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Introduction



WELCOME

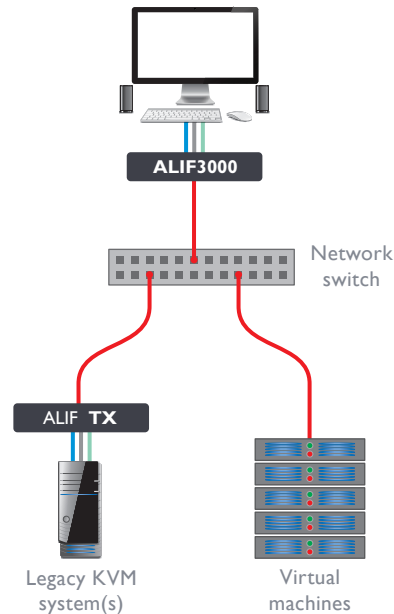
Thank you for choosing the ADDERLink™ INFINITY 3000 (aka ALIF3000), a member of the wide ranging ADDERLink INFINITY family of advanced extenders. The ALIF3000 receiver has been created to address the growing requirement to connect users to both physical and virtual machines. Using standard VDI (Virtual Desktop Infrastructure) protocols ALIF3000 delivers seamless access to legacy KVM systems as well as Virtual Machine (VM) sources, from the same set of peripherals (the console).

Like all products within the ADDERLink INFINITY family, ALIF3000 is fully administered by the AIM application to allow centralized, secure management of all aspects. *Note: ALIF3000 can only be used under AIM control.*

Dual DisplayPort™ video outputs provide support for a two displays up to UHD resolutions (3840 x 2160). VDI sessions can run at UHD. Connections to AdderLink Infinity KVM sources are limited to a single 2560 x 1600 source or two at a maximum 1920x1200 resolution (60Hz refresh).

Gigabit connections

The ALIF3000 receiver has two SFP ports located on its rear panel, which can accommodate a range of fiber or copper networking modules, as suits your installation. Each port can be connected to a separate gigabit fiber (or copper) network to permit access to a wider range of systems. A third network port (RJ45) is also provided to allow separate access, where necessary, to a corporate network to gain the VM hosting configuration data. All three connections are securely isolated within the ALIF3000 to prevent any cross contamination between networks.



Features

- Full management via ADDERLink INFINITY Manager (AIM).
- Pixel-perfect picture quality.
- Multiple 1Gb Ethernet links.
- Support for multiple remote access protocols:
 - RDP (Remote Desktop Protocol)
 - SSH (Secure SHell)
 - HTML5
 - VNC®
- Adder's USB True Emulation for USB 2.0 switching.
- Bi-directional analog audio.
- Backwards compatibility with existing ADDERLink INFINITY range.

Safety

Please refer to the safety booklet provided in the box before use of this product.

Technical Specifications

Operating/storage conditions

Operating temperature:	0 to 40°C / 32 to 104°F
Storage temperature:	0 to 40°C / 32 to 104°F
Storage and operating relative humidity:	10 to 90% non-condensing
Altitude:	< 2000m

Power

External power:	12VDC, 5A
Typical power consumption:	20W
Maximum capacity:	60W

Physical

Dimensions	(D) 210mm/8.3" x (W) 215mm/8.5" x (H) 40mm/1.6"
Weight:	1.8kg / 4 lbs

Case material

Aluminium and steel construction

Connectors

Desk:	2x DisplayPort™ 6x USB type A 3x 3.5mm audio jack sockets
Ethernet:	1x 8p8c (RJ45) 2x SFP+ cages
Power:	3-pin Kycon socket

USB

6 ports of USB2.0 with USB True Emulation enable connection to any USB human interface device from mice and keyboards through to graphics tablets, jog shuttles, joysticks and 3D explorers.

Video resolutions

Dual DisplayPort™ video outputs provide support for a two displays up to UHD resolutions (3840 x 2160). VDI sessions can run at UHD . Connections to AdderLink Infinity KVM sources are limited to a single 2560 x 1600 source or two at a maximum 1920x1200 resolution (60Hz refresh).

Audio

Analog Line in/out 2 channel 16bit 48KHz 1V RMS in / 1V RMS out. The microphone port can be boosted 20dB with Mic Boost.

Ethernet

1GbE via copper or fiber SFP modules

Packing Box

Dimensions:	(D) 285mm/11.2" x (W) 245mm/9.6" x (H) 145mm/5.7"
Weight:	2.5kg / 5.5lb

Approvals / Compliance

CE and FCC: See the compliance web page for the full list

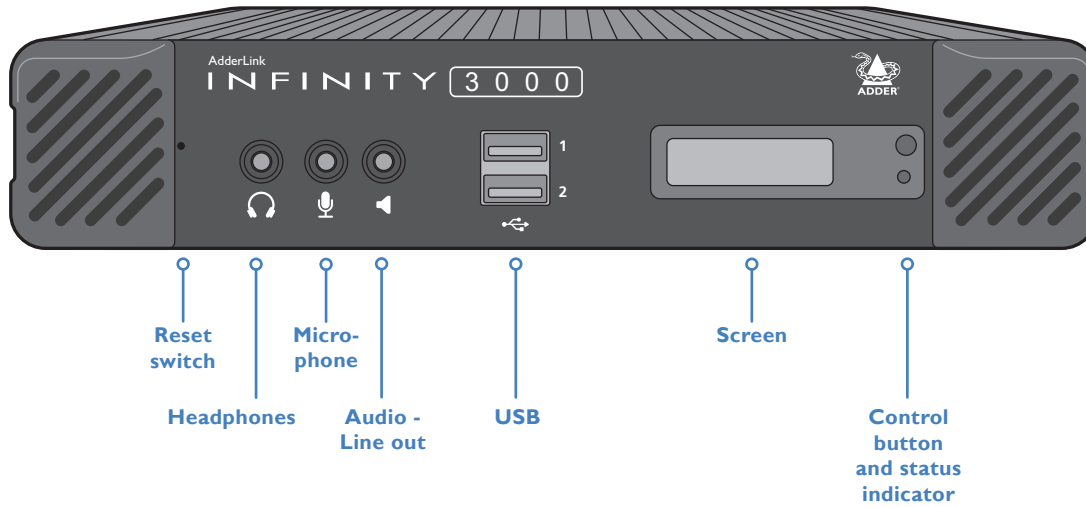
Product information labels

The product information labels are located on the base of each unit

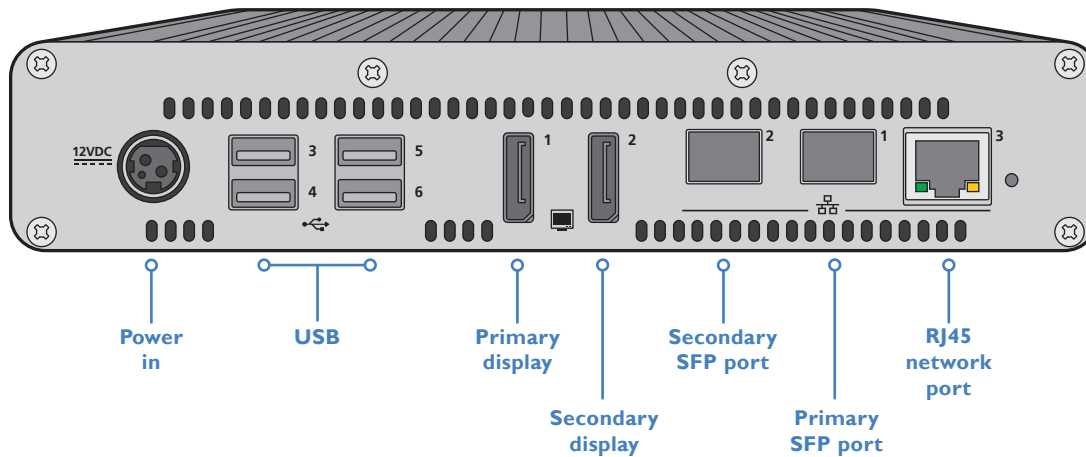
ALIF3000 UNIT FEATURES

ALIF3000 units are housed within durable, vented enclosures, with connectors situated on the front and rear panels. The front face also features an information screen with a control button (to scroll through the various informational pages) and also a status indicator.

Front



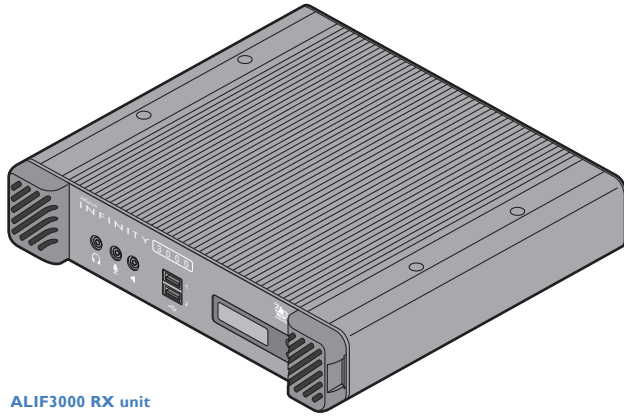
Rear



Note: Units shipped before July 1st 2020, will have their network link ports incorrectly labeled in the order (L to R): 1, 2, 3.

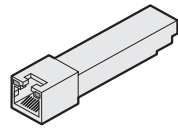
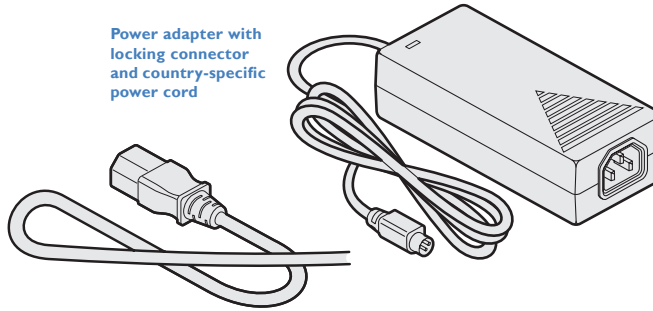
SUPPLIED ITEMS

ALIF3000 package

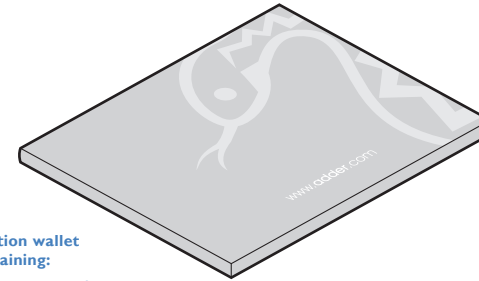


ALIF3000 RX unit

Power adapter with locking connector and country-specific power cord



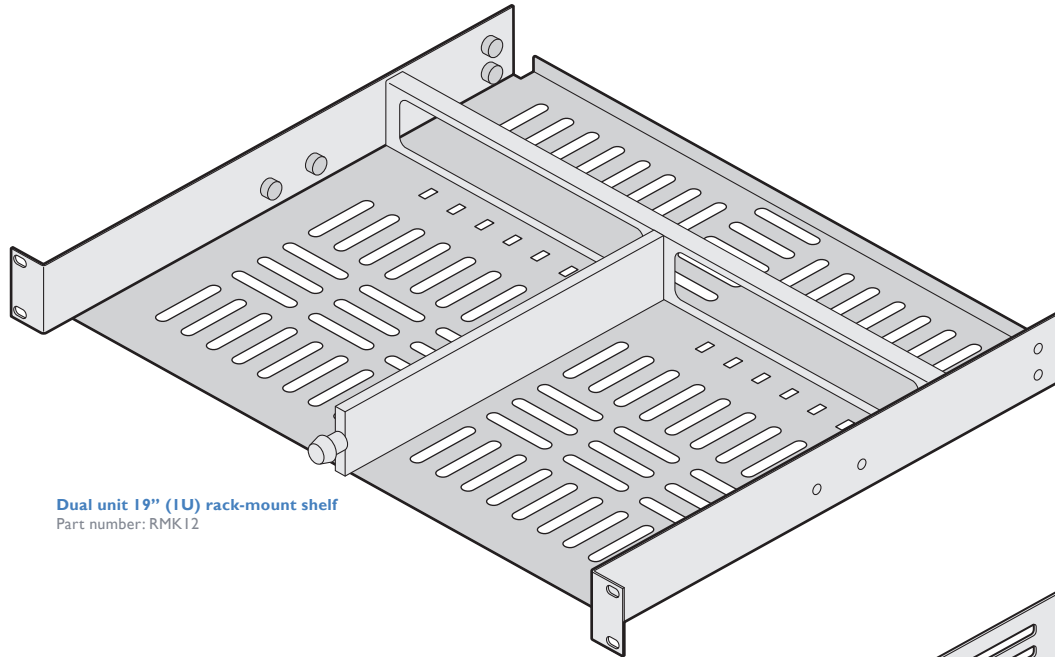
1GbE copper SFP module



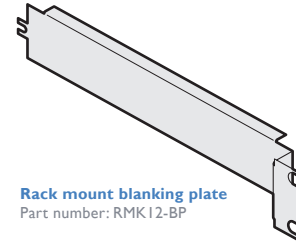
Information wallet containing:

