DLAP-401-Xavier

Edge Inference System

User's Manual



Manual Rev.: 1.0

Revision Date: May 10, 2022

Part No: 50M-00076-1000

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Leading **EDGE COMPUTING**

Revision History

Revision	Release Date	Description of Change(s)
1.0	2022-05-10	Initial release

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Preface

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Conventions

Take note of the following conventions used throughout this manual to make sure that users perform certain tasks and instructions properly.



Additional information, aids, and tips that help users perform tasks.



Information to prevent ***minor*** physical injury, component damage, data loss, and/or program corruption when trying to complete a task.

Informations destinées à prévenir les blessures corporelles mineures, les dommages aux composants, la perte de données et/ou la corruption de programme lors de l'exécution d'une tâche.



Information to prevent ***serious*** physical injury, component damage, data loss, and/or program corruption when trying to complete a specific task.

Informations destinées à prévenir les blessures corporelles graves, les dommages aux composants, la perte de données et/ou la corruption de programme lors de l'exécution d'une tâche spécifique.

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1 Introduction

ADLINK's DLAP-Xavier Edge Inference System harnesses the power of NVIDIA® Jetson™ AGX Xavier modules to realize industry-leading smart automation across a wide range of applications, enabling tasks such as automatic obstacle identifying, collision avoiding, safety navigation, detour adjustments, and automatic adjustments to a number of environmental factors.

DLAP-401-Xavier features intelligent, flexible, and robust computing power to automate intralogistic workflows in both industrial and commerical environments alike.

Boasting comprehensive industrial I/O and visual inferencing capabilities all in a compact system, DLAP-401-Xavier supports 1x HDMI display, 2x GbE ports, 3x USB 3.1 ports (plus a USB 3.1 Type-C OTG port for software updates), 1x eSATA port, 1x isolated CAN bus, 1x M.2 NVME/SATA (for additional storage options), and 1x M.2 slot to support Wi-Fi communications.

1.1 Features

- Deep learning acceleration with NVIDIA® Jetson™ AGX Xavier
- 3 x USB 3.1 Gen1, 2x GbE LAN, 1x Type Type-C USB 3.1 OTG
- Internal function expansions by M.2 E key 2230, M.2 B key 3042
- Compact system: 175(W) x 145(D) x 85(H) mm
- 24V DC input
- Additional storage by M.2 key 2242

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1.2 Specifications

Item	Description
System Core	
Module	NVIDIA® Jetson™ Xavier
Memory	32GB LPDDR4x (on module)
Storage	32GB eMMC 5.1 (on module)
Front Panel I/O Interface	
eSATA / USB 3.0	1x eSATA/USB combo
USB 3.0	3x Type-A
Pushbuttons	1x Power button 1x Reset button 1x Recovery button
Side Panel I/O Interface	
CAN Bus	1x CAN bus (DB-9 male)
USB-C 3.0	1x Type-C
HDMI	1x HDMI 2.0a Type A
Ethernet	2x GbE
External I/O Interface	
M.2 E Key	1x (2230)
M.2 B Key	1x (2242 / 3042)
USIM	1x USIM
Power	
DC Input	24V
AC Input	Optional160W AC-DC adapter
Fail Reset	Reset and recovery buttons
Buttons	Power button w/ LED indicator
Mechanical	
Antenna Holes	2x SMA
Dimensions	175(W) x 145(D) x 85(H) mm
Weight	2021g

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Environmental	
Operating Temperature	-20°C to 60°C (-4°F to 140°F)
Operating Humidity	93% RH @40°C (non-condensing)
Storage Temperature	-20°C to 80°C (-4°F to 176°F)
Altitude	Operating: < 2000 m
Vibration	Operating: 5 to 500 Hz, 1 G acceleration (IEC 60068-2-6)
Shock	Operating: 15G, half sine 11 ms (IEC 60068-2-6)
EMC	CE & FCC class B, (EN61000-6-4/-6-2/-3-3/-3-2)
Safety	IEC/CE standard
RF Regulations	FCCID
Substance Regulations	WEEE/ROHS/REACH compliant
Operating System Support	
Linux	Ubuntu for Tegra

Table 1-1: Specifications

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1.3 Mechanical Dimensions

All dimensions shown in millimeters (mm).

