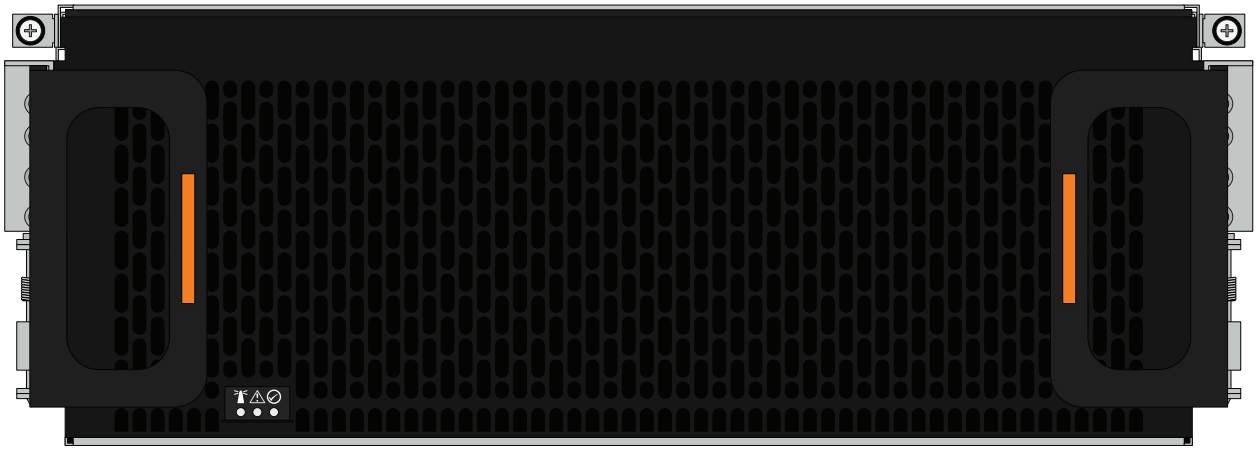
# TrueNAS® ES60 Gen 2 User Manual

v.25111



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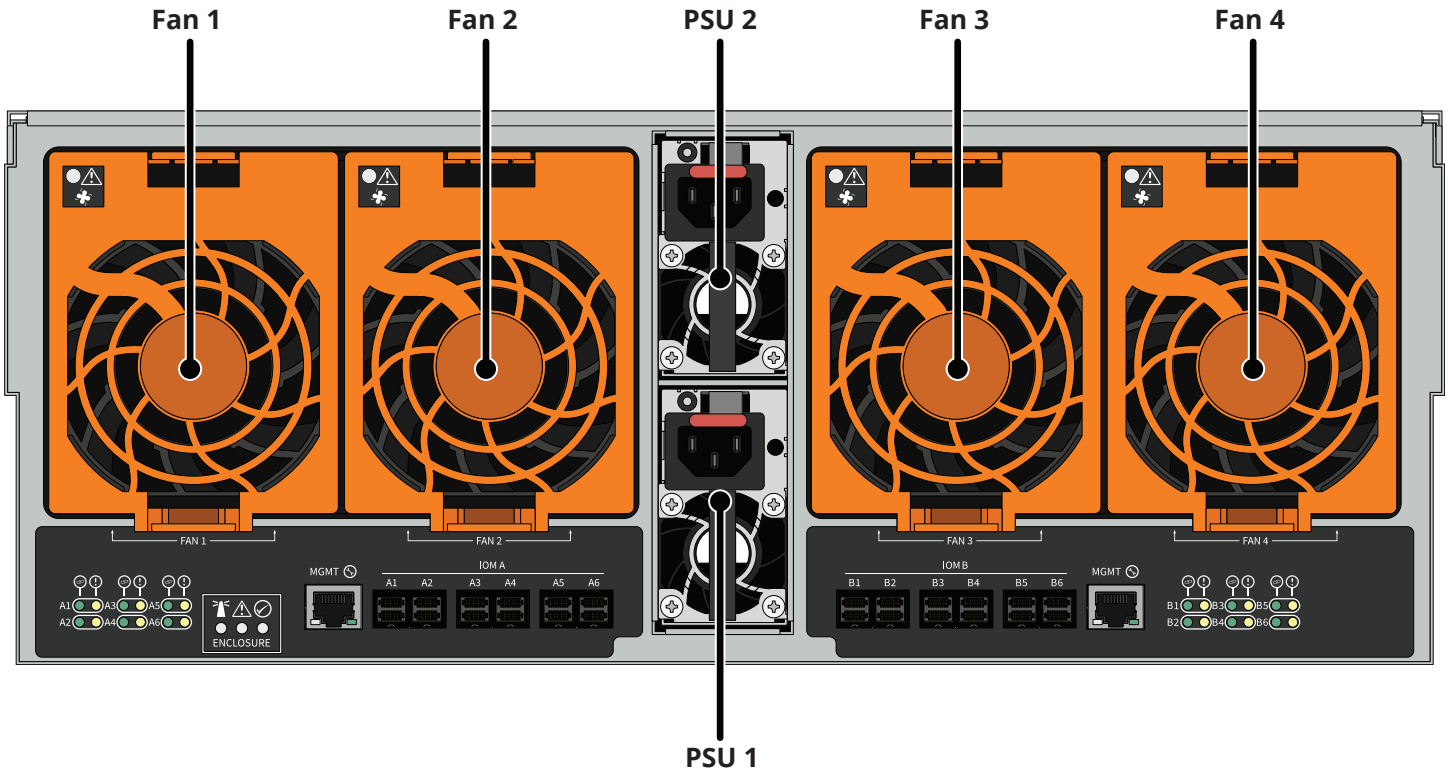
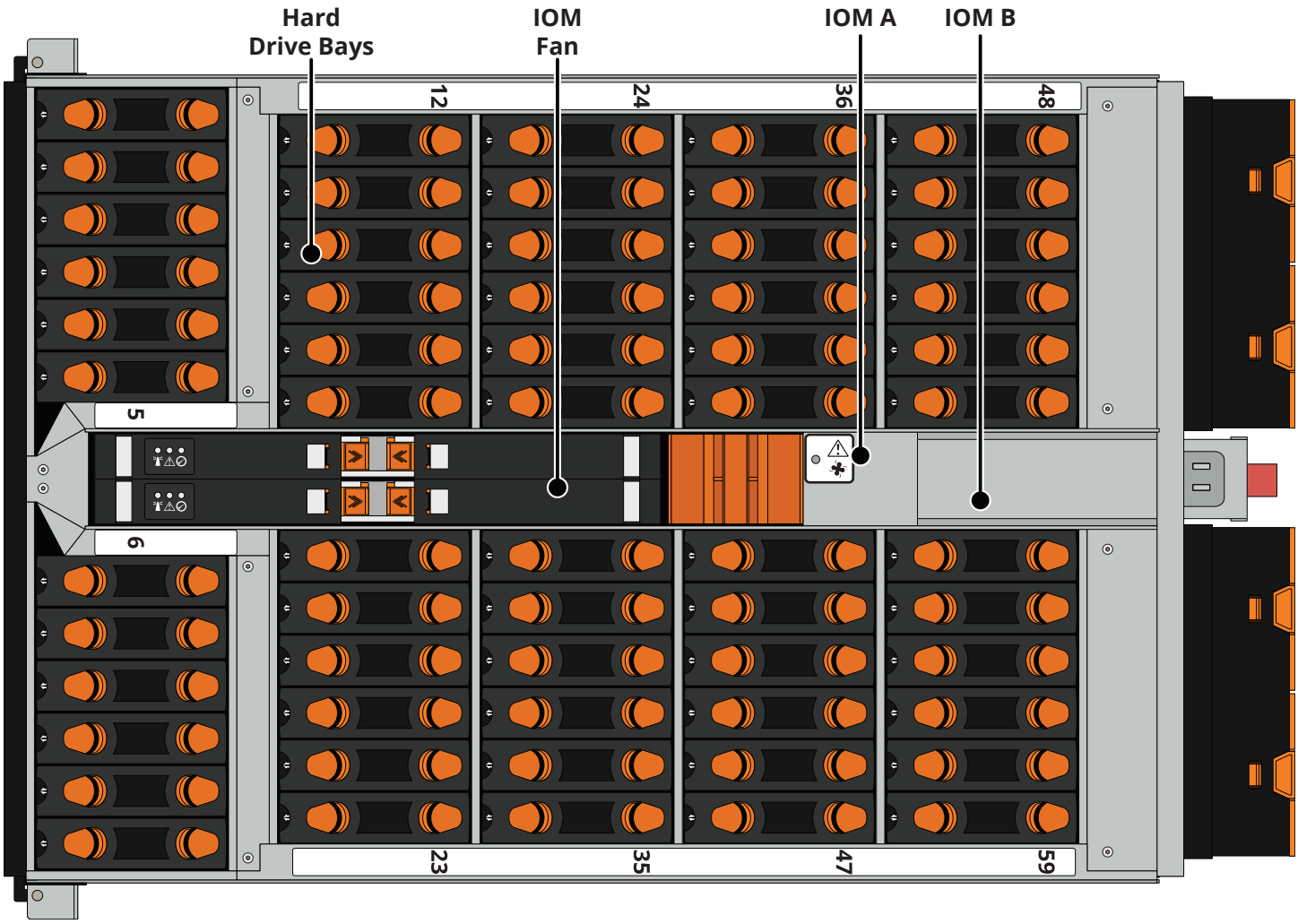
# 1 Introduction

The TrueNAS ES60 Gen 2 is a 4U, 60-bay expansion shelf. It has redundant I/O modules and power supplies.



# 2 Safety

## 2.1 Battery

**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.

## 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 - Damage or Injury**

The ES60 weighs 175 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 Recommended Tools

We recommend these tools when interacting with the TrueNAS ES60 Gen 2:

- Long #2 Phillips head screwdriver
- T15 Torx screwdriver
- Tape measure
- Level
- Table Lift or Server Lift

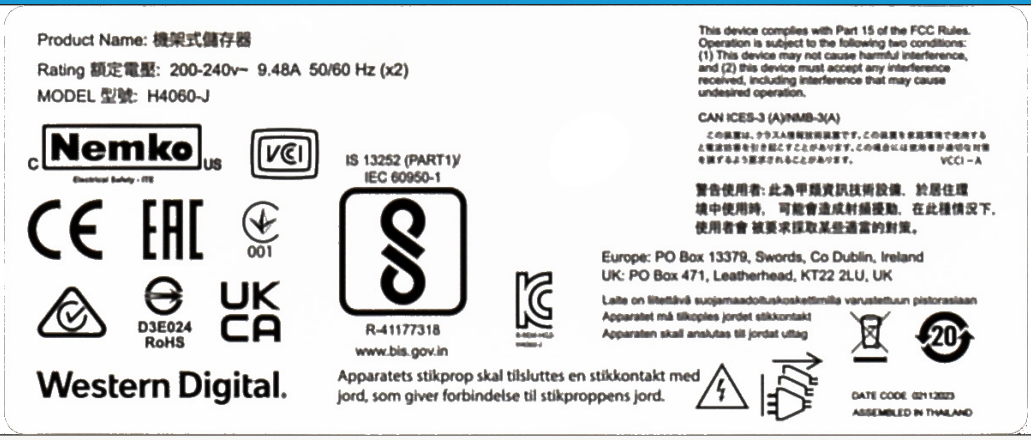
# 4 Specifications

| ES60 Components | |
|---|---|
| Drive Count | 60 3.5-inch HDDs or 2.5-inch SSDs |
| Cooling Fans | 4 |
| Power Supplies (200v) | 2 |
| Power Distribution Requirements | 200V - 240V |
| Power Draw with 60 HDDs | 1000W (typical), 1250W (max) |
| I/O Modules | 2 |
| IOM Fans | 1 |

| ES60 Dimensions and Weight | |
|---|---|
| Dimensions (H x W x L) | 6.89 in x 17.61 in x 28.03 in (175mm x 447mm x 712mm) |
| Length with Chassis Rail and CMA | 35.04” (89 cm) |
| Net Weight (Fully Loaded) | 175 lbs (79 kg) |

| ES60 Environmental Specifications | |
|---|---|
| Operating Temperature | 41°F - 95°F (5°C - 35°C) |
| Non-Operating Temperature | -40°F - 140°F (-40°C - 60°C) |
| Operating Humidity (non-condensing) | 20% - 80% |
| Vibration | 0.10G at 5 Hz to500 Hz |
| Supply Voltage | 200-240VAC, 9.48A 50-60 Hz |

## Compliance




The TrueNAS ES60 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 ES60 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.

# 5 Space Requirements

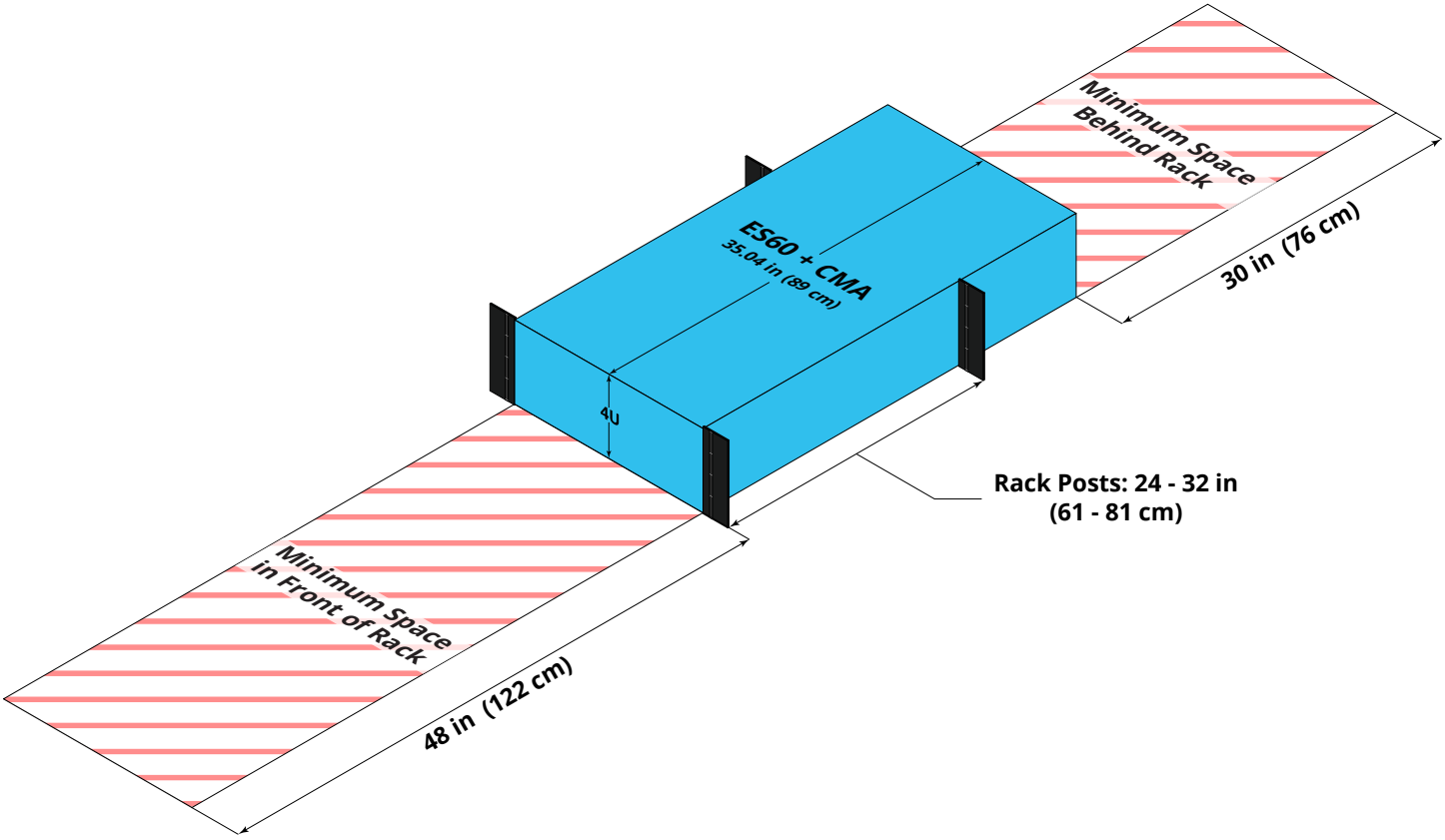
The ES60 Gen 2 requires at least 4U of rack space in an EIA-310 compliant rack.

The ES60 is up to 35.04” (890 mm) long with the rail kit and CMA. The rack posts must be 24” to 32” (61cm to 81cm) apart to install the rail kit.

We recommend having at least 72” (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.

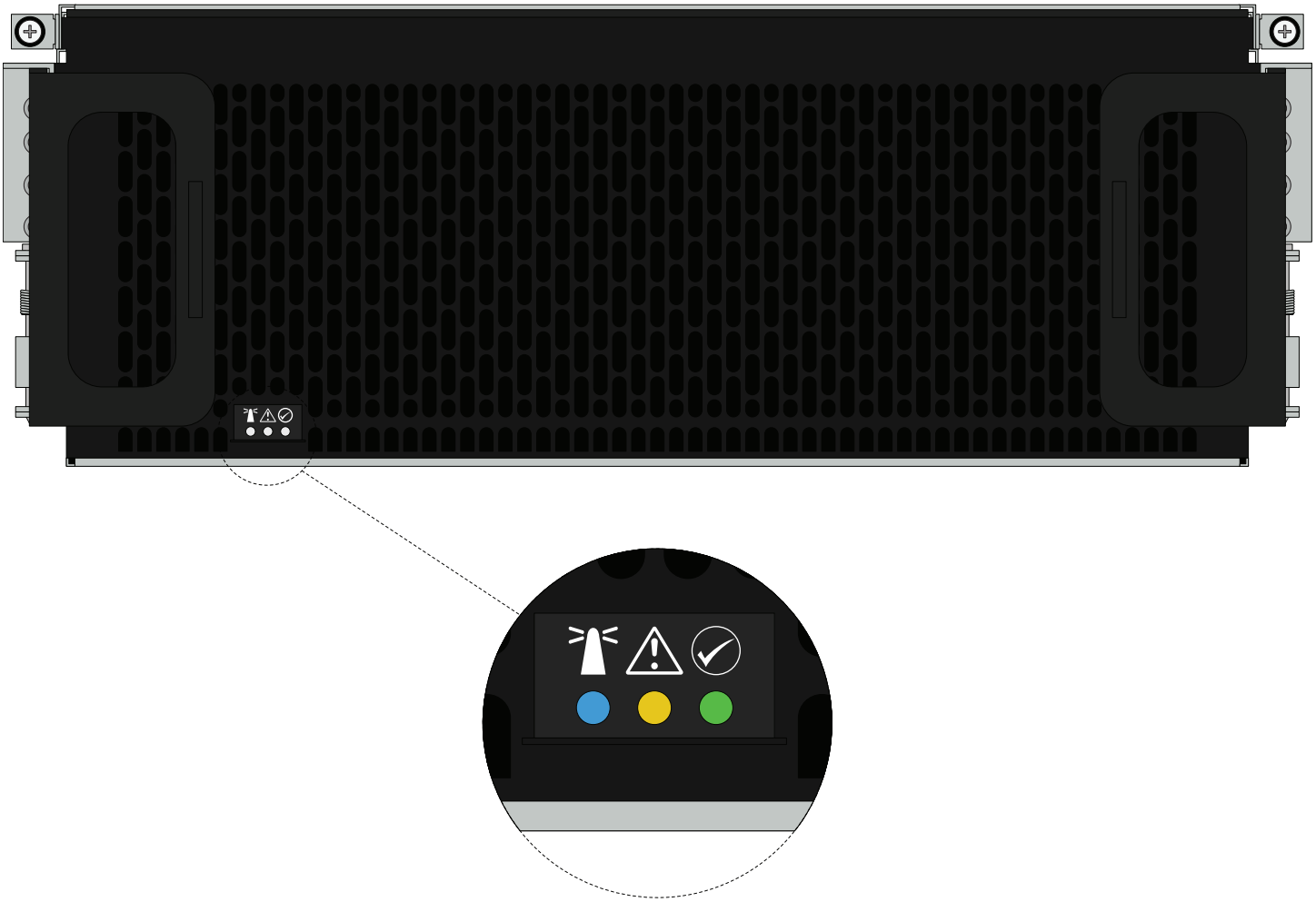
We also recommend having at least 32” (813 mm) of space behind the rack to account for cable management and personnel serving the back of the system.

Review your rack setup to ensure the ES60 fits in the rack with any front or back rack doors closed.



