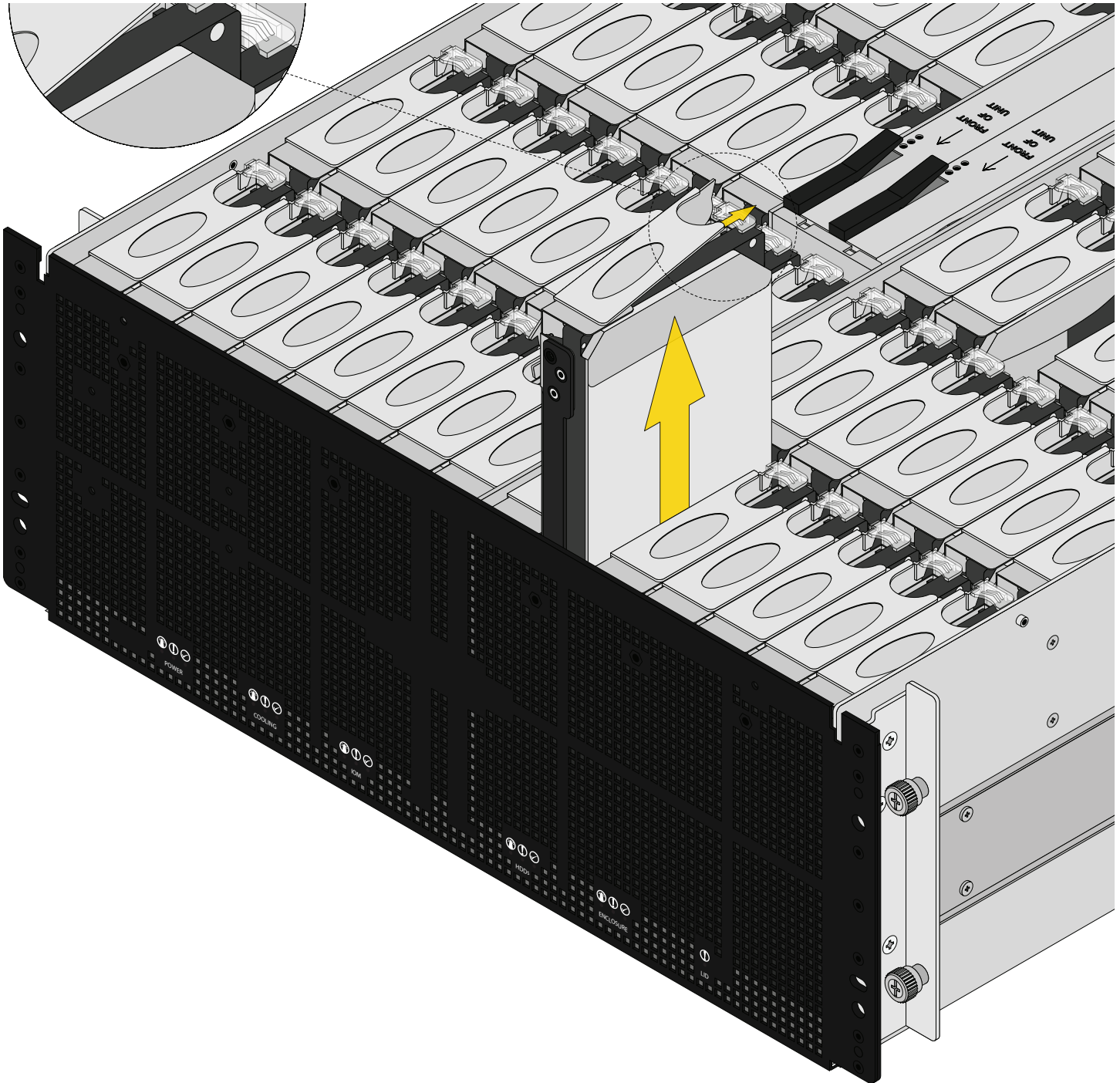


9.4 Remove Hard Drives

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.