- Four self-adhesive rubber feet
- Quick start guide
- Safety document

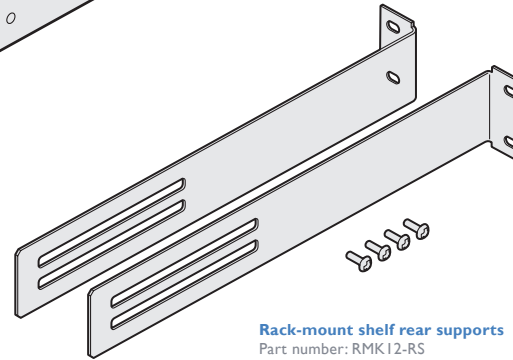
OPTIONAL EXTRAS



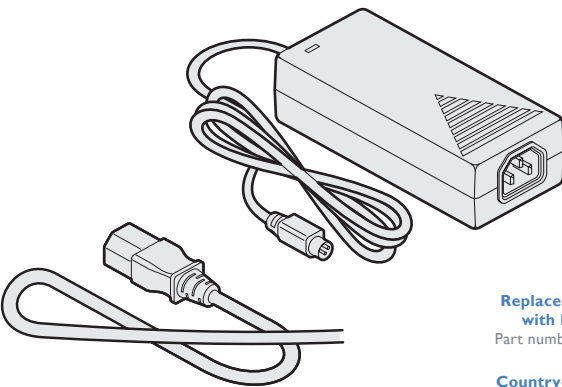
Dual unit 19" (1U) rack-mount shelf
Part number: RMK12



Rack mount blanking plate
Part number: RMK12-BP

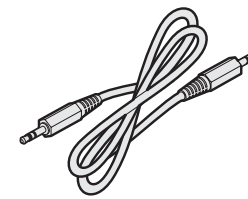


Rack-mount shelf rear supports
Part number: RMK12-RS

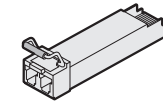


Replacement power adapter with locking connector
Part number: PSU-IEC-12VDC-5A

- Country-specific power cords**
- CAB-IEC-AUS (Australia)
 - CAB-IEC-EURO (Central Europe)
 - CAB-IEC-UK (United Kingdom)
 - CAB-IEC-USA (United States)
 - CAB-IEC-JP (Japan)
 - CAB-IEC-CN (China)

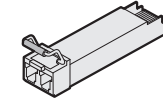


Audio cable 2m (3.5mm stereo jacks)
Part number: VSC22

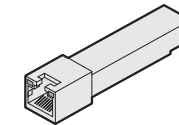


1GbE single mode fiber SFP module
Part number: SFP-SM-LC

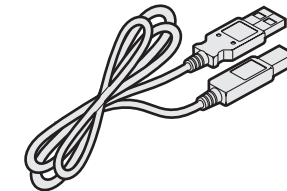
Please refer to the table in [Appendix E](#) for information about fiber modules and cables



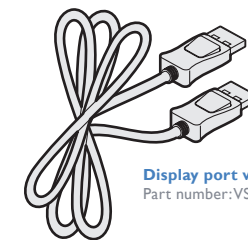
1GbE multi mode fiber SFP module
Part number: SFP-MM-LC



1GbE copper SFP module
Part number: SFP-CATX-RJ45



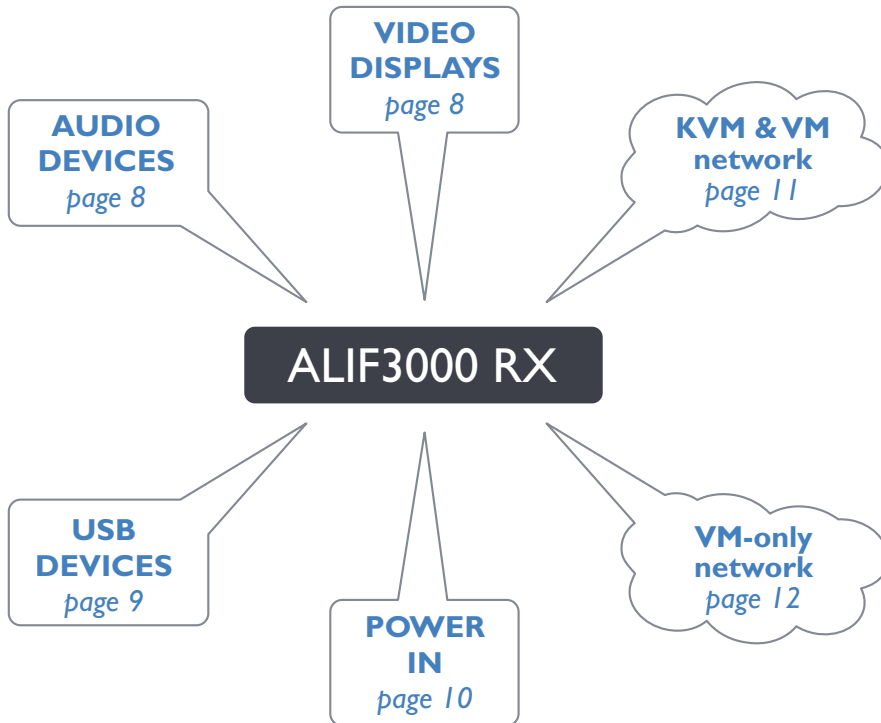
USB cable 2m (type A to B)
Part number: VSC24



Display port video cable 2m
Part number: VSCD10A

CONNECTIONS

Installation involves linking an ALIF3000 unit to networks and your peripherals (collectively known as the *Console*):



Click a connection to see details

MOUNTING

Please see [Appendix F](#) for details about mounting options for ALIF units.

IMPORTANT: When mounting the ALIF units (and their power adapters), ensure that the vents are not obscured and that there is sufficient airflow. The operating temperature range is 0 to 40°C (32 to 104°F) and must not be exceeded.

IMPORTANT: To install and configure ALIF units using an ADDERLink™ INFINITY Management (AIM) server it is necessary for the ALIF units to start up with factory default settings. The AIM server will not discover new ALIF units that are not in the require state. If necessary, perform a [factory reset](#) on the ALIF unit.

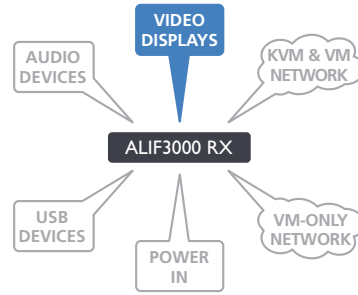
Please also see [Appendix B - Tips for success when networking ALIF units](#)

Suitable for installation in Information Technology Rooms in accordance with Article 645 of the National Electrical Code and NFPA 75.

Peut être installé dans des salles de matériel de traitement de l'information conformément à l'article 645 du National Electrical Code et à la NFPA 75.

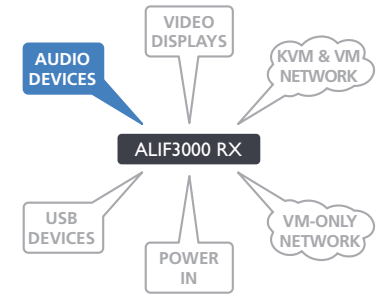
Video displays

An ALIF3000 unit supports two video displays, each up to 1920 x 1200 or a single display at 3840 x 2160, with refresh rates up to 60Hz.



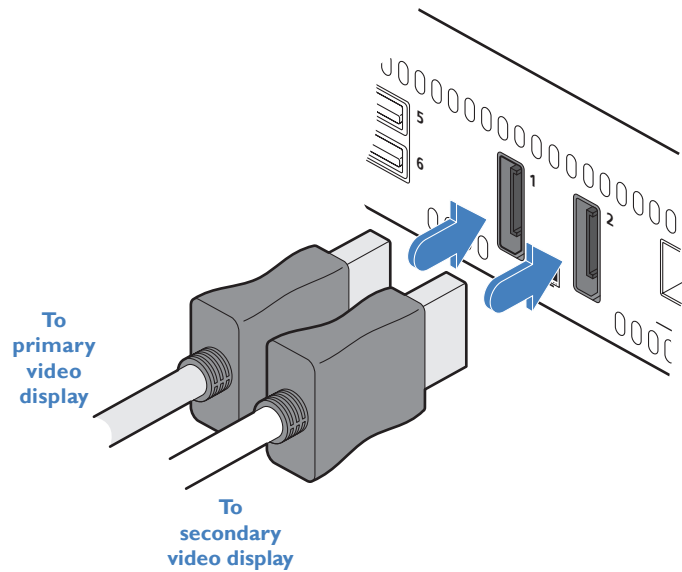
Audio

An ALIF3000 unit provides separate microphone, speaker and headphone sockets.



To connect video displays

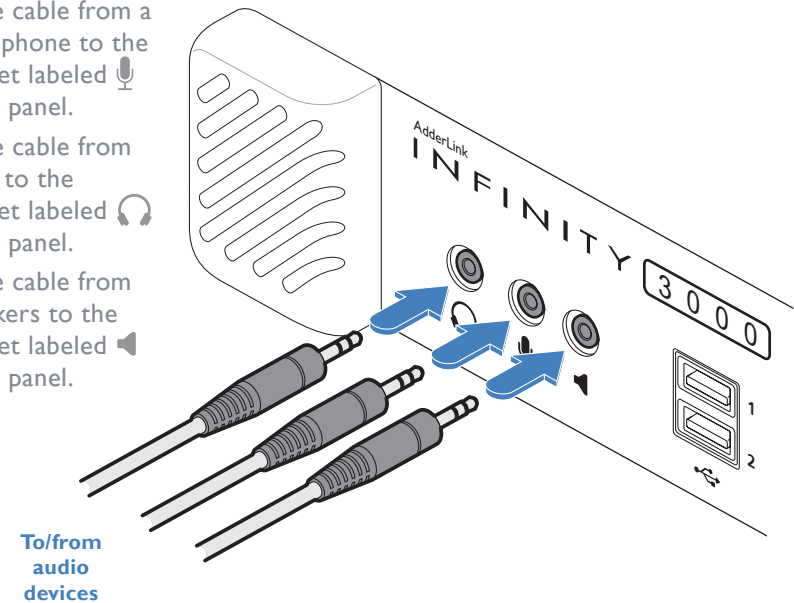
- 1 Connect the cable from the primary video display to the DisplayPort™ socket marked '1' on the rear panel:



- 2 If required, connect the cable from the second video display to the DisplayPort socket marked '2' on the rear panel.

