Models:

SX42PHU-4X – Secure 4 to 2 port DP/HDMI KVM Ultra Mini-Matrix with fUSB support, NIAP PP4.0 compliant
SX82PHU-4X – Secure 8 to 2 port DP/HDMI KVM Ultra Mini-Matrix with fUSB support, NIAP PP4.0
SX42PHU-NX – Commercial 4 to 2 port DP/HDMI KVM Ultra Mini-Matrix with USB 3.0 support
SX82PHU-NX – Commercial 8 to 2 port DP/HDMI KVM Ultra Mini-Matrix

HLT37143 Rev. 1.1

TABLE OF CONTENTS

INTRODUCTION

High Sec Labs' Secure Keyboard/Video/Mouse (KVM) Ultra Mini-Matrix enables simultaneous viewing and control of multiple computers presented on the same display, using a single set of keyboard, mouse, video, audio, and USB peripherals. It uses advanced video processing technology to display dynamic high-resolution images from connected sources, all while enforcing unidirectional data flow through its USB and video ports. This allows seamless switching between all connected computers, without any risk of data leaks, making it ideal for meeting rooms or other environments where computers may have differing levels of security classification.

This User Manual shows how to install, configure, and operate an HSL KVM Ultra Mini-Matrix.

Highlights

- **Simultaneous Viewing and Control:**
  The Ultra Mini-Matrix can display and control multiple computer sources at the same time.
- **Multiple Viewing Modes:**
  The Ultra Mini-Matrix has several layouts to provide the ideal presentation for any environment, including Extended, Duplicate, Tile Mode, Scale Mode, and Picture-in-Picture.
- **Seamless Mouse Switching:**
  The Ultra Mini-Matrix uses Virtual Display Technology (VDT) to switch the mouse and keyboard controls between different sources by simply dragging the mouse from channel to channel.
- **4K Support:**
  For high quality viewing, the HSL Ultra Mini-Matrix supports 4K resolutions up to 3840x2160.

INTRODUCTION

Features Exclusive to Secure Models

- **NIAP Compliance:**
  The Secure Ultra Mini-Matrix is designed for compliance with NIAP's Common Criteria PP4.0 Protection Protocol.
- **Share Peripherals Across Different Security Domains:**
  Share peripherals between computers that belong to different security levels, while keeping the highest possible data classification separation security.
- **Prevent Information Leaks:**
  Prevent threats derived from sharing and switching of vulnerable, untrusted, or unauthorized peripheral devices. Block peripheral exploits, information leaks, eavesdropping, signal transmissions, computer malware; hardware and firmware tampering, by enforcing multi-layered security mechanisms.
- **Filter USB Peripherals:**
  Block unauthorized USB devices while allowing secure switching of smart card and biometric authentication devices between computers. Whitelist and blacklist specific USB devices based on VID/PID characteristics.

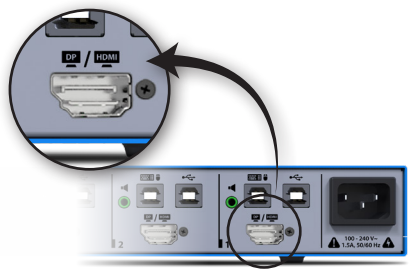
Features Exclusive to Commercial Models

- **USB 3.0 Support:**
  Connect computers and peripherals using USB 3.0.

DP/HDMI Combo Connector

To ensure easy and intuitive interoperability with different sources, the HSL KVM Ultra Mini-Matrix includes a special type of video input connector: the DP/HDMI Combo Connector. The connector supports both HDMI and DisplayPort video interfaces and allows connections to either type of cable.

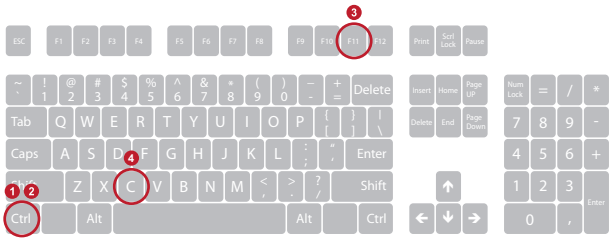
DP\HDMI Connector



INTRODUCTION

Keyboard Hotkeys

The interface to operate the HSL KVM Ultra Mini-Matrix uses keyboard hotkeys that can be entered at any time. These hotkeys are based on a QWERTY keyboard layout. For example, to enter the key combination **Ctrl | Ctrl | F11 | C**, press the keys seen below, regardless of the keyboard layout used:



Keyboard Hotkey Terms

- **|** Separates keys pressed in sequential order. For example, to enable Extended Viewing Mode, the key combination is two presses of the **Ctrl** key and one press of the x key, so the combination is shown as **Ctrl | Ctrl | x**.
- **+** Press two buttons simultaneously. For example, to temporarily switch to Absolute Mouse Navigation, press and hold **LCtrl + LShift**.

Notes:

- All letter keys in hotkey combinations are shown in lowercase, but the hotkeys are not case sensitive. They are shown as lowercase to prevent confusion between letter keys and function keys, such as confusing the combination **f | 3** and the function key **F3**.
- Always use the left Control key (**LCtrl**) unless otherwise specified.
- Do not use the numeric pad for number keys, unless otherwise specified.
- All hotkey combinations are configured using a QWERTY keyboard. When using a non-QWERTY keyboard, use the key location corresponding to the QWERTY layout. For example, on an AZERTY keyboard where the **a** key is in the location of the **q** key on a QWERTY keyboard, the hotkey **Ctrl | Ctrl | q** would be entered as **Ctrl | Ctrl | a**.

INTRODUCTION

On-Screen Display

In addition to using keyboard hotkeys, HSL's KVM Ultra Mini-Matrix is equipped with an On-Screen Display (OSD) interface for easy customization of video, channel display, USB interface, and audio settings. The OSD can be opened at any time by entering **LCtrl | LCtrl | o** or **LCtrl | LAlt | o**.

Detailed instructions on how to operate the OSD can be found in the section **On-Screen Display Operation**.

