HighSecLabs
Highest Security Solutions ● ● ● Ltd.

Secure Mini-Matrix Switch

Models:

SX42DU-3 – Secure 4-Port Mini-Matrix Switch

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INTRODUCTION

HSL Secure Mini Matrix

HSL's K224E is a secure 4 port Mini-Matrix KVMA switch which allows a single user to share two displays and a single set of keyboard, mouse & audio between multiple computers that belong to different security classifications levels while isolating all coupled hosts from each other keeping the data of each computer completely separate and protecting against data leakage and malicious attacks through shared USB, keyboard, mouse, video and audio peripherals.

This guide instructs how to install, configure and operate HSL's Mini Matrix.

INSTALLATION

Installing the Mini Matrix

Step 1 – Cable Installation

1. Connect console port peripherals:

   • Connect video displays to the Mini Matrix primary and secondary display ports.

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. In case of using non-identical displays, connect the smaller display to the primary console display port.

   • Connect keyboard, mouse and audio peripherals to the Mini Matrix console ports. These will be shared securely between all sources.

   • Connect a smartcard/biometric reader to the combiner's console fUSB secure port to support user authentication across multiple isolated sources.

2. Computer/Source channel ports:

   • For each source, connect the video, keyboard, mouse, fUSB and audio cables to the Mini Matrix source ports.

3. Dual screen support:

   • Download and install HSL's Multi Display Driver on source computers that have multiple screens (currently available only for Windows)(http://highseclabs.com/dl.php?fid=446).
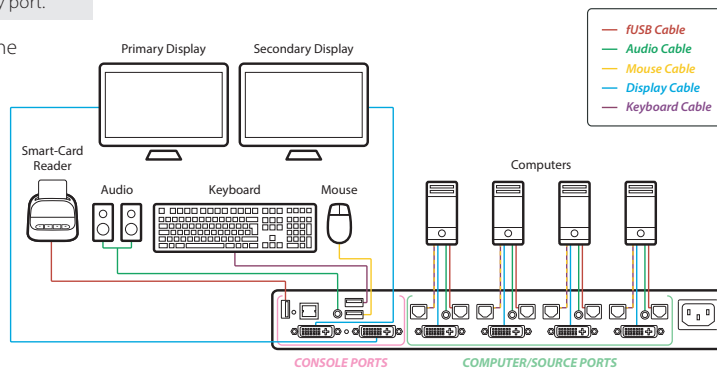
INSTALLATION

Step 2 – Power ON the Mini Matrix

- Turn ON all the PCs.
- Connect the power supply and power ON the Mini Matrix (approximate boot time is 10 seconds).
- The Mini Matrix boots into duplicate-mode, where source number 1 is presented on both displays.
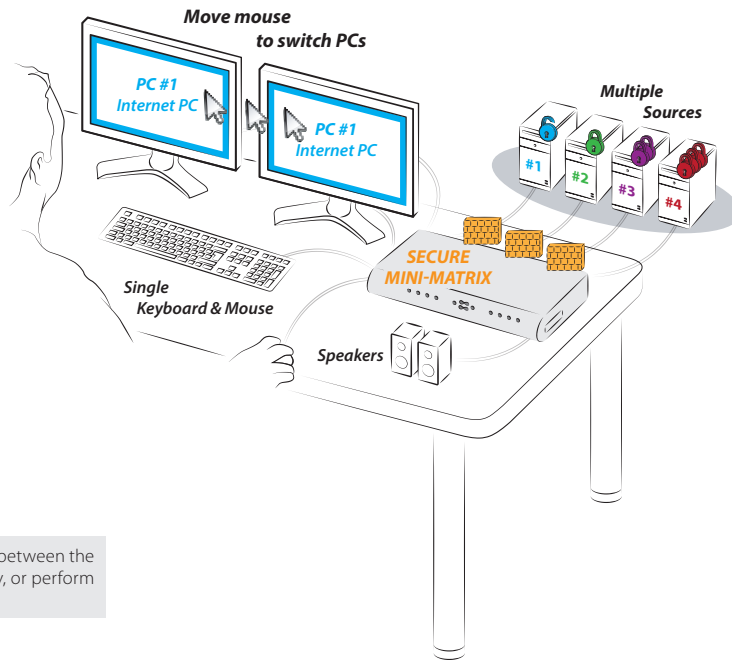
Note: In case no picture is presented after powering ON, switch between the primary and secondary displays, or, connect an alternate display, or perform a reset to factory default.