To connect a microphone, headphones and/or speakers

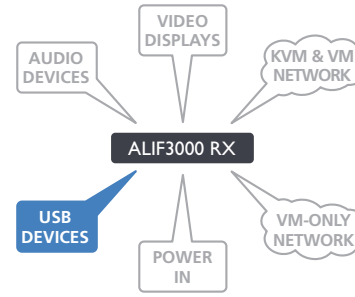
- 1 Connect the cable from a mono microphone to the 3.5mm socket labeled on the front panel.
- 2 Connect the cable from headphones to the 3.5mm socket labeled on the front panel.
- 3 Connect the cable from stereo speakers to the 3.5mm socket labeled on the front panel.



USB devices

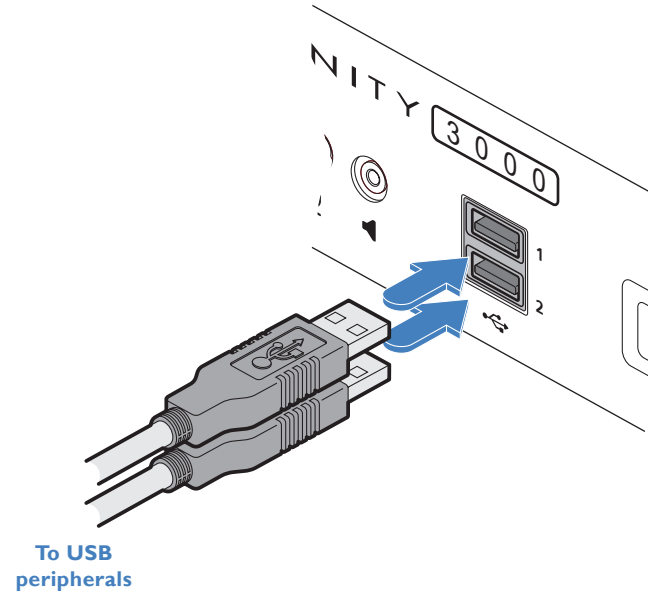
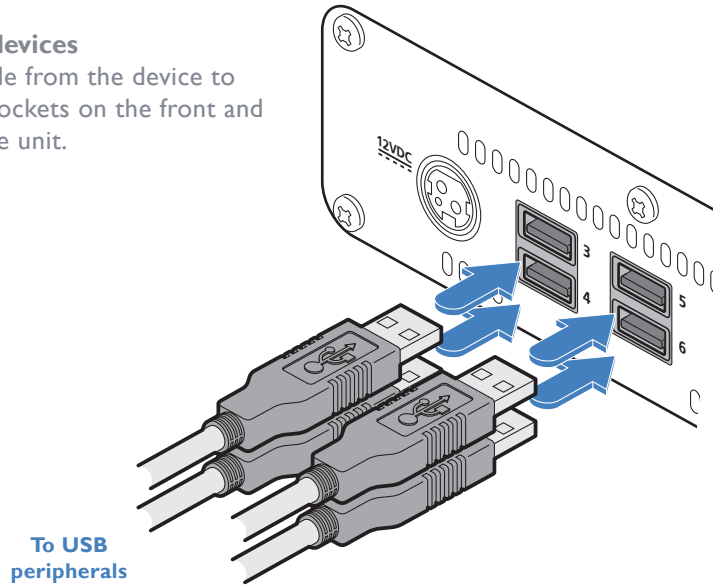
The ALIF3000 unit has six USB ports (two on the front panel and four on the rear) to which peripherals may be connected. When administered by AIM, only the four USB ports on the rear panel will receive special configuration.

To connect more than six peripherals, one or more USB hubs may be used. The total current that may be drawn in total from all of the USB ports is 1.2A, which should be sufficient for a keyboard, mouse (no more than 100mA each) and any two other devices (500mA maximum each). If more power for USB devices is required, use a powered USB hub.



To connect USB devices

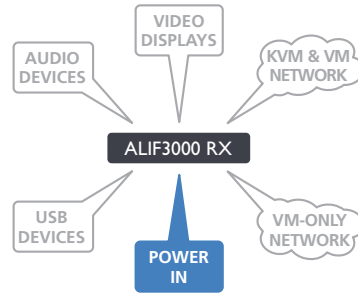
1 Connect the cable from the device to any of the USB sockets on the front and rear panels of the unit.



Power in

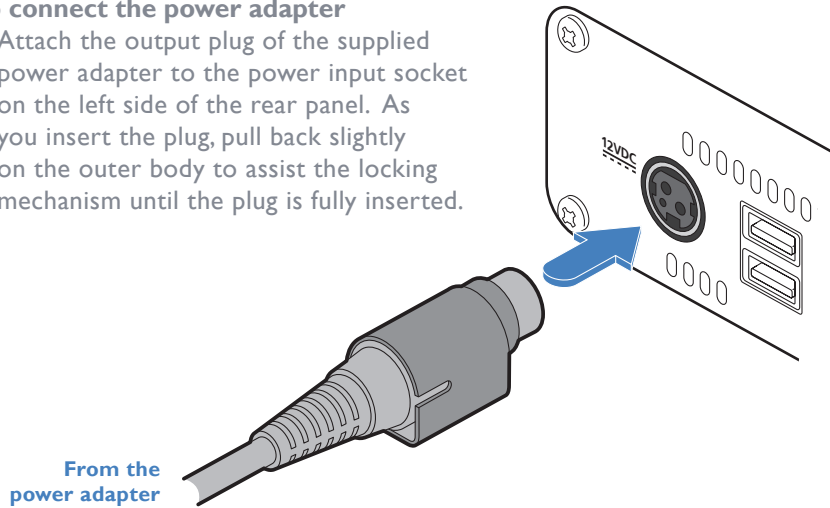
A power adapter is supplied with a country-specific power cord. The power adapter uses a locking-type plug to help prevent accidental disconnection; please follow the instructions shown on the right when disconnecting a power adapter.

Note: When first powered on and booting up, the indicators and screen of an ALIF3000 unit will not respond for approximately 40 seconds.

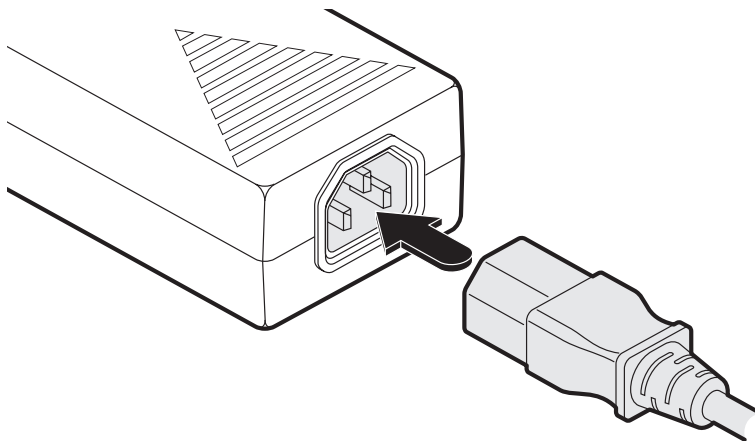


To connect the power adapter

1 Attach the output plug of the supplied power adapter to the power input socket on the left side of the rear panel. As you insert the plug, pull back slightly on the outer body to assist the locking mechanism until the plug is fully inserted.



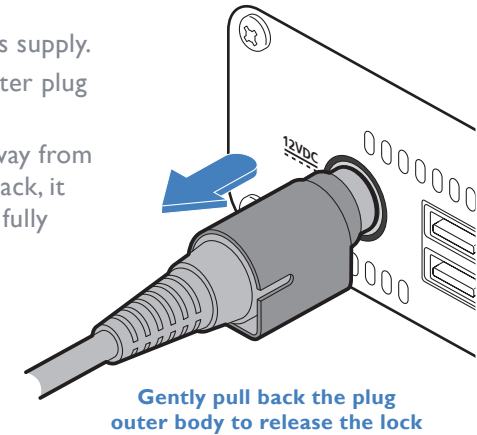
2 Insert the IEC connector of the supplied country-specific power cord to the socket of the power adapter.



3 Connect the power cord to a nearby mains supply socket.

To disconnect the power adapter

- 1 Isolate the power adapter from the mains supply.
- 2 Grasp the outer body of the power adapter plug where it connects with the unit.
- 3 Gently pull the body of the outer plug away from the unit. As the body of the plug slides back, it will release from the socket and you can fully withdraw the whole plug.



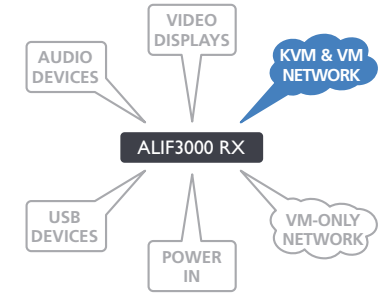
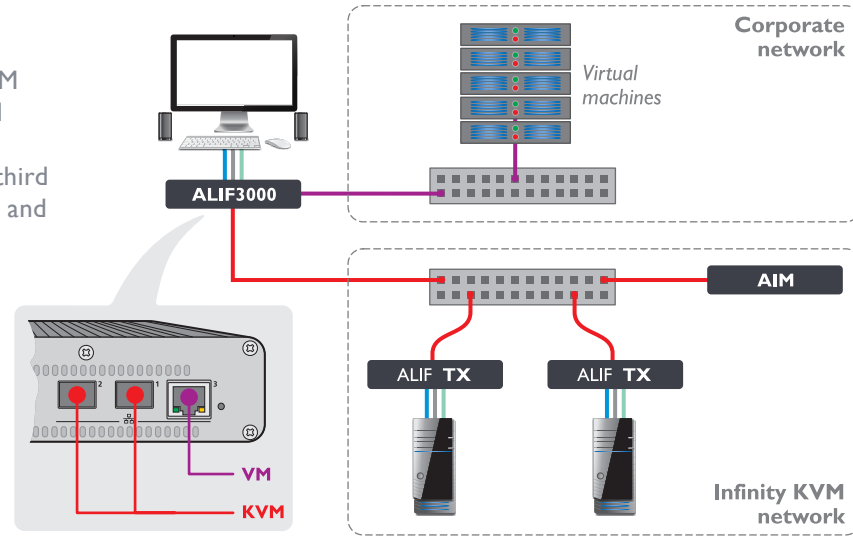
IMPORTANT: Please read and adhere to the electrical safety information given within the Safety information booklet provided with this product. In particular, do not use an unearthed power socket or extension cable.

Note: The unit and the power adapter generate heat when in operation and will become warm to the touch. Do not enclose them or place them in locations where air cannot circulate to cool the equipment. Do not operate the equipment in ambient temperatures exceeding 40 degrees Centigrade. Do not place the products in contact with equipment whose surface temperature exceeds 40 degrees Centigrade.