Ultra Mini-Matrix Specifications

Part Number	SX42PHU-4X	SX82PHU-4X	SX42PHU-NX	SX82PHU-NX
Number of Sources	4	8	4	8
Console Ports				
Displays	2xHDMI	2xHDMI	2xHDMI	2xHDMI
Max Output Resolution	Supporting UHD 4K Resolutions up to 3840x2160		Supporting UHD 4K Resolutions up to 3840x2160	
Mouse and Keyboard	USB Type A	USB Type A	USB Type A	USB Type A
Audio Jack	3.5mm	3.5mm	3.5mm	3.5mm
USB Port	USB Type A filtered	USB Type A filtered	4 x USB 3.0 Type A	USB 3.0 Type A
Remote Control Unit Port	RJ14 Female	RJ14 Female	RJ14 Female	RJ14 Female
Microphone Jack	NA	NA	3.5mm	NA
Computer Ports				
Displays	4xDP/HDMI	8xDP/HDMI	4xDP/HDMI	8xDP/HDMI
Max Input Resolution	Supporting UHD 4K Resolutions up to 3840x2160		Supporting UHD 4K Resolutions up to 3840x2160	
Mouse and Keyboard	USB Type B	USB Type B	USB Type B	USB Type B
Audio Jack	3.5mm	3.5mm	3.5mm	3.5mm
USB Port	fUSB Type B	fUSB Type B	USB 3.0 Type B	USB 3.0 Type B
Microphone Jack	NA	NA	3.5mm	NA
Physical				
Dimensions	342x148x42mm / 13.4x5.8x1.6 in	440x192x48mm / 17.3x7.5x1.9in	342x148x42mm / 13.4x5.8x1.6in	440x192x48mm / 17.3x7.5x1.9in
Weight	1.6kg / 3.5lb	3.7kg / 8.1lb	1.6kg /3.5lb	3.7kg / 8.1lb
Power				
Power Requirements	35W Max	35W Max	35W Max	35W Max
AC Input	100V to 240V AC	100V to 240V AC	100V to 240V AC	100V to 240V AC
Power Type	Internal	Internal	Internal	Internal
Environmental				
Operating Temperature	0°C to 40°C / 32°F to 104°F	0°C to 40°C / 32°F to 104°F	0°C to 40°C / 32°F to 104°F	0°C to 40°C / 32°F to 104°F
Storage Temperature	-20°C to 60°C / -4°F to 140°F	-20°C to 60°C / -4°F to 140°F	-20°C to 60°C / -4°F to 140°F	-20°C to 60°C / -4°F to 140°F
Humidity	0%-80% RH, non-condensing	0%-80% RH, non-condensing	0%-80% RH, non-condensing	0%-80% RH, non-condensing
Software				
Supported OS	Windows, Linux, Mac	Windows, Linux, Mac	Windows, Linux, Mac	Windows, Linux, Mac
Security				
Compliance	Designed for compliance with NIAP Common Criteria PP4.0 for Peripheral Sharing Device (PSD)		NA	NA

INSTALLATION

Before Installation

Before opening the product's sealed packaging, inspect the seal's condition to verify that the product was not accessed or tampered with during delivery. If the packaging seal looks suspicious, contact HSL support and do not use the product.

Tamper-Evident Label

The KVM Ultra Mini-Matrix uses a holographic tamper-evident label to provide visual indications in case of enclosure intrusion attempts. These labels display white dots or the text "VOID", once removed. When opening the product's packaging, inspect the tampering evident label.

Once the KVM Ultra Mini-Matrix is removed from its packaging materials, carefully inspect the tamper-evident label to verify that the product is properly sealed. If the label is damaged or missing, contact HSL support and do not use the product.

HSL Holographic Tamper-Evident Label

Package Contents

Once the packaging for the KVM Ultra Mini-Matrix is opened, inspect the contents of the package to make sure all components are included.

Model	Component	Qty
SX42PHU-4X	Secure 4P to 2P DP/HDMI KVM Ultra Mini-Matrix with fUSB support, PP 4.0	1
	RJ14 to DB9 (Female, RS-232) Cable	1
	C13 Female to C14 Male Power Cable	1
	Adapters Kit- Plugs UK/USA/AU/EU to ERC230/C13	1
SX82PHU-4X	Secure 8P to 2P DP/HDMI KVM Ultra Mini-Matrix with fUSB support, PP4.0	1
	WR80-MM Remote Control	1
	RJ14 to RJ14Cable	1
	RJ14 to DB9 (Female, RS-232) Cable	1
	C13 Female to C14 Male Power Cable	1
	Adapters Kit - Plugs UK/USA/AU/EU to ERC230/C13	1
	WX12N-4 HSL Mini-Matrix AFP Splitter	1
	FH10NN-4 USB HID filter	1
	K10NEW-ML HSL Secure Keyboard	1
	8/16-Port Rack Mount Kit	1
SX42PHU-NX	Commercial 4P to 2P DP/HDMI KVM Ultra Mini-Matrix with USB 3.0 support	1
	RJ14 to DB9 (Female, RS-232) Cable	1
	C13 Female to C14 Male Power Cable	1
	Adapters Kit- Plugs UK/USA/AU/EU to ERC230/C13	1
SX82PHU-NX	Commercial 8P to 2P DP/HDMI KVM Ultra Mini-Matrix with USB 3.0 support	1
	WR80-MM Remote Control	1
	RJ14 to RJ14Cable	1
	RJ14 to DB9 (Female, RS-232) Cable	1
	C13 Female to C14 Male Power Cable	1
	Adapters Kit- Plugs UK/USA/AU/EU to ERC230/C13	1
	WX12N-4 HSL Mini-Matrix AFP Splitter	1
	FH10NN-4 USB HID filter	1
	K10NEW-ML HSL Secure Keyboard	1
	8/16-Port Rack Mount Kit	1

Cable Installation

Step 1 – Connect the Console Port Peripherals

- Connect the primary video display to the Ultra Mini-Matrix's primary HDMI port.
- Connect the secondary video display to the Ultra Mini-Matrix's secondary HDMI port.

Note: It is highly recommended to use identical primary and secondary display models. EDID information is taken from the primary console display port (#1) and sent to all connected computers. When using non-identical displays, connect the lower resolution display to the primary console display port.

- Connect the console keyboard and mouse to the Ultra Mini-Matrix's USB A ports, and the console audio output to the 3.5mm jack. These are shared securely between all sources.

