MINI-MATRIX
KVM SWITCHES

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PRESENTATION OVERVIEW

1 — **WHAT IS A MINI-MATRIX KVM?**

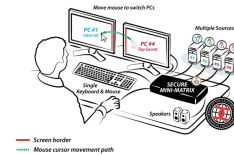*The end user's usability challenges in multi-computer environments. Explanation of what a Mini-Matrix KVM is and a review of its benefits.*

2 — **WHAT IS A SECURE MINI-MATRIX KVM?**

Overview of HSL's Secure Mini-Matrix KVM security and product highlights.

3 — **MINI-MATRIX PRODUCT HIGHLIGHTS EXPLAINED**

Product highlights explained in detail.

4 — **PRODUCT TABLE AND MAIN MODELS**

Review the differences between models.

WHAT IS A MINI-MATRIX KVM?

1

*The end user's usability challenges
in multi-computer environments.
Explanation of what a Mini-Matrix KVM is
and a review of its benefits.*

The Challenge of Working with Multiple Computers

Users whose work requires immediate access to multiple computers, like those in the government, military, and financial sectors, have a problem:

They need to juggle between multiple sets of keyboards, mice, and displays – every time they want to change to a different computer.

It's confusing; they're never quite sure whether they're switching to the computer they want to control.

If that's not enough, the multiple sets of keyboards, mice, and displays take up valuable space on their desktop. Clutter.

THE SOLUTION

What is a Mini-Matrix KVM?

A Mini-Matrix lets users view and control **two** out of all (four or eight) computers – on **two** displays – while sharing a **single** keyboard-and-mouse set.

The Mini-Matrix enables users to both:

* Free up their desktops from the clutter of multiple peripherals

* Access two selected computers simultaneously

A Mini Matrix is ideal for meeting rooms and control centers, where multiple computers must be presented - at the same time - on two displays. For example:

* In control centers, where information from several sources needs to be constantly displayed in real-time.

* In meeting rooms, where both visitor and host computers are viewed and controlled simultaneously.

THE SOLUTION
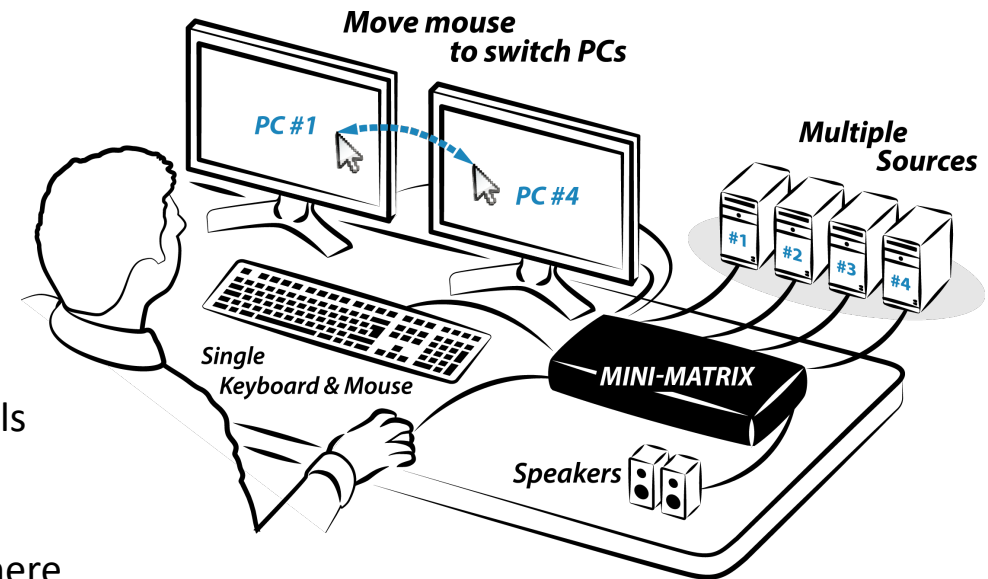
## What is the Difference Between a KVM and a Mini-Matrix KVM?

Both a KVM and a Mini-Matrix KVM are keyboard-video-mouse switches that enable sharing **one** set of peripherals between **all** (four or eight) computers.

A Mini-Matrix KVM has the added functionality of letting users:

- View and control **each** of the two selected computers on **two** displays - at the same time

- Easily switch peripheral control from one selected computer to another, by sliding the mouse cursor over the computer's display border. No more need, like on a KVM, to press the front-panel buttons to switch channels.

KVM

VS.
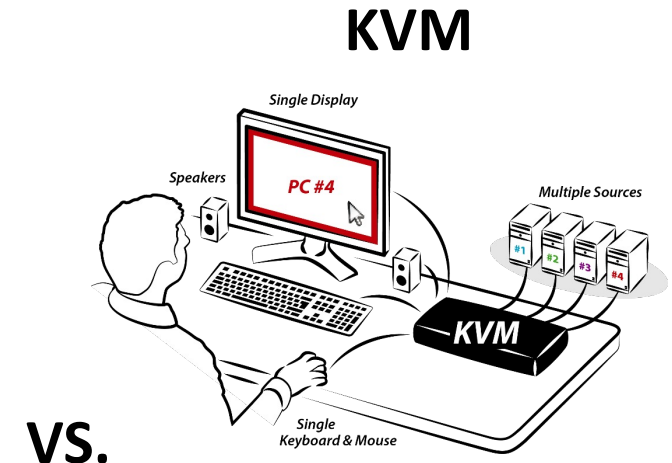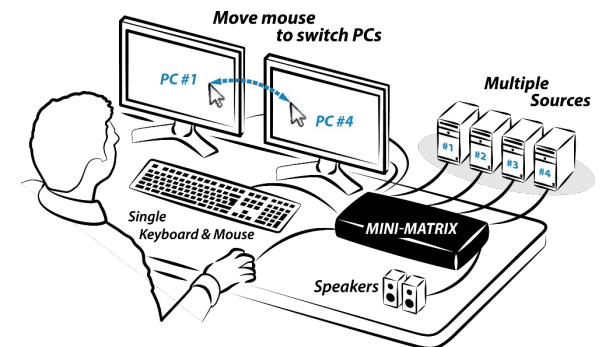
Mini-Matrix KVM

PRODUCT CONNECTION DIAGRAM

Simple Setup

To set up the Mini-Matrix KVM, connect:

- **PCs to the computer/source ports:**
  Connect each computer's display, USB, and audio cables to the Mini-Matrix KVM's corresponding computer port.