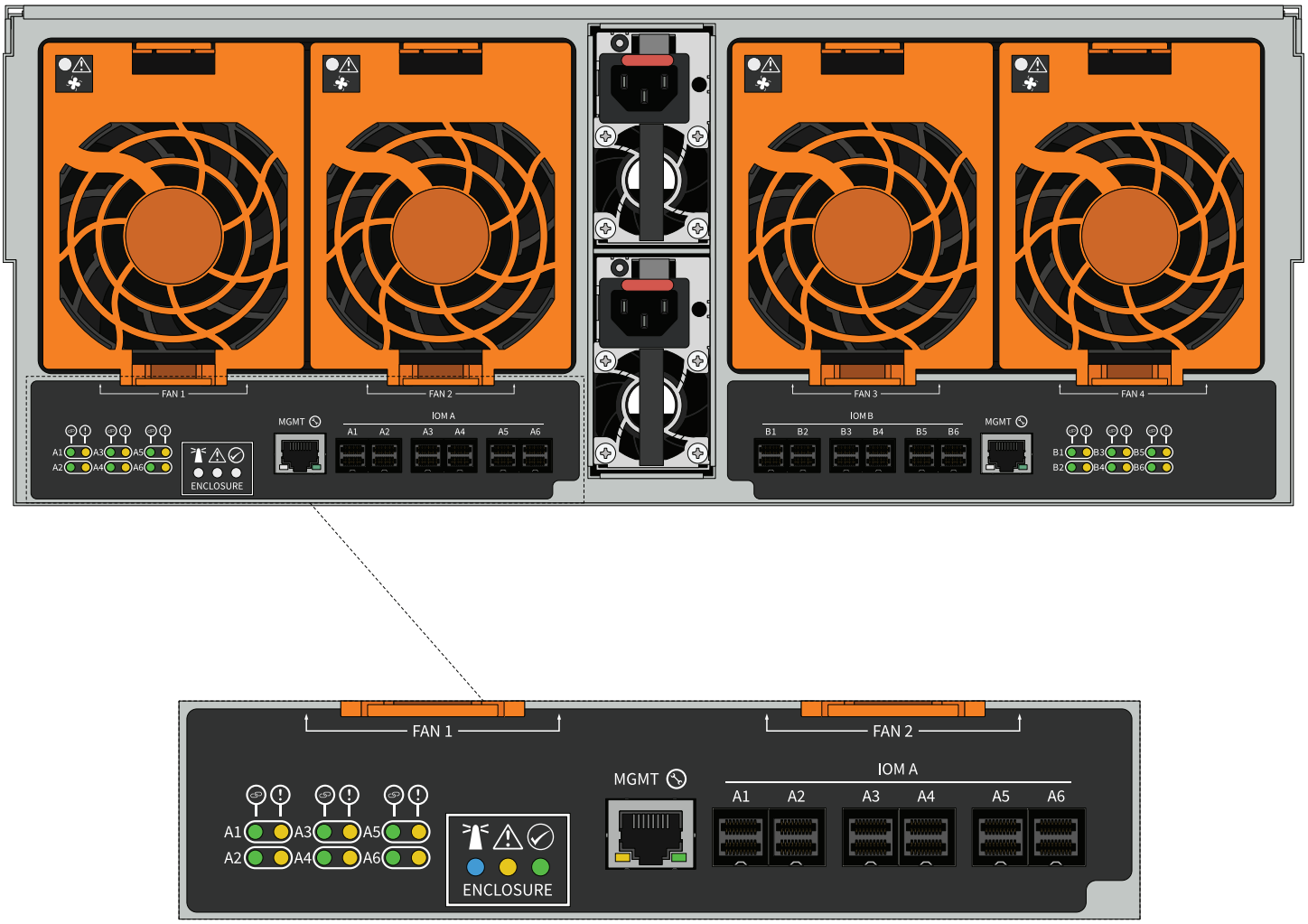
# 6 LED Indicators

## 6.1 Front Indicators



| Light | Color and Indication |
|---|---|
| | Blue (Blinking): Locate ID Active |
| | Amber (Blinking): Component Fault |
| | Green (Solid): Component Ready |

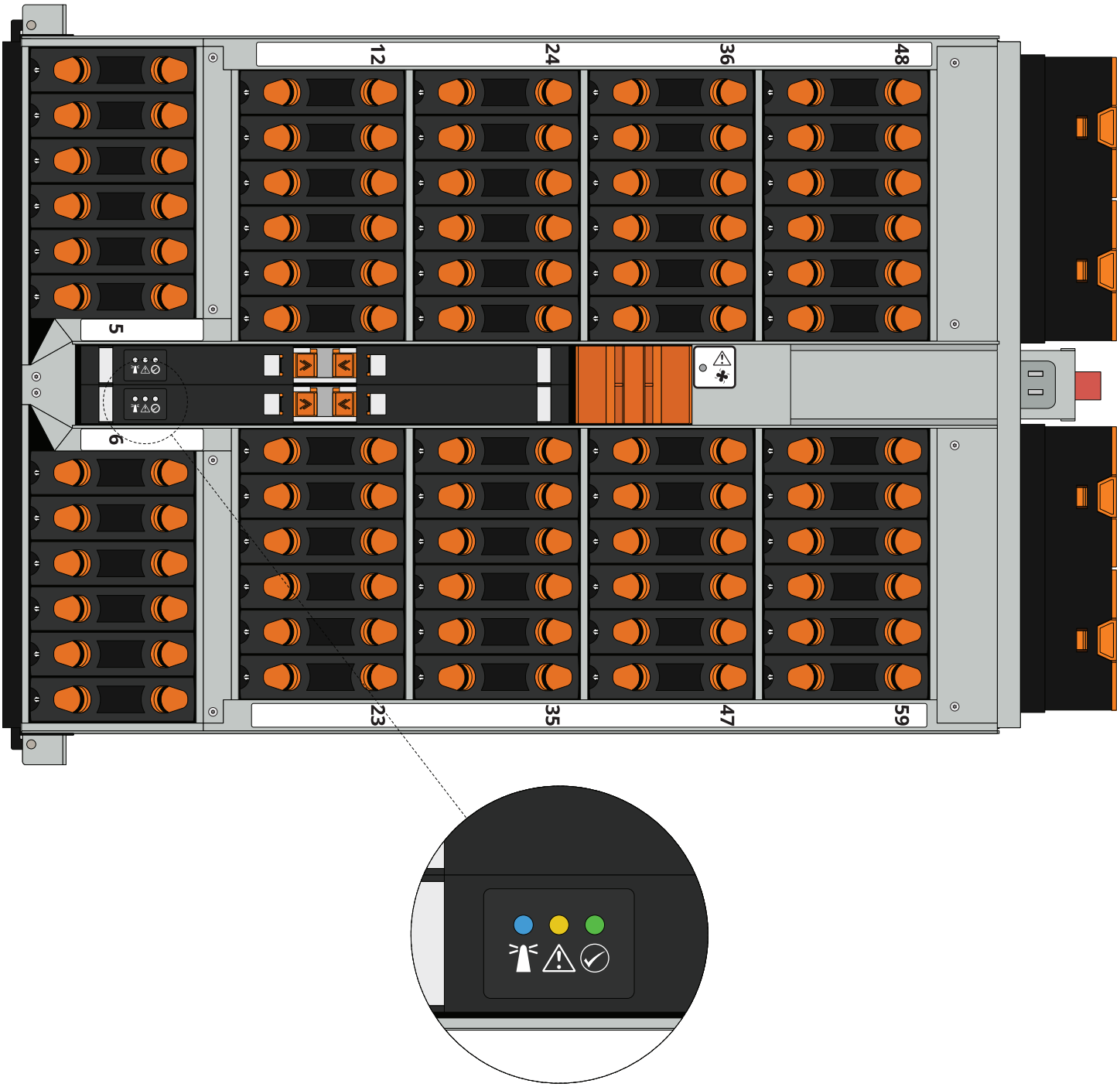
## 6.2 Rear Indicators




| Light | Color and Indication |
|---|---|
| SAS LEDs | Green (Solid): SAS Connected<br>Amber (Flashing): SAS Connection Fault |
| Enclosure LEDs | Blue (Solid): Locate ID Active<br>Amber (Solid): Component Fault<br>Green (Solid): Component Ready |

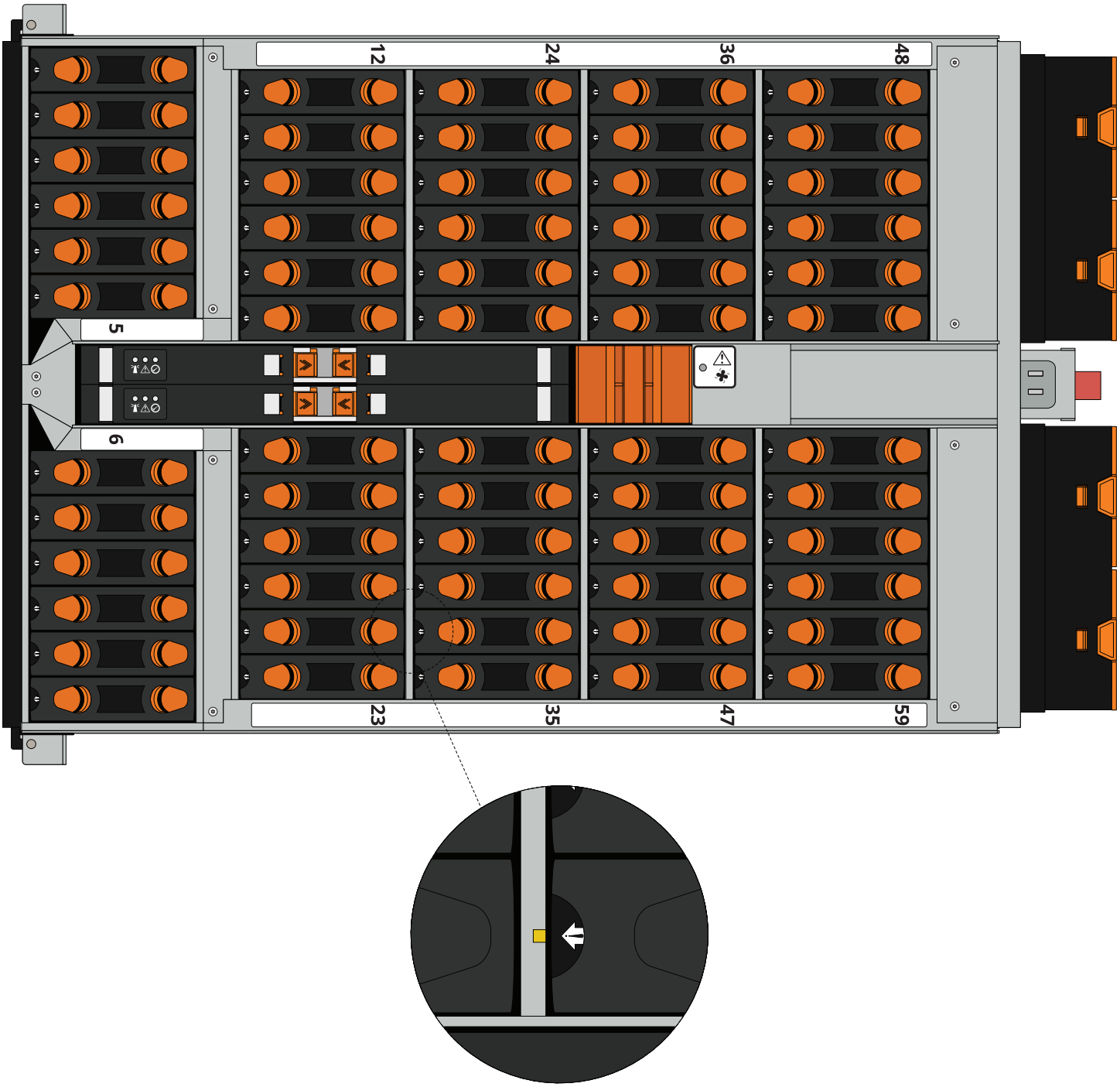
## 6.3 Interior Indicators

### 6.3.1 IOM Indicators



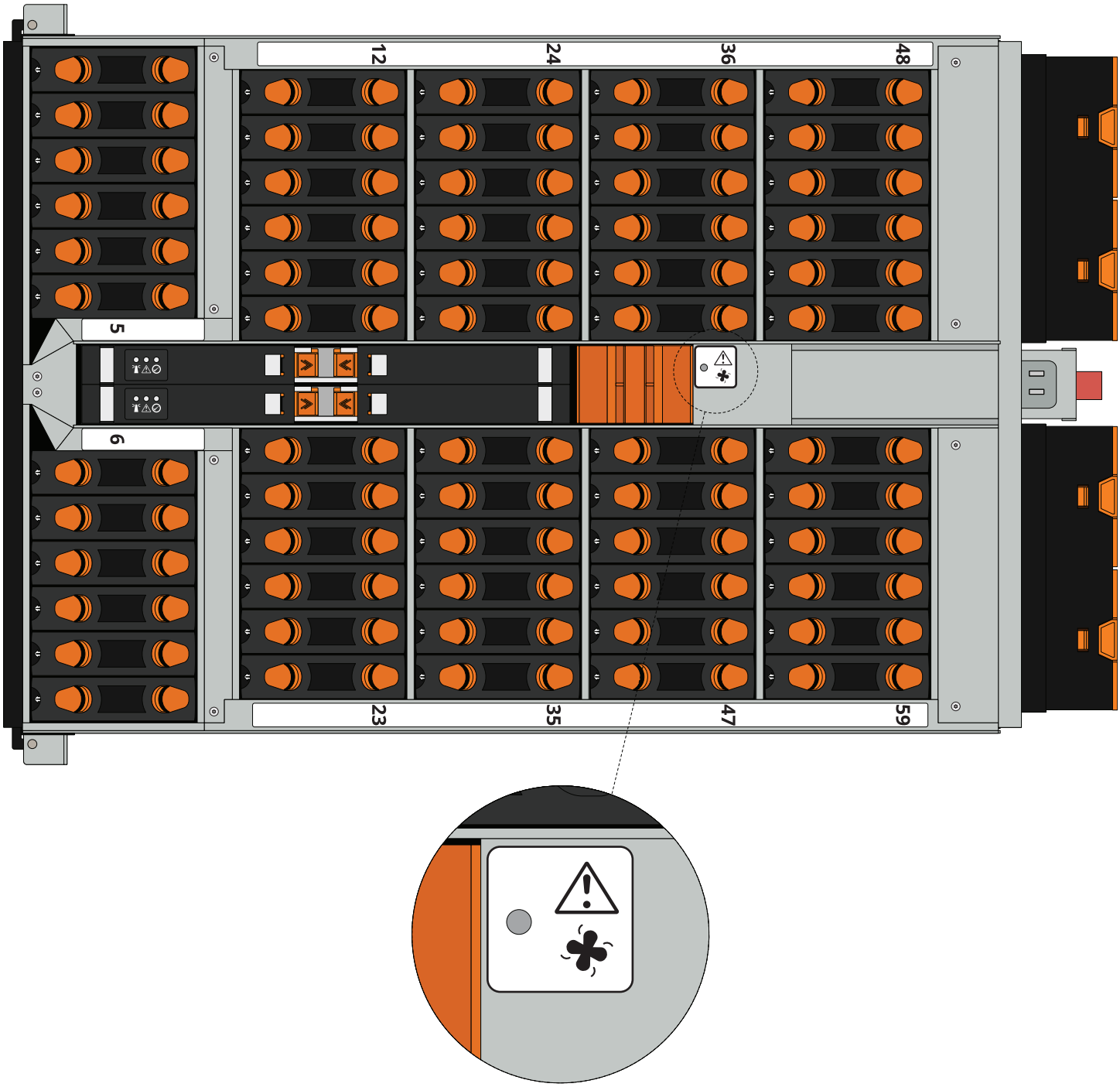

| Light | Color and Indication |
|---|---|
| | Blue (Solid): Locate ID Active |
| | Amber (Solid): Component Fault |
| | Green (Solid): Component Ready |

### 6.3.2 Drive Indicators




| Light | Color and Indication |
|---|---|
| Hard Drive LED | Amber (1 Hz Flashing): Drive Fault<br>Amber (2 Hz Flashing): Locate ID Active |

### 6.3.3 IOM Fan Indicators




| Light | Color and Indication |
|---|---|
| IOM Fan LED | Amber (1 Hz Flashing): Component Fault<br>Amber (2 Hz Flashing): Locate ID Active |

# 7 Racking Procedure

**Note - Rack Space**

The ES60 Gen 2 requires at least 4U of rack space in an EIA-310 compliant rack.

The ES60 is up to 35.04” (890 mm) long with the rail kit and CMA. The rack posts must be 24” to 32” (61cm to 81cm) apart to install the rail kit.

We recommend having at least 72” (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” (813 mm) of space behind the rack to account for cable management and personnel serving the back of the system.

Review your rack setup to ensure the ES60 fits in the rack with any front or back rack doors closed.

**Important - Damage or Injury**

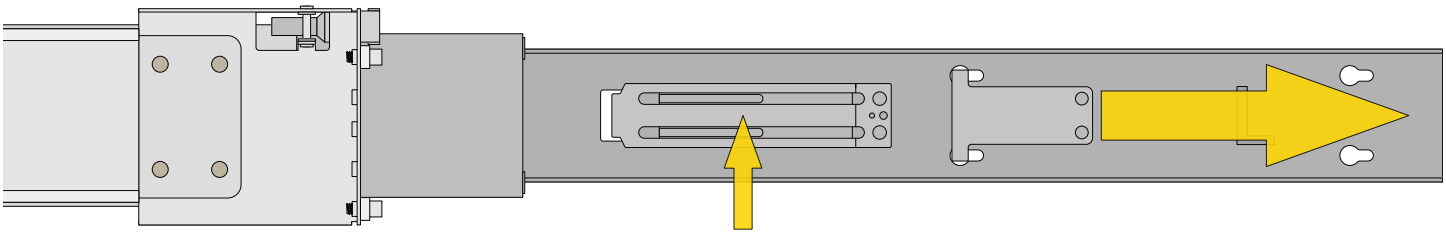
When handling rails, system components, or drives, never force movement if a part seems stuck or does not insert properly. Gently remove the part and check for pinched cables or obstructing material before installing it again. Installing a part with excessive force can damage the system or cause personal injury.

**Warning - Team Lift**

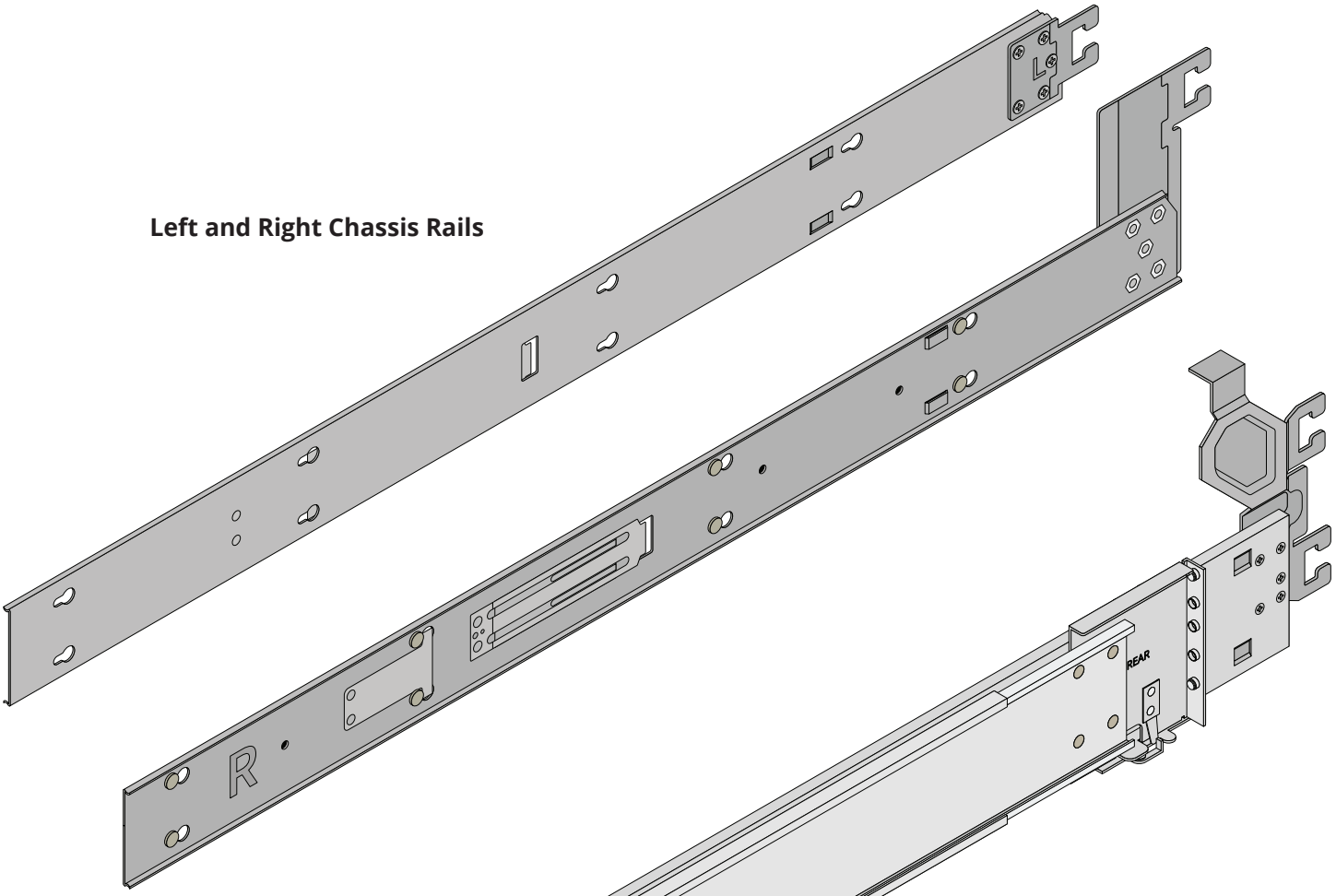
The ES60 requires two people to lift safely. Failure to follow safety recommendations can lead to severe system damage or personal injury.

## 7.1 Remove Chassis Rail from Rack Rail

Extend the innermost chassis rail until you expose the metal safety catch. Push the safety catch in and pull the chassis rail out until it is free from the rack rail. Repeat the process for the other rail.



