NXS-B60E™

Expansion Unit

Hardware Manual


nexsan
TECHNOLOGIES

Contents

About the NXS-B60E Hardware Manual

NOTE – Notes contain important information and useful tips on the operation of the NXS-B60E.

CAUTION – A Caution must be observed to avoid damage to the equipment.

WARNING – Warnings must be followed carefully to avoid personal injury.

All information within this manual is correct at the time of writing. Nexsan Technologies is constantly working on new features. As a result, new features may be available on the NXS-B60E. Please contact Nexsan Technical Support if you have any questions.

For Your Own Safety

This manual covers the NXS-B60E only. Please check other manuals for all other Nexsan products. Note that the NXS-B60E is a disk-expansion chassis and requires connection to a master control unit such as a SATABeast 2.5 or similar.

In the interest of your own safety and the perfect performance of your new product and computer system please note the following:

- Computer components and disk drives are sensitive to static charge. Take precautions to earth any electrostatic charge from your person before and while handling components with your hands or any tools. Please use the anti-static wrist-strap shipped with the NXS-B60E.

- Ensure correct lifting methods are used when handling the NXS-B60E. Special care should be taken when removing the NXS-B60E from its packaging and positioning the NXS-B60E into its required location.

- When installing NXS-B60E as a rack-mounted component, ensure that all Nexsan-supplied mounting fixtures are secure. DO NOT mount this unit exclusively by the front ears. All bolts and screws should be fully tightened. Failure to comply with this may result in the unit not being fully supported in the rack and could lead to the product dropping out of the rack or falling onto other rack components.

WARNING – The NXS-B60E encapsulates hazardous energies. Only a trained operator may remove field-replaceable units (FRU's). The NXS-B60E comprises these FRU's – power supply modules, expander control modules and faulty disk drives. Only a fully trained service engineer is authorized to disassemble any other part of the unit, and only when the unit is powered off.

WARNING – Owing to there being multiple power connections, remove all power leads to completely isolate the power and always use the IEC power cords which are supplied with THE NXS-B60E.

WARNING – Ensure that the rack is sufficiently stable by having wall anchors or stabilising legs, and that the floor supporting the rack has sufficient strength for the overall weight loading.

NXS-B60E Technical Specifications

Physical Specifications

Dimensions

Height	4U	177.00mm.
Length	Overall Chassis Ear mounting to face to end of unit	950mm. 1026 inc facia and handles
Width	Overall Of chassis body	482.6mm. 430mm.
Weight		93/90Kg 2/1 TB drives
Rack Mounting Kit		2.5Kg

Power

- 2 x 1600W load-sharing, redundant PSUs.
- Permitted input voltage is 200V to 264V.
- Typical power consumption is 1190W RMS at 5.26amps at 240V (running 60 x Hitachi 450GB SAS disks). Peak current is up to 15A.

Cooling

Front Panel	3 x 120cfm 12V Axial Fans (life 40,000hrs)
PSUs	2 per PSU, 60cfm 12V Axial Fans (life 40,000hrs)
Auxiliary Blower Module	4 x 10cfm 12V Radial Blower (life 40,000hr)

Materials

Chassis	Extruded aluminium, welded sections, sheet steel.
Chassis (internal)	Aluminium supports, steel divider plates.
Fascia	ABS (blend) Thermoplastic UL 94 V.0.

Communication Interfaces

- None supported on the expansion unit.

External Data Interface

- There are 4 connectors on each Expansion Control Unit, arranged in 2 pairs.
- Each one has 4 x 3 GB/s SAS links.
- On each controller, one pair of connectors is for “input” from the Master Controller, the second pair is for future options. From the rear view, the right-hand pair is used for input.
- SAS cable connector type – External Mini SAS 26 pin I-Pass (8088) connector with Universal Keying
- SAS cable type – Amphenol Spectra-Strip cable or equivalent – 2 metres 28AWG, 3metres 26AWG, 4metres 24AWG equalized
- Maximum SAS cable length is 4m – Applications requiring greater than 4m should consult Nexsan.

Field Replaceable Modules

- Two replaceable PSUs at the rear (the top 2 units)
- One or two “Expansion Control Units” (ECU) fitted at the rear (middle units).
- Disk drives within any of the Drive Modules at the front of the unit.
- Rear “fan-pack” module at the rear of a fully withdrawn Drive Module.
- The fascia assemblies on the front of the drive modules, which each contain a fan. This assembly can be removed in the event of a fan failure removal of a screw on each side of the drive module.

Other Modules

- Three “Interconnect Service Modules” (ISM’s) at the rear (bottom 3 units). There are no serviceable parts inside the units; they can only be exchanged for the correct Nexsan replacement parts.
- Three “Drive Modules” (DM’s) at the front on the unit. These may either be blank modules (no disks) or full modules capable of carrying up to 20 3.5” disk drives.

Getting Started

This manual is designed to enable the user to install and prepare the NXS-B60E quickly and safely. Please read it carefully and review all of the information in this section before installing the product.