INSTALLATION

Step 3 – Reset to Factory Defaults

Reset to factory defaults clears the device settings and restores the device to its original configuration.

- System reset, clears behavioral characteristics such as mouse settings and display presets. Type { **L CTRL | L CTRL | F11| r** } key combination.

- Complete reset: clears all device settings and resets to factory defaults. From the Terminal menu select the "Reset to Factory Defaults" option (refer to terminal mode guide).

Important Notes:

1. Always use the **left control key (CTRL)** unless otherwise specified.

2. Keyboard shortcut keys are to be pressed sequentially

3. Do not use the numeric keypad for toggling shortcuts unless otherwise specified.

4. ALL KEYBOARD SHORTCUTS REFER TO QWERTY KEYBOARDS. In case a non-qwerty keyboard is in use, keep using the QWERTY layout.
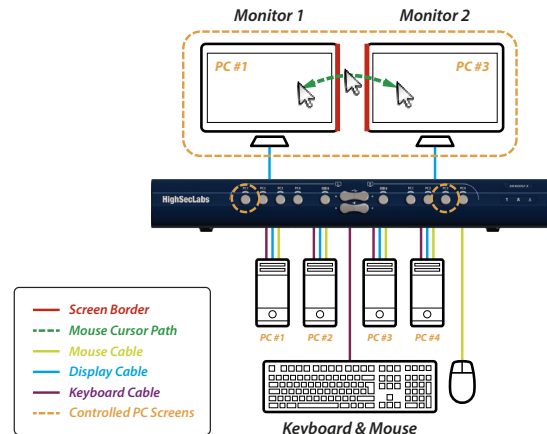
OPERATION

Operating the Mini Matrix

Step 1 – Display & Control Options

Display & Control options define which source to display and control on each screen. Source selection is done through the source selection buttons on the front panel or via the DCU (dedicated control unit) port.

- Freeze Audio and fUSB option buttons allow the operator to switch peripheral and audio ports independently of the source being displayed.
- Additional options are described ahead under the advanced presets section.

Primary Source Selection Panel   Secondary Source Selection Panel

- Use the Source Selection Panels to choose which source to display on each screen.
- The left panel controls which source to display on the Primary display while the right panel controls the secondary display.
- For example, as seen in the illustration, when #1 is selected on the Primary Panel and #3 is selected on the Secondary panel, the selected sources will be presented accordingly.
- A source can be duplicated, by selecting its number on both panels.
- By default, Mouse, Keyboard, Audio and fUSB peripherals follow the display association.

Monitor 1   *Monitor 2*

PC #1   *PC #3*

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

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

Keyboard & Mouse

OPERATION

Step 2 – Relative vs Absolute Mouse

**By default the Mini Matrix is setup with relative mouse settings.**

- **Relative mouse** (default) confines the mouse movement to the screen of each selected computer. To switch the mouse between sources, use the front panel push buttons.
- **Absolute mouse** (VDT) allows switching the mouse between sources by moving the mouse cursor across display boarders.

Cursor Navigation (Virtual Display Technology - VDT):

- With cursor navigation the user can move from one highly isolated computer system to another by simply moving the mouse cursor across display borders.
- Once the cursor crosses the display border, Keyboard, Mouse, Audio and USB mapping switch to the computer that is connected to that display.
- No need to push any buttons.

How to define mouse state

- Use the key combination { **L CTRL | L CTRL | F11 | c** } to enable absolute mouse (VDT).
- Use the key combination { **L CTRL | L CTRL | F11 | b** } to enable relative (this is the default mode).

- Screen border
- Mouse cursor movement path
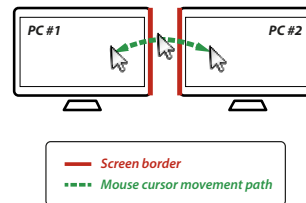
OPERATION

Step 3 – Predefined Display Layouts (Presets)

What are presets?
- Presets reflect the layout and boarders of computer displays to the Mini Matrix.
- The Mini Matrix includes 6 predefined presets, described below.

What are presets for?
- Presets allow the Mini Matrix to correctly associate the mouse with each source based on the physical display positioning and the respective number of displays which are associated with each source.
- Presets enable cursor navigation switching which allows the user to switch control between PCs by moving the mouse cursor across display boarders.