KVM network links

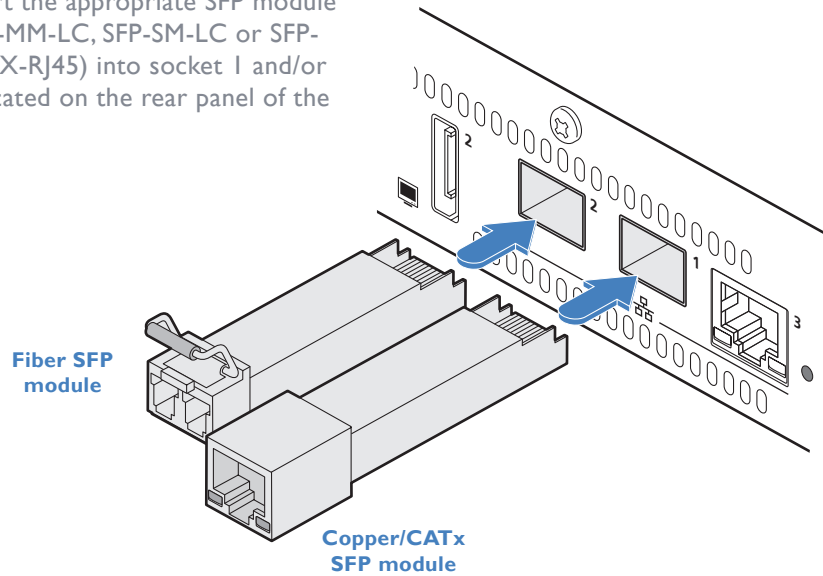
Two SFP ports are located on the rear panel to allow connections to Infinity KVM networks. Access to the AIM server is only possible through these ports. VM (Virtual Machine) access is only possible through these ports if expressly permitted by the network configuration. The third (RJ45) port (see next page) is used solely for VM access and does not support KVM connections.

Note: Units shipped before July 1st 2020, will have their network link ports incorrectly labeled in the order (L to R): 1, 2, 3

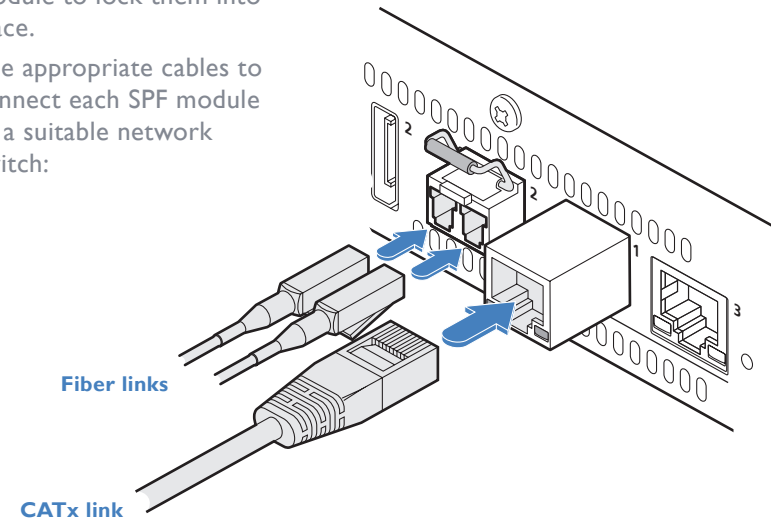


To connect with KVM networks

1 Insert the appropriate SFP module (SFP-MM-LC, SFP-SM-LC or SFP-CATX-RJ45) into socket 1 and/or 2 located on the rear panel of the unit:



- 2 Close the latch of each SFP module to lock them into place.
- 3 Use appropriate cables to connect each SFP module to a suitable network switch:



*Note: SFP-CATX-RJ45 for use with CAT5e (and above) cable.
SFP-SM-LC modules require OS1 or OS2 single mode fiber.
SFP-MM-LC modules require OM1, OM2, OM3 or OM4 multi-mode fiber.*

See [Appendix E](#) for details.

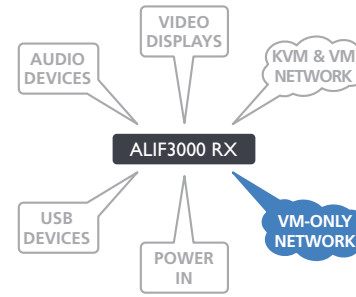
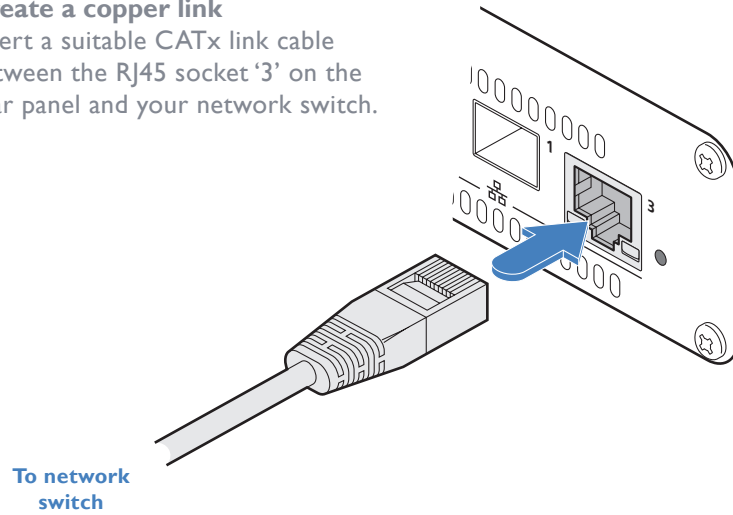
VM-only network link

An RJ45 network socket is located on the rear panel to allow a 1Gb CATx copper link to a network.

Note: This port is used only to access VM machines on a Corporate network that is separate to the KVM network. The unit is not discoverable by AIM through this port.

To create a copper link

- 1 Insert a suitable CATx link cable between the RJ45 socket '3' on the rear panel and your network switch.



ALIF3000 CONFIGURATION

ALIF3000 units are configured using ADDERLink INFINITY Manager (AIM). For an AIM Manager to take control of an ALIF3000 unit, the unit must start from a factory default state. To reset an ALIF3000 to the factory default state use the procedure described on this page.

Note: When first powered on and booting up, the indicators and screen of the unit will not respond for approximately 40 seconds.

AIM configures the SPF ports but not the RJ45 port (labeled '3') on the rear panel. This port allows connection to a network separate from the main KVM/VM links.

Please refer to:

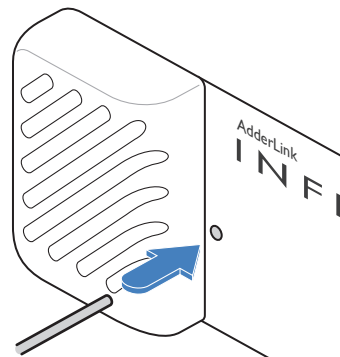
- **Creating a virtual desktop (VDI) session** on the [next page](#) in this guide for a walkthrough example.
- The ADDERLink INFINITY Manager user guide (available from adder.com) for details about AIM configuration.

The recessed power button

On the left hand side of the front panel is a recessed power button which can be used to initiate a controlled shut down of the unit. Once shut down in that manner, another press of the button will boot the unit again without having to cycle the power input.

Note: Whenever the unit is first powered on, it will start as normal, it is not necessary to press this button at power on.

The recessed power button is accessible using a long narrow implement (e.g., a straightened-out paper clip), which needs to be inserted approximately 20mm to reach the switch. Its location is similar to the recessed buttons on other ALIF units, however, its function is slightly different.



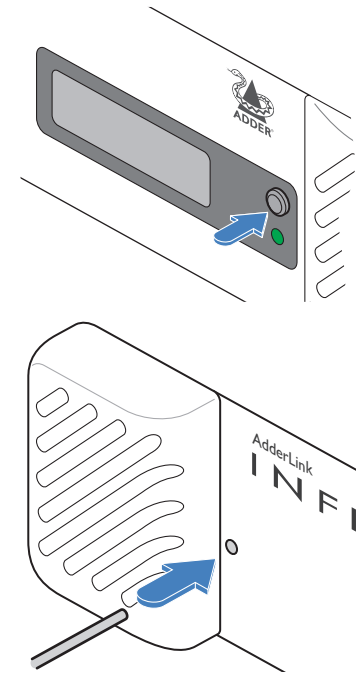
Performing a manual factory reset

A factory reset returns unit to its default configuration. *Note: You can use the [front panel screen](#) to discover the internal software version.*

To perform a manual factory reset

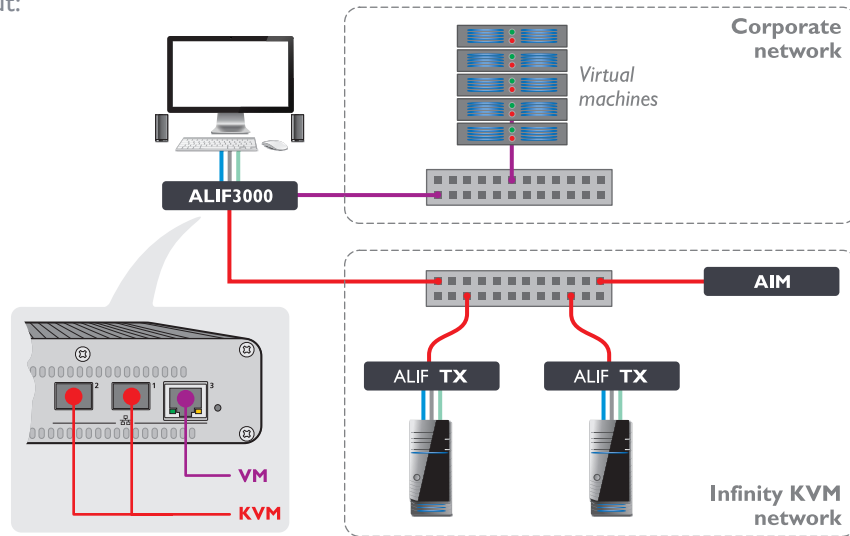
- 1 Power on the unit.
- 2 Press-and-hold the button located next to the front panel screen for 10 seconds until the indicator flashes blue and the screen shows the message: *Factory resetting device.**
- 3 The reset will take place and once complete, the screen will show the message: *Factory Reset Complete. Now Reboot.*
- 4 Cycle the power using either the recessed power button (see right) or the power adapter input.

** Note: Firmware revisions up to v1.1.1 will behave slightly differently. The message shown on the screen will be 'In factory reset mode' and you will need to cycle the power at that stage to complete the procedure.*



SETTING UP A VDI TRANSMITTER

This section details the steps required to configure a VDI transmitter within ADDERLink INFINITY Manager (AIM). This diagram shows a typical connection layout:



In the sample layout above, an ALIF3000 is connected to two separate networks:

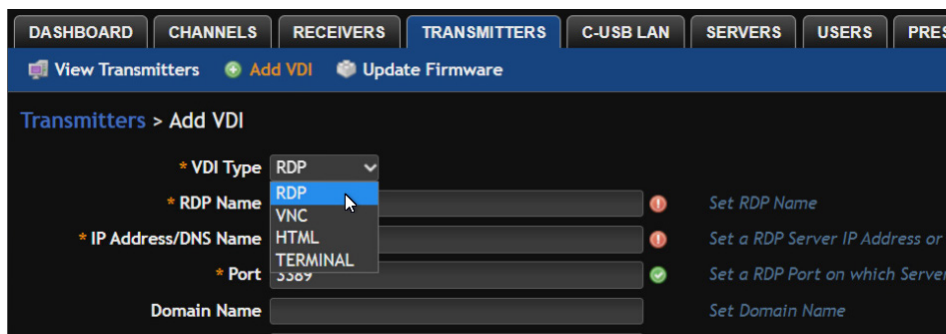
- The **Infinity KVM network** gives access to hosts that are connected via ALIF transmitters,
- The **Corporate network** is where the virtual machines running VDI hosts reside.

Prerequisites

- The AIM Manager is running firmware version 5.6 or above.
- The ALIF3000 is connected to the networks and is recognised by the AIM Manager.

