Draco

484 Series

CPU Switch

User Manual

Edition: 2020-07-09

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Trademarks

Contents

1 About This Manual

1.1 Scope

This manual describes how to install your CPU Switch, how to operate it and how to perform trouble shooting.

1.2 Validity

This manual is valid for all devices listed on the front page. The product code is printed on the base of the devices.

1.3 Cautions and Notes

The following symbols are used in this manual:

This symbol indicates an important operating instruction that should be followed to avoid any potential damage to hardware or property, loss of data, or personal injury.

This symbol indicates important information to help you make the best use of this product.

This symbol indicates best practice information to show recommended and optimal ways to use this product in an efficient way.

1.4 EU Declaration of Conformity

Please find the EU Declaration of Conformity for the product series under: www.ihse.com/eu-declaration-of-conformity

A copy of the original, product-specific EU Declaration of Conformity can be provided upon request.

2 Safety Instructions

To ensure reliable and safe long-term operation of your CPU Switch please note the following guidelines:

Installation

➜ Only use in dry, indoor environments.

➜ Only use the device according to this User Manual. Failure to follow these procedures could result in damage to the equipment or injury to the user or installer.

➜ The CPU Switch and the power supply units can get warm. Do not install components in an enclosed space without any airflow.

➜ Do not place the power supply directly on top of the device.

➜ Do not obscure ventilation holes.

➜ Only use power supplies originally supplied with the product or manufacturer-approved replacements. Do not use a power supply if it appears to be defective or has a damaged chassis.

➜ Connect all power supplies to grounded outlets. In each case, ensure that the ground connection is maintained from the outlet socket through to the power supply's AC power input.

➜ Do not connect the link interface to any other equipment, particularly network or telecommunications equipment.

➜ Take any required ESD precautions.

In order to disconnect the device completely from the electric circuit, all power cables have to be removed.

Repair

➜ Do not attempt to open or repair a power supply unit.

➜ Do not attempt to open or repair the CPU Switch. There are no user serviceable parts inside.

➜ Please contact your dealer or manufacturer if there is a fault.

3 Description

3.1 Application

The CPU Switch is used to convert and extend video signals of one or more VGA sources (computer, CPU) into the DVI-D format. The device functions like a CPU Unit of a KVM extender.

The CPU Switch can be used as a switch between concurrently available input signals.

Next to the video signal, USB-HID and analogue audio signals can be also switched and extended.

The CPU Switch can further be used as a scaler, scaling video signals to a specific output format.

3.2 System Overview

The input ports of the CPU Switch are connected to the video source(s) (computer, CPU), using the provided cables or other suitable cables.

The DVI-D monitor is connected to the output of the CON Unit.
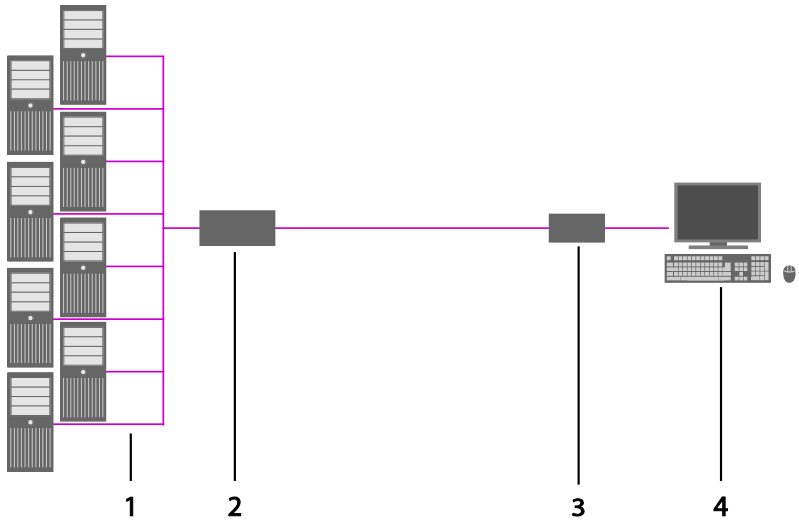
System Overview

1   VGA Sources (computer, CPU)

2   CPU Switch (as CPU Unit)

3   KVM extender CON Unit

4   Console (monitor, keyboard, mouse)

See Chapter 4.3, Page 16 for installation examples.

3.3   Product Range

Model	Description
L484-8VHCWR	8 port CPU Switch as a KVM extender CPU Unit with integrated analog/digital conversion (up to 1920x1200) and redundant connector for interconnect cables (Cat X), USB-HID, local USB 2.0 (High-Speed), Analog Audio
L484-8VHSWR	8 port CPU Switch as a KVM extender CPU Unit with integrated analog/digital conversion (up to 1920x1200) and redundant connector for interconnect cables (fiber), USB-HID, local USB 2.0 (High-Speed), Analog Audio
L484-8VECWR	8 port CPU Switch as a KVM extender CPU Unit with integrated analog/digital conversion (up to 1920x1200) and redundant connector for interconnect cables (Cat X), USB-HID, USB 2.0 embedded, local USB 2.0 (High-Speed), Analog Audio
L484-8VESWR	8 port CPU Switch as a KVM extender CPU Unit with integrated analog/digital conversion (up to 1920x1200) and redundant connector for interconnect cables (fiber), USB-HID, USB 2.0 embedded, local USB 2.0 (High-Speed), Analog Audio

3.4   Upgrade Kits

Model	Description
474-6RMK	19"/1U rack mount kit for CPU Switch

The CPU Switch and the provided power supply units can get warm, for this reason an installation in closed rooms without air circulation is not allowed. Please note that you will need at least 0,5 U (height unit) for the ventilation above the extenders, if you mount them into racks.

