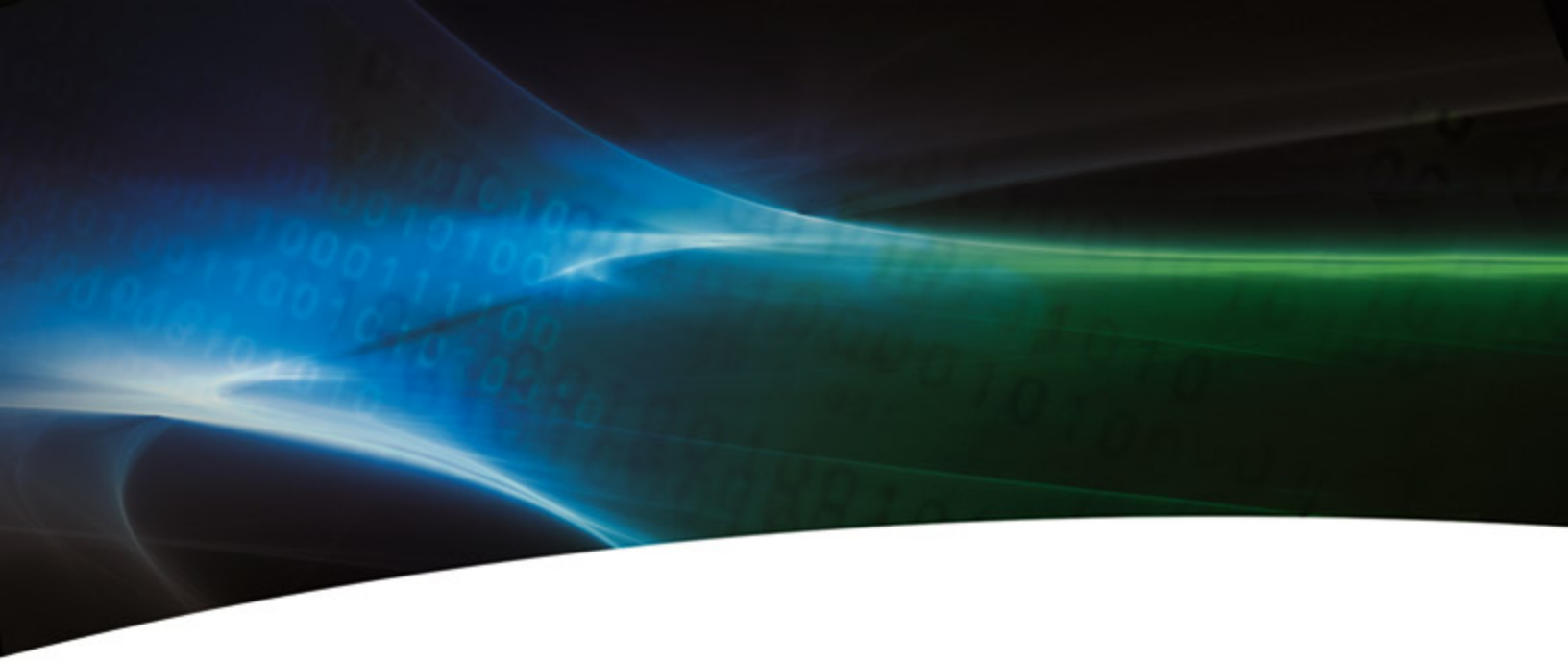

IBM High IOPS Adapter

Hardware Installation Guide

for ioMemory VSL 2.3.10

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Safety Information

DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.
- Connect all power cords to a properly wired and grounded electrical outlet.
- Connect to properly wired outlets any equipment that will be attached to this product.
- When possible, use one hand only to connect or disconnect signal cables.
- Never turn on any equipment when there is evidence of fire, water, or structural damage.
- Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.

Connect and disconnect cables as described in the following table when installing, moving, or opening covers on this product or attached devices.

To Connect	To Disconnect
1. Turn everything OFF. 2. First, attach all cables to devices. 3. Attach signal cables to connectors. 4. Attach power cords to outlet. 5. Turn device ON.	1. Turn everything OFF. 2. First, remove power cords from outlet. 3. Remove signal cables from connectors. 4. Remove all cables from devices.

Introduction

Overview

Congratulations on your purchase of a IBM solid-state storage device. This guide explains how to install your IBM High IOPS Adapter.

For information on installing software for your device, consult the *IBM ioMemory VSL User Guide* for your operating system.

NOTE Throughout this manual, when you see a reference to an **IBM High IOPS Adapter**, you may substitute your particular device(s), such as an IBM High IOPS Adapter or an IBM High IOPS Duo Adapter.