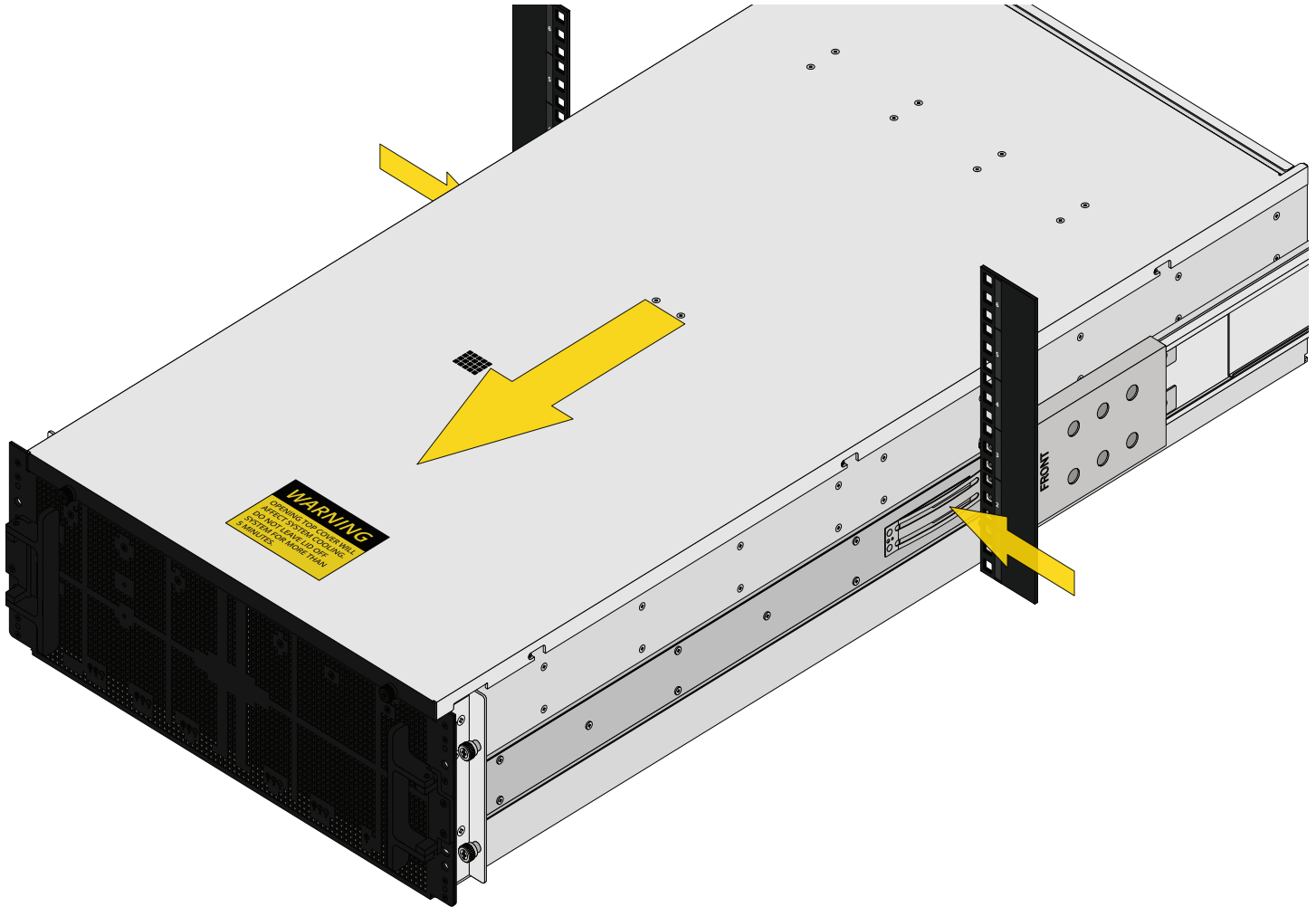
9.5 Remove the System from the Rack

⚠ 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.