3.5   Accessories

Model	Description
261-6J	VGA cable 2.0 m (VGA male to VGA male)
247-U1	USB cable 1.8 m (Type A to B)
455-CK	Stereo jack cable 1.6 m (3.5 mm Stereo)
474-IECLOCK	IEC connection cable for power supply, lockable

3.6 Device Views

3.6.1 Model L484-8VHCWR, -8VECWR
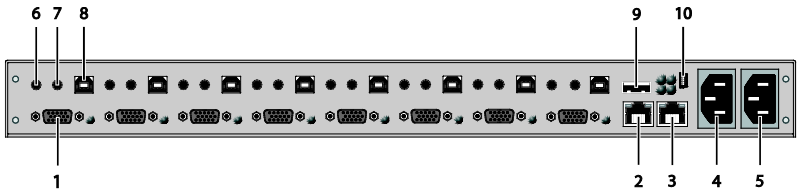
Rear View

1   To CPU 1: VGA (accordingly CPU #2-8)

2   Connect to interconnect cable 1

3   Connect to interconnect cable 2 (redundancy)

4   Connect to power supply 1

5   Connect to power supply 2 (redundancy)

6   To CPU 1: Audio IN (accordingly CPU #2-8)

7   To CPU 1: Audio OUT (accordingly CPU #2-8)

8   To CPU 1: USB (accordingly CPU #2-8)

9   Connect to USB 2.0 devices

10 Service port

3.6.2 Model L484-8VHSWR, -8VESWR
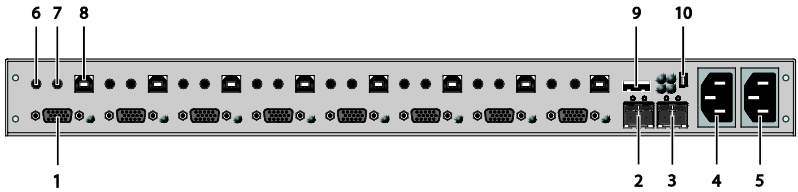
Rear View

1. To CPU 1: VGA (accordingly CPU #2-8)
2. Connect to interconnect cable 1
3. Connect to interconnect cable 2 (redundancy)
4. Connect to power supply 1
5. Connect to power supply 2 (redundancy)
6. To CPU 1: Audio IN (accordingly CPU #2-8)
7. To CPU 1: Audio OUT (accordingly CPU #2-8)
8. To CPU 1: USB (accordingly CPU #2-8)
9. Connect to USB 2.0 devices
10. Service port

3.7 Status LEDs

The CPU Switch is fitted with a multi-color LED for indication of the connection status:

Model L484-8VHCWR, -8VECWR
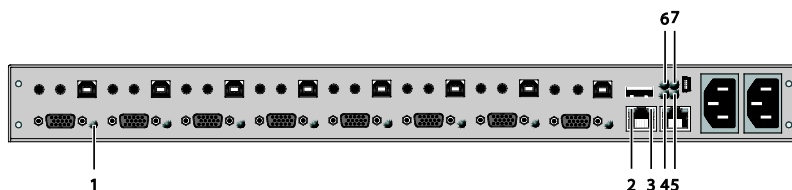
Rear View

Model L484-8VHSWR, -8VESWR
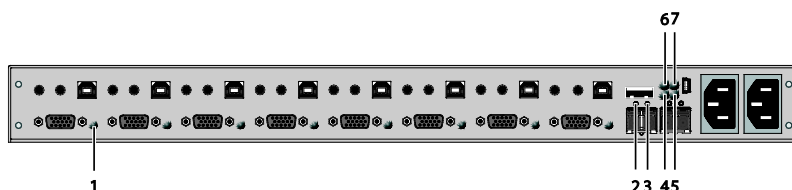
Rear View

LED 1: Switching Status

| Pos.	LED	Status	Description
1	**Input LED** (green)	Off	Connection not available
		On	Video signal available
		Flashing rapidly	Channel selected, no video signal available
		Flashing slowly	Channel selected, video signal available

LED 2 and 3: Connection Status

Pos.	LED	Status	Description
2	**Failure LED** (green)	Off	Connection available
		On or Flashing	Connection failure (flashing for about 20 s following a connection failure)
3	**Status LED** (green)	Flashing	No connection via interconnect cable
		On	Connection available

LED 5 and 7: USB and Video Status (Link 1/2)

LED color		Description
Red		Device ready
Violet		Connection and USB signal (connection to extender) available
Green		Connection and video signal available
Light Blue		Connection, USB and video signal available (operating condition)

LED 4 and 6: Power Supply Unit Status

Pos.	LED	Status	Description
4	**Status PSU 2** (green)	On	Operating condition
		Off	Power supply unit off
6	**Status PSU 1** (green)	On	Operating condition
		Off	Power supply unit off

4 Installation

4.1 Package Contents

Your CPU Switch package contains the following items:

- CPU Switch device
- 2x Country specific power cord
- Quick Setup
- 1x VGA cable (2.0 m, VGA connector to VGA connector)

- 1x USB cable (1.8 m, type A to type B)

- 2x Stereo jack cable (1.6 m, 3.5 mm male connector)

If anything is missing, contact your dealer.

