# Xpander Desktop Elite Gen 3 User Guide

Xpander Desktop Elite (see the image at the right) is a portable PCI Express (PCIe) expansion enclosure that enables connection of graphics processing units (GPUs) or other controllers to a host computer. The host must provide one PCIe x16 expansion slot available for the host interface controller (HIC).

Install the x16 HIC and cable in a PCIe Gen 3 x16 slot to provide a theoretical 128Gbps connection to Desktop Elite with four slots.

Desktop Elite provides four PCIe Gen 3 x16 slots on one mainboard for double-wide GPUs that are NVIDIA® Compute Unified Device Architecture (CUDA) or OpenCL-enabled. Desktop Elite supports other PCIe adapters as well. It supports applications that exploit multiple GPUs, including rendering graphics or high-performance computing (HPC).
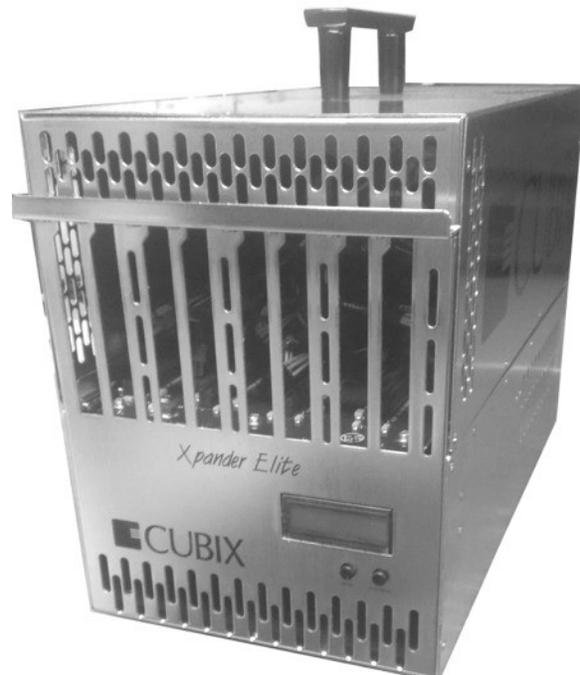
Desktop Elite standard version features a 1,500Watt power supply, 4 x 8P + 8P auxiliary power connectors and a fan that cools 4 x double-wide, actively-cooled GPUs. The optional version features a 1,200Watt power supply, 4 x 8P + 6P auxiliary power connectors and a fan that cools 4 x double-wide, actively-cooled GPUs or other PCIe cards. Adjustable fan settings allow quieter operation if fewer GPUs or single-wide GPUs or other PCIe cards are installed.

Xpander Desktop Elite Technical Specifications

Expansion slots, x16 std	PCI Express x16 mechanical / electrical on 1 Main Interface Boards (MIB)
Number of slots / MIB	4 slots / 1 MIB
Form factor support	4 double-wide, full-length, full-height controllers / adapters
PCIe device support	PCIe cards must adhere to PCIe specifications for power and dimensions: maximum 250Watts and 4.38in (111.15mm) H x 10.51in (267.00mm) L
Connecting cable	External PCI Express x16, 136-pin
Connector duty cycle	250 mating cycles maximum per connector
Length, standard	2.00meters (78.74inches or 6.56feet)
Length, optional	1.00meters (39.37inches or 3.28feet)
PCIe x16 HIC	Install in a PCIe x16 slot in the host computer
In host PCIe Gen 3 slot	Provides theoretical 128Gbps data transfer
Front panel LCD	Main menu = left button; sub-menu = right button (See detail on page 7.)
Cubix Corporation	MIB assembly and revision; management firmware revision
Power supply status	Standard main power; optional redundant power
Temperature status	3 sensor readouts in degrees Centigrade (C)
Fan status	Fan status, voltage percent (%) speed
PCIe link status	x16 cable connected; 8.0Gbps x16 link speed
x16 cable	Connected or not connected status
Slot 1 - 4 x16 transfer	PCIe Gen 3, 8.0Gbps x16 = 128.0Gbps