How to switch between presets
- Use the key combination { **L CTRL | L CTRL | F11 | F1-to-F6** } to toggle between presets.

Enable absolute-mouse prior to working with presets, type:
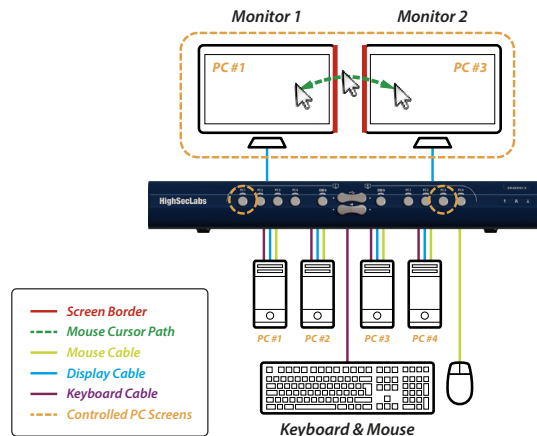**{ L CTRL | L CTRL | F11 | c }.**

OPERATION

Preset #1 (default) { L CTRL | L CTRL | F11 | F1 }

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

Highlights:

- Use the source selection panel to choose which sources to display.
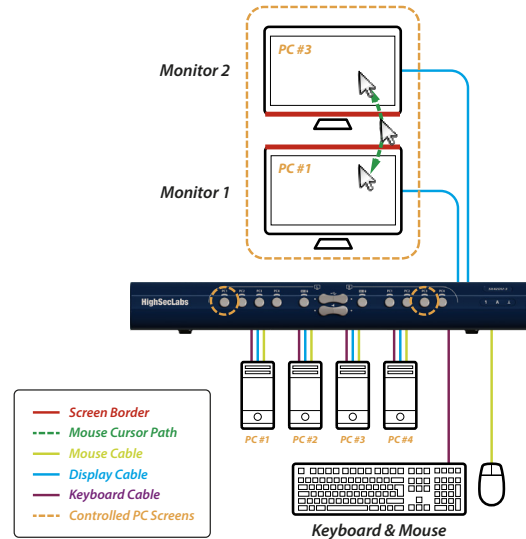- Switch between selected sources by dragging the mouse cursor horizontally.

Monitor 1   *Monitor 2*

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

Keyboard & Mouse

OPERATION

Preset #2 { L CTRL | L CTRL | F11 | F2 }

- 2 display-monitors (monitor 1 & 2) are connected to the Primary and Secondary console ports.
- 4 single-display sources (PC 1-4) are connected to the Mini Matrix source ports 1-4.
- Display-monitors are aligned vertically so that the Secondary screen is on top of the Primary screen.
- VDT mouse cursor movement axis is vertical.

Highlights:

- Use the source selection panel to choose which sources to display.
- Switch between selected sources by dragging the mouse cursor vertically.

Monitor 2

PC #3

Monitor 1

PC #1

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

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

Keyboard & Mouse

OPERATION

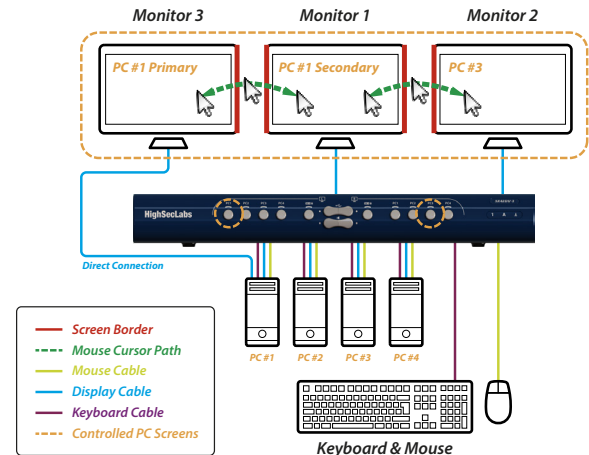## Preset #3 { L CTRL | L CTRL | F11 | F3 }

- 2 display-monitors (monitor 1 & 2) are connected to the Primary and Secondary console ports.
- 1 display-monitor (monitor 3) is connected directly to PC #1 primary-display adapter.
- PC #1 secondary-display adapter is connected to the Mini Matrix source port 1.
- 3 single-display sources (PC 2, 3, 4) are connected to the Mini Matrix source ports 2, 3, 4.
- All display-monitors are aligned horizontally so that the Primary screen of PC#1 is on the left, the Mini Matrix Primary screen is on the middle and the Mini Matrix Secondary screen is on the right.
- VDT mouse cursor movement axis is horizontal.