4.2 System Setup

First time users are recommended to setup the device in the same room as a test setup. This will allow you to identify and solve any cabling problems, and to experiment with your system more conveniently.

→ Please verify that interconnect cables, interfaces and handling of the devices comply with the requirements (see Chapter 7, Page 39).

1. Switch off all devices.
2. Connect the CPU Switch to either a KVM extender CON Unit or a KVM matrix via the interconnect cable(s).
3. Connect the sources (computer, CPU) to the CPU Switch using the provided cables. Please ensure the cables are not strained.
4. Connect at least one provided power cord to the CPU Switch.
5. Power up the system.

4.3   Example Applications

This section illustrates typical installations of CPU Switches:
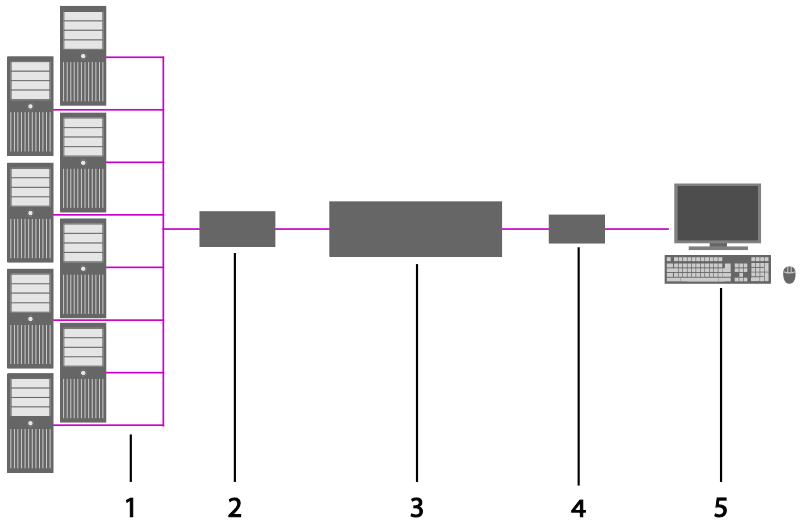
CPU Switch

1   VGA sources (Computer, CPU)

2   CPU Switch (as CPU Unit)

3   KVM matrix (optional)

4   KVM extender CON Unit

5   Console (monitor, keyboard, mouse)

5 Configuration

5.1 Command Mode

The CPU Switch has a Command Mode that allows several functions via keyboard command during normal use.

To enter Command Mode use a 'Hot Key' sequence and to exit Command Mode, press <Esc>. While in Command Mode, the LEDs **Shift** and **Scroll** on the console keyboard will flash.

In Command Mode normal keyboard and mouse operation will cease. Only selected keyboard commands are available.
If no keyboard command is executed within 10 s after activating Command Mode, it will be automatically deactivated.

The following table lists the keyboard commands to enter and to exit Command Mode and to change the 'Hot Key' sequence:

Function	Keyboard Command
Enter Command Mode (default)	2x <Left Shift> (or 'Hot Key')
Exit Command Mode	<Esc>
Change 'Hot Key' sequence	<current 'Hot Key'>, <c>, <new 'Hot Key' code>, <Enter> Until 2011-30-09: <Left Ctrl> + <Left Shift> + <c>, <'Hot Key' Code>, <Enter>

<Key> + <Key>   Press keys simultaneously
<Key>, <Key>   Press keys successively
2x <Key>   Press key quickly, twice in a row
(similar to a mouse double-click)

The 'Hot Key' sequence to enter Command Mode can be changed. The following table lists the 'Hot Key' Codes for the available key sequences:

'Hot Key' Code	'Hot Key'
0	Freely selectable (2012-01-12)
2	2x <Scroll>
3	2x <Left Shift>
4	2x <Left Ctrl>
5	2x <Left Alt>
6	2x <Right Shift>
7	2x <Right Ctrl>
8	2x <Right Alt>

In a KVM switch configuration, choose different 'Hot Keys' for the KVM Extender and the Draco CPU Switch.

Set freely selectable 'Hot Key' (exemplary)

In order to set a freely selectable 'Hot Key' (e.g. 2x <Space>), use the following keyboard sequence:

<current 'Hot Key'>, <c>, <0>, <Space>, <Enter>

Reset 'Hot Key'

In order to set a 'Hot Key' back to default settings of the extender, press the key combination <Right Shift> + <Del> within 5 s after switching on the CON unit or plugging in a keyboard.

5.2   Control via Keyboard

The CPU Switch connected to a KVM extender KVM extender CON Unit offers the possibility for control via keyboard.

For this purpose the CPU Switch is equipped with its own Command Mode that can be used to activate various functions by keyboard commands and to control the integrated On-screen Display (OSD).

The Command Mode is entered by a keyboard sequence ('Hot Key') and can be closed using the key <Esc>. When Command Mode is activated, the keyboard LEDs **Shift** and **Scroll** are flashing.