rate, theoretical	
LCD panel backlight	Toggle on / off using right button
Rear panel	Power input receptacle, PCIe cables and cooling fan
Fan profile settings	Use Xpander internal jumpers JP7 and JP8 (see page 8)
Cooling fan profiles	1 x fan runs at 112cfm (cubic feet per minute) maximum
Performance	2 x double-wide GPUs in slots 1 and 4, plus 1 – 2 x single-slot PCIe cards
Quiet	1 x double-wide GPU in slot 1 or 4 x single-wide GPUs
High Performance	2 – 3 x double-wide GPUs, plus 1 – 2 x single-slot PCIe cards
GPU	4 x double-wide GPUs
AC power supply	
Standard version	Single-phase, auto-ranging, 100 - 240VAC, 15-7Amps, 50/60Hz; total output power is not to exceed 1,500Watts
High-power option	Single-phase, auto-ranging, 115 - 240VAC, 17-10Amps, 50/60Hz; total output power is not to exceed 1,600Watts
Low-power option	Single-phase, auto-ranging, 100 - 240VAC, 10-5Amps, 50/60Hz; total output power is not to exceed 1,200Watts
Standard aux power	4 sets of connectors, each with 8pins + 8pins
Optional aux power	4 sets of connectors, each with 8pins + 6pins
Operating environment	0° to 30° Celsius (32° to 86° Fahrenheit) temperature 5% to 80% non-condensing humidity
Dimensions (no handle)	10.85" H x 8.50" W x 16.17" D (27.56cm H x 21.59cm W x 41.07cm D)
Dimensions (with handle)	12.60" H x 8.50" W x 16.17" D (32.00cm H x 21.59cm W x 41.07cm D)
Weight	23.00lbs (10.43kg)
Warranty / period	Parts & labor return to manufacturer / 2 years
Ext. warranty period	Optional 3 years

Included

Desktop Elite HE standard version includes a cooling fan, a 1,500W power supply with 4 x 8Pin + 8Pin (8P + 8P) auxiliary (aux) power cables and a power cord as well as Main Interface Board (MIB), one PCIe x16 HIC and one external PCIe x16 cable, 1meter long. Desktop Elite includes installation media because installation requires no driver or other software. The only drivers you install are those for the devices you install in the unit. Xpander includes a two-year warranty.

Options

The optional LE version features a 1,200W power supply with 4 x 8P + 6P aux power cables. The standard external PCIe cable length is 1meter. Optional 2m PCIe cable is also available. Cubix offers an optional third-year warranty on Xpander products.

Quick Start without Detail

This quick start is for users who have installed GPUs in Cubix Xpander products. If you have not installed Xpander before, proceed to the Start-up / Test Procedure with Detail below.

Install a GPU in a host system PCIe x16 slot and install device drivers. Once you have verified operation, repeat the process for other PCIe cards. After verifying operation for each type of PCIe card, move the cards to Xpander, install the HIC in the same slot in the host computer and connect Xpander to the HIC using the cable provided. Connect power to Xpander and power on the host computer. Boot the host computer. If it is plug-n-play, the operating system (OS) will detect the new hardware configuration and install device drivers.

Start-up / Test Procedure with Detail

Check your host computer motherboard vendor's Website for device driver and firmware updates, especially those that may affect multiple GPUs. During this procedure, place the Xpander Desktop Elite on a stable surface. Use a Philips #2 screwdriver. Do not install graphics or other controllers until instructed to do so.

1. Remove AC power to the host computer and to Xpander.
2. Install the x16 HIC in a PCIe x16 slot within the host computer. In Apple® Mac Pro, install the x16 HIC in PCIe slot 2.
3. Remove the screws holding the top cover, remove it and set it aside.
4. Connect the external PCIe cable coming from the Xpander Desktop Elite into the HIC in the host computer. Make sure the cable connector seats firmly in the HIC port. You will feel the cable connector click into place. See the image of a properly-seated connector in an Apple Mac Pro at the right.