Download and install HSL's Multi Display Driver on source computers that have multiple screens (currently available only for Windows).
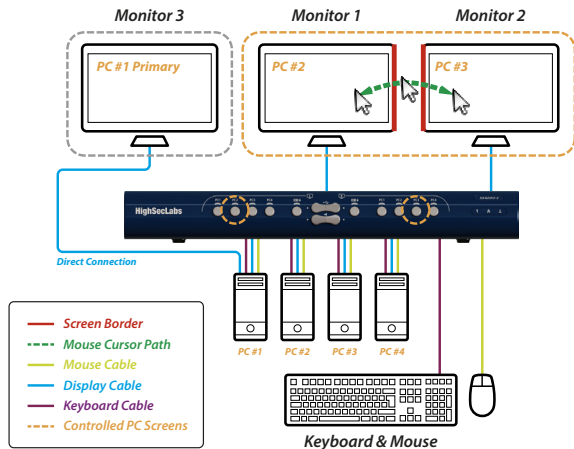
Example #1
VDT cursor navigation applies to Monitor 3 even though it is connected directly to PC#1

OPERATION

Preset #3 { L CTRL | L CTRL | F11 | F3 }

Example #2

Monitor 3 constantly displays PC#1 Primary screen even when switching to other sources

Keyboard & Mouse

OPERATION

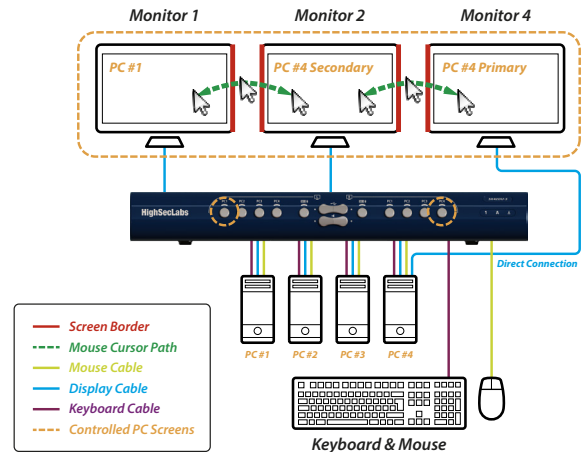## Preset #4 { L CTRL | L CTRL | F11 | F4 }

Same as Preset #3 while source #4 is directly connected to a primary screen.

- 2 display-monitors (monitor 1 & 2) are connected to the Primary and Secondary console ports.
- 1 display-monitor (monitor 4) is connected directly to PC #4 primary-display adapter.
- PC #4 secondary-display is connected to the Mini Matrix source port 4.
- 3 single-display sources (PC 1, 2, 3) are connected to the Mini Matrix source ports 1, 2, 3.
- All display-monitors are aligned horizontally so that the Mini Matrix Primary screen is on the left, the Mini Matrix Secondary screen is in the middle and the Primary screen of PC#4 is on the right.
- VDT mouse cursor movement axis is horizontal.

Download and install HSL's Multi Display Driver on source computers that have multiple screens (currently available only for Windows).
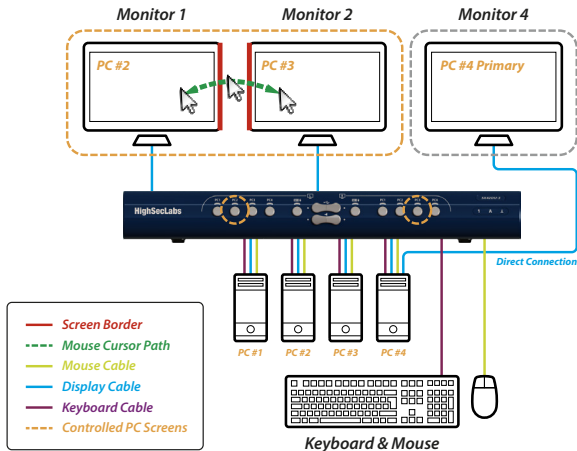
Example #1

VDT cursor navigation applies to Monitor 4 even though it is connected directly to PC#4

OPERATION

Preset #4 { L CTRL | L CTRL | F11 | F4 }

Example #2
Monitor 4 constantly displays PC#4 Primary screen even when switching to other sources

Keyboard & Mouse

OPERATION

Preset #5 { L CTRL | L CTRL | F11 | F5 }

Combines Preset #3 and Preset #4.

