

Secure KVM Switch 2-Port, Single-Head User Manual



Products covered by this manual - secure 2 port KVMs:

- SC 820 – DVI-I Video
- SC 820D – DisplayPort Video
- SC 820H – HDMI Video

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Introduction

Thank you for purchasing this Vertiv Secure product designed for use in secure defense and intelligence installations. The product provides the highest security safeguards and features that meet today's IA (information assurance) computing requirements as defined in the latest PSS Protection Profile Rev 3.0.

This User Manual provides all the details you'll need to install and operate your new product.

Intended Audience

This document is intended for the following professionals:

- System Administrators/IT Managers
- End Users

Important Security Note:

If you are aware of potential security vulnerability while installing or operating this product, we encourage you to contact us immediately in one of the following ways:

- Email: Secure@VertivCo.com
- Tel: +1-888-793-8763

Important: This product is equipped with always-on active anti-tampering system. Any attempt to open the product enclosure will activate the anti-tamper triggers and render the unit inoperable and warranty void.

Package Contents

Inside product packaging you will find the following:

- Vertiv Secure Product
- DC Power Supply
- User Guidance Documentation

Revision

A – Initial Release, 24 Feb 2015

B – Corrections, 5 April 2015

C – Product image updates, 25 May 2015

D – User Guidance updates, 21 June 2015

E – Correction to Features section, 13 August 2015

F – Changing to VERTIV new branding, 15 May 2019

Overview

Safety Precautions

Please read the following safety precautions carefully before using the product:

- Before cleaning, disconnect the product from any electrical power supply.
- Do not expose the product to excessive humidity or moisture.
- Do not store or use for extensive period of time in extreme thermal conditions – it may shorten product lifetime.
- Install the product only on a clean secure surface.
- If the product is not used for a long period of time, disconnect it from electrical power.
- If any of the following situations occurs, have the product checked by a qualified service technician:
 - Liquid penetrates the product's case.
 - The product is exposed to excessive moisture, water or any other liquid.
 - The product is not working well even after carefully following the instructions in this user's manual.
 - The product has been dropped or is physically damaged.
 - The product shows obvious signs of breakage or loose internal parts.
 - In case of external power supply – If power supply overheats, is broken or damaged, or has a damaged cable.

- The product should be stored and used only in temperature and humidity controlled environments as defined in the product's environmental specifications.
- Never attempt to open the product enclosure. Any attempt to open the enclosure will permanently damage the product.
- The product contains a non-replaceable internal battery. Never attempt to replace the battery or open the enclosure.
- This product is equipped with always-on active anti-tampering system. Any attempt to open the product enclosure will activate the anti-tamper triggers and render the unit inoperable and warranty void.

Safety Precautions (French)

Veillez lire attentivement les précautions de sécurité suivantes avant d'utiliser le produit:

- Avant nettoyage, débranchez l'appareil de l'alimentation DC / AC.
- Assurez-vous de ne pas exposer l'appareil à une humidité excessive.
- Assurez-vous d'installer l'appareil sur une surface sécurisée propre.
- Ne placez pas le cordon d'alimentation DC en travers d'un passage.
- Si l'appareil n'est pas utilisé de longtemps, retirez l'alimentation murale de la prise électrique.
- L'appareil devra être rangé uniquement dans des environnements à humidité et température contrôlées comme défini dans les caractéristiques environnementales du produit.
- L'alimentation murale utilisée avec cet appareil devra être du modèle fourni par le fabricant ou un équivalent certifié fourni par le fabricant ou fournisseur de service autorisé.
- Si une des situations suivantes survenait, faites vérifier l'appareil par un technicien de maintenance qualifié:
 - En cas d'alimentation externe - L'alimentation de l'appareil surchauffe, est endommagée, cassée ou dégage de la fumée
 - ou provoque des court circuits de la prise du secteur.
 - Un liquide a pénétré dans le boîtier de l'appareil.
 - L'appareil est exposé à de l'humidité excessive ou à l'eau.
 - L'appareil ne fonctionne pas correctement même après avoir suivi attentivement les instructions contenues dans ce guide de l'utilisateur.
 - L'appareil est tombé ou est physiquement endommagé.
 - L'appareil présente des signes évidents de pièce interne cassée ou desserrée
 - L'appareil contient une batterie interne. La batterie n'est pas remplaçable. N'essayez jamais de remplacer la batterie car toute tentative d'ouvrir le boîtier de l'appareil entraînerait des dommages permanents à l'appareil.
 - Ce produit est équipé d'un système anti-sabotage actif. Toute tentative d'ouvrir le boîtier du produit va activer le déclencheur anti-sabotage et de rendre l'unité inutilisable et garantie.