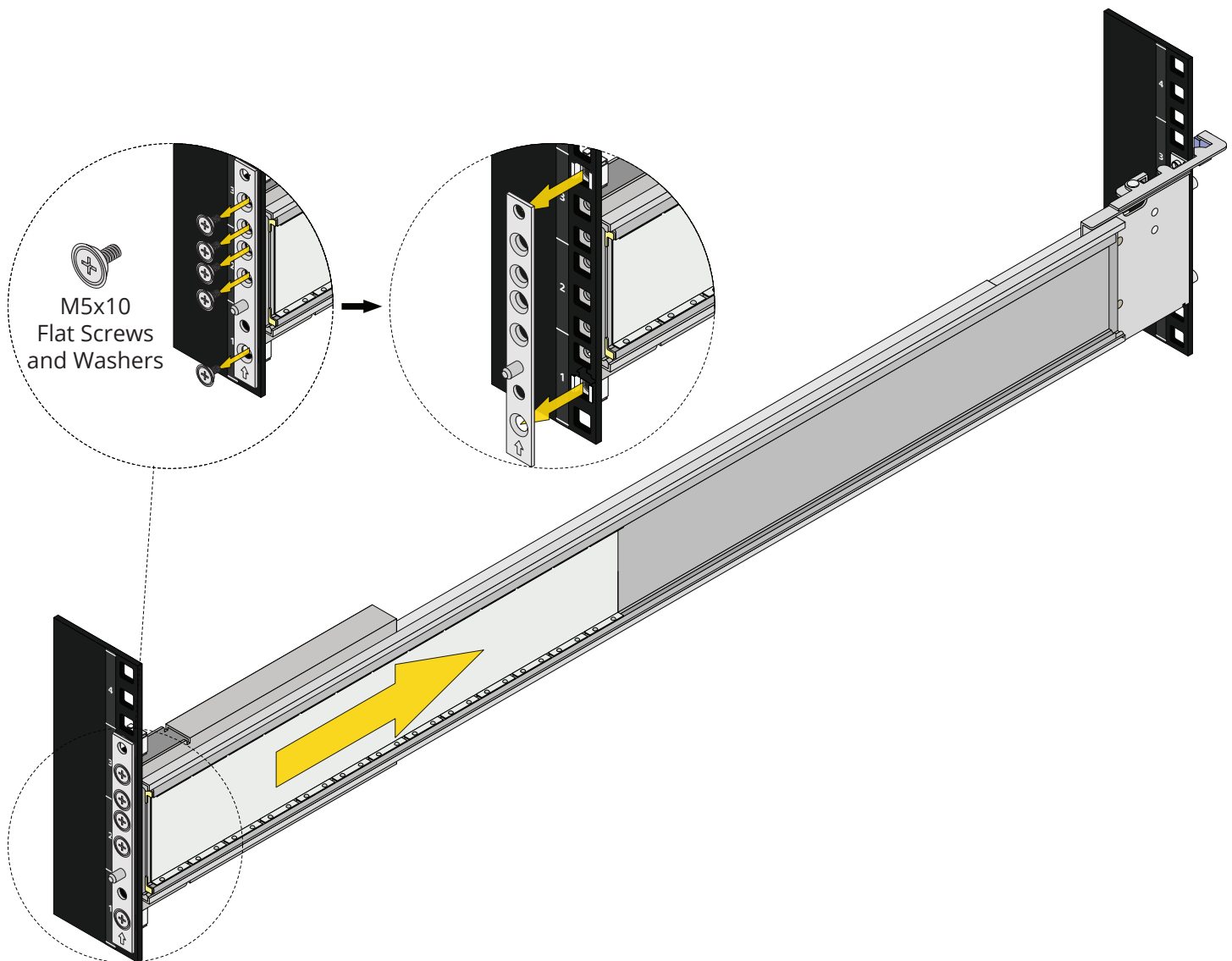
Replace the lid on the system and tighten the thumbscrews.

Press the metal safety catches on each chassis rail into the system and pull the system all the way out of the rack.