- **Peripherals to the console ports:**
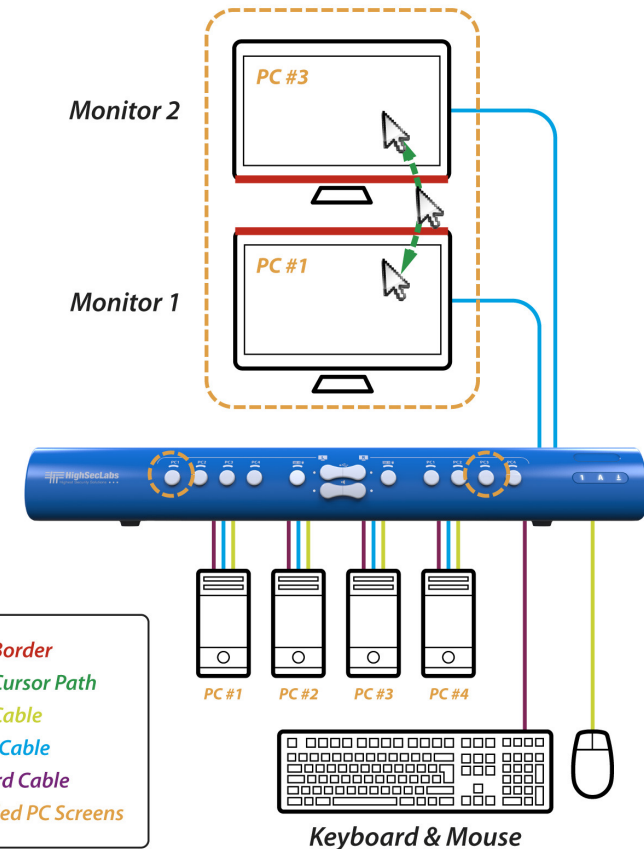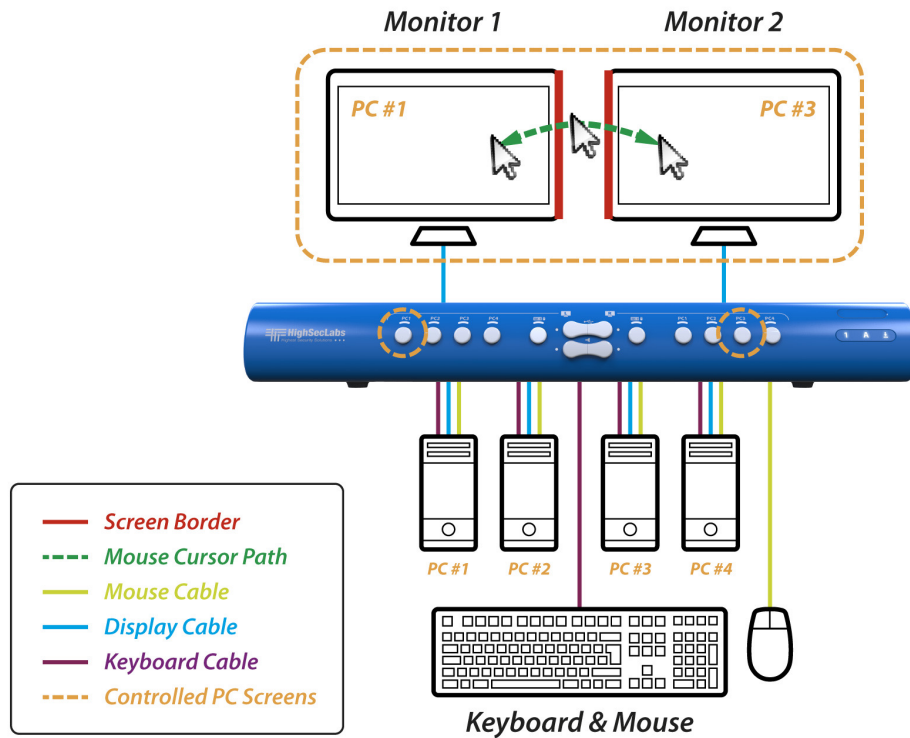 Connect the monitor, keyboard, mouse, and speaker/headphone to the console ports.

AFP – Auxiliary Front Panel Remote Control
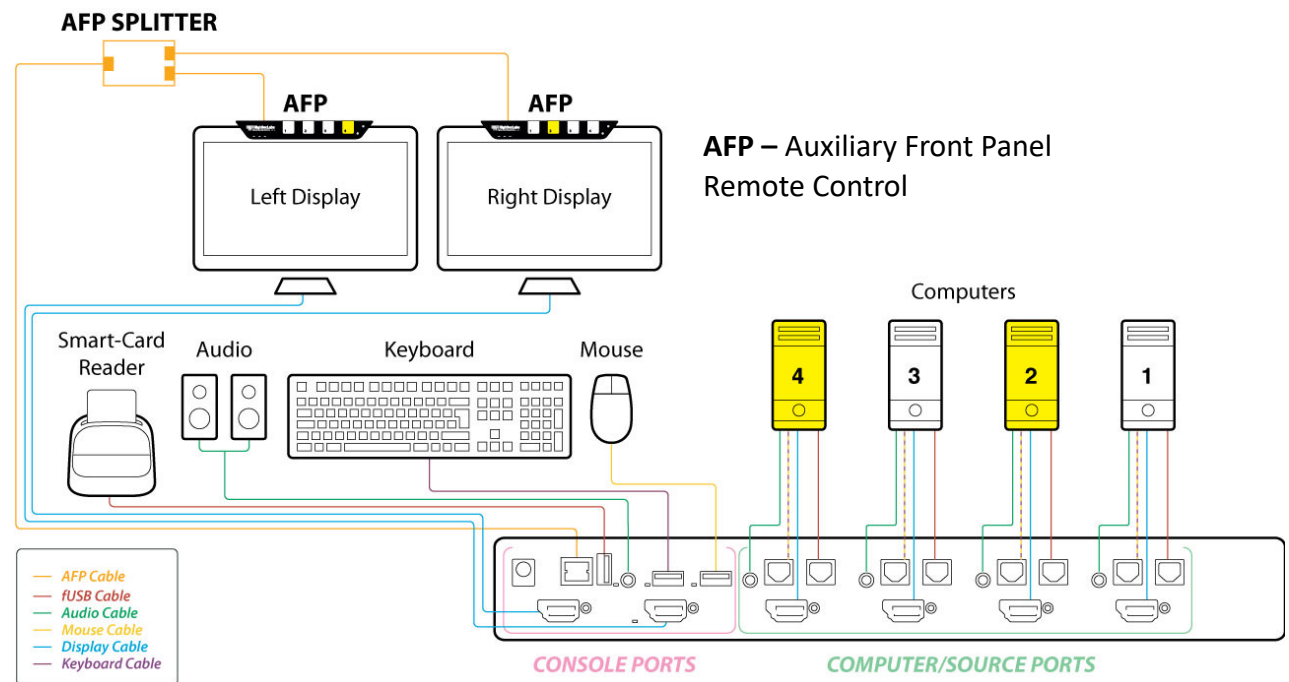
FLEXIBLE SCREEN LAYOUT

The Mini-Matrix supports creating various display layouts (presets) to meet your needs. Users can align displays vertically (on top), horizontally (alongside), and custom (using extended-screen presets).

For a full list of possible Mini-Matrix layouts please review Mini-Matrix User Manual.

FLEXIBLE SCREEN LAYOUT
Dual-Head Configuration

The Mini-Matrix supports dual-head layouts. In the example:

- 2 display-monitors (Monitor 1 and 2) are connected to the Primary and Secondary console ports.
- 2 dual-display sources (PC 1 and 2) are connected to the Mini-Matrix source ports 1-4.
- Display-monitors are aligned horizontally so that the Secondary screen is on the right of the Primary screen.
- VDT mouse cursor movement axis is horizontal.

Highlights:

Use the source selection panel to choose which sources to display.

View and control any monitor combination, such as:

- PC#1 Primary and Secondary screens
- PC#2 Primary and Secondary screens
- PC#1 and #2 Primary screens
- PC#1 and #2 Secondary screens
- PC#1 Primary and PC#2 Secondary
- PC#2 Primary and PC#1 Secondary

Switch between selected sources by dragging the mouse cursor horizontally.
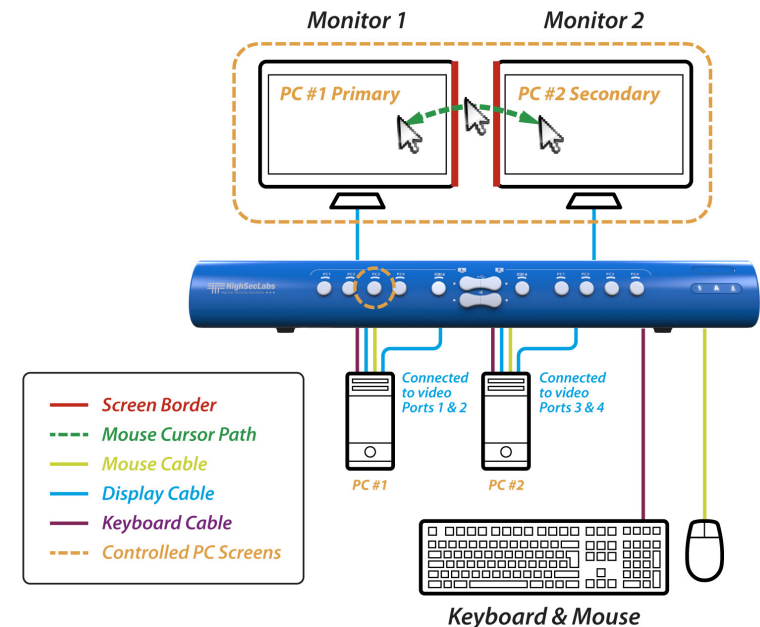
For a full list of possible Mini-Matrix layouts please review the Mini-Matrix User Manual.