User Guidance & Precautions

Please read the following User Guidance & Precautions carefully before using the product:

1. As product powers-up it performs a self-test procedure. In case of self-test failure for any reason, including jammed buttons, the product will be Inoperable. Self-test failure will be indicated by the following abnormal LED behavior:
 - a. All channel-select LEDs will be turned ON and then OFF;
 - b. A specific, predefined LED combination will be turned ON;
 - c. The predefined LED combination will indicate the problem type (jammed buttons, firmware integrity).

Try to power cycle product. If problem persists please contact your system administrator or technical support.

2. Product power-up and RFD behavior:
 - a. By default, after product power-up, the active channel will be computer #1, indicated by the applicable front panel push button LED lit.
 - b. Product Restore-to-Factory-Default (RFD) function is available via a physical control button on rear panel. Use a sharp object or paper clip to hold RFD button pressed for several seconds to initiate an RFD action.
 - c. RFD action will be indicated by front panel LEDs blinking all together.
 - d. When product boots after RFD, keyboard and mouse will be mapped to the active channel #1 and default settings will be restored, erasing all user-set definitions.

3. The appropriate usage of peripherals (e.g. keyboard, mouse, display, authentication device) is described in detail in this User Manual's appropriate sections. Do not connect any authentication device with an external power source to product.
4. For security reasons products do not support wireless keyboards and mice. In any case do not connect wireless keyboard/mouse to product.
5. For security reasons products do not support microphone/line-in audio input. In any case do not connect a microphone to product audio output port, including headsets.
6. Product is equipped with always-on active anti-tampering system. Any attempt to open product enclosure will activate the anti-tamper system indicated by all channel-select LEDs flashing continuously. In this case, product will be inoperable and warranty void. If product enclosure appears disrupted or if all channel-select LEDs flash continuously, please remove product from service immediately and contact technical support.
7. In case a connected device is rejected in the console port group the user will have the following visual indications:
 - a. When connecting a non-qualified keyboard, the keyboard will be non-functional with no visible keyboard strokes on screen when using the keyboard.
 - b. When connecting a non-qualified mouse, the mouse will be non-functional with mouse cursor frozen on screen.

- c. When connecting a non-qualified display, the video diagnostic LED will flash green and video will not work.
 - d. When connecting a non-qualified USB device, fUSB LED will flash green and USB device will be inoperable.
- 8. Do not connect product to computing devices:
 - a. That are TEMPEST computers;
 - b. That include telecommunication equipment;
 - c. That include frame grabber video cards;
 - d. That include special audio processing cards.
- 9. Product has a remote control port in the back panel labeled RCU. Do not use this port - it is inoperable and for future use.
- 10. Important! Before re-allocating computers to channels, it is mandatory to power cycle product, keeping it powered OFF for more than 1 minute.
- 11. Product log access and administrator configuration options are described in product Administrator Guide.
- 12. Authentication session will be terminated once product power is down or user intentionally terminates session.
- 13. If you are aware of any potential security vulnerability while installing or operating product, please remove product from service immediately and contact us in one of the ways listed in this manual.

Main Features

Product is designed, manufactured and delivered in security-controlled environments. Below is a summary of the main advanced features incorporated in product:

Advanced isolation between computers and shared peripherals

The emulations of keyboard, mouse and display EDID, prevent direct contact between computers and shared peripherals. Product design achieves maximal security by keeping the video path separate with keyboard and mouse switched together, purging keyboard buffer when switching channels. All these features contribute to strong isolation between computer interfaces, maintained even when product is powered off.

Unidirectional data flow: USB, audio and video

Unique hardware architecture components prevent unauthorized data flow, including:

- Optical unidirectional data flow diodes in the USB data path that filtrate and reject unqualified USB devices;
- Secure analog audio diodes that prevent audio eavesdropping with no support for microphone or any other audio-input device;
- Video path is kept separate from all other traffic, enforcing unidirectional native video flow. EDID emulation is done at power up and blocks all EDID/MCCS writes. For DisplayPort video, filtration of AUX channel exists to reject unauthorized transactions.