Taking Delivery

On receipt of your NXS-B60E, you should check to ensure no damage has been sustained in transit (report any damage to your shipper before proceeding) and that you have received the following items:

- The basic enclosure, rack-mounting hardware, front Drive Module fascias, packaging containing disk drives (check for the correct number of SATA and/or SAS disk drives), two power cables, a disposable ESD strap, and any other additionally ordered items such as SAS interconnect cables. There should a bolt-on transit bar across the front of the main unit in order to secure the disk modules.

- Packaging is reusable and should be retained for re-shipment purposes. The packaging comprises: main external carton (reusable), enclosure wrap with lifting handles, box with ESD foam compartments housing the drive canisters (should be used to ship out canisters containing drives when fitted) and two component/accessory boxes.

Before you begin

Ensure that the ambient temperature of the installation site for the NXS-B60E does not exceed 35°C. If installed in rack (recommended), ensure the NXS-B60E’s ingress air temperature is no higher than 35°C. If the temperature of the installation site is not automatically regulated, then ensure that daily or seasonal changes will not result in the maximum temperature being exceeded. The product’s ambient temperature requirement remains the same when multiple units are present. Ensure full airflow is possible at the front and rear of the unit.

NOTE – Units may be shipped without the chassis ears at the front corners being attached, and/or the front fan modules on the disk drawers. These are easily clipped and screwed and bolted into place using the correct screws that will be include din the package. If the unit arrived with thin metal “shipping strap” across the front of the unit this should be removed and retained.

CAUTION – Do not obstruct the front or rear of the product. Irrecoverable disk damage, data loss or electronic damage may ensue if the unit is operated beyond the maximum ambient temperature.

WARNING – Ensure two or more people are used to lift the NXS-B60E chassis and remove all pluggable components to reduce weight. You should remove PSUs, controllers and any disk drives already fitted, in order to decrease the weight for safe handling of the unit.

If installing the NXS-B60E into a rack-mount cabinet you must follow the Rack Mount Instructions in the relevant section of this manual). When installing into a rack-mount cabinet take extra care not to trap fingers and clothing during the installation. Also, please ensure that the rack is correctly grounded according to instructions provided by you rack vendor.

The user must ensure that the mains power drawn by the equipment does not overload the available electrical supply in the rack. When connecting the equipment to the electrical supply, please consult the rating details of the NXS-B60E. Note that the NXS-B60E is designed to run from a nominal 220-240V supply, owing to its high peak power loading.

CAUTION – A disposable ESD strap is supplied with the unit as protection against electrostatic discharge. This strap should be worn at all times and properly tied to ground while fitting or removing disk drives in your

Nexsan systems. Ensure that your environment has sufficient ESD safeguards to protect against latent failures. Failure to protect against ESD may result in critical losses.

Single and Dual Controller Configurations

The NXS-B60E supports both single Expansion Controller and dual Expansion Controller configurations.

Dual Expansion controller systems provide extra protection in the event of cable failure or Expansion Controller failure.

This manual will focus predominantly on a dual Expansion Controller installation, but with added information, where necessary, for a single controller installation.

Installing the NXS-B60E into a Rack

Important Notes about Rack Mounting

Elevated Operating Ambient

If the unit is installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature. For the NXS-B60E, this is 35C.

In the event of a fan failure, ensure the fan is replaced as soon as possible. There are numerous ways within the system's software to set up a mechanism to inform the System Administrator or other responsible operator of the unit about failures such as a failed fan (e.g. alarm sounder, SNMP trap, email messages etc.).

If prolonged operation with a failed fan is unavoidable, then to maintain disk reliability, ensure the ambient temperature is no more than 30C.

Reduced Air Flow

Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised. The front and rear of the unit must not be covered or obstructed in any way, to ensure good airflow through the unit.

Mechanical Loading

Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading. Ensure the unit is properly mounted within the rack, with no overhangs likely to make the rack unstable.

WARNING – Ensure that the rack is sufficiently stable by having wall anchors or having stabilising legs deployed. Check the maximum weight loading of your rack and the floor it stands on.

CAUTION – Owing to the weight of the NXS-B60E chassis you must remove the PSUs, Expansion Controllers and any installed disks before attempting to mount the NXS-B60E into a rack. Failure to do this may result in injury or damage to the unit.