FLEXIBLE SCREEN LAYOUT
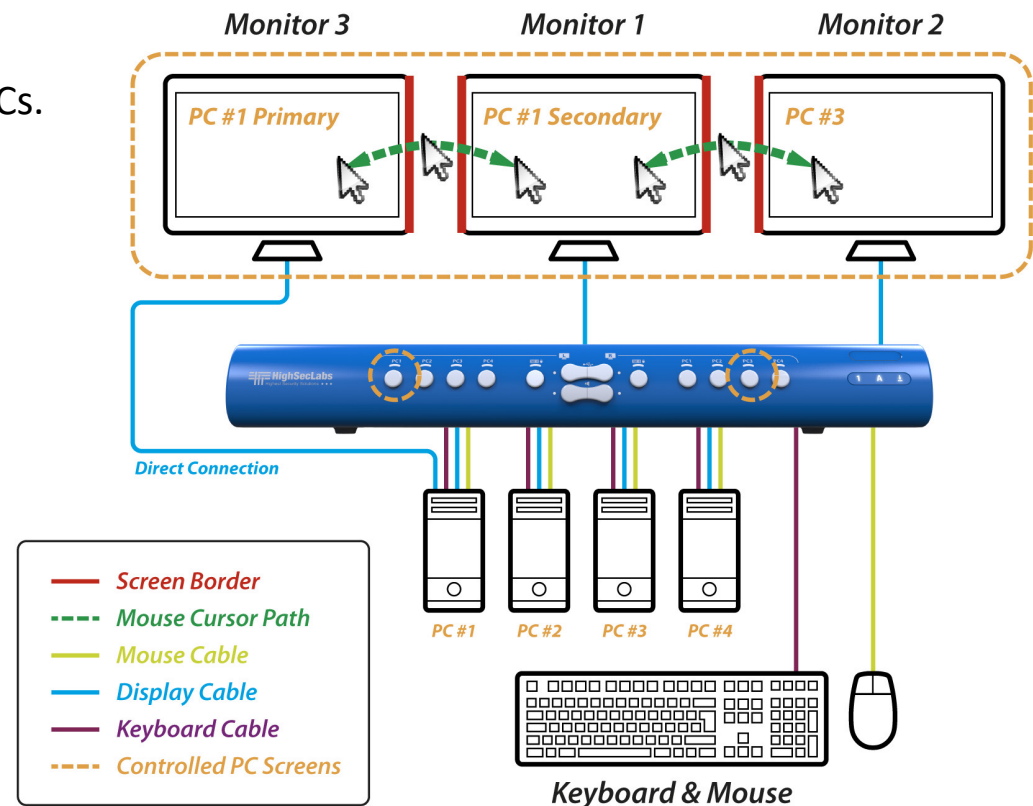## Using Extended-Screen Preset

Using extended-display presets, users can connect more than two screens. The mouse can move freely between the different screens, whether they are connected to the Mini-Matrix or directly connected to the PC.

In the example, Monitor 3 is directly connected to PC #1 (PC #1's Primary).

The two other displays (Monitor 1 and Monitor 2) are switchable – through the Mini-Matrix – between the four PCs. These two other displays are Secondary displays of:

• PC #1 (KVM channel 1), OR -

• PCs #2-4 (KVM channels 2-4)

For a full list of possible Mini-Matrix layouts please review Mini-Matrix User Manual.

Monitor 3 — PC #1 Primary
Monitor 1 — PC #1 Secondary
Monitor 2 — PC #3

Direct Connection

Legend:
— Screen Border
---- Mouse Cursor Path
— Mouse Cable
— Display Cable
— Keyboard Cable
---- Controlled PC Screens

PC #1   PC #2   PC #3   PC #4

Keyboard & Mouse
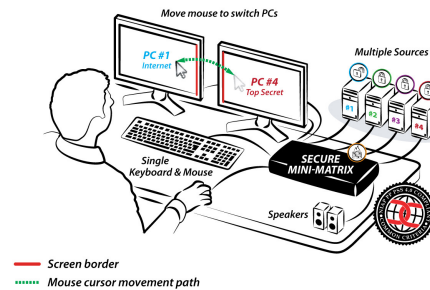
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2

WHAT IS A SECURE MINI-MATRIX KVM?

Overview of HSL's secure Mini-Matrix KVM, security, and product highlights.

THE NEED FOR A SECURE SOLUTION

When is a Secure Mini-Matrix KVM Needed?

Users connecting multiple computers of different classifications through a non-secure KVM switch put their networks at risk.

Why? Because computers connected through a non-secure KVM switch may leak information through the KVM switch itself, or the peripherals connected to it.

The solution? HSL's Secure Mini-Matrix KVM is a NIAP PP4.0 PSD certified secure unit that assures no information leaks between connected computers, through the switch or via the connected peripherals.
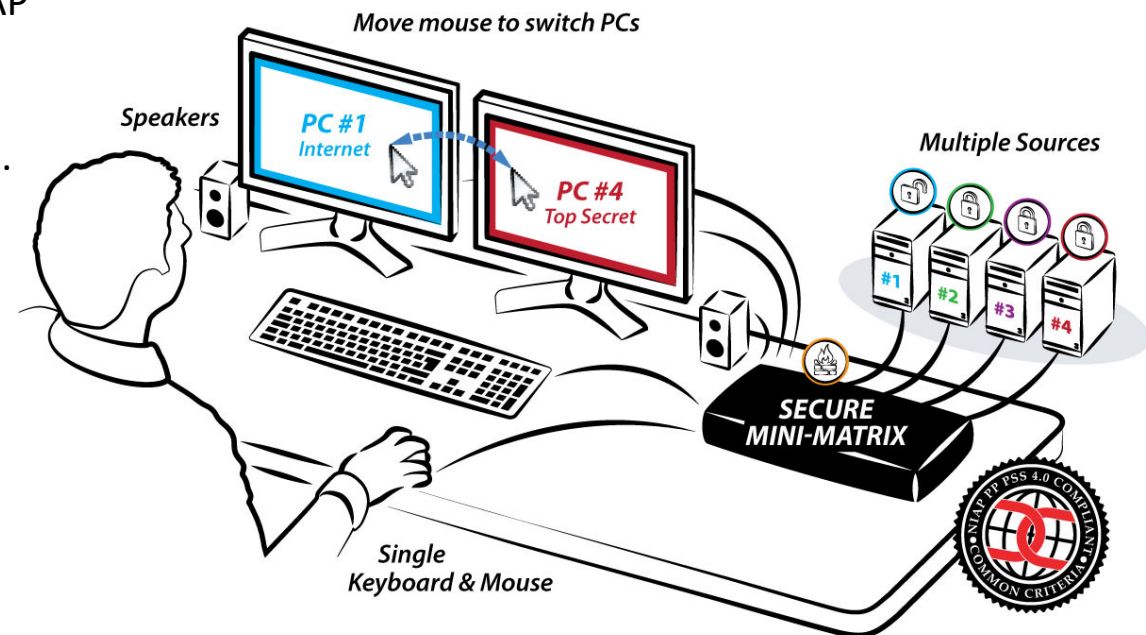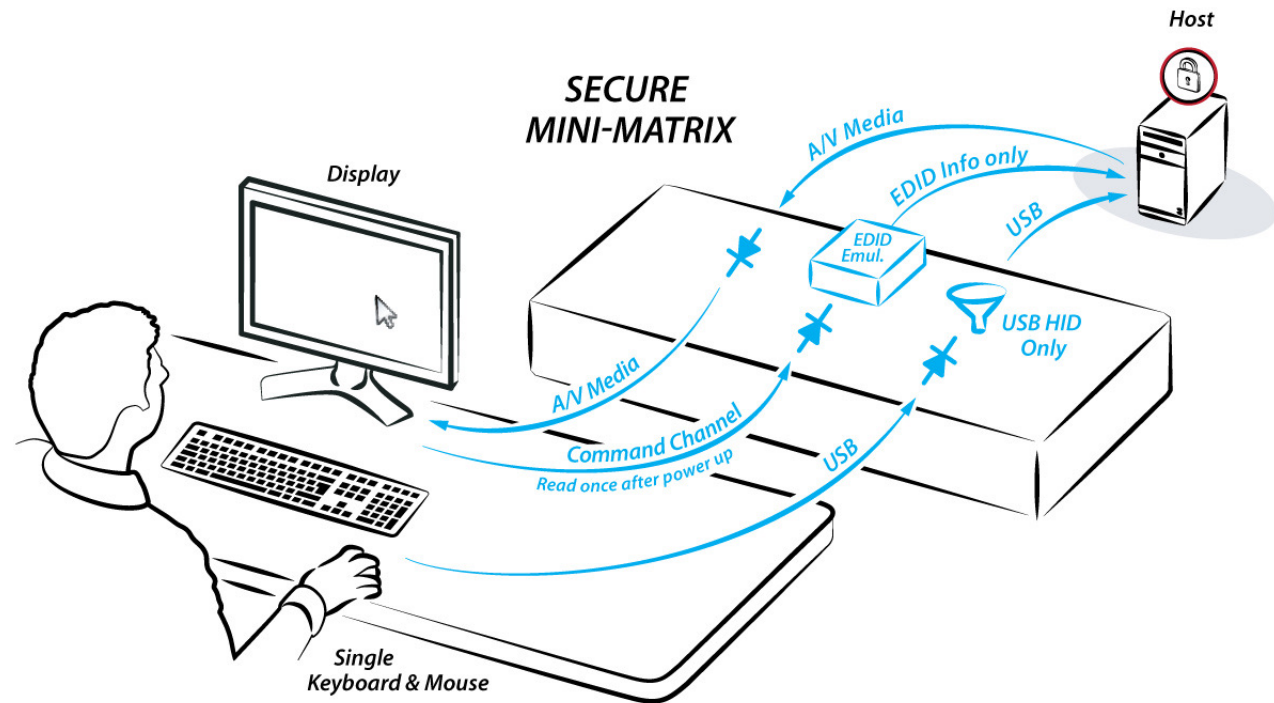
SECURE MINI-MATRIX KVM HIGHLIGHTS (1)