Isolation of power domains

Complete isolation of power domains prevents signaling attacks.

Secure administrator access & log functions

Product incorporates secure administrator access and log functions to provide auditable trail for all product security events, including battery backup life for anti-tampering and log functions. Non-reprogrammable firmware prevents the ability to tamper with product logic.

Always-on, active anti-tamper system

Active anti-tampering system prevents malicious insertion of hardware implant such as wireless key-logger inside product enclosure. Any anti-tampering attempt causes isolation of all computers and peripheral devices rendering product inoperable and showing clear indications of tampering event to user.

Holographic security tamper-evident labels are placed on the enclosure to provide a clear visual indication if product has been opened or compromised.

Metal enclosure is designed to resist mechanical tampering with all microcontrollers protected against firmware-read, modification and rewrite.

Main Features (Cont.)

Small form factor:

Small form factor product occupying minimum desktop space.

Video Support

- SC820 supports DVI-I displays as well as VGA and HDMI via compatible cables.
- SC820D supports DisplayPort1.1 & 1.2 displays.
- SC820H supports HDMI displays.

Resolutions Supported

Products support video resolutions of up to 4K-2K Ultra HD (3840 X 2160 pixels).

Tamper Evident Labels

Product uses holographic tamper evident labels to provide visual indications in case of an enclosure intrusion attempt. When opening product packaging inspect the tampering evident labels.

If for any reason one or more tamper-evident label is missing, appears disrupted, or looks different than the example shown here, please call Technical Support and avoid using that product.



Vertiv Tamper Evident Label

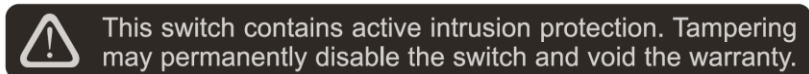
Active Anti-Tampering System

Product is equipped with always-on active anti-tampering system. If mechanical intrusion is detected by this system, the Product will be permanently disabled and all LEDs will blink continuously.

If product indicates "tampered state" (all LEDs blinking) - please call Technical Support and avoid using that product.

Product Enclosure Warning Label

Product has the following warning sticker on a prominent location on the product enclosure:



Equipment Requirements

Cables

It is highly recommended to use Vertiv Cable Kits for product to ensure optimal security and performance.

One Cable Kit is required per connected computer.

Operating Systems

Product is compatible with devices running on the following operating systems:

- Microsoft® Windows®
- Red Hat®, Ubuntu® and other Linux® platforms
- Mac OS® X v10.3 and higher.

USB Keyboard console port

The product console USB keyboard port is compatible with Standard USB keyboards.

Notes:

- a. Console USB keyboard and mouse ports are switchable, i.e. you can connect keyboard to mouse port and vice versa. However, for optimal operation it is recommended to connect USB keyboard to console USB keyboard port and USB mouse to console USB mouse port.
- b. For security reasons products do not support wireless keyboards. In any case do not connect wireless keyboard to product.
- c. Non-standard keyboards, such as keyboards with integrated USB hubs and other USB-integrated devices, may not be fully supported due to security policy. If they are supported, only classical keyboard (HID) operation will be functional. It is recommended to use standard USB keyboards.

USB Mouse console port

The product console USB mouse port is compatible with standard USB mice.

Notes:

- a. Console USB keyboard and mouse ports are switchable, i.e. you can connect keyboard to mouse port and vice versa. However, for optimal operation it is recommended to connect USB keyboard to console USB keyboard port and USB mouse to console USB mouse port.
- b. Console USB mouse port supports Standard KVM Extender composite device having a keyboard/mouse functions.
- c. For security reasons products do not support wireless mice. In any case do not connect wireless mouse to product.

User Display

The Switch console video port is compatible with the following types of displays:

- SC820 supports DVI-I displays as well as VGA and HDMI via compatible cables.
- SC820D supports DisplayPort1.1 & 1.2 displays.
- SC820H supports HDMI displays.

