

TrueNAS® ES102 Expansion Shelf Basic Setup Guide

Version 1.03



Contents

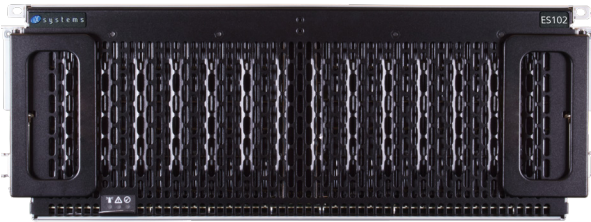
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1 Unpacking the Unit

TrueNAS units are carefully packed and shipped with trusted carriers to arrive in perfect condition. If there is any shipping damage or any parts are missing, please take photos and contact iXsystems Support immediately at support@ixsystems.com or 1-855-GREP4-iX (1-855-473-7449) or 1-408-943-4100.

Please locate and record the hardware serial numbers on the back of each chassis for quick reference. Carefully unpack the shipping boxes and locate these components:



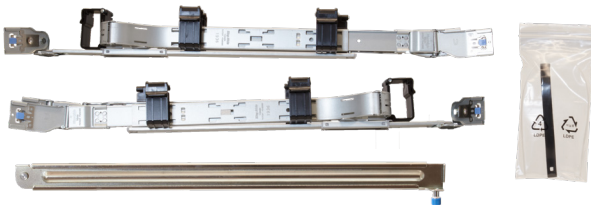
ES102 Expansion Shelf



Set of rackmount rails. The rails are stamped with indicators for the left, right, front, and back positions.



102 drive clips with installed hard drives, shipped separately.



Two Cable Management Arms (CMAs), a CMA brace, and bag with cable ties.



Left and right cover retention brackets.



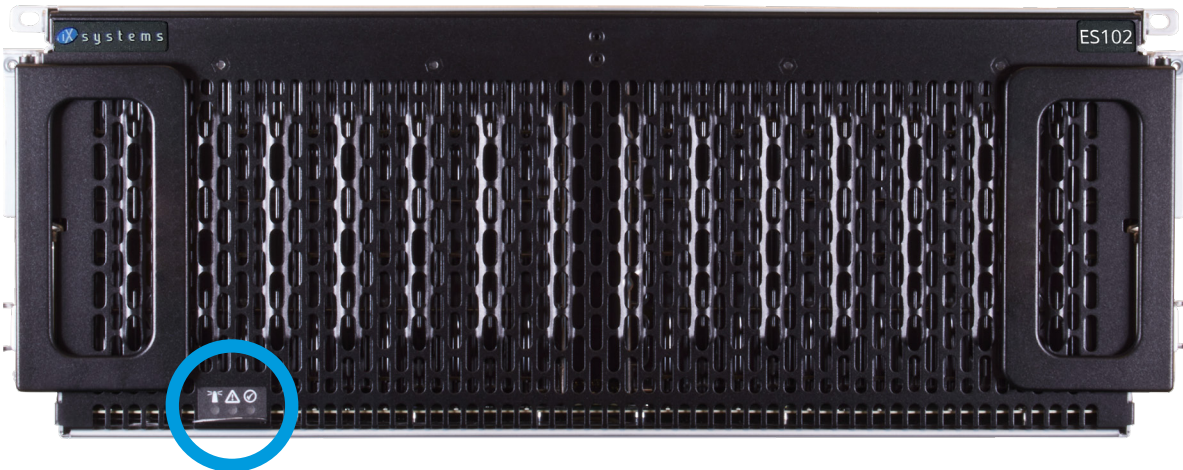
Two 3-meter Mini SAS HD to Mini SAS HD cables.



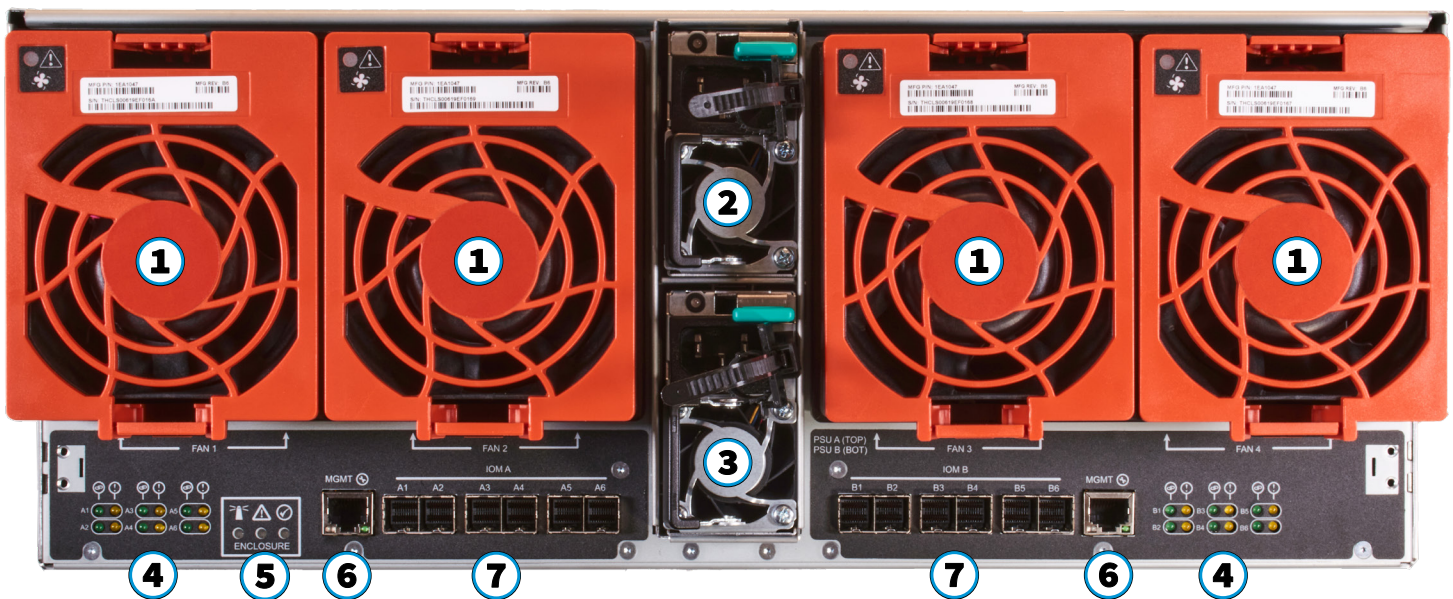
Components kit with two IEC C14 to C13 power cords, velcro strips, and rack mounting hardware.