Direct Control

The following table contains the keyboard commands for opening and closing the Command Mode and for direct control of various converter functions.

Function	Keyboard Command
Activate Command Mode (default)	2x <Left Shift> (or 'Hot Key'), <v>
Exit Command Mode	<Left Shift> + <Esc>
Configure video settings automatically (only with VGA / RGB / EGA input)	2x <Left Shift>, <v>, <a>
Switch to port 1	2x <Left Shift>, <v>, <1>, <Enter>
Switch to port 2	2x <Left Shift>, <v>, <2>, <Enter>
Switch to port 3	2x <Left Shift>, <v>, <3>, <Enter>
Switch to port 4	2x <Left Shift>, <v>, <4>, <Enter>
Switch to port 5	2x <Left Shift>, <v>, <5>, <Enter>
Switch to port 6	2x <Left Shift>, <v>, <6>, <Enter>
Switch to port 7	2x <Left Shift>, <v>, <7>, <Enter>
Switch to port 8	2x <Left Shift>, <v>, <8>, <Enter>

OSD Control

The following table contains the keyboard commands for entering and exiting the OSD and for navigation and configuration.

Function	Keyboard Command
Open OSD window	2x <Left Shift>, <v>, <o>
Close OSD window	<Esc>
Navigation down in the menu	<Cursor down>
Navigation up in the menu	<Cursor up>
Menu selection	<Enter>
Leave sub menu	<Backspace>
Change of settings in sub menus or selection of parameter values	<Cursor right> or <Cursor left>

5.3　On Screen Display (OSD)

All settings of the CPU Switch can be adjusted via the on screen display (OSD).

General Structure of the OSD:
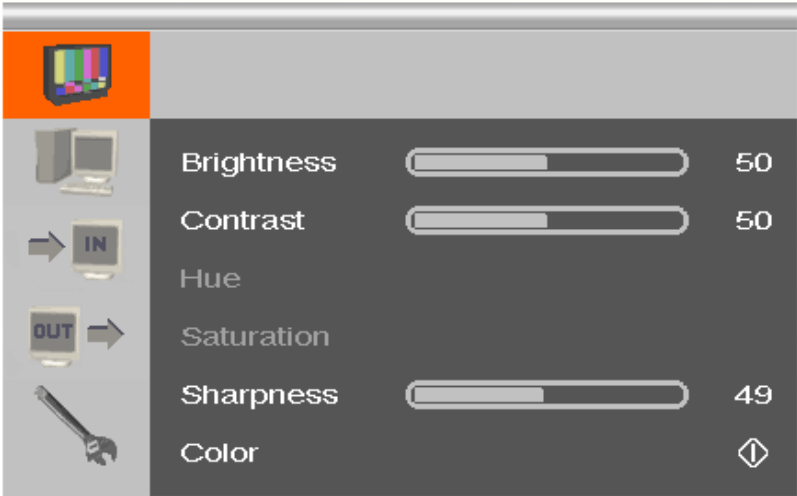
The left column shows the range of the main menu, the right column shows the current submenus with the respective configuration options.

The various configuration and setting options of the CPU Switch are described below:

5.3.1   Main Menu Item 'Color Settings'

This menu offers color specific settings and configurations for the CPU Switch.
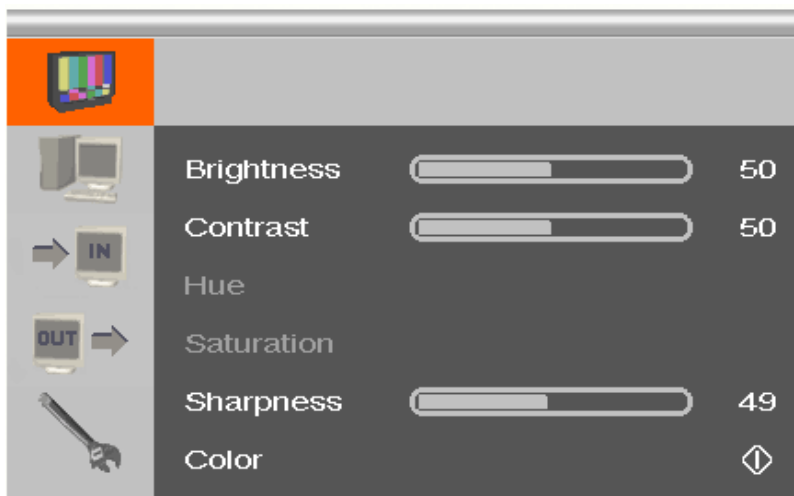
Menu View 'Color Settings'

Menu Item	Description
Brightness	Adjust brightness of the picture
Contrast	Adjust contrast of the picture
Hue	Change and adjust hue of the picture (only selectable for video input signals).
Saturation	Adjust saturation of the picture (only selectable for video input signals).
Sharpness	Adjust sharpness of the picture
Color	Open submenu 'Color' (see Chapter 5.3.1.1, Page 22).