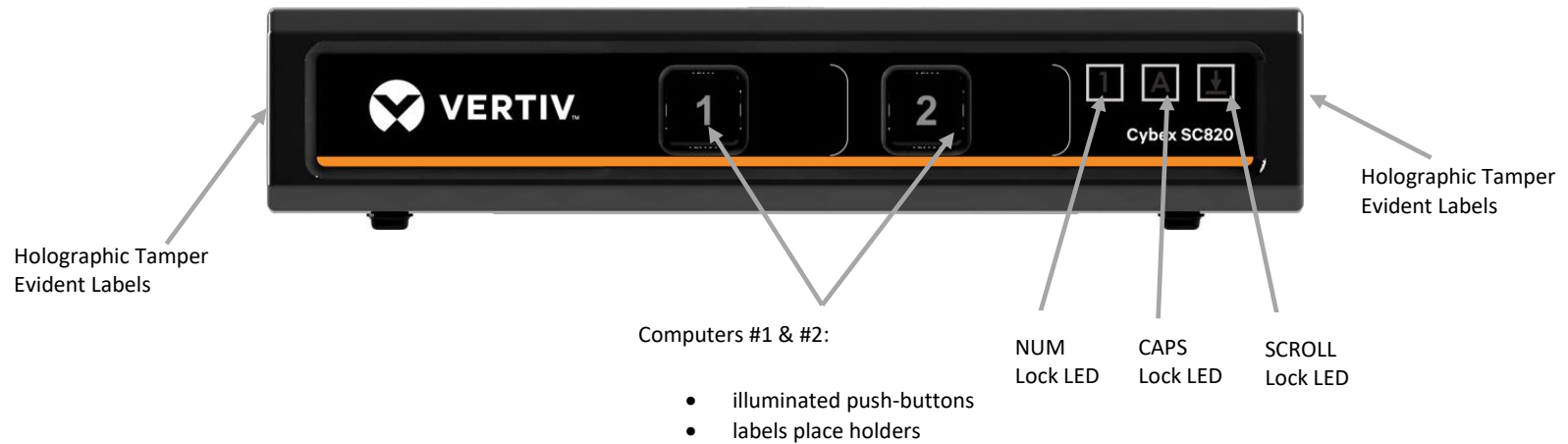
User Audio Devices

Product is compatible with the following types of user audio devices:

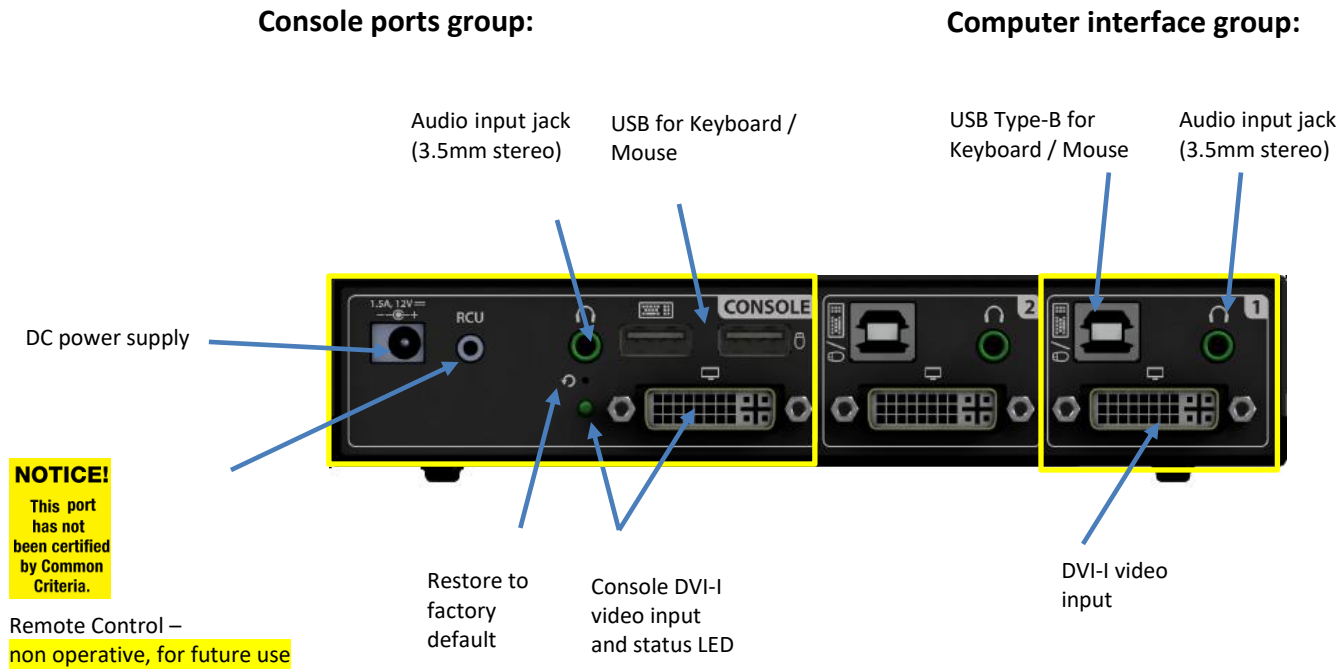
- Stereo headphones;
- Amplified stereo speakers.