1.2 Become Familiar with the ES102

Indicators on the front panel show identification and status. The fault indicator is on during the initial power-on self-test (POST) or when the TrueNAS software has issued an alert. These indicators are duplicated on the back panel.



The ES102 has two expansion controllers in a side-by-side configuration.



- Enclosure Fans (1)
- First Power Supply (2)
- Second Power Supply (3)
- SAS Connection Indicators (4)
- Enclosure Indicators (5)
- Controller Management Port (not used) (6)
- HD Mini SAS3 connectors (7)

2 Prerequisites

There are additional considerations and some preparation required before installing the ES102 into a rack.

2.1 Safety

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

2.1.1 Static Discharge

Static electricity can build up in your body and discharge when touching conductive materials. Electrostatic Discharge (ESD) is very harmful to sensitive electronic devices and components. Keep these safety recommendations in mind before opening the system case or handling system components:

1. Turn off the system and remove the power cable before opening the system case or touching any internal components.
2. Place the system on a clean, hard work surface like a wooden tabletop. Using an ESD dissipative mat can also help protect the internal components.
3. Touch the metal chassis with your bare hand before touching any internal component, including components not yet installed in the system. This redirects static electricity in your body away from the sensitive internal components. Using an anti-static wristband and grounding cable is another option.
4. Store all system components in anti-static bags.

More details about ESD and preventative tips can be found at <https://www.wikihow.com/Ground-Yourself-to-Avoid-Destroying-a-Computer-with-Electrostatic-Discharge>

2.1.2 Enclosure Size

The ES102 weighs 70 lbs unloaded and requires a minimum of **two** people to lift.

Do not attempt to lift the ES102 when it is fully populated with drives! The total weight of a fully-populated system is over 260 lbs. When removing a fully-populated system from a rack, remove the drives before de-racking the enclosure.

You will need at least 37.5" (952.5mm) empty space in front of a racked ES102 to fully extend the enclosure to access all drive bays. Due to the weight of the enclosure, this can be a tipping hazard for the rack. Be sure to follow all tipping prevention instructions recommended by your rack provider before installing the ES102.

2.2 Tools

These tools are needed to properly install the ES102 in a compatible rack:
Long T15 screwdriver and a #2 Philips head screwdriver.

These items are not required, but can be useful when installing the ES102:
Tape measure, level, flat head screwdriver, and cable ties.

2.3 Rack Requirements

At minimum, the ES102 requires 4U of space in a EIA-310 compliant rack that is 47.24" (1200mm) deep, from frame to frame. The vertical rack rails need to be spaced between 31.5" - 36.2" (800mm - 920mm) apart to properly install the ES102 rails. It is recommended to adjust the front vertical rack rails to be as close to the front of the rack as possible to prevent the cable management arms (CMAs) from protruding from the back of the rack. The system with CMAs attached is 47.1 (1197mm) deep.

The rack must be a standard 17.72" - 18.31" (450mm - 465mm) wide, although a minimum 29.5" (750mm) cabinet width allows for using a zeroU PDU with the enclosure. Narrower cabinets could require a rack-mounted PDU to properly allow the enclosure to be fully installed into the rack and properly cabled with the included Cable Management Arms.

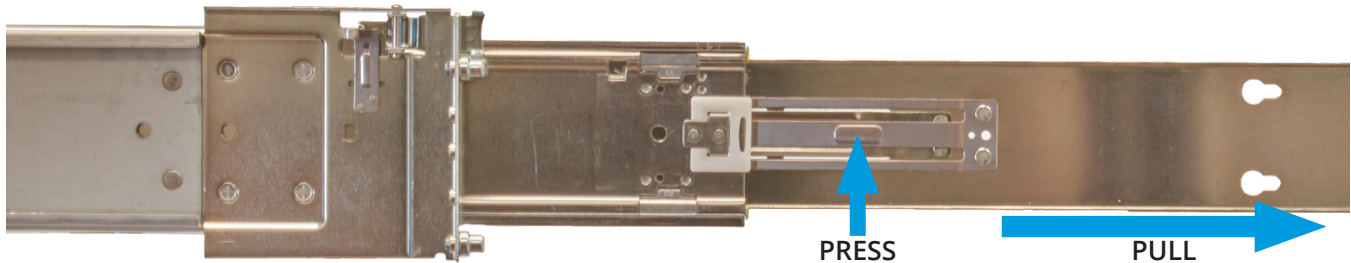
For 52U racks, iXsystems recommends the AR3357X674. In a 42U rack, iXsystems recommends the AR3350 APC. It is recommended to use the lowest 4U of available space in the rack to better balance the weight of the system with other equipment installed in that rack.

3 ES102 Rail Installation Procedures

There are several steps to installing the rails on both the ES102 and inside the rack. The chassis rails need to be separated from the larger rack rails and installed on the ES102. Then, the rack rails need to be fitted inside the rack. Additional components for securing the ES102 drive cover and latching the unit in the rack are also installed before the ES102 can be reattached to the rack rails and installed in the rack.

3.1 Enclosure Rails

Each rack rail includes an inner chassis rail that must be removed. Extend the innermost rail as shown below until it clicks into place and the metal safety catch is fully exposed. Push the safety catch in and continue to pull out the innermost rail until it is completely free from the rack rail. Repeat the process for the second rail.



The chassis rails are attached to each side of the ES102. Align the chassis rail keyholes with the posts on the side of the ES102. Slide the rail towards the rear of the system until the metal tab clicks and locks the rail in place. Use **three** of the included low-profile M4 Philips screws to secure the rail to the ES102. Repeat this process on the other side. The Cable Management Arm attach point will be at the *back* of the system.