Software Compatibility

Compatible Software (Driver)

The ioMemory VSL is more than just a hardware driver, it is the "secret sauce" that gives IBM High IOPS Adapters their amazing performance. Each release of the ioMemory VSL software is compatible with certain IBM High IOPS Adapters.

For a list of devices that are compatible with the version of the ioMemory VSL that you are installing, consult the *IBM ioMemory VSL Release Notes* for that version.

Compatible Operating Systems

The operating system requirements depends on the version of ioMemory VSL that you are installing with this device.

For more information, consult the *IBM ioMemory VSL Release Notes* for the version you wish to install.

Hardware Requirements

PCIe Slots and Power Requirements

The minimum slot requirements for your IBM High IOPS Adapter depends on the type of product.

Attention Once you have installed the ioMemory VSL, you can use the `fio-pci-check` utility on most operating systems to see if the PCIe slot meets the bandwidth requirements.

IBM High IOPS Duo Adapters require at least:

- A PCI-Express (PCIe) Gen1 x4 slot, with at least 4 lanes that are electrically active.
- Clearance for a half-height, half-length PCI device.

IBM High IOPS Duo Adapters require at least:

- A PCIe Gen1 x8 slot or Gen2 x4 slot.
- A minimum of a **full-height**, half-length slot.

Adequate System Cooling

- **300 LFM**:To maximize the longevity and performance of IBM High IOPS Adapters, we recommend at least 300 Linear Feet per Minute (LFM) of airflow across the devices.
- **55°C Maximum**: The ambient air temperature around the device should not exceed 55°C.

Thermal throttling

In order to protect against thermal damage, the IBM High IOPS Adapter monitors the temperature of its onboard controller chip (This is reported by the `fio-status` command-line utility as "Internal temperature").

- In an attempt to contain temperatures within an optimal range, the ioMemory VSL will start throttling write performance once the controller temperature reaches 78°C.
- If the controller temperature continues to rise, the software will shut down the device once the controller temperature reaches the maximum operating temperature of 85°C.
- If the device is shut down due to insufficient cooling, reboot the system to re-enable the device.

  NOTE If your system logs indicate write-performance throttling due to high temperatures, consult your server's documentation for details on increasing airflow within your system (for example, by increasing the fans to **maximum** speed within the system via a BIOS setting).

High Performance/Power Mode

If your BIOS has a High Performance/Power Mode, enable it when using IBM High IOPS Adapters. Also disable any power-saving modes. This improves performance in two ways:

1. Prevents operating systems and the BIOS from suspending PCIe devices (using ASPM), including IBM High IOPS Adapters. IBM High IOPS Adapters do not support ASPM.
2. Maintains higher fan speeds to prevent thermal throttling.

Sufficient System Memory (RAM)

The ioMemory VSL software requires enough RAM to accelerate your IBM High IOPS Adapter. The RAM requirements depend on how your operating system tracks I/O's (average written block sizes), the capacity of your IBM High IOPS Adapters, and the version of the ioMemory VSL.

For more information, including a chart on RAM required per GB of IBM High IOPS Adapter capacity, consult the *IBM ioMemory VSL Release Notes* for the version of ioMemory VSL that you will install with the device(s).

Firmware Requirements

Your IBM High IOPS Adapter may have a minimum firmware label affixed (for example, "MIN FW: XXXXXX"). This label indicates the minimum version of the firmware that is compatible with your device.

NOTE For firmware and upgrade considerations, consult the *IBM ioMemory VSL Release Notes* for the version you wish to install.

IBM High IOPS Adapters

IBM High IOPS Adapter Options

Feature Code	Option Part Number	Description	PCIe Slot Required
0096	46M0877	IBM 160GB High IOPS SS Class SSD PCIe Adapter	Gen1 x4
0097	46M0878	IBM 320GB High IOPS SD Class SSD PCIe Adapter	Gen1 x8 or Gen2 x4
1649	46M0898	IBM 320GB High IOPS MS Class SSD PCIe Adapter	Gen1 x4
5985	81Y4519	640GB High IOPS MLC Duo Adapter for IBM System x	Gen1 x8 or Gen2 x4
A1NE	81Y4535	320GB High IOPS SLC Adapter for IBM system x	Gen1 x4
A1ND	81Y4539	640GB High IOPS SLC Duo Adapter for IBM System x	Gen1 x8 or Gen2 x4
A1NC	81Y4531	640GB High IOPS MLC Adapter for IBM System x	Gen1 x4
A1NB	81Y4527	1.28TB High IOPS MLC Duo Adapter for IBM System x	Gen1 x8 or Gen2 x4