To configure a VDI transmitter

- 1 Within the AIM Manager's web interface, navigate to the **Transmitters** page.
- 2 At the top of the page, click on **Add VDI**.



- 3 Open the **VDI Type** list, choose the required remote connection type and then enter the related settings:

RDP

RDP Name

Enter a name for the virtual machine. *Note: This is not the server name.*

IP Address/DNS Name

Enter the IP address or DNS name for the virtual machine.

Port

The usual port address for RDP connections is 3389.

Domain Name

Enter the domain name if the virtual machine host is part of a Windows domain. This will mean that users do not need to enter the domain name when they log in. Otherwise, leave this field blank.

Maximum Resolution

This option sets the maximum resolution used for RDP connections to improve performance when high resolution monitors are used.

VNC

VNC Name

Enter a name for the virtual machine.

IP Address/DNS Name

Enter either a unique IP address or DNS name for the virtual machine.

Port

The usual port address for VNC connections is 5900.

HTML

HTML Name

Enter a name for the virtual machine.

HTML URL

Enter the URL for the virtual machine.

Port

The usual port address for HTML connections is 80, or 443 for secure websites.

Certificate

Secure websites require a security certificate. Supported file types are *.pem* and *.crt*, see step 4 on the next page.

TERMINAL (SSH, Secure Shell)

Terminal Name

Enter a name for the virtual machine.

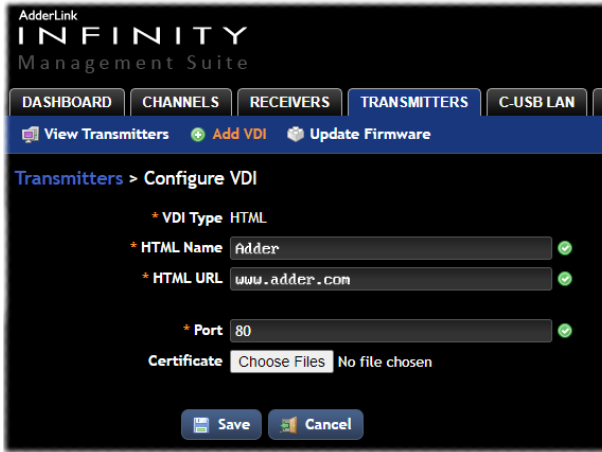
IP Address/DNS Name

Enter either a unique IP address or DNS name for the virtual machine.

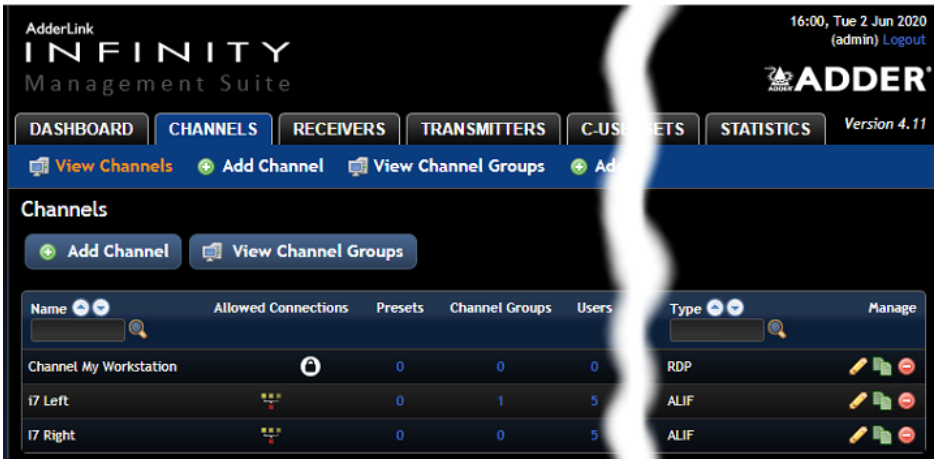
Port

The usual port address for SSH connections is 22.

4 [Additional step if **VDI Type** is set to **HTML**, otherwise skip to step 5] When connecting to a secure website, one or more security certificates may be required. Certificates with .pem and .crt are supported. Click the “Choose Files” button and direct the file dialog to the location of the appropriate certificate file:

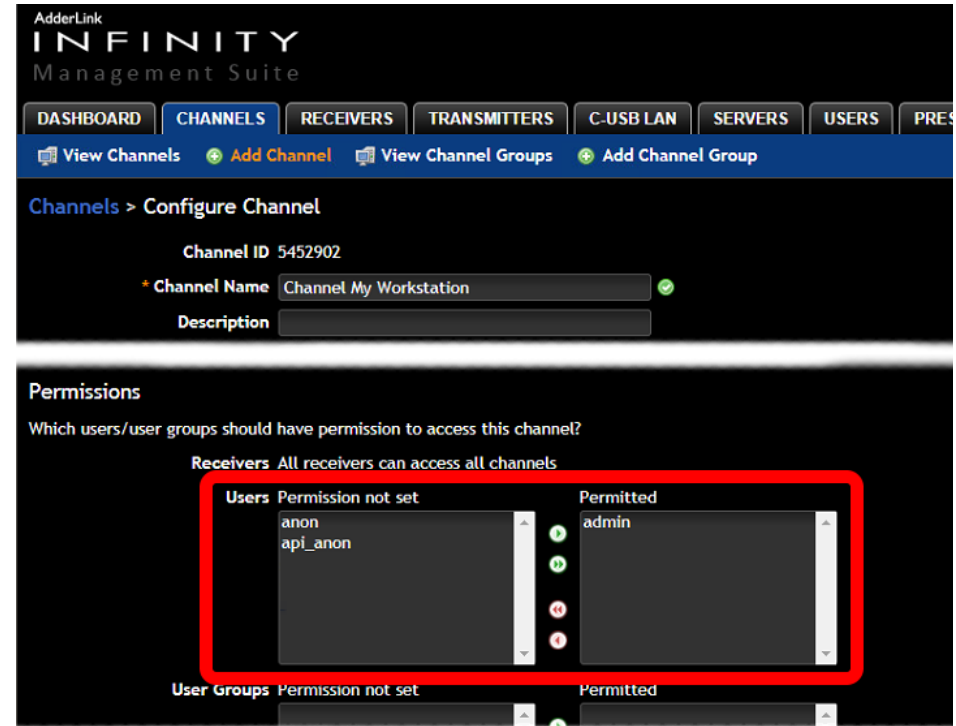


5 Click **Save**. A channel for the transmitter will be generated based on the transmitter’s name, in this instance **Channel My Workstation**:



By default, no users or user groups will have access to the new channel.

6 Click for the new channel to grant access to users and user groups:



Access to VDI channels
Please see [VDI channel access](#) on page 18.

Operation

In operation, many ALIF3000 installations require no intervention once configured. The unit takes care of all connection control behind the scenes so that you can continue to work unhindered.

Note: When first powered on and booting up, the indicators and screen of the ALIF3000 unit will not respond for approximately 40 seconds.

SCREEN

- Press and release the button to wake the screen and begin showing information.
- Press the button to advance to the next page.
- If a page is empty e.g., there is no alert to show or no IP for an interface, then the page will be skipped.
- Press the button on the last page to return to the first page.



Status page

This primary page will indicate the AIM connection status: Searching..., Connecting.... or Connected.



Connection page

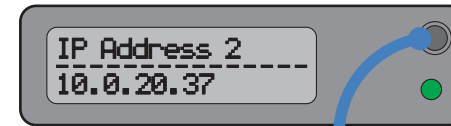
Shows the names of the media streams that are enabled for the current connection. The capitalization of the name indicates the status of that media stream. A blank name means that the stream is not enabled for this connection.

- **vid vid aud usb**
Lower case means that the stream is not available from the transmitter.
- **Vid Vid Aud Usb**
Capitalised means that the stream is available but no data is being received.
- **VID VID AUD USB**
All caps means that the stream is available and media data is being received.
- **Vid aud USB**
A single Vid entry means: Single display setup.



Alert page

If there is an alert, this page will be displayed with an explanation. Once shown, the Status page will be returned.



IP Address pages

With each press, the IP addresses of the three network ports will be shown in turn.



AIM Address page

Shows the IP address of the AIM server, if connected.



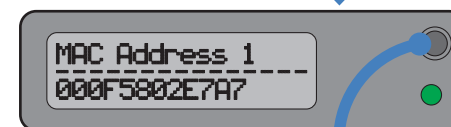
Software version page

Displays the current software version.



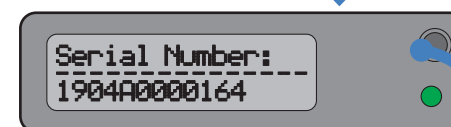
Display resolution pages

With each press, the resolutions of the two displays will be shown in turn (if both connected).



MAC Address pages

With each press, the MAC addresses of the three network ports will be shown in turn.



Serial Number page

Shows the serial number of the ALIF3000 unit.

FRONT PANEL INDICATOR

The front panel of each ALIF3000 unit features a single indicator capable of producing numerous color and flash patterns to provide a useful guide to operation as well as an information screen.

Indicator color and flash patterns

The single front panel indicator uses varying color and flashing patterns to signal key status:

Off	No power.
Green	All services provided by configuration working and during boot.
Amber	Running but video, USB or network link missing (or not connected to a transmitter/VM).
Red	Interim state during boot.
Blue	Factory reset mode active.
Red/green flash	Currently using the non-default partition.
Green/blue flash	Upgrade mode active.
Fast green flash	Identify mode active.

Boot up indicator sequence

During normal boot up, the front panel indicator will show:

- Green until the software is loaded, then red until software is established then amber. During operation the indicator will only turn green once all the requested channels have been successfully linked.

Note: Further details for each channel can be seen on the Connection page of the screen - see page 16.

BOOTING INTO THE OTHER PARTITION

ALIF3000 has two bootable systems, called 'Red' and 'Black'. When manufactured the two systems are identical and Red is the default. Each time the unit is upgraded or factory reset, the other partition is promoted to be the new default.

Occasionally it may be necessary to override the usual boot up and use the other (non-default) partition - for various reasons:

- To recover from a corrupted or unwanted upgrade.
- To recover from a corrupt partition.
- To try out a new upgrade without committing to it.

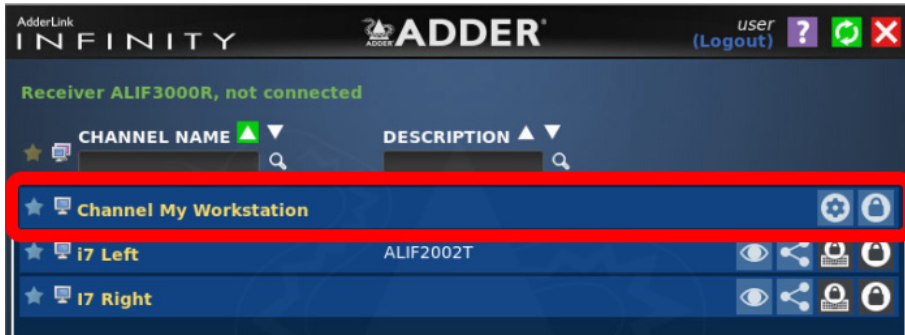
To override the default boot up

- 1 As the ALIF3000 is powered on, press the space key on the connected keyboard until the 'GNU GRUB' menu is displayed.
- 2 Select 'Red' or 'Black' as desired and then press Enter to boot the unit using the selected partition. The chosen partition will be used until the next upgrade or until this process is repeated to choose the previous default partition.

Note: In situations where the monitor is slow to wake-up, you can optionally press the up or down key to delay the GNU GRUB menu.

