KUMO

SDI Routers and Control Panels

Installation and Operation Guide

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AJA VIDEO SYSTEMS

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Support Email	support@aja.com
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Chapter 1 – Introduction

Overview

KUMO compact SDI routers are small and cost-effective, yet robust and reliable. All KUMO routers support full-broadcast specifications over SDI, HD-SDI, and 3G-SDI. A KUMO-12G router also supports single connector 12G-SDI. Additionally, KUMO routers support SDI related protocols such as 270Mb/s DVB-ASI and Canon 3G-SDI RAW. KUMO routers are re-clocking, non-blocking, and ready for any broadcast, production, or post production environment. Running Embedded Linux, KUMO routers support powerful HTTP control and monitoring. Each KUMO product contains an internal web server that allows immediate installation, configuration, and operation without requiring additional software. It offers a powerful user interface via any standard web browser. KUMO SDI routers are available in five configurations:

- KUMO 1604 - sixteen SDI inputs and four outputs
- KUMO 1616 - sixteen SDI inputs and sixteen outputs
- KUMO 1616-12G - supports single connector 12G-SDI, sixteen inputs and sixteen outputs
- KUMO 3232 - thirty two SDI inputs and thirty two outputs
- KUMO 6464 - sixty four SDI inputs and sixty four outputs

Because of their compact sizes, KUMO SDI routers are ideal for space-sensitive applications such as mobile sports trucks, edit suites, corporate video installations, or live theatrical A/V rigs.

KUMO Features

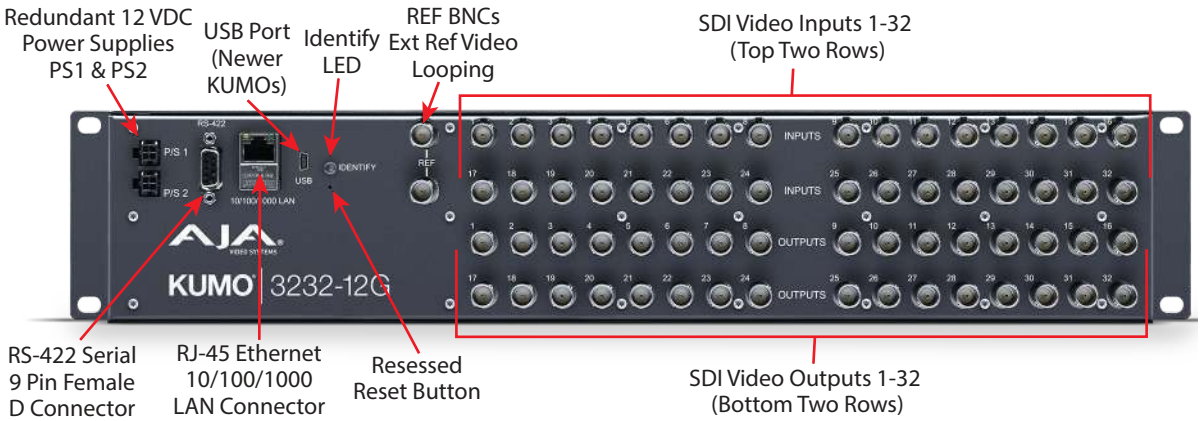
The KUMO routers offer the following features for ease of use in a broad range of SDI applications and workflows:

- KUMO 1604, 1616, and 3232 support for SD-SDI, HD-SDI, 3G-SD (SMPTE 259M/292M/424M)
- KUMO 1616-12G support for SD-SDI, HD-SDI, 3G-SDI, 6G-SDI and 12G-SDI (SMPTE-259/292/424/2081/2082)
- KUMO v3.0 and above firmware supports dual and quad mode routing, allowing users to group together inputs and outputs for multiple cable applications like Dual Link, Quad HD, Quad split monitors, and even 8K video.
- KUMO v4.3 and above firmware supports salvos, controlled from the KUMO router web UI and the KUMO CP2 panel.
- Automatic cable equalization and re-clocking
- Supports all embedded VANC and HANC ancillary information, including embedded audio
- Reference via BNC, passive loop, PAL/NTSC color black or Tri-level sync
- Output switch timing per SMPTE RP 168 when using an external reference
- 10/100/1000 Ethernet LAN
- Embedded Linux OS with internal web server for web browser control
- User authorization to restrict access via web browser
- Optional KUMO CP hardware 32 pushbutton remote control panel via Ethernet
- Optional KUMO CP2 hardware 64 pushbutton remote control panel via Ethernet
- 1RU form factor for 1604, 1616, and KUMO CP, 2RU for 3232 and KUMO CP2, 4RU for 6464
- Power loss recovery to the last operational state, both router and control panel
- Redundant power supply (optional), isolated power inputs

NOTE: KUMO routers switch SDI signals in a manner compliant with SMPTE RP168-2009. Because KUMO routers (or any similar router) switch the SDI stream without de-serializing, the switch point can cause a temporary anomaly in the SDI stream. This can cause downstream equipment, depending on the characteristics of the SDI receiver(s), to react to the switch (for example, a monitor "glitch or roll"). It is also possible that switching anomalies can appear on just one or more outputs in the same group in the Dual and Quad modes and in salvos. This effect occurs regardless of the relative timing of the SDI signals being switched, or any reference input connected to the router.

KUMO Router Connections

Figure 1. KUMO Rear Panel Connections (3232 shown, other models similar)



PS 1 & PS 2 Power Connectors

Power to the KUMO unit is supplied by an external power supply module that accepts a 110-240VAC, 50/60Hz power input and supplies +12 VDC to KUMO via connector PS1 or PS2. One power supply is provided, and it may be connected to either of the two power connectors. An optional second power supply can provide redundancy to help protect against outages.

IMPORTANT: The power connector has a latch, similar to an Ethernet connector. Depress the latch (facing the outside edge of the KUMO device) before disconnecting the power cable from the unit.

Power Loss Recovery

If KUMO experiences a loss of power, when power is restored the router returns to the previous state of all source to destination crosspoints, and all configured source and destination names are retained. If a KUMO control panel configured with a KUMO router loses power, when power is restored the control panel's configuration is retained, and button tallies will return to their previous states.

RJ-45 Ethernet Connector

The RJ-45 Ethernet connector allows you to connect KUMO to an Ethernet 10/100/1000 Ethernet LAN using CAT5 cable and access KUMO's built in web server. Multiple configurations are possible, including standalone control, a local LAN, or a WAN. This also allows control over the network using GVG Native Protocol.

ID and Reset

The ID (Identification) LED lights when you use the web interface to identify the KUMO unit you are controlling. The Reset button (pinhole) below the LED allows a safeboot reset of the unit as explained in *"Safeboot Reset" on page 31*.

REF BNC Connector

The REF BNC connector is the looping input for synchronizing the crosspoint switch timing of KUMO to your house video signals. Apply an analog NTSC, PAL, or Tri-level sync signal to this input. Be sure to terminate the second BNC with a 75 Ohm terminator, or if you loop to other equipment terminate the last connected device.

When reference is present, KUMO will switch at the SMPTE RP168 designated switch point with respect to the reference input. If no reference is present, the KUMO will switch at random times.

Video Inputs and Outputs

Depending on your KUMO model, up to 64 SDI video inputs and outputs can be connected to the video input and output BNC connectors.

Normal Mode

In Normal mode, BNC inputs and outputs have a one-to-one relationship with the SDI signals being routed.

Dual and Quad Modes

In Dual mode, inputs and outputs use adjacent pairs of BNCs for each routed signal. In Quad mode, four adjacent BNCs are used for each routed signal. See *"Dual and Quad Mode BNC Connectors and Signal" on page 25*.

RS-422 Connector

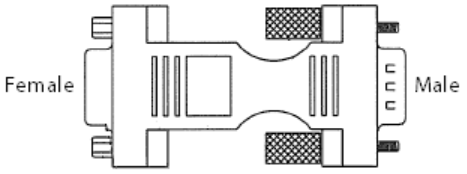
KUMO includes an RS-422 female DB-9 connector for making serial connections to other equipment. This control connection enables interoperability with other devices, including those that use GVG Native Protocol. See *"RS-422 Control Specifications (Routers)" on page 47* for more information.

Older Model RS-422 Adapter

Older KUMO 1604, 1616, and 3232 routers (serial numbers ending in -R0) needed an RS-422 adapter for proper serial control operation (*Figure 2*) This adapter was shipped with those older model routers. Be aware of this fact if your facility has a mixture of older and newer KUMO routers that use RS-422 control.

NOTE: Only older KUMO 1604, 1616, and 3232 routers with a serial number ending in -R0 require this adapter. KUMO routers with serial numbers ending in -R1 or higher do NOT require the adapter. This adapter is also NOT needed for any KUMO 6464 model router.

Figure 2. RS-422 Adapter



KUMO Control Panel Connections

Similar to the KUMO router, KUMO CP has an RJ-45 Ethernet connector and power supply connectors, but has no BNC connectors and no RS-422 port.

KUMO Control and Monitoring

The KUMO router user-interface provides powerful remote setup, control, and monitoring with:

- Zero-configuration Bonjour Protocol and support for UPnP networking protocols
- Remote web browser control interface via Ethernet
- Optional KUMO CP (32 button) and KUMO CP2 (64 button) hardware control panels, each unit able to control of up to four KUMO routers

NOTE: *The 32 button KUMO CP hardware Control Panel can be used with a KUMO 6464 router operating in Normal mode, but can only control the first 32 Inputs and Outputs. The KUMO CP can be used to fully control a KUMO 6464 that is operating in Dual or Quad mode. Control of KUMO routers in all modes is available via the KUMO CP and CP2 button hardware panel, web browser, Ethernet control, and RS-422.*

- GVG Native Protocol built-in to allow serial or LAN interconnection (one RS-422 or up to ten Ethernet) and interoperability with other equipment. Specifically, KUMO can be controlled by the SMS 7000 portion of the GVG Native Protocol. For details, refer to: *"GVG Native Protocol Support" on page 46*.

Default Network Settings

KUMO routers and control panels ship with DHCP enabled, making system operation possible simply by connecting the KUMO device's Ethernet cabling.

In addition, temporary default static IP addresses can be activated for initial KUMO system configuration. See *"KUMO Temporary Static IP Address" on page 13*.

In This Manual

Chapter 1: Introduction lists features and gives a general description of the product.

Chapter 2: Installation details KUMO installation, connections, and networking configuration options (from closed to WAN (wide area) networking.

Chapter 3: Web Browser User Interface provides complete instructions for controlling and monitoring the KUMO router from a computer.

Chapter 4: KUMO Remote Control Panel details the configuration and operation of the optional KUMO CP Control Panel.

Appendix A: Specifications lists technical specifications for the product.

Appendix B: Safety and Compliance information.

Warranty and Index

Chapter 2 – Installation

Overview

KUMO SDI routers are easy to set up and use. All of the steps for KUMO installation and configuration are documented in this chapter, summarized as follows:

1. Install the chassis in an appropriate rack. If you are mounting multiple KUMO units, try to place them visually in the same area so if you communicate with them via a network attached computer, you can use the KUMO's Identify feature to flash the corresponding LED of the unit you're communicating with. Ensure you have an Ethernet cable routed to where the KUMO will be placed.
2. Assemble the Ethernet network connections to a closed network or LAN using Cat.5 Ethernet cable and any required switches and hubs.
3. Connect the KUMO to power, connecting the power cord to mains AC.
4. If necessary, configure device network settings for operation in your facility.
5. Cable the system SDI video source and destination equipment and reference signals.
6. If operating with Dual Link or Quad Link signals, select the appropriate KUMO operating mode.

Warning! Do not defeat the safety purpose of the grounding-type plug

Caution! To meet safety regulations for leakage current when using redundant power supplies, connect the KUMO dual power supplies to separate branch circuits

What's In The Box?

When you unpack your AJA KUMO SDI device, you'll find the following components:

- KUMO SDI router or KUMO control panel
- AC adapter and AC power cord

Please save all packaging for shipping KUMO should you wish to do so when moving or sending it in for service

KUMO Chassis Installation

Space Requirements

When planning equipment locations and mounting methods, take into account the size of the chassis. KUMO devices are designed for EIA 19" equipment rack mounting. See *"Appendix A Specifications"* for exact dimensions of each router model.

Plan adequate space for cable routing from the back of the router chassis. Ensure that SDI video cable connectors will not be stressed and that cables are not bent or crimped in the process.

Cooling Requirements

When rack mounting or stacking multiple KUMO chassis, ensure there is adequate airspace for cooling around the KUMO units. Note the location of cooling vents on all equipment next to the KUMO and ensure none are obstructed.

Power Requirements

- Input Voltage: 110-240VAC, 50/60Hz
- Optional redundant power supply

Caution! KUMO is designed to take advantage of its chassis to aid in cooling. It is common and expected for the densely populated chassis to have a warm front panel in normal, active operating conditions.