Memory Attributes

Feature Code	NAND Type [1]	Total Memory	Memory Modules	Module Capacity	Maximum writes per memory module	Maximum writes per card
0096	SLC	160GB	1	160GB	75PB	75PB
0097	SLC	320GB	2	160GB	75PB	150PB [2]
1649	MLC	320GB	1	320GB	4PB	4PB
5985	MLC	640GB	2	320GB	4PB	8PB [2]
A1NE	SLC	320GB	1	320GB	50PB	50PB
A1ND	SLC	640GB	2	320GB	50PB	100PB [2]
A1NC	MLC	640GB	1	640GB	10PB	10PB
A1NB	MLC	1.28TB	2	640GB	10PB	20PB [2]

1. Single Level Cell (SLC), Multi Level Cell (MLC).
2. Assumes uniform distribution of writes across both memory modules.

In the Box

Your IBM High IOPS Adapter comes with these items:

- IBM High IOPS Adapter
- Quick Start Instructions
- USB Key

On the USB Key are the following items:

- Environmental Notices document
- Important Notices document

Additional Item(s)

Depending on your device, this additional item may be included (consult the installation instructions for item information):

- Half-height bracket, used on low-profile systems

Installing the Device

NOTE Please read the Hardware Requirements if you have not done so.
Be sure to retain your proof of purchase. It might be required for warranty service.

Installation Instructions

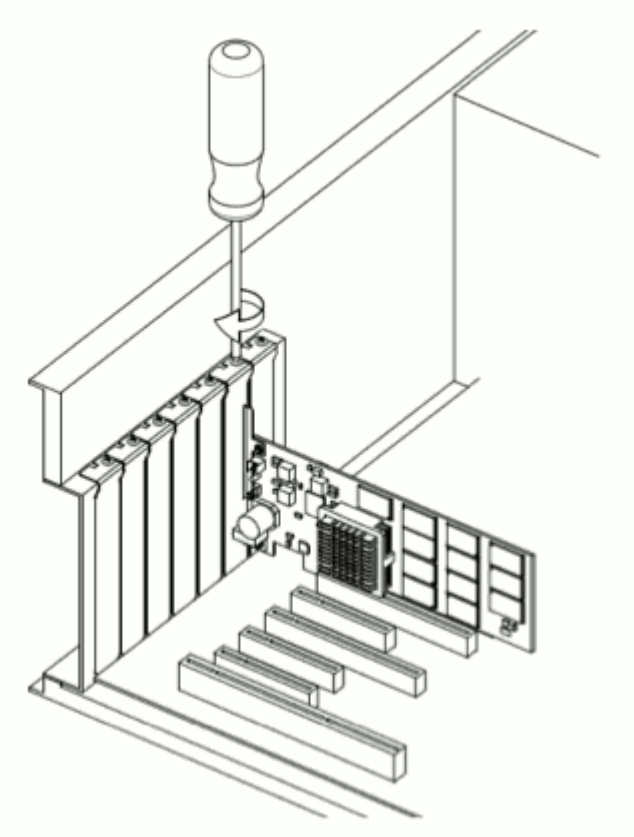
Attention Electrostatic discharge (ESD) can damage electronic components. Be sure that you are properly grounded before beginning any hardware installation procedure.

These installation instructions are for any IBM IBM High IOPS Adapter.

1. Locate the serial number label(s) on your device and record the number(s) for future reference.
   NOTE The serial number label(s) will have a number and a barcode.
   NOTE **Visible in fio-status**: Once the ioMemory VSL is installed, the device's serial number(s) will be visible in the `fio-status` ioMemory VSL utility.
2. **Optional Half-height Bracket:** If your product includes a half-height bracket (included with single IBM High IOPS Adapter products), and you are installing the device in a low-profile system, replace the full-height bracket before installing the device. Please refer to the Half-Height Bracket Installation section for details.
3. Turn off the computer and disconnect the power cable.
4. Remove the computer's access panel. Locate an available PCIe slot compatible with the device. See Hardware Requirements for PCIe slot requirements.
   NOTE Consult your computer's documentation for details on removing the panel and identifying PCIe slots.
5. Remove the cover slot (if applicable).

6. Grasp the IBM High IOPS Adapter by the top edge and seat it gently but firmly in the available PCIe slot, for example:

   Attention This illustration is an example of one type of IBM High IOPS Adapter, your specific device will install in the same manner.