VDI CHANNEL ACCESS

1 On the console attached to the ALIF3000, open the OSD (default CTRL+ALT+C) and log in as a user who has access to the newly created Channel:

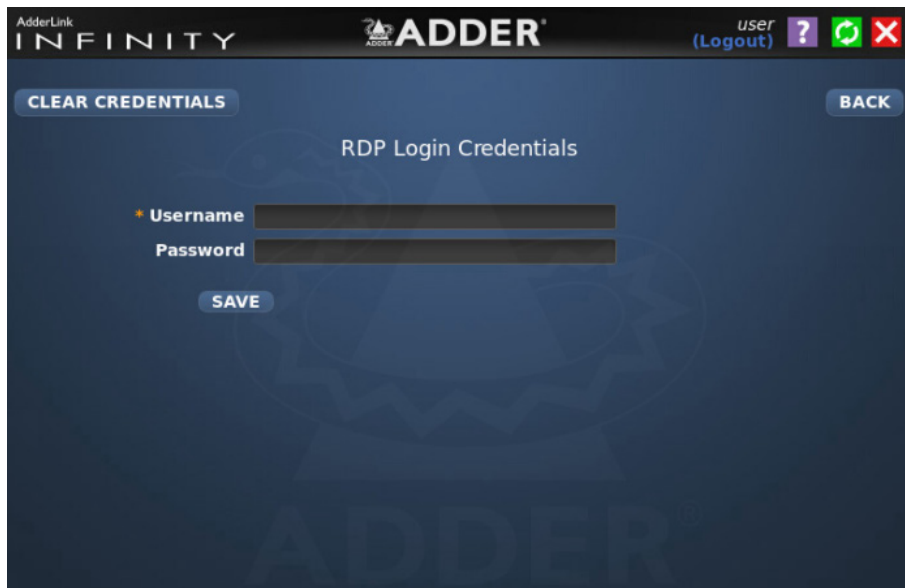


You should now see the new VDI channel displayed on the OSD or amongst the pages of other channels and presets. A virtual channel only has two icons, unlike the other channels for standard ALIF transmitters:

 - To enter the login credentials for the virtual session.

 - To make a private connection to the virtual host.

2 Click on  first to enter the user credentials:



3 Enter the **Username** and **Password** required to access the virtual host.

- Note: Do not use the # or “ characters or spaces within passwords.

4 Click Save.

5 Click on  to start the virtual session.

VDI channel access notes:

VNC

- ALIF3000R supports passwords of up to 8 characters in length for VNC® when the server is using the VNCAuth authentication method. It is possible to enter more characters, but the server will ignore them when it validates the password. This is common to all VNC setups using VNCAuth.
- You need to disable **password hashing** in order to access a VNC server.
 - To do this: Configuration -> User Accounts -> Enable Password Hashing (no)
 - Passwords need to be re-entered after disabling password hashing.
- The VNC mouse pointer only supports Absolute mode.

HTML

- The browser runs in automation mode and certain websites, such as Google and Gmail cannot be contacted.
- Files cannot be downloaded via the browser.

This chapter contains a variety of information, including the following:

- Getting assistance - see right
- [Appendix A](#) - Configuration page
- [Appendix B](#) - Tips for success when networking ALIF units
- [Appendix C](#) - Troubleshooting
- [Appendix D](#) - Glossary
- [Appendix E](#) - SFP (Small Form Factor Pluggable) modules and cables
- [Appendix F](#) - Using the optional ALIF3000 rack shelf
- [Appendix G](#) - Open source licenses

LITHIUM BATTERY

CAUTION: This product contains a lithium battery which must be disposed of in the correct manner.

RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.

- If the lithium battery needs to be changed, you must return the product to your nearest Adder dealer. The battery must be replaced by an authorized Adder dealer.
- Once the product has come to the end of its useful life, the lithium battery must be removed as part of the decommissioning process and recycled in strict accordance with the regulations stipulated by your local authority. Advice on battery removal can be provided on request by Adder.

GETTING ASSISTANCE

If you are still experiencing problems after checking the information contained within this guide, then please refer to the Support section of our website:

www.adder.com

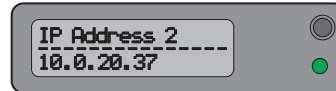
APPENDIX A - Configuration page

The ALIF3000 is controlled using the AIM Manager. System information about a specific ALIF3000 can be obtained from the units web page.

To view the system information

1 Using a system connected to the same network as an ALIF3000 unit, open a web browser and access the IP address of the ALIF3000.

- To find the address of the web server for the ALIF3000 unit: Press the small button next to the [screen](#) to find the IP addresses of each network port, and select an address that is accessible by the web browser.



2 The configuration page should be displayed:

ADDERLink
RECEIVER (dual)
ALIF3000

System Information **Unit controlled by AIM**

About

Identify Unit (short)
Identify Unit (long)

System	Firmware Version
Main	1.0.0.866
Backup	1.0.0.830

Interface	MAC Address	IP Address
Port 1	00:07:32:65:67:63	-
Port 2	00:07:32:65:67:64	10.0.20.37/24
Port 3	00:07:32:65:67:65	10.1.0.160/16

NTP	
Enabled	Yes
Server IP	10.0.10.10

AIM

Identify unit

When clicked, these buttons cause the front panel indicators to flash to assist with identifying the ALIF unit within a rack.

- The **Identify Unit (short)** button flashes the indicators for five seconds.
- The **Identify Unit (long)** button flashes the indicators for one hour but can be overridden by clicking the Identify Unit (short) button.

Remote Support

The remote support feature allows Adder technical support to connect via a secure SSL connection, should the need arise. When you click the Enable button, the unit will generate and display a single-use password (and port number) on the page. Attach the unit to an internet-connected switch (using SFP port 1 or 2). Note the resulting IP address and pass this, together with the generated password and port number, to Adder technical support, allowing limited direct access.

AIM	
Enabled	Yes
Server IP	10.0.10.10 192.168.10.197 10.0.10.11

DHCP	
Enabled	Yes

Remote Support	
Enabled	No Enable

Hardware Information	
Board Revision	0
System Type	RX8
Product Code	ALIF3000
Unit Serial Number	[NONE]
Unit ID	000732ffe656763
Factory Certificates	e8d8341fc53583fc9e09c23a704ea316

Getting Help

Contact support@adder.com or visit <https://www.adder.com> for help

APPENDIX B - Tips for success when networking ALIF units

ALIF units use multiple strategies to minimize the amount of data that they send across networks. However, data overheads can be quite high, particularly when very high resolution video is being transferred, so it is important to take steps to maximize network efficiency and help minimize data output. The tips given in this section have been proven to produce very beneficial results.

Summary of steps

- Choose the right kind of switch.
- Create an efficient network layout.
- Configure the switches and devices correctly.

Choosing the right switch

[Layer 2](#) switches are what bind all of the hosts together in the subnet, however, they are all not created equally. In particular look for the following:

- 1 Gigabit ports.
- Support for [IGMP v2](#) (or v3) snooping.
- Support for [Jumbo frames](#) up to 9216-byte size.
- High bandwidth connections between switches, preferably Fiber Channel.
- Look for switches that perform their most onerous tasks (e.g., [IGMP snooping](#)) using multiple dedicated processors (ASICS).
- Ensure the maximum number of concurrent ‘snoopable groups’ the switch can handle meets or exceeds the number of ALIF transmitters that will be used to create multicast groups.
- Check the throughput of the switch: Full duplex, 1 Gbps up- and down- stream speeds per port.
- Use the same switch make and model throughout a single subnet.
- You also need a [Layer 3](#) switch. Ensure that it can operate efficiently as an [IGMP Querier](#).

Creating an efficient network layout

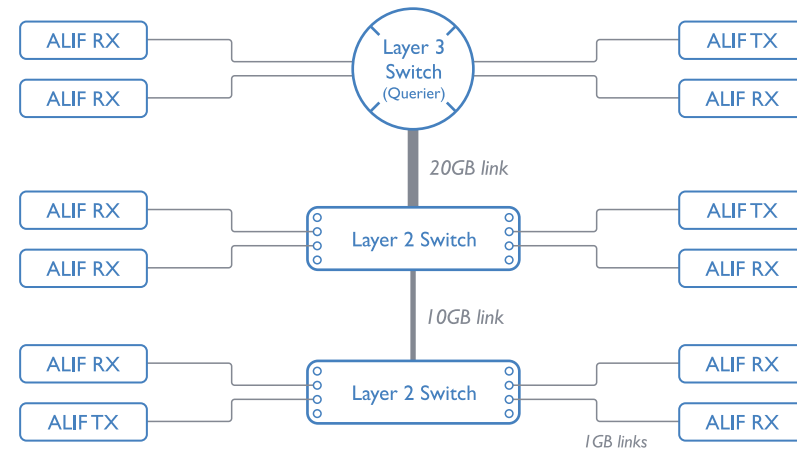
Network layout is vital. The use of [IGMP snooping](#) also introduces certain constraints:

- Keep it flat. Use a basic line-cascade structure rather than a pyramid or tree arrangement.
- Keep the distances between the switches as short as possible.
- Ensure sufficient bandwidth between switches to eliminate bottlenecks.
- Where the AIM server is used to administer multiple ALIF transceivers, ensure the AIM server and all ALIF units reside in the same subnet.
- Do not use VGA to DisplayPort converters, instead replace VGA video cards in older systems with suitable DisplayPort replacements. Converters cause ALIF TX units to massively increase data output.
- Wherever possible, create a private network.

The recommended layout

The layout shown below has been found to provide the most efficient network layout for rapid throughput when using IGMP snooping:

- Use no more than two cascade levels.



- Ensure high bandwidth between the two L2 switches and very high bandwidth between the top L2 and the L3. Typically 10GB and 20GB, respectively for 48 port L2 switches.

continued

Configuring the switches and devices

The layout is vital but so too is the configuration:

- Enable [IGMP Snooping](#) on all L2 switches.
 - Ensure that [IGMP Fast-Leave](#) is enabled on all switches with ALIF units connected directly to them.
 - Enable the L3 switch as an [IGMP Querier](#).
 - Enable [Spanning Tree Protocol \(STP\)](#) on all switches and importantly also enable portfast (only) on all switch ports that have ALIF units connected.
 - If any hosts will use any video resolutions using 2048 and above horizontal pixels (e.g., 2048 x 1152, 2048 x 2048), ensure that [Jumbo Frames](#) are enabled on all switches.
 - Choose an appropriate forwarding mode on all switches. Use [Cut-through](#) if available, otherwise [Store and forward](#).
 - Optimize the settings on the ALIF transmitters:
 - If moving video images are being shown frequently, then leave Frame Skipping at a low percentage and instead reduce the Peak bandwidth limiter.
 - Where screens are quite static, try increasing the Background Refresh interval and/or increasing the Frame skipping percentage setting.
- Make changes to the ALIF transmitters one at a time, in small steps, and view typical video images so that you can attribute positive or negative results to the appropriate control.
- Ensure that all ALIF units are fully updated to the latest firmware version. Go to adder.com to download the latest release.

APPENDIX C - Troubleshooting

Problem: The video image of the ALIF receiver shows horizontal lines across the screen.

This issue is known as *Blinding* because the resulting video image looks as though you're viewing it through a venetian blind.

When video is transmitted by ALIF units, the various lines of each screen are divided up and transmitted as separate data packets. If the reception of those packets is disturbed, then blinding is caused. The lines are displayed in place of the missing video data packets.