USB Security
- Blocks unauthorized USB devices
- Whitelist & blacklist USB devices based on VID/PID

Video Security
- Video inputs are isolated electronically
- Display is isolated by EDID emulation. Access to monitor's EDID is blocked.
- Access to MCCS is blocked

Keyboard & Mouse Security
- KBD & mouse are isolated by USB emulation
- Unidirectional peripheral to computer data is enforced through optical data diodes. No communication from to computer to KBD/mouse.
- Non-HID data traffic is blocked

13

Audio Security

- Enforces computer to speaker unidirectional sound flow through optical data diodes.
- Prevents eavesdropping and line-in retasking by blocking speaker-to-computer communication
- Blocks data exfiltration by cutting off high-frequency ultra-sonic transmissions.

Hardware Anti-Tampering

- Attempts to open the product render it useless
- Blinking leds indicate AT event
- Special holographic labels on enclosure.

Firmware Anti-Tampering

- Firmware & memory are inaccessible through any port
- Firmware is stored on non-reprogrammable ROM.
- Firmware integrity is verified during power-up self-test.
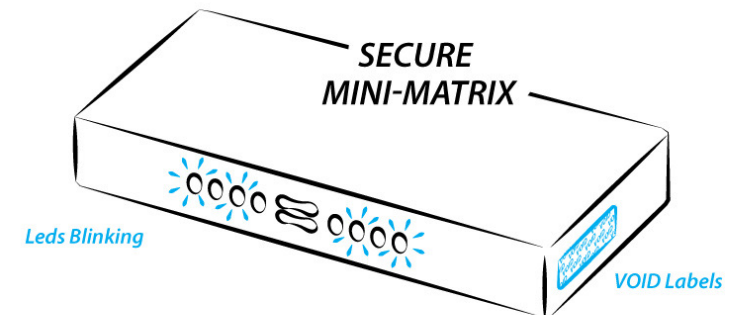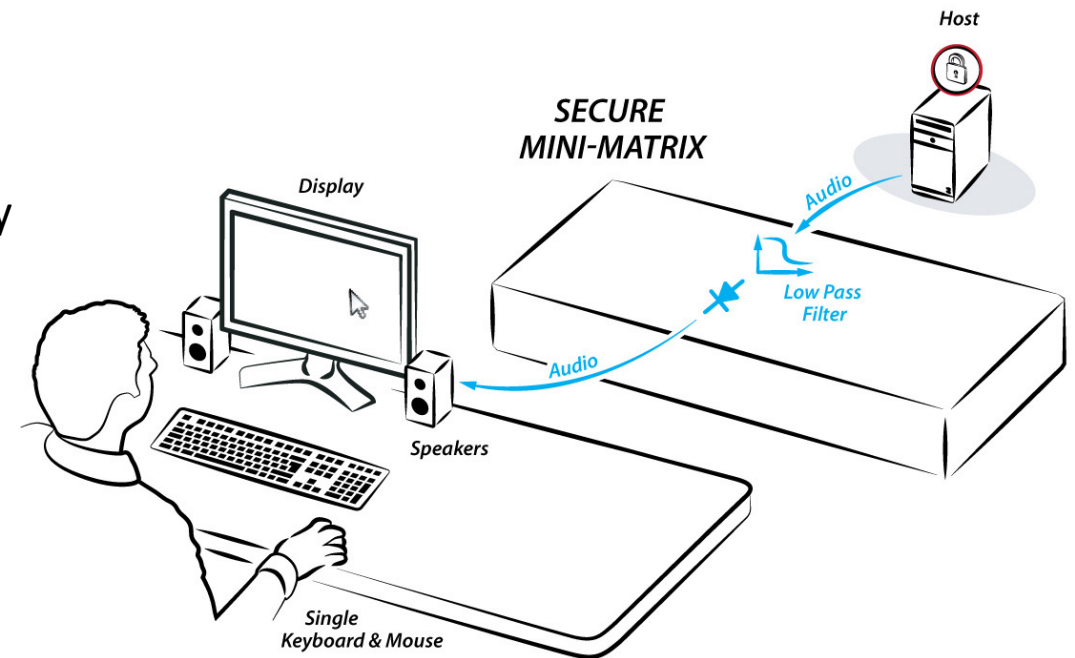
3   **MINI-MATRIX KVM PRODUCT HIGHLIGHTS**

Product highlights explained in detail

LIST OF FEATURES

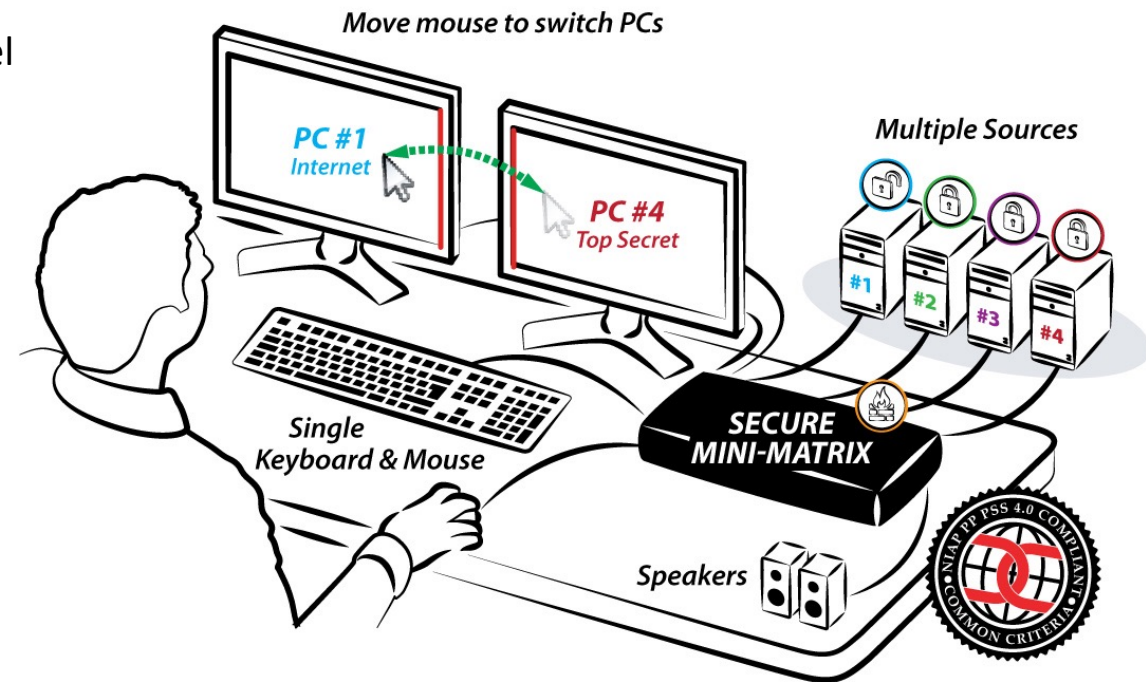| Feature	Commercial Mini-Matrix KVM	Secure Mini-Matrix KVM
Smoothly Switch Between Computers	✓	✓
View Applications in Ultra High Definition (UHD) 4K Video Quality	✓	✓
Copy & Paste	✓	✗
Super Speed USB 3.0 Ports	✓	✗
Freeze Audio	✓	✓
Freeze USB	✓	✗
Compliant with NIAP Common Criteria PSD 4.0 for Peripheral Sharing Switch (PSS) devices	✗	✓
Filter USB (fUSB) Peripherals	✗	✓
Freeze Filtered USB (fUSB)	✗	✓
Avoid Typing Mistakes	✗	✓
Auxiliary Front Panel (optional)	✓	✓
Dual DisplayPort and HDMI Connector (select models)	✓	✓