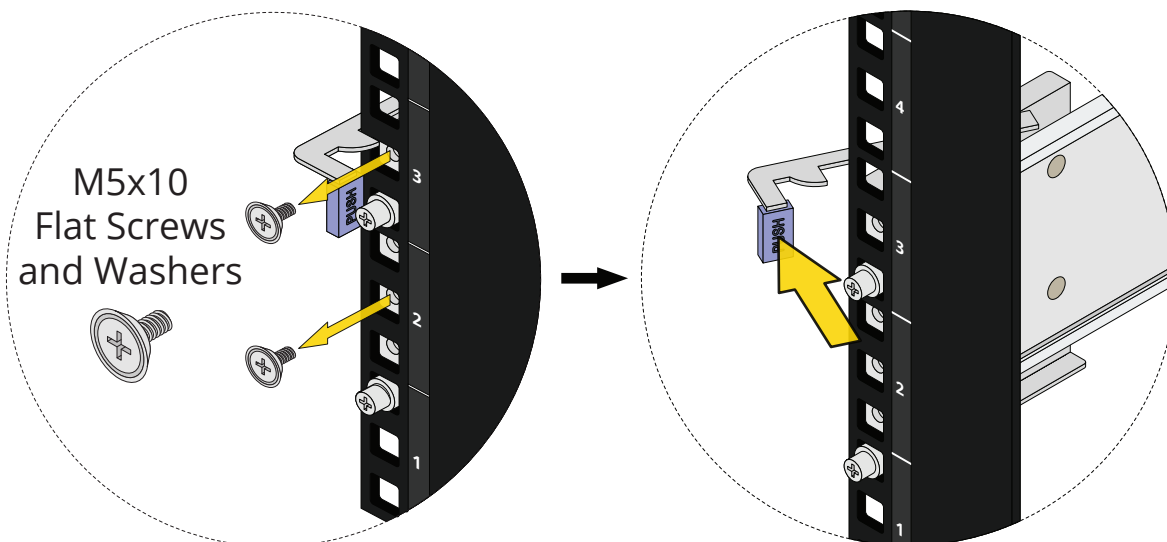


9.6 Remove the Rack Rail to the Front Rack Post

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.



12 SAS Connections

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.

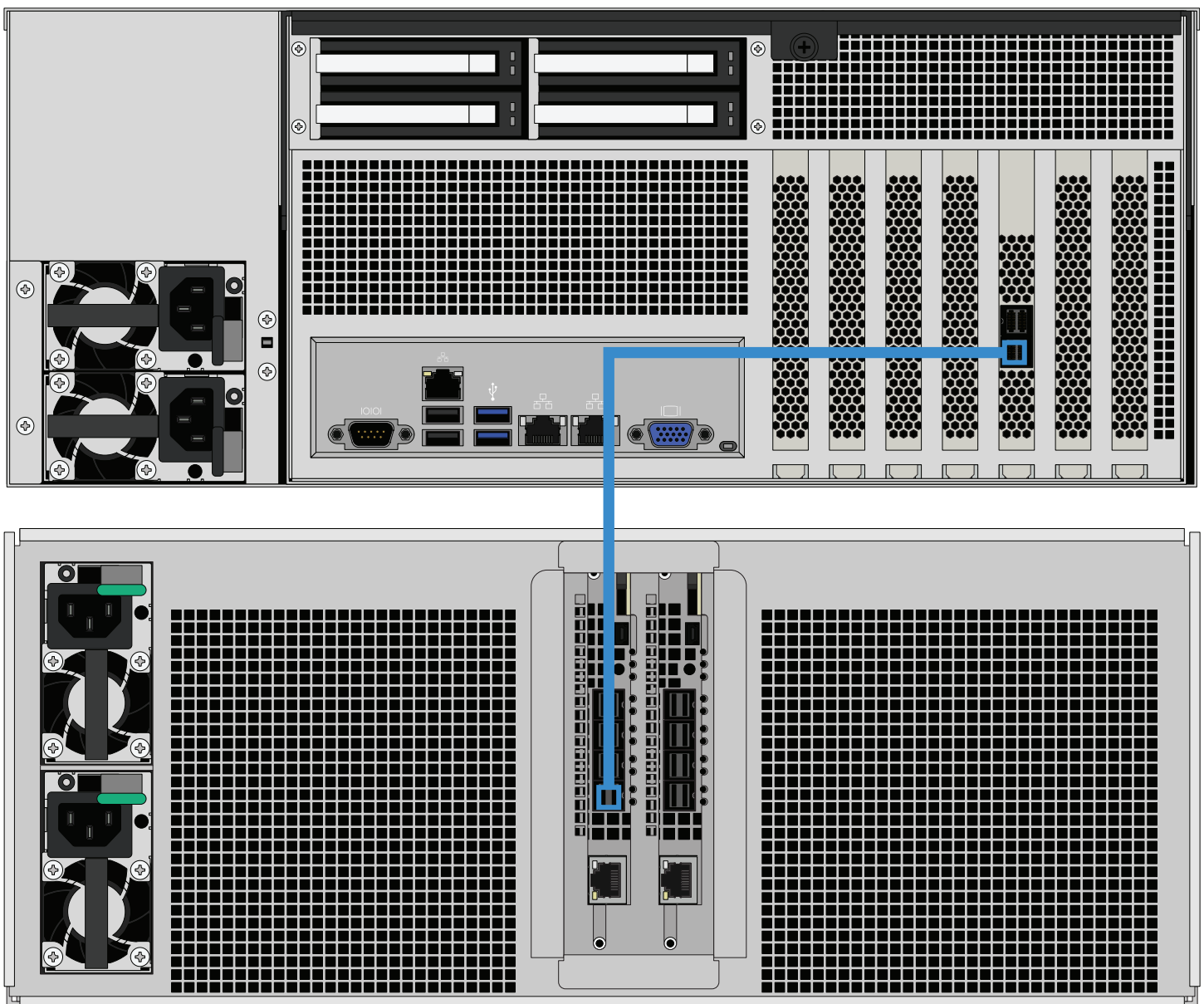
If your TrueNAS system has HA, reboot or failover after connecting SAS cables to sync drives between controllers.