Note: In any case do not connect a microphone to product audio output port including headsets.

Front Panel Features



Rear Panel Features – SC 820



Model illustrated above is SC820.
SC820D and SC820H are identical except for having DP and HDMI video ports, respectively.

Product Specifications

Enclosure:	Steel metal enclosure
Power Requirements:	DC input 12V / 1.5A maximum
No. of Users Supported:	1
No. of Computers Supported:	2
No. of Displays Supported:	1
Console Keyboard Input:	USB Type-A female connector
Console Mouse Input:	USB Type-A female connector
Resolution Support	up to 4K-2K Ultra HD (3840 X 2160 pixels) resolutions
Console Display Port	1 x DVI-I female connector (SC 820 model) 1 x DisplayPort female connector (SC 820D model) 1 x HDMI female connector (SC 820H model)
Console Audio input jack:	1/8" (3.5mm) stereo female jack
Computer Keyboard/Mouse ports:	USB Type B
Computer Audio Input plug:	1/8" (3.5mm) stereo plug
Front Panel indicators	CAPS LOCK, NUM LOCK, SCL LOCK

Computer Video Input plug:

- 1 x DVI-I video port (SC 820 model)
- 1 x DisplayPort video port (SC 820D model)
- 1 x HDMI video port (SC 820H model)

Port Selector illuminated push-buttons & LEDs: 2

User Channel Selection Methods: Front panel push-buttons

Operating Temp: 32° to 104° F (0° to 40° C)

Storage Temp: -4° to 140° F (-20° to 60° C)

Humidity: 0-80% RH, non-condensing

Product design life-cycle: 10 years

Warranty: 2 years

Before Installation

Unpacking the Product

Before opening the product packaging, inspect the packaging condition to assure that product was not damaged during delivery.

When opening the package, inspect that the product Tamper Evident Labels are intact.

Important:

1. If the unit's enclosure appears disrupted or if all channel-select LEDs flash continuously, please remove product from service immediately and contact Technical Support at:
<http://www.VertivCo.com>
2. Do not connect product to computing devices:
 - a. That are TEMPEST computers;
 - b. That include telecommunication equipment;
 - c. That include frame grabber video cards
 - d. That include special audio processing cards.

Where to locate the Product?

The enclosure of the product is designed for desktop or under the table configurations. An optional Mount Kit is available.

Product must be located in a secure and well protected environment to prevent potential attacker access.

Consider the following when deciding where to place product:

- Product front panel must be visible to the user at all times.
- The location of the computers in relation to the product and the length of available cables (typically 1.8 m)

Warning: Avoid placing cables near fluorescent lights, air-conditioning equipment, RF equipment or machines that create electrical noise (e.g., vacuum cleaners).

Installation

1. Connecting devices to product console

Product requires connection of all displays; devices and computers prior to powering it up.

Note: some devices such as user display would not be recognized if connected after product is already powered up.

See figures above for connector locations.

- Connect user display. Mark which display is coupled with which computer. It is also recommended to mark which computer is coupled with which channel.
- Connect user keyboard and mouse to console keyboard and mouse ports.
- Connect headphones/speakers to console audio out port (optional).

Notes:

1. Console USB keyboard and mouse ports are switchable, i.e. you can connect keyboard to mouse port and vice versa. However, for optimal operation it is recommended to connect USB keyboard to console USB keyboard port and USB mouse to console USB mouse port.
2. For security reasons products do not support wireless keyboards. In any case do not connect wireless keyboard to product.
3. Non-standard keyboards, such as keyboards with integrated USB hubs and other USB-integrated devices, may not be fully supported due to security policy. If they are supported, only classical keyboard (HID) operation will be functional. It is recommended to use standard USB keyboards.
4. Console USB mouse port supports Standard KVM Extender composite device having a keyboard/mouse functions.

2. Connecting the Computers

- Using USB cables, connect each computer to the USB type B port in "computer interface ports" area on product.
- If computer uses audio output, e.g. speakers/headphones, connect audio cable from its audio output port to the corresponding audio input port on product.