There are several possible causes for the loss of data packets:

- Incorrect switch configuration. The problem could be caused by multicast flooding, which causes unnecessary network traffic. This is what IGMP snooping is designed to combat, however, there can be numerous causes of the flooding.
- Speed/memory bandwidth issues within one or more switches. The speed and capabilities of different switch models varies greatly. If a switch cannot maintain pace with the quantity of data being sent through it, then it will inevitably start dropping packets.
- One or more ALIF units may be outputting Jumbo frames due to the video resolution (2048 horizontal pixels) being used. If Jumbo frames are output by an ALIF unit, but the network switches have not been configured to use jumbo frames, the switches will attempt to break the large packets down into standard packets. This process introduces a certain latency and could be a cause for dropped packets.
- One or more ALIF units may be using an old firmware version. Firmware versions prior to v2.1 exhibited an issue with the timing of IGMP join and leave commands that caused multicast flooding in certain configurations.

Remedies:

- Ensure that [IGMP snooping](#) is enabled on all switches within the subnet.
- Where each ALIF unit is connected as the sole device on a port connection to a switch, enable [IGMP Fast-Leave \(aka Immediate Leave\)](#) to reduce unnecessary processing on each switch.
- Check the video resolution(s) being fed into the ALIF transmitters. If resolutions using 2048 horizontal pixels are unavoidable then ensure that [Jumbo frames](#) are enabled on all switches.
- Check the [forwarding mode](#) on the switches. If *Store and forward* is being used, try selecting *Cut-through* as this mode causes reduced latency on lesser switch designs.
- Ensure that one device within the subnet is correctly configured as an [IGMP Querier](#), usually a layer 3 switch or multicast router.
- Ensure that the firmware in every ALIF unit is version 2.1 or greater.
- Try adjusting the transmitter settings on each ALIF to make the output data stream as efficient as possible. See [ALIF transmitter video settings](#) for details.

continued

Problem:The audio output of the ALIF receiver sounds like a scratched record.

This issue is called Audio crackle and is a symptom of the same problem that produces blinding (see previous page). The issue is related to missing data packets.

Remedies:

As per blinding discussed previously.

Problem:AIM cannot locate working ALIF units.

There are a few possible causes:

- The ALIF units must be given a factory reset to allow AIM discovery. If you have a working network of ALIFs without AIM and then add AIM to the network, AIM will not discover the ALIFs until they have had a factory reset.

- This could be caused by Layer 2 Cisco switches that have [Spanning Tree Protocol \(STP\)](#) enabled but do not also have *portfast* enabled on the ports to which ALIF units are connected. Without portfast enabled, ALIF units will all be assigned the same zero config IP address at reboot and AIM will only acquire them one at a time on a random basis. *Note: A factory reset also places the unit into zero config.*

You can easily tell whether portfast is enabled on a switch that is running STP: When you plug the link cable from a working ALIF unit into the switch port, check how long it takes for the port indicator to change from orange to green. If it takes approximately one second, portfast is on; if it takes approximately thirty seconds then portfast is disabled.

Remedies:

- Ensure that the ALIF units and the AIM server are located within the same subnet because AIM cannot cross subnet boundaries.
- [Manually reset](#) the ALIF units to their factory settings.
- Enable portfast on all switch ports that have ALIF units attached to them or try temporarily disabling STP on the switches while AIM is attempting to locate ALIF units.

APPENDIX D - Glossary

Internet Group Management Protocol

Where an ALIF transmitter is required to stream video to two or more receivers, multicasting is the method used.

Multicasting involves the delivery of identical data to multiple receivers simultaneously without the need to maintain individual links. When multicast data packets enter a subnet, the natural reaction of the switches that bind all the hosts together within the subnet, is to spread the multicast data to all of their ports. This is referred to as Multicast flooding and means that the hosts (or at least their network interfaces) are required to process plenty of data that they didn't request. IGMP offers a partial solution.

The Internet Group Management Protocol (IGMP) is designed to prevent multicast flooding by allowing [Layer 3](#) switches to check whether host computers within their care are interested in receiving particular multicast transmissions. They can then direct multicast data only to those points that require it and can shut off a multicast stream if the subnet has no recipients.

There are currently three IGMP versions: 1, 2 and 3, with each version building upon the capabilities of the previous one:

- IGMPv1 allows host computers to opt into a multicast transmission using a Join Group message, it is then incumbent on the router to discover when they no longer wish to receive; this is achieved by polling them (see IGMP Querier below) until they no longer respond.
- IGMPv2 includes the means for hosts to opt out as well as in, using a Leave Group message.
- IGMPv3 encompasses the abilities of versions 1 and 2 but also adds the ability for hosts to specify particular sources of multicast data.

ADDERLink™ INFINITY units make use of IGMPv2 or IGMPv3 when performing multicasts to ensure that no unnecessary congestion is caused.

IGMP Snooping

The IGMP messages are effective but only operate at [layer 2](#) - intended for routers to determine whether multicast data should enter a subnet. A relatively recent development has taken place within the switches that glue together all of the hosts within each subnet: IGMP Snooping. IGMP snooping means these layer 2 devices now have the ability to take a peek at the IGMP messages. As a result, the switches can then determine exactly which of their own hosts have requested to receive a multicast – and only pass on multicast data to those hosts.

IGMP Querier

When IGMP is used, each subnet requires one [Layer 3](#) switch to act as a Querier. In this lead role, the switch periodically sends out IGMP Query messages and in response all hosts report which multicast streams they wish to receive. The Querier device and all snooping Layer 2 switches then update their lists accordingly (the lists are also updated when Join Group and Leave Group (IGMPv2) messages are received).

IGMP Fast-Leave (aka Immediate Leave)

When a device/host no longer wishes to receive a multicast transmission, it can issue an IGMP Leave Group message as mentioned above. This causes the switch to issue an IGMP Group-Specific Query message on the port (that the Leave Group was received on) to check no other receivers exist on that connection that wish to remain a part of the multicast. This process has a cost in terms of switch processor activity and time.

Where ALIF units are connected directly to the switch (with no other devices on the same port) then enabling IGMP Fast-Leave mode means that switches can immediately remove receivers without going through a full checking procedure. Where multiple units are regularly joining and leaving multicasts, this can speed up performance considerably.

Jumbo frames (Jumbo packets)

Since its commercial introduction in 1980, the Ethernet standard has been successfully extended and adapted to keep pace with the ever improving capabilities of computer systems. The achievable data rates, for instance, have risen in ten-fold leaps from the original 10Mbit/s to a current maximum of 100Gbit/s.

While data speeds have increased massively, the standard defining the number of bytes (known as the Payload) placed into each data packet has remained resolutely stuck at its original level of 1500 bytes. This standard was set during the original speed era (10Mbit/s) and offered the best compromise at that speed between the time taken to process each packet and the time required to resend faulty packets due to transmission errors.

But now networks are much faster and files/data streams are much larger; so time for a change? Unfortunately, a wholesale change to the packet size is not straightforward as it is a fundamental standard and changing it would mean a loss of backward compatibility with older systems.

Larger payload options have been around for a while, however, they have often been vendor specific and at present they remain outside the official standard. There is, however, increased consensus on an optional 'Jumbo' payload size of 9000 bytes and this is fully supported by the ADDERLink™ INFINITY (ALIF) units.

Jumbo frames (or Jumbo packets) offer advantages for ALIF units when transmitting certain high resolution video signals across a network. This is because the increased data in each packet reduces the number of packets that need to be transferred and dealt with - thus reducing latency times.

The main problem is that for jumbo frames to be possible on a network, all of the devices on the network must support them.

Spanning Tree Protocol (STP)

In order to build a robust network, it is necessary to include certain levels of redundancy within the interconnections between switches. This will help to ensure that a failure of one link does not lead to a complete failure of the whole network.

The danger of multiple links is that data packets, especially multicast packets, become involved in continual loops as neighbouring switches use the duplicated links to send and resend them to each other.

To prevent such bridging loops from occurring, the Spanning Tree Protocol (STP), operating at [layer 2](#), is used within each switch. STP encourages all switches to communicate and learn about each other. It prevents bridging loops by blocking newly discovered links until it can discover the nature of the link: is it a new host or a new switch?

The problem with this is that the discovery process can take up to 50 seconds before the block is lifted, causing problematic timeouts.

The answer to this issue is to enable the portfast variable for all host links on a switch. This will cause any new connection to go immediately into forwarding mode. However, take particular care not to enable portfast on any switch to switch connections as this will result in bridging loops.

Forwarding modes

In essence, the job of a layer 2 switch is to transfer as fast as possible, data packets arriving at one port out to another port as determined by the destination address. This is known as data forwarding and most switches offer a choice of methods to achieve this. Choosing the most appropriate forwarding method can often have a sizeable impact on the overall speed of switching:

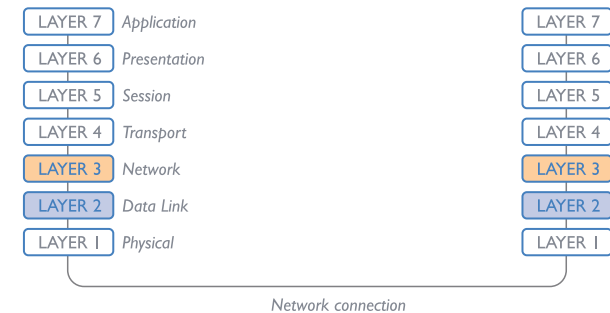
- **Store and forward** is the original method and requires the switch to save each entire data packet to buffer memory, run an error check and then forward if no error is found (or otherwise discard it).
- **Cut-through** was developed to address the latency issues suffered by some store and forward switches. The switch begins interpreting each data packet as it arrives. Once the initial addressing information has been read, the switch immediately begins forwarding the data packet while the remainder is still arriving. Once all of the packet has been received, an error check is performed and, if necessary, the packet is tagged as being in error. This checking ‘on-the-fly’ means that cut-through switches cannot discard faulty packets themselves. However, on receipt of the marked packet, a host will carry out the discard process.
- **Fragment-free** is a hybrid of the above two methods. It waits until the first 64 bits have been received before beginning to forward each data packet. This way the switch is more likely to locate and discard faulty packets that are fragmented due to collisions with other data packets.
- **Adaptive** switches automatically choose between the above methods. Usually they start out as a cut-through switches and change to store and forward or fragment-free methods if large number of errors or collisions are detected.

So which one to choose? The *Cut-through* method has the least latency so is usually the best to use with ADDERLink™ INFINITY units. However, if the network components and/or cabling generate a lot of errors, the *Store and forward* method should probably be used. On higher end store and forward switches, latency is rarely an issue.

Layer 2 and Layer 3: The OSI model

When discussing network switches, the terms Layer 2 and Layer 3 are very often used. These refer to parts of the Open System Interconnection (OSI) model, a standardized way to categorize the necessary functions of any standard network.

There are seven layers in the OSI model and these define the steps needed to get the data created by you (imagine that you are Layer 8) reliably down onto the transmission medium (the cable, optical fiber, radio wave, etc.) that carries the data to another user; to complete the picture, consider the transmission medium is Layer 0. In general, think of the functions carried out by the layers at the top as being complex, becoming less complex as you go lower down.



As your data travel down from you towards the transmission medium (the cable), they are successively encapsulated at each layer within a new wrapper (along with a few instructions), ready for transport. Once transmission has been made to the intended destination, the reverse occurs: Each wrapper is stripped away and the instructions examined until finally only the original data are left.

So why are Layer 2 and Layer 3 of particular importance when discussing ADDERLink™ INFINITY? Because the successful transmission of data relies upon fast and reliable passage through network switches – and most of these operate at either Layer 2 or Layer 3.