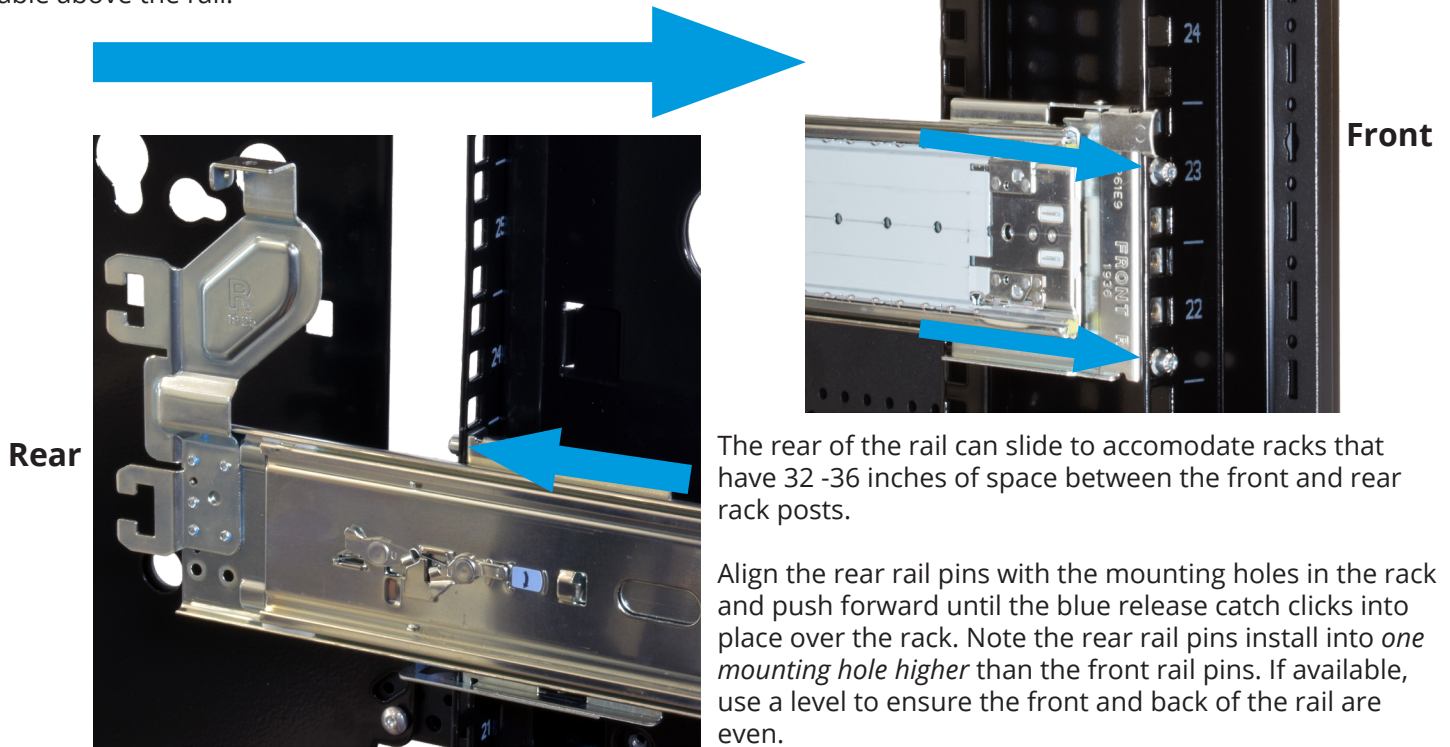


3.2 Rack Rails

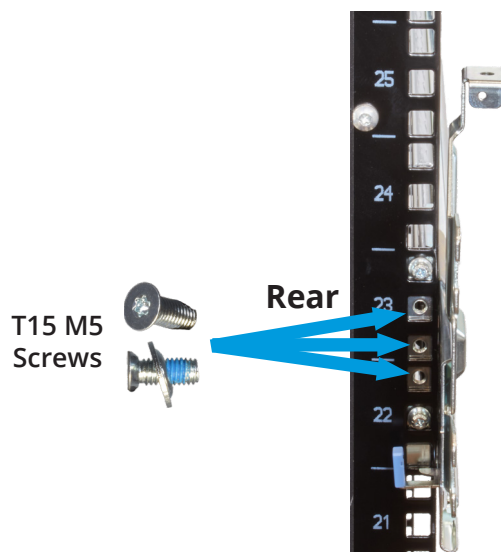
The ES102 occupies 4U of rack space. The *front* rail pins are mounted to the bottom-most attach points of this 4U and *back* rail pins are mounted to one space above the bottom-most attach points of the 4U. The rails are stamped for left side (L) and right side (R) of the rack, according to your perspective when facing the rack.

Install the front of the rail first. Align the rail pins with the mounting holes in the rack and push forward until the front latch clicks into place on the rack.

Double check that an additional 2U of rack space is available above the rail.



Use **three** of the included washers and T15 M5 screws to secure the rear of the rail to the rack post.



When installed correctly, the front and rear of the rail will be level and the inner part of the rail with the gray bearing sleeve is facing the *inside* of the rack. Use the same procedure to install the other rail, but make sure both left and right rails are installed at the same height mounting holes in each rack post.

4 Cover Retention

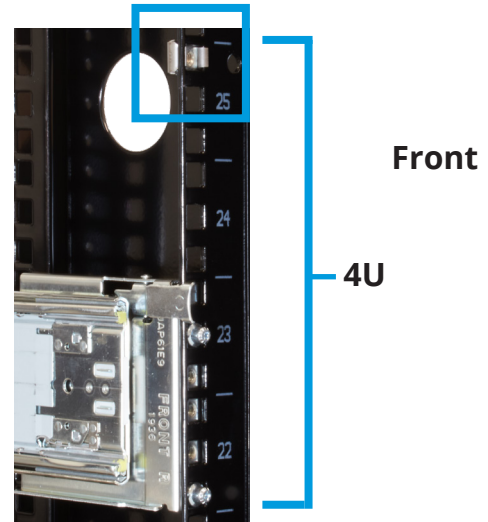
Installing the cover retention components allows for holding the cover in place when the unit is slid forward out of the rack, greatly simplifying drive bay access. This requires installing alignment brackets over the rear of the rack rails and cage nuts at the front of the system for the included cover retention screws.