Warning! Do not open the chassis. There are no user-serviceable parts inside. Opening the chassis will void the warranty unless performed by an AJA service center or licensed facility. Remove the brick power supply AC line cord(s) from mains power when moving the unit

Physical Equipment Setup

1. Connect power supplies (1 or 2 for redundancy) to KUMO routers and control panels.

IMPORTANT: The power connector has a latch, similar to an RJ-45 Ethernet connector. Depress the latch (facing the outside edge of the KUMO device) before disconnecting the power cable from the unit.

1. Connect source and destination SDI equipment (this step can be deferred).
2. Connect network:
   - Direct Connection: connect a KUMO router to a KUMO CP (if used), or to a Mac or PC, via an Ethernet Cable.
   - LAN Connection: connect a KUMO router (and a KUMO CP if used) to a hub or switch and connect a PC or Mac to the same LAN via a hub or switch.

NOTE: KUMO devices are compatible with both CAT-5 straight-through and cross-over Ethernet cables—they automatically detect whichever is used.

3. Proceed to your desired network configuration method using one of the procedures presented later in the chapter.

Quick Start Configuration

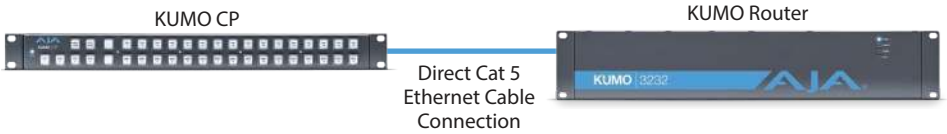
Default Auto Configure KUMO Router and Control Panel

If you purchased a KUMO control panel along with a KUMO router, the easiest way to get your system operating is to simply direct connect them with a single Ethernet cable and power up both units.

NOTE: The KUMO 6464 router in Normal mode (64 sources and destinations) can be fully controlled with the newer KUMO CP2. The original 32 button KUMO CP hardware Control Panel can fully control a KUMO 6464 router operating in Dual or Quad mode. A 32 button KUMO CP can control first 32 Inputs and Outputs of a KUMO 6464 router operating in Normal mode.

KUMO devices are compatible with both CAT-5 straight-through and cross-over Ethernet cables. The KUMO CP will use an Auto Configure function to set itself up to operate with the KUMO router it is directly connected to. The KUMO CP panel buttons will light and, if SDI BNC connections have been made, you will be able to route sources to destinations.

Figure 3. KUMO Router Direct Connection to KUMO CP



The KUMO CP Auto Configure assigns Router Select Button 1 to the attached router.

NOTE: A KUMO CP that has had its network settings configured previously will not use automatic configuration to find a directly connected KUMO router. However, you can force the KUMO CP to enter into Auto Configuration Mode by pressing the **RTR 1** *and* **SHIFT DEST** *buttons simultaneously for four seconds.*

DHCP on an Existing Network

Another easy way to get your KUMO system operating is to connect KUMO routers to an existing network configured with a DHCP server. When the units reset during power up, they will see the DHCP server and automatically be given compatible IP network settings. If auto discovery is configured on a computer on that network, that computer will be able to find and control the KUMO router via a web browser (see below).

Computer Auto Discovery

Computers can support network auto discovery, which makes the network configuration process easy. Two methods of connecting using this technique are described below.

Older Mac OS Configuration with Safari Browser Using Bonjour

Mac OSX Safari browser versions 10 and earlier have Bonjour functionality built-in, which can be used to auto-detect and connect to an Ethernet device like a KUMO Router.

NOTE: Apple removed Bonjour support from Safari versions 11 and higher.

To find a KUMO router using Bonjour on a supported version of Safari:

1. Ensure the KUMO to be controlled is powered up and connected via Ethernet (directly to a Mac or via LAN).
2. Start Safari browser on a Mac.
3. Click on the top menu Bookmark->Bonjour->Webpages drop-down and click on a listed AJA KUMO router or control panel.

NOTE: If Bonjour is not visible in the Bookmark drop-down, go to Safari->Preferences->Advanced and check the "Include Bonjour in the Bookmarks menu" checkbox.

4. Safari will display the KUMO web user-interface, which you can use to control and configure that KUMO device.

Windows PC Configuration using UPnP

If your Windows PC supports UPnP protocols (most do) and UPnP network discovery service is enabled (refer to your Microsoft Windows documentation), you can control KUMO routers by simply selecting one from a device list:

1. Ensure the KUMO to be controlled is powered up and connected via Ethernet (directly to the PC or via LAN).
2. Use your Windows Control Panel or File Explorer to go to Computer->Network.
3. Look at the list under "Other Devices"—double click a KUMO's name to launch your Windows PC's default browser.
4. The browser will display the KUMO web user-interface, which you can use to control and configure that KUMO device.

KUMO Temporary Static IP Address

KUMO devices also offer a factory default static IP address, allowing a direct and fail-safe way to connect via a computer connected to KUMO either directly or via a LAN connection. The computer you use will need to be set to a static IP address that is compatible with the KUMO temporary IP address. Once connected, the KUMO device's network settings can be reconfigured to work with your facility network. The KUMO default static IP address is temporary and is intended only to allow an initial connection.

NOTE: All KUMO routers and control panels have the same temporary static IP address, so more than one device set to this default cannot reside on the same network simultaneously. Work with only one device at a time.

Table 1. KUMO Device Temporary Static IP Address Values

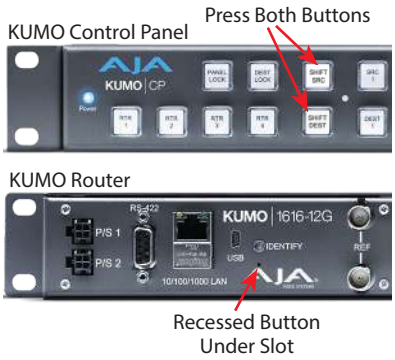
Device	IP address	Subnet Mask
KUMO Router and KUMO CP	192.168.101.1	255.255.255.0

NOTE: The default static address is temporary and will be disabled the next time KUMO restarts. Any changes in the Network configuration will be saved upon restart.

To set KUMO to its temporary static IP address:

1. Power up the KUMO device and wait for it to boot normally.
2. Set the KUMO device to its static IP address::
   - For a KUMO router, insert a straightened paper clip or similar device into the reset slot on the rear and hold for five seconds and then release. The KUMO will restart with the default IP. When the KUMO router default IP is set the Identify LED will blink.
   - For a KUMO CP/CP2, press and hold the two SHIFT buttons on the panel for five seconds and then release. When the KUMO CP default IP is set, the Source and Destination buttons will flash alternately.

Figure 4. KUMO Router and KUMO CP Default Static IP Setting



IMPORTANT: Be sure to record your computer's existing TCP-IP settings before the next step so that you can return the computer to normal operation after this procedure.

3. Configure your computer to 192.168.101.X. Do not use .1 at the end of the address to avoid duplicate IP addresses.
4. Start a web browser and enter 192.168.101.1 as the web address. This is the KUMO temporary static IP address.
5. Once you've connected using the static IP, you can then enter a desired network configuration using the KUMO device's Network tab.

Network Configuration In Depth

A LAN is a shared network that includes other Ethernet devices all attached via a hub or digital switch. LANs may be divided into zones separated by software or hardware routers. Routers may also be used to connect the LAN to an outside wide area network (WAN) such as the Internet. Devices on a LAN have IP addresses which may be fixed and permanent, or dynamically assigned by the network (DHCP with DNS server).

NOTE: Once connected and properly configured, the KUMO router can then be controlled by a web browser or one or more KUMO CP control panels. KUMO and KUMO CP are equipped with zeroconf (Bonjour) and support UPnP networking protocols but initially start up as DHCP active devices. If you are operating on a DHCP server, KUMO will take an assigned IP address and appear on the network.

Caution! When attaching KUMO to a standard static IP LAN, you must configure KUMO components with a new, unique IP address. You should first talk to your network administrator and find out how it should be connected (TCP/IP Static IP or DHCP). Your IT department will be able to supply the information you need to install KUMO on a LAN.

KUMO uses TCP-IP network communications and Ethernet connections (a 10/100/1000 Ethernet port) for crosspoint control, status monitoring, and software updates. KUMO devices have an internal HTTP web server that works with a standard web browser on a Mac or PC. An Ethernet cable can also be used to connect an optional KUMO CP (control panel) directly to a KUMO router for operation without a computer.

KUMO devices are compatible with both CAT-5 straight-through and cross-over Ethernet cables—they automatically detect whichever is used.

KUMO's internal HTTP networking software supports three levels of network control:

- Closed KUMO network – uses Default Auto Configure (KUMO CP), or Bonjour (Mac or PC).

- Auto Configured LAN – employs a Bonjour or UPnP enabled computer/ browser to automatically connect devices and allows KUMO web browser User Interface (UI).
- Standard TCP-IP network – employs DHCP or Static IP addressing and allows the KUMO web-based UI and an unlimited number of KUMO routers and up to 16 KUMO CP control panels.

The following web browsers have been tested and approved for use with KUMO (Bonjour capability is recommended):

- Firefox - latest version on all platforms
- Safari - latest version on Mac and Windows
- Internet Explorer - version 10 and higher on Windows
- Chrome - latest version on all platforms (Bonjour is supported)

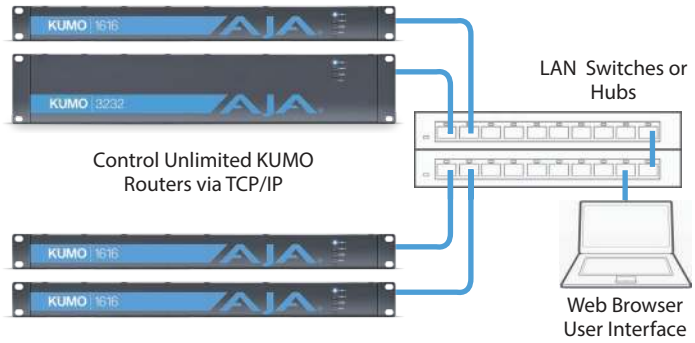
Once connected, you can use a web browser to:

- Configure any TCP/IP settings
- Select and name KUMO routers and control panels
- Assign a KUMO panel to be able to control specific KUMO routers
- Name sources and destinations
- Make Source to Destination assignments (signal routing)
- Change router operating mode (Normal, Dual Mode, Quad Mode)
- Set a variety of operational and monitoring options

LAN Connection Using a Hub or Switch

In a LAN connection, connect one or more KUMO routers to your LAN or closed network using Cat. 5 Ethernet cable and an Ethernet hub or switch; then power up the equipment.

Figure 5. KUMO Routers on LAN with Web Browser UI



Setup and Control Methods

Regardless of direct connection or LAN connection, KUMOs are controlled over a network by connecting to KUMO's internal web server with a standard web browser on a Mac or PC. To do this you first need to establish a network connection between the computer and the KUMO to be controlled. There are various methods supported for doing this depending on the operating system and/or web browser being used.

When using KUMO in a DHCP or Static IP addressed network, it is best to select and maintain a consistent network scheme. If you use a mix of DHCP and Static IP addresses, inconsistent performance can result. The most stable operation is achieved when all IP addressing is either DHCP or Static

Setup and Control from a Browser on Mac OSX

Safari Browser: Type in KUMO Static IP Address

KUMO offers a factory default static IP address. The default static IP address is temporary and is intended only to allow an initial connection. Once you've connected using the static IP, you can then enter a desired network configuration using KUMO's Network tab.

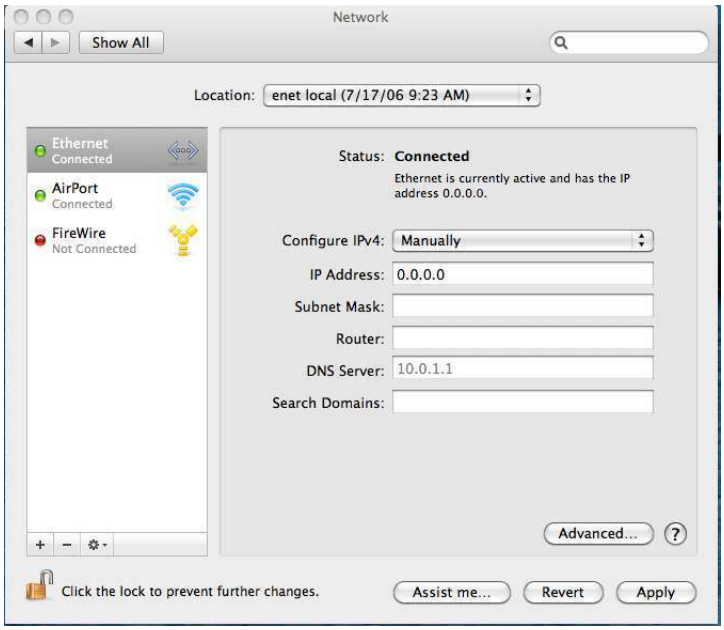
NOTE: The default static address is temporary and will be disabled the next time KUMO restarts. Any changes in the Network configuration will be saved upon restart.