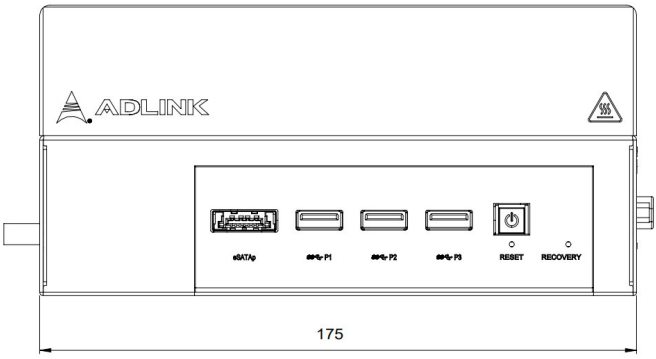


Figure 1-1: Front View Dimensions

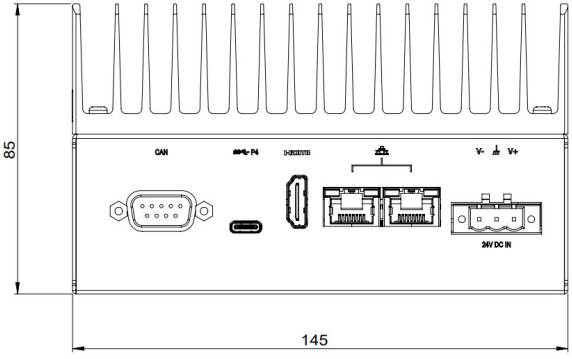


Figure 1-2: Side View Dimensions

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1.4 External Layout

Front Panel

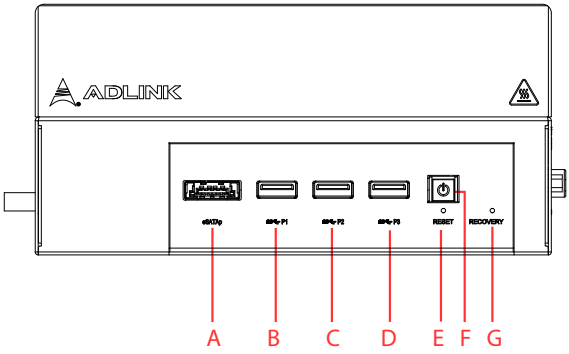


Figure 1-3: Front Panel I/O Connectors & Controls

Item	Name	Description
A	eSATA / USB 3.0 combo	See **Section 1.5.7 eSATA / USB Combo Connector**.
B - D	USB 3.0 x3	See **Section 1.5.2 USB 3.0 Connectors**.
E	Power button	The power button is a non-latched push button with a blue LED power indicator. If the system is powered off when the button is pressed, the system powers up and the blue LED lights up. If the system hangs, pressing and holding the button continuously for 5 seconds performs a hard shutdown on the system.
F	Reset button	The reset button executes a hard reset on the system.
G	Recovery button	Press this button to force the system into recovery mode. See **Section 3.2 System Recovery**.

Table 1-2: Front Panel I/O Connectors & Controls

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Side Panel

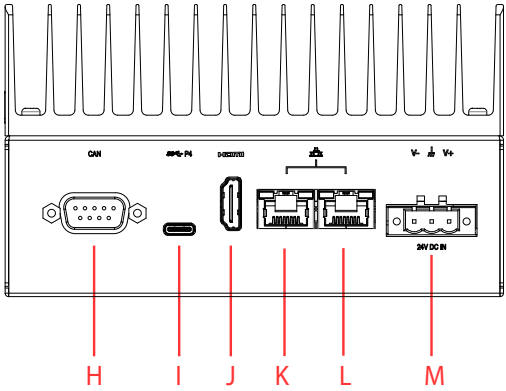


Figure 1-4: Side Panel I/O Connectors

Item	Name	Description
H	CAN bus	CAN 2.0B (only supported with Jetson Xavier NX, backward compatible with 2.0A)
I	USB 3.0 OTG Type-C	See **Section 1.5.6 USB 3.0 OTG Connector**.
J	HDMI port	HDMI 2.0
K	GbE connector (LAN 1)	GbE from Intel® I210
L	GbE connector (LAN 2)	GbE from NVIDIA® Jetson™ module
M	DC connector 24V	24V DC screw-type connector. See **Section 1.5.3 24 Volt DC Connector**.