3. Power up

- Connect product DC power supply.
- Power up user display/s. Select through display setup menu the appropriate video input if applicable.
- Power up the connected computers.
- Power up the product.

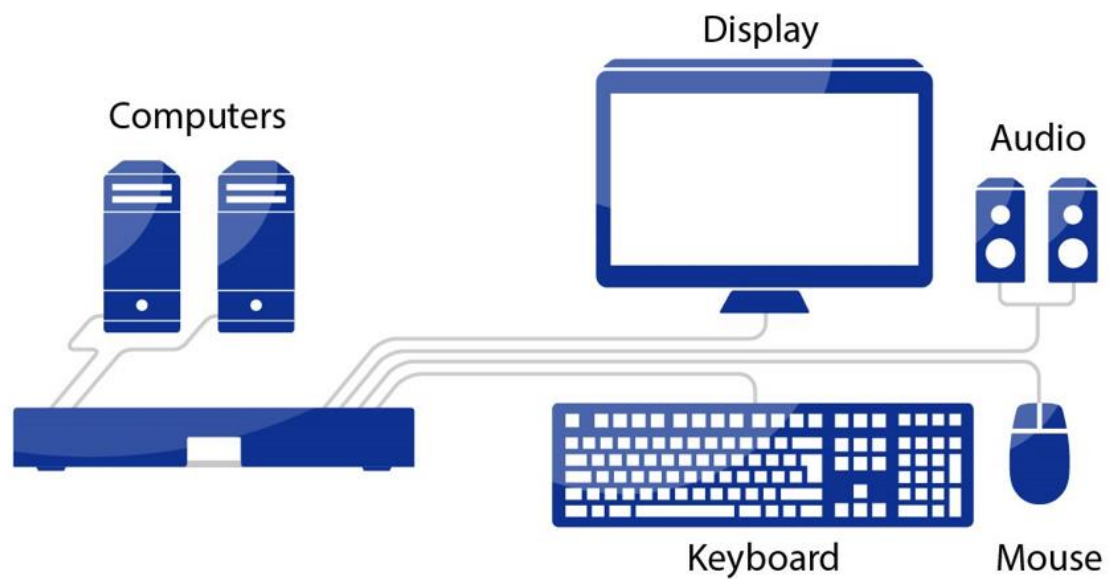
When you power up your computers, product emulates display, mouse and keyboard on each port and allows your computers to boot normally. You should be able to move the mouse cursor on the primary display connected to computer #1.

Check to see that the keyboard and mouse are working properly on each computer.

Repeat this check with all occupied ports to verify that all computers are connected and responding correctly.

If you encounter an error, check your cable connections for that computer and reboot. If the problem persists, please refer to the Troubleshooting section in this User Manual.

Typical system installation



Operation

Operating the Product

Self-Test Procedure:

As product powers-up it performs a self-test procedure. In case of self- test failure for any reason, including jammed buttons, the product will be Inoperable. Self-test failure will be indicated by the following abnormal LED behavior:

- All channel-select LEDs will be turned ON and then OFF;
- A specific, predefined LED combination will be turned ON;
- The predefined LED combination will indicate the problem type (jammed buttons, firmware integrity).

Try to power cycle product. If problem persists please contact your system administrator or technical support.

Now that product, computers and peripherals are connected and powered up, it is ready for use.

Default Channel

After product boots up, blue LEDs stripe will illuminate and the default active channel will be channel #1. This will be indicated by white color illumination of push-button #1.

Product Mapping to Sources

Product mapping to sources is indicated by stickers/labels specifying which channel is mapped to which computer.

Front Panel Push-Buttons

Following power up, the default channel is #1.

The user can select any other channel by pressing the appropriate front panel push button.

The mouse cursor will be positioned at the center of the selected computer display. If computer is connected to multiple displays, the cursor will be positioned at the center of the primary display.

The currently selected channel is indicated by white color illumination of the appropriate push-button.

Once a different channel is selected - keyboard, mouse, and audio follow selected channel.

Keyboard Status Indication

In order to enhance usability, product provides keyboard status indications via dedicated LEDs located on product front panel. To maintain the required unidirectional connectivity between keyboard and product, these indication are not given on the keyboard itself as done with non-secure products

The keyboard status indications are given via 3 LEDs on the front panel of the product:

- CL – CAPS Lock
- SL – SCROLL Lock
- NL – NUM Lock

The indications behave the same as the LEDs on the keyboard as if it was connected directly to computer.