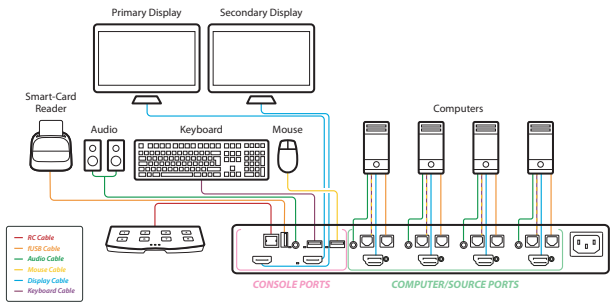
Note: The Ultra Mini-Matrix's mouse and keyboard USB A ports only support USB HID keyboards and mice. These ports will not support non-standard keyboards, keyboards with USB hubs or other USB-integrated devices, or other USB devices apart from keyboards and mice.

- To support user authentication across multiple isolated sources, connect a smartcard/biometric reader such as HSL's Multi-Domain Reader to the Ultra Mini-Matrix's console fUSB secure port.

Step 2 – Connect the Source Port Peripherals

- For each source, connect the video, keyboard, mouse, USB, and audio cables to the Ultra Mini-Matrix's corresponding source ports.

To receive dual-screen support in MS-Windows OS, download and install HSL's multi-display driver on source computers that have multiple screens (https://highseclabs.com/downloads/km-multi-display-drivers/).



INSTALLATION

Step 3 – Power On the Ultra Mini-Matrix

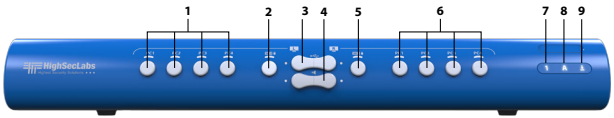
- Power ON all PCs connected to the Ultra Mini-Matrix.
- Connect the power supply and power ON the Ultra Mini-Matrix (approximate boot time is 10 seconds).

Note: Only use the power supply provided with the Ultra Mini-Matrix. If this power supply fails, contact HSL Support to order a replacement.

- The Ultra Mini-Matrix boots into Duplicate Mode, where the video of PC #1 is presented on both displays.

Basic Use of the KVM Ultra Mini-Matrix

The HSL KVM Ultra Mini-Matrix enables viewing and interacting with multiple computers simultaneously. There is always an active channel to which the keyboard and mouse are linked. Inactive channels are displayed but not interactable until selected.



1 Left Side Channel Select Buttons
2 Left Side Keyboard and Mouse Toggle
3 Left/Right Side fUSB Freeze toggle
4 Left/Right Side Audio Freeze toggle
5 Right Side Keyboard and Mouse toggle
6 Right Side Channel Select Buttons
7 Num Lock LED
8 Caps Lock LED
9 Scroll Lock LED

Front Panel Buttons

The KVM Ultra Mini-Matrix can switch channels by pressing the buttons along the front panel. By default, pressing one of the numbered buttons will switch to the corresponding channel. In addition, the Ultra Mini-Matrix can freeze the audio and USB ports of a chosen channel. This allows for listening to audio or using a USB device connected to a specific channel while operating on another.

On-Screen Display

The KVM Ultra Mini-Matrix features an On-Screen Display (OSD) to configure video, channel display, USB interface, and audio settings. The OSD can be opened at any time by entering **LCtrl | LCtrl | o** or **LCtrl | LAlt | o**.

Detailed instructions on how to operate the OSD can be found in the section **On-Screen Display Operation**.

Keyboard Hotkeys

The KVM Ultra Mini-Matrix has a variety of functions that can be controlled by entering keyboard hotkeys.

Action	Keyboard Hotkey
Activate On-Screen Display	**LCtrl | RCtrl | o** or **LCtrl | LAlt | o**
Activate Terminal Menu	**LCtrl | RCtrl | t** (with Notepad open)
Reset to Factory Default	**Ctrl | Ctrl | F11 | r**
Mouse Navigation	**Keyboard Hotkey**
Relative Mouse	**Ctrl | Ctrl | F11 | b**
Absolute Mouse	**Ctrl | Ctrl | F11 | c**
Temporarily Enable Absolute Mouse Navigation	**LCtrl + LShift**
Increase Mouse Speed (Relative Mouse Mode)	**Ctrl | Ctrl | F11 | =**
Decrease Mouse Speed (Relative Mouse Mode)	**Ctrl | Ctrl | F11 | -**
Default Vertical Mouse Navigation (Screen 1 on bottom)	**Ctrl | Ctrl | F11 | d | n**
Inverted Vertical Mouse Navigation (Screen 1 on top)	**Ctrl | Ctrl | F11 | d | r**
Display Resolution / EDID	**Keyboard Hotkey**
Select Input Resolution / EDID	**Ctrl | Ctrl | F12 | d | [1...7]**
Select Output Resolution / EDID	**Ctrl | Ctrl | F11 | d | [1...8]**
Enable EDID Pass-Through	**Ctrl | Ctrl | F12 | d | e**
Disable EDID Pass-Through	**Ctrl | Ctrl | F12 | d | d**
Enable Retain EDID after Power Cycle	**Ctrl | Ctrl | F12 | r | e**
Disable Retain EDID after Power Cycle	**Ctrl | Ctrl | F12| r | d**
Maintain Aspect Ratio	**Ctrl | Ctrl | a | e**
Disable Aspect Ratio	**Ctrl | Ctrl | a | d**
Screen Mode	**Hotkey**
Single Screen / Duplicate Mode	**Ctrl | Ctrl | F11 | s | 1**
Extended Mode (Horizontal)	**Ctrl | Ctrl | F11 | s | 2**
Extended Mode (Vertical)	**Ctrl | Ctrl | F11 | s | 3**
Viewing Mode	**Hotkey**
Full-Screen View	**Ctrl | Ctrl | f**
Matrix / Side-by-Side View	**Ctrl | Ctrl | x**
Tile / Quad View	**Ctrl | Ctrl | q**
Scale View	**Ctrl | Ctrl | s**
Picture-in-Picture View	**Ctrl | Ctrl | F11 | x**

Mouse Navigation Options

The Ultra Mini-Matrix has two options for navigating with a mouse:

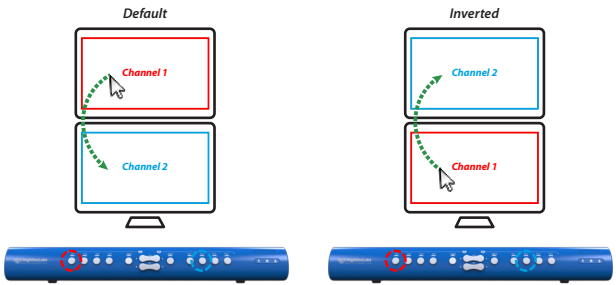
- **Relative Mouse (REL):**
  Relative Mouse Mode confines mouse movement to the active channel. While REL Mouse is active, switching channels can be done by using the buttons on the Ultra Mini-Matrix's front panel. REL Mouse is the default mode upon booting up, and can also be enabled by entering the key combination **Ctrl | Ctrl | F11 | b**.
- **Absolute Mouse (ABS):**
  Absolute Mouse Mode uses Virtual Display Technology (VDT) to switch seamlessly between sources, simply by holding down the **LCtrl** key and moving the cursor across the borders between channels. Depending on the chosen configuration of displays, the VDT mouse cursor movement axis between video displays can be either horizontal (where the cursor moves across displays arranged left-to-right) or vertical (where the cursor moves across displays arranged top-to-bottom). ABS Mouse can be toggled by entering **Ctrl | Ctrl | F11 | c**, or temporarily enabled from Relative Mouse Mode by holding **LCtrl + LShift**.
- **ABS Mouse Safety Trigger:**
  By default, hold down the **LCtrl** key to switch between channels while in ABS Mouse Mode. This prevents uncontrolled switching between source computers.

OPERATION

Invert Vertical Mouse Movement in Extended (Vertical) Viewing Modes

By default, when the Ultra Mini-Matrix is set to the Extended (Vertical) Viewing Mode, it configures the VDT mouse navigation borders so that the primary screen is on the top and the secondary screen is on the bottom. This can be inverted so that the primary screen is on the bottom and the secondary screen is on top.

To set mouse navigation with the primary display on the bottom, enter **Ctrl | Ctrl | F11 | j | n**. To set mouse navigation with the primary display on top, enter **Ctrl | Ctrl | F11 | j | r**.



System Reset

Performing a system reset restores the device to its factory default configuration. This clears previously stored behavioral characteristics such as mouse settings and display presets. To perform a system reset, enter the key combination **Ctrl | Ctrl | F11 | r**.

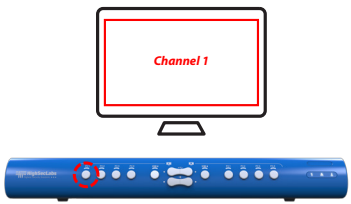
Viewing Modes

The Ultra Mini-Matrix has several viewing modes to accommodate the most common configurations and workflows with 1 or 2 video displays.

Viewing Modes for 1 Display or Duplicate Mode

Full-Screen View:

Ctrl | Ctrl | f

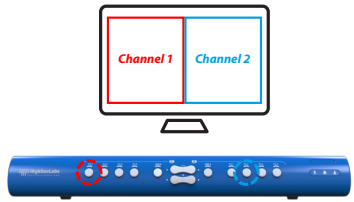


Full-Screen View, Channel 1 Selected

In Full-Screen View, the selected channel is shown as a single maximized window that fills the entire display. Select the desired channel using the buttons on the left side of the Ultra Mini-Matrix's front panel.

Matrix View / Side-by-Side View:

LCtrl | LCtrl | x



Matrix View, Channel 1 selected on left, Channel 2 selected on right

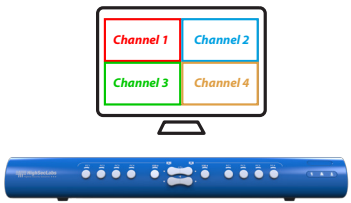
In Matrix View, the display shows two windows side-by-side in a horizontal split-screen. The left-side channel select buttons select the channel in the left window, and the right-side channel select buttons select the channel in the right window.

Note: Matrix View cannot show the same channel in both windows. If the same channel is selected for both windows, the Ultra Mini-Matrix will switch the window already showing that channel to the next channel in sequential order (for example: if the user switches the left window to Channel 1, then switches the right window to Channel 1, the Combiner will switch the right window to Channel 1 and switch the left window to Channel 2.)

OPERATION

Tile View:

LCtrl | LCtrl | q

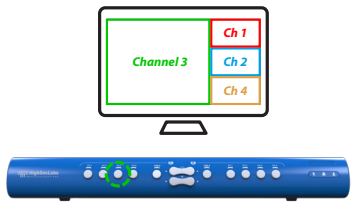


Tile View, no channel selected

In Tile View, the display shows all channels until a channel is selected with the buttons on the left side of the front panel. The selected channel is then displayed in Full-Screen View, with all other channels hidden. Selecting a different channel displays the new channel as a full-screen window. Selecting the same channel again returns the screen layout to Tile View.

Scale View:

LCtrl | LCtrl | s

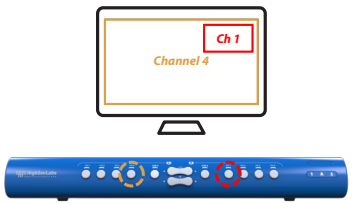


Scale View, Channel 3 selected

In Scale View, the selected channel is shown in a scaled window that takes approximately two-thirds of the display, with the other 3 channels in smaller scaled windows on the right side of the display.

Picture-in-Picture View:

LCtrl | LCtrl | F11 | x



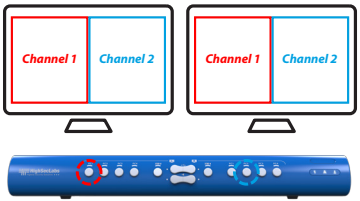
Picture-in-Picture View, Channel 4 selected in full-screen window, Channel 1 selected in PIP window.

In Picture-in-Picture View, the display shows a selected channel in a full-screen window, and a second selected channel in a smaller scaled PIP window in the upper-right corner. The left-side channel select buttons switch the channel in the full-screen window, and the right-side channel select buttons switch the channel in the PIP window.