Table 1-3: Side Panel I/O Connectors

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1.5 Pin Definitions

1.5.1 Ethernet GbE Connectors

The DLAP-401-Xavier comes with two RJ-45 connectors:

- Intel® I210 (LAN 1)
- NVIDIA® Jetson™ AGX Xavier (LAN 2)

LAN LED connection speed color indicators:

Rate	Speed (left) LED	Active & Link (right) LED
10Mbps	N/A	Blinks orange
100Mbps	Lights orange	
1Gbps	Lights green	

1.5.2 USB 3.0 Connectors

The USB 3.0 ports support a USB Type-A connection, compatible with SuperSpeed, Hi-Speed, full-speed, and low-speed USB devices. It is suitable for USB peripherals including USB cameras.

The following table provides details for the USB pin connections.

Pin #	Signal Name
1	USB3.0_P5VA
2	USB2_CMAN
3	USB2_CMAP
4	GND
5	USB3A_CMRXN
6	USB3A_CMRXP
7	GND
8	USB3A_CMTXN
9	USB3A_CMTXP

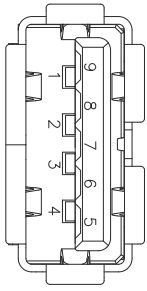
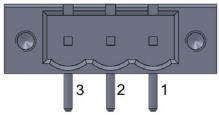


Table 1-4: USB 3.0 Pin Definition

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1.5.3 24 Volt DC Connector

The system requires a DC power source via a Eurostyle terminal block.



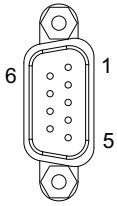
Pin	Signal
1	DC in P
2	DGND
3	DC in N

Table 1-5: 24 Volt DC Connector Pin Definition

1.5.4 CAN (Controller Area Network) Bus

The Controller Area Network (CAN) enables communication among devices. The table below provides CAN bus pin information.

Pin	Signal	Description
1	NC	(Not connected)
2	CAN_Low	Differential CAN signal negative level
3	GND	CAN interface ground
4	NC	(Not connected)
5	NC	(Not connected)
6	GND	CAN interface ground
7	CAN_High	Differential CAN signal positive level
8	NC	(Not connected)
9	NC	(Not connected)

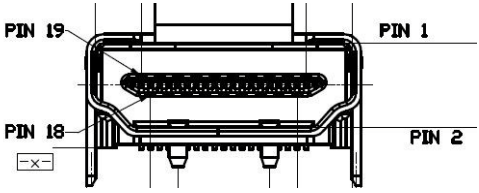


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1.5.5 CAN Bus Pin Definition

HDMI Connector

The side panel supports HDMI 2.0.



Pin #	Signal	Pin #	Signal
1	HDMI_TX2_P	2	GND
3	HDMI_TX2_N	4	HDMI_TX1_P
5	GND	6	HDMI_TX1_N
7	HDMI_TX0_P	8	GND
9	HDMI_TX0_N	10	HDMI_CLK_P
11	GND	12	HDMI_CLK_N
13	CEC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	+5 V Power
19	Hot Plug Detect	20	GND
21	GND	22	GND
23	GND		

Table 1-6: HDMI Connector Pin Definition

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1.5.6 USB 3.0 OTG Connector

The DLAP-401-Xavier supports a USB 3.0 OTG Type-C connection for system recovery. The pin definition is as follows.



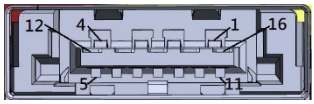
Pin #	Signal	Pin #	Signal
A1	GND	A2	SSTXp1
A3	SSTXn1	A4	VBUS
A5	CC1	A6	Dp1
A7	Dn1	A8	SBU1
A9	VBUS	A10	SSRXn2
A11	SSRXp2	A12	GND
B1	GND	B2	SSTXp2
B3	SSTXn2	B4	VBUS
B5	CC2	B6	Dp2
B7	Dn2	B8	SBU2
B9	VBUS	B10	SSRXn1
B11	SSRXp1	B12	GND

Table 1-7: USB 3.0 OTG Connector Pin Information

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1.5.7 eSATA / USB Combo Connector

The front panel supports an eSATA / USB 3.0 combo connector. The pin definition is as follows.