ⓘ Important - SAS Configuration

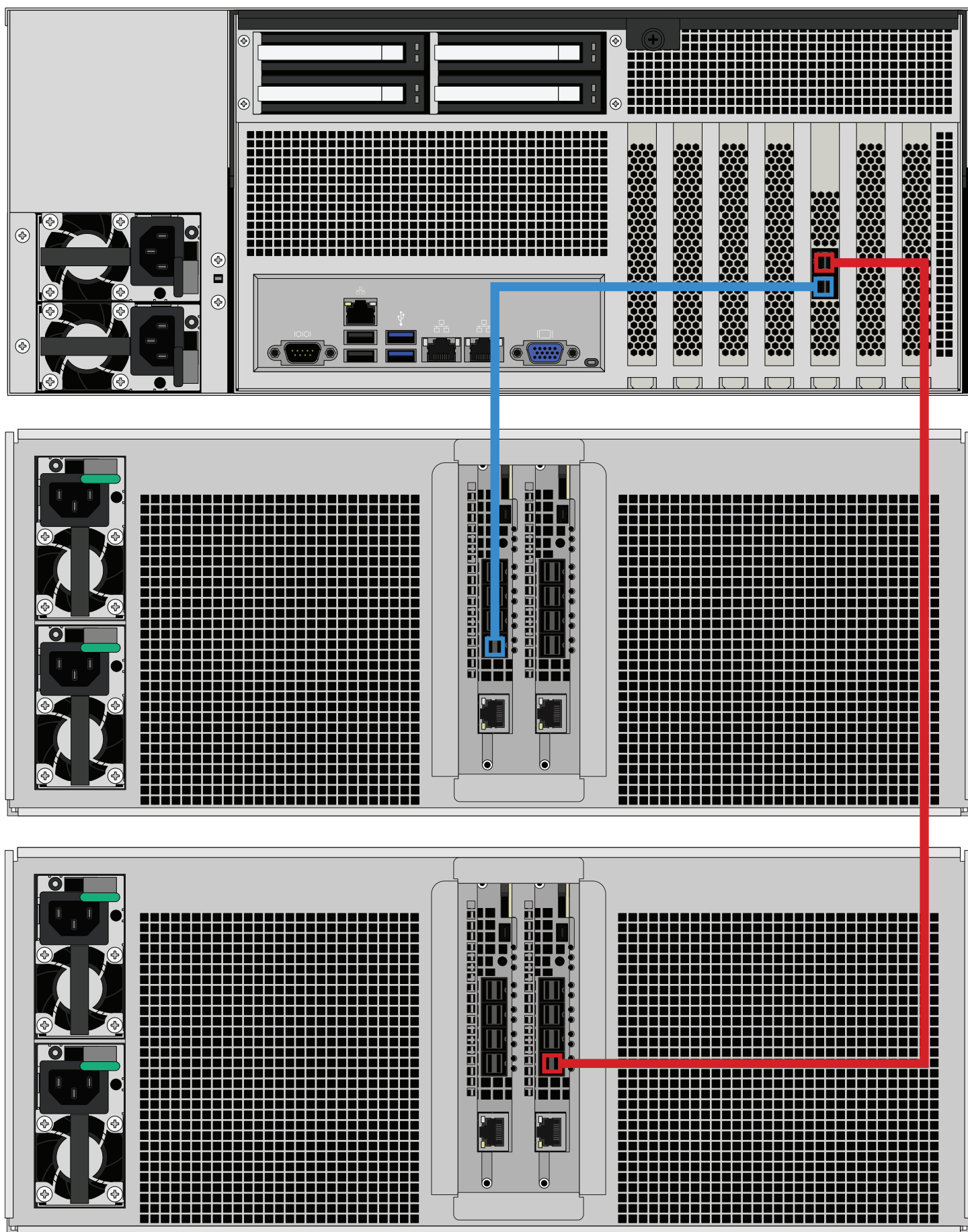
When setting up SAS connections, please adhere to the wiring example below. Connecting Expansion Shelves incorrectly causes errors. Never cable a single controller to different IOMs/expanders on the same shelf.