Viewing Modes for 2 Displays

Duplicate Mode

LCtrl | LCtrl | F11 | s | 1



2 Displays in Matrix View, Duplicate Mode

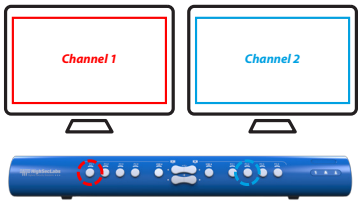
Duplicate Mode reproduces the same video on both displays, replicating the view of Display 1.

Note: Duplicate Mode can be applied to any of the views for 1 display listed above.

OPERATION

Extended Mode (Horizontal)

LCtrl | LCtrl | F11 | s | 2



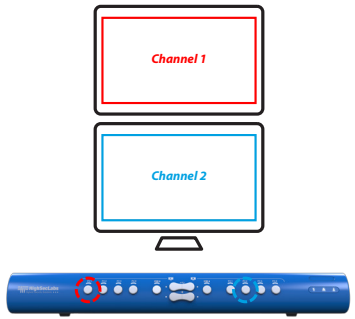
2 Displays in Matrix View, Extended Mode (Horizontal)

In Extended Mode (Horizontal), the view is extended across 2 horizontally aligned displays as a single window.

Note: Extended Mode must be applied to any of the multi-display viewing modes (Full-Screen, Tile, Scale, or Matrix).

Extended Mode (Vertical)

LCtrl | LCtrl | F11 | s | 3



Example: 2 Displays in Matrix View, Extended Mode (Vertical)

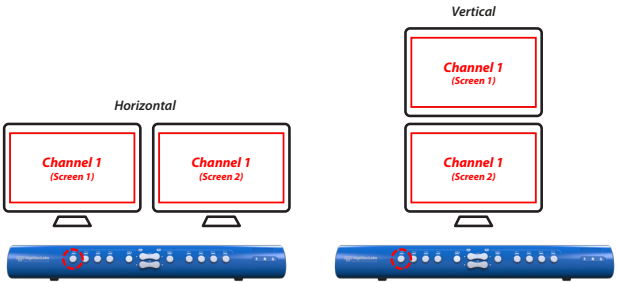
In Extended Mode (Vertical), the view is extended across 2 vertically aligned displays as a single window.

Note: Extended Mode must be applied to any multi-display viewing mode (Full-Screen, Tile, Scale, or Matrix).

OPERATION

Full-Screen View

LCtrl | LCtrl | f

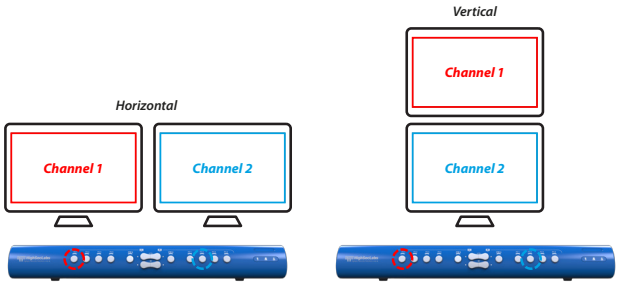


Full-Screen View, Channel 1 selected

In Full-Screen View, the selected channel is shown as a maximized window extended across both displays.

Side-By-Side / Matrix View

LCtrl | LCtrl | x



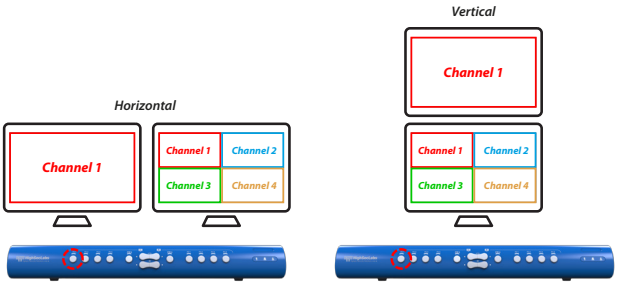
Matrix View, Channel 1 selected on left, Channel 2 selected on right

In Matrix View, each display shows a full-screen window of the selected channels. The left-side channel select buttons switch the channel on Display 1, and the right-side channel select buttons switch the channel on Display 2.

OPERATION

Tile View

LCtrl | LCtrl | q

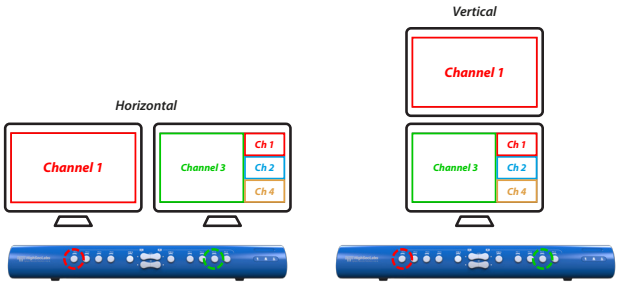


Tile View, Channel 1 selected

In Tile View, Display 1 shows an unscaled, full-screen image of the selected channel. Display 2 shows all channels in smaller, equally scaled windows. The left-side channel select buttons switch the channel on Display 1, and the right-side channel select buttons switch the selected channel on Display 2.

Scale View

LCtrl | LCtrl | s

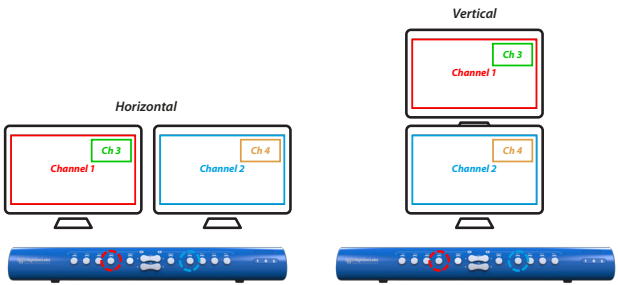


Scale View, Channel 1 selected in full-screen, Channel 3 selected in Scale window

In Scale View, Display 1 shows a full-screen image of the selected channel, and Display 2 shows another selected channel in a scaled window that takes approximately two-thirds of the display, with the other 3 channels in smaller scaled windows on the right side of the display. The left-side channel select buttons switch the full-screen channel on Display 1, and the right-side channel select buttons switch the larger channel on Display 2.

Picture-in-Picture View

LCtrl | LCtrl | F11 | x



Picture-in-Picture View, Channel 1 selected on left, Channel 2 selected on right

In Picture-in-Picture View, each display shows a selected channel in a full-screen window, with the remaining two windows shown in a smaller scaled PIP window in the lower-right corner. The left-side channel select buttons switch the full-screen channel on Display 1, and the right-side channel select buttons switch the full-screen channel on Display 2.