5. Connect a power cord to the receptacle at the enclosure rear.

6. Check the connection LED near the HIC L-bracket in the host. If you have properly seated the HIC in the host PCIe slot, you will see the LED near the HIC L-bracket light steady green.
7. Power on the host computer. Xpander Desktop Elite also powers on.

8. Confirm that exterior Link OK LED, the HIC Link LED, the interior Cable (P0) LED are lit green and the unit fans are spinning.
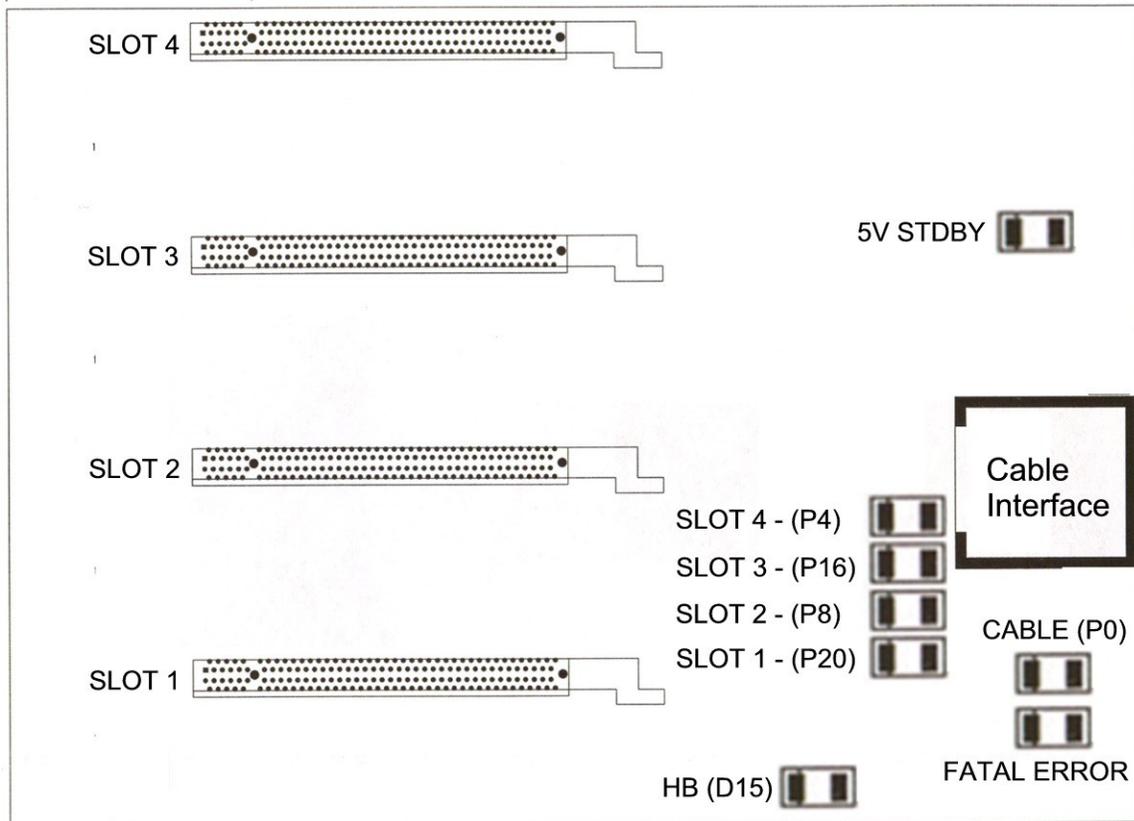
Xpander is functioning properly once the Cable (P0) LED lights green.