1. Set the KUMO to its factory default IP address. See *"KUMO Temporary Static IP Address" on page 13* for this procedure.
2. Configure your computer to communicate on the 192.168.101.X subnet as shown below:

IMPORTANT: First record existing TCP-IP settings so that you can return your computer to normal operation after this procedure.

A. Go to your System Preferences>Network and select Ethernet and Configure: Manually.

Figure 6. Mac Network Setup Screen (System Preferences -> Network)



B. Input the address information shown below:
   - IP Address: 192.168.101.X (do not use .1 in the last octet).
   - Subnet Mask: 255.255.255.0

C. Click Apply.

3. Ensure the KUMO device to be controlled is connected to the Mac via Ethernet (directly or via LAN).
4. Start Safari and enter 192.168.101.1 as the web address. This is the KUMO temporary static IP address.
5. Once you've connected to KUMO's web interface, reconfigure KUMO's network parameters as desired using the KUMO device's Network tab.
6. Restore your computer to its normal network settings using this procedure and the IP addresses you recorded earlier.

Setup and Control from a Browser on Windows

The easiest methods of setting up a controlling a KUMO device from a PC running Windows are:

- Setup and Control from a Browser on Windows using UPnP
- Setup and Control from a Browser on Windows using a Static IP Address

Windows: Using UPnP (Universal Plug and Play)

This method was covered earlier in this chapter.

See *"Windows PC Configuration using UPnP" on page 13*.

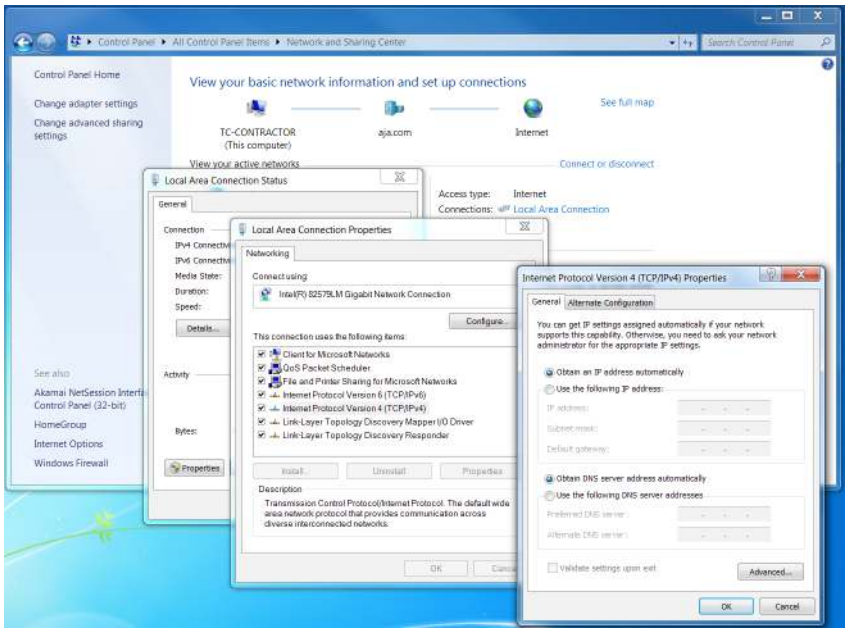
Windows Browser: Type in KUMO Static IP Address

KUMO offers a factory default static IP address. The default static IP address is temporary and is intended only to allow an initial connection. Once you've connected using the static IP, you can then enter a desired network configuration using KUMO's Network tab.

NOTE: The default static address is temporary and will be disabled the next time KUMO restarts. Any actual changes made to KUMO's Network configuration will be saved and used upon restart.

1. Set the KUMO to its factory default IP address. See *"KUMO Temporary Static IP Address" on page 13* for this procedure.
2. Configure your computer to 192.168.101.X as shown below (this example is for a PC running Windows 7 connected directly to KUMO, other Windows versions use similar procedures):
   A. Use Control Panel to access your Local Area Network properties. In Windows 7 the path is:
      - Control Panel > Network and Sharing Center
   B. Then, under "Connections" click on the Local Area Connection for the PC's Ethernet port.

Figure 7. Windows 7 Network Configuration Screens



   C. In the resulting General dialog screen, select the Properties button.

D. Then on the Networking tab, select Internet Protocol Version 4 and click the Properties button below.

IMPORTANT: Record your computer's existing TCP-IP settings. You will later need to restore these original settings so that you can return your computer to normal operation after this procedure.

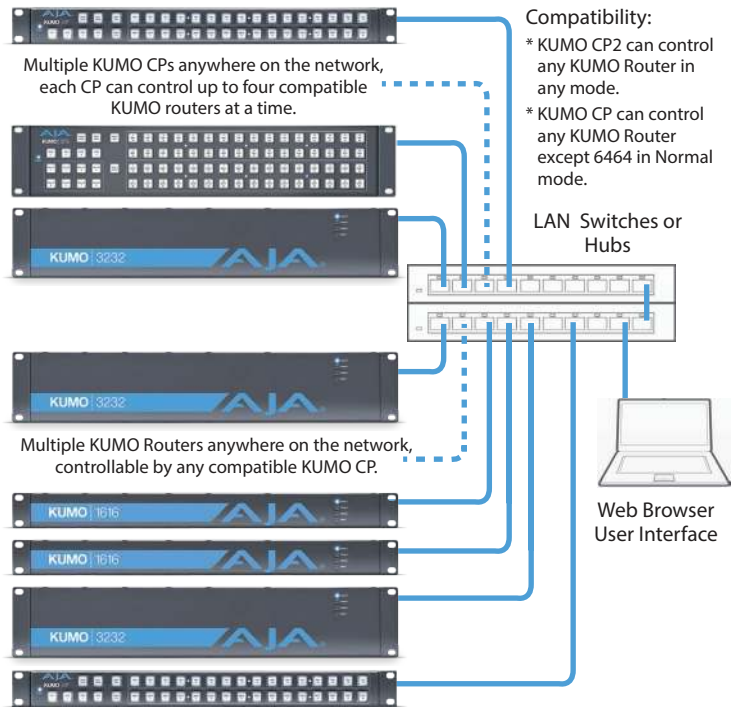
E. Finally, click the "Use the following IP address:" radio button and enter the IP Address and Subnet Mask below:
   - IP Address: 192.168.101.X (do not use .1 in the last octet).
   - Subnet Mask: 255.255.255.0

F. Click the OK button to store the changes.

3. Connect the Windows PC to KUMO's RJ-45 port (either direct or through your LAN)
4. Point your web browser to 192.168.101.1 as the web address. This is the KUMO temporary static IP address.
5. Once you've connected to KUMO's web interface, reconfigure KUMO's network parameters as desired using the KUMO device's Network tab.
6. Restore your computer to its normal network settings using this procedure and the IP addresses you recorded earlier.

Larger System Control Configurations

Figure 8. Multiple KUMO Routers and KUMO CPs with Web Browser UI Control.



NOTE: The 32 button KUMO CP hardware Control Panel cannot be used with a KUMO 6464 router operating in Normal mode (only 32 buttons for 64 sources and destinations). However the KUMO CP can be used when the KUMO 6464 is operating in Dual or Quad mode. Control of the KUMO 6464 router in all modes is available via the KUMO CP2 64 button hardware panel, web browser, Ethernet control, and RS-422.

If the KUMO will be attached to a WAN, talk to your IT administrator and obtain the details on how to configure the KUMO (DHCP or static IP).

TCP-IP Network Connection

KUMO supports traditional TCP-IP networking through DHCP or Static IP addressing.

IMPORTANT: When using KUMO in a DHCP or Static IP addressed network, it is best to select and maintain a consistent network scheme. If a mixture of DHCP and Static IP addresses are used, inconsistent performance can result. The most stable operation is achieved when all IP addressing is either DHCP or Static.

Default DHCP Configuration

DHCP is the default initial configuration routine for KUMO devices. If you start up on a DHCP network, KUMO will accept assigned IP addresses. After DHCP initialization, use your zeroconf browser to view the KUMO web page and view the assigned IP address.

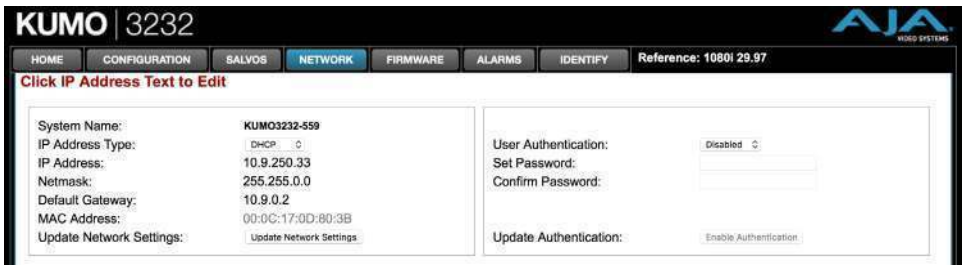
Static IP Configuration

If your IT administrator prefers an assigned IP address that is fixed (called a "Static IP), you will need to set network parameters using the KUMO UI Network screen where you will enter:

- IP address type—Static IP
- a unique IP address
- the Subnet Mask and default gateway IP address (your LAN's router that does the network's routing)

You will need to press the Enter key on the keyboard for every field changed. Press the **Update Network Settings** button when all fields are complete.

Figure 9. KUMO User Interface Network Tab



Select KUMO to Control from Web Page

Each KUMO device has a built in web server that generates a web page. KUMO devices see each other on the network and list those other KUMO devices in their web pages. From the Home screen, use the pulldown menu in the upper left to see all of the KUMO devices present on the local LAN and select the router you want to control, or select the KUMO CP you want to use.

Figure 10. KUMO Router Selection

Assign KUMO CP and CP2 to Control KUMO Routers

With multiple KUMO routers and KUMO control panels on the same network, you can assign which routers are able to be controlled by a panel by configuring the four Router Select buttons on the panel. On the KUMO control panel web page, go to the Home screen, click on the box below the RTR button, and select the KUMO router from the drop-down list.

Figure 11. KUMO Control Panel Router Button Assignment

Locating a Specific KUMO Device on the Network

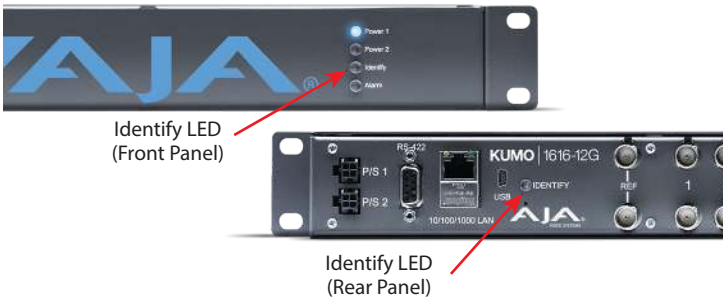
Identify Button

Click on the web UI Identify button to find the physical location of the currently controlled KUMO router or panel.

The web browser button will alternate between blue and gray background color in Identify mode. Click again to turn the Identify function off.

- On a KUMO router, the Identify LEDs on the front and back will flash, enabling quick physical location of the router in a populated rack of equipment.
- On a KUMO CP, the Source and Destination button rows will flash alternately.

Figure 12. KUMO Router Identify LEDs.



Chapter 3 – Router Web Browser User Interface

Overview

An optimized web server inside the KUMO allows you to remotely monitor and adjust parameter settings via a network-attached computer running a web browser.

NOTE: In this chapter a KUMO 3232 is used as the example. Other models will have different numbers of buttons.

Navigation Bar

The KUMO web browser user interface (UI) provides a navigational bar of tabs for access to control screens and the Identify toggle button:

- Home – control surface tab for salvo/source/destination selections
- Configuration – custom naming for sources and destinations, and mode selection
- Salvos – salvo configuration
- Network – IP settings for LAN/WAN operation and enabling authentication
- Firmware – update menu for KUMO software from AJA
- Alarms – log of service failures and allows alarms to be suppressed
- Identify – toggles activation of Identify LEDs for easy location of KUMO devices.

Figure 13. KUMO Navigation Bar

Click any of the first six tabs to jump to that screen. To the right of the Identify button you will see the format of the Reference Video signal being used (if present).

KUMO Home Screen Device Selection

From the Home screen (*Figure 14 on page 2323*), you can use the pulldown menu in the upper left to see all of the KUMO devices present on the local LAN and select the one you want to control or monitor.

Web Browser Control Surface Operation

On the Home screen immediately below the KUMO selection menu are the Salvo buttons, below them the Source buttons, and below them the Destination (output) buttons.

Click on any Destination button and it will highlight and it's currently selected Source button will also be highlighted.

Figure 14. KUMO Web Browser Home Screen (3232 Router)

NOTE: In Configuration, you can hide Destination buttons that you do not want to control from this screen (see "Hide" on page 26).