7. Secure the IBM High IOPS Adapter's retaining bracket using a screw, lever, clasp, or other method (depending on how your hardware is configured, consult your computer's documentation).
8. Replace the computer's access panel.
9. Plug in the computer's power cable and turn on the computer.
10. Your operating system may detect the IBM High IOPS Adapter and ask if you want it to install a hardware driver for the device. In that case, click **Cancel**.

NOTE **Device Packaging**: Note: We recommend saving the product box in case you need to store or return your device. The ioMemory device product box is the safest way to store and transport your ioMemory device. It is made of ESD-safe materials, and protects the device from damage in shipping.

To remove the IBM High IOPS Adapter, follow the above instructions in reverse. Be sure to place the device in an ESD-safe package.

You are now ready to install the ioMemory VSL software. See the *IBM ioMemory VSL User Guide* based on your

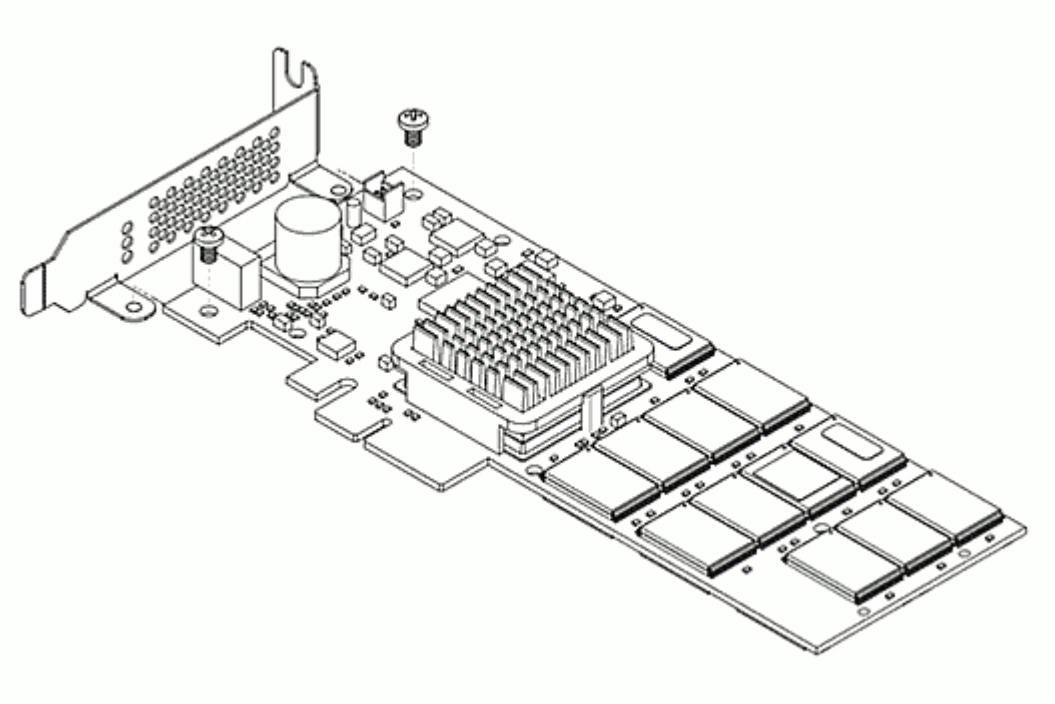
operating system.

Half-Height Bracket Installation

For half-height installation (such as in low-profile systems), you need to replace the full-height retaining bracket with the included half-height bracket.

Attention Electrostatic discharge (ESD) can damage electronic components. Be sure you are properly grounded before starting any hardware installation procedure.

1. Locate the half-height bracket in your IBM High IOPS Adapter package:
   Attention Use care in removing the retaining screws. Do not twist or pull on the bracket until both screws are out as this can cause damage to the components.
2. To prevent damage to the IBM High IOPS Adapter, use only a Phillips #1 tip screwdriver. Remove the two screws holding the full-height bracket to the IBM High IOPS Adapter
   Attention Take note of the position of the screws and how the bracket screw holes were inserted in the device. You must insert the half-height bracket holes in the same manner.
3. Remove the bracket carefully from the device.
4. Align the LEDs on the IBM High IOPS Adapter with the holes in the half-height bracket. Insert the bracket screw holes in the same manner as the full height bracket was inserted. Refer to the example below.



5. Attach the half-height bracket using a Phillips #1 tip screwdriver to tighten the two screws.
   Attention Do not over-tighten! This can cause damage to the device.

6. Return to Step 3 of the installation section to complete the install.

IBM Support

IBM High IOPS Adapter software and documentation are available on the web at the following address:

http://www.ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-5083174.

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