Press



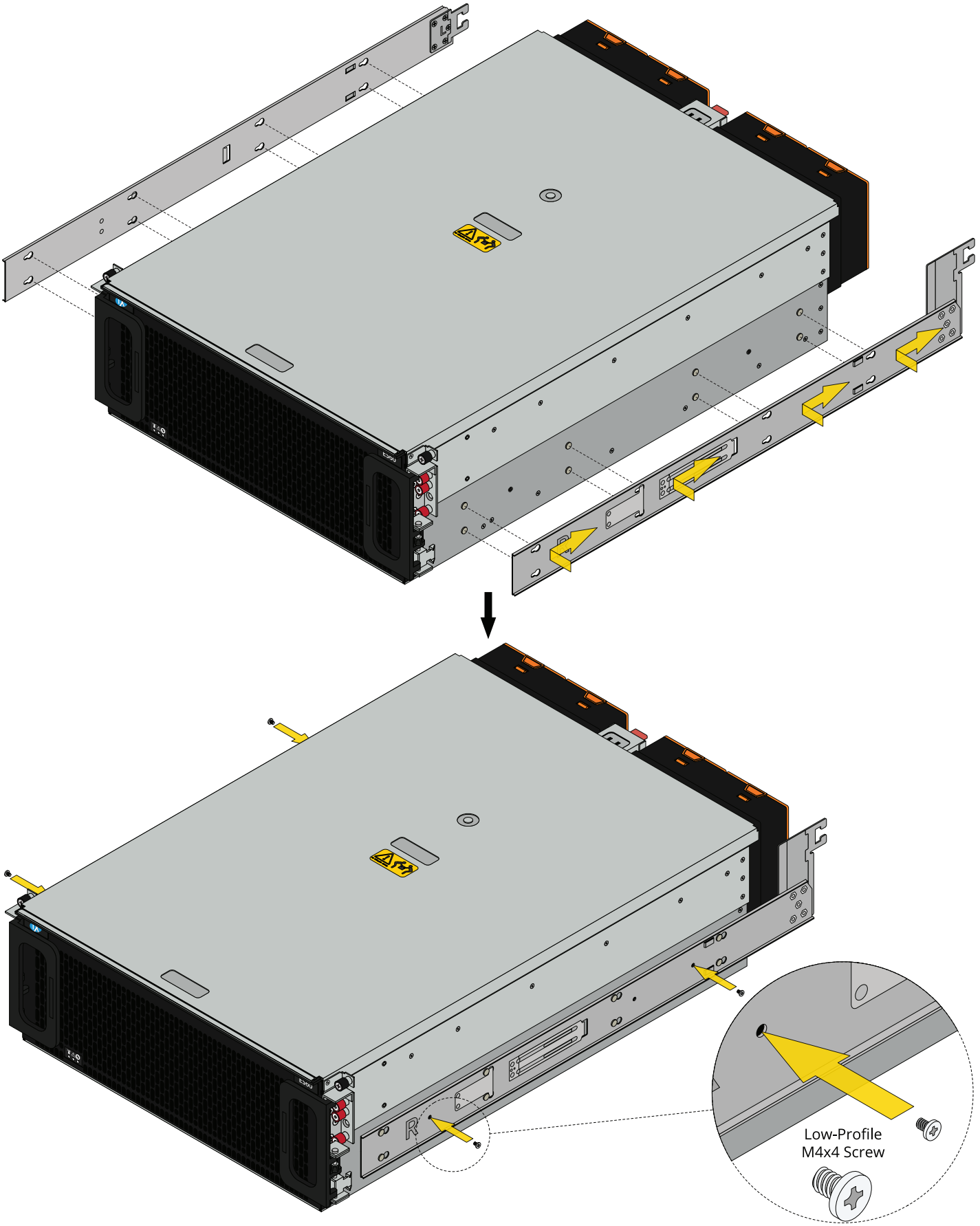

Left and Right Chassis Rails




Rack Rail

## 7.2 Install the Chassis Rail on the System

Fit the rail keyholes over the mounting pegs on the system and slide the rail toward the back of the system until it locks. Use a low-profile M4x4 screw to secure the rail to the chassis. Repeat the process for the other chassis rail.



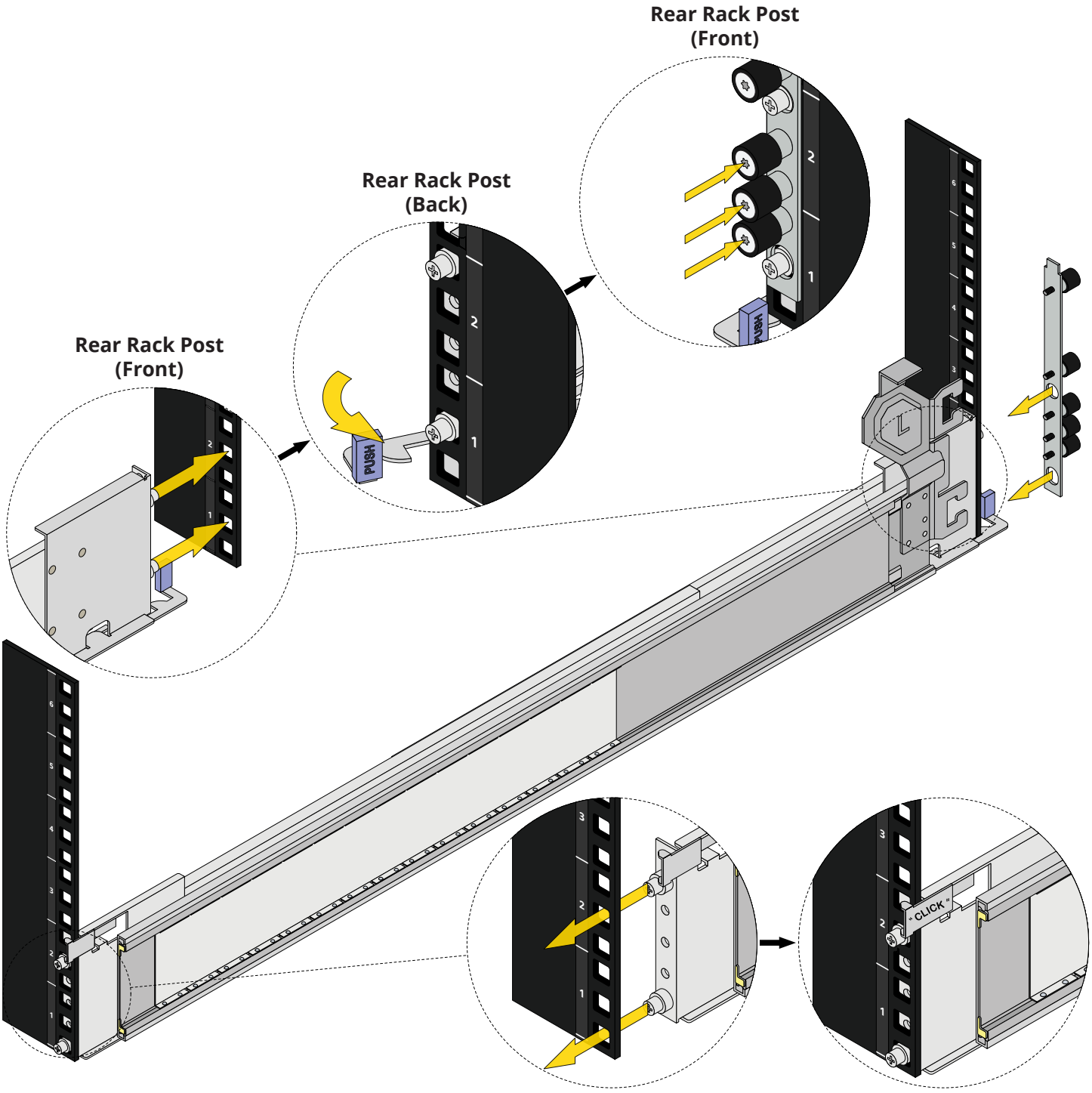
## 7.3 Install the Rack Rail in the Rack

The front rail pins mount to the 4U bottom-most attach points, and the back rail pins mount one hole above the 4U bottom-most attach points. The rails have left-side “L” and right-side “R” stamps.

Install the front of the rail first. Align the rail pins with the mounting holes in the rack and push them through until the front latch clicks into place. Make sure an additional 2U of rack space is available above the rail.

Align the rear rail pins with the rack mounting holes and push them through until the blue release catch clicks into place over the rack. Fit a screwplate over the rear rail pegs and secure the rail to the rear rack post with the lower three thumbscrews on the screwplate. Note that the rear rail pins install one mounting hole higher than the front rail pins. You can use a level to ensure the front and back of the rail are even.

Repeat this process for the other rack rail.



## 7.4 Install Cover Retention Hardware

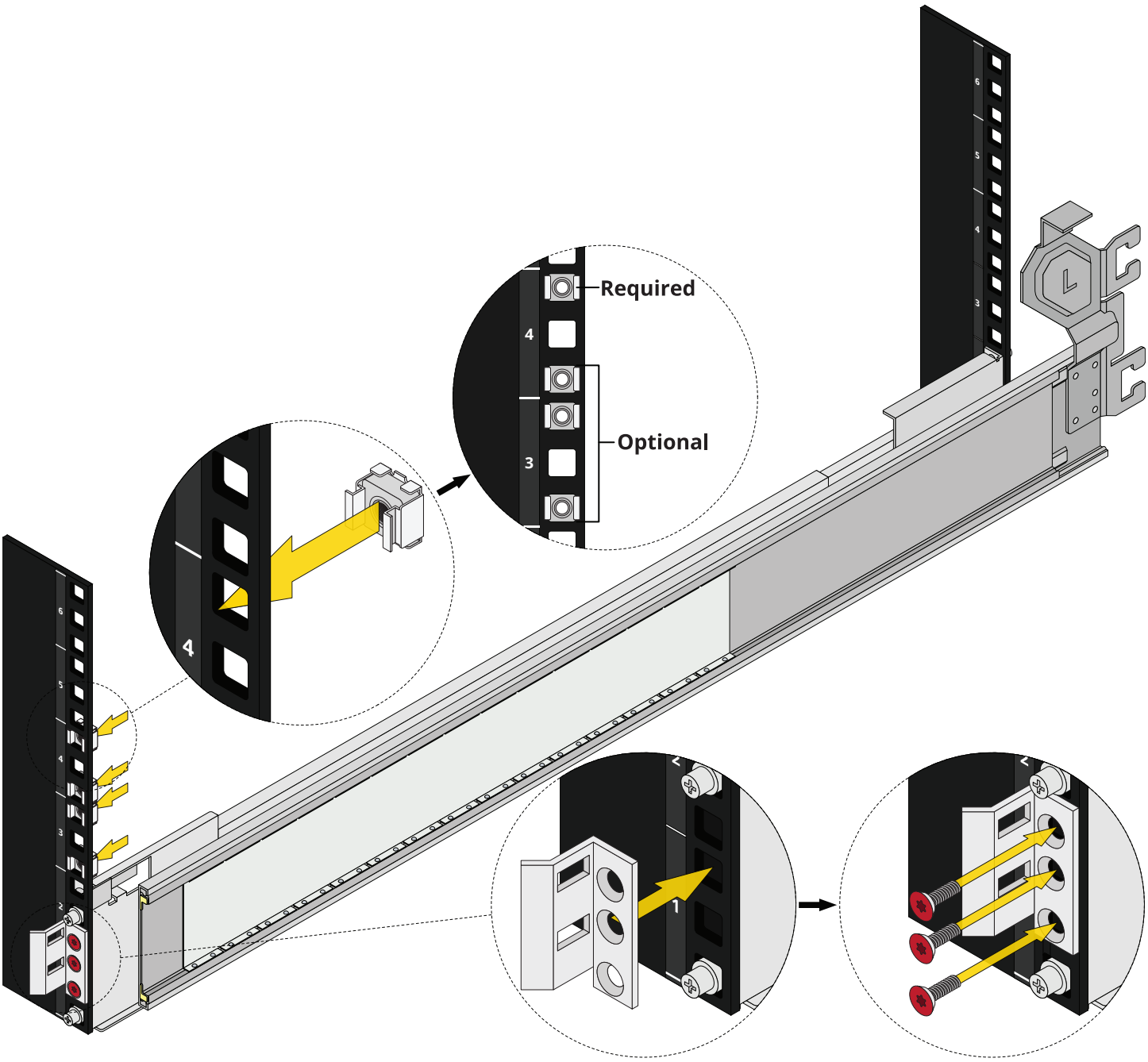
At the front rack post, place a cage nut in the topmost rack mounting hole of the reserved 4U

You can optionally place more cage nuts two, three, and five rack mounting holes down from the first one to lock the entire system to the rack later.

The nut should be **inside** the rack, with the “wings” touching **the left and right sides of the hole (horizontal)**.

Repeat this process for the other rack post and make sure to install all cage nuts in parallel rack mounting holes.

Align a latch plate over the three holes between the rack rail mounting pins with the flange pointing to the outside of the rack. Secure the latch plate to the rack with three T15 M5 screws. Repeat for the other latch plate.

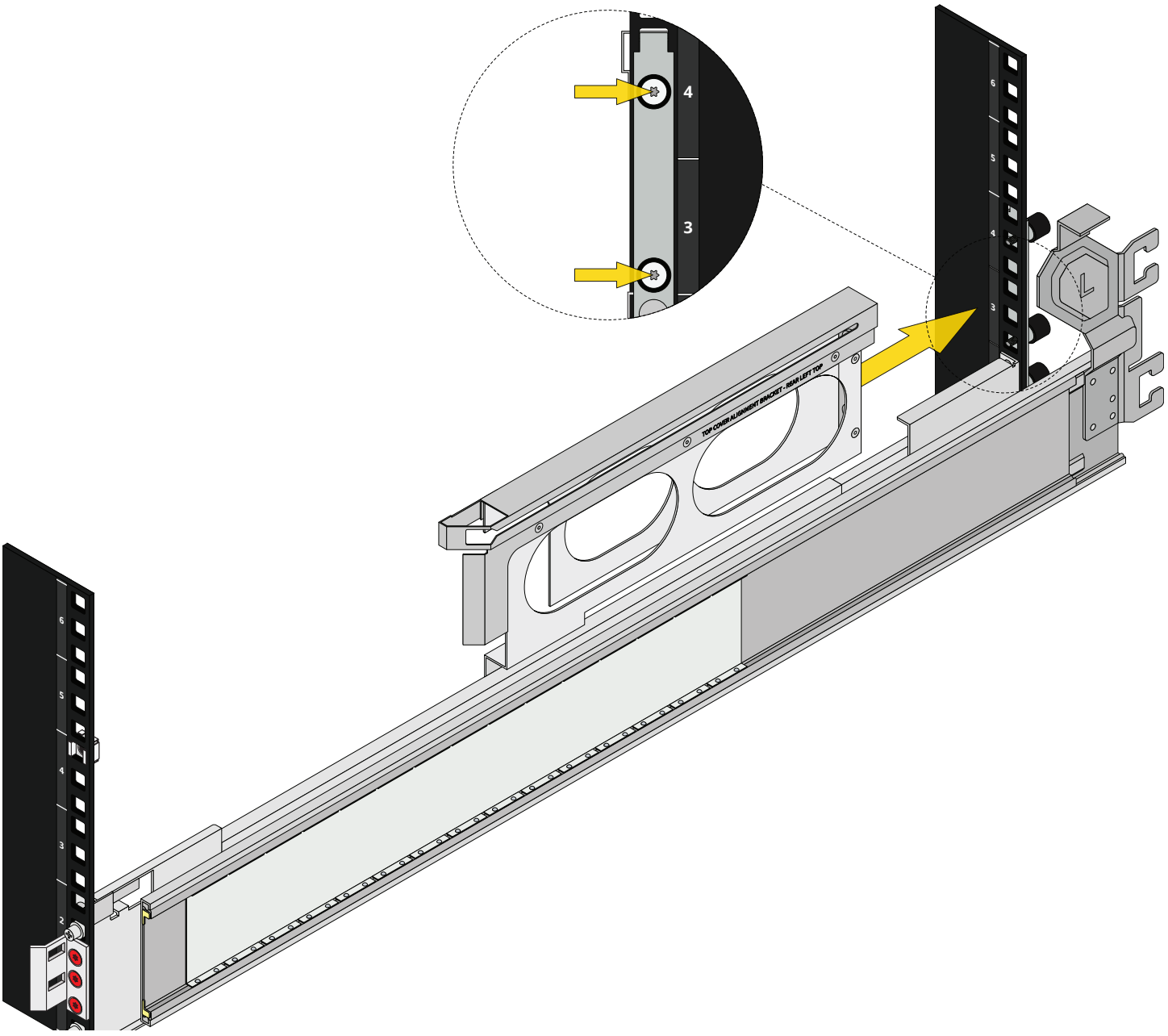


Place the left Cover Retention Bracket over the rail and align it with the mounting holes on the *rear* of the rack rail. The groove in the bracket must face toward the inside of the rack.

Tighten the top two thumbscrews on the screwplate to secure the bracket to the rear of the rack rail.

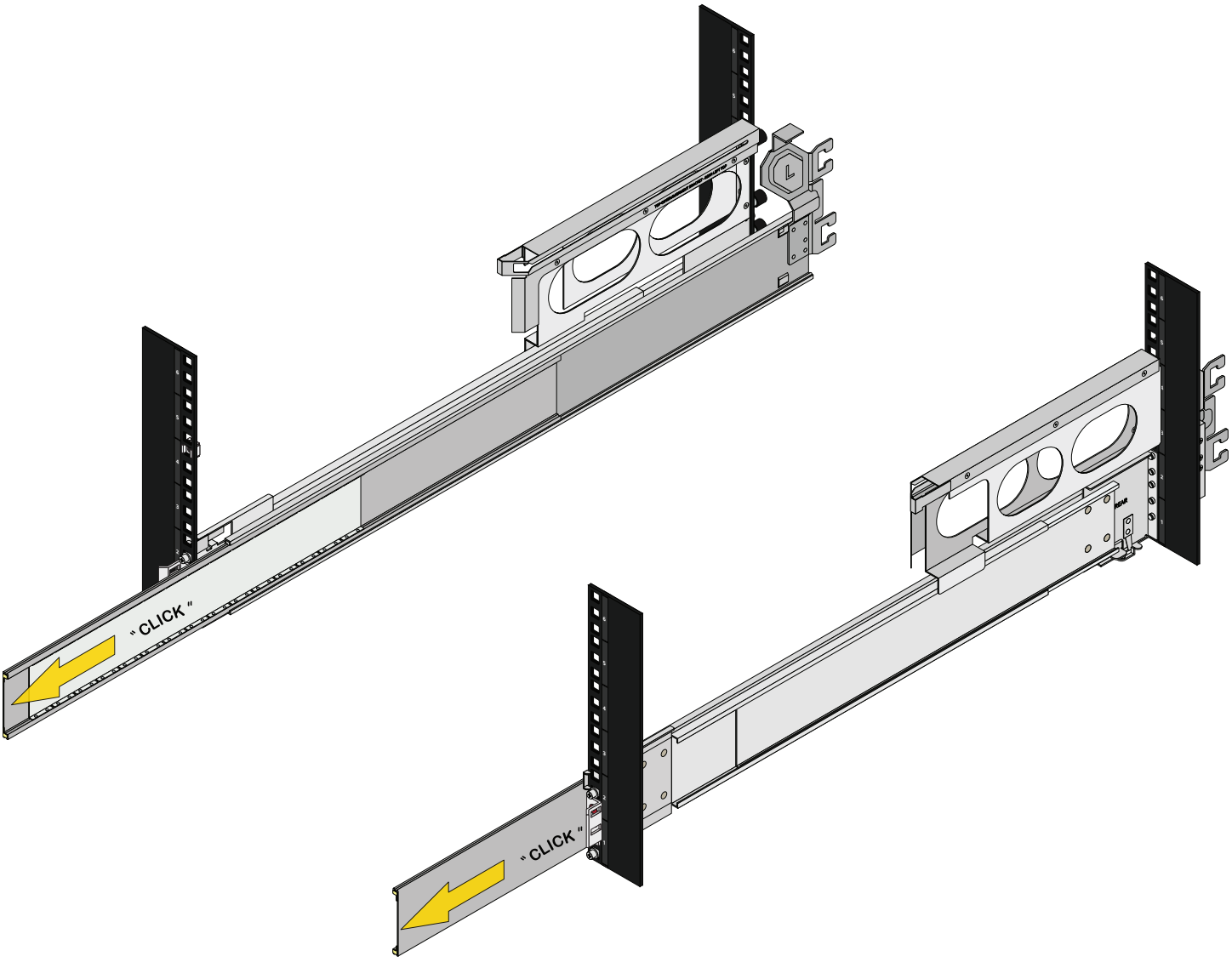
Use the same method to install the second alignment bracket to the other rail. Make sure the grooves on top of both brackets face inside the rack.

The ES60 cover slides into the grooves when it is pushed into the rack.



## 7.5 Extend the Middle Rails

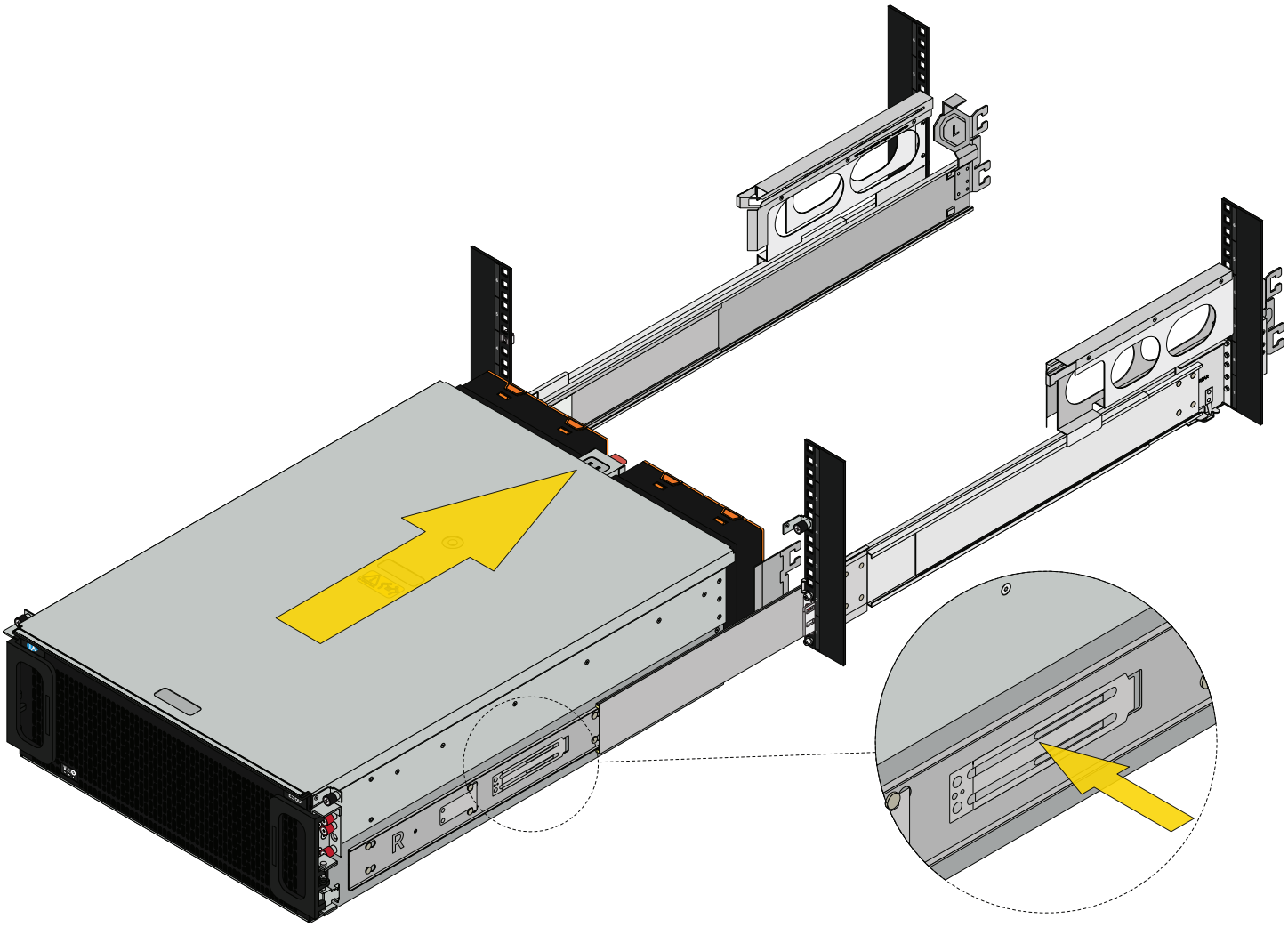
Slide the middle rack rails out until they click and lock. Ensure the bearing sleeve is also as far forward as possible.