4.1 Attach Cage Nuts

You will need **two** of the included square cage nuts.

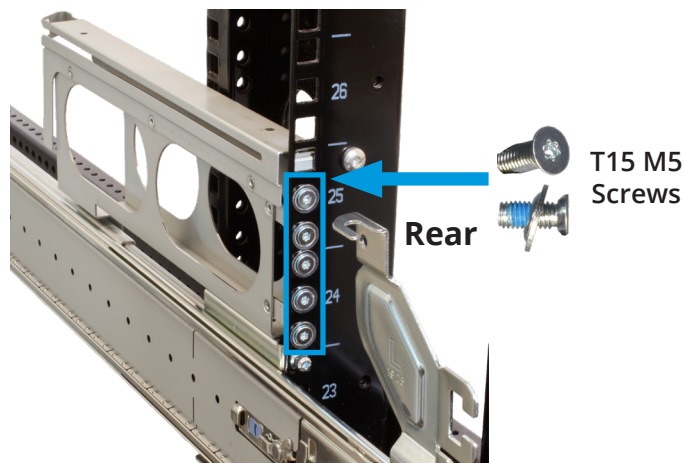
Take a cage nut and add it to the topmost rack mounting hole of the required 4U of space. A flat head screwdriver can be helpful to push the cage nut “wings” into the rack mounting hole.

The nut will be **inside** the rack, with the attach “wings” touching **the left and right sides of the hole (horizontal)**. Repeat this process for the other rack post and make sure both cage nuts are installed parallel rack mounting holes.



4.2 Install Alignment Brackets

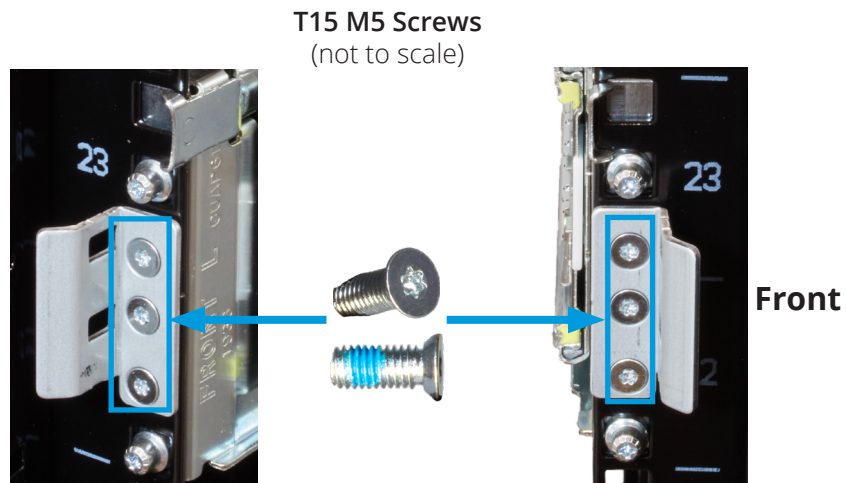
Place the included Cover Alignment Bracket over the rail and align it with the mounting holes on the *rear* of the rack rail. The groove in the bracket must be pointed toward the *inside* of the rack. Use five washers and T15 M5 screws to secure the bracket to the *rear* of the rack rail.



Use the same procedure to install the second alignment bracket to the other rail. Make sure that the grooves on the top of both brackets are pointed inside the rack. The ES102 cover will slide into these grooves when it is pushed into the rack.

5 Latch Plates

The latch plates are used to hold the enclosure in place when it is fully inserted into the rack. They attach to the *front* of the rack rails and also help secure the rails to the rack. Align the plate over the three holds between the rack rail front mounting pins. The flange must be pointed to the *outside* of the rack. Use three T15 M5 screws to secure the latch plate, rack post, and rack rails together.

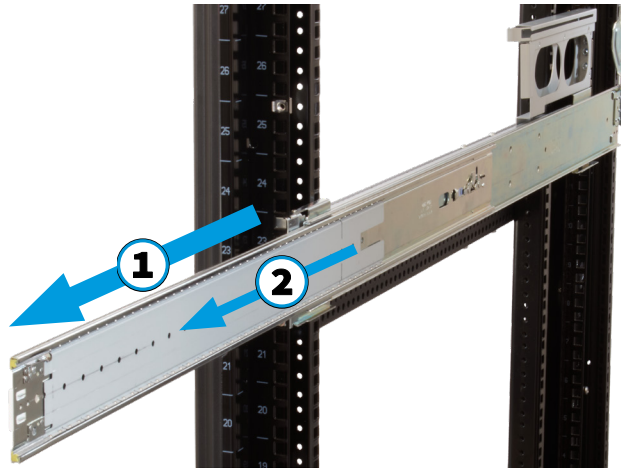


Use the same procedure to install the second plate on the front of the other rail. Make sure that both flanges on the latch plates are pointed to the *outside* of the rack.