9. Switch off AC power to the host computer and disconnect power to Desktop Elite. Leave the external PCIe cable to the host computer port connected.
10. Remove as many screws as necessary to install GPUs or other PCIe devices. For example, if you have 2 x double-wide GPUs, remove 4 x screws. After installation, these screws will hold down end brackets of GPUs or other PCIe devices. See the image at right. If you have an empty slot, install the 2 x blank end-brackets provided within the packaging.
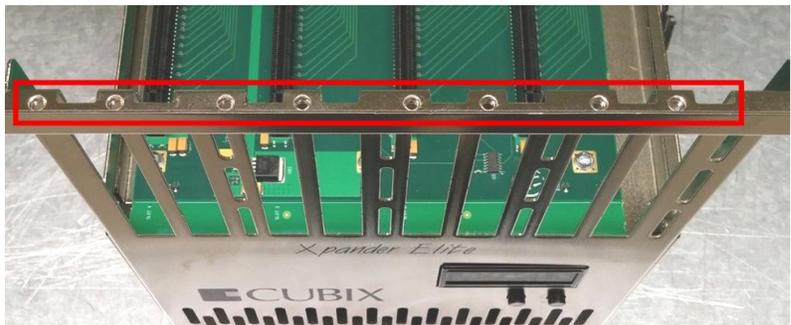
11. Install the graphics or other controller(s) in the Xpander PCIe slot(s) and connect PCIe auxiliary power cables (see the image at the right). Desktop Elite with a 1200Watt provides four sets of aux power connectors with 8P + 6P. Optional 8P + 8P aux power connectors are available. Seat each set of connectors properly in the GPU devices so the host computer system and operating system (OS) can detect and use the devices.

Warning
Before installing or removing cards from the Xpander, shut down the host, disconnect AC power from Xpander and wait for the 5V Standby LED to power off.

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12. Connect GPU video port(s), if present, to monitors. This step is especially important for Linux, because X Windows (X) will crash if you have not connected video ports to monitors. If you cannot connect monitors to installed GPU video ports, you can edit the Device section of /etc/X11/xorg.conf to define which GPU X should use as the primary display device. For example:

```
Section "Device"
    Identifier      "Device0"
    Driver          "nvidia"
    VendorName      "NVIDIA Corporation"
    BoardName       "Quadro M6000"
    BusID           "PCI:8:0:0"
EndSection
```

To determine the BusID for the GPU you wish to use as the primary display, run the scanpci tool discussed in Step 14.

13. Connect power to Desktop Elite and power up the computer to confirm that the appropriate slot link LEDs (P1, P5, P7 and P9 in the image above) are lit green, which confirms that you have installed the controller(s) correctly in each slot.
14. For instance, in a PC running Microsoft® Windows®, check Windows Device Manager. Within Windows, you can also run GPU-Z, a utility available for free download here. In an Apple Mac Pro, run the System Profiler and look for GPUs under Graphics/Displays. To open System Profiler, choose Apple Menu > About This Mac, and then click More Info. In a PC running Linux, run the following:

```
root# > XFree86 –scanpci
```

Read more about scanpci here.

15. If all the Cable Link and slot LEDs are lit green but your OS does not detect the GPUs, shut down the OS gracefully, power down GPU-Xpander and remove / replace the GPUs. Make sure that you seat each GPU firmly in its slot and that you connect all auxiliary power connectors properly. Switch on GPU-Xpander and boot up the host computer.
16. Install the appropriate graphics or other controller driver(s) using the vendor's procedure. Apple Mac OS X may not support natively all NVIDIA® GPU products.

17. Power down the host computer gracefully, which powers down Desktop Elite. Leave the power cords and the external PCIe cable to the host computer port connected.
18. Replace the Xpander top cover with the vents away from the fan and secure the screws holding the top cover in place. Use all of the screws included in the bag.

Warning
Replace the cover as soon as possible to allow for proper cooling of controllers installed in the unit and secure the cover in place with all of the screws provided. Do not run Xpander without the cover for more than a few minutes.

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19. Switch on the host computer and both will boot and run.

Normal Power On/Off Procedure
1. With Xpander connected to the host computer and running, shut down the host normally.
2. With Xpander connected to the host computer and with power connected, switch on the connected host; both will boot up.
3. To run the host PC or Mac Pro without Xpander connected, power down the host, remove power from Xpander and boot the host. When you are ready to run Xpander again, power down the host, connect power to Xpander and boot the host.