## 7.6 Install the System in the Rack

Team-lift the system and align the chassis rails with the rack rails, then slide them in and push the system into the rack until the metal safeties click and lock.

Press the metal safety catches on each chassis rail against the chassis and gently push the chassis into the rack until the chassis latches lock into the latch plates.



**Warning - Pinch Point**

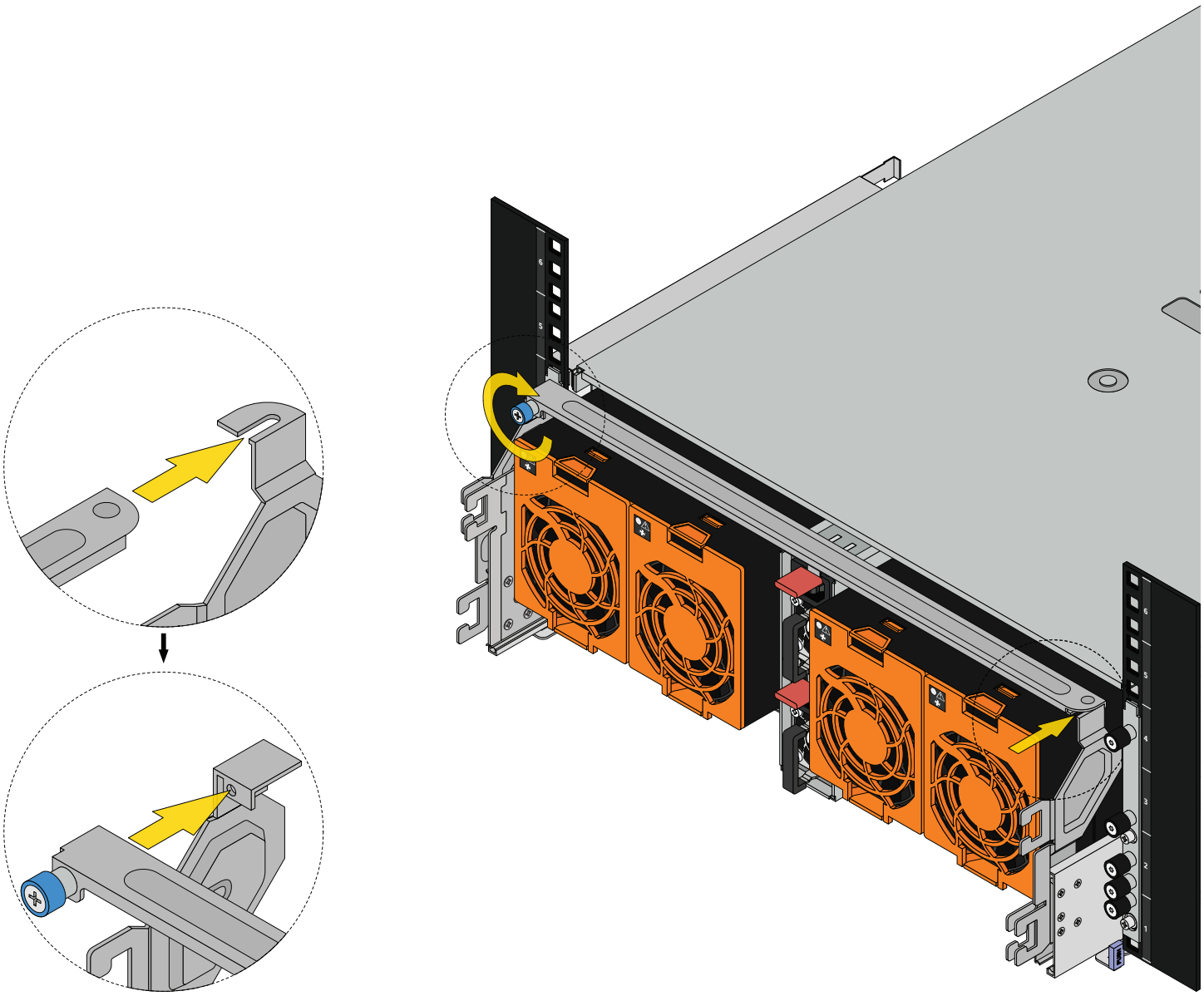
The ES60 can pinch or crush fingers when sliding the rail sleeves onto the rack rails.

Tighten the black thumbscrews to secure the cover to the rack.

## 7.7 Install the Cable Management Brace

At the back of the system, insert the brace pivot pin into the top bracket on the **right** rail.

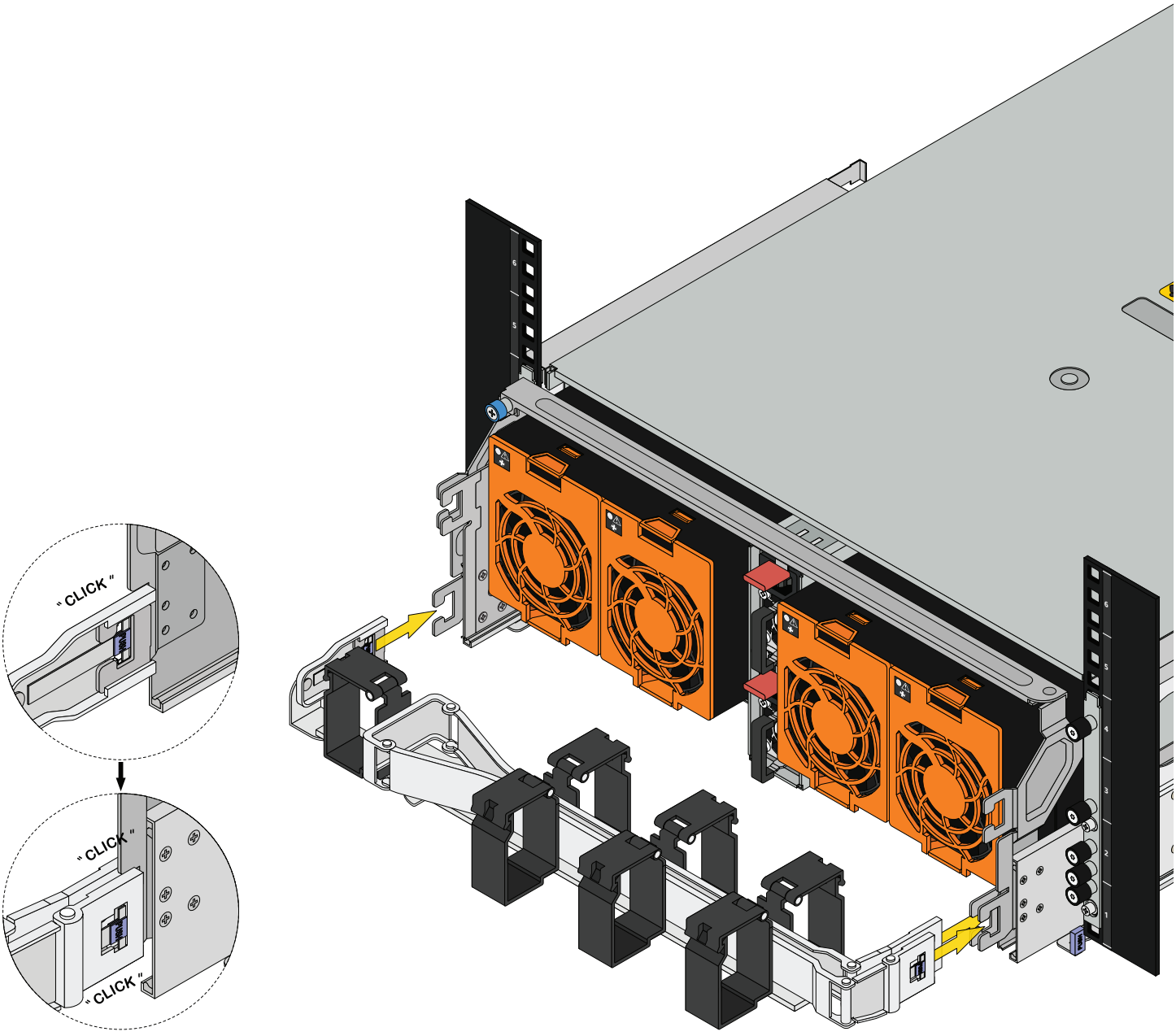
Swing the left side of the brace to the top bracket on the **left** rail and tighten the thumbscrew to secure the brace to the brace brackets.



## 7.8 Install the Lower Cable Management Arm (CMA)

Starting with the left side, push the post onto the left bracket. On the right side, push the inner post onto the inner bracket, then push the outer post onto the outer bracket.

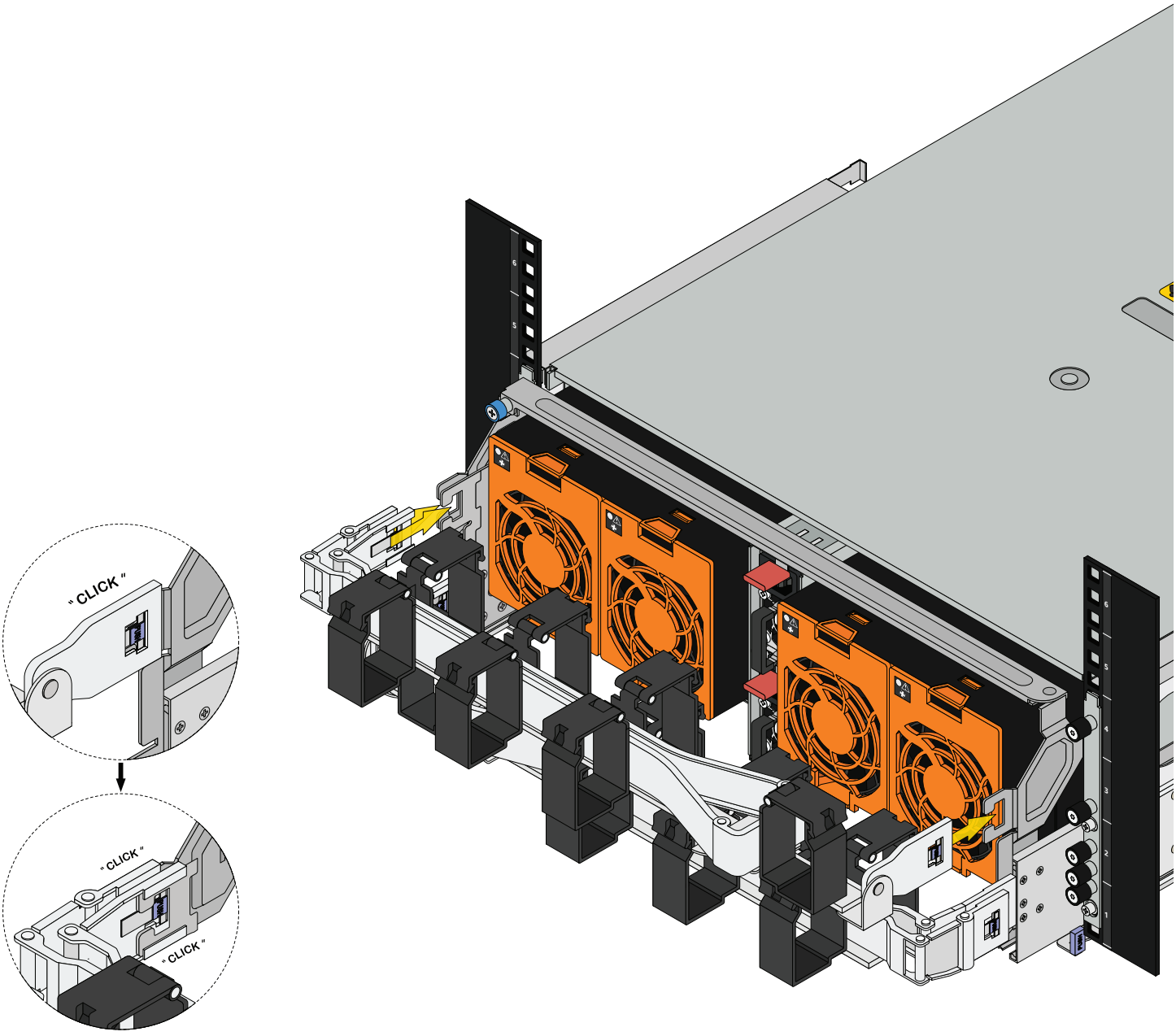
The CMA posts click and lock when installed correctly.



## 7.9 Install the Upper Cable Management Arm (CMA)

Starting with the right side, push the post onto the right bracket. On the left side, push the inner post onto the inner bracket, then push the outer post onto the outer bracket.

The CMA posts click and lock when installed correctly.



## 7.10 Install Cables

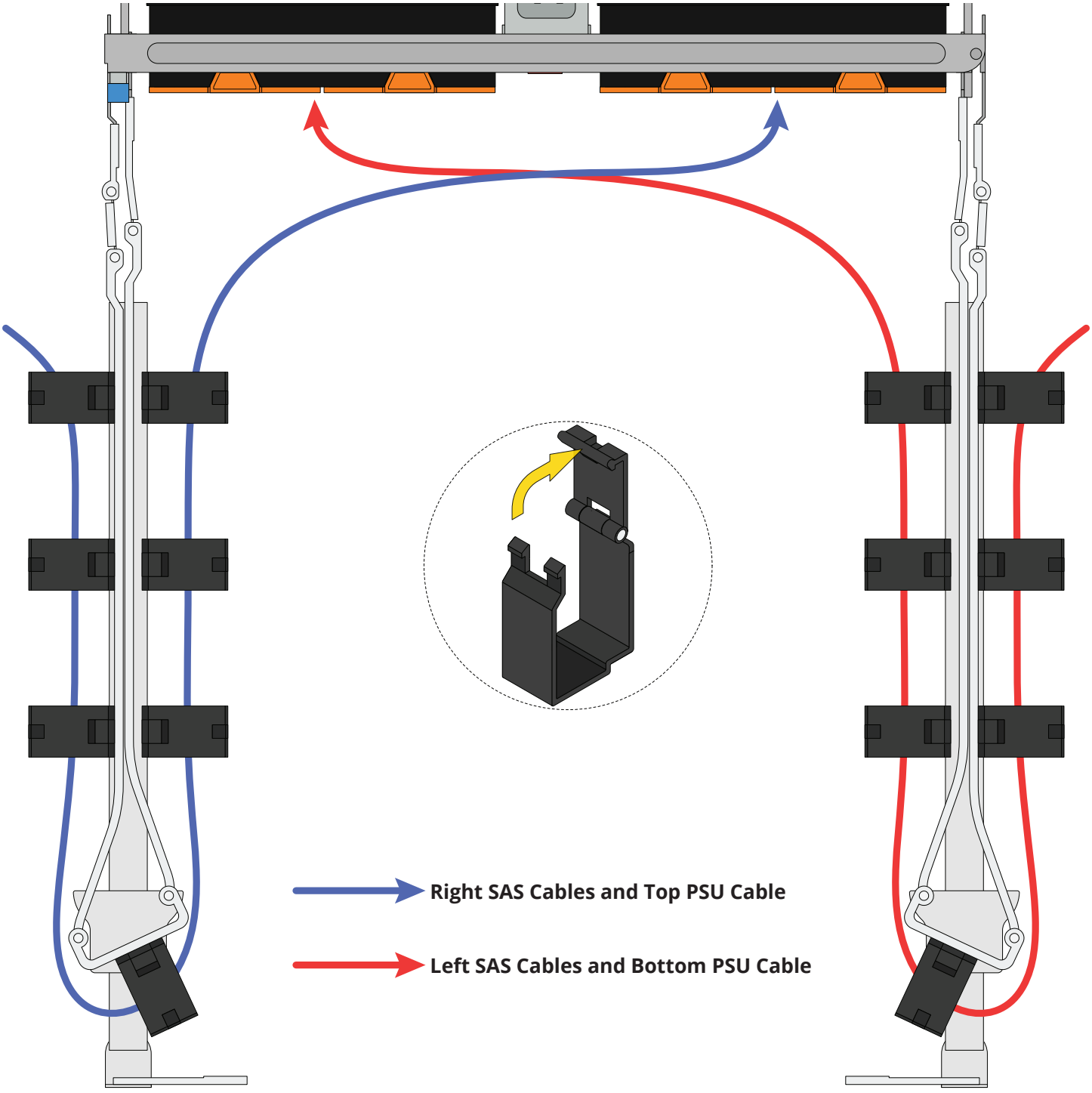
Open the top CMA by pushing the blue release on the right CMA post and pulling it away from the bracket. Then, swing the top CMA out to the left.

Open the bottom CMA by pushing the blue release on the left CMA post and pulling it away from the bracket. Then, swing the top CMA out to the right.

Open the black baskets on the CMAs by pulling the tops up and route all the cables for power and SAS. Ensure all cables have at least 20 inches of slack between the system and the CMA. After installing cables, reconnect the CMAs.

**Tip - Cabling**

We recommend bundling the cables for each side using the included velcro straps to make servicing easier.

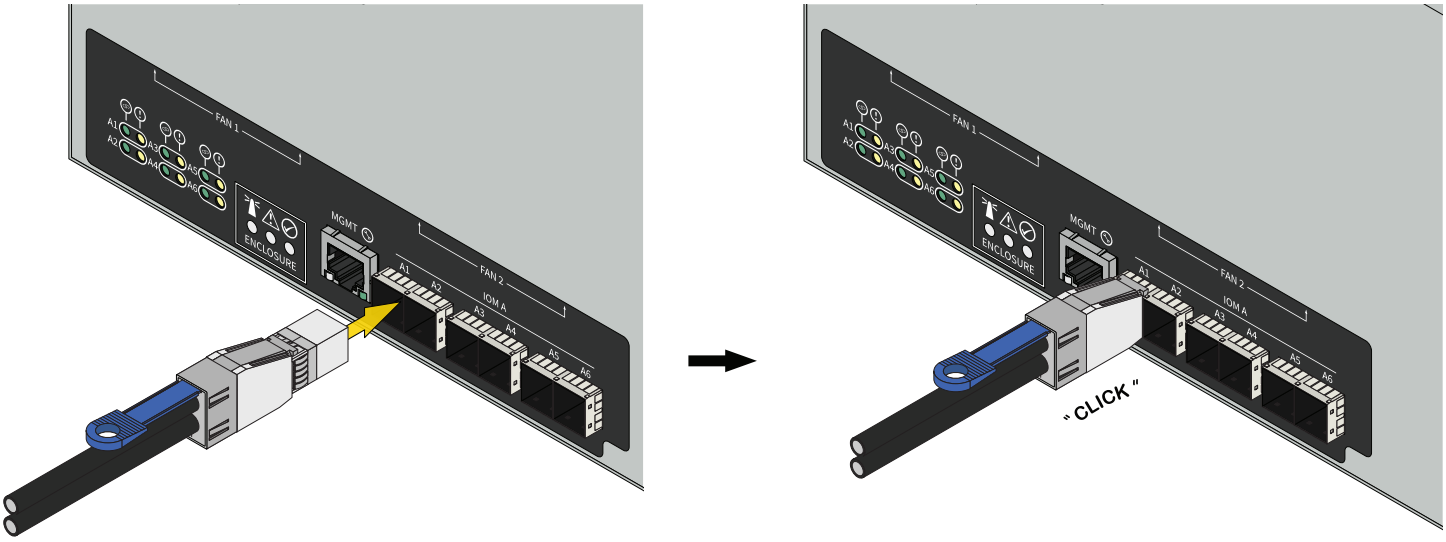


Connect ethernet network cables from your local switch or management network to the management ports on both sides of the system.

## 7.11 SAS Cabling

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 on top. Gently push the connector into the port until it clicks.

For more information on SAS configuration, see the ES60 Gen 2 User Manual (https://www.truenas.com/docs/files/ES60Gen2PUM.pdf).

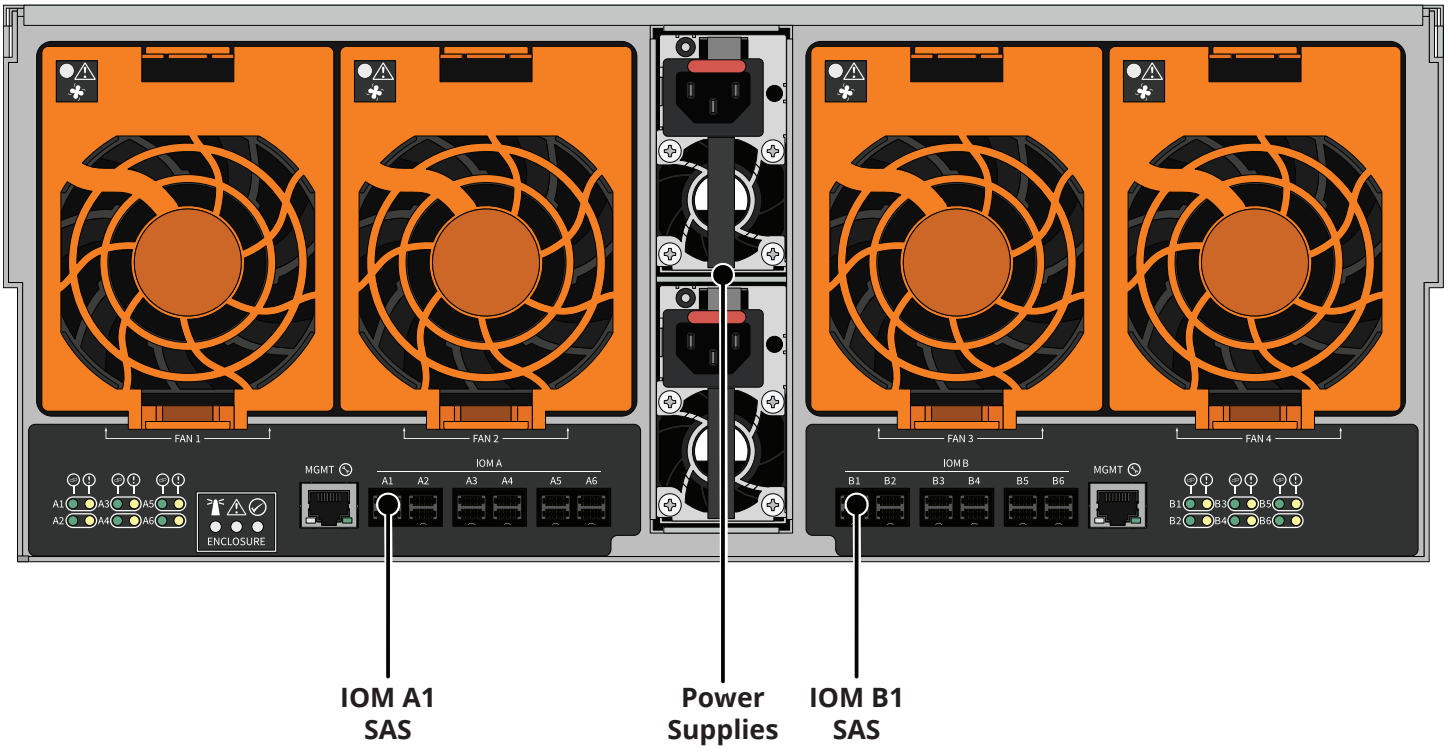



**Tip - Cable Management**

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.