6 Mount the Unit in the Rack

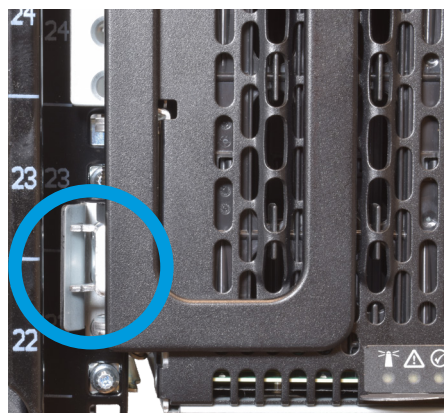
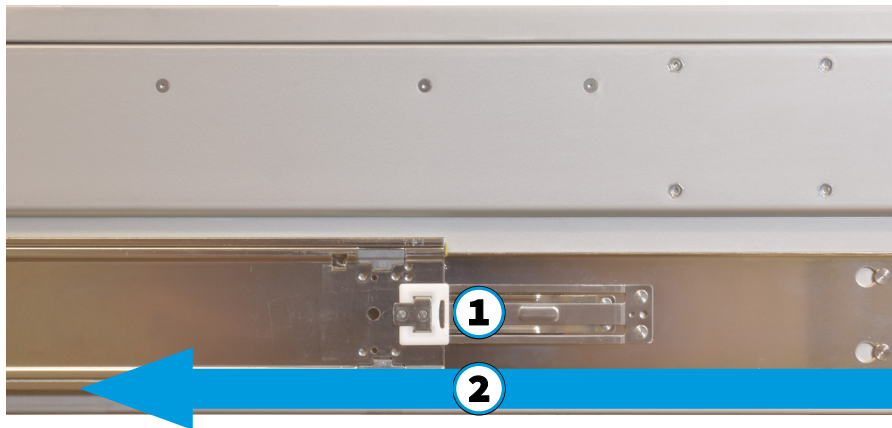
Caution: When using a lift to install the system, **two people and 7ft** of clearance between the system front and rack is required. When lifting unaided, **three people and 5ft** of clearance is required to safely lift and install the chassis. Do not install drives until after the chassis has been installed in the rack, and remove all drives before removing the chassis from the rack.

Slide the middle part of the rack rails out of the rack until they click into place (1). Make sure the inner bearing sleeve is also slid as far forward as possible (2).

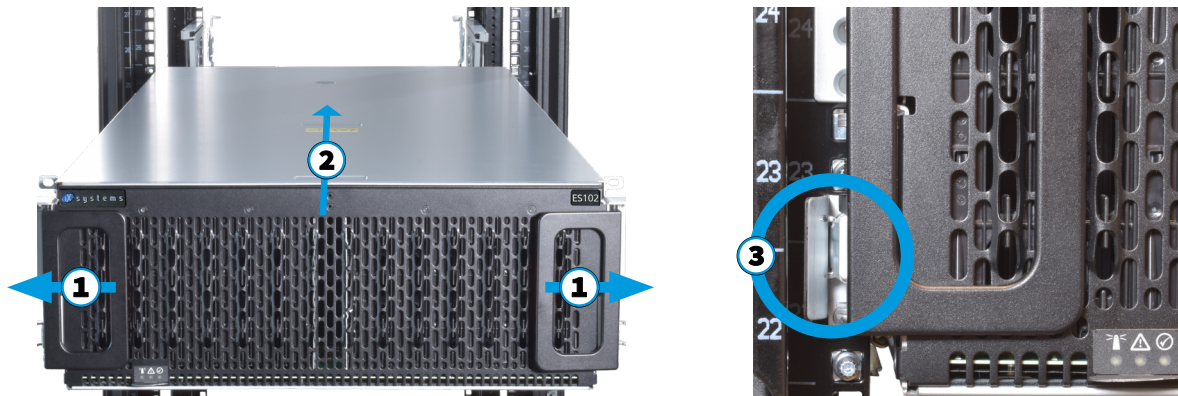


Caution: Do not use the front handles to lift the ES102! These handles are only intended for unlatching and sliding the enclosure after it has been attached to the rack rails. They cannot support the weight of the system. Lift the ES102, align the attached cabinet rails with the middle rack rails, and push the ES102 into the rack rails until it stops.

Locate the metal safety catches on each chassis rail and squeeze them into the chassis (1). Holding the safety catches in place, push the chassis into the rack (2) until the chassis latches are touching the rail latch plates.

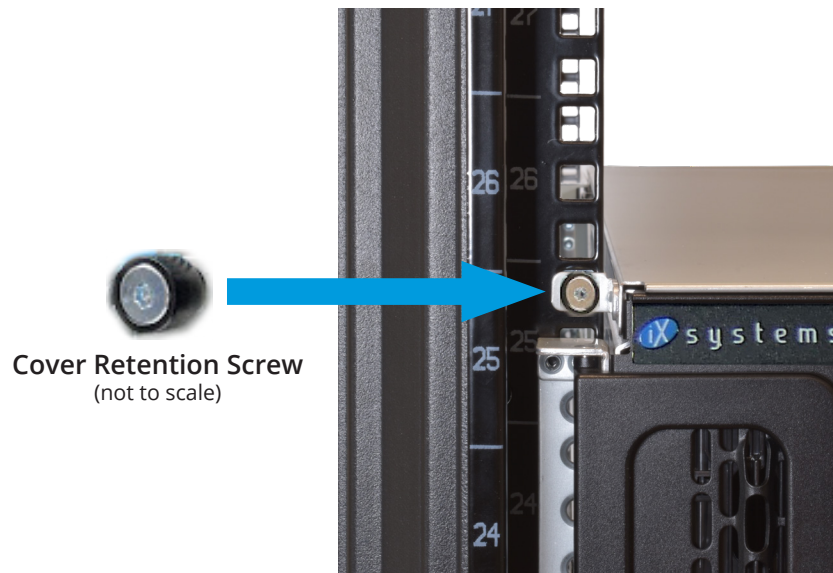


Make sure the enclosure cover slides into the Alignment Bracket grooves at the rear of the rack. To minimize any jarring motions, softly secure the enclosure in place by swinging the front handles out (1) and gently pushing the enclosure forward until it is fully in the rack (2). When the handles are released, the enclosure latches will catch behind the latch plates and hold the system in the rack (3).



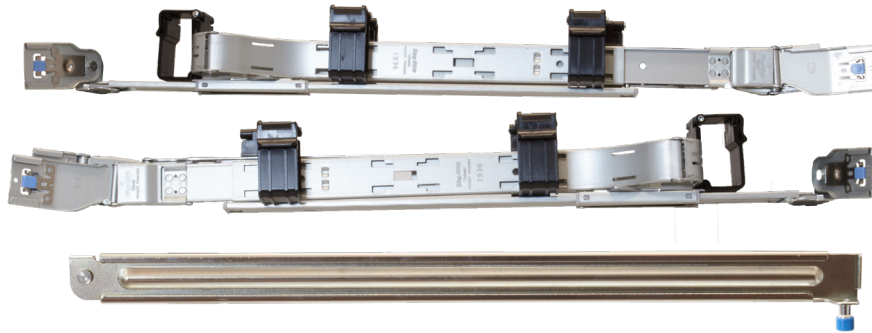
6.1 Attach Cover Retention Screws

To hold the ES102 cover in place when the system is slid out of the rack, attach the **two** included Philips head retention screws through the *left* and *right* cover retention holes and into the installed cage nuts. Make sure both screws are tight enough to securely hold the cover in place.