Circuit Overloading

Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable Earthing

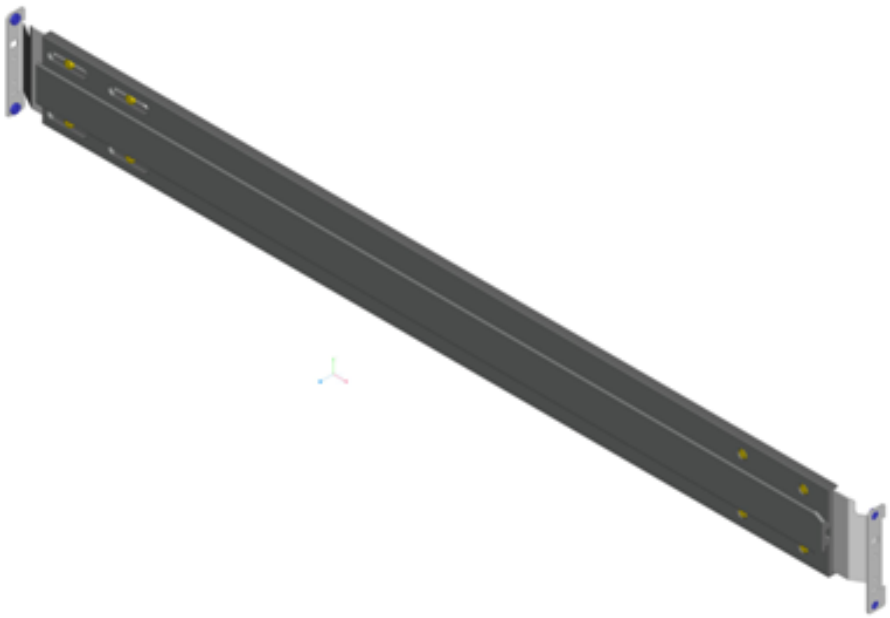
Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

Fitting the Rack-mount Kit

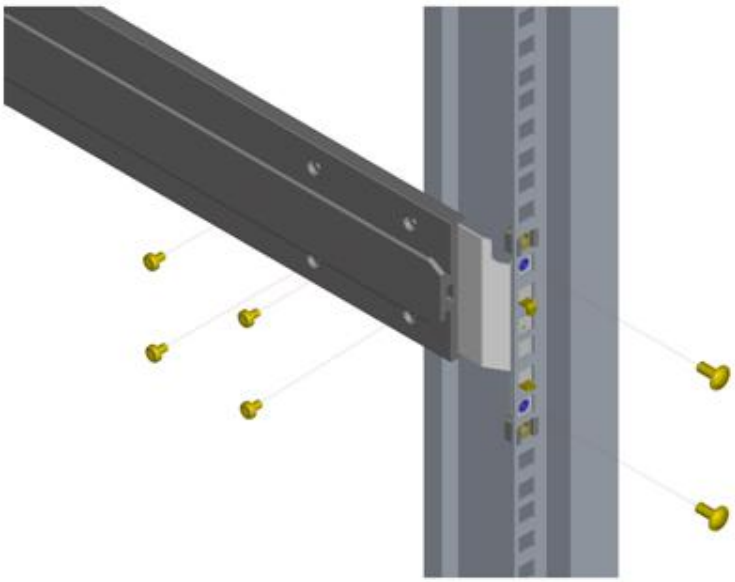
The NXS-B60E is designed to fit a 1000mm rack. Ensure that your rack can take the total weight and that your floor is sufficiently strong.

Note that you may need screw on the chassis “ears” at the front corners of the unit prior to rack mounting.

The rack-mount system consists of left and right-handed assemblies. Each side has three major components – front and rear sections and a joining plate – that can be assembled to fit a range of racks. The three main parts for each side can be loosely pre-assembled for fitting into the rack as shown below:

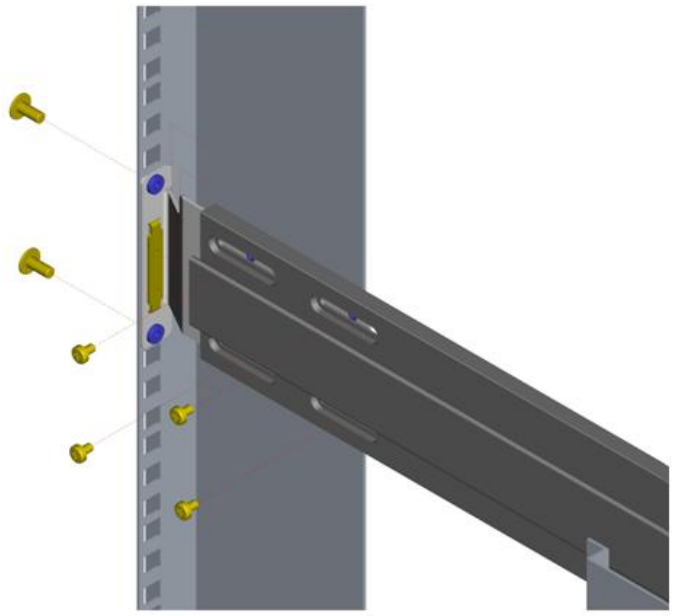


Connect the right-hand assembly (as seen from the front of the unit) into the front of the rack as shown below:



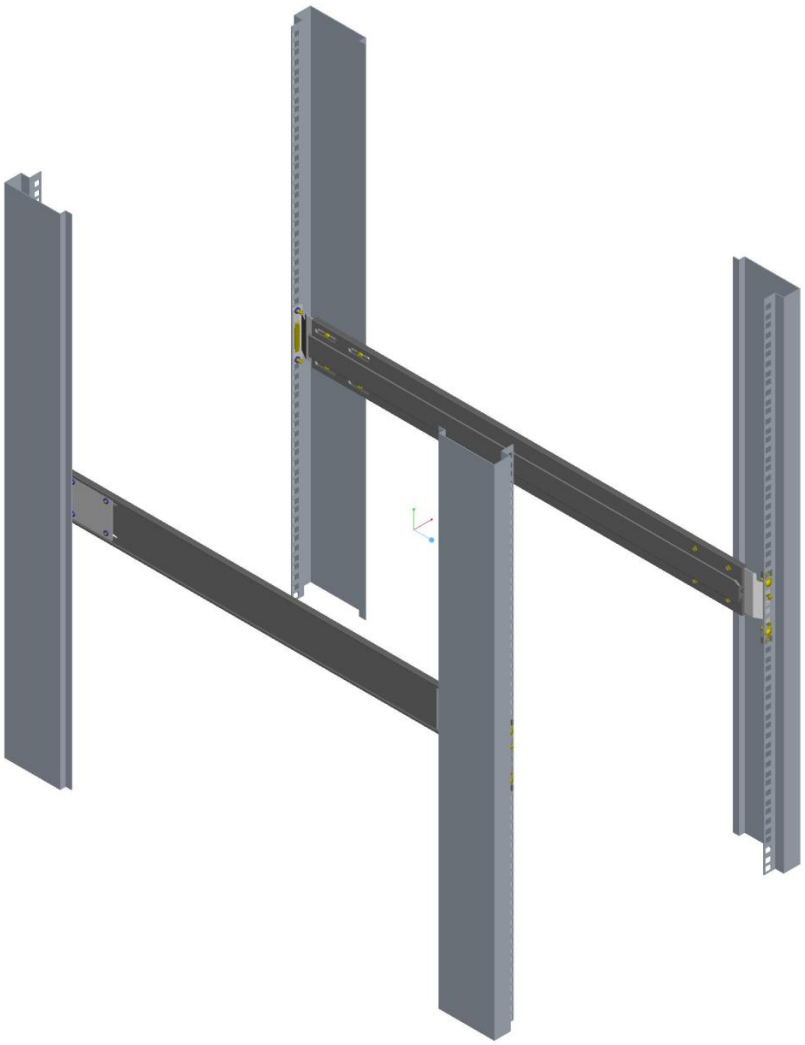
View of Right Hand Rack-mount, from the front

And connect the rear end of the assembly to the rear of the rack as shown below; note that the diagram shows the means by which the overall length of the rack mount can be adjusted.



View of Right Hand Rack-mount, rear end.

The completed assembly should look like this:



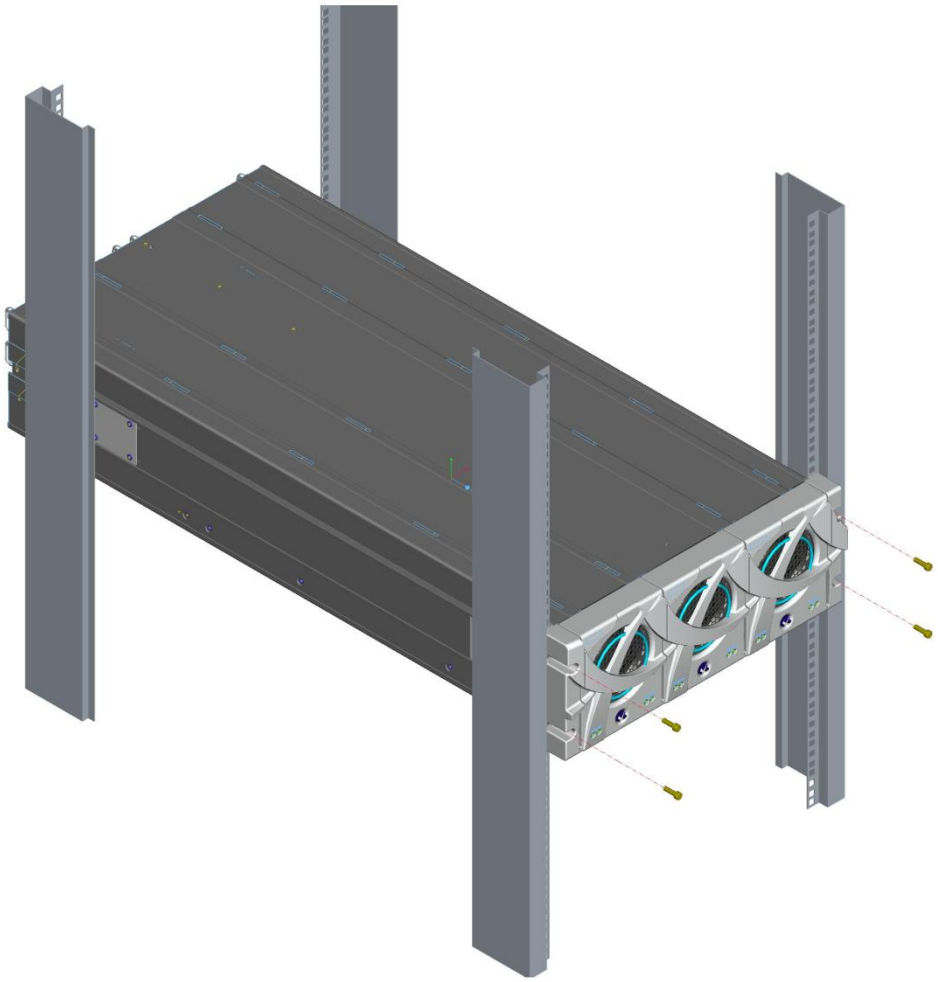
WARNING – Ensure that the screws securing the rack-mount assemblies are tight, especially the screws in the “join plate” that allows front-rear adjustments. Failure to ensure this structure is safe may result in injury and damage to the unit.