## 7.12 Power Cables

Connect the power cables to both power supplies, but **do not plug them into a power source yet.**



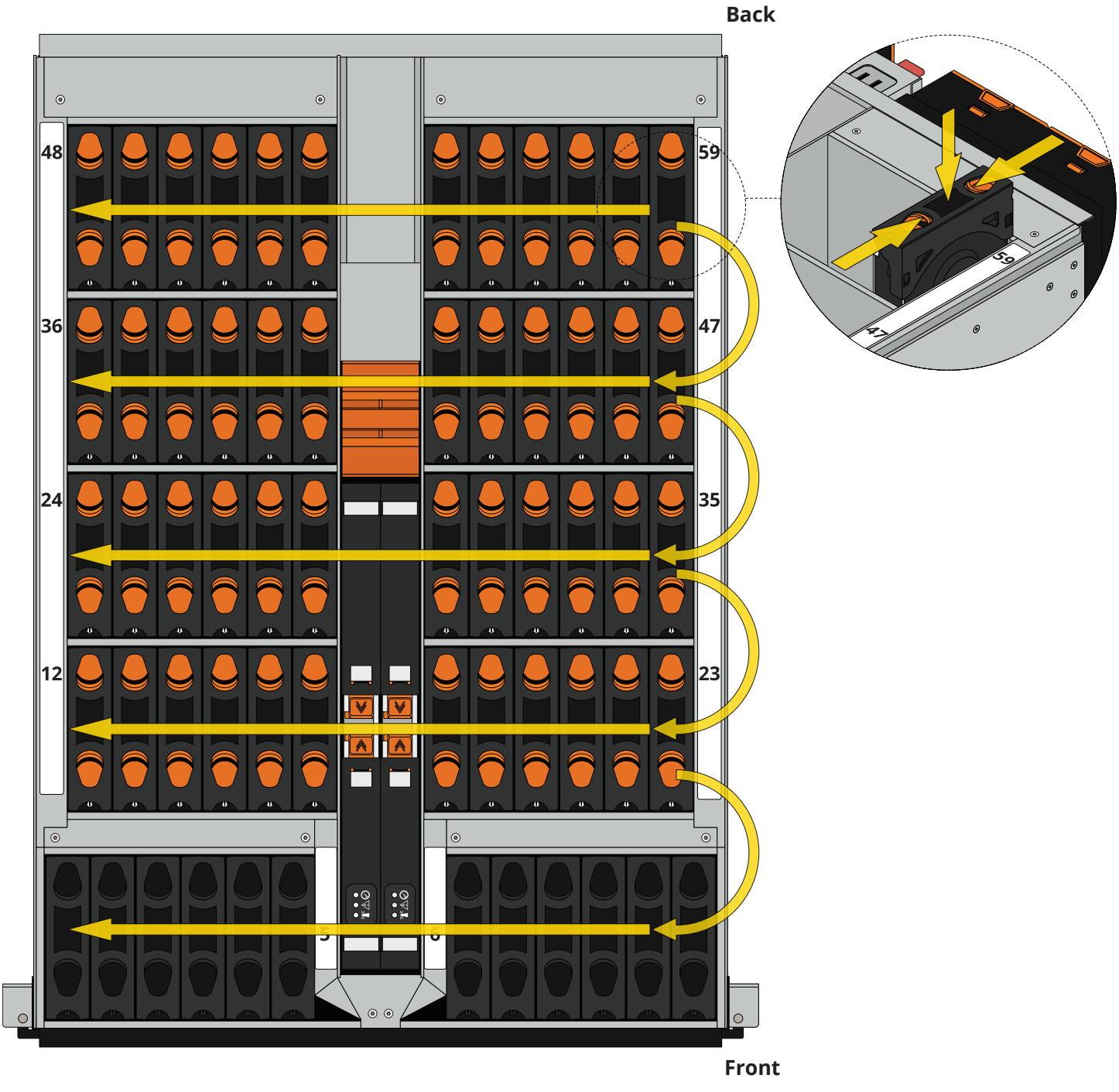
## 7.13 Install Drives

Pull the latch handles to free the ES60 from the rack, then pull the ES60 out until it locks into the service position.

Retrieve a drive assembly (drives and clips come pre-installed) and point the arrow on the clip towards the front of the ES60. Pinch the orange tabs and gently push the drive into a slot, then release the tabs. Ensure the drive is fully inserted into the bay and does not extend above the system.

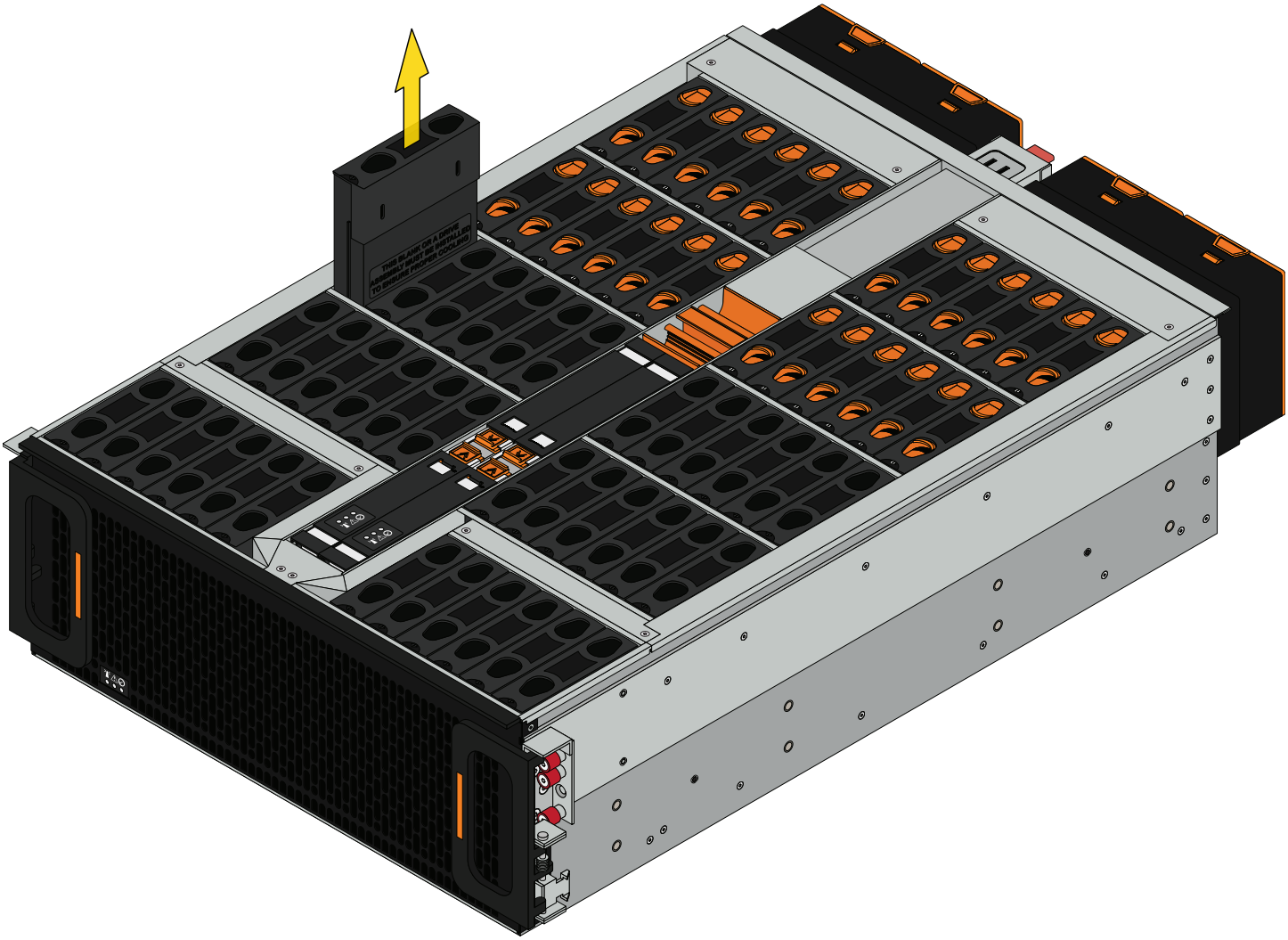
For proper airflow, start with the row labeled **48** at the back of the drive drawer. Install the drives from left to right. When that row is full, move to the next row forward labeled **36** and proceed to fill the enclosure from left to right, back to front. Drive blanks come pre-installed, but you can move them as needed.

> **Note - Drive Cooling**
>
> You must install at least 12 drives into the ES60 to ensure proper airflow for cooling.



### 7.13.1 Upgrading Drive Blanks to Hard Drives

Grasp a drive blank by the finger-holds and gently pull it up and out of the drive bay, then follow the procedure in section "7.11 Install Drives" on page 27 to install a drive in the now empty slot.



## 7.14 Boot the System

Push the system back into the rack by pressing the metal safety catches on each chassis rail against the chassis and pushing the chassis into the rack until the chassis latches lock into the latch plates.

Plug the power cables into PDU outlets and wait for the ES60 to boot up. After booting, the ES60 automatically pairs with the TrueNAS system it is connected to. You can access ES60 hardware details through the TrueNAS UI.

**ⓘ Note - Voltage Requirements**

The ES60 requires power from a 200V to 240V power distribution unit (PDU).

**Warning - Grounded Connection**

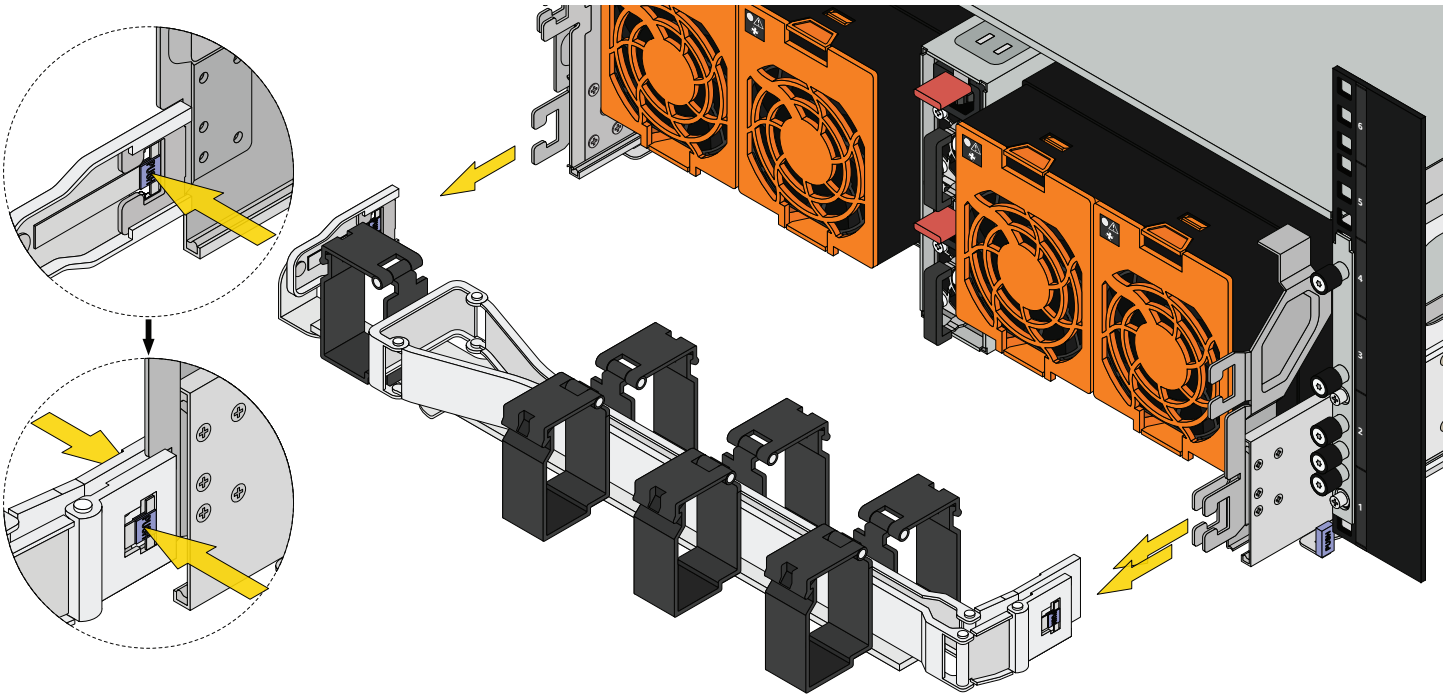
Always connect power cords to properly grounded connections.

# 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, be sure to label the cables so you can easily cable the system again.

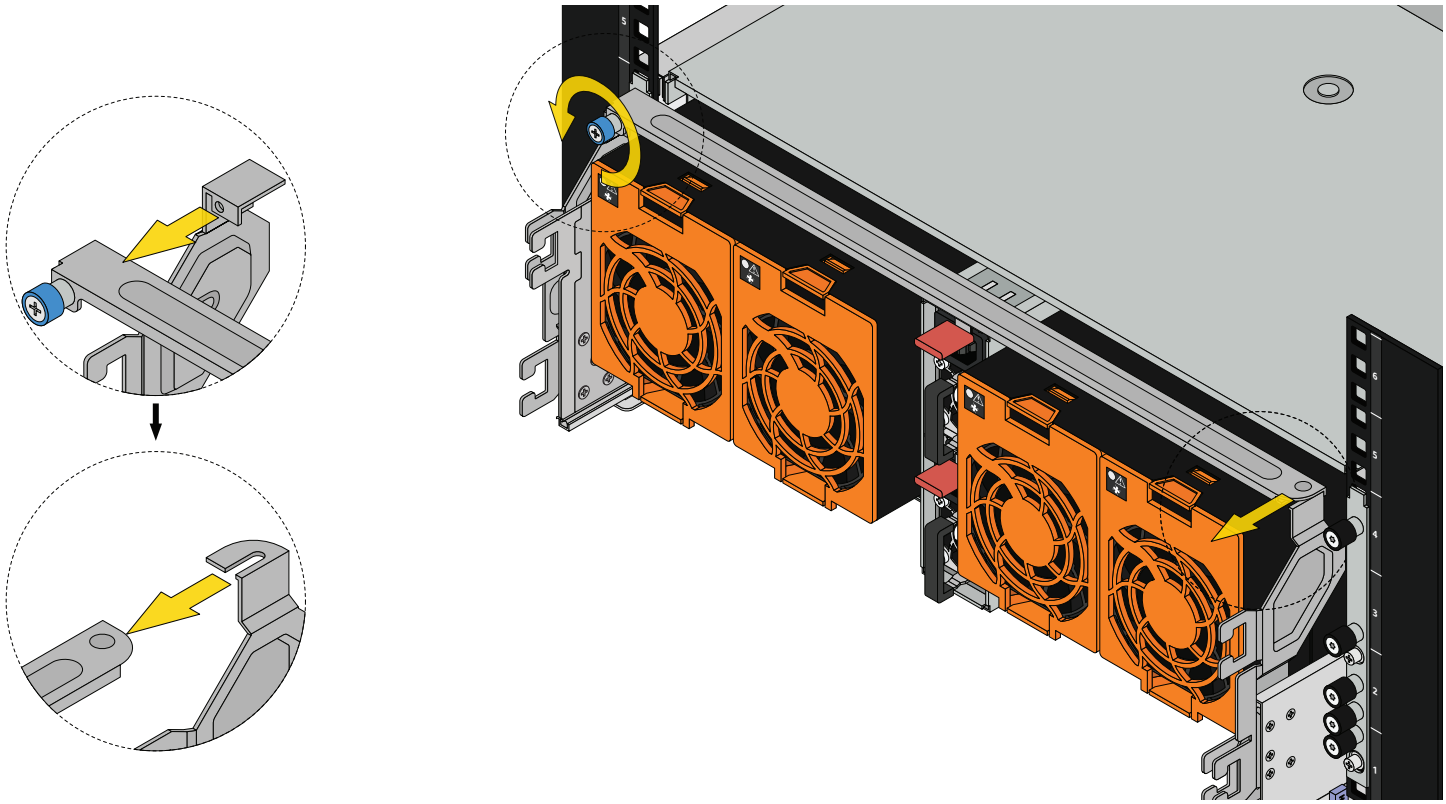
## 8.1 Remove Cable Management Arms (CMAs)

Push the blue buttons on the posts to release them from the brackets, then pull the CMA away from the system.



## 8.2 Remove Cable Management Brace

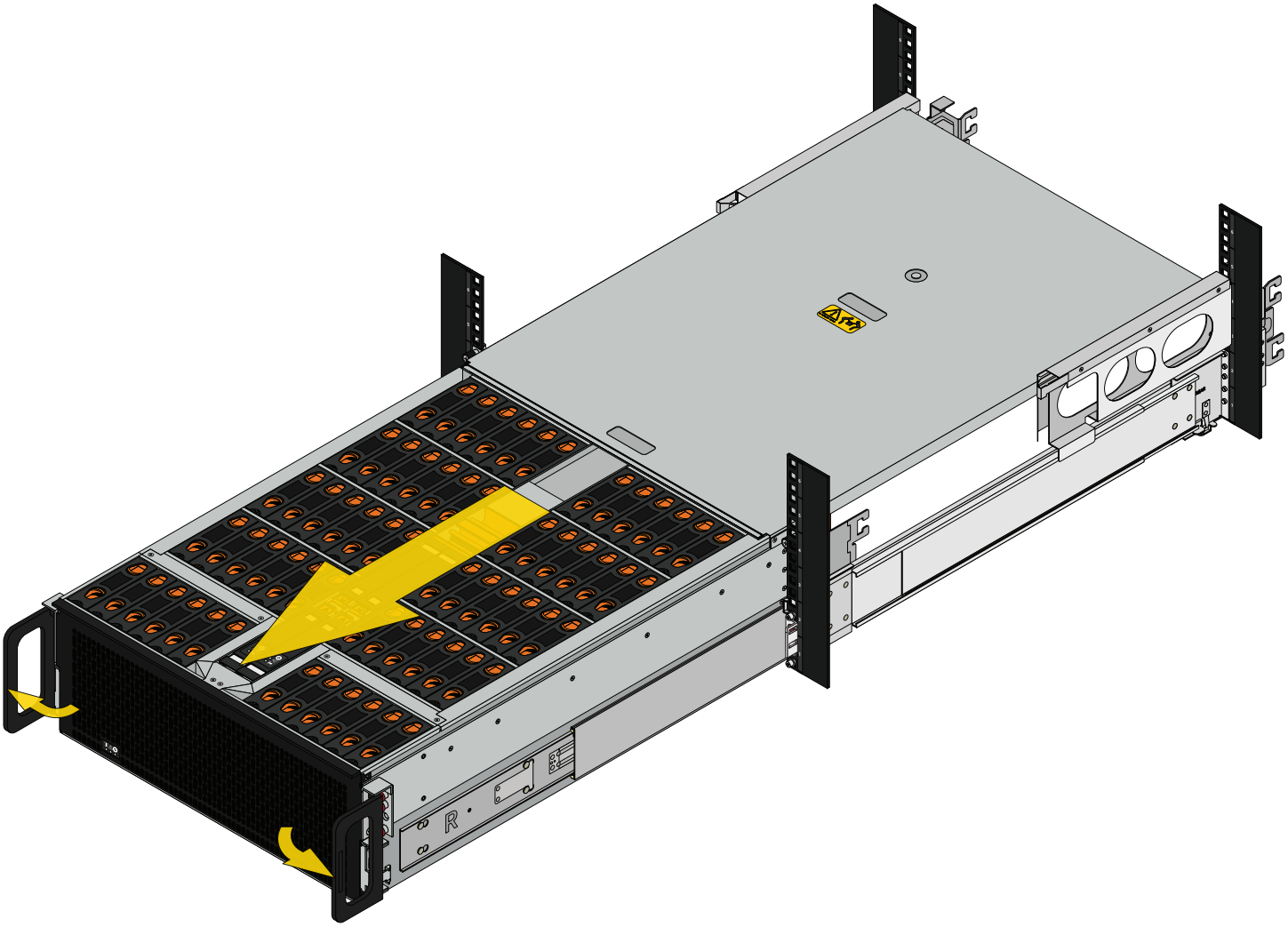
Loosen the blue thumbscrew and swing the brace away from the **left** rail, then pull the brace pivot pin out of the bracket on the right rail.



## 8.3 Pull the System Out into the Service Position

Pull the latch handles to release the system from the rack, then continue pulling the system out until it locks into the service position.