Front Panel LCD
Xpander Desktop Elite front panel LCD provides enclosure details and status. Beneath the LCD are two buttons: left button scrolls through main-menu items and right button scrolls through sub-menu items.

When you first connect power, Xpander comes up in standby mode. The LCD displays Cubix on the top line and Corporation on the bottom line. This is the Start menu. Access all other main menu items by pressing the left button.

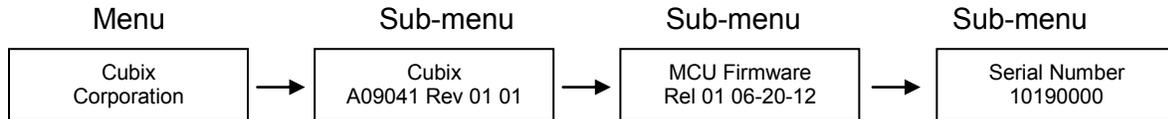The upper right corner of the LCD shows a flashing asterisk *. This indicates that the on-board Micro-Controller Unit (MCU) is running properly. If the asterisk is not flashing or the LCD is not responding, reset the MCU by pressing and holding the left button for 3 seconds while Xpander is running. A corresponding HB (for heartbeat) LED on the MIB also shows the MCU is working.

When a fault occurs, the LCD will jump to that fault and the LCD backlight will flash on / off. Press the left button to acknowledge the fault and the LCD will stop flashing and enable normal

operation. The LCD will continue to display the fault at the applicable sub-menu until you clear the fault.

Start Menu

Menu	Sub-menu	Sub-menu	Sub-menu
Cubix Corporation	Cubix A09041 Rev 01 01	MCU Firmware Rel 01 06-20-12	Serial Number 10190000

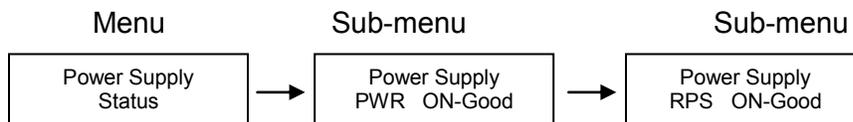Main menu: Cubix Corporation
Sub-menu: PCB Assembly
- Board Number
- EEPROM Revision
- Board Revision

Sub-menu: MCU (Micro-Controller Unit) Firmware
- Release Number
- Release Date

Sub-menu: Cubix Serial Number

Power Supply Status

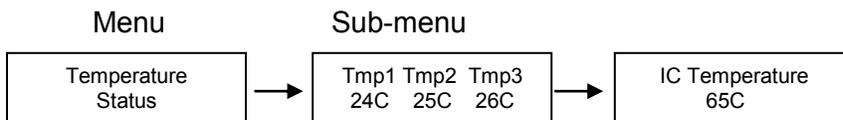| Menu	Sub-menu	Sub-menu
Power Supply Status	Power Supply PWR ON-Good	Power Supply RPS ON-Good

Menu: Power Supply Status
Sub-Menu: Power Supply Status:
- PWR Standby = Main power is off; system is in standby
- PWR ON-Good = Main power is on; +3.3V, +5V, +12, -12V are within spec.
- PWR ON-FAULT = Main power is on; +3.3V, +5V, +12V, or -12V is out of spec.

Temperature Status

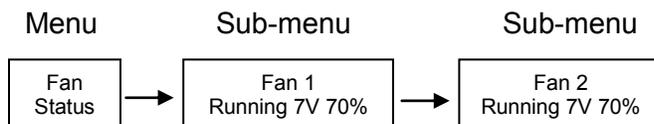| Menu	Sub-menu	
Temperature Status	Tmp1 Tmp2 Tmp3 24C 25C 26C	IC Temperature 65C

Menu: Temperature Status
Sub-Menu: Display the temperature of the 3 temperature sensors in degrees Celsius.
Note: If a temperature sensor fails, FLT (fault) appears under the failed sensor.