Performing a Take

1. Go to the KUMO router Home screen and select the router you wish to control with the drop down menu.
2. Press the desired Destination button. It will illuminate.
3. Press the desired Source button. That source will be routed to that destination and the Source button will illuminate.

NOTE: Sources for locked Destinations cannot be changed.

Taking a Salvo

Up to eight salvos can be configured on a KUMO router. Each salvo can route any number of sources to any number of destinations, including the same source to multiple destinations. Paths not included in a salvo remain unchanged. Configured Salvo buttons are colored green on the Home page. See *"Salvos Configuration" on page 26* to learn how to configure salvos.

Performing a salvo is a two stage process. First you arm the salvo, and then you take the salvo.

1. Go to the KUMO router Home screen and select the router you wish to control with the drop down menu.
2. Press the desired configured Salvo button. The TAKE SALVO button on the right will be colored red.
3. Press the TAKE SALVO button. All sources configured in that salvo will be routed to their destinations.

NOTE: Salvos do not change locked Destinations.

Router Configuration

From the Configuration screen you can select the operating mode (Normal, Dual, Quad), change the Source and Destination names and the colors of the buttons, and Lock and Hide Destination buttons.

Figure 15. KUMO Web Interface, I/O Configuration Screen

Mode Selection

Click on the **Signal switching mode** drop down list to select Normal, Dual, or Quad operating mode. When Dual or Quad mode is selected, the number of Source and Destination buttons will be reduced to match that configuration.

Figure 16. Dual Mode Reduced Sources and Destinations

Figure 17. Quad Mode Reduced Sources and Destinations

In Dual and Quad modes adjacent BNCs are used for each routed signal.

Table 2. Dual and Quad Mode BNC Connectors and Signal

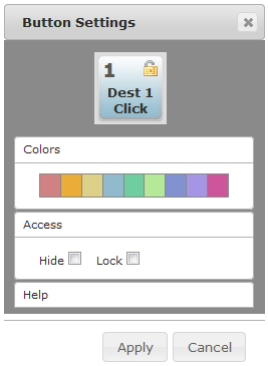
Dual Mode					Quad Mode	
BNC #	**Signal**	**BNC #**	**Signal**		**BNC #**	**Signal**
1-2	1	33-34	17		1-4	1
3-4	2	35-36	18		5-8	2
5-6	3	37-38	19		9-12	3
7-8	4	39-40	20		13-16	4
9-10	5	41-42	21		17-20	5
11-12	6	43-44	22		21-24	6
13-14	7	45-46	23		25-28	7
15-16	8	47-48	24		29-32	8
17-18	9	49-50	25		33-36	9
19-20	10	51-52	26		37-40	10
21-22	11	53-54	27		41-44	11
23-24	12	55-56	28		45-48	12
25-26	13	57-58	29		49-52	13
27-28	14	59-60	30		53-56	14
29-30	15	61-22	31		57-60	15
31-32	16	63-64	32		61-64	16

Button Settings

In the Configuration screen you can click on the any button to access the Button Settings panel. In the panel, click on the name fields to assign custom Source and Destination names to the inputs and outputs of the router.

The Settings selection allows you to pick a color from the settings panel to color code the button backgrounds. The selected color is set for both the static state color and the High Tally (rollover/active) state.

Figure 18. Button Settings/Color Panel



Lock

If you want to lock any of the Destinations from Source changes, click on the Lock/Unlock box for the desired Destination.

NOTE: This lock is a universal lock for all KUMO devices controlling the selected Destination. It is tallied throughout the network and can be released from other KUMO control devices on the network.

Hide

You can also hide selected Destinations from display on the Home screen by activating the Show/Hide box. This setting applies only to the local browser.

Click on the **Apply** button to commit your changes, or **Cancel** to exit the pane without making any changes.

Reset to Factory Defaults

The **Reset to Factory Defaults** button can be used to return all router user settings to factory defaults.

Salvos Configuration

The Salvos screen lets you configure up to eight salvos for the selected KUMO router. Each salvo can route any number of sources to any number of destinations, including the same source to multiple destinations. Crosspoints not included in a salvo remain unchanged.

When you first select the Salvo screen the eight Salvo buttons are shown. Buttons with currently configured salvos are colored green.

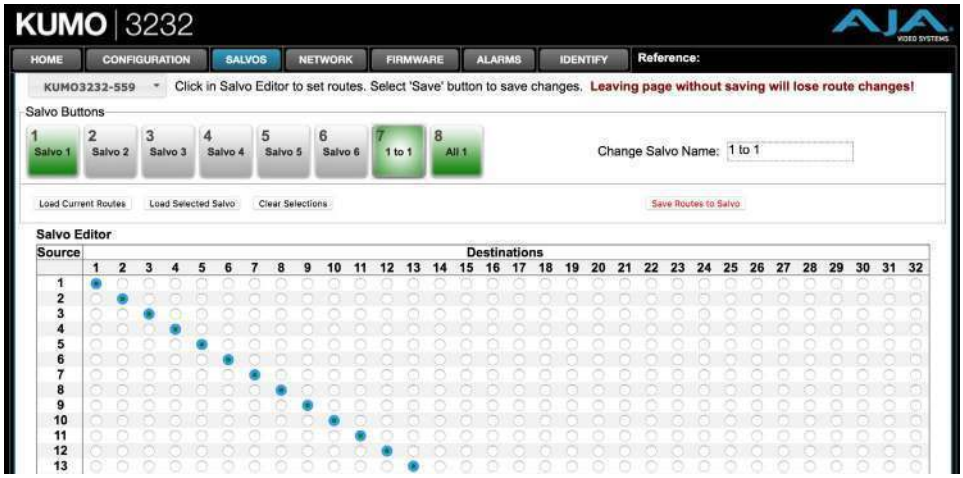
Enable Exit Page Warning

The **Enable Exit Page Warning** checkbox enables or disables the display of a warning message if you leave the Salvo configuration screen without saving.

Figure 19. Initial KUMO Salvos Screen

Clicking on one of the eight Salvo buttons selects that salvo for configuration. After selection, a router table appears below with Sources listed vertically and Destinations listed horizontally. After a salvo is configured, you will need to save the crosspoint takes for that salvo.

Figure 20. KUMO Salvos Screen with Router Table



Salvos Screen Controls

Salvo Select Buttons

At the top of the Salvos screen are eight Salvo select buttons. Configured buttons are colored green, and the button for the currently selected salvo is highlighted.

Change Salvo Name

You can enter a name into this field for the selected salvo.

NOTE: Salvo names should be unique.

Load Current Routes

Click to load the current KUMO crosspoint status into the table below. All crosspoints that have been set will be displayed.

Load Selected Salvo

Click to clear any current configuration from the router table and load the crosspoint paths from the currently selected salvo into the table.

Clear Selections

Click to clear all the paths from the router table.

Save Routes To Salvo

After configuration, click on this button to save the selected salvo.

NOTE: If you leave the page without saving, all the changes made to the selected salvo will be lost.

Salvo Configuration Procedure

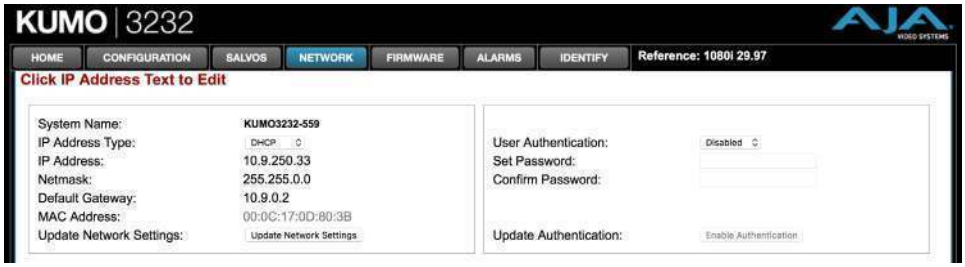
1. Go to the KUMO router Home screen and select the router you wish to control with the drop down menu.
2. Go to the Salvos screen and select the salvo to be configured.
3. If you want to edit the name of the salvo, click on its name in the field on the right, type in a new unique name, and press the Enter key to save the name. Clicking outside the field will undo any typed changes.
4. Select the crosspoint(s) in the Salvo Editor below for the routes to include in this salvo. Sources are listed vertically, and Destinations horizontally.
   - Clicking on the empty box below the left Source column header creates a one to one (diagonal) salvo in the router table.
   - Clicking on any Source number applies that same source to all the Destinations.
5. Click the **Save Routes To Salvo** button to save the current router table to that salvo.

Network Setup

The Network screen provides access to standard TCP-IP setup fields and allows you to click on the System Name field to change it. The MAC address is a fixed machine address composed of manufacturer identification and product serial numbers.

You can choose DHCP or Static IP with the drop down menu. When Static IP is selected the fields below are able to be edited. After changing the network type or entering Static IP information, click the Update Network Settings button to commit your settings.

Figure 21. KUMO Network Setup Screen



User Authentication

This parameter enables or disables an authentication login requirement. By default this parameter is set to **Disabled**.

When Login is enabled, you are directed to the login screen before you can access KUMO over the network. You are required to log in before you can access any other browser screens.

When you select **Login** as the User Authentication choice, you then must set and confirm a password. To save these settings select the **Enable Authentication** button. You can change the password using the Network browser screen.

NOTE: If authentication is used, it provides only a minimum security safeguard against unauthorized use. The authentication mechanism is simple and does not provide robust security.

Password Reset

You can use a password reset procedure to set the KUMO device's password back to the default value, allowing network access to the device if the password should become lost or mistakenly changed. The default password is "password".

After resetting the password, the current KUMO authentication setting itself is not changed. If authorization is enabled, after resetting the password you will need to enter "password" (the default) to gain network access.

KUMO Router Password Reset

1. For a KUMO router, insert a straightened paper clip or similar device into the reset slot on the rear, hold in for more than eight seconds and then release.
2. The Identify button will blink, then light steadily, and then go out, indicating the password has been reset to default.

KUMO Control Panel Password Reset

1. For a KUMO CP/CP2, press and hold the two SHIFT buttons on the panel for more than eight seconds and then release.

2. The Panel Lock button will be colored red and then go out, indicating the password has been reset to default.

Firmware Updating

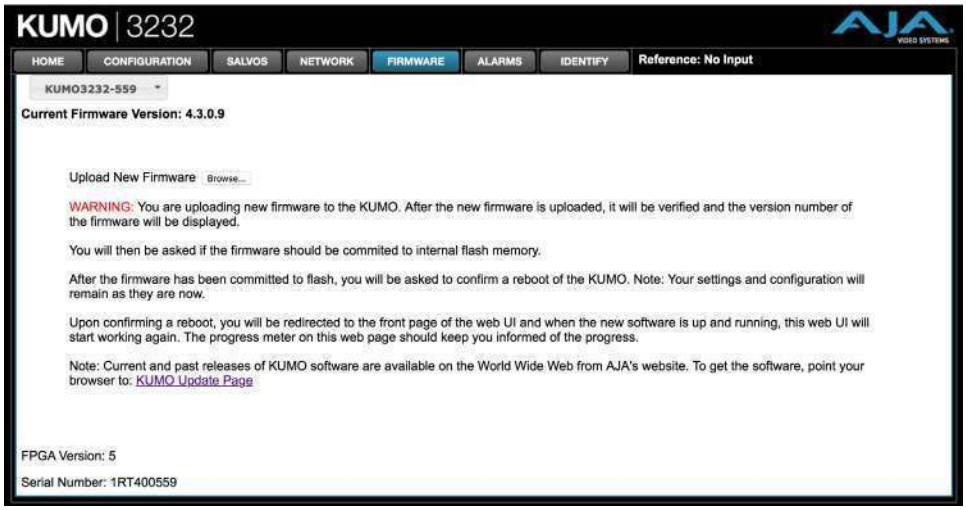
AJA is constantly upgrading it's product software so it is a good idea to check the AJA website often for updates and to assure optimum system performance. Go to the AJA KUMO Update web page by clicking the link at the bottom of the Firmware screen, or using the following link:

https://www.aja.com/family/kumo#support

Click on any of the KUMO products to go to its support tab.

Current firmware version number is reported here under the pull-down menu, and the device's serial number is listed at the bottom of the screen.