The next step is to offer up the main chassis to the rack. You will see that the main chassis has large, keyed grooves in the extruded side plates. These are designed such that the rack-mount assemblies that are fixed to the rack are able to slide into these grooves, and thus provide a means of supporting the chassis.

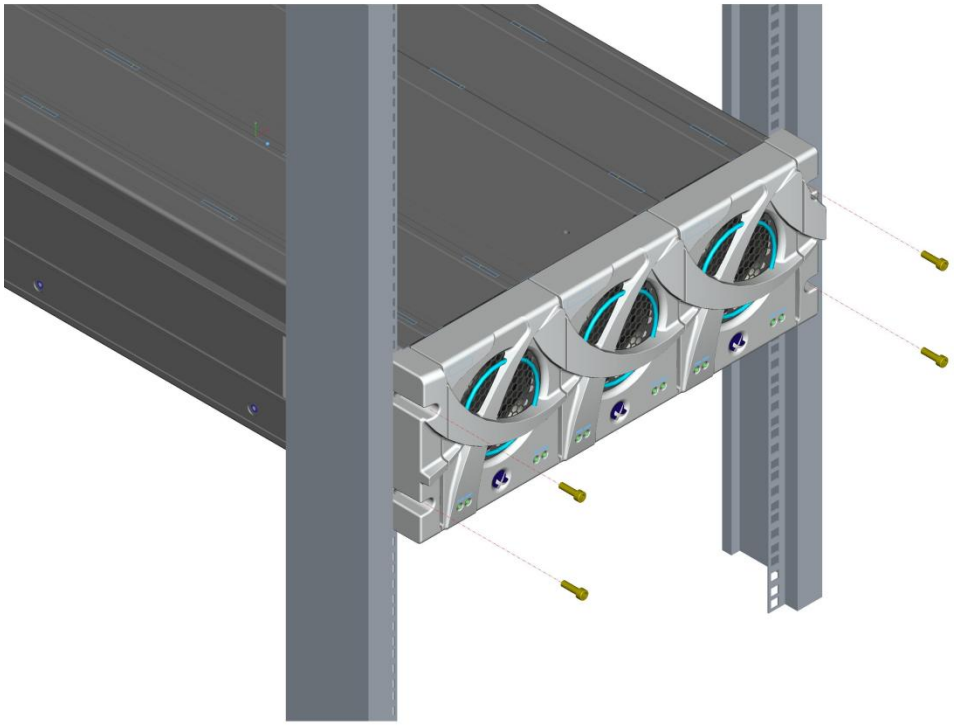
CAUTION – The unit is heavy and two people should assist with rack-mounting. You should remove the PSUs and Expander units from the rear of the unit to lighten it prior to rack mounting – you can replace these when the unit is mounted. The disks must NOT be placed into the unit until it is secured in the rack.

WARNING – Only support the unit by placing hands under the metal chassis – DO NOT support the weight of the unit by any plastic parts.

Slide the chassis all the way into the rack as shown below:



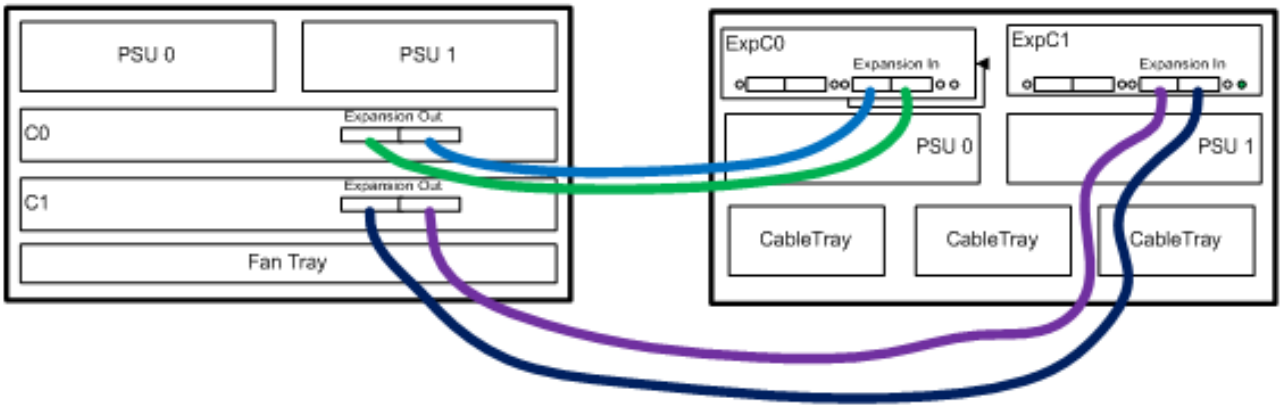
Now bolt the unit into the rack – see details below:



Wiring Configurations

The NXS-B60E requires a SATABeast 2.5 to provide RAID functionality to the disks, and connectivity to hosts or to a SAN. Both units should ideally be mounted in the same rack (see instructions). Once this has been done, you can connect the NXS-B60E unit to the master SATABeast 2.5 unit using the SAS cables provided – see the diagram below, but note that in one rack the units will likely be stacked vertically. You can then connect the NXS-B60E to a 220~240V mains supply using the supplied power cords.

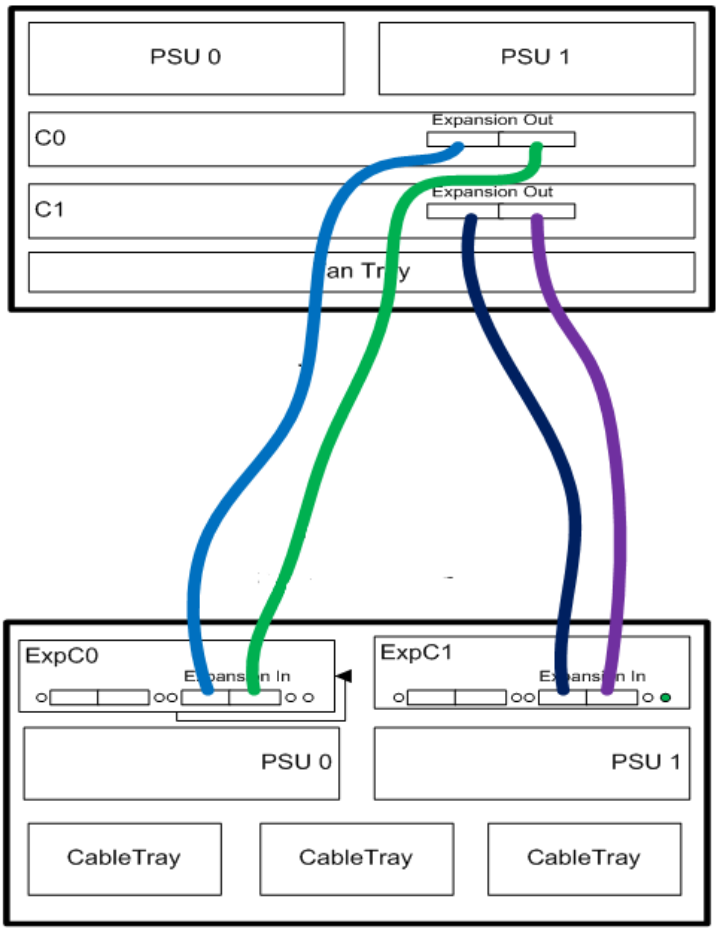
The Expansion chassis should be connected to the Raid Controller by one or more cables from Raid C0 to ExpC0, and by one or more cables from Raid C1 to ExpC1, or a table.



Rear view of SATABeast 2.5 Master controller

Rear view of NXS-B60E expansion unit

If the units are mounted in a single rack, wire them as indicated below:



Power-Up

The Expansion chassis should be powered on first, followed by the SATABeast 2.5 master RAID controller. Once the system is powered up, the LED's next to the connected Expansion "In" ports on the Expansion chassis will go green, if the cabling is correct.

If the cables are connected incorrectly, then the LED's next to the Expansion unit's "In" ports on the Expansion controllers which are connected wrongly will flash amber. If this occurs, then power off both units, correct the cabling and re-power the NXS-B60E unit first, followed by the master SATABeast system.

Note that unplugging the cable and reconnecting it while powered up will not work as the input ports will have been permanently disabled until the next power cycle to prevent disk access problems.

If all units are connected properly, System Reboots will reboot both Raid Controller and Expansion controllers.