5.3.1.1 Submenu 'Color'

This submenu offers advanced color settings for the picture (VGA / RGB / EGA input only).
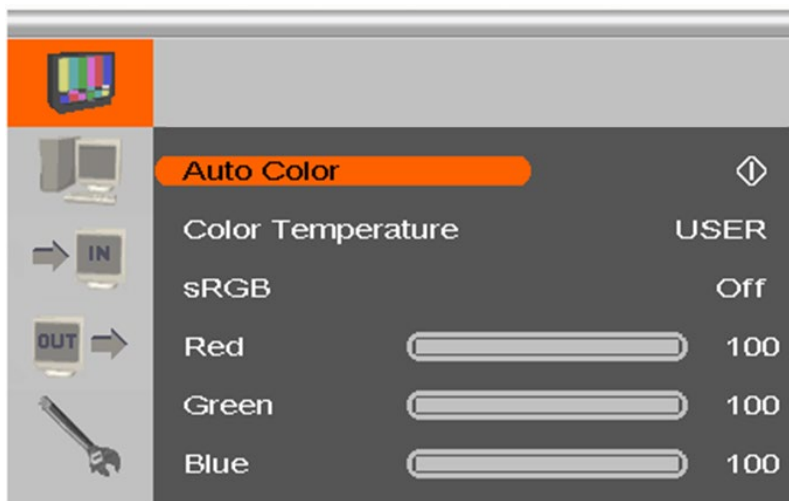
Menu View 'Color'

Menu Item	Description
Auto Color	Adjust color values automatically
Color Temperature	Adjust color temperature of the picture
sRGB	Activate the use of the standard RGB color range (Color optimization for tube monitors).
Red	Adjust red color range
Green	Adjust green color range
Blue	Adjust blue color range
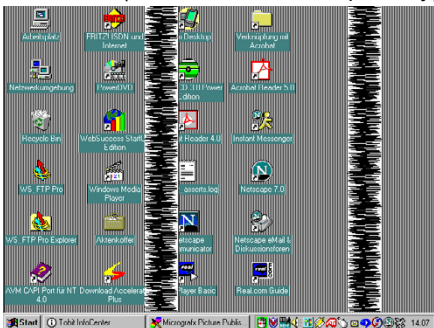
5.3.2 Main Menu Item 'Picture Settings'

This menu offers specific picture settings at the CPU Switch.
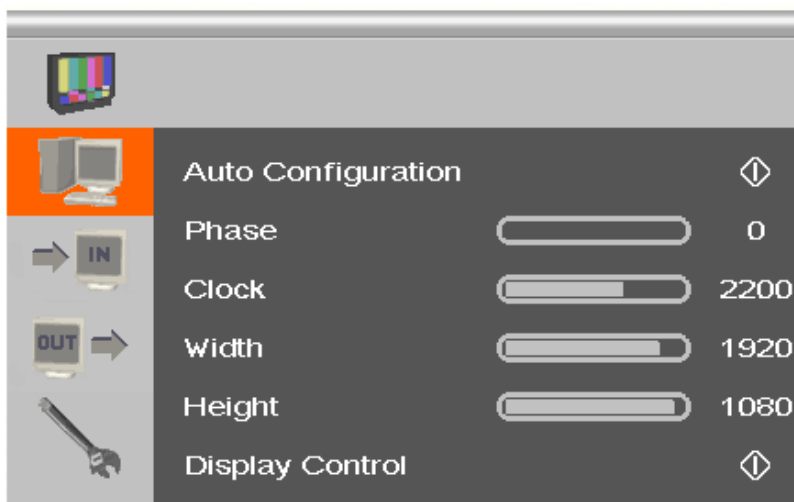
Menu View 'Picture Settings'

Menu Item	Description
Auto Configuration	Configure picture settings automatically (VGA / RGB / EGA input only).
Phase	Adjust pixel phase i.e. the best position for the analog / digital conversion within one pixel (VGA / RGB / EGA input only). *Example for incorrect pixel phase*

Menu Item	Description
Clock	Adjust pixel clock. The pixel clock shows the maximum number of the pixels that are horizontally displayable. Non-visible and inactive pixels are counted in (VGA / RGB / EGA input only). *Example for a wrong pixel clock.*
Width	Adjust width of the picture with the number of pixels.
Height	Adjust height of the picture with the number of pixels.
Display Control	Open submenu 'Display Control' (see Chapter 5.3.2.1, Page 25).

5.3.2.1 Submenu 'Display Control'

This submenu offers control options for the display of the picture.
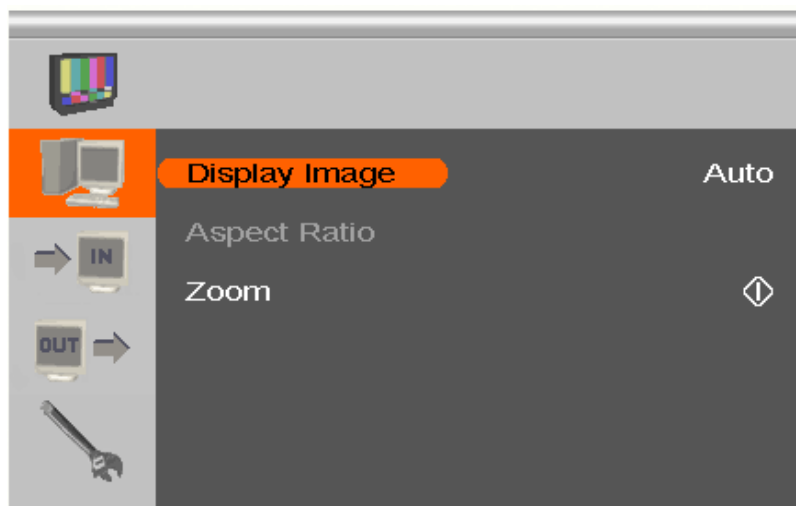
Menu View 'Display Control'