Dual Head Mode

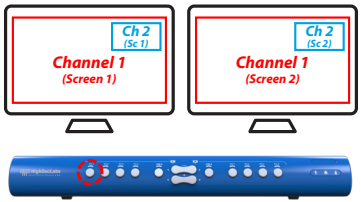
Dual-Head Mode enables the functionality of a traditional dual-head secure KVM setup, while also allowing the ability to view and operate multiple computer sources across two displays.

To activate and configure Dual-Head Mode, activate the On-Screen Display. Detailed instructions on how to operate the OSD can be found in the section **On-Screen Display Operation**.

To receive dual-screen support in MS-Windows OS: download and install HSL's multi-display driver on source computers that have multiple screens (https://highseclabs.com/downloads/km-multi-display-drivers/)

OPERATION

4-Port Model

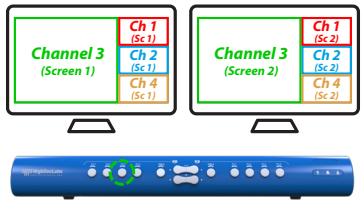


A 4-Port Ultra Mini-Matrix replicating a dual-head 2-port KVM, Channel 1 selected

A 4-Port Ultra Mini-Matrix can replicate a dual-head 2-port KVM setup. While in Dual-Head Mode, the Ultra Mini-Matrix shows the primary and secondary screens of the primary channel in the full-screen windows of both displays. The primary and secondary screens of the secondary channel are shown in PIP windows on both displays.

To switch between channels using the mouse, hold down the **LCtrl** button and drag the cursor from one channel to the other. Absolute Mouse Mode must be enabled.

8-Port Model



An 8-Port Ultra Mini-Matrix replicating a dual-head 4-Port KVM, Channel 3 selected

An 8-Port Ultra Mini-Matrix can replicate a dual-head 4-port KVM setup. While in Dual-Head Mode, the Ultra Mini-Matrix shows the primary and secondary screens of the primary channel in a scaled window on the left side of the screen. The primary and secondary screens of the other channels are shown in scaled thumbnail windows on the right side of the screen.

To switch between channels using the mouse, hold down the **LCtrl** button and drag the cursor from one channel to the other. Absolute Mouse Mode must be enabled.

OPERATION

On-Screen Display Operation

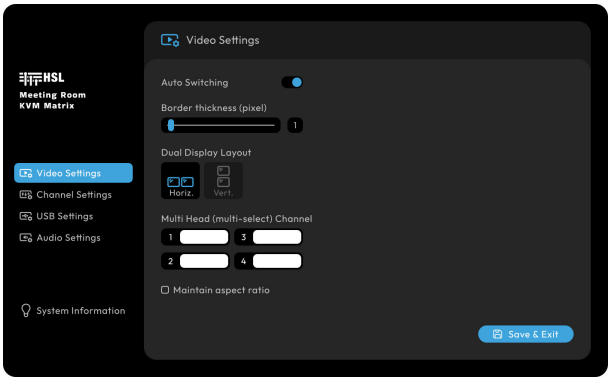
LCtrl | RCtrl | o or LCtrl | LAlt | o

The KVM Ultra Mini-Matrix is configured using an On-Screen Display (OSD) menu system. The OSD allows easy customization of video, channel, USB, and audio settings to create an optimal setup.

Multiple settings can be adjusted across different menus while the OSD is active, but no changes will be saved until selecting the option **Save & Exit**. Exiting the OSD without saving will discard any changes and revert to previous settings.

To exit the OSD without saving any changes, press **Esc**.

Video Settings



Auto Switching (Commercial Models Only)

If a new source is connected while the Ultra Mini-Matrix is on, Auto Switching immediately displays the new source as the active channel.

Border Thickness

Determine the thickness (in pixels) of the borders around the channel windows. By default, the borders are set to 6 pixels thick.

Dual Display Layout

Define the alignment of the Primary and Secondary Displays as horizontal or vertical. This determines the VDT mouse cursor movement axis when Absolute Mouse Mode is enabled.

Multi-Head (Multi select) Channel

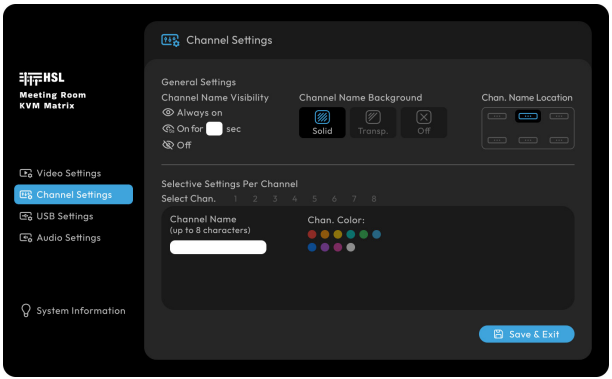
To connect a multi-head PC to multiple channels, select the channel connected to the USB port. In the text box next to the selected channel, add the other channels with displays connected to the same PC, with each channel number separated by the + key (e.g. "**1+2**").

For example, if there is a dual-head PC connected to Channels 1 and 2, select Channel 1 and enter "**1+2**" in the text box.

Maintain Aspect Ratio

Select whether a channel window will maintain the aspect ratio of the displayed channel when it is scaled up or down for different viewing modes.

Channel Settings



General Settings

These settings apply across all channels.

Channel Name Visibility

Determine how long the designated names of each channel are visible on the display(s).

- **Always on:** Channel names are always visible.
- **On for (x) sec:** Specify how many seconds the channel names are visible.
- **Always off:** Channel names are not visible.

Channel Name Background

Determine the visibility of a pill-shaped background that appears behind the channel name to stand out from the channel image.

- **Solid:** The background is shown as a solid color, contrasting the channel name sharply from the channel image.
- **Transparent:** The background is semi-transparent, contrasting the channel name partially from the channel image.
- **Off:** The background is removed, only displaying the channel name.

Channel Name Location

Determine the location of the channel window in which the channel name appears:

- Upper-left corner
- Upper middle
- Upper-right corner
- Lower-left corner
- Lower middle
- Lower-right corner

OPERATION

Selective Settings Per Channel

These settings only apply to a selected channel.