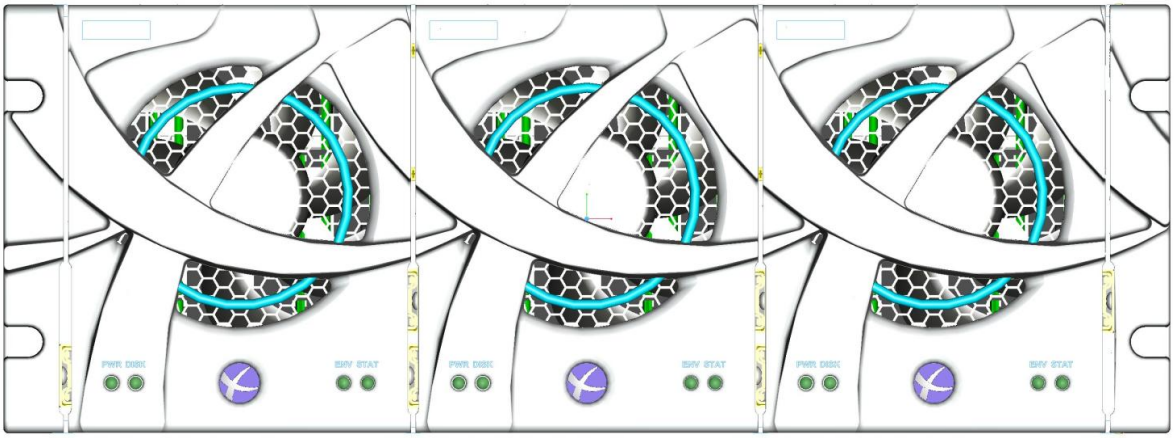
When a System Shutdown is requested and when the shutdown is complete the Expansion should be powered off first followed by the Raid Controller.

Information LED's

The status of the main components of the NXS-B60E can be established by referring to the LED's on the front and rear of the unit.

Front LED's

The front view of the NXS-B60E is shown below:



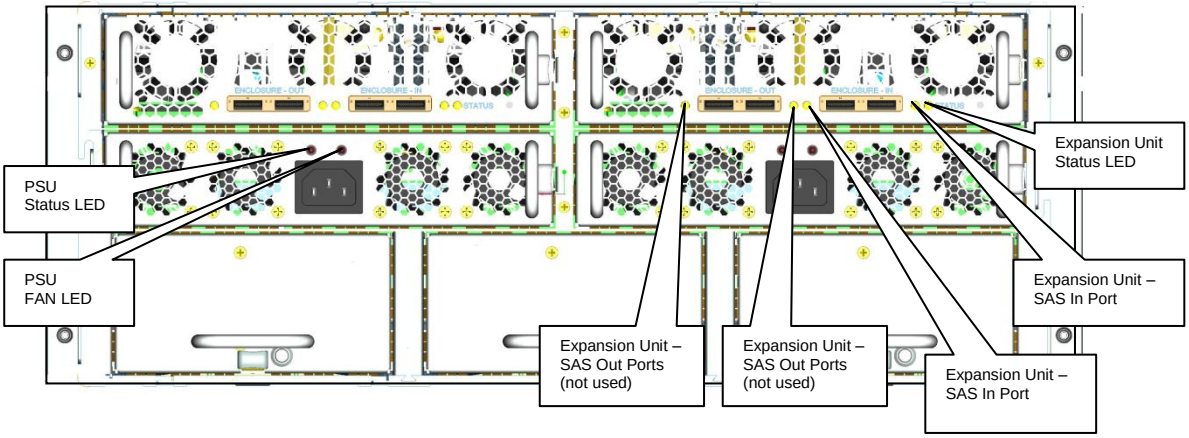
The four LED's on each POD are used in the following manner. From left to right: Power, Disk, Environment and Status. They have individual Pod meaning and overall chassis meaning when the same indication is used on all Pods.

- Power LED: Green indicates power levels in this Pod are OK. Red indicates one or more power levels are incorrect. The Environmental Page on the GUI can be used to determine which.
- Disk LED: Green indicates all disks in the Pod are OK, Red means one or more disk faults have been detected.
- Environment LED: Green means all temperatures and fans in the Pod are good, Red means one or more temperature and/or a fan is bad.
- Status LED: Green indicates all is OK, Amber means Pod is unlocked and Red means there is some other system problem in the Pod.

When all Power LED's or Environmental LED's are red then this will mean that there are other power or environmental problems that are not Pod specific. The GUI should be used to identify which.

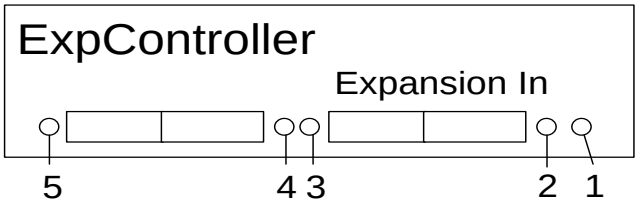
Rear LED's

The rear view of the NXS-B60E is shown below:



Expansion unit LED's

There are five LED's on each Expansion Controller. One for each SAS port and one general status as shown below:



1. General Status:
    a. Flashing Green: Normal Operation
    b. Flashing Red: Rebooting
    c. Red: Environmental Problem(see GUI)
2. SAS In Port
    a. Green: Connected OK
    b. Flash Amber: Cable Incorrectly Connected
    c. Off: No Connections
3. SAS In Port
    a. Green: Connected OK
    b. Flash Amber: Cable Incorrectly Connected
    c. Off: No Connections
4. SAS Out Port: Not Used(Off)
5. SAS Out Port: Not Used(Off)

PSU LED's

- The Power Supply Unit has two bi-colour Red/Green LED's. For indeterminate states (e.g. momentarily during boot), the LED's will illuminate orange.