Pin #	Signal	Pin #	Signal
1	VBUS	2	D-
3	D+	4	GND
5	GND	6	A+
7	A-	8	GND
9	B-	10	B+
11	GND	12	SSRX-
13	SSRX+	14	GND
15	SSTX-	16	SSTX+

Table 1-8: eSATA / USB Connector Pin Information

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1.6 DIP Switch Configurations

The DLAP-401-Xavier provides 2 mode switches:

- M.2 mode DIP switch
- AT power mode DIP switch

1.6.1 M.2 DIP Switch

SW5			
Interface	**#1**	**#2**	**Device / application**
USB	ON	OFF	LTE
SATA (default)	OFF	ON	SSD
2x PCIe	OFF	OFF	NVME

Table 1-9: M.2 DIP Switch

1.6.2 AT Power Mode Switch

SW7		
Mode	**#1**	**#2**
Disable auto power on (default)	ON	ON
Enable auto power on	OFF	ON

Table 1-10: AT Power Mode Switch

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2 Getting Started

2.1 Unpacking Checklist

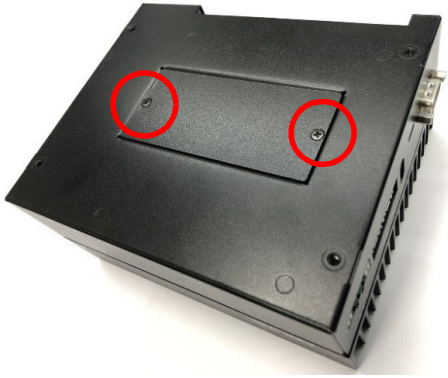
Before unpacking, check the shipping carton for any damage. If the shipping carton and/or contents are damaged, inform your dealer immediately. Retain the shipping carton and packing materials for inspection. Obtain authorization from your dealer before returning any product to ADLINK. Ensure that the following items are included in the package.

- DLAP-401-Xavier unit
- (Optional) AC-DC adapter 160W 24V, 6.67A

2.2 Removing the Chassis Cover

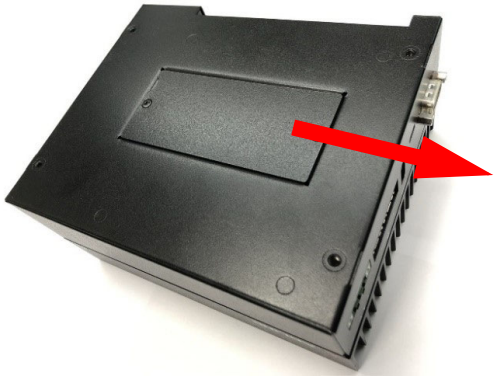
To add additional storage by installing M.2 B key 2242 SATA or NVME PCIe x2 SSD, remove the underside of the chassis as follows.

1. On the underside of the device, remove the two screws indicated by the red circles in the figure below.



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2. Slide the cover in the direction indicated by the red arrow to the position shown below.





Reverse the steps above to replace the bottom cover.

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2.3 Installing an M.2 SSD Module

Use the following steps to install an M.2 SSD module.

1. Insert the M.2 2242 B key module into the indicated slot at an angle.



Figure 2-1: M.2 Slot

2. Press down on the M.2 module until it is seated, then secure it with one M2.5-P-head-L5 screw (not provided).
3. Replace the bottom cover of the chassis.

CAUTION:

Take care not to remove or damage any wires while installing the module.
Veillez à ne pas retirer ou endommager les fils lors de l'installation du module.

2.4 Installing a Wi-Fi Module

Use the following steps to install an M.2 E key Wi-Fi module.

1. Insert the Wi-Fi module into the indicated slot at an angle.



Figure 2-2: Mini PCIe Wi-Fi Slot

2. Press down on the module until it is seated, then secure it to the board using two M2.5-P-head-L5 screws (not provided).
3. Attach the wires and antennas that came with your Wi-Fi kit.
4. Replace the bottom cover of the chassis.

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2.5 Connecting DC Power



Before providing DC power to the DLAP-401-Xavier, ensure the voltage and polarity provided are compatible with the DC input. Improper input voltage and/or polarity can be responsible for system damage.