Figure 22. KUMO Web Interface, Firmware Upload Screen



Unpack the Software

Download the latest version of KUMO firmware and use the Firmware screen to upload it to your KUMO router. KUMO software update files are "ZIP" files, which you can open with a number of standard and third party uncompressor applications. The software image that you'll install on KUMO is a file with a name similar to:

- kumo_ver_4.0.0.3-1475859474.bin

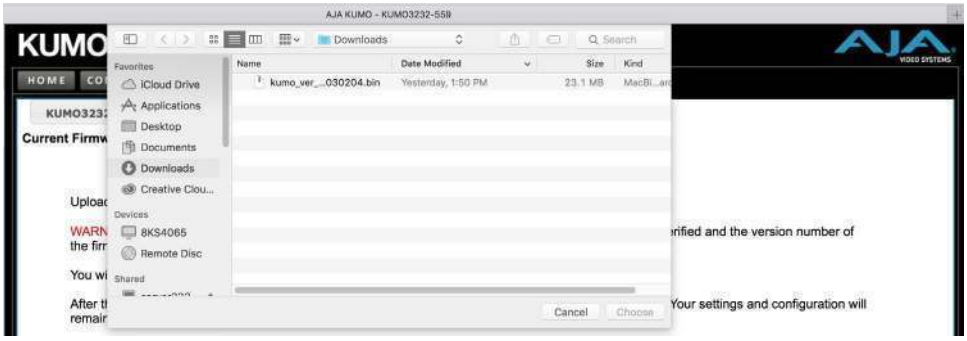
NOTE: Depending on your PC or Mac operating system settings, the ".bin" extension may not be visible to you in a file directory.

Uploading and Installing Firmware to KUMO

Uploading and installing the software update only requires a PC or Mac that can "see" the KUMO via its browser. Follow this procedure to install the software:

1. Launch a browser on your PC or Mac and connect to the KUMO product that requires a firmware update.
2. Once the KUMO web page is visible, click on the **FIRMWARE** tab.
3. Then click on the **Browse** button to locate the KUMO firmware image file on your PC or Mac.

Figure 23. KUMO Firmware Screen, Browse for Firmware



4. When you have selected a valid KUMO image file, click **Open** and then **OK** the upload in the web browser. The file you select will upload to the KUMO and be tested for validity. Incomplete, corrupted, or non-KUMO software files are rejected.
5. When the upload completes you will be asked if you want to commit the firmware to flash. Click **Commit Uploaded Firmware**. The firmware will be loaded to flash. Wait for this to complete.
6. When done, click the **Restart** button to reset your KUMO and refresh the web browser and KUMO UI.

Figure 24. KUMO Firmware Screen, Success and Restart

Once these steps are complete, the KUMO will be running the software you just uploaded. The configuration of the KUMO prior to the upgrade is preserved.

Verify the new software is running by bringing up the KUMO web page again. Check the Firmware page for the current version number. The restart and refresh cycle may take a couple of minutes. If for some rare reason it didn't update, you can then run through the update steps again. *On some browsers, the Retry page may appear even though the software upgrade was successful. If this occurs, before clicking on retry, refresh the web page and check the version number. If the new version number appears at the top of the page, the software upgrade was successful. If the old version appears, click Retry.*

If there is a power outage or glitch during the software download, the KUMO will boot the older software version and the upgrade process can then be re-started by the user. This happens because the KUMO has been designed with a safety feature where an internal "safe" copy of the previous software is retained in the event the updating process fails.

Safeboot Reset

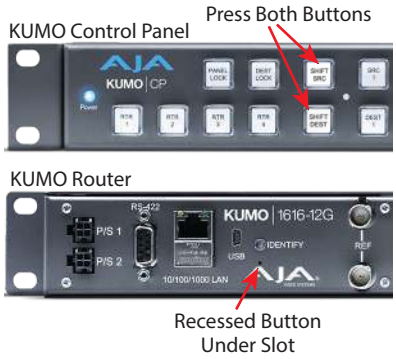
If your KUMO firmware becomes corrupted to the point of freezing the device, you can reset to a safeboot firmware image. The existing KUMO network configuration (DHCP or Static IP) is retained during safeboot. When safeboot is active you can then re-install the latest firmware via the web interface to regain full system operation.

IMPORTANT: A KUMO device running safeboot firmware is not operational other than being accessible on a network so compatible firmware can be installed.

To perform a KUMO safeboot:

1. Power down the KUMO device.
2. Engage the reset function:
   - For a KUMO router, insert a straightened paper clip or similar device into the reset slot on the rear.
   - For a KUMO CP, press and hold the two SHIFT buttons on the panel.
3. Apply power to the device, wait at least 5 seconds and then release the reset function.

Figure 25. KUMO Reset Locations

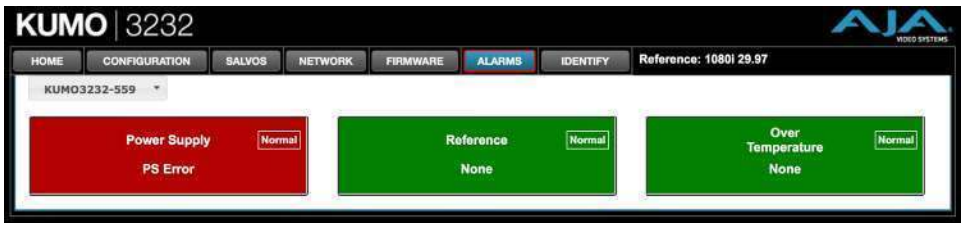


KUMO Alarms

KUMO reports alarms on the router front panel by lighting an Alarm LED and in the web browser UI by illuminating the border of the Alarms tab (see below). Alarms include:

- Power Supply – displays error condition if a redundant power supply is off-line
- Reference – displays error condition if no valid video reference signal is found
- Over Temperature – displays error if KUMO exceeds normal operating temperature

Figure 26. KUMO Web Interface, Alarms Screen



If you do not want any of the above conditions to report an error, click the boxed text to access the drop-down menu shown above. Select **Suppress** and click **OK** to deactivate the specific alarm.

Locating a Specific KUMO

Click on the web UI Identify button to find the physical location of the currently controlled KUMO router or panel.

See *"Locating a Specific KUMO" on page 39* for more information.

Chapter 4 – KUMO Remote Control Panels

Overview

The KUMO hardware panels are destination-oriented control panels allowing selection of sources and destinations on each of up to four KUMO routers. A KUMO control panel will connect to a single KUMO router automatically without computer/browser interface. For connection to up to four routers on a single CP, use the KUMO browser interface to assign the router select buttons to any four KUMO routers on your network.

Two KUMO hardware panels are available, the KUMO CP able to control up to 32 source and destinations, and the KUMO CP2, able to control up to 64.

NOTE: The 32 button KUMO CP hardware Control Panel cannot be used with a KUMO 6464 router operating in Normal mode (only 32 buttons for 64 sources and destinations). However the KUMO CP can be used when the KUMO 6464 is operating in Dual or Quad mode. Control of the KUMO 6464 router in all modes is available via the KUMO CP2 64 button hardware panel, web browser, Ethernet control, and RS-422.

KUMO Control Panel Installation and Network Configuration

Refer to *"Chapter 2 Installation" on page 10* for detailed information about KUMO hardware control panel installation and network configuration.

Performing a Take

1. Select the router you wish to control with a Router delegation button.
2. Press the desired Destination button. It will illuminate.
3. Press the desired Source button. That source will be routed to that destination and the Source button will illuminate.

NOTE: Sources for locked Destinations cannot be changed.

Taking a Salvo

Up to eight salvos can be configured on a KUMO router. Each salvo can route any number of sources to any number of destinations, including the same source to multiple destinations. Crosspoints not included in a salvo remain unchanged. See *"Salvos Configuration" on page 26* to learn how to configure salvos.

Performing a salvo is a two stage process. First you arm the salvo, and then you take the salvo.

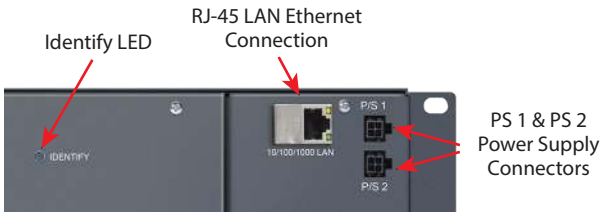
1. Press the desired Salvo button. The button will blink for five seconds.
2. Press that blinking Salvo button again to take that salvo.

After five seconds, the Salvo button will no longer be armed and stop blinking. To take that salvo you will need to press the Salvo button again to rearm that salvo.

NOTE: Salvos do not change locked Destinations.

Connectors and Indicators

Figure 27. KUMO CP Connectors and Indicator



Power Connectors

KUMO CP provides inputs for two power supplies—one included, redundant supply optional.

IMPORTANT: The power connector has a latch, similar to an Ethernet connector. Depress the latch (facing the outside edge of the KUMO device) before disconnecting the power cable from the unit.

Ethernet Connector

An RJ-45 connector provides 10/100/1000 Ethernet connection to the internal Linux OS/web server.

Identify LED

The Identify LED can be flashed from the web UI to identify that specific KUMO CP.

Button Key Caps

Each control panel button has a removable lens cap that allows you to customize Source and Destination names. AJA has provided a template for printing custom lens chips (we suggest using 29 lb. vellum) for button designations. The template is available at:

https://www.aja.com/support/kumo/lens_chip.zip

Panel Function Buttons

Each KUMO Control Panel provides:

- Panel Lock – prevents Source or Destination changes from this panel.
- Destination Lock – prevents any Source change for a Destination.
- Router Delegation Buttons – (RTR 1–RTR 4) enable immediate control of the KUMO assigned to the button.

Figure 28. KUMO CP Function Buttons

Panel Lock

When you press the Panel Lock button, it lights red and all panel functions for this panel are disabled. All other KUMO devices on the network will function normally.

Destination Lock

Press the DEST LOCK button to prevent any changes to the KUMO destination you are currently controlling (DEST button high tallied). The lock can be removed from any other KUMO CP or browser interface on the network.

The DEST and DEST LOCK buttons turn red on all panels that are assigned to the KUMO you are controlling. You can select other destinations and apply the Destination Lock function to each. All locks will tally red. To remove the lock, select the destination and press DEST LOCK again.

Locked destinations are reported on the KUMO router's browser Home page with a lock icon.

Figure 29. KUMO Router Home Screen Destination Buttons

Router Delegation Buttons (RTR 1 - 4)

Use the Router delegate buttons to connect to the specific router to be controlled.

You can assign the delegate buttons to any of up to four routers in your system. To assign router/control panel delegation, access the Home page for your KUMO CP.

If network communications between a control panel and router fails, the control panel's delegation button for that router will be colored pink. When communications is restored the delegation button returns to its normal color.

Shift/Reset Buttons

The SHIFT SRC and SHIFT DEST buttons serve multiple functions. They allow you to select shifted sources and destinations (17–32), and they also perform the same reset functions as the reset slot. Resets should be done only by qualified network personnel:

- Shift: Hold down SHIFT SRC and press a source button to select a shifted source, or hold down SHIFT DEST and press a destination button to select a shifted destination. When a shift button is not held down, pressing a source or destination button selects the unshifted source or destination (1–16).

- IP Reset: See *"KUMO Temporary Static IP Address" on page 13*.
- Password Reset: see *"Password Reset" on page 28*.
- Reset to Safeboot Firmware: See *"Safeboot Reset" on page 31*.

SALVO Buttons (CP2 Only)

The eight Salvo buttons, when configured, can each be used to perform multiple source to destination takes using just that one button.

Performing a salvo is a two stage process. First you arm the salvo, and then you take the salvo.

1. Press the desired Salvo button. The button will blink for five seconds.
2. Press that blinking Salvo button again to take that salvo.

NOTE: Salvos do not change locked Destinations.

Control Panel Web Browser Interface

The KUMO CP browser interface provides many of the same Navigation Bar tabs as the router. This section discusses those functions unique to the control panel interface. The Navigation Bar includes:

- Home – assign router elect buttons to KUMO routers
- Configuration – adjust the control panel display intensity and, if necessary, Reset the panel to its original "Auto Configure" state or to original factory settings
- Buttons - (control panel browser only) deactivate and reactivate panel buttons, see *"Disabling Control Panel Buttons" on page 37*.
- Network and Firmware tabs – same as KUMO router network settings, see *"Network Setup" on page 28* and *"Firmware Updating" on page 29*.
- Alarms – Power Supply and Over Temperature, refer to *"KUMO Alarms" on page 31*.
- Identify button – to identify the physical location of a particular control panel.

Home Screen

Use the Home page to assign a router to each of the router delegation buttons. Each button has a pulldown menu that lists the active networked KUMOs for assignment and provides an Unassign and Refresh function.

Figure 30. KUMO CP Browser Interface Home Screen

The assigned router name appears below each button. You can change the selected (currently-controlled) router on the panel by clicking the button on the Home page. The panel's router delegation button will tally appropriately.

Configuration Screen

Using the Configuration page, you can:

- Adjust the Display Intensity slider – select one of four button illumination levels.
- Reset "Auto Configure" – resets the Auto Configure function to automatically set up one control panel to one router. This function re-boots the panel to trigger the configuration. Upon reboot, if any other router is found on the network, it will not pair to the panel.
- Reset to Factory Defaults – resets all control panel settings to factory defaults, including System Name and Network settings.

Figure 31. KUMO CP Browser Configuration Screen

Buttons Screen

The Buttons screen lets you enable or disable the Source, Destination, and Salvo buttons on a hardware KUMO hardware control panel.

Disabling Control Panel Buttons

The v4.1 and higher KUMO firmware includes a button disabling feature, useful to uniquely configure the button operation of each KUMO CP/CP2 for specific work areas and specific workflows.