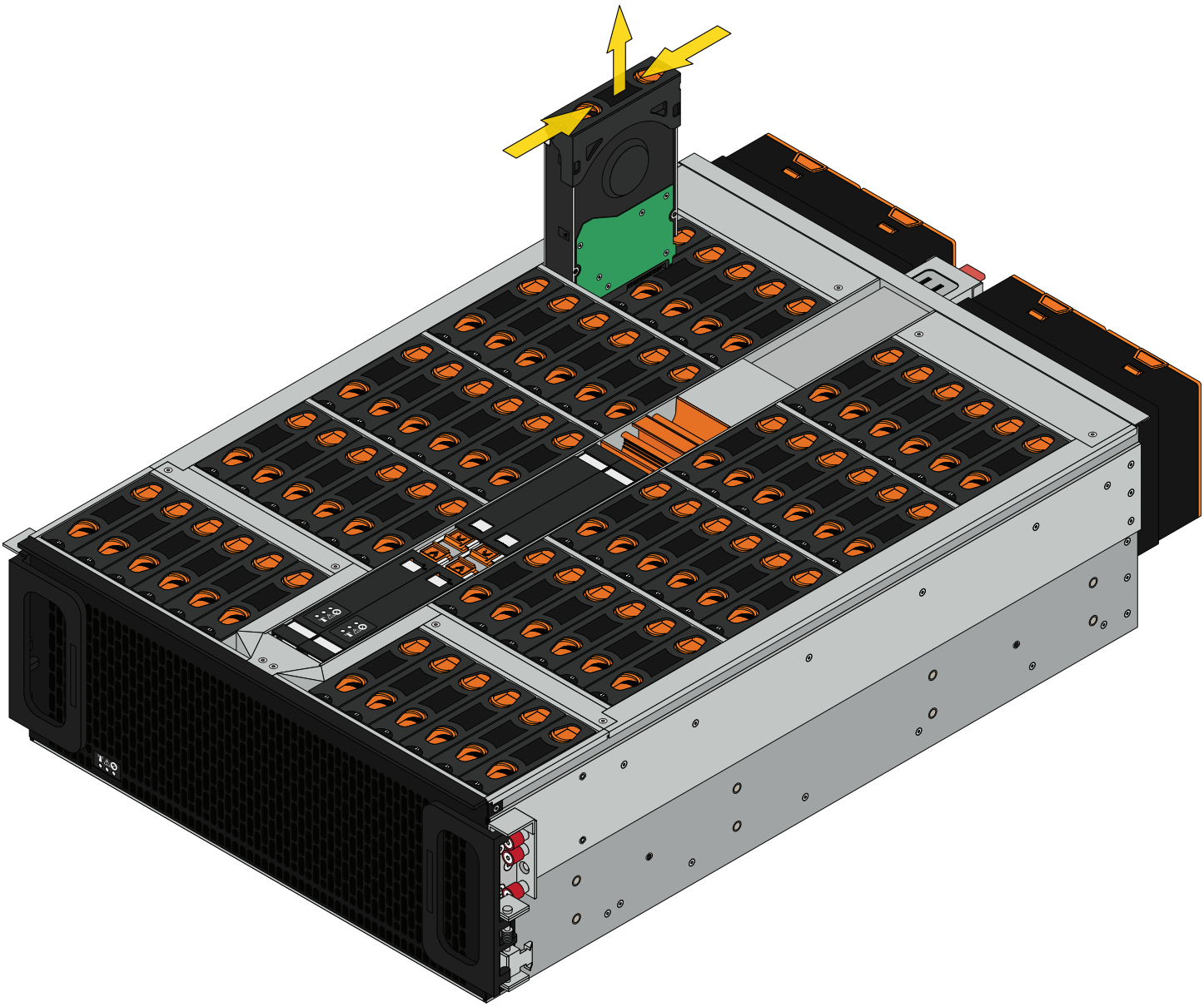
If you used the red thumbscrews to lock the system to the rack, you must loosen them before you can pull the system out.



## 8.4 Remove Drive Assemblies

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

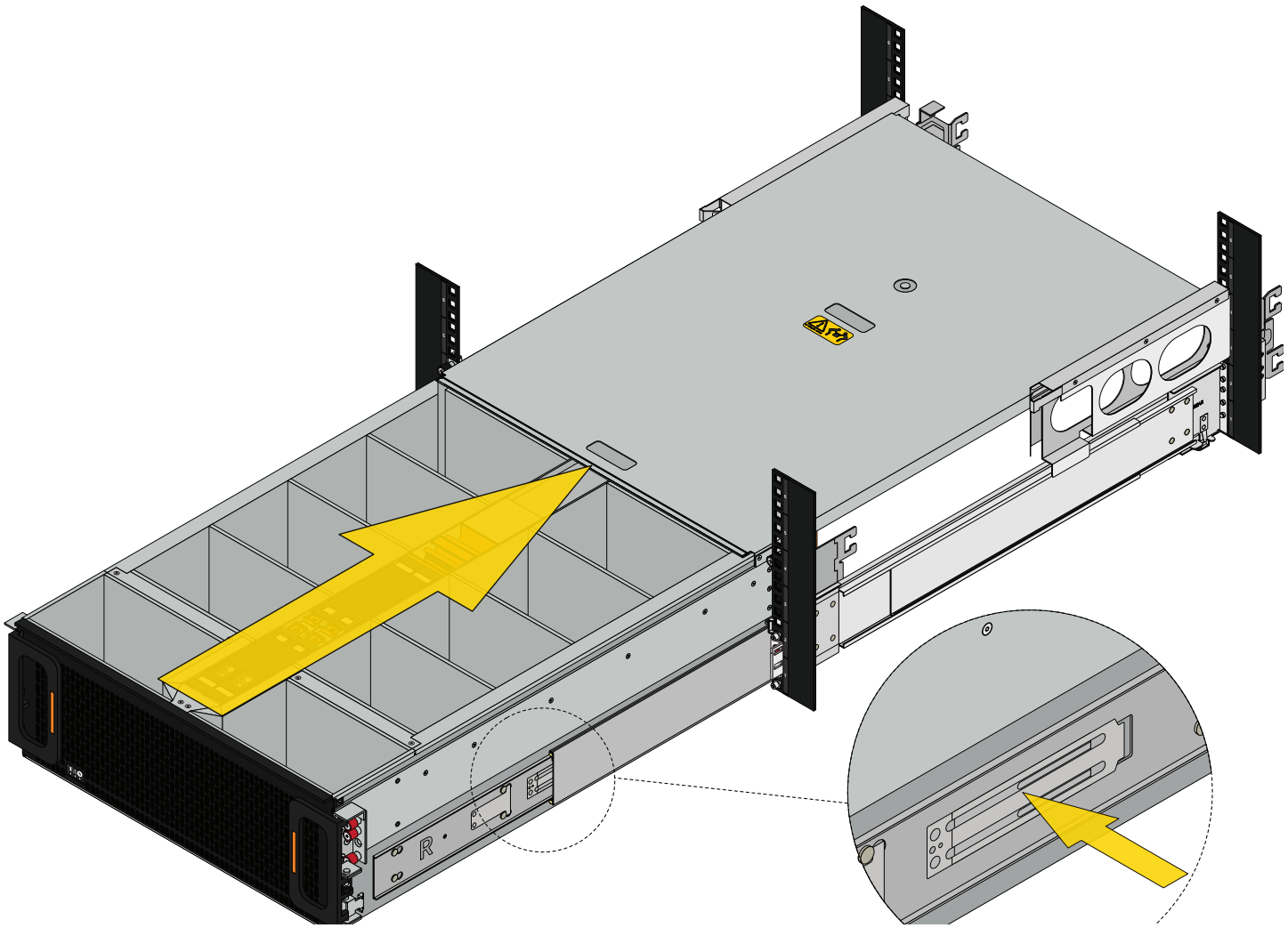
Repeat for all remaining drives.



## 8.5 Push the System Back into the Rack

Press the metal safety catches on each chassis rail against the chassis and push the chassis into the rack until the chassis latches lock into the latch plates.

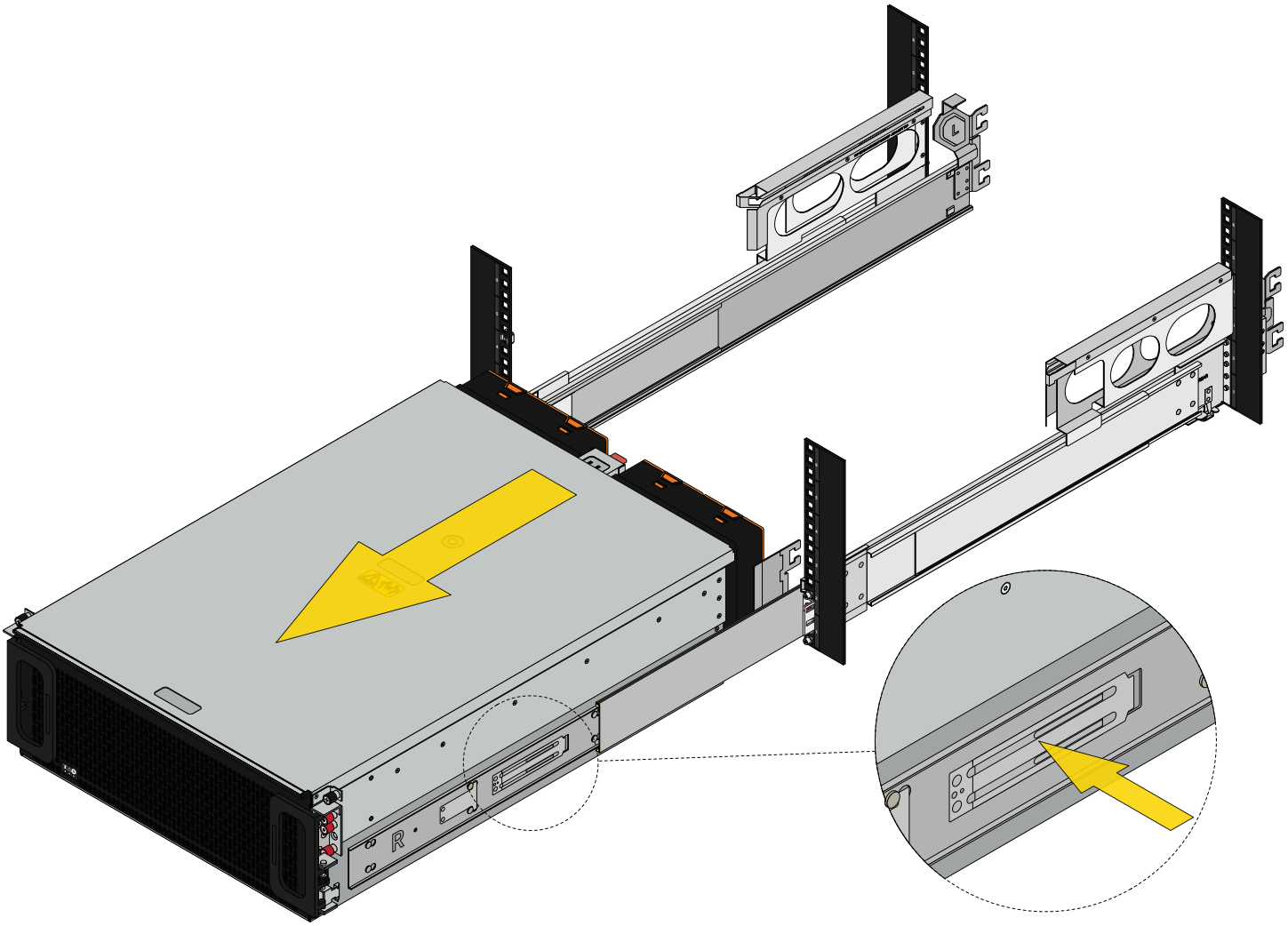
Loosen the black thumbscrews to release the cover from the rack.



## 8.6 Uninstall the System From the Rack

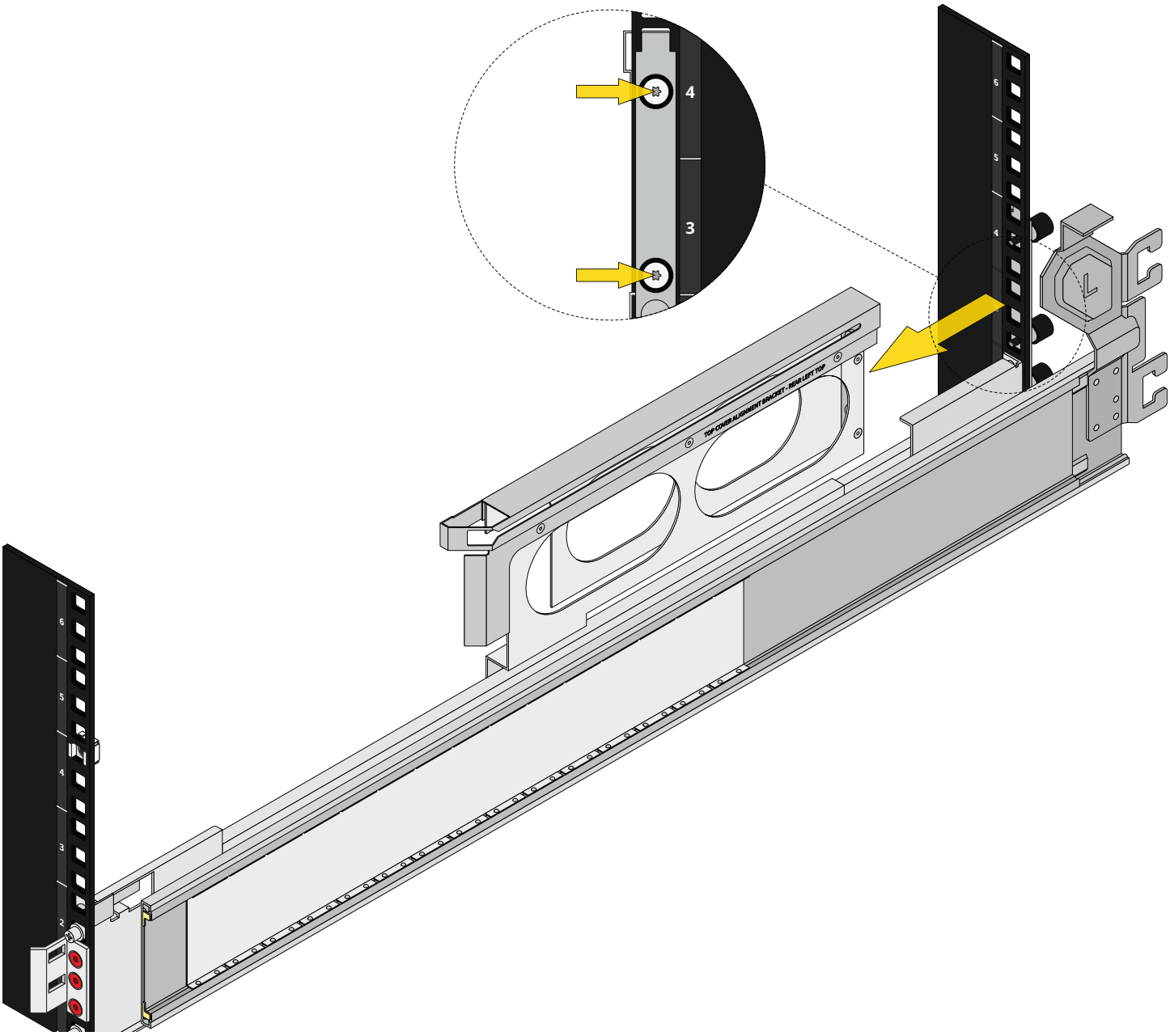
Pull the system out of the rack until the metal safeties click and lock.

Press the metal safety catches on each chassis rail against the chassis and team-lift the chassis out of the rack.



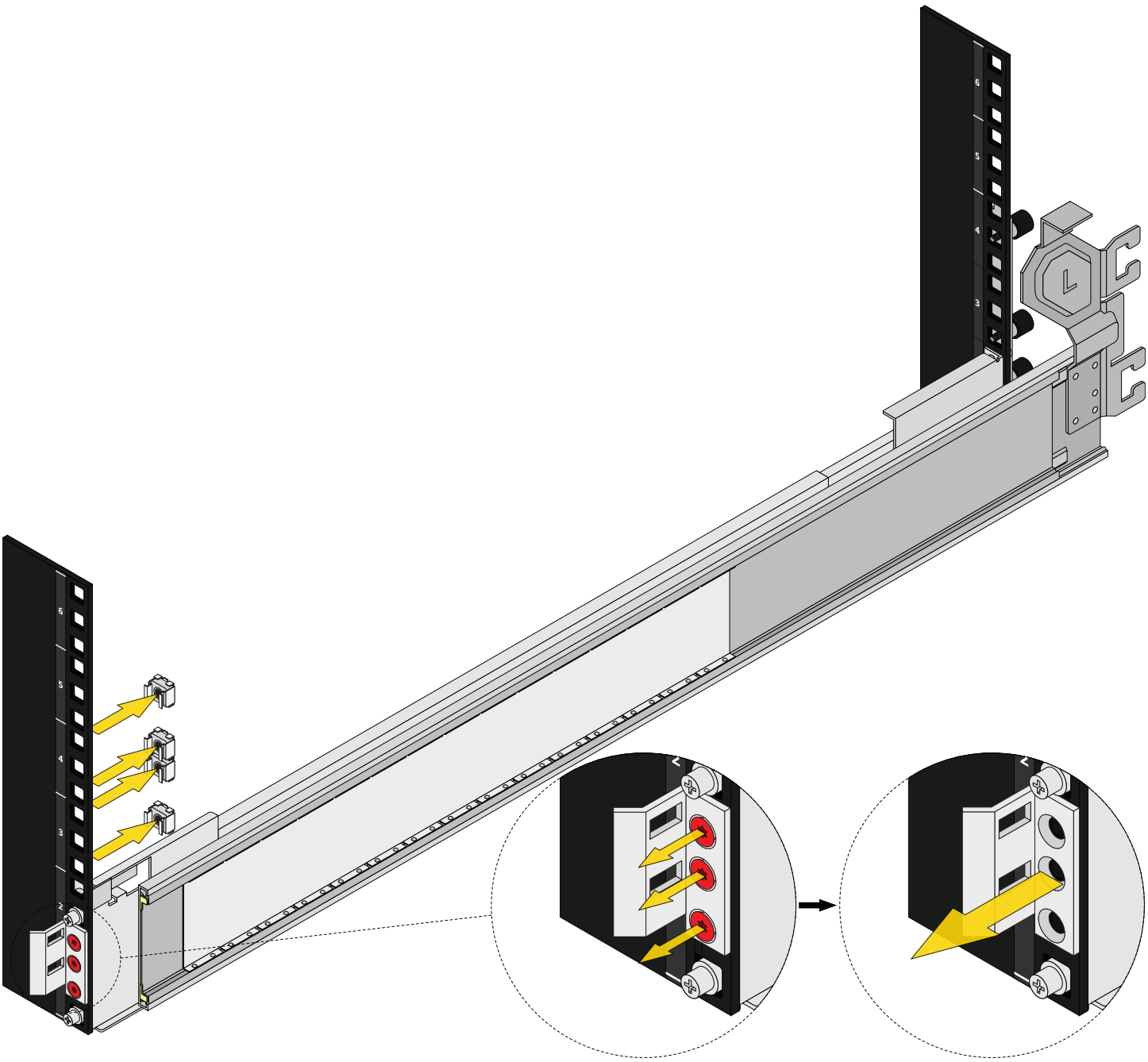
## 8.7 Remove Cover Retention Hardware

Loosen the two screwplate thumbscrews that secure the bracket to the rack rail, then remove the bracket.



Remove the three T15 M5 screws that secure the latch plates the rack, then remove the latch plates.

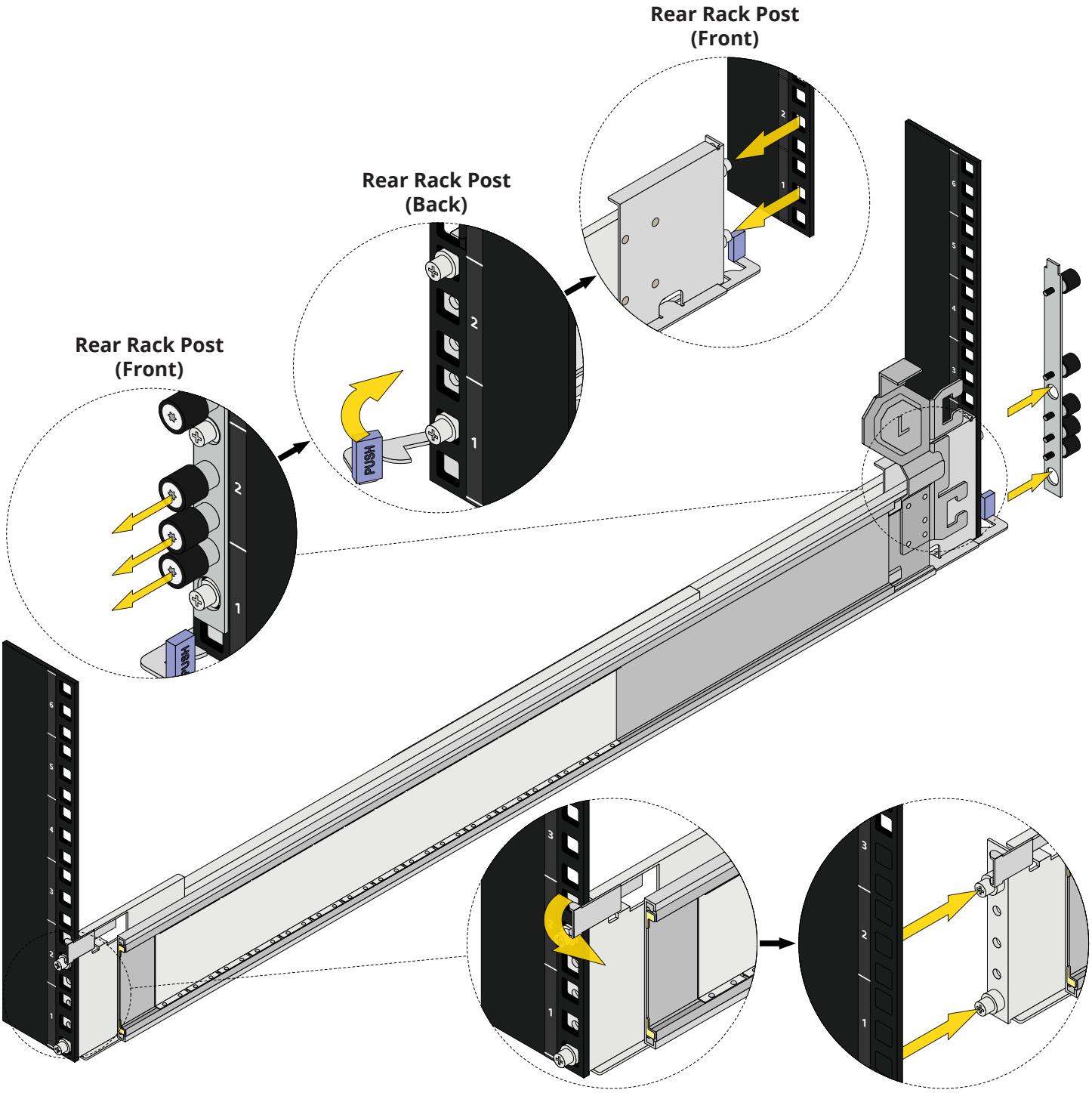
Remove the two (or eight if you used extra optional ones) M5 cage nuts from the from rack posts.