Menu Item	Description
Display Image	Select display option: • 'Auto': Scale picture automatically to the maximum value • 'Aspect': Adjust aspect ratio manually • '1:1': Show picture in original size with a black border • 'Panoramic': Scale picture to a non-linear value (only if there is video input)
Aspect Ratio	Select aspect ratio: 'Auto', '4:3', '14:9', '16:9' or '>16:9' (only if 'Display Image' is set to 'Aspect Ratio').
Zoom	Zoom picture and determine position of enlargement (not available in combination with onboard DVI-I extenders).

5.3.3   Main Menu Item 'Input Settings'

This menu offers specific settings for Media- / DVIConverter inputs.CPU Switch.
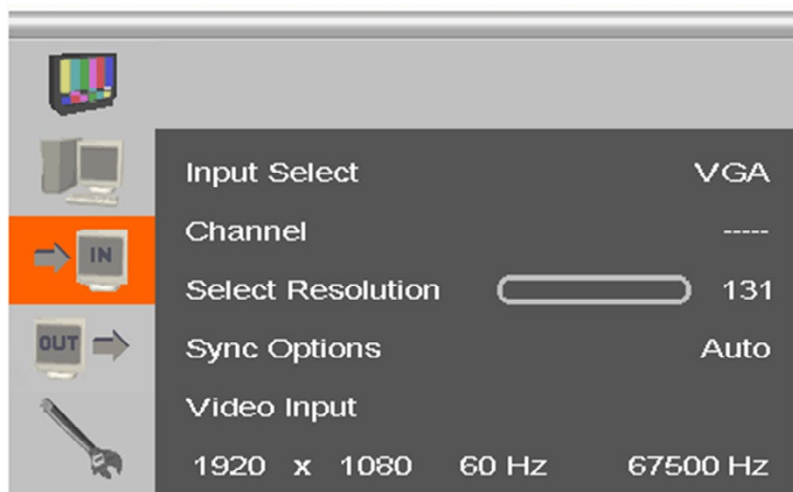
Menu View 'Input Settings'

Menu Item	Description
Input Select	Select input signal

Channel	• For CVBS input signal:
	       Select Composite channel.
	 • For EGA input:
	       Select EGA, CGA or MDA input signal.

Select Resolution	Select video mode compatible to input signal (see Chapter 7, Page 39for supported video modes). Save settings by leaving the menu (monitor goes blank for a short time).
Sync Options	Select type of synchronization of the RBG signal. The type depends from the incoming RGB signal. • 'Auto': Automatic adjustment • 'Composite (CS)' or 'Sync On Green (SOG)': Manual adjustment in case of picture failures (VGA / RGB input only)
Video Input	Display of selected video mode

5.3.4   Main Menu Item 'Output Settings'

This menu offers specific settings for the output of the CPU Switch.
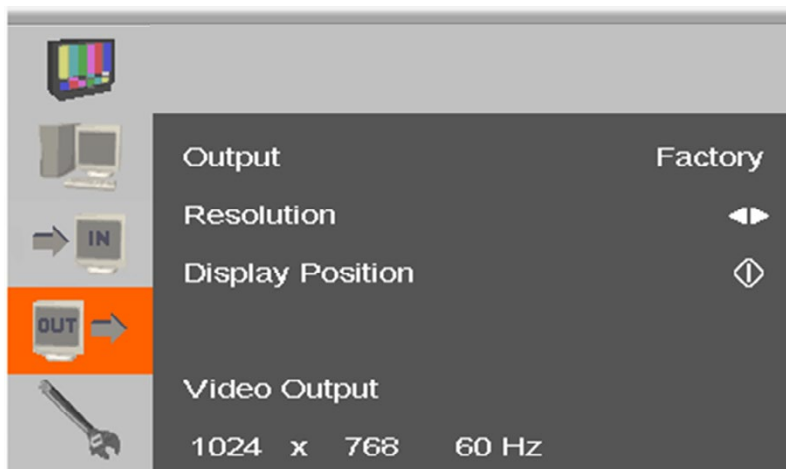
Menu View 'Output Settings'

Menu Item	Description
Output	Select output resolution: • 'DDC': Use preferred resolution of the monitor's DDC at the output • 'Select': Select from predefined output resolutions in the menu item 'Resolution' • '1:1': Use input resolution as output resolution Note: The option "DDC" is not available in onboard DVI-I extenders.
Resolution	If 'Output' is set to 'Select': Select from predefined output resolutions. A higher resolution can be selected at any time. If you select a lower resolution, the number of output pixels needs to comply with the following rule: • Horizontally: At least 50% • Vertically: At least 33% (Not available with onboard DVI-I extenders.)
Display Position	Adjust position of picture manually
Video Output	Display of the selected output resolution

- Graphic contents with up to 2 mega pixels are scalable (1920x1080).
- For the scaling of the 1920x1200 resolution, restrictions apply and the video will be transmitted 1:1, if applicable.
- If you scale resolutions of 1280x1024 or higher, there will be a reduction of color depth to 16 bit YCbCr.