NOTE: *This feature is not a router Destination or Source lock. Takes can still be performed on paths with disabled buttons, using the KUMO web UI or another KUMO control panel.*

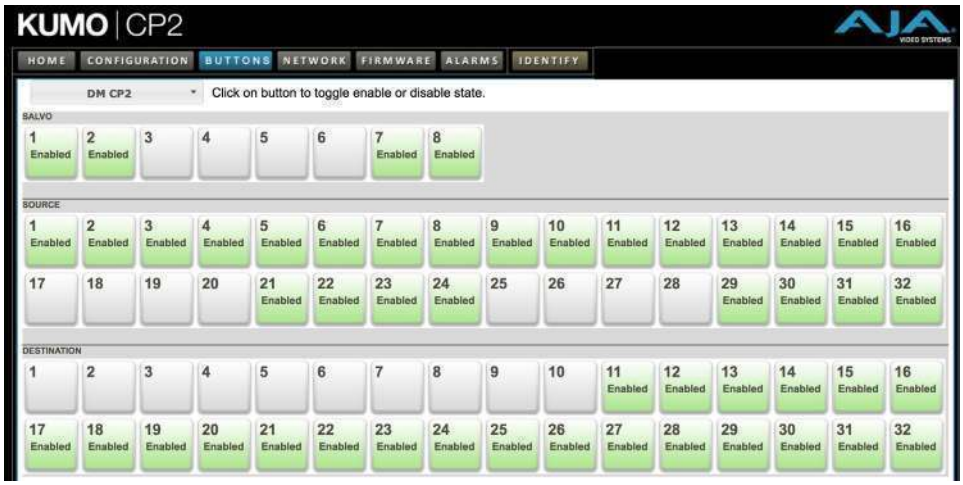
The current KUMO CP configuration is retained after a power cycle, including any disabled Source or Destination buttons.

NOTE: *Performing a KUMO CP factory reset clears the configuration. All Salvo, Source and Destination buttons are enabled after a factory reset.*

Procedure

1. Access the KUMO CP via its internal web page.
2. Click on the HOME tab and select one of the four routers.
3. Click on the BUTTONS tab and then click on the Source, Destination, and/or Salvo buttons you wish to disable. Enabled buttons have a green background color and disabled buttons have a gray background color.

Figure 32. KUMO CP 2 Configuration with Disabled Buttons



4. Web UI buttons that have been disabled will go blank, and the tally lights of the disabled physical buttons on the KUMO CP will go off.

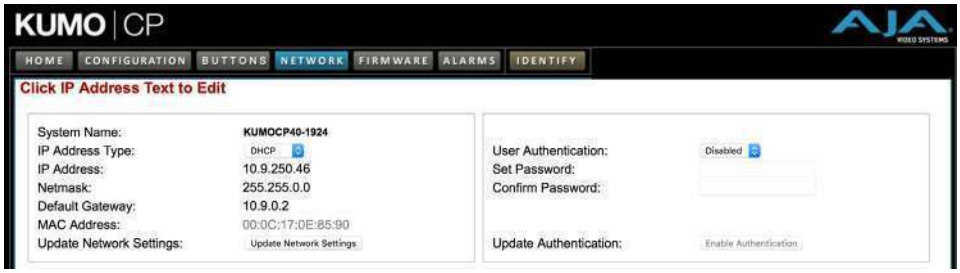
Network Screen

The Network screen provides access to standard TCP-IP setup fields and allows you to click on the System Name field to change it. The MAC address is a fixed machine address composed of manufacturer identification and product serial numbers.

You can choose DHCP or Static IP with the drop down menu. When Static IP is selected the fields below are able to be edited. After changing the network type or entering Static IP information, click the Update Network Settings button to commit your settings.

IMPORTANT: Do not Update Network Settings with 0.0.0.0 values for either IP Address or Netmask. This will disable the control panel and it will need to be returned to AJA for repair.

Figure 33. KUMO CP Network Setup Screen

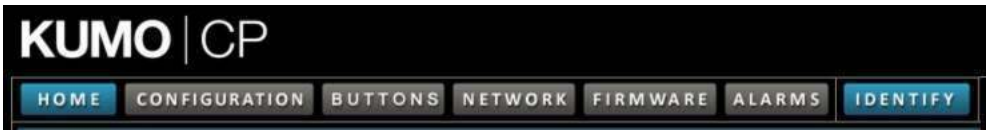


User Authentication

This parameter enables or disables an authentication login requirement. See *"User Authentication" on page 28* for more information.

Locating a Specific KUMO

Click on the web UI Identify button to find the physical location of the currently controlled KUMO router or panel.



See *"Locating a Specific KUMO Device on the Network" on page 20* for more information.

Appendix A – Specifications

All KUMO Router Models

Ancillary Data

- Passes all SDI embedded ancillary data including audio

Salvo

- Up to 8 Salvos can be configured and saved in each KUMO router

Switching Modes

- Single, Dual, and Quad link modes
- Switches in vertical blanking per SMPTE RP-168

Reference Input

- External, 2x BNC
- Looping, nonterminating
- Blackburst or tri-level sync

Network Interface

- 1x RJ-45, 10/100/1000 Ethernet
- Supports AJA KUMO Ethernet control panels, direct connect or networked
- Grass Valley Native Protocol
- Embedded web server for remote control

Serial Interface

- 1x DB-9 Female, RS-422
- Grass Valley Native Protocol
- (See *"RS-422 Control Specifications (Routers)" on page 47* for pinouts.)

Environment

- Safe Operating Temperature: 0 to 40 degrees C (32 to 104 degrees F)
- Safe Storage Temperature (Power OFF): -40 to 60 degrees C (-40 to 140 degrees F)
- Operating Relative Humidity: 10-90% noncondensing
- Operating Altitude: <3,000 meters (<10,000 feet)

KUMO 6464 Tech Specs

Video Formats

- 270 Mbps, 1.5 Gbps, 3 Gbps SDI
- 270 Mbps DVB-ASI
- Format agnostic, 125 Mbps - 3 Gbps

Video Input Digital

- 3G-SDI Inputs
- 64x BNC, SMPTE-259/292/424

Video Output Digital

- 3G-SDI Outputs
- Noninverting
- 4x BNC, SMPTE-259/292/424

Cable Equalization

(Belden 1694A)

- 3 Gbps, up to 140m
- 1.5 Gbps, up to 200m
- 270 Mbps, up to 400m
- Automatic operation

Reclocking

- 270 Mbps, 1.483 Gbps, 1,485 Gbps, 2.966 Gbps, 2.970 Gbps - Auto Select
- All other rates are passed through and not reclocked

Control Panel Compatibility

- AJA KUMO CP (First 32 I/O in Normal, all I/O in Dual or Quad mode) – 1RU X-Y Ethernet control panel
- AJA KUMO CP2 (Single, Dual or Quad mode) – 2RU X-Y Ethernet control panel

Size (w x d x h)

- 4RU - 17.4" x 1.54" x 7.00" (441.96 x 39.12 x 177.8 mm)

Weight

- 9.2 lbs (4.2 kg)

Power

- 10-14VDC regulated, 32W typ, 36W max, power supply required, included with purchase
- AC Adapter: 100-240VAC, 50/60 Hz, universal input

KUMO 3232 Tech Specs

Video Formats

- 270 Mbps, 1.5 Gbps, 3 Gbps SDI
- 270 Mbps DVB-ASI
- Format agnostic, 125 Mbps - 3 Gbps

Video Input Digital

- 3G-SDI Inputs
- 32x BNC, SMPTE-259/292/424

Video Output Digital

- 3G-SDI Outputs
- Noninverting
- 32x BNC, SMPTE-259/292/424

Cable Equalization

(Belden 1694A)

- 3Gbps, up to 140m
- 1.5Gbps, up to 200m
- 270Mbps, up to 400m
- Automatic operation

Reclocking

- 270 Mbps, 1.483 Gbps, 1,485 Gbps, 2.966 Gbps, 2.970 Gbps - Auto Select
- All other rates are passed through and not reclocked

Control Panel Compatibility

- AJA KUMO CP – 1RU X-Y Ethernet control panel
- AJA KUMO CP2 – 2RU X-Y Ethernet control panel

Size (w x d x h)

- 2RU - 17.4" x 1.54" x 3.5" (482.6mm x 39.1 mm x 88.9mm)

Weight

- 4.6 lb (2.1 kg)

Power

- 10-14VDC regulated, 18 W typ, 43.2W max, power supply required, included with purchase
- AC Adapter: 100-240VAC, 50/60 Hz, universal input

KUMO 1616-12G Tech Specs

Video Formats

- 270 Mbps, 1.5 Gbps, 3 Gbps, 6 Gbps, 12 Gbps SDI
- 270 Mbps DVB-ASI
- Format agnostic, 125 Mbps - 12 Gbps

Video Input Digital

- 12G-SDI Inputs
- 16x 12G-SDI BNC, SMPTE-259/292/424/2081/2082

Video Output Digital

- 12G-SDI Outputs
- Noninverting
- 16x 12G-SDI BNC, SMPTE-259/292/424/2081/2082

Cable Equalizaton

(Belden 1694A)

- 12 Gbps, up to 55m
- 6 Gbps, up to 110m
- 3 Gbps, up to 185m
- 1.5 Gbps, up to 210m
- 270 Mbps, up to 405m
- Automatic operation

Reclocking

- 270 Mbps, 1.483 Gbps, 1.485 Gbps, 2.967 Gbps, 2.970 Gbps, 5.934 Gbps, 5.940 Gbps, 11.868 Gbps, 11.880 Gbps - Auto Select

Control Panel Compatibility

- AJA KUMO CP – 1RU X-Y Ethernet control panel
- AJA KUMO CP2 – 2RU X-Y Ethernet control panel

USB Interface

- 1x Mini-USB (future use)

Size (w x d x h)

- 1RU - 17.4" x 1.54" x 1.75" (441.96 x 39.12 x 44.45 mm)

Weight

- 1.4 lb (0.7 kg)

Power

- 10-14VDC regulated, 13W typ, 17W max, power supply required, included with purchase
- AC Adapter: 100-240VAC, 50/60 Hz, universal input

KUMO 1616 Tech Specs

Video Formats

- 3 Gbps SDI, 1.5 Gbps, 270 Mbps
- 270 Mbps DVB-ASI
- Format agnostic, 125 Mbps - 3 Gbps

Video Input Digital

- 3G-SDI Inputs
- 16x BNC, SMPTE-259/292/424

Video Output Digital

- 3G-SDI Outputs
- Noninverting
- 16x BNC, SMPTE-259/292/424

Cable Equalization

(Belden 1694A)

- 3Gbps, up to 140m
- 1.5Gbps, up to 200m
- 270Mbps, up to 400m
- Automatic operation

Reclocking

- 270 Mbps, 1.483 Gbps, 1,485 Gbps, 2.966 Gbps, 2.970 Gbps - Auto Select
- All other rates are passed through and not reclocked

Control Panel Compatibility

- AJA KUMO CP – 1RU X-Y Ethernet control panel
- AJA KUMO CP2 – 2RU X-Y Ethernet control panel

Size (w x d x h)

- 1RU - 17.4" x 1.54" x 1.75" (482.6mm x 39.1mm x 44.5mm)

Weight

- 1.4 lb (0.7 kg)

Power

- 10-14VDC regulated, 13W typ, 21.6W max, power supply required, included with purchase
- AC Adapter: 100-240VAC, 50/60 Hz, universal input

KUMO 1604 Tech Specs

Video Formats

- 270 Mbps, 1.5 Gbps, 3 Gbps SDI
- 270 Mbps DVB-ASI
- Format agnostic, 125 Mbps - 3 Gbps

Video Input Digital

- 3G-SDI Inputs
- 16x BNC, SMPTE-259/292/424

Video Output Digital

- 3G-SDI Outputs
- Noninverting
- 4x BNC, SMPTE-259/292/424

Cable Equalization

(Belden 1694A)

- 3Gbps, up to 140m
- 1.5Gbps, up to 200m
- 270Mbps, up to 400m
- Automatic operation

Reclocking

- 270 Mbps, 1.483 Gbps, 1,485 Gbps, 2.966 Gbps, 2.970 Gbps - Auto Select
- All other rates are passed through and not reclocked

Control Panel Compatibility

- AJA KUMO CP – 1RU X-Y Ethernet control panel
- AJA KUMO CP2 – 2RU X-Y Ethernet control panel

Size (w x d x h)

- 1RU - 17.4” x 1.54” x 1.75” (441.96 x 39.12 x 44.45 mm)

Weight

- 1.2 lb (0.6 kg)

Power

- 10-14VDC regulated, 7W typ, 9.6W max, power supply required, included with purchase
- AC Adapter: 100-240VAC, 50/60 Hz, universal input

KUMO CP2 Tech Specs

User Interface

- 80 buttons with removable overcap for lens chips
- Includes factory installed lens chip set
- High and Low button tally indication, configurable brightness
- Controls up to four KUMO routers
- Panel Lock feature
- Destination Lock feature

Router Support

- KUMO 1604
- KUMO 1616
- KUMO 3232
- KUMO 6464
- KUMO 1616-12G

Salvo

- 8 Salvos buttons can be enabled to trigger a KUMO router's configured salvos.