Fan

- When both fans are running correctly the Fan LED will illuminate green, but will illuminate red if a fan has failed. The Fan LED is controlled by the RAID controller via an I^2C bus.
- The LED is red to indicate that the fan is spinning too slow or not at all.

PSU Status

- When the 12V and 3V3 outputs are within specification the Status LED will illuminate green, but will illuminate red if either output is outside specified limits.
- When the PSU is in Standby Mode, the Status LED will illuminate orange and the Fan LED should default off.

Physical Components

In order to use the NXS-B60E, it is important for you to know how to correctly install and remove the pluggable components.

Should failure of a component be suspected, a Beacon on the Graphical User Interface (GUI) indicates which unit, PSU or Disk Drive, has failed.

Power Supplies

Should a PSU fail or lose its mains power, its cooling fans will still operate because they are powered from the surviving PSU via the mid-plane of the unit.

PSU Insertion

Inserting PSUs into a chassis is a matter of ensuring the units is the correct way up, and pushing the unit into the rear of the chassis. The PSU should slide into place but be a snug fit – be careful not to attempt insertion at a slight angle. Ensure the PSU is fully home and that the sprung locking tab secures the unit.

PSU Removal

CAUTION – A FAILED POWER SUPPLY OR BLOWER SHOULD BE REPLACED AS SOON AS POSSIBLE. CONTINUED OPERATION WITH A FAILED POWER SUPPLY OR BLOWER WILL RESULT IN A DRAMATIC, IRREVERSIBLE REDUCTION IN SYSTEM MTBF. DO NOT REMOVE THE FAILED POWER SUPPLY UNTIL A REPLACEMENT IS ON SITE AND AVAILABLE. .

CAUTION – INADVERTENTLY REMOVING THE FUNCTIONAL, SURVIVING POWER SUPPLY WILL RESULT IN SYSTEM FAILURE AND POSSIBLE DATA LOSS.

Remove the mains power cord. Press the sprung locking tab away from the edge of the PSU, until it is sufficiently disengaged that the PSU module can be pulled out. Support the weight of the PSU as it is being removed.

Expansion Controller

Controller Insertion

Hold the RAID controller up to the main chassis. Gently push the RAID controller into the chassis until you meet resistance. The sprung locking tabs should click into place when the module is fully home.

Controller Removal

Remove all cabling. Press the sprung locking tab away from the edge of the controller module, until it is sufficiently disengaged that the module can be pulled out. Support the weight of the controller module as it is being removed.

Disk Drives

The NXS-B60E can be fitted with up to 60 disk drives in 3 drive modules containing 20 disks in each. Depending on product variant, these can be SATA, SAS or a mix of both. Note that all disks must be pre-fitted with disk rails.

CAUTION – Although the unit is designed to allow disk changes while the unit is running, **disk drives are shock sensitive**. All actions involving disk modules or disks are to be performed gently.

Disk Insertion

WARNING – POTENTIALLY HAZARDOUS ENERGY. TRAINED SERVICE PERSONNEL ONLY.

CAUTION – ENSURE THAT THE RACK STABILISERS ARE DEPLOYED OR THAT THE RACK IS ADEQUATELY SECURED PRIOR TO WORKING IN THE DRIVE BAY OF NXS-B60E.

1. If necessary, using the supplied key, turn the lock knob on the front of the drive module drawer to the left to unlock the drawer.

2. Gently pull the disk module drawer out of the main chassis on its rack slides, until it reaches the rack slide stops, when you will hear a click. Note that you may not be able to push the drive module back into place unless the module has first been fully withdrawn owing to the way the rack slides work.

3. Flip the lid of the module open to expose the drives. You must use ESD protection when installing drives to protect the disks from static discharge.

4. Identify the drive you wish to remove and gently push on the two “legs” of the handle. This will flip up the main handle from the top of the drive. Pull on the handle to remove the drive.

Disk Removal

CAUTION – REMOVING A DISK FROM A WORKING SYSTEM MAY RESULT IN OFFLINE RAID ARRAYS AND INACCESSIBLE HOST DATA. ALWAYS BE SURE THAT THE CORRECT DISK IS BEING REMOVED, CHECK BY LOOKING AT THE DISK STATUS LED.

CAUTION – ENSURE THAT THE RACK STABILISERS ARE DEPLOYED OR THAT THE RACK IS ADEQUATELY SECURED PRIOR TO WORKING IN THE DRIVE BAY OF THE NXS-B60E

1. Ensure the drive is correctly orientated to fit the empty slot and gently lower the drive until you meet resistance.

2. Firmly push the drive into the chassis until it reaches a full stop.

3. Repeat until all drives are installed. Reattach the cover and close the front panel, replace and tighten the front panel fixing screws before powering on the system.

CAUTION - DO NOT LEAVE THE NXS-B60E RUNNING WITH THE LID OFF LONGER THAN IS NECESSARY, THIS WILL REDUCE THE COOLING OF THE DRIVES AND THE MTBF OF THE SYSTEM.

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