12.1 R50

R50 with a single ES102 Gen 2 Expansion Shelf:

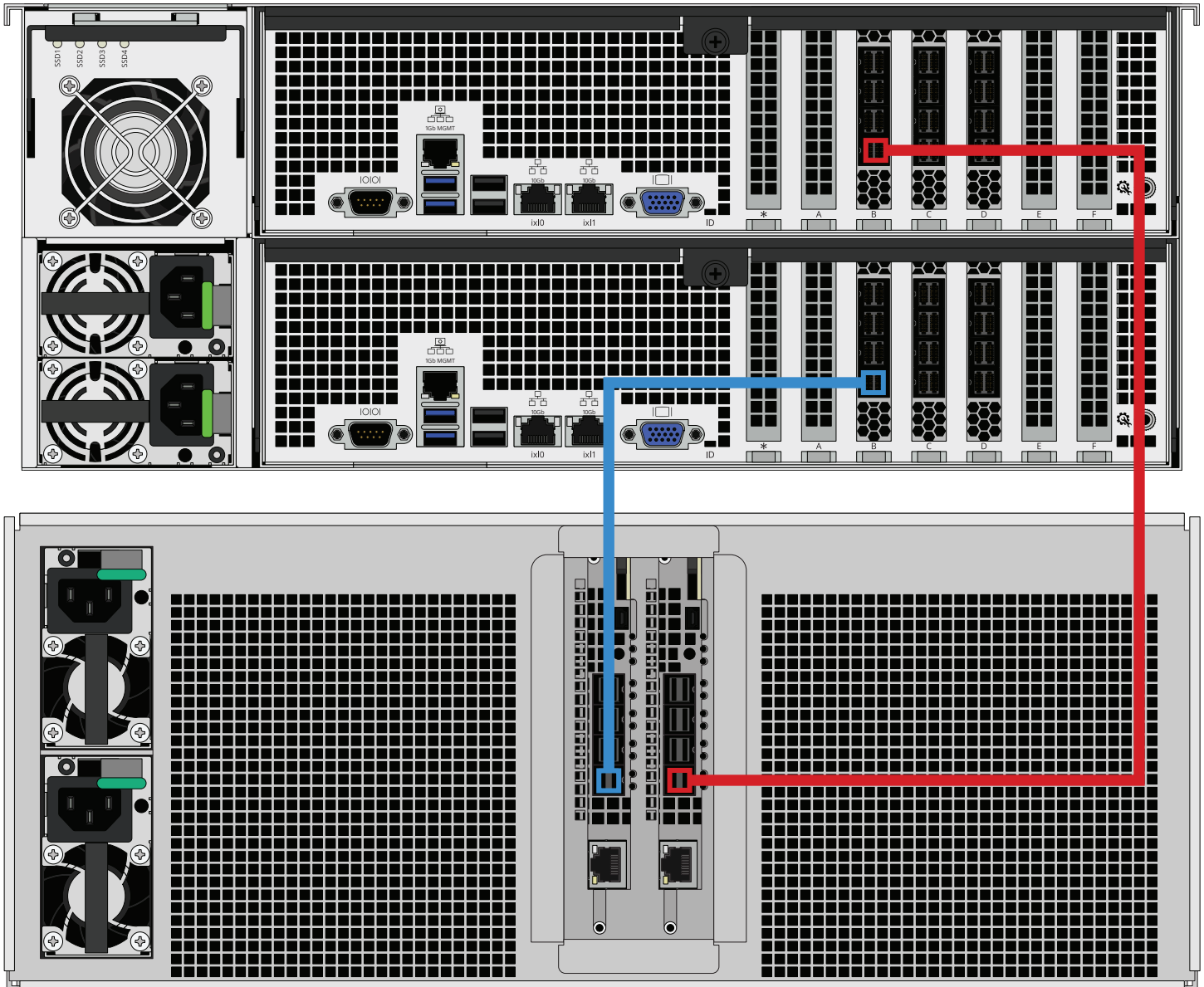


R50 with two ES102 Gen 2 Expansion Shelves:

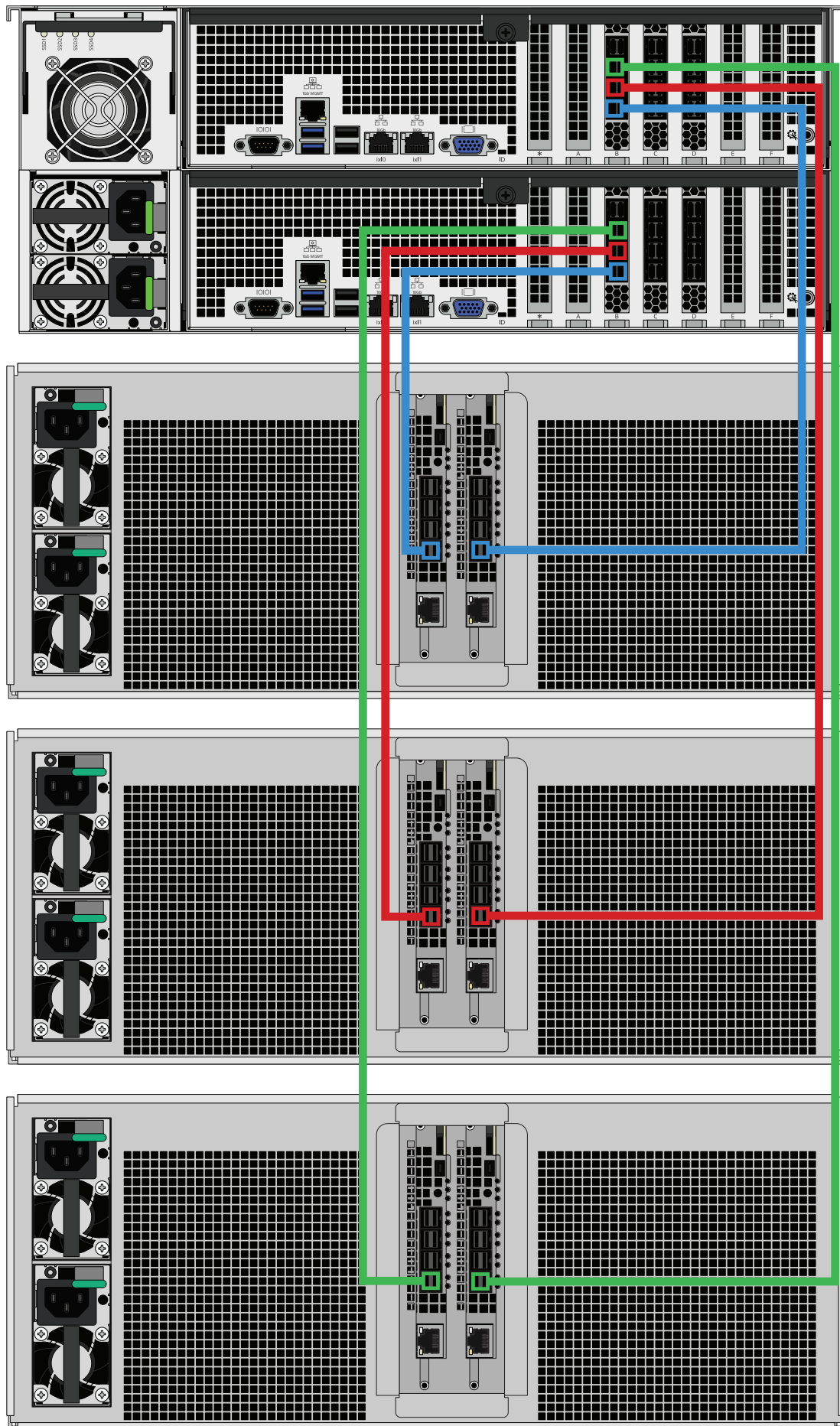


12.2 M60 (HA)

M60 with a single ES102 Gen 2 Expansion Shelf:



M60 with three ES102 Expansion Shelves. The M60 supports up to 12 Expansion Shelves using additional SAS cards.



13 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/>

14 Contacting iXsystems

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

Contact Method	Contact Options
Web	https://support.ixsystems.com
Email	support@ixsystems.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)