Avant de connecter le PC DLAP-401-Xavier à une source de courant continu, veuillez vous assurer de la polarité de la tension conformément à l'entrée CC du PC. Une tension et/ou une polarité incorrectes peuvent causer des dommages irréversibles sur le système.

DC power sources must comply with ES1 circuits as well as the following:

- IEC 62368-1 + IEC 60950-1 + UL 62368-1
- Output voltage: 24 VDC
- Output current: 6.67A minimum
- TMA: 60°C minimum

The DLAP-401-Xavier DC power input connector uses V+, V-, and chassis ground pins and accepts input voltage as shown previously.

Customers may optionally order a DC power adapter from ADLINK.

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2.6 Mounting (Optional)

Optional Mounting Kit (91-95221-0000) for DLAP-401-Xavier provides the following:

- Wall Mount BKT A3a170042B*2
  (34-34255-1000-B0)
- Screw M4, P-head, L6, Toothed Washer Nylok*4
  (33-04202-0060

)

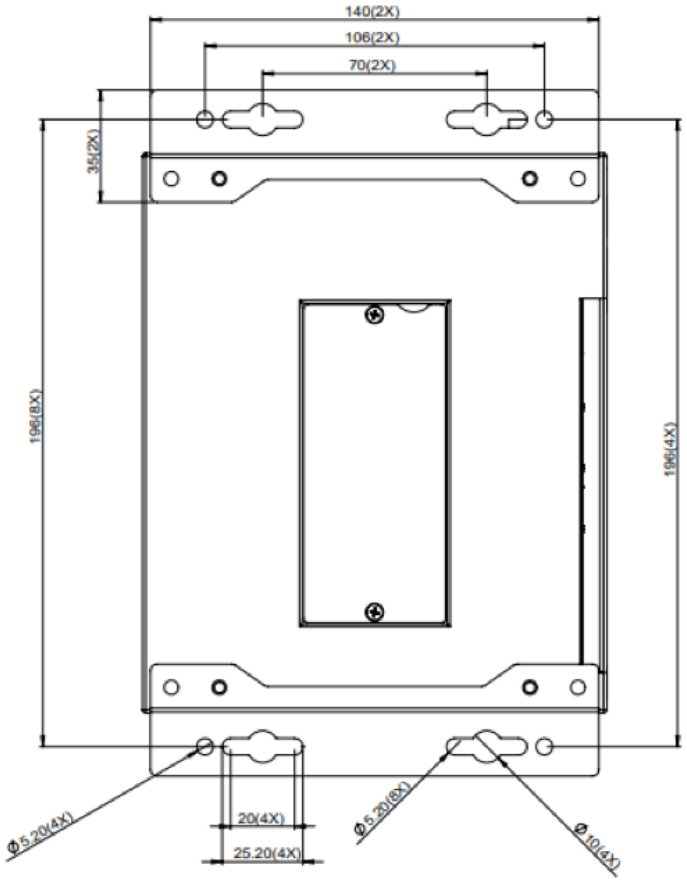


Figure 2-3: Wall Mount

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3 Using the System

3.1 Software Configuration

The DLAP-401-Xavier ships with a customized NVIDIA Linux for Tegra (L4T) image pre-installed. The latest version of this custom L4T image and other relevant files are available on the ADLINK website:

https://www.adlinktech.com/Products/Deep_Learning_Accelerator_Platform_and_Server/Inference_Platform/DLAP-401-Xavier

3.2 System Recovery

You will need a Linux host PC (Ubuntu is recommended) in order to flash your client device with a new system image. Note the locations of DLAP-401-Xavier's power, reset, and recovery buttons and complete the following steps on it before performing the host PC steps.

Client (DLAP-401-Xavier):

1. Connect the OTG (Type-C) cable to the USB 3.0 port.
2. Press the power button to power on the device.
3. Press and hold the recovery button and then press the reset button.
4. Release the reset button.
5. Release the recovery button.

Host PC:

1. Install Python 2.7, python-minimal (or equivalent packages) and qemu-user-static on the host PC.
2. Connect the host PC to the client via OTG cable.
3. Open a terminal on the host PC and run this command:

```
# lsusb
```

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4. Look for “NVidia Corp.” in the output (an example is circled in red in the screenshot below). If found, the host PC recognizes the client and you may proceed. If not, double-check the OTG cable connection and perform troubleshooting as needed until the client is recognized.