Network Interface

- 1x RJ-45, 10/100/1000 Ethernet
- Embedded web server for remote control

Size (w x d x h)

- 2RU - 17.4" x 1.3" x 3.5" (482.6mm x 33.0mm x 89.0mm)

Weight

- 2.1 lb (1.0 kg)

Power

- 10-14VDC regulated, 4W typical, 9.6W max, power supply required, included with purchase
- AC Adapter: 100-240VAC, 50/60 Hz, universal input

Environment

- Safe Operating Temperature: 0 to 40 degrees C (32 to 104 degrees F)
- Safe Storage Temperature (Power OFF): -40 to 60 degrees C (-40 to 140 degrees F)
- Operating Relative Humidity: 10-90% noncondensing
- Operating Altitude: <3,000 meters (<10,000 feet)

KUMO CP Tech Specs

User Interface

- 40 buttons with removable overcap for lens chips
- Includes factory installed lens chip set
- High and Low button tally indication, configurable brightness
- Controls up to four KUMO routers
- Panel Lock feature
- Destination Lock feature

Router Support

- KUMO 1604
- KUMO 1616
- KUMO 3232
- KUMO 6464 (First 32 I/O in Normal Mode)
- KUMO 1616-3G

Network Interface

- 1x RJ-45, 10/100/1000 Ethernet
- Embedded web server for remote control

Size (w x d x h)

- 1RU - 17.4" x 1.3" x 1.75" (482.6mm x 33.0mm x 44.5mm)

Weight

- 1.2 lb (0.6 kg)

Power

- 10-14VDC regulated, 2.5W typical, 6W max, power supply required, included with purchase
- AC Adapter: 100-240VAC, 50/60 Hz, universal input

Environment

- Safe Operating Temperature: 0 to 40 degrees C (32 to 104 degrees F)
- Safe Storage Temperature (Power OFF): -40 to 60 degrees C (-40 to 140 degrees F)
- Operating Relative Humidity: 10-90% noncondensing
- Operating Altitude: <3,000 meters (<10,000 feet)

GVG Native Protocol Support

Introduced with v2.0 firmware, KUMO provides basic support for the GVG Native Protocol, aka Series 7000 Native Protocol. GVG Native Protocol, using:

- 1 serial connection via RS-422 with a 9-pin connector
- TCP/Ethernet for up to 10 connections

For for information, refer to Grass Valley documentation at:

http://grassvalley.jp/pdf/RoutingProductsProtocolManual_2.pdf

NP Commands Supported

Background:

- BK, I; Connect, heartbeat
- BK, N; Gets system name
- BK, T; Gets software title
- BK, t; Gets protocol software
- BK, R; Gets software version
- BK, d; Gets device name.

Queries:

- QN, S; Gets all srcs by name
- QN, IS; Gets all srcs, name & index
- QN, D; Gets all dests, names
- QN, ID; Gets all dests, name & indx
- QN, L; Gets levels (hard coded as "Kumo_Lev0")
- QD, {destname}; Gets: protect {On/Off}, chop{=OFF}, {sourceName}, level{= lev0}
- Qd, {destname}; Gets: protect {On/Off}, chop{=OFF}, {sourceName}, level{= lev0}

Control:

- TD,{destname,srcname};Takes by name
- TI,{destIndx,srcIndx}; Takes by index
- PR,{destname, levelmask} Sets lock for given dest.
- UP,{destname, levelmask} Unsets lock for given dest.

RS-422 Control Specifications (Routers)

NOTE: All KUMO Routers support RS-422 control. KUMO Control Panels do not support RS-422 control.

- Baud Rate: 38400
- Parity: None
- Stop Bit: 1
- Data Bits: 8

Serial Interface

- 1x DB-9 Female, RS-422
- Grass Valley Native Protocol
- 9-pin D-connector pinout is as follows:

1	GND
2	TX-
3	RX+
4	GND
5	No Connection
6	GND
7	TX+
8	RX-
9	GND
Shell	GND

NOTE: Older KUMO 1604, 1616, and 3232 routers with a serial number ending in -R0 have different pinouts. See "Older Model RS-422 Adapter" on page 8 for more information.

Appendix B – Safety & Compliance

Federal Communications Commission (FCC) Compliance Notices

Class A Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15, Subpart B of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Canadian ICES Statement

Canadian Department of Communications Radio Interference Regulations

This digital apparatus does not exceed the Class A limits for radio-noise emissions from a digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications. This Class A digital apparatus complies with Canadian ICES-003.

Règlement sur le brouillage radioélectrique du ministère des Communications

Cet appareil numérique respecte les limites de bruits radioélectriques visant les appareils numériques de classe A prescrites dans le Règlement sur le brouillage radioélectrique du ministère des Communications du Canada. Cet appareil numérique de la Classe A est conforme à la norme NMB-003 du Canada.

European Union and European Free Trade Association (EFTA) Regulatory Compliance

This equipment may be operated in the countries that comprise the member countries of the European Union and the European Free Trade Association. These countries, listed in the following paragraph, are referred to as The European Community throughout this document:

AUSTRIA, BELGIUM, BULGARIA, CYPRUS, CZECH REPUBLIC, DENMARK, ESTONIA, FINLAND, FRANCE, GERMANY, GREECE, HUNGARY, IRELAND, ITALY, LATVIA, LITHUANIA, LUXEMBOURG, MALTA, NETHERLANDS, POLAND, PORTUGAL, ROMANIA, SLOVAKIA, SLOVENIA, SPAIN, SWEDEN, UNITED KINGDOM, ICELAND, LICHTENSTEIN, NORWAY, SWITZERLAND

Declaration of Conformity

Marking by this symbol indicates compliance with the Essential Requirements of the EMC Directive of the European Union 2014/30/EU.

This equipment meets the following conformance standards:

Safety

EN 60065: 2014 (T-Mark License)

IEC 60065: 2014 (CB Scheme Report/Certificate)

Additional licenses issued for specific countries available on request.

Emissions

EN 55032: 2012 + AC: 2013, CISPR 32: 2015,

EN 61000-3-2: 2014, EN 61000-3-3: 2013

Immunity

EN 55103-2: 2009, EN 61000-4-2: 2009, EN 61000-4-3: 2006 + A1: 2008 + A2: 2010,

EN 61000-4-4: 2004 + A1: 2010, EN 61000-4-5: 2006, EN 61000-4-6: 2009,
EN 61000-4-11: 2004

Environments: E2, E3 and E4

The product is also licensed for additional country specific standards as required for the International Marketplace

Warning! This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take appropriate measures.

Achtung! Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Attention! Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l?utilisateur de prendre les mesures spécifiques appropriées..

The product is also licensed for additional country specific standards as required

Recycling Notice

This symbol on the product or its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste for recycling, please contact your local authority, or where you purchased your product.

Korea KCC Compliance Statement

A급 기기 (업무용 방송통신기자재)	이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서 사용하는 것을 목적으로 합니다.
Class A (Broadcasting Communication Equipment for Office Use)	As an electromagnetic wave equipment for office use (Class A), this equipment is intended to use in other than home area. Sellers or users need to take note of this.

Taiwan Compliance Statement

警告使用者：
這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

This is a Class A product based on the standard of the Bureau of Standards, Metrology and Inspection (BSMI) CNS 13438, Class A. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Japan Compliance Statement

この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI－A

This is a Class A product based on the standard of the VCCI Council (VCCI-32: 2016). If this equipment is used in a domestic environment, radio interference may occur, in which case, the user may be required to take corrective actions.

Translated Warning and Caution Messages

The following caution statements, warning conventions, and warning messages apply to this product and manual.

Warning Symbol

Caution Symbol

Before Operating Please Read These Instructions

Warning! Read and follow all warning notices and instructions marked on the product or included in the documentation.

Avertissement! Lisez et conformez-vous à tous les avis et instructions d'avertissement indiqués sur le produit ou dans la documentation.

Warnung! Lesen und befolgen Sie die Warnhinweise und Anweisungen, die auf dem Produkt angebracht oder in der Dokumentation enthalten sind.

¡Advertencia! Lea y siga todas las instrucciones y advertencias marcadas en el producto o incluidas en la documentación.

Aviso! Leia e siga todos os avisos e instruções assinalados no produto ou incluídos na documentação.

Avviso! Leggere e seguire tutti gli avvisi e le istruzioni presenti sul prodotto o inclusi nella documentazione.

Warning! Do not use this device near water and clean only with a dry cloth.

Avertissement! N'utilisez pas cet appareil près de l'eau et nettoyez-le seulement avec un tissu sec.

Warnung! Das Gerät nicht in der Nähe von Wasser verwenden und nur mit einem trockenen Tuch säubern.

¡Advertencia! No utilice este dispositivo cerca del agua y límpielo solamente con un paño seco.

Aviso! Não utilize este dispositivo perto da água e limpe-o somente com um pano seco.

Avviso! Non utilizzare questo dispositivo vicino all'acqua e pulirlo soltanto con un panno asciutto.

Warning! Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

Avertissement! Ne bloquez aucune ouverture de ventilation. Suivez les instructions du fabricant lors de l'installation.

Warnung! Die Lüftungsöffnungen dürfen nicht blockiert werden. Nur gemäß den Anweisungen des Herstellers installieren.

¡Advertencia! No bloquee ninguna de las aberturas de la ventilación. Instale de acuerdo con las instrucciones del fabricante.

Aviso! Não obstrua nenhuma das aberturas de ventilação. Instale de acordo com as instruções do fabricante.

Avviso! Non ostruire le aperture di ventilazione. Installare in conformità con le istruzioni del fornitore.

Warning! Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

Avertissement! N'installez pas l'appareil près d'une source de chaleur telle que des radiateurs, des bouches d'air de chauffage, des fourneaux ou d'autres appareils (amplificateurs compris) qui produisent de la chaleur.

Warnung! Nicht in der Nähe von Wärmequellen wie Heizkörpern, Heizregistern, Öfen oder anderen Wärme erzeugenden Geräten (einschließlich Verstärkern) aufstellen.

¡Advertencia! No instale cerca de fuentes de calor tales como radiadores, registros de calor, estufas u otros aparatos (incluidos amplificadores) que generan calor.

Aviso! Não instale perto de nenhuma fonte de calor tal como radiadores, saídas de calor, fogões ou outros aparelhos (incluindo amplificadores) que produzam calor.

Avviso! Non installare vicino a fonti di calore come termosifoni, diffusori di aria calda, stufe o altri apparecchi (amplificatori compresi) che emettono calore

Warning! Unplug this device during lightning storms or when unused for long periods of time.

Avertissement! Débranchez cet appareil pendant les orages avec éclairsou s'il est inutilisé pendant de longues périodes.

Warnung! Das Gerät ist bei Gewitterstürmen oder wenn es über lange Zeiträume ungenutzt bleibt vom Netz zu trennen.

¡Advertencia! Desenchufe este dispositivo durante tormentas eléctricas o cuando no se lo utilice por largos periodos del tiempo.

Aviso! Desconecte este dispositivo da tomada durante trovoadas ou quando não é utilizado durante longos períodos de tempo.

Avviso! Utilizzare soltanto i collegamenti e gli accessori specificati e/o venduti dal produttore, quali il treppiedi e l'esoscheletro.

Warning! Do not open the chassis. There are no user-serviceable parts inside. Opening the chassis will void the warranty unless performed by an AJA service center or licensed facility.

Avertissement! Ne pas ouvrir le châssis. Aucun élément à l'intérieur du châssis ne peut être réparé par l'utilisateur. La garantie sera annulée si le châssis est ouvert par toute autre personne qu'un technicien d'un centre de service ou d'un établissement agréé AJA.

Warnung! Öffnen Sie das Gehäuse nicht. Keine der Geräteteile können vom Benutzer gewartet werden. Durch das Öffnen des Gehäuses wird die Garantie hinfällig, es sei denn, solche Wartungsarbeiten werden in einem AJA-Service-Center oder einem lizenzierten Betrieb vorgenommen.

¡Advertencia! No abra el chasis. El interior no contiene piezas reparables por el usuario. El abrir el chasis anulará la garantía a menos que se lo haga en un centro de servicio AJA o en un local autorizado.

Advertência! Não abra o chassi. Não há internamente nenhuma peça que permita manutenção pelo usuário. Abrir o chassi anula a garantia, a menos que a abertura seja realizada por uma central de serviços da AJA ou por um local autorizado.

Avvertenza! Non aprire lo chassis. All'interno non ci sono parti riparabili dall'utente. L'apertura dello chassis invaliderà la garanzia se non viene effettuata da un centro ufficiale o autorizzato AJA.