Switching from channel to channel may change the status of the LEDs based on the current settings on the computer connected to the active channel.

Troubleshooting Guide

Important Security Note:

If you are aware of potential security vulnerability while installing or operating this product, we encourage you to contact us immediately in one of the following ways:

- Email: Secure@VertivCo.com
- Tel: +1-888-793-8763

Important: If the unit's enclosure appears disrupted or if all LEDs flash continuously, please remove product from service immediately and contact Technical Support at

<http://www.Vertiv.com>

Important: This product is equipped with always-on active anti-tampering system. Any attempt to open the product enclosure will activate the anti-tamper triggers and render the unit inoperable and warranty void.

General

Problem: As product powers-up all channel-select LEDs are turned ON and then OFF. After that a specific, predefined LED combination is turned ON. Product is inoperable.

Solution: The product did not pass self-test procedure. Try to power cycle product. If problem persists please contact your system administrator or our technical support.

Problem: No power - No video output, none of the front panel LEDs are illuminating.

Solutions:

- Check DC power supply connection to make sure product receives power properly. Replace cable if needed. If problem persists, contact your system administrator or our technical support.

Problem: Product enclosure appears disrupted or all channel-select LEDs flash continuously.

Solution: The product may have been tampered with. Please remove product from service immediately and contact Technical Support.

Keyboard

Problem: Mouse and keyboard are not working (two channels)

Solutions:

- Check that computer USB and video cables are not crossed i.e. computer #1 video is connected to channel #1 while USB keyboard and mouse cables are connected to channel #2.

Problem: Keyboard does not work (all channels)

Solutions:

- Check that the keyboard you are using is properly connected to product.
- Check that the USB cable between the product and computer is properly connected.
- Try connecting keyboard to a different USB port on computer.
- Make sure the keyboard works when directly connected to computer, i.e. the HID USB driver is installed on computer; this may require computer reboot.
- It is recommended to use standard USB keyboards and not a keyboard with an integrated USB hub or other USB-integrated devices.
- If the computer is coming out of standby mode, allow up to one minute to regain mouse function.
- Try a different keyboard.
- Do not use a wireless keyboard.

Mouse

Problem: Mouse and keyboard are not working (two channels)

Solutions:

- Check that computer USB and video cables are not crossed i.e. computer #1 video is connected to channel #1 while USB keyboard and mouse cables are connected to channel #2.

Problem: Mouse does not work (all channels)

Solutions:

- Check that the mouse you are using is properly connected to product.
- Check that USB cable between the product and computer is properly connected.
- Try connecting mouse to a different USB port on computer.
- Make sure the mouse works when directly connected to computer, i.e. the HID USB driver is installed on computer; this may require computer reboot.
- It is recommended to use standard USB mice.
- If the computer is coming out of standby mode, allow up to one minute to regain mouse function.
- Try a different mouse.
- Do not use a wireless mouse.

Problem: both keyboard and mouse are not working (one channel)

Solution: Use computer Device Manager Utility to see product and solve problem.

Video

Problem: No video image in user display (all channels)

Solutions:

- Check that displays are properly powered.
- Check that video cable is properly secured at both sides.
- Check at the displays' on-screen menu that sources selected match the cables connected to displays.
- Check if display video mode is the same as computer's video mode (e.g. DVI and DVI, etc.).
- Check that displays' diagnostic LED is steady green – if not, change displays, change displays' cables or call technical support.

Problem: No video image in user display (specific channel)

Solutions:

- Reboot product first, then disconnect and reconnect the video cable and reboot the computer.
- Check that the video cable connecting computer and product is properly secured at both sides.
- Check that computer video output is sent to the connected video connector (if computer supports multiple displays).

- Check that computer resolution matches connected display capabilities.
- Connect the display/s directly to the computer to confirm that video output is available and that a good image is shown.

Problem: Bad video image quality (some or all channels)

Solutions:

- Check that all video cables are properly connected to product, computer, and display.
- Check that cables are original cables supplied by Vertiv.
- With everything connected, power-cycle the product to reset the video. Make sure the Video Diagnostic LED is solid green.
- Check that the displays that you are using support the resolution and refresh-rate setting on computer.
- Lower the video resolution of your computer.
- Connect displays directly to computer showing bad video image to see if problem persists.

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