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SMOOTHLY SWITCH BETWEEN COMPUTERS (VIRTUAL DISPLAY TECHNOLOGY)

Intuitively Switch Between Displays

Automatically switch sources using the Mini-Matrix KVM's Virtual Display Technology :

- Control transfers from one selected computer to another by sliding the mouse cursor over the display borders. No need to press the front-panel buttons.

- The other shared peripherals (keyboard, audio, USB) switch to the next computer, once the mouse cursor passes the display border.

4K VIDEO QUALITY

Never Compromise on Video Quality

Ultra HD 4K

Run graphic-intensive, ultrahigh definition applications on all single- and dual-monitor Mini-Matrix KVM models.

- 4K @ 60HZ supported

- Wide display – 3400 x1440 supported

- High Refresh rate – 2560x1440 @ 120HZ

- Wide display – 32:9 resolutions supported

SD
(720 x 576)

HD
(1280 x 720)

Full HD
(1920 x 1080)

Quad HD
(3840 x 2160)
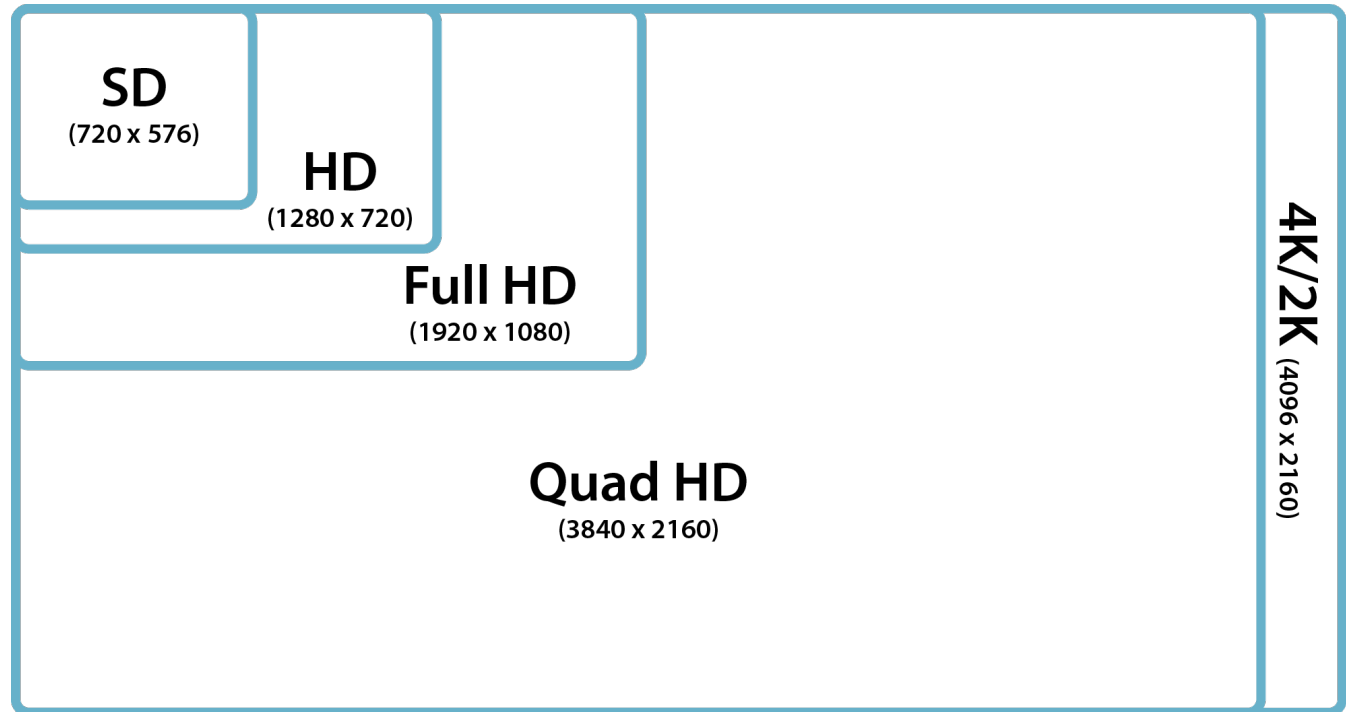
4K/2K
(4096 x 2160)

Five resolutions compared:
Standard Definition, High Definition, Full High Definition, Quad HD and 4K/2K

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Copy & Paste

The Copy & Paste feature enables:

- Transferring text and files between the computers connected to the Mini-Matrix KVM, through the Mini-Matrix KVM (no network connection is needed between parties).

- Using standard copy-and-paste keyboard key combinations (**Ctrl**+**c**/**Ctrl**+**v**) or mouse-context menu commands.

SUPER SPEED USB 3.0 Ports
(Commercial Mini-Matrix KVM Only)
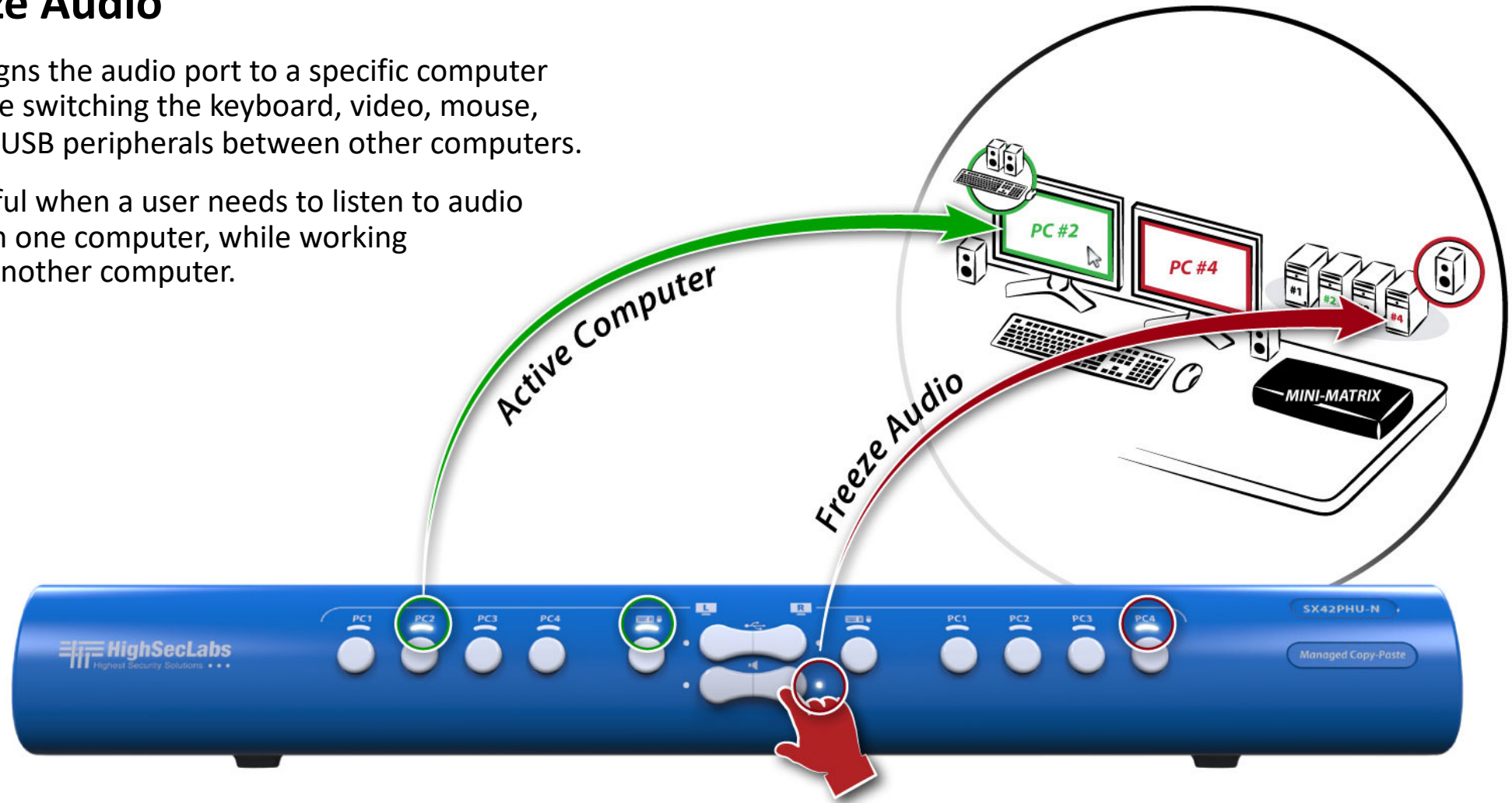
Fast Data Transfer