Warning! Refer all servicing to qualified service personnel. Servicing is required when the device has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the device, the device has been exposed to rain or moisture, does not operate normally, or has been dropped.

Avertissement! Référez-vous au personnel de service qualifié pour tout entretien. L'entretien est exigé quand l'appareil a été endommagé de quelque manière que ce soit, par exemple lorsque le cordon d'alimentation ou la prise sont endommagés, que du liquide a été versé ou des objets sont tombés dans l'appareil, que l'appareil a été exposé à la pluie ou à l'humidité, ne fonctionne pas normalement ou est tombé.

Warnung! Das Gerät sollte nur von qualifizierten Fachkräften gewartet werden. Eine Wartung ist fällig, wenn das Gerät in irgendeiner Weise beschädigt wurde, wie bei beschädigtem Netzkabel oder Netzstecker, falls Flüssigkeiten oder Objekte in das Gerät gelangen, das Gerät Regen oder Feuchtigkeit ausgesetzt wurde, nicht ordnungsgemäß funktioniert oder fallen gelassen wurde.

¡Advertencia! Consulte al personal calificado por cuestiones de reparación. El servicio de reparación se requiere cuando el dispositivo ha recibido cualquier tipo de daño, por ejemplo cable o espigas dañadas, se ha derramado líquido o se han caído objetos dentro del dispositivo, el dispositivo ha sido expuesto a la lluvia o humedad, o no funciona de modo normal, o se ha caído.

Aviso! Remeta todos os serviços de manutenção para o pessoal de assistência qualificado. A prestação de serviços de manutenção é exigida quando o dispositivo foi danificado mediante qualquer forma, como um cabo de alimentação ou ficha que se encontra danificado/a, quando foi derramado líquido ou caíram objectos sobre o dispositivo, quando o dispositivo foi exposto à chuva ou à humidade, quando não funciona normalmente ou quando foi deixado cair.

Avviso! Fare riferimento al personale qualificato per tutti gli interventi di assistenza. L'assistenza è necessaria quando il dispositivo è stato danneggiato in qualche modo, ad esempio se il cavo di alimentazione o la spina sono danneggiati, è stato rovesciato del liquido è stato rovesciato o qualche oggetto è caduto nel dispositivo, il dispositivo è stato esposto a pioggia o umidità, non funziona correttamente o è caduto

Warning! Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

Avertissement! La sécurité de la prise polarisée ou de la prise de type mise à la terre ne doit en aucun cas être empêchée de fonctionner. Une prise polarisée a deux broches, l'une étant plus large que l'autre. Une prise de type mise à la terre a deux broches et une troisième broche pour la mise à la terre. La broche large ou la troisième broche sont fournies pour votre sécurité. Si la prise fournie ne s'insère pas dans votre prise femelle, consultez un électricien pour le remplacement de la prise femelle obsolète.

Warnung! Der Sicherheitszweck des gepolten bzw. Schukosteckers ist zu berücksichtigen. Ein gepolter Stecker verfügt über zwei Pole, von denen einer breiter als der andere ist. Ein Schukostecker verfügt neben den zwei Polen noch über einen dritten Pol zur Erdung. Der breite Pol bzw. der Erdungspol dienen der Sicherheit. Wenn der zur Verfügung gestellte Stecker nicht in Ihren Anschluss passt, konsultieren Sie einen Elektriker, um den veralteten Anschluss zu ersetzen.

¡Advertencia! No eche por tierra la finalidad del tipo de enchufe polarizado con conexión a tierra. Un enchufe polarizado tiene dos espigas, una más ancha que la otra. Un enchufe con conexión a tierra tiene dos espigas iguales y una tercera espiga que sirve para la conexión a tierra. La expiga ancha, o la tercera espiga, sirven para su seguridad. Si el enchufe suministrado no encaja en el tomacorriente, consulte con un electricista para reemplazar el tomacorriente obsoleto.

Aviso! Não anule a finalidade da segurança da ficha polarizada ou do tipo ligação terra. Uma ficha polarizada tem duas lâminas sendo uma mais larga do que a outra. Uma ficha do tipo de ligação à terra tem duas lâminas e um terceiro terminal de ligação à terra. A lâmina larga ou o terceiro terminal são fornecidos para sua segurança. Se a ficha fornecida não couber na sua tomada, consulte um electricista para a substituição da tomada obsoleta.

Avviso! Non compromettere la sicurezza della spina polarizzata o con messa a terra. Una spina polarizzata ha due spinotti, di cui uno più largo. Una spina con messa a terra ha due spinotti e un terzo polo per la messa a terra. Lo spinotto largo o il terzo polo sono forniti per motivi di sicurezza. Se la spina fornita non si inserisce nella presa di corrente, contattare un elettricista per la sostituzione della presa obsoleta.

Warning! Since the Mains plug is used as the disconnection for the device, it must remain readily accessible and operable.

Avertissement! Puisque la prise principale est utilisée pour débrancher l'appareil, elle doit rester aisément accessible et fonctionnelle.

Warnung! Da der Netzstecker als Trennvorrichtung dient, muss er stets zugänglich und funktionsfähig sein.

¡Advertencia! Puesto que el enchufe de la red eléctrica se utiliza como dispositivo de desconexión, debe seguir siendo fácilmente accesible y operable.

Aviso! Dado que a ficha principal é utilizada como a desconexão para o dispositivo, esta deve manter-se prontamente acessível e funcional.

Avviso! Poiché il cavo di alimentazione viene usato come dispositivo di sconnessione, deve rimane prontamente accessibile e operabile.

Warning! Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the device.

Avertissement! Protégez le cordon d'alimentation pour que l'on ne marche pas dessus ou qu'on le pince, en particulier au niveau des prises mâles, des réceptacles de convenance, et à l'endroit où il sort de l'appareil.

Warnung! Vermeiden Sie, dass auf das Netzkabel getreten oder das Kabel geknickt wird, insbesondere an den Steckern, den Steckdosen und am Kabelausgang am Gerät.

¡Advertencia! Proteja el cable de energía para que no se le pise ni apriete, en especial cerca del enchufe, los receptáculos de conveniencia y el punto del que salen del equipo.

Aviso! Proteja o cabo de alimentação de ser pisado ou de ser comprimido particularmente nas fichas, em tomadas de parede de conveniência e no ponto de onde sai do dispositivo.

Avviso! Proteggere il cavo di alimentazione in modo che nessuno ci cammini sopra e che non venga schiacciato soprattutto in corrispondenza delle spine e del punto in cui esce dal dispositivo.

Warning! Disconnect the external AC power supply line cord(s) from the mains power before moving the unit.

Avertissement! Retirez le ou les cordons d'alimentation en CA de la source d'alimentation principale lorsque vous déplacez l'appareil.

Warnung! Trennen Sie die Wechselstrom-Versorgungskabel vom Netzstrom, bevor Sie das Gerät verschieben.

¡Advertencia! Cuando mueva la unidad desenchufe de la red eléctrica el/los cable(s) de la fuente de alimentación CA tipo brick.

Advertência! Remova os cabos CA de alimentação brick da rede elétrica ao mover a unidade.

Avvertenza! Scollegare il cavo dell'alimentatore quando si sposta l'unità.

Caution! To meet safety regulations for leakage current when using redundant power supplies, connect the KUMO dual power supplies to separate branch circuits.

Attention! Pour satisfaire aux réglementations sur la sécurité concernant le courant de fuite pendant l'utilisation d'appareils fournisseurs d'alimentation redondants, branchez les deux appareils fournisseurs d'alimentation KUMO à des circuits de dérivation distincts.

Achtung! Um die Einhaltung aller Sicherheitsbestimmungen bzgl. Ableitstrom beim Einsatz von redundanten Netzteilen sicherzustellen, schließen Sie die zwei KUMO-Netzteile bitte an separate Abzweigleitungen an.

¡Precaución! Para cumplir con las regulaciones de seguridad con el propósito de evitar pérdidas de corriente cuando se utiliza fuentes de alimentación múltiples, conecte las fuentes de alimentación dual KUMO a circuitos independientes.

Atenção! Para atender às regulamentações de segurança relativas à corrente de fuga ao usar fontes de alimentação redundantes, conecte as fontes de alimentação duplas KUMO para separar os circuitos derivados.

Attenzione! Per soddisfare i requisiti di sicurezza per la corrente di dispersione usando alimentatori ridondanti, collegare i doppi alimentatori KUMO per separare i circuiti derivati

Caution! KUMO is designed to take advantage of its chassis to aid in cooling. It is common and expected for the densely populated 1616 chassis to have a warm front panel in normal, active operating conditions.

Attention! KUMO est conçu pour tirer parti de son châssis pour le refroidissement. Il est normal et attendu que le panneau frontal du très compact châssis 1616 demeure chaud dans des conditions normales de fonctionnement .

Achtung! Das Design von KUMO nutzt das Gehäuse zur Kühlung. Es ist normal und entspricht den Erwartungen, dass die Vorderseite des dicht bestückten 1616-Gehäuses bei normalen, aktiven Betriebsbedingungen warm ist.

¡Precaución! KUMO está diseñado para aprovechar el chasis para asistir en el proceso de enfriamiento. Es común y está previsto que el chasis 1616 densamente surtido de componentes tenga el panel frontal caliente en condiciones normales y activas de funcionamiento.

Atenção! O KUMO foi projetado para aproveitar seu chassi para auxiliar no resfriamento. É normal e esperado que o chassi 1616 densamente preenchido apresente um painel frontal aquecido em condições de operação normais e ativas.

Attenzione! KUMO sfrutta lo chassis per migliorare il raffreddamento. È normale per lo chassis 1616, data la concentrazione di cavi, che il panello anteriore si riscaldi durante la normale attività.

Caution! When attaching KUMO to a standard Static IP LAN, you must configure KUMO components with a new, unique IP address. You should first talk to your network administrator and find out how it should be connected (TCP/IP Static IP or DHCP). Your IT department will be able to supply the information you need to install KUMO on a LAN. Methods for assigning Static IP addressing are discussed in the KUMO Installation and Operation manual.

Attention! Lorsque vous branchez l'appareil KUMO à un réseau LAN IP fixe standard, vous devez configurer les composants KUMO avec une nouvelle adresse IP qui soit unique. Vous devez d'abord consulter votre administrateur réseau pour savoir comment connecter l'appareil (TCP/IP, IP fixe ou DHCP). Votre service informatique pourra vous fournir les informations nécessaires pour installer KUMO sur un réseau LAN. Les méthodes d'attribution des adresses IP fixes sont traitées dans le manuel d'installation et de fonctionnement de KUMO.

Achtung! Beim Anschließen von KUMO an ein standardmäßiges statisches IP-LAN müssen Sie die KUMO-Komponenten mit einer neuen, einzigartigen IP-Adresse konfigurieren. Fragen Sie bei Ihrem Netzwerkadministrator nach, wie der Anschluss erfolgen soll (TCP/IP statische IP oder DHCP). Ihre IT-Abteilung kann Ihnen zudem alle nötigen Informationen liefern, die Sie zur Installation von KUMO auf einem LAN benötigen. Die Methoden zur Zuweisung von statischen IP-Adressen werden im KUMO Installations- und Benutzerhandbuch besprochen.

¡Precaución! Cuando conecte KUMO a una LAN de IP estática estándar, deberá configurar los componentes KUMO con una dirección de IP nueva y única. Primero deberá contactarse con su administrador de red y averiguar el método de conexión (IP estática TCP/IP o DHCP). Su departamento de TI podrá suministrarle la información que necesita para instalar KUMO en una LAN. Los métodos para asignar direcciones IP estáticas se presentan en el Manual de instalación y funcionamiento de KUMO.

Atenção! Ao conectar o KUMO a uma LAN padrão de IP estático, é preciso configurar os componentes do KUMO com um novo endereço IP exclusivo. Você deve primeiro conversar com seu administrador de rede e descobrir como ele deverá ser conectado (IP estático TCP/IP ou DHCP). O seu departamento de TI estará disponível para fornecer as informações necessárias para instalar o KUMO em uma LAN. Métodos para atribuir endereços IP estático são abordados no manual de Instalação e Operação do KUMO.

Attenzione! Quando si collega KUMO a un IP LAN statico standard, occorre configurare i componenti KUMO con un nuovo indirizzo IP univoco. Per prima cosa occorre parlare con l'amministratore di rete e scoprire come effettuare la connessione (IP statico TCP/IP o DHCP). Il reparto IT potrà fornire le informazioni necessarie per installare KUMO su una LAN. I metodi di assegnazione dell'indirizzo IP statico sono illustrati nel manuale KUMO Installazione e funzionamento.

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AJA Video Systems, Inc. (AJA Video) warrants that the hardware product, not including storage modules or software components, will be free from defects in materials and workmanship for a period of five (5) years from the date of purchase. AJA Video warrants that the storage modules provided as part of the hardware product will be free from defects in materials and workmanship for a period of one year from the date of purchase. AJA Video provides a separate software warranty as part of the license agreement applicable to software components.

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