5.3.5   Main Menu Item 'General Settings'

This menu offers general settings for the CPU Switch.
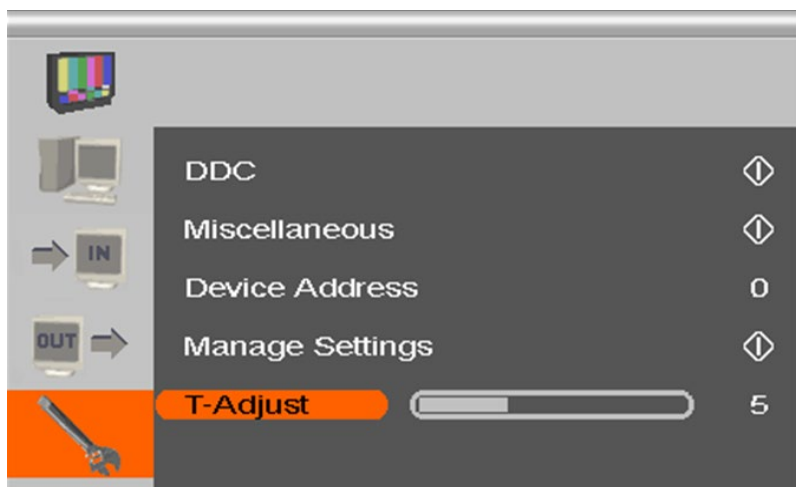
Menu View 'General Settings'

Menu Item	Description
DDC	Open submenu 'DDC' (see Chapter 5.3.5.1, Page 30).
Miscellaneous	Open submenu 'Miscellaneous' (see Chapter 5.3.5.2, Page 31).
Device Address	Assign device ID. The device ID clearly identifies the device for the infrared remote control so that settings can be made for a specific device only.
Manage Settings	Write the existing device settings on the internal memory of the CPU Switch ('Save'). These settings can be loaded again if required ('Load'), e.g. after a firmware update.
T-Adjust	Compensate picture failures due to device temperature

Save device settings if you have made extensive settings or if you want to perform a firmware update.

5.3.5.1 Submenu 'DDC'

This submenu offers DDC specific settings. DDC information is relevant to output settings for computer or CPU connection.

Menu View 'DDC'

Menu Item	Description
Read DDC	Use the monitor DDC as the device DDC and save it as DVI or VGA DDC.
Change DDC	Save the device DDC as DVI or VGA DDC
Factory DDC	Use default DDC 'VGA2DVI' as device DDC
MON:	Display of name and type of monitor DDC
DEV:	Display of name and type of the device's DDC that is provided at the DVI-I input by the CPU Switch.

When saving the DDC as DVI or VGA DDC, the selected type of DDC must match the video signal of the source (VGA or DVI) (see Chapter 5.3.3, Page 26: Menu item 'Input Select').

5.3.5.2 Submenu 'Miscellaneous'

This submenu offers various device specific settings.
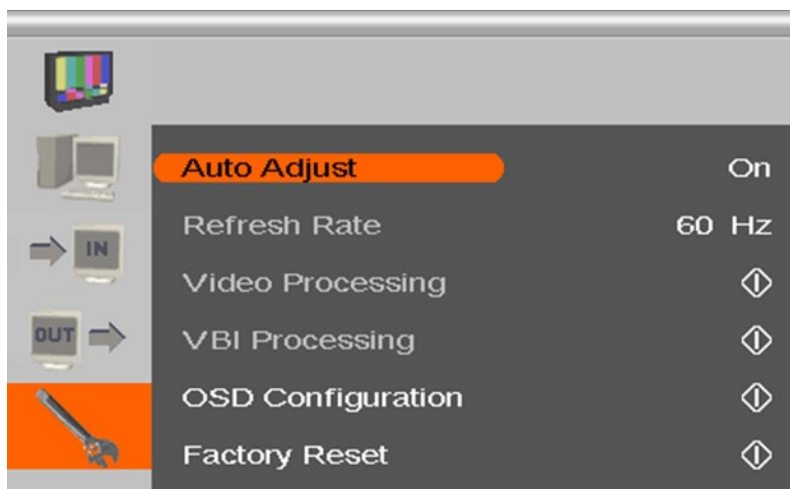
Menu View 'Miscellaneous'

Menu Item	Description
Auto Adjust	Activate or deactivate the automatic configuration of picture settings after changing the video mode.
Refresh Rate	Change refresh rate if output is set to 'DDC'.
Video Processing	Not used
VBI Processing	Not used
OSD Configuration	Configure OSD display on screen.
Factory Reset	Reset device to factory default (confirmation dialog)

Submenu 'OSD Configuration'

This submenu offers various settings for the OSD display.

Menu View 'OSD Configuration'

Menu Item	Description
OSD Timer	Activate and select time of inactivity after which OSD is closed automatically.
OSD Position	Adjust vertical and horizontal OSD position on screen.
OSD Transparency	Adjust OSD transparency
OSD Zoom	Activate scaling of OSD display

6 Operation

6.1 Optimization of Picture Settings

All common video modes are pre-installed in an internal table of the CPU Switch. If the input signal corresponds to one of these video modes, the signal will be automatically detected and the picture will be displayed.