- 2 display-monitors (monitor 1 & 2) are connected to the Primary and Secondary console ports.
- 2 display-monitors (monitor 3 & 4) are connected directly as primary-displays to PCs #1 and #4 respectively.
- PCs #1 and #4 secondary-display adapters are connected to the Mini Matrix source ports 1 and 4.
- 2 single-display sources (PC 2, 3) are connected to the Mini Matrix source ports 2, 3.
- All display-monitors are aligned horizontally so that the Primary screen of PC#1 is on the left and the Primary screen on PC#4 is on the right. The Mini Matrix Primary and Secondary screens are in the middle.
- VDT mouse cursor movement axis is horizontal.
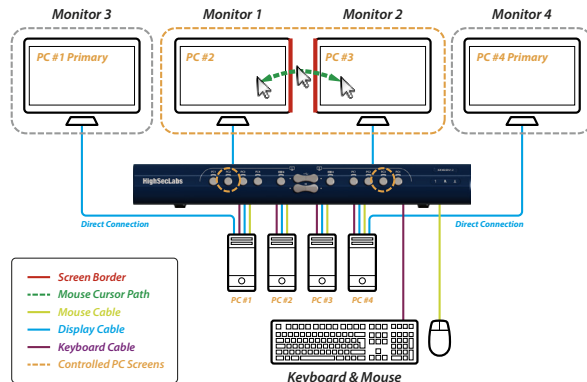
Highlights:

- Display and control PC#1 & PC#4 dual-displays.
- Control PC#2 and PC#3 while displaying the primary screens of PCs 1 and 4.

Download and install HSL's Multi Display Driver on source computers that have multiple screens (currently available only for Windows).

OPERATION

Preset #6 { L CTRL | L CTRL | F11 | F6 }

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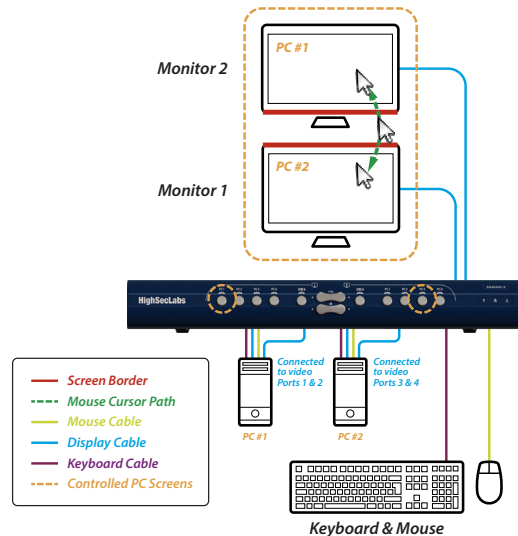- VDT mouse cursor movement axis is vertical.

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 vertically.

Monitor 2

PC #1

Monitor 1

PC #2

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

Connected to video Ports 1 & 2

Connected to video Ports 3 & 4

PC #1   *PC #2*

Keyboard & Mouse

Download and install HSL's Multi Display Driver on source computers that have multiple screens (currently available only for Windows).

OPERATION

Keyboard shortcut options

#	Action Description	Keyboard
1	Toggle between mouse modes	(Absolute) - **L CTRL | L CTRL | F11 | c** (Relative) - **L CTRL | L CTRL | F11 | b**
2	Freeze mouse on active channel	(Freeze) - **L CTRL | L CTRL | F11 | f** (Un Freeze) - **L CTRL | L CTRL | F11 | u**
3	Increase / Decrease mouse speed	(Increase) - **L CTRL | L CTRL | F11 | +** (Decrease) - **L CTRL | L CTRL | F11 | -**
4	Change presets	**L CTRL | L CTRL | F11 | F1 – F6**
5	System Reset to factory defaults	**L CTRL | L CTRL | F11 | r**
6	Enter Terminal-Mode	**L CTRL | R CTRL | t**

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