## 8.8 Remove the Rack Rails

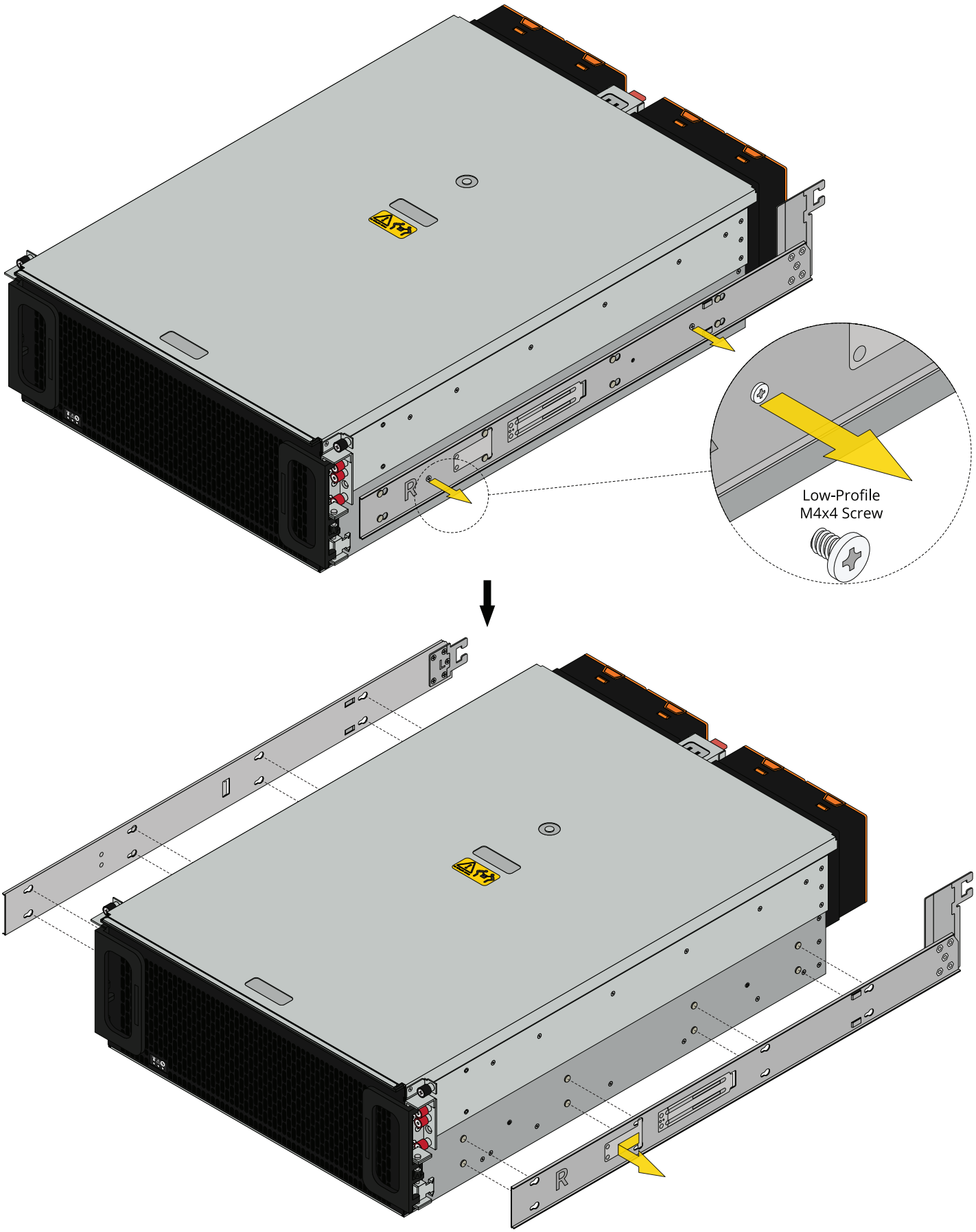
Remove the last three screwplate thumbscrews that secure the rear rail to the rack. Push the blue latch handle away from the rack post and pull the rail away from the rack.

At the front of the rack, push the rail latch plates away from the rack post, then pull the rail out of the rack.



## 8.9 Remove the Chassis Rails from the System

Remove the M4x4 screws that secure the rails to the chassis. Pull the chassis rail retention clips away from the chassis, then slide the chassis rails toward the front of the system until they are free of the mounting pegs.



# 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.

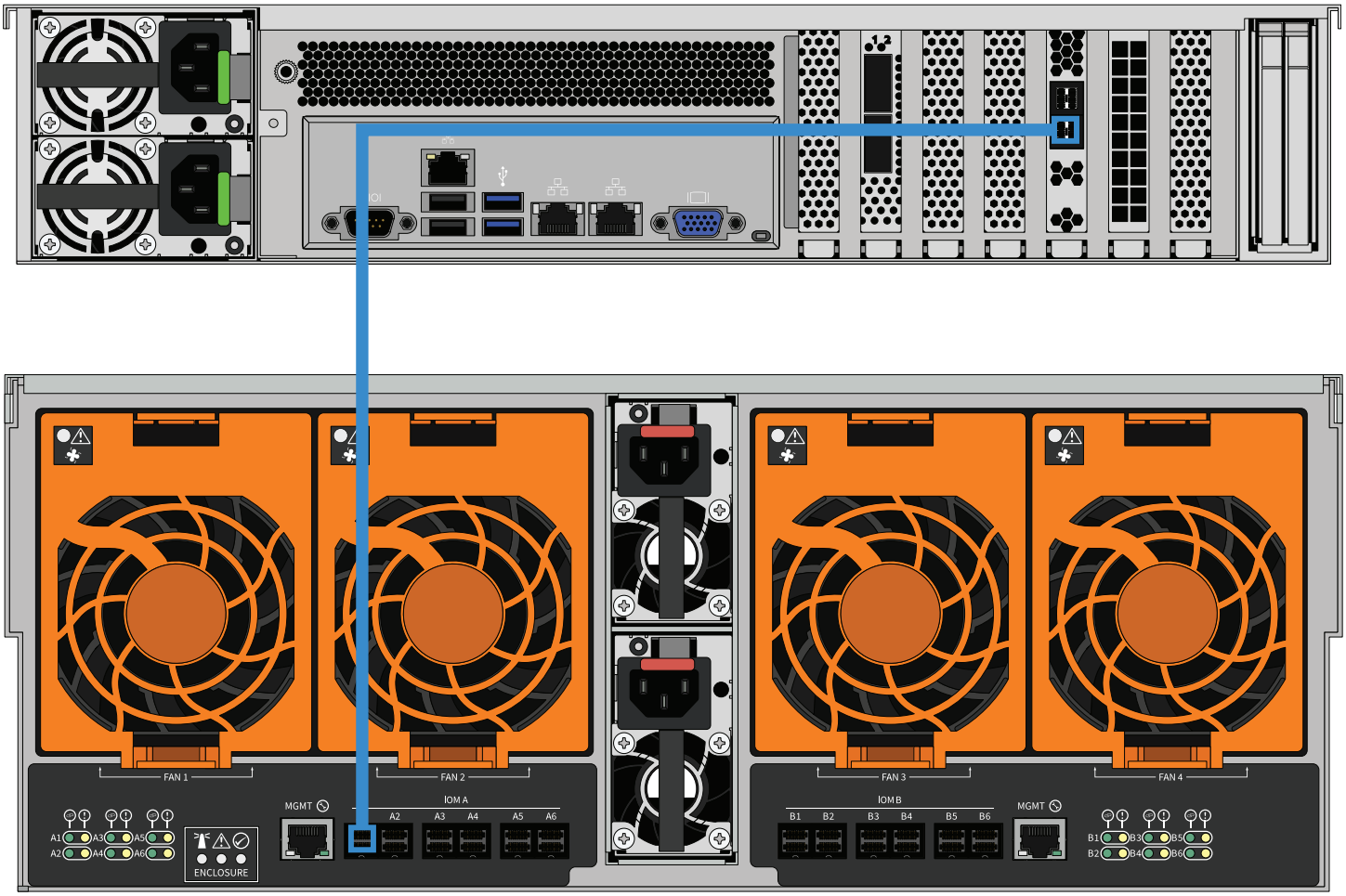
**⚠ Important - SAS Configuration**

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.