Channel Name

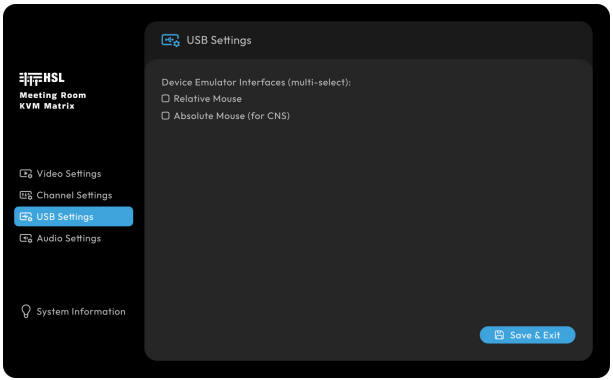
Enter a custom name for an individual channel by entering the name into the text box. Channel names can be a maximum of 8 characters long, and letters must be in uppercase.

Channel Color

Select a color for the borders of a selected channel:

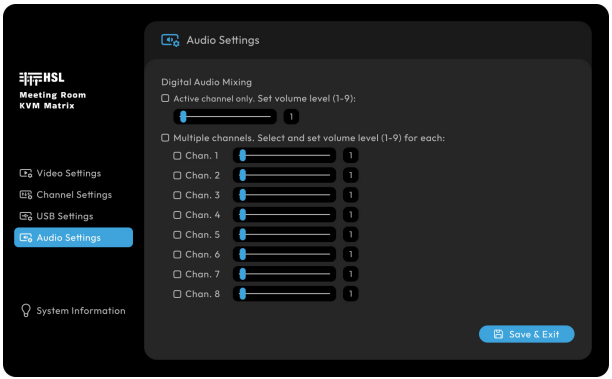
- Red
- Orange
- Yellow
- Mint
- Green
- Cyan
- Blue
- Purple
- Magenta
- White

USB Settings



- **Relative Mouse (REL):** Relative Mouse Mode confines mouse movement to the selected source's channel. While REL Mouse is active, switching between channels can be done by using the buttons on the Ultra Mini-Matrix's front panel. REL Mouse is the default mode upon booting up.
- **Absolute Mouse (ABS):** Absolute Mouse Mode uses Virtual Display Technology (VDT) to switch seamlessly between sources, simply by holding the **LCtrl** key and moving the cursor across the borders between channels. Depending on the chosen configuration, the VDT mouse cursor movement axis between video displays can be either horizontal (where the cursor moves across screens arranged left-to-right) or vertical (where the cursor moves across screens arranged top-to-bottom).

Audio Settings



The KVM Ultra Mini-Matrix features Digital Audio Mixing, playing digital audio from multiple channels simultaneously so alerts tones and other audio from inactive channels can be heard while operating on another.

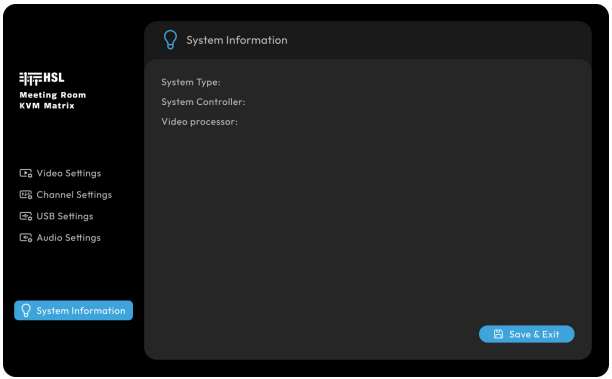
Active Channel Only

Only the audio from the active channel and set its volume level. This option is selected by default, with the volume set to level 9.

Multiple Channels

Select which channels play digital audio and set the volume for each channel independently.

System Information



System Type

Specifies if the KVM Ultra Mini-Matrix is a Secure or Commercial model.

System Controller

Indicates the firmware version for the Ultra Mini-Matrix's system controller.

Video Processor

Displays the firmware version of the FPGA EDID Generator for the video matrix, controller functionality, and view layouts.

EDID Configuration

Upon initial connection, the Ultra Mini-Matrix captures the Extended Display Identification Data (EDID) from the primary video display and transfers it to all connected host computers. The Ultra Mini-Matrix has an LED on the console side of its rear panel to indicate the current EDID status.

- Off: no EDID detected
- Flicker: EDID read in progress
- On: EDID received

If a video display's EDID is not compatible, the Ultra Mini-Matrix includes 7 predefined EDID files that can resolve compatibility issues.

Internal EDID for Host Computers

To select a predefined EDID file for the host computers, enter the key combination **Ctrl | Ctrl | F12 | d | [1…7]**, where **[1...7]** represents one of the following resolution options:

1) 3840x2160/30Hz
2) 3440x1440/30Hz
3) 2560x1600/60Hz
4) 2560x1440/60Hz
5) 2048x2048/60Hz
6) 1920x1200/60Hz
7) 1920x1080/60Hz

Output EDID for Video Display

The Ultra Mini-Matrix can also set the EDID file for video displays. To set the output EDID, enter **Ctrl | Ctrl | F11 | d | [1…8]**, where **[1...8]** is one of the following resolution options:

1) 2048x2048
2) 3840x1080
3) 2560x1440
4) 2560x1600
5)1920x1080
6) 1920x1200
7) 3440x1440
8) 3840x2160

Note: 5K will be reduced to 3440x1440/30HZ by shortcut.

EDID Pass-Through

EDID Pass-Through uses the EDID of the connected display, passing it directly to the source computers. To enable EDID Pass-Through, enter **Ctrl | Ctrl | F12 | d | e**. To disable EDID Pass-Through, enter **Ctrl | Ctrl | F12 | d | d**.

Last Good Known EDID

The last good known EDID will be stored in the Ultra Mini-Matrix until a reset to factory defaults is performed. Upon powering up, if no EDID is detected, the Ultra Mini-Matrix will load the last good known EDID file. This feature is for use cases such as using a Video Extender with the video display, as the time to renew a transmitter/receiver connection may take longer than the window to acquire the EDID file from the display.

Remote Control Device Settings

The KVM Ultra Mini-Matrix can be controlled using an external remote control, PC, or any other device with RS-232 capability (referred to hereafter as the Remote Control Unit or RCU).