Transfer data and files between peripherals
and computers at USB 3.0 super-speed rate

USB 3.0

Freeze Audio

- Assigns the audio port to a specific computer while switching the keyboard, video, mouse, and USB peripherals between other computers.

- Useful when a user needs to listen to audio from one computer, while working on another computer.
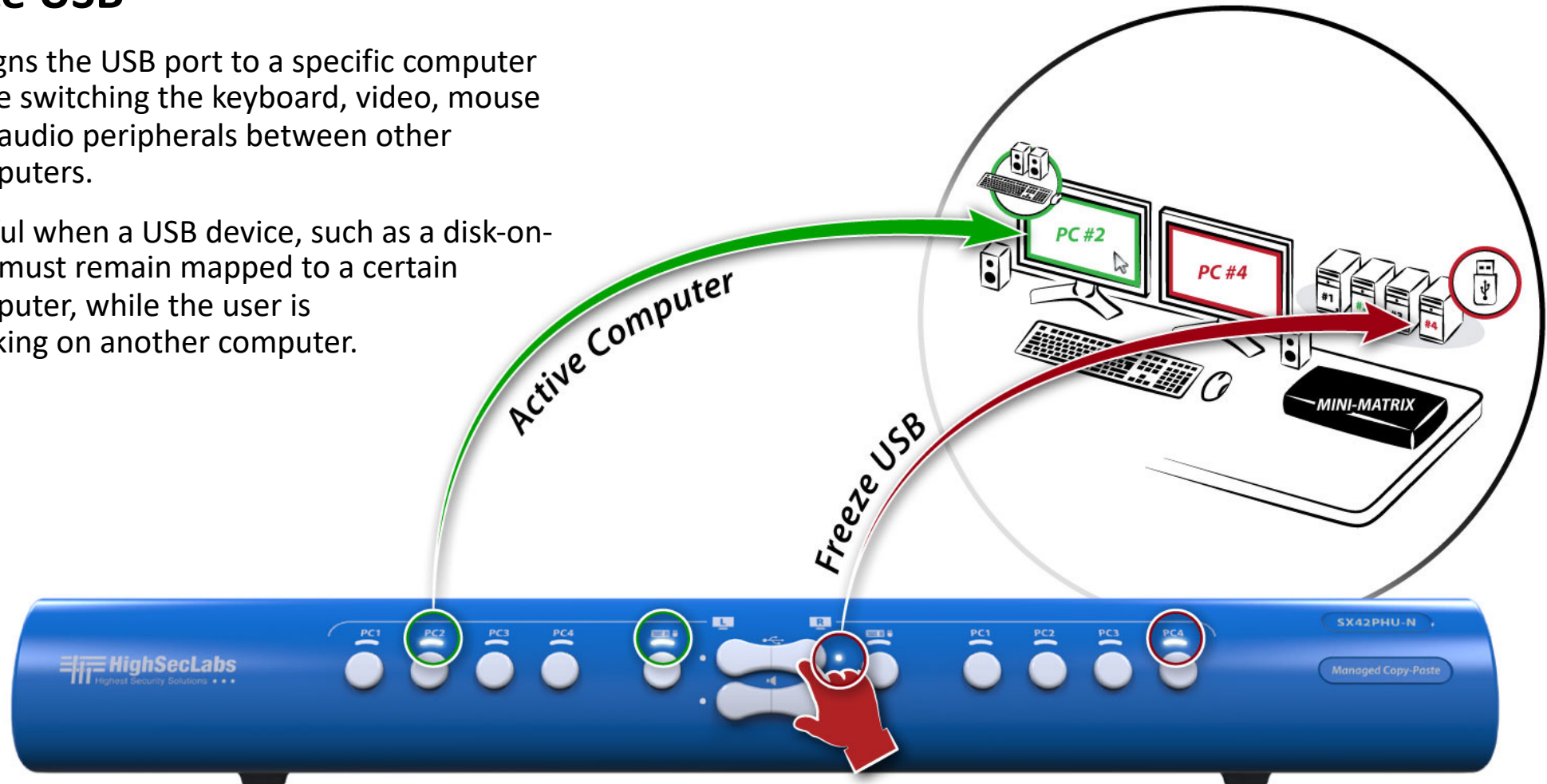
FREEZE USB
(Commercial Mini-Matrix KVM Only)

Freeze USB

- Assigns the USB port to a specific computer while switching the keyboard, video, mouse and audio peripherals between other computers.

- Useful when a USB device, such as a disk-on-key, must remain mapped to a certain computer, while the user is working on another computer.

Securely Share Peripherals Between Computers of Different Classification Levels

To prevent the risk of sharing peripherals, HSL's line of secure Mini-Matrix KVMs has the following features:

- **NIAP/Common Criteria PSD 4.0 Certification**
  HSL secure Mini-Matrix KVMs qualify to the latest NIAP Common Criteria Protection Profile version 4.0 (PSD 4.0) certification.

- **Securely share peripherals across different security domains** Securely share peripherals between computers that belong to different security classifications levels, while maintaining the highest possible data separation security.

- **Prevent information leaks**
  Block threats derived from sharing and switching of vulnerable, untrusted or unauthorized peripheral devices. Prevent peripheral exploits, information leaks, eavesdropping, signal transmission, computer malware, hardware, and firmware tampering by enforcing multilayered security mechanisms.