If picture quality is not an optimal or no picture is displayed, proceed as follows:

1. Optimize the output settings (see Chapter 6.1.1, Page 33). Thus, the picture display will be adapted to the properties of the monitor.

2. Optimize the input settings (see Chapter 6.1.2, Page 34). Check if the automatically detected video mode corresponds to your input signal. Alternatively, you can manually select the most suitable video mode, even if you have an unknown input signal.

3. Optimize the picture settings for your input signal (see Chapter 6.1.3, Page 35).

In the unlikely event that the picture cannot be optimized using the controls provided, please fill in and return the video mode questionnaire (Download) so that a customer specific video mode can be created.

6.1.1 Optimization of Output Settings

1. For an analog input signal, display a picture with as much detail as possible on your graphic source, e.g. a text with black letters on a white ground (or vice versa).

2. Open the OSD with the infrared remote control.

3. Select 'Output Settings' in the main menu (see Chapter 5.3.4, Page 27).

4. Select the output resolution in the menu item 'Output':

    –   Select 'DDC' to use the preferred resolution of the monitor DDC.

    –   If the preferred resolution of the device DDC does not result in an optimal picture, select 'Factory' and from the menu item 'Resolution' the most suitable resolution for the monitor.

5. Exit the OSD.

    A window appears to save settings. This may take a few seconds.

6. Save the settings.

6.1.2   Optimization of Input Settings

For certain analog input signals (VGA / RGB / EGA), if picture quality is not optimal or no picture is displayed, proceed as follows:

1.   Open the OSD with the infrared remote control.

2.   Select 'Input Settings' in the main menu (see Chapter 5.3.3, Page 26).

3.   Test the recommended resolutions that are listed in the menu item 'Select Resolution'. The menu item is inactive, if there is only one recommended resolution.

4.   Run the automatic picture adjustment:

–   Select 'Picture Settings' in the main menu (see Chapter 5.3.2, Page 23).

–   Select the menu item 'Auto Configuration'. Thereby picture size might change.

5.   Check the test picture: If the vertical lines are displayed clearly, without smear or tremble, the setting has been successful.

6.   Exit the OSD.

A window appears to save settings. This can take a few seconds.

7.   Save the settings.

6.1.3 Optimization of Picture Settings

Should Auto Configuration fail to provide the optimal picture, it can be adjusted manually by following this procedure:

1. Select 'Picture Settings' in the main menu.

2. Modify the values in the menu items 'Clock' and 'Phase' until all picture corruption has disappeared.

3. If the picture is displaced:

   – Select the menu item 'Display position' in the main menu item 'Output Settings' and position the picture in the upper left corner of the monitor.

   – Select the menu items 'Width' and 'Height' in the main menu item 'Picture Settings' and modify the values for width and height of the picture until the monitor is completely filled by the picture.

4. Exit the OSD.

   A window appears to save settings. This can take a few seconds.

5. Save the settings.

6.2 Download of DDC Information

Loading DDC information is only relevant if you want to connect a VGA source. By default, the factory DDC information is reported to the source (computer, CPU). If these settings do not lead to a satisfying result, the DDC information of the connected monitor can be downloaded and stored internally.

There are two options to load the DDC information of the connected monitor:

• By means of a keyboard connected to the KVM extender CON Unit (see Chapter 6.2, Page 35).

• By means of the 'Read DDC' command in the OSD (see Chapter 6.2, Page 35).

6.2.1   Download of DDC via Keyboard

You can load the DDC information of the console monitor via keyboard command under operating conditions.

1.   Switch to the respective port of the CPU Switch to be used.

2.   Enter Command Mode with the 'Hot Key' (see Chapter 5.1, Page 17).

3.   Press the key <a> to download the DDC information of the console monitor.

      At the same time Command Mode is closed and the keyboard LEDs return to previous status.

4.   Restart the switched source (computer, CPU)

      The video mode has been readjusted. Screen quality should be optimal. The CPU should now show the console monitor as the current screen, together with the available video resolutions.

      The DDC information of the console monitor was loaded once. Reloading is possible by repeating the operation.

When transmitting DDC information via keyboard, this will be only provided to the VGA input that is currently switched on the CPU Switch.

6.2.2   Download of DDC via OSD

1.   Open the OSD with the infrared remote control.

2.   Select 'General Settings' in the main menu (see Chapter 5.3, Page 20).

3.   Select the menu item 'Read DDC' in the submenu 'DDC'.

Select 'DDC' in the menu item 'Factory DDC' to receive the default DDC information.

4.   Save the DDC as DVI or VGA DDC matching the input video signal.

      The DDC information of the connected monitor is saved in the CPU Switch in the selected format and is displayed at the bottom of the OSD menu under 'DEV:'.

      The source (computer, CPU) can read the DDC information of the monitor and display the available video resolutions.

6.2.3   Further DDC settings

If there are special requirements, DDC information can be imported or exported at the device.

Therefore, please connect the device to a computer via mini USB cable.

1.   Connect the power supply to the CPU Switch.

2.   Connect the CPU Switch to a computer via mini USB cable.

    The CPU