Connect the Controlling Device to the Ultra Mini-Matrix

- Connect the Remote Control Unit to the Ultra Mini-Matrix via the RJ14 port labeled RDC (Remote Device Control) or RCU.
- It may be necessary to connect the devices using a USB to RJ14 cable (Part CUS18RJ, sold separately).
- The specific method of connecting the RCU to the Ultra Mini-Matrix may vary depending on the type of device being used. For full instructions on how to connect a controlling device, consult the RS-232 Remote Control Administrator Guide:

https://highseclabs.com/wp-content/uploads/2020/10/HDC18581_HSL_QSG_Remote-RS232-control_1.3.pdf

Remote Control Commands

The buttons on an RCU replicate the buttons on the Ultra Mini-Matrix's front panel. This is done by entering commands via a serial terminal program (e.g. PuTTY).

Keepalive events are used by the Ultra Mini-Matrix to periodically communicate its status to the RCU, using the RS-232 protocol. Entering an RS-232 command updates the keepalive event. Because these events are related to the buttons on the Ultra Mini-Matrix's front panel, they are constructed as **#AFP_ALIVE** followed by the command argument corresponding to the selected channel.

For example, to switch to Channel 4 on the left side of a 4-port Ultra Mini-Matrix, enter the command **#AFP_ALIVE FFFFFFF7**.

Note: while using a Remote Control Unit, the Ultra Mini-Matrix's front panel buttons are deactivated. This is because the Ultra Mini-Matrix is receiving commands from the RCU instead of the front panel buttons.

APPENDIX

To replicate the Ultra Mini-Matrix's front panel buttons using RS-232, enter the **#AFP_ALIVE** command with the following arguments:

4-Port Ultra Mini-Matrix	
Front Panel Button	
Channel 1	FFFFFFDE
Channel 2	FFFFFFDD
Channel 3	FFFFFFDB
Channel 4	FFFFFFD7
Channel 5	FFFFFFEE
Channel 6	FFFFFFDE
Channel 7	FFFFFFBE
Channel 8	FFFFFF7E

Note: For the 4-Port Ultra Mini-Matrix, the left-side channel select buttons correspond with channels [1...4], while the right-side channel select buttons correspond with channels [5...8].

Note: To freeze the keyboard/mouse, audio, or fUSB to the left or right side, enter the respective toggle command twice. Entering the command a third time will unfreeze.

For example, to freeze the audio to the left side of a 4-port Ultra Mini-Matrix, enter the command **#AFP_ALIVE FFFFFFF7** twice. Entering **#AFP_ALIVE FFFFFFF7** again will unlock the audio.

APPENDIX

Hotkey Commands

In addition to the front panel buttons, the KVM Combiner is also controlled using keyboard hotkeys. These hotkeys can be replicated using RS-232 commands.

Notes:

- Include the spaces between characters.
- The characters **[...]** represent a range of selectable options.
- The characters <**m**> represent a single selectable option, such as a channel number.
- The characters <**n**> represent a selectable quantity of options, such as how many channels are displayed in a custom layout.
- The characters <**m1**...> represent a selectable sequence of options, such as the order in which channels are displayed in a custom layout.
- Commands that include a function key, such as **F11**, are typed as a sequential key combination (**f | 1 | 1**). For example, as the key combination to switch to Duplicate Mode is **LCtrl | LCtrl | F11 | s | 1**, the RS-232 command is displayed as **#anatl *F11* s 1**.

Action	Command
Activate On-Screen Display	#ANATR o
Freeze USB Peripheral on Selected Channel	#ANATL ***F11*** z d
Reset to Factory Default	#ANATL ***F11*** r
Mouse Navigation	**Command**
Relative Mouse	#ANATL ***F11*** b
Absolute Mouse	#ANATL ***F11*** c
Default Vertical Mouse Navigation (Screen 1 on bottom)	#ANATL ***F11*** d n
Inverted Vertical Mouse Navigation (Screen 1 on top)	#ANATL ***F11*** d r
Display Resolution / EDID	**Command**
Select Input Resolution / EDID	#ANATL ***F12*** d [1…7]
Select Output Resolution / EDID	#ANATL ***F11*** d [1…8]
Enable EDID Pass-Through	#ANATL ***F12*** d e
Disable EDID Pass-Through	#ANATL ***F12*** d d
Enable Retain EDID after Power Cycle	#ANATL ***F12*** r e
Disable Retain EDID after Power Cycle	#ANATL ***F12*** r d
Maintain Aspect Ratio	#ANATL a e
Disable Aspect Ratio	#ANATL a d
Screen Mode	**Command**
Single Screen / Duplicate Mode	#ANATL ***F11*** s 1
Extended Mode (Horizontal)	#ANATL ***F11*** s 2
Extended Mode (Vertical)	#ANATL ***F11*** s 3
Viewing Mode	**Command**
Full-Screen View	#ANATL f
Matrix / Side-by-Side View	#ANATL x
Tile / Quad View	#ANATL q
Scale View	#ANATL s
Picture-in-Picture View	#ANATL ***F11*** x

APPENDIX

Command Structure for Kramer, Extron, Crestron Remote Controls

Depending on the manufacturer, some Remote Control Units may require certain characters when entering a keepalive command. The following are command structures for the most common RCUs.

Action	Description	Kramer	Extron	Crestron
Carriage Return	Return text cursor to beginning of line	<cr>	<cr>	\x0d
Line Feed	Move text cursor to new line	<lf>	<lf>	\x0a
Command Start	Begin a new command			#
Space	Separate multiple strings			\x

Examples:

The following examples all enter a command into the keepalive sequence for an 8-port Ultra Mini-Matrix's front panel "**AFP_ALIVE**" to switch to Channel 1 "**FFFFFFDE**" ending with a carriage return.

- Kramer or Extron: **#AFP_ALIVE FFFFFFDE <cr>**
- Crestron: **##AFP_ALIVE FFFFFFDE\x0d**

For further information on programming a Remote Control Unit to enter RS-232 commands, consult the Programmable Remote Control User Manual, which can be found here:

https://highseclabs.com/downloads/user-manual-pp4-0-wr80pc-4-secure-8-button-programmable-remote-control-unit/.

Highseclabs.com

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