FILTER USB PERIPHERALS SHARING
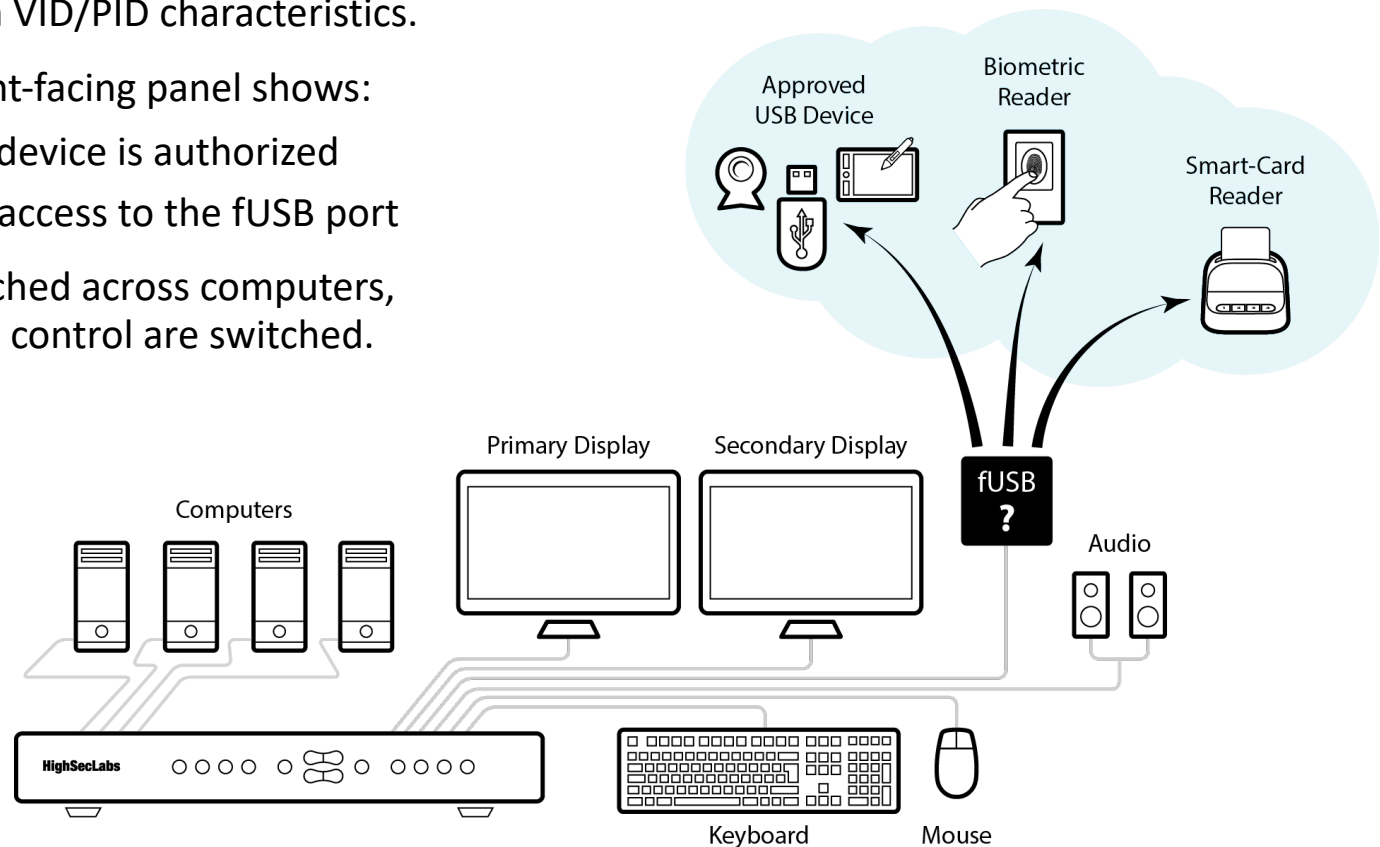## (Secure Mini-Matrix KVM Only)

A filtered USB (fUSB) is a USB port with configurable device filtering capabilities.

- It allows secure switching of USB smart-card and biometric authentication devices between computers, while blocking other USB devices (such as a malicious disk-on-key).

- Its configurable whitelisting and blacklisting ability lets administrators filter specific USB devices, based on VID/PID characteristics.

- LED indication on the product's front-facing panel shows:
    - Whether the connected USB device is authorized
    - Which computer has current access to the fUSB port

- The fUSB port is automatically switched across computers, once a keyboard, mouse, and audio control are switched.

*Authentication / Explicitly Approved USB Devices*

Approved USB Device

Biometric Reader

Smart-Card Reader

Primary Display   Secondary Display

fUSB ?

Computers

Audio

HighSecLabs

Keyboard   Mouse

Freeze fUSB

- Freezes the fUSB port to a specific computer, when switching the keyboard, mouse, and audio control to another computer.

- Useful when an fUSB authentication device, such as a smart-card reader, must remain mapped to a specific computer, when switching to another computer.
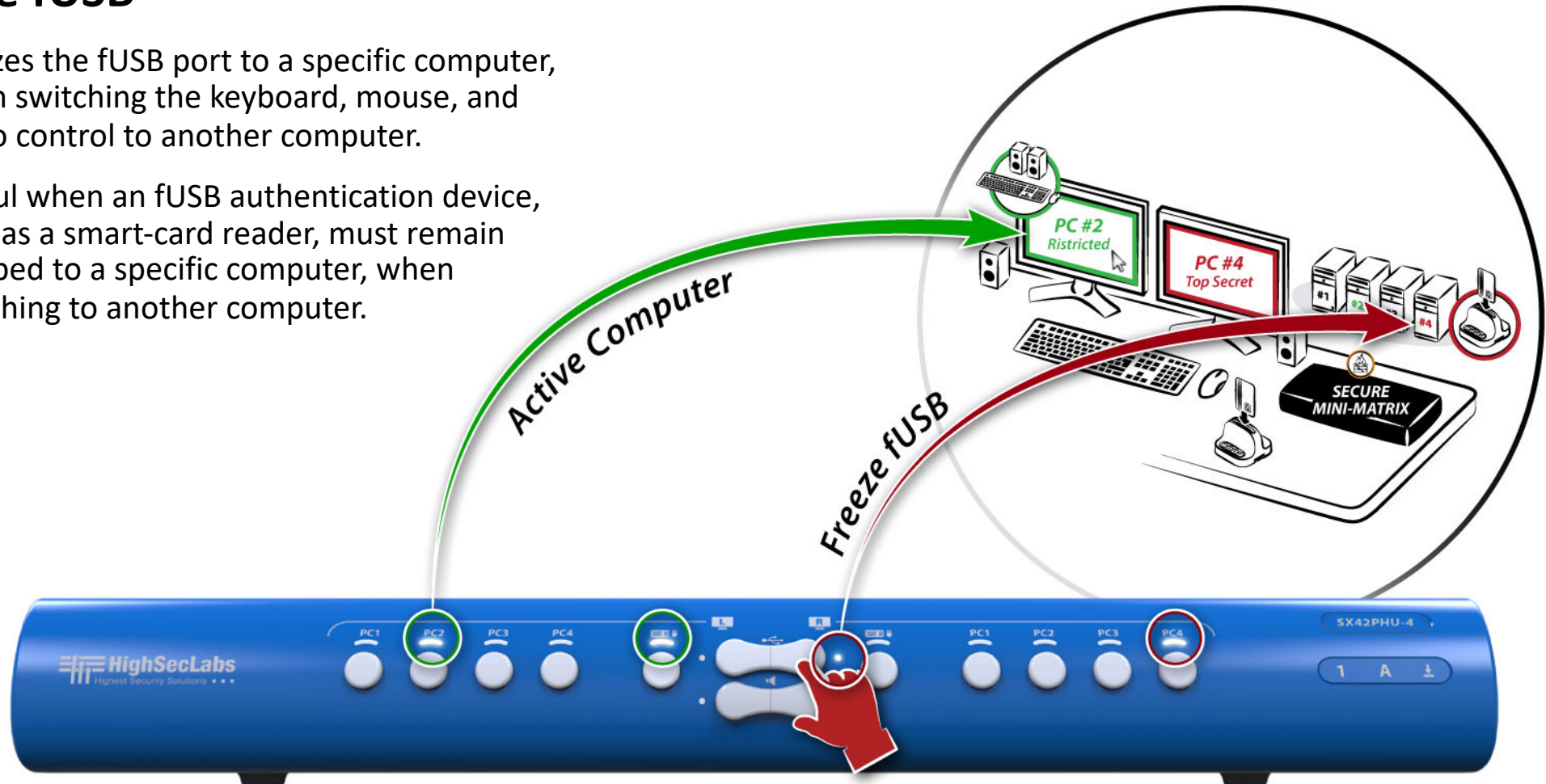
AVOID TYPING MISTAKES
(Secure Mini-Matrix KVM Only)

- To prevent data leakage, one-way keyboard-to-computer data flow is enforced through unidirectional optical data diodes. As a result, keyboard lock LEDs do not function.

- Without keyboard lock LED indicators, users might experience occasional typing mistakes. For example, when typing a password while the Caps Lock key is ON.

- To help avoid typing mistakes, LEDs on the product's front-facing panel indicate the status of the keyboard lock keys (Caps Lock | Num Lock | Scroll Lock).

- Each time keyboard and mouse control switches between computers, the LED's status is updated automatically to reflect the state of the lock keys on the currently active computer.

Auxiliary Front Panel

When the Mini-Matrix is out of reach, such as when installed under a desk or in a cabinet, the user doesn't have access to the buttons for selecting and viewing the active PCs.

The small, attachable Auxiliary Front Panel (AFP) solves this problem, by providing direct control of the Mini-Matrix, right from the desktop or monitor.