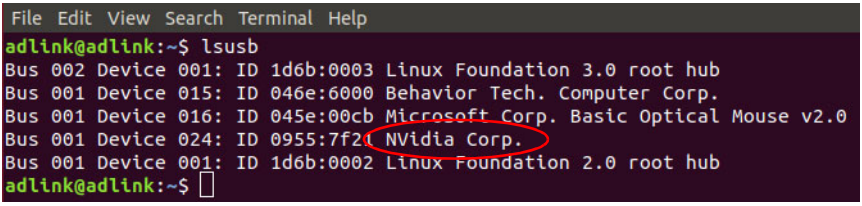


Figure 3-1: Successful USB Connection

5. Now run the following commands in the directory that contains your downloaded L4T file:

```
# sudo tar xzvf mfi_jetson-xavier-<version>.tbz2
# cd mfi_jetson-xavier-<version>
# sudo ./nvmflash.sh
```

6. Allow the update to complete.

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3.3 CAN Bus Configuration

By default, the DLAP-401-Xavier is configured to support the CAN bus protocol.

The loopback test commands are as follows:

```
# ifconfig can0 down
# ip link set can0 type can bitrate 500000 dbitrate
  20000000 berr-reporting on fd on
# ip link set up can0

# cansend can0 123#0101020300050607   //send data

# candump can0 > recv.txt &           //recv data

# cat recv.txt
```

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Important Safety Instructions

For user safety, please read and follow all instructions, Warnings, Cautions, and Notes marked in this manual and on the associated device before handling/operating the device, to avoid injury or damage.

S'il vous plaît prêter attention stricte à tous les avertissements et mises en garde figurant sur l'appareil , pour éviter des blessures ou des dommages.

- Read these safety instructions carefully.
- Keep the User's Manual for future reference.
- Read the Specifications section of this manual for detailed information on the recommended operating environment.
- The device can be operated at an ambient temperature of 55ºC.
- When installing/mounting or uninstalling/removing device, or when removal of a chassis cover is required for user servicing:
  - Turn off power and unplug any power cords/cables.
  - Reinstall all chassis covers before restoring power.
- To avoid electrical shock and/or damage to device:
  - Keep device away from water or liquid sources.
  - Keep device away from high heat or humidity.
  - Keep device properly ventilated (do not block or cover ventilation openings).
  - Always use recommended voltage and power source settings.
  - Always install and operate device near an easily accessible electrical outlet.
  - Secure the power cord (do not place any object on/over the power cord).
  - Only install/attach and operate device on stable surfaces and/or recommended mountings.
- If the device will not be used for long periods of time, turn off and unplug it from its power source
- Never attempt to repair the device, which should only be serviced by qualified technical personnel using suitable tools

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- A Lithium-type battery may be provided for uninterrupted backup or emergency power.


CAUTION:

Risk of explosion if battery is replaced with one of an incorrect type; please dispose of used batteries appropriately.
Risque d'explosion si la pile est remplacée par une autre de type incorrect. Veuillez jeter les piles usagées de façon appropriée.

- The device must be serviced by authorized technicians when:
  - The power cord or plug is damaged.
  - Liquid has entered the device interior.
  - The device has been exposed to high humidity and/or moisture.
  - The device is not functioning or does not function according to the User's Manual.
  - The device has been dropped and/or damaged and/or shows obvious signs of breakage.
- Disconnect the power supply cord before loosening the thumbscrews and always fasten the thumbscrews with a screwdriver before starting the system up.
- It is recommended that the device be installed only in a server room or computer room where access is:
  - Restricted to qualified service personnel or users familiar with restrictions applied to the location, reasons therefor, and any precautions required.
  - Only afforded by the use of a tool or lock and key, or other means of security, and controlled by the authority responsible for the location.

	**BURN HAZARD** Touching this surface could result in bodily injury. To reduce risk, allow the surface to cool before touching. ***RISQUE DE BRÛLURES*** *Ne touchez pas cette surface, cela pourrait entraîner des blessures.* *Pour éviter tout danger, laissez la surface refroidir avant de la toucher.*

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Getting Service

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