Fan Status

Menu	Sub-menu	Sub-menu
Fan Status	Fan 1 Running 7V 70%	Fan 2 Running 7V 70%

Menu: Fan Status
Sub-Menu: Indicates fan status for fan 1

Note: Fan speed is controlled by adjusting fan voltage based on sensed system temperature. Fan voltage adjusts from 6V min (25deg C or lower) at 50% to 12V max (50deg C or higher) at 100%. Fan voltage is the same for all fans.
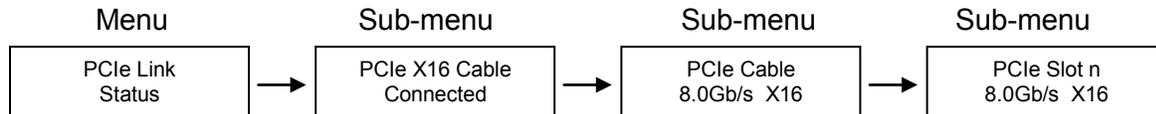
  Status: PWR OFF is 0V at 00%; system is in standby.
  Status: Running aaV at pp%; fan is good; aa = fan voltage and pp = fan power percent (%).
  Status: STOPPED is 12V at 100%; fan fault: fan voltage is set to full on.
  Status: NO FAN aaV at pp%; Xpander can be configured with 1, 2, 3 or 4 fans. No fan means fan is not installed.

PCIe Link Status

Menu		Sub-menu		Sub-menu		Sub-menu
PCIe Link Status	→	PCIe X16 Cable Connected	→	PCIe Cable 8.0Gb/s X16	→	PCIe Slot n 8.0Gb/s X16

  Menu: PCIe Link Status
Sub-Menu: Indicates x16 PCIe cable installation status
- Connected   x16 cable is properly connected to the HIC
- NOT-Connected   x16 cable is not properly connected to the HIC

Sub-Menu: x16 PCIe cable link speed and link width. Speed and width depend on the host capability.
- Speed: 2.5Gb/s, 5.0Gb/s or 8.0Gb/s
- Width: x1, x2, x4, x8, x16 and "NO Link" when the host did not successfully link or Xpander is in standby power.

 Sub-Menu: Link speed and link width for slots 1-4.
- Speed: 2.5Gb/s, 5.0Gb/s or 8.0Gb/s
- Slot 1 - 4 width: x1, x2, x4, x8, and "NO Link" when the slot is empty, unsuccessful link, or Xpander is in standby power.

LCD Backlight Control
Press right button to toggle the LCD backlight On/Off.

Fan Speed Control
Shunts JP7 and JP8 are used to change the fan profile to reduce fan noise.

Fan Profile	JP8	JP7	*Tmax	*Tmin
Performance Mode	1-2	1-2	55C	20C
Quiet Mode	1-2	2-3	65C	30C
High Performance Mode	2-3	x	40C	5C
**GPU Mode	2-3	2-3	80C/40C	45C/5C

* Tmax - Fan Voltage ~12V, Tmin - Fan Voltage ~6V
**GPU Mode: Tmax: GPU temp = 80C, if no GPU is found Tmax = 40C (on-board temp sensors)
                Tmin: GPU temp = 45C, if no GPU is found Tmin = 5C (on-board temp sensors)
                GPUs supported: Quadro K6000, M6000 and P6000

Fan Profile Guidelines. GPU Mode supports 4 x double-wide GPUs like NVIDIA Quadro or GTX Series. High-Performance Mode supports 2 – 3 double-wide GPUs. and Performance Mode Performance Mode supports 2 x double-wide GPUs. Quiet Mode supports 1 x double-wide GPU or 4 x single-wide GPUs. See Technical Specifications on page 2.

Shipping Procedure
Before shipping Desktop Elite, remove any installed graphics or other controller(s) using the
following procedure:
1. Power down and switch off the host computer.
2.   Remove the power cord from the rear power receptacle on Xpander.
3. Disconnect GPU-Xpander from the HIC.