7 ES102 Cable Management Arms

The included Cable Management Arms (CMA) are required to ensure the ES102 remains properly cabled while being slid out of the rack. There are two CMAs included with the ES102, installed on the rear of the enclosure in an Upper (U) and Lower (L) configuration. There is also a brace included to help stabilize the CMAs and rails together.



7.1 Attach Cable Management Brace

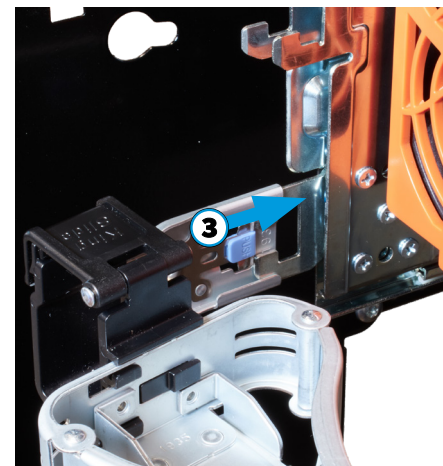
At the back of the system, insert the brace pivot pin into the top bracket on the *right* rail (1). Align the brace with the top bracket on the left rail (2) and tighten the thumbscrew until the brace is firmly in place (3).



7.2 Install Lower Cable Management Arm

You will need the CMA stamped Lower (L) for this procedure.

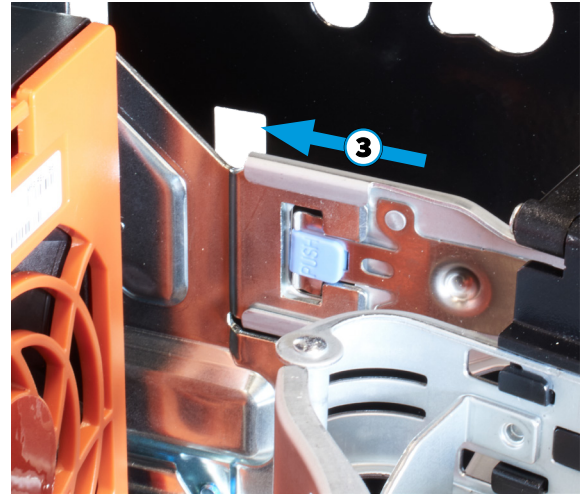
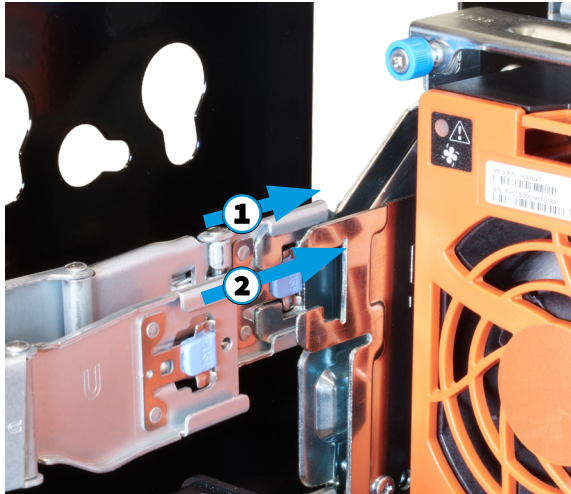
There are three attach points for the lower CMA, two on the *right* rail and one on the *left*. Beginning with the *right* side, insert the outermost connection post into the outer bracket until it clicks into place (1). Now align and insert the inner post into the innermost bracket (2). Swing the back of the CMA to the *left* rail and insert the post into the *left* bracket until it clicks into place (3).



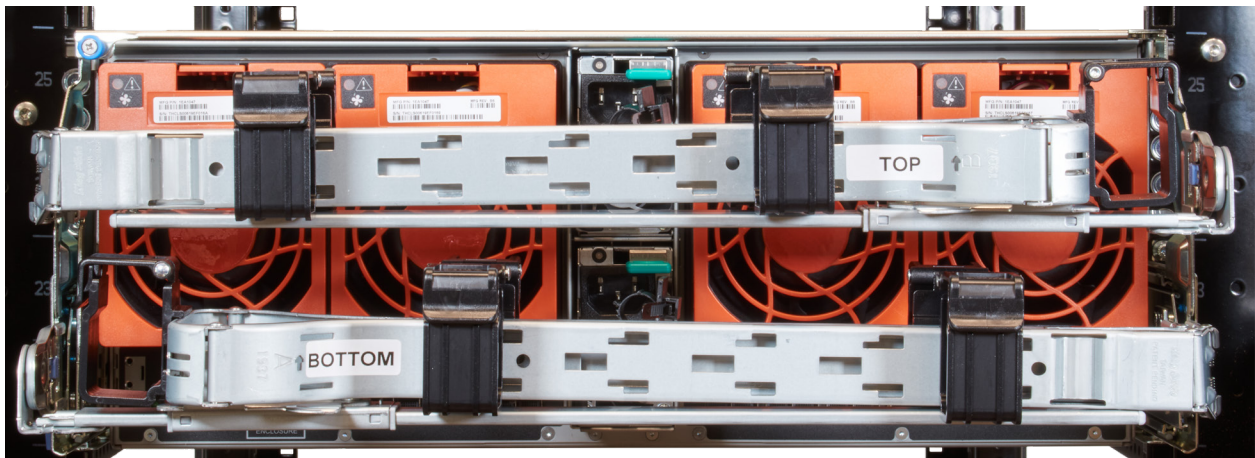
7.3 Install Upper Cable Management Arm

You will need the CMA stamped Upper (U) for this procedure.

There are three attach points for the upper CMA, two on the *left* rail and one on the *right*. Beginning with the *left* side, insert the outermost connection power into the outer bracket until it clicks into place (1). Now align and insert the inner post into the innermost bracket (2). Swing the back of the CMA to the *right* rail and insert the post into the *right* bracket until it clicks into place (3).