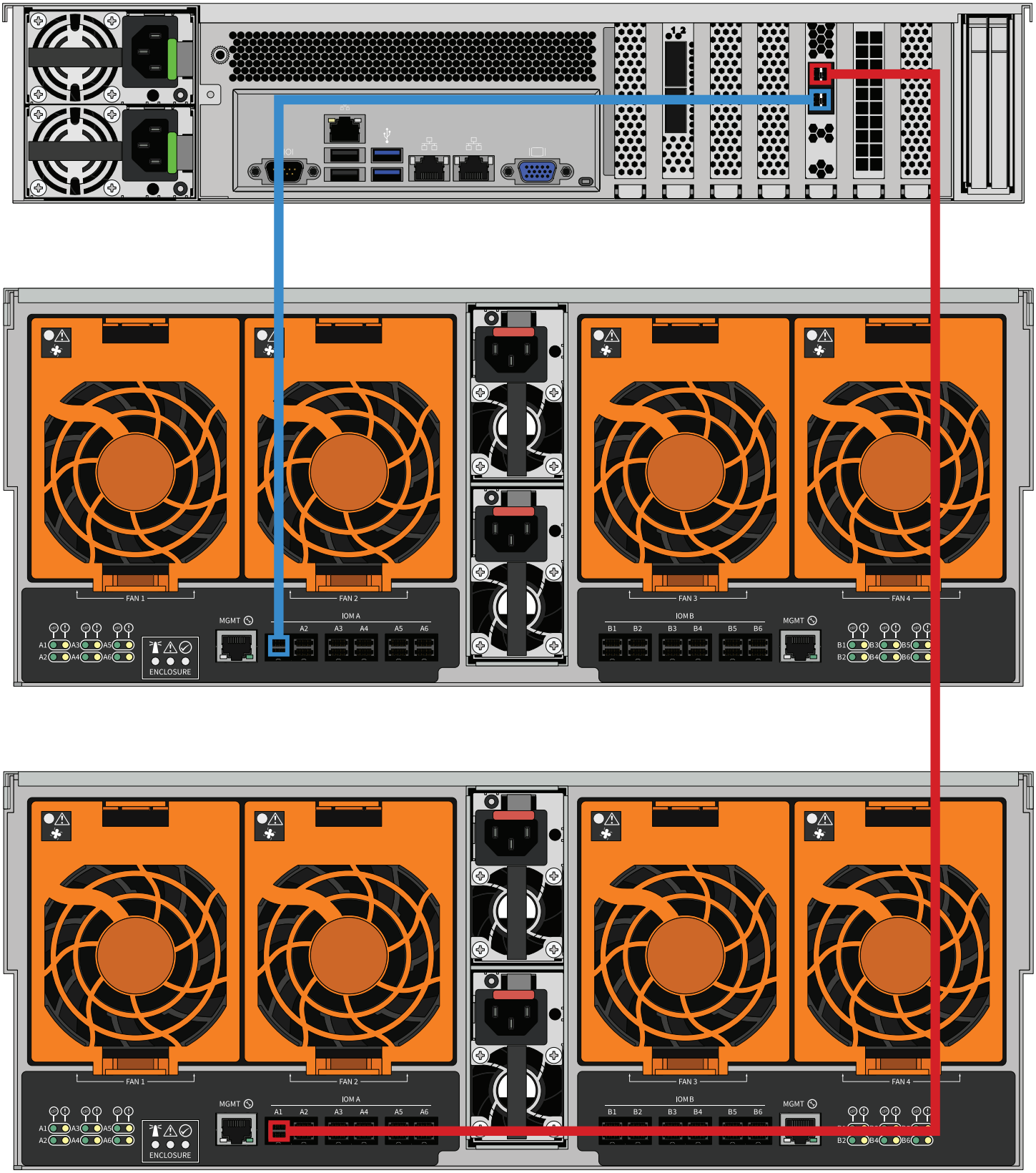
## 9.1 R-Series

### 9.1.1 R20

R20 with a single ES60 Gen 2 Expansion Shelf

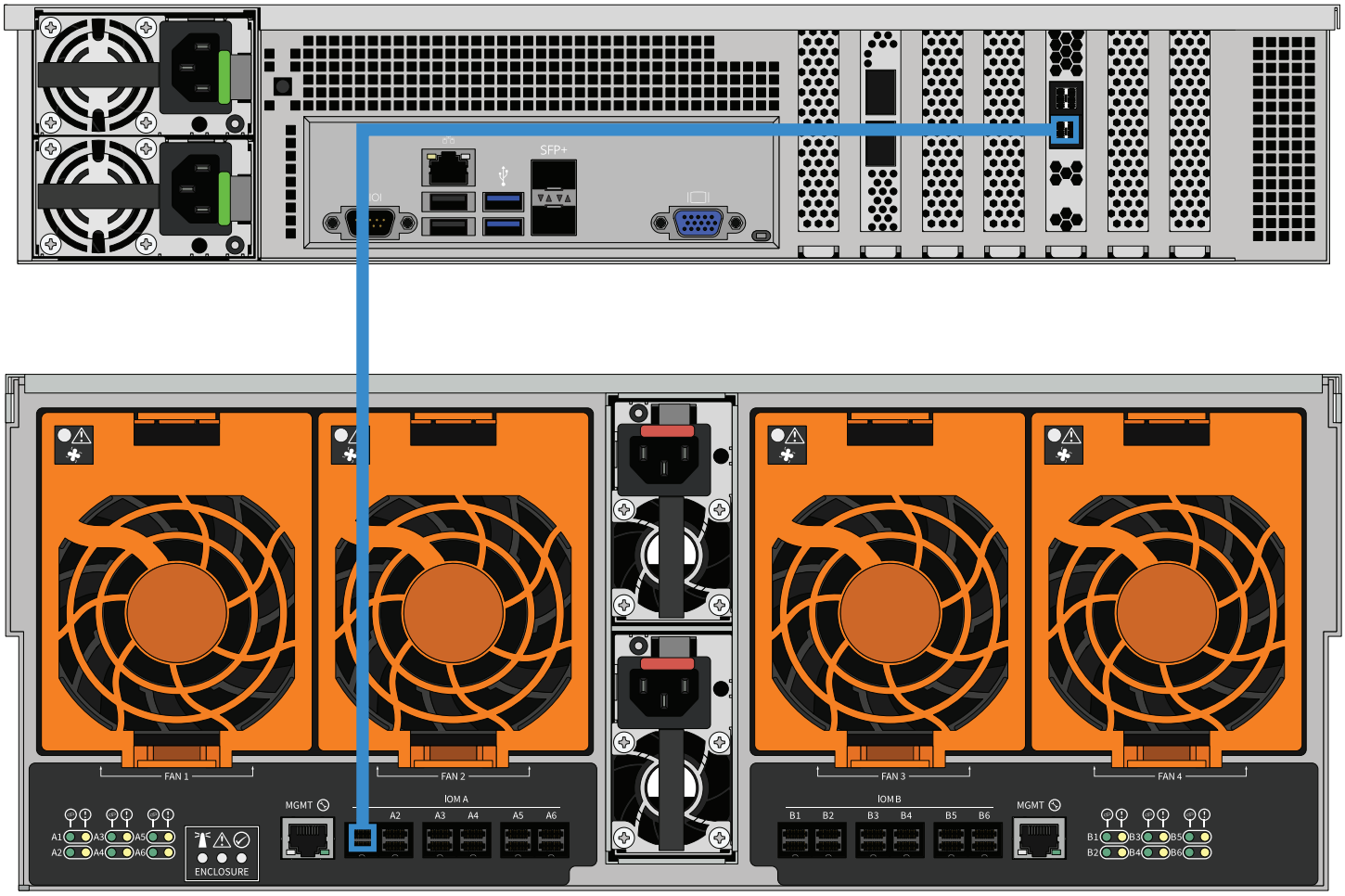


R20 with two ES60 Gen 2 Expansion Shelves

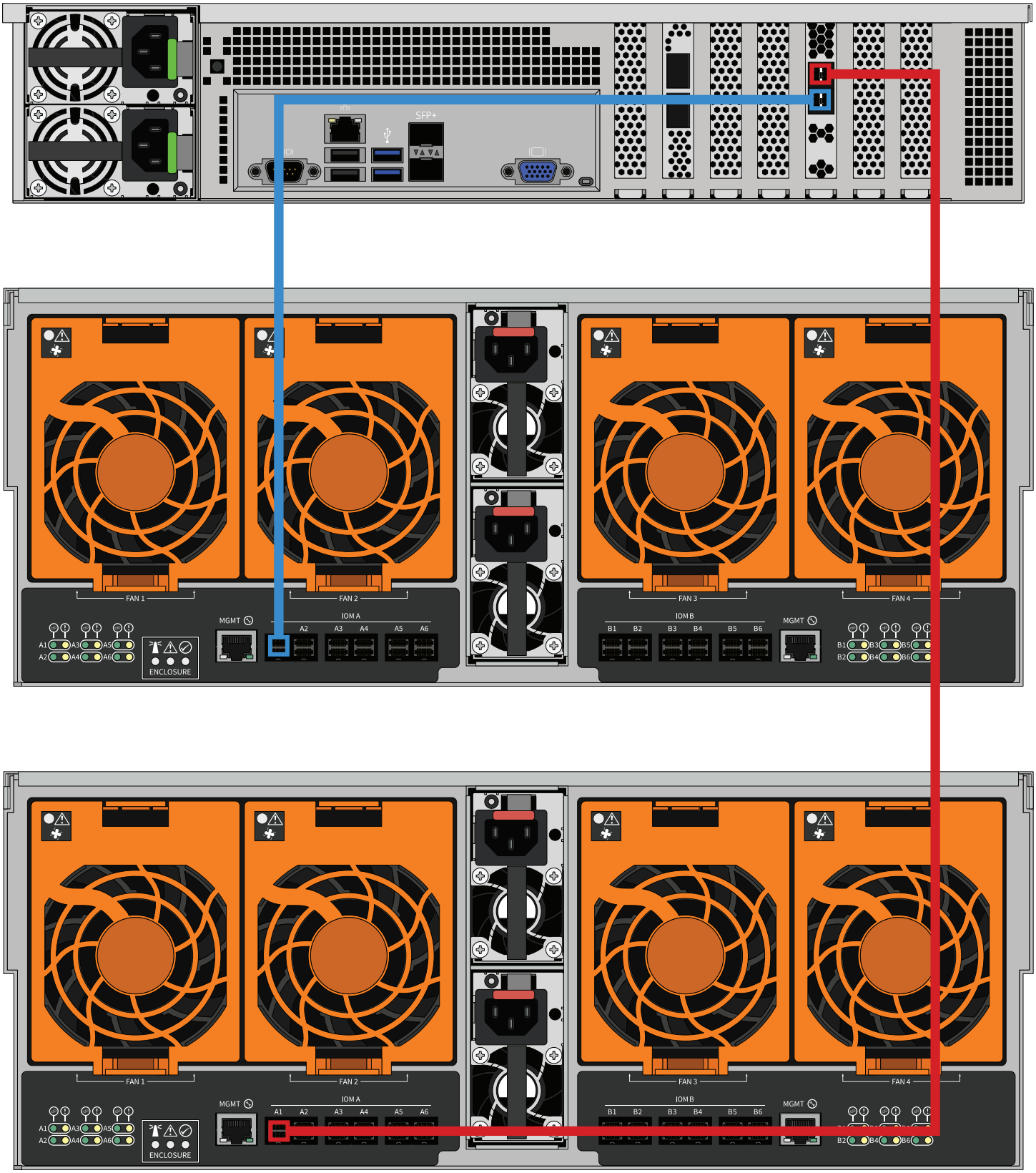


### 9.1.2 R40

R40 with two ES60 Gen 2 Expansion Shelves

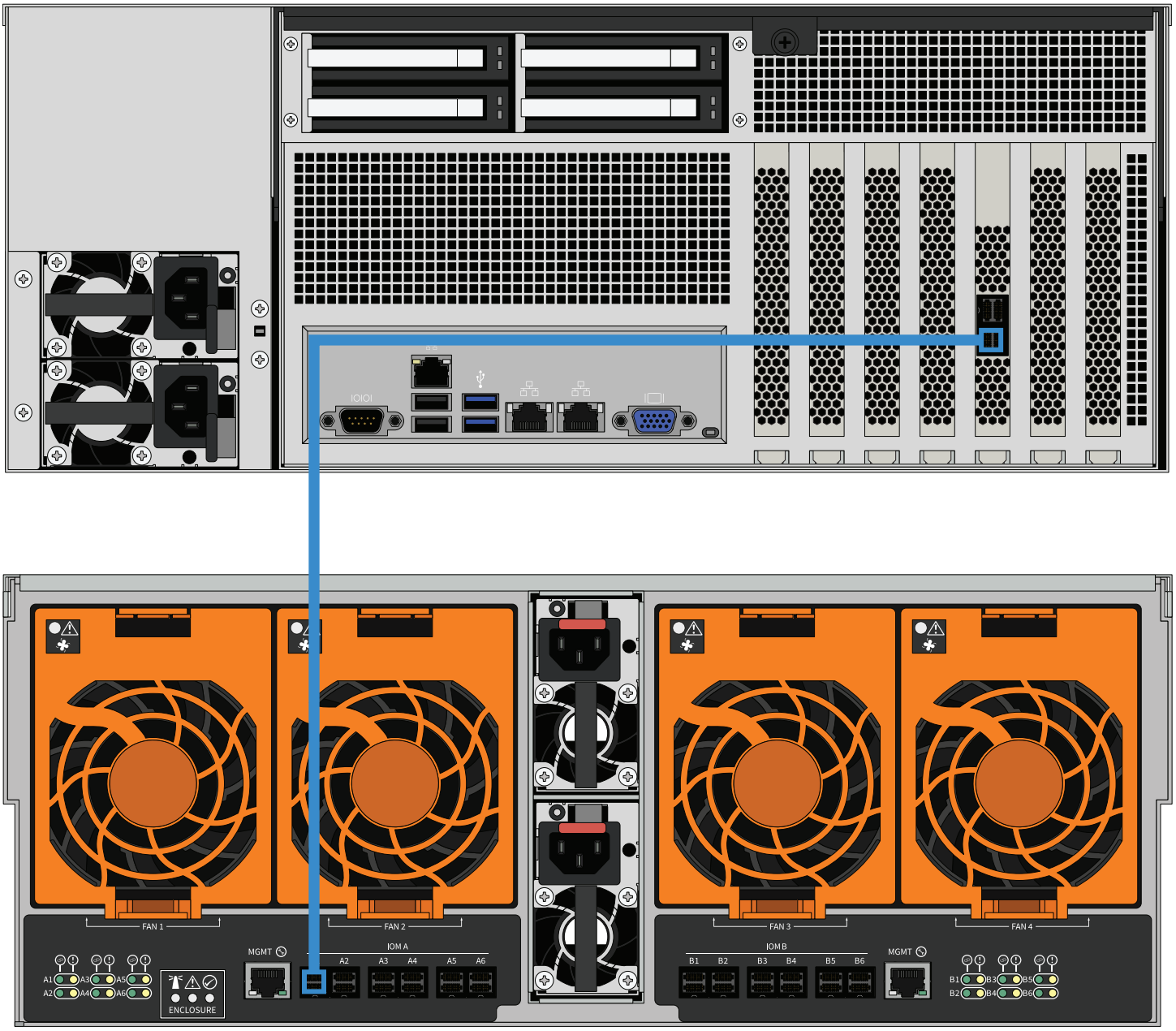


R40 with two ES60 Gen 2 Expansion Shelves

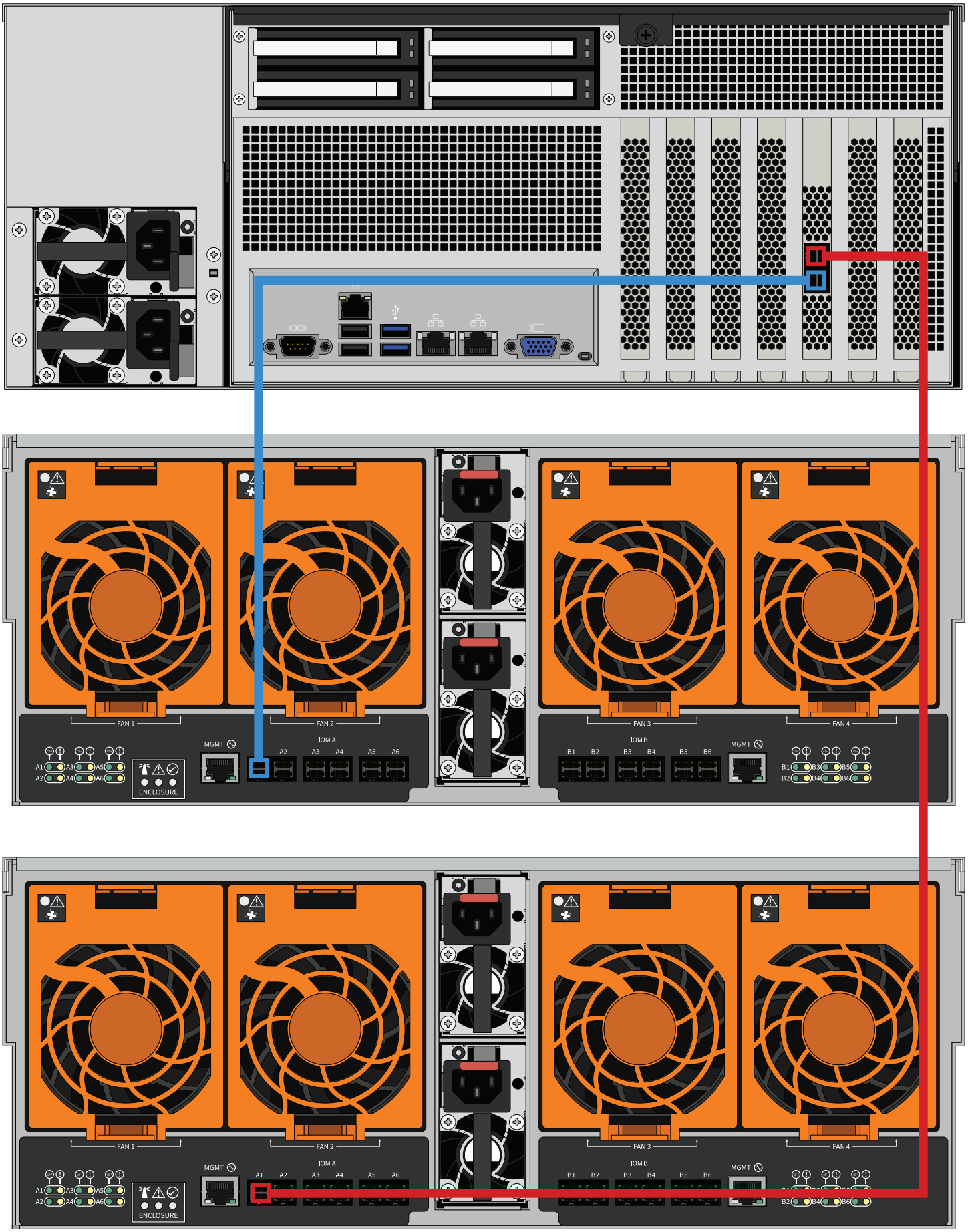


### 9.1.3 R50

R50 with one ES60 Gen 2 Expansion Shelf



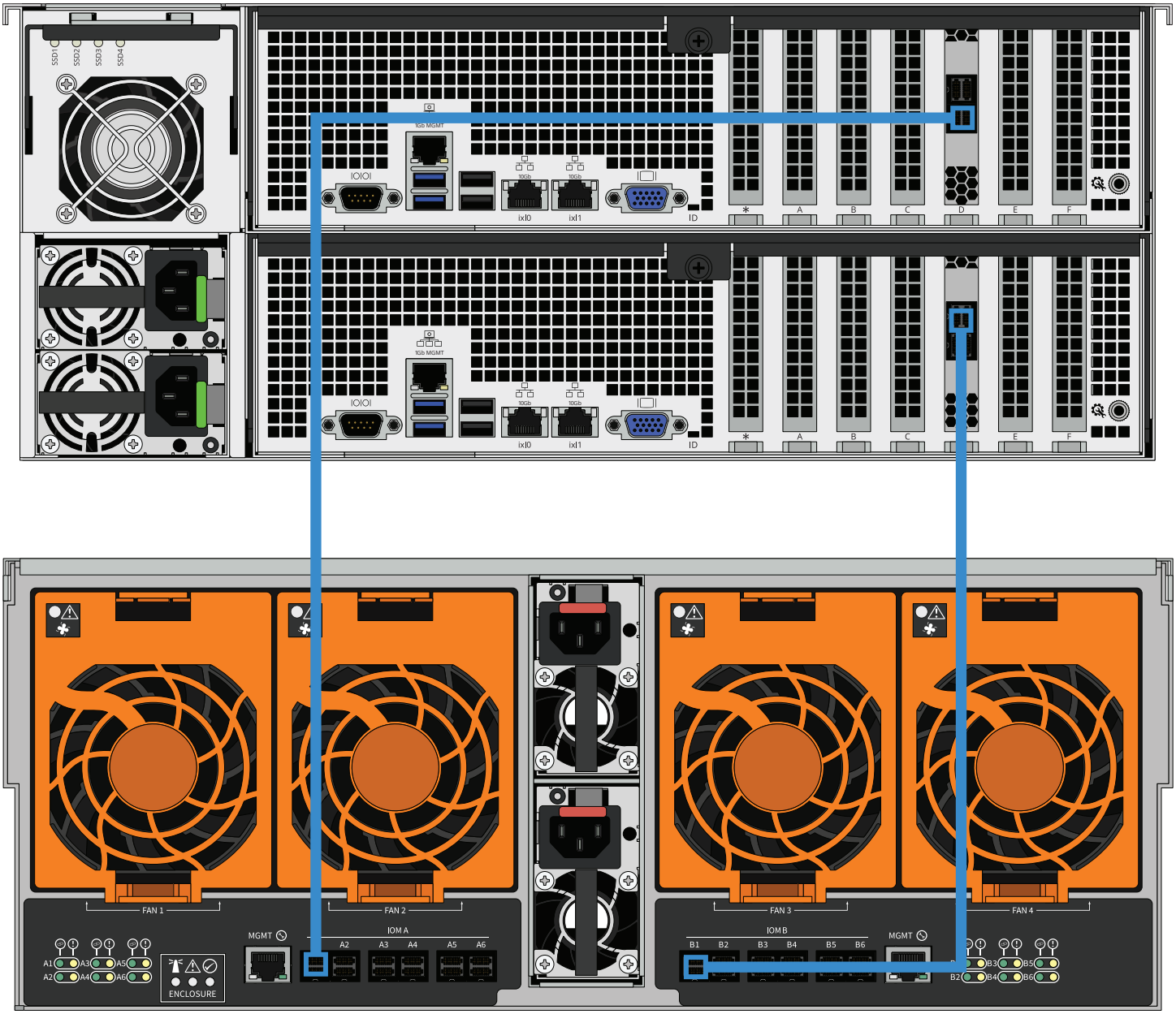
R50 with two ES60 Gen 2 Expansion Shelves



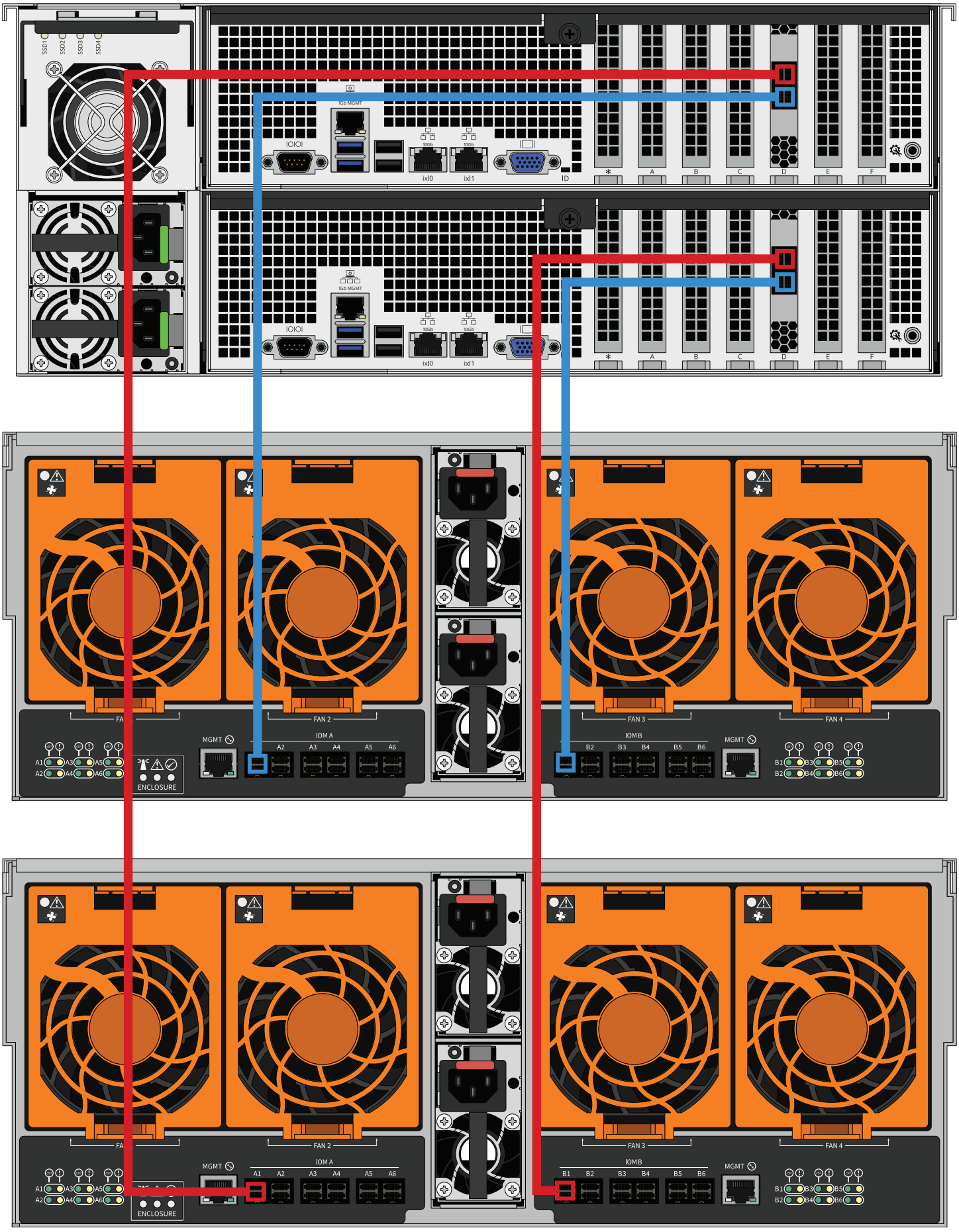
## 9.2 M-Series

### 9.2.1 M40

M40 with a single ES60 Gen 2 Expansion Shelf

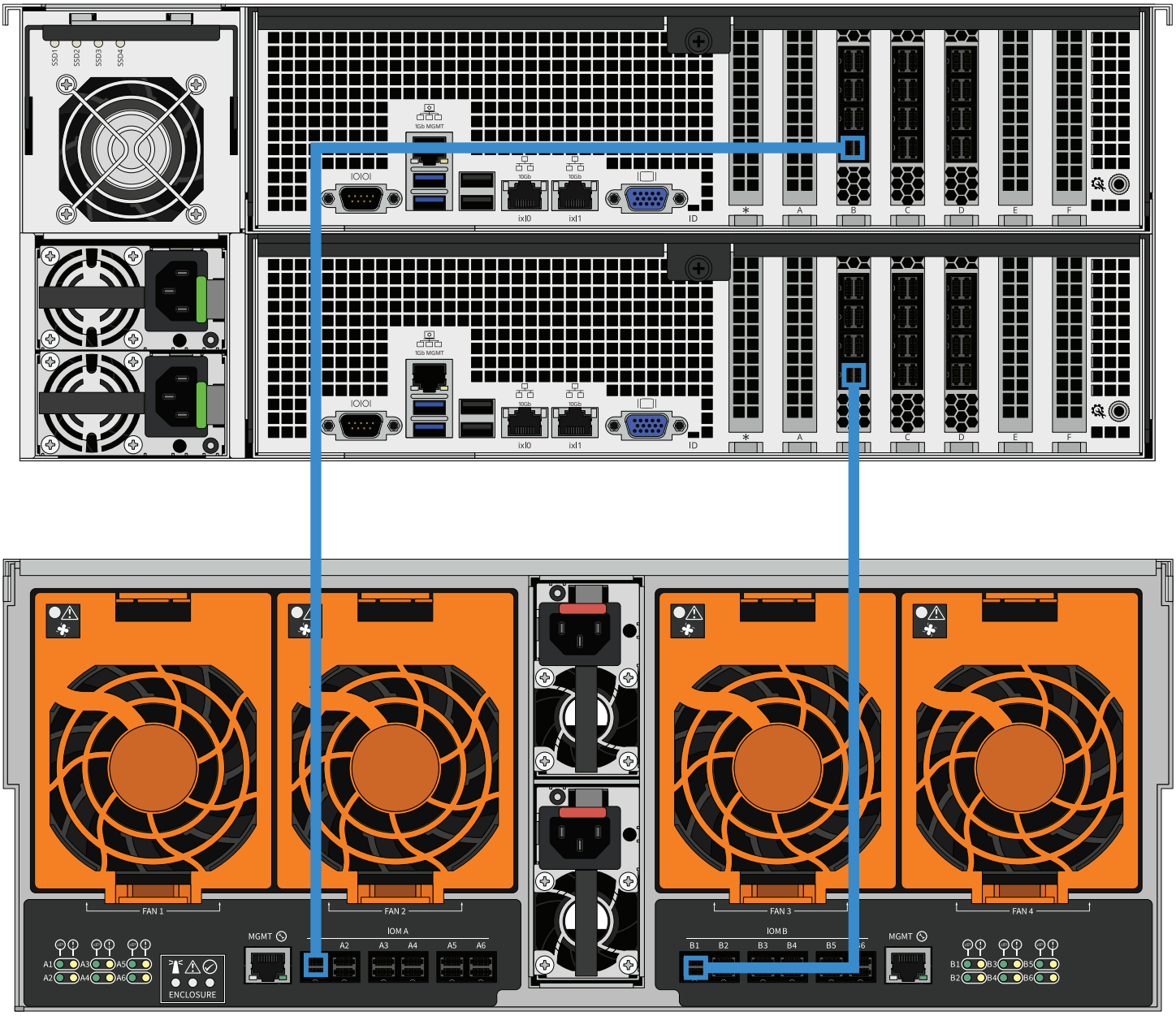


M40 with two ES60 Gen 2 Expansion Shelves

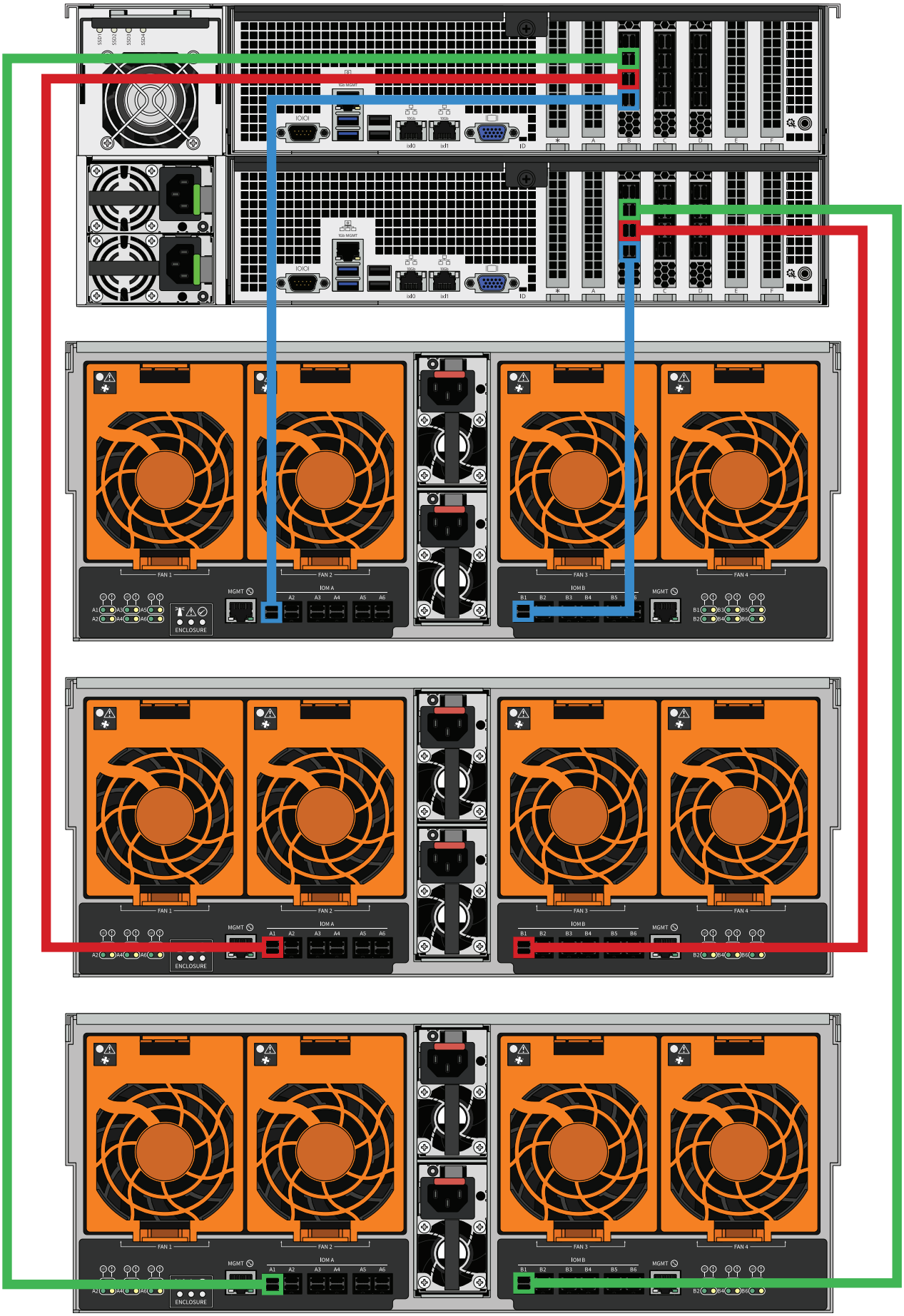


### 9.2.2 M50 and M60

M50/M60 with a single ES60 Gen 2 Expansion Shelf



M50/M60 with three ES60 Expansion Shelves.  The M50 can support up to 8 total Expansion Shelves with the use of additional SAS cards. The M60 can support up to 12 total Expansion Shelves with the use of 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:<br>• US-only toll-free: **1-855-473-7449** option 2<br>• Local and international: **1-408-943-4100** option 2 |
| Telephone | Telephone After Hours (24x7 Gold Level Support only):<br>• US-only toll-free: **1-855-499-5131**<br>• International: **1-408-878-3140** (International calling rates will apply) |
| Address | iXsystems, Inc. dba TrueNAS - 541 Division St, Campbell, CA 95008, USA |