The AFP provides several benefits:

- Push buttons, like those on the Mini-Matrix, for easy channel switching, combined with LEDs showing the active PC
- Dimmer controls that let the user adjust LED light intensity, for changes of ambient light
- Mounts easily on a desktop or display
- Communicates via a standard RS232 protocol for easy and intuitive installation and control

Use an AFP on both displays with the optional AFP Splitter

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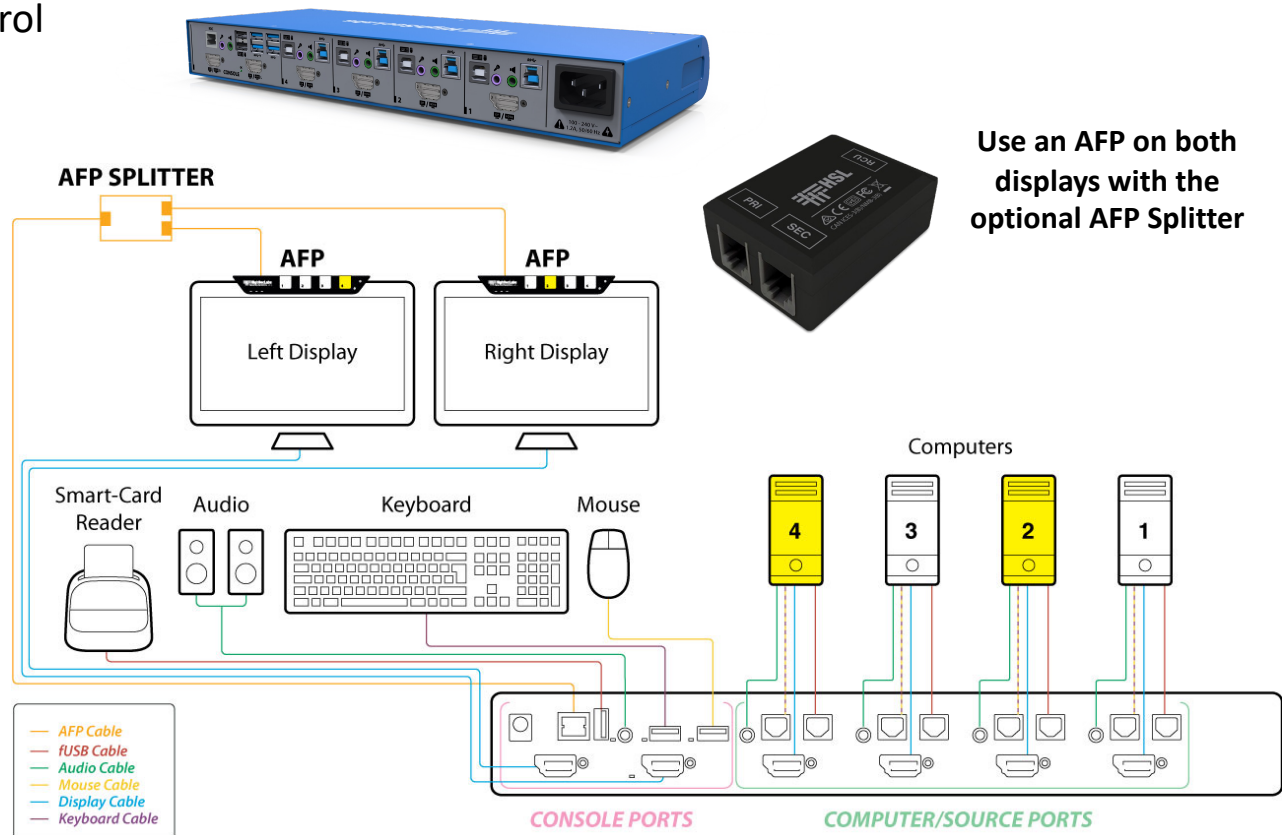
Dual DisplayPort and HDMI Connector
(Select models)

Some models have a dual-source video connector that supports connecting either DisplayPort or HDMI sources on the same port. No need for adapters and converters.

SX42PHU-4
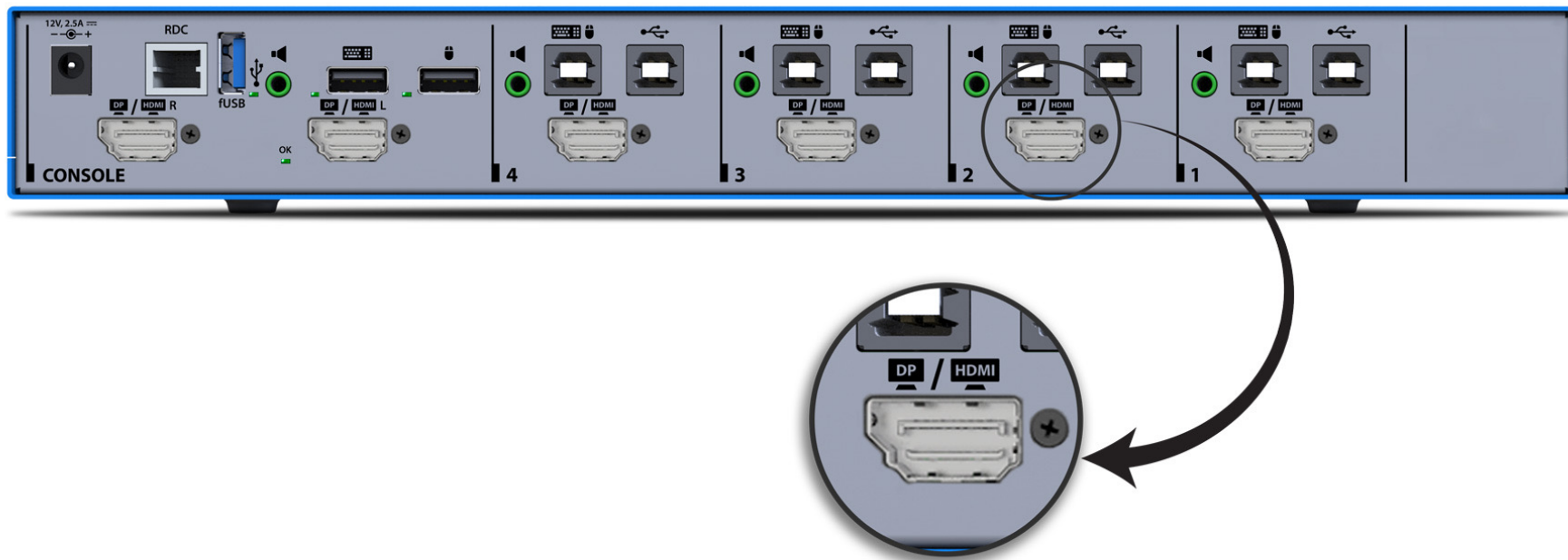
PRODUCT TABLE
AND MAIN MODELS

4

Compare the different models.

Commercial Models

Model	SX22H-N	SX42HU-N SX42PHU-N	SX82PHU-N
# of sources (inputs)	2	4	8
# of projected displays (outputs)	2	2	2
Keyboard and mouse ports	USB	USB	USB
USB 3.0 port	✘	✔	✔
Video source	UHD 4K	UHD 4K DP/HDMI	DP/HDMI
Computers (inputs) video	Up to 4K-2K Ultra HD Resolutions (3840 X 2160 pixels)		
Console (outputs) video	Up to 4K-2K Ultra HD Resolutions (3840 X 2160 pixels)		

MINI-MATRIX PRODUCTS LIST TABLE

Secure Models

Model	SX42PH-4 SX42PHU-4	SX82PH-4 SX82PHU-4 SX82PHU-4T/R
# of sources (inputs)	4	8
# of projected displays (outputs)	2	2
Keyboard and mouse ports	USB	USB
USB peripheral port (fUSB)	✓	✓
Video source	DP/HDMI	DP/HDMI
Computers (inputs) video	Up to 4K-2K Ultra HD Resolutions (3840 X 2160 pixels)	
Console (outputs) video	Up to 4K-2K Ultra HD Resolutions (3840 X 2160 pixels)	

Compliant with NIAP PP4.0 PSD.
T = TEMPEST Level A compliant
R = Rugged

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THANK YOU

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