Here is how the back of the system should appear when both CMAs are properly installed:



Before installing any drives in the ES102 or routing any cables through the CMAs, test the installation by unlatching the enclosure and sliding it all the way forward until it clicks into place. The CMAs will fully extend behind the ES102 and the cover will remain in place, exposing the drive and component bay.

If you feel any grinding or the enclosure unexpectedly stops before locking into place, don't force the motion! Carefully press the enclosure rail safety catches and push the enclosure back into the rack, secure it in place, and verify the Cable Management Arms, Latch Plates, Cover Alignment Brackets, and Rails are correctly installed.

8 Drive Installation

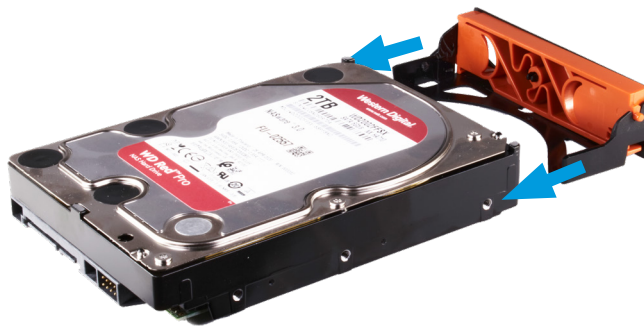
Do not install the drives until the enclosure has been installed in the rack. Only approved WD drives are compatible with the ES102.

The ES102 is sold with all the drives needed to fully populate the enclosure, packaged separately. Drives are shipped already attached to the drive clips, but in the event you need to replace a failed drive, the clip attach procedure is included here.

8.1 Attach Clip to Drive

ES102 drive clips fit over the front of a drive and have two plastic pegs that pop into the frontmost screw holes on the left and right sides of the drive.

Align the drive and clip so the the bottom of the clip fits over the bottom of the drive and the drive connection ports are on the opposite end from the clip. Push the clip connection peg into place on one side of the drive and then gently flex the clip over the drive until the other connection peg pops into place.



8.2 Insert Drives into the Enclosure

Drives with attached clips are used to install drives in the enclosure in order from back to front.

To install a drive, point the arrow on the clip towards the front of the enclosure, squeeze the orange buttons together, and gently push the drive down into the enclosure slot. Release the orange buttons to secure the drive in place. Make sure the drive is fully inserted into the enclosure and doesn't extend above the top of the system. You might need to gently work the clip into the sides of the bay to fully secure the drive in place.



For proper airflow, be sure to follow this drive installation order:

Starting with the row at the *back* of the ES102 drive bay, install the drives from *left* to right. When that row is filled, move to the next row forward and proceed to fill the enclosure from *left* to right, *back* row to front.

8.3 Drive LED Indicators

There is a single amber LED on each drive bay. The LED indicates different drive states:

- Drive Insertion: Amber Light - Solid Note: LED stays in this state until the shelf is closed
- Normal Behavior: No light.
- Activity: No light.
- Issue/Fault: Amber Light - On for one second, then off (repeats).
- Identify: Amber Light - On for two seconds, then off (repeats). The front chassis blue identify light also blinks.
- Hot-Spare: No light

9 Cabling

Do not plug the power cords into a power outlet yet.

Start by connecting cables to the various ports on the back of the ES102 and routing through the cable management arms. Make sure to leave enough flex in the cables so that they are not pulled out of place when the enclosure is slid out of the rack.

Service and Management ports are not used during normal operation and do not require cabling.