Warning
Disconnect power to Xpander before connecting or disconnecting the HIC.

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4. Using a Philips #2 screwdriver, remove the screws securing the top cover.
5. Loosen the captured screws holding down the end brackets and remove the graphics or
    other controllers.
6. Replace the hold-down bracket and tighten the captured screws.
7. Pack the graphics cards within the boxes in which you received them.
8. Replace the top cover and secure it in place using 4 screws. Put the remaining screws in the
    plastic bag included.
9. Within the original packaging, pack the Xpander, the extra screws for the top cover, the
    power cord, the host adapter and the boxed graphics cards. Include a copy of these
    instructions.

Troubleshooting Procedure

Issue: The front-panel LCD asterisk does not flash.
Resolution: Reset the LCD's MCU by pressing and holding the left button for 3 seconds while
                Xpander is running.

Issue: The HB LED inside Xpander flashes green.
Resolution: This is normal; it indicates that the on-board MCU is running properly.

Issue: Cable LED inside Xpander does not light green.
Resolution: Check the following:
                •   Confirm that the HIC is firmly seated in a PCIe slot within the host computer.
                •   Confirm that the cable connector is firmly seated HIC connector port.

Issue: Cable LED inside Xpander flashes green even though I have a PCIe x16 HIC
                and cable.
Resolution: The internal Cable LED should light steady green if the HIC is in a PCIe Gen 3.0
                slot. If the Cable LED flashes, it is transferring data at a reduced bandwidth
                because you installed the PCIe x16 HIC in a Gen 1 or Gen 2 slot or a PCIe x8
                (electrical) slot. The HIC operates at full bandwidth when installed in a PCIe Gen
                3 slot.

Issue: Slot LED inside Xpander does not light green.
Resolution: Shut down the OS gracefully, power down Xpander and reseat the GPUs in each
                PCIe slot. Make sure that you seat each GPU firmly in its slot and that you
                connect all aux power connectors firmly.

Issue: Slot LED inside Xpander flashes green even though I installed a PCIe Gen 3 x16
                GPU or card.

Resolution: Slot LEDs should light steady green if a PCIe Gen 3 x16 GPU or other card is installed. If they are flashing, it may be because the GPUs in the slots do not have a processing load. Apply a processing load on the GPUs. If the slot LEDs still flash green, check the vendor's link for a driver update.

Issue: All Cable and Slot LEDs are lit green but your OS does not detect the GPUs.
Resolution: Shut down the OS gracefully, power down Xpander and reseat the GPUs in each PCIe slot. Make sure that you seat each GPU firmly in its slot and that you connect all aux power connectors firmly.

Issue: The front-panel LCD screen backlight is flashing on/off, which indicates a fault.
Resolution: Acknowledge the fault by pressing the Menu button, which will stop the LCD flashing and the LCD will remain at the fault.
Issue: After acknowledging a fault, the front-panel LCD screen backlight continues flashing on/off, which indicates two or more faults. If multiple faults have occurred, when you acknowledge the first fault, the LCD will jump to the next fault and the LCD backlight will once again flash on/off. This continues until you clear all faults.
Resolution: Acknowledge the fault by pressing the Menu button, which will either stop the LCD flashing and the LCD will remain at the fault, or the LCD will jump to the next fault and the LCD backlight will once again flash on/off.

Issue: The front-panel LCD screen either does not respond or is blank even though Xpander is operating.
Resolution: Press and hold the MIB Select button to reset the Micro-Controller Unit (MCU).

Issue: The front-panel LCD screen either does not respond or is blank for a particular MIB even though Xpander and the MIB are both operating.
Resolution: Press and hold the Menu (left) button for 3 seconds to reset the Micro-Controller Unit (MCU). If the Xpander is running, the Xpander fans will turn on full speed for 10 seconds and then slow down to the operating speed set by the MIB local temperatures.