The job of any network switch is to receive each incoming network packet, strip away only the first few wrappers to discover the intended destination then rewrap the packet and send it in the correct direction.

continued

In simplified terms, the wrapper that is added at Layer 2 (by the sending system) includes the physical address of the intended recipient system, i.e., the unique MAC address (for example, 09:f8:33:d7:66:12) that is assigned to every networking device at manufacture. Deciphering recipients at this level is more straightforward than at Layer 3, where the address of the recipient is represented by a logical IP address (e.g., 192.168.0.10) and requires greater knowledge of the surrounding network structure. Due to their more complex circuitry, Layer 3 switches are more expensive than Layer 2 switches of a similar build quality and are used more sparingly within installations.

APPENDIX E - SFP (Small Form Factor Pluggable) modules and cables

To suit your installation layout, fiber and copper modules are available for the ALIF3000 units to support various fiber optic and CATx cables. The specifications for all are summarized in this table:

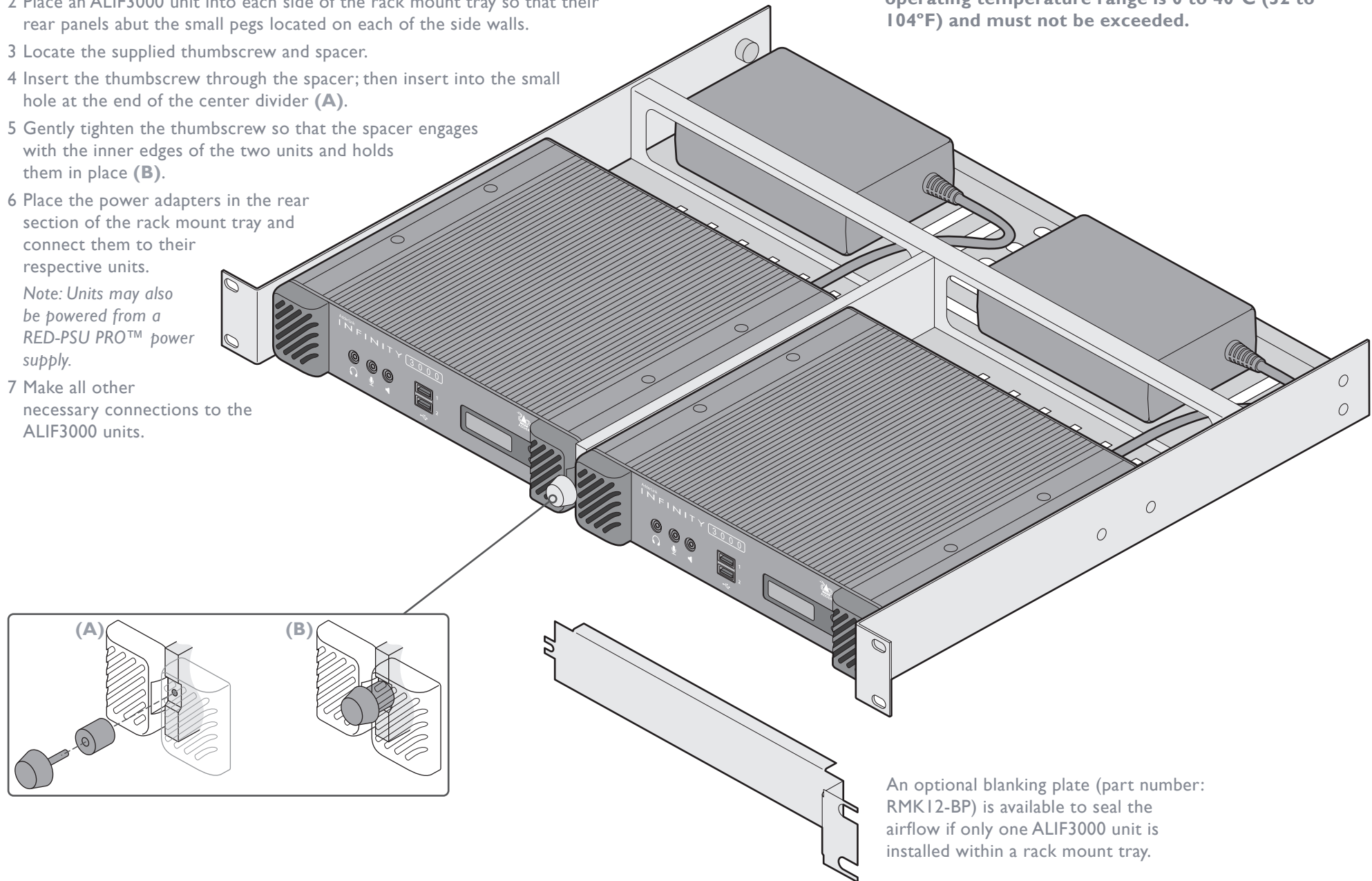
Name	Fiber size	Type	Coding		Distance at 1 Gbps	Adder part number for SFP module
			Normal applications	Suggested print nomenclature		
OM1	(62.5/125)	Multimode (TIA-492AAAA)	Orange	62.5/125	220m	SFP-MM-LC
OM2	(50/125)	Multimode (TIA-492AAAB)	Orange	50/125	550m	“
OM3	(50/125)	Multimode (850 nm Laser-optimized) (TIA-492AAAC)	Aqua	850 LO 50 /125	550m	“
OM4	(50/125)	Multimode (850 nm Laser-optimized) (TIA-492AAAC)	Aqua	850 LO 50 /125	550m	“
OS1 and OS2	(9/125)	Single-mode (TIA-492C000 / TIA-492E000)	Yellow	SM/NZDS, SM	10Km	SFP-SM-LC
CATx	n/a	CAT5e and above	n/a	n/a	100m	SFP-CATX-RJ45

APPENDIX F - Using the optional ALIF3000 rack shelf

Note: See also the optional rack shelf rear supports on the next page.

- 1 Install the empty ALIF3000 rack mount tray into your 19" rack frame and fully secure it.
 - 2 Place an ALIF3000 unit into each side of the rack mount tray so that their rear panels abut the small pegs located on each of the side walls.
 - 3 Locate the supplied thumbscrew and spacer.
 - 4 Insert the thumbscrew through the spacer; then insert into the small hole at the end of the center divider **(A)**.
 - 5 Gently tighten the thumbscrew so that the spacer engages with the inner edges of the two units and holds them in place **(B)**.
 - 6 Place the power adapters in the rear section of the rack mount tray and connect them to their respective units.
- Note: Units may also be powered from a RED-PSU PRO™ power supply.
- 7 Make all other necessary connections to the ALIF3000 units.

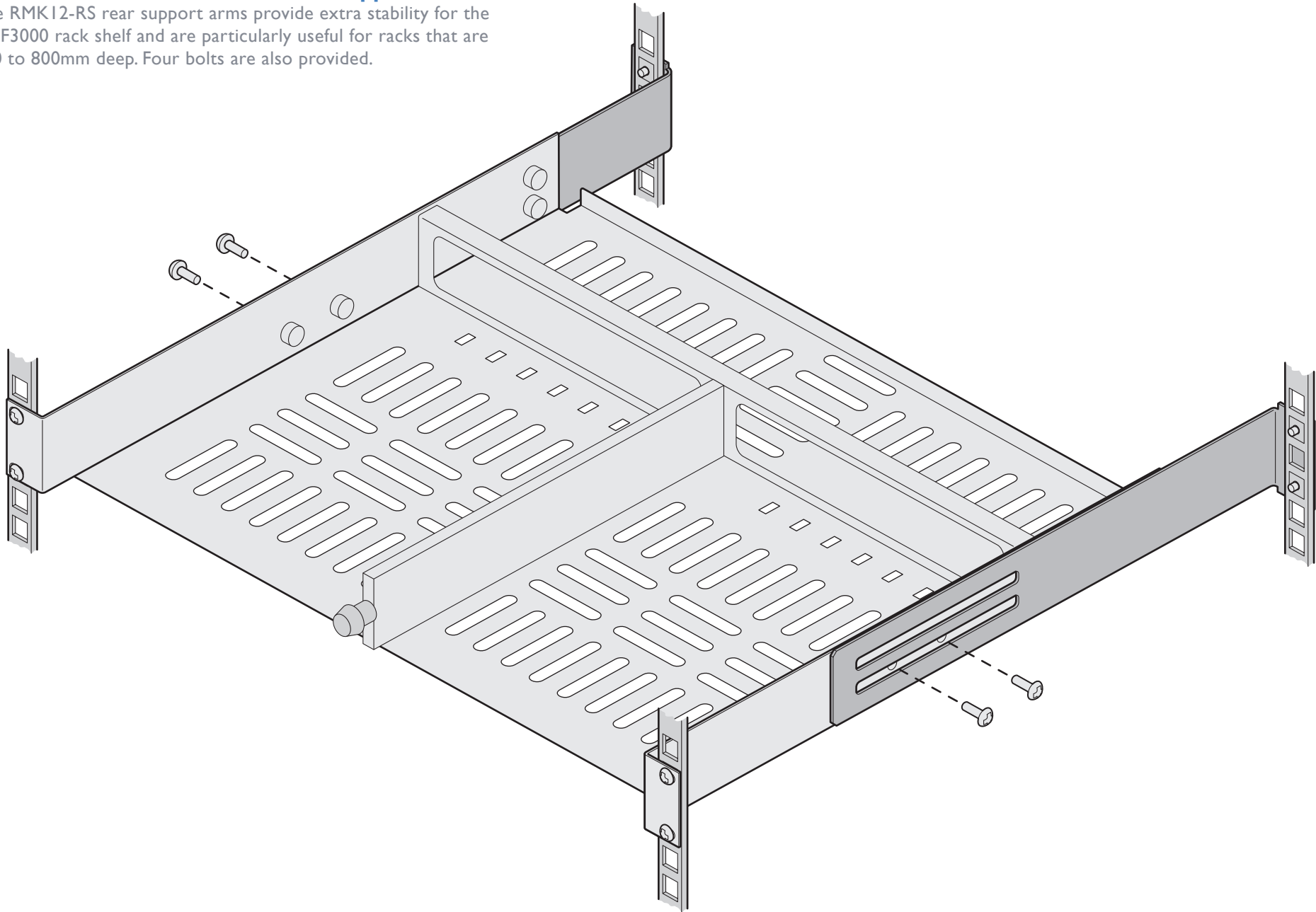
IMPORTANT: When mounting the ALIF units (and their power adapters), ensure that the vents are not obscured and that there is sufficient airflow. The operating temperature range is 0 to 40°C (32 to 104°F) and must not be exceeded.



An optional blanking plate (part number: RMK12-BP) is available to seal the airflow if only one ALIF3000 unit is installed within a rack mount tray.

Optional ALIF3000 rack shelf rear supports

The RMK12-RS rear support arms provide extra stability for the ALIF3000 rack shelf and are particularly useful for racks that are 600 to 800mm deep. Four bolts are also provided.



APPENDIX G - OPEN SOURCE LICENSES

This product includes binaries that are derived from the open source community by Adder under the GNU General Public License v2. Please follow the link below to view the full list of open source licenses used:

<http://support.adder.com/tiki/tiki-index.php?page=ALIF3000%3A+OpenSource+Licence>

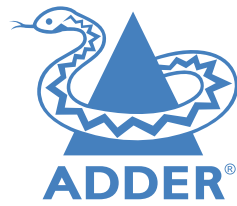
The software included in this product contains copyrighted software that is licensed under the GNU General Public License (GPL). You may obtain the complete Corresponding Source Code from Adder for a period of three years after the last shipment of this product, which will be no earlier than 2028, by contacting support@adder.com or writing to:

Attn: ACD/Open Source Request,
Adder Technology Ltd,
Saxon Way, Bar Hill,
Cambridge, CB23 8SL,
United Kingdom

Please write "Source for product XXXXXXXXX" in the subject line, where XXXXXXXXX is the model and version number.

This offer is valid to anyone in receipt of this information.





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