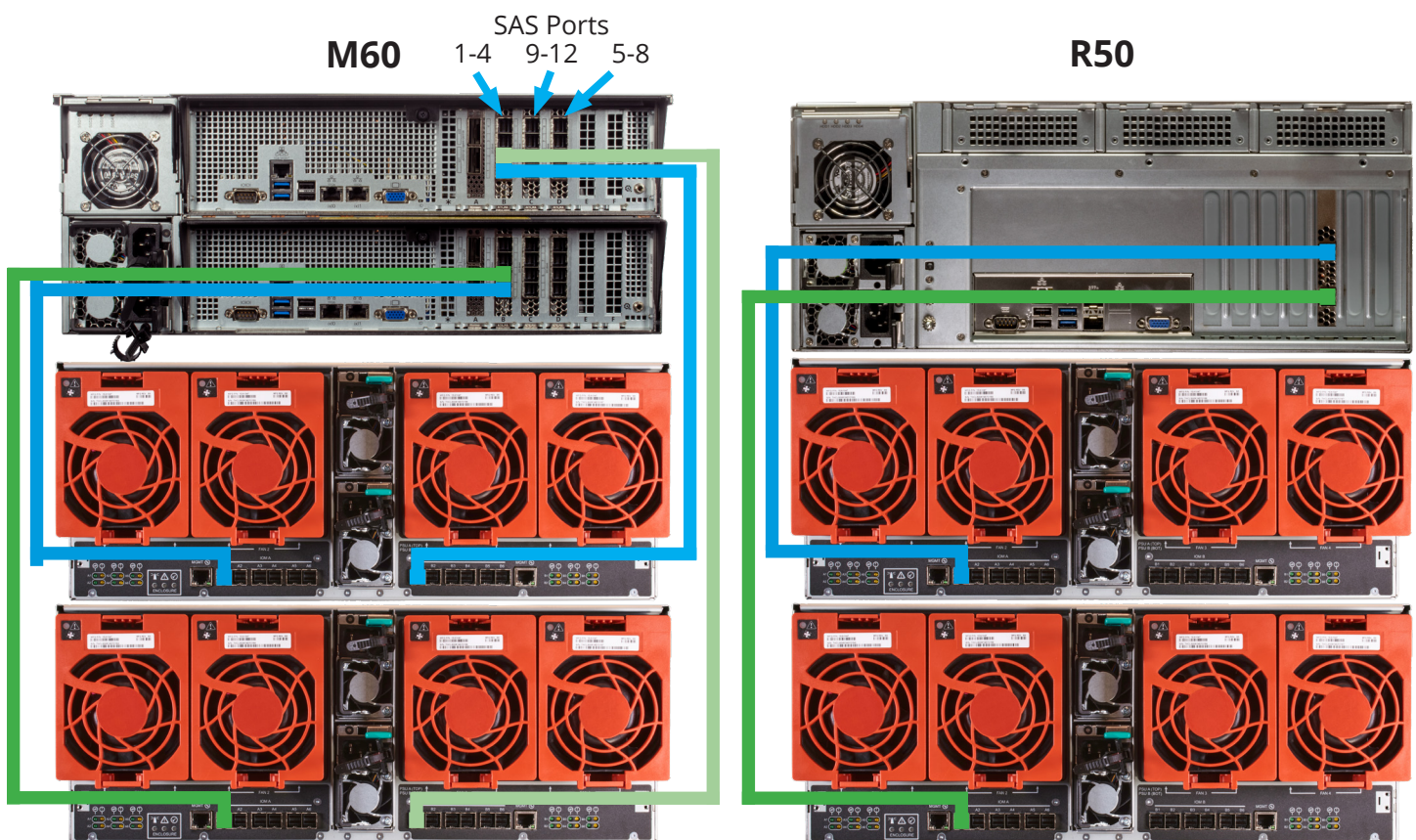
9.1 Power

The ES102 only accepts 200-240v power input. Connect a power cord to the back of one power supply. Extend the plastic retention clamp, open it, fit it over the power cable, and push it down over the cable to lock it in place. Repeat the process to connect the second power supply and secure the cord.



9.2 SAS Connections

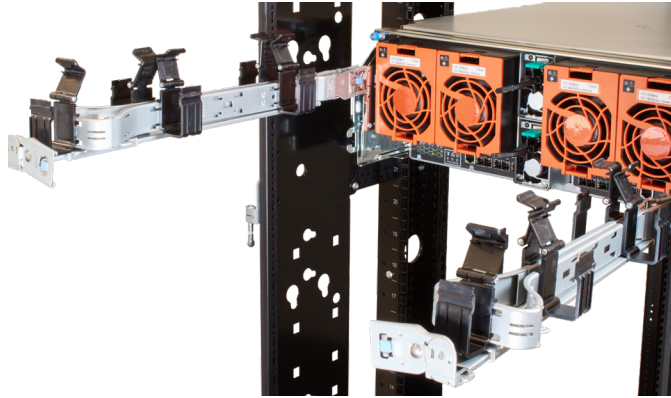
ES102 systems are compatible with the M60 and R50 Unified Storage Arrays. Typical SAS cable connections for two ES102s to either system are shown here:



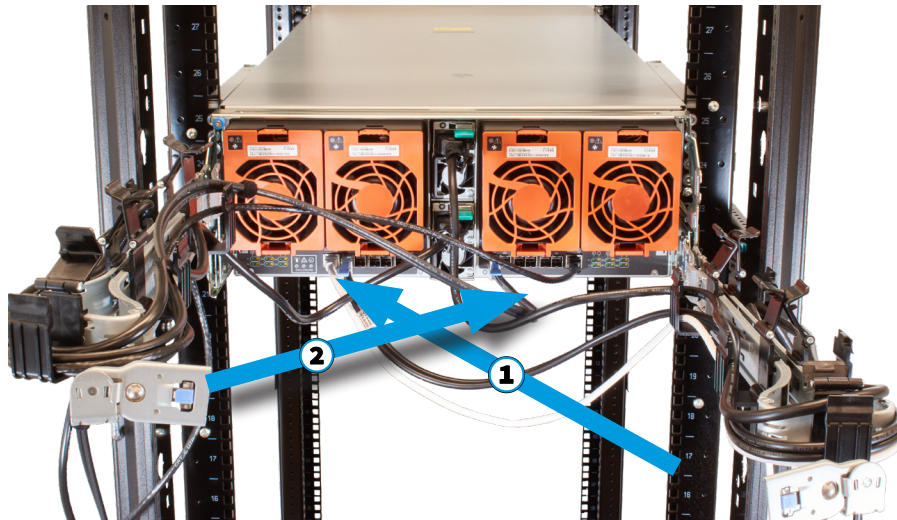
9.3 Cable Routing

To simplify cabling with the Cable Management Arms (CMAs), swing open both arms so that they are pointed directly away from the enclosure. To do this, start with the lower arm and press the blue release catch on the left side connector, then swing the arm to the right. Release the right side connector on the upper arm and swing it to the left.

To open the cable retention clips, gently squeeze and lift the top of the clip.



To ensure there is enough flex in the cables to allow sliding the enclosure fully out of the rack, it is recommended to route cables for the first Storage Controller (*left side*) through the lower CMA (*right side*) (1). Route cables for the second Storage Controller (*right side*) through the upper CMA (*left side*) (2). Allow plenty of flex in the cables by not pulling them tightly through the CMAs.



When finished routing all the cables through the CMAs, close all the cable retention clips and swing the arms back to the left and right, reconnecting each side back to the enclosure. If you see any cables getting pinched or pulled while swinging the arms back, do not force the motion! Return to the starting position and adjust the cables to allow more flex or avoid getting pinched.



If the TrueNAS system is already on, then you can turn on the ES102 at any time by plugging both power cords into PDU outlets and waiting two minutes for the drives to start.

10 Additional Resources

The TrueNAS Documentation Hub has complete software configuration and usage instructions. It is available by clicking **Guide** in the TrueNAS web interface or going directly to:

<https://www.truenas.com/docs/>

Additional hardware guides and articles are available in the Hardware section of the Documentation Hub:

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

The TrueNAS Community forums provide an opportunity to interact with other TrueNAS users and to discuss their configurations. The forums are available at:

<https://www.truenas.com/community/>

10.1 Contacting iXsystems

For assistance, please contact iX Support:

Contact Method	Contact Options
Web	https://support.ixsystems.com
Email	support@ixsystems.com
Telephone	Monday-Friday, 6:00AM to 6:00PM Pacific Standard Time: <ul style="list-style-type: none">• 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): <ul style="list-style-type: none">• US-only toll-free: 1-855-499-5131• International: 1-408-878-3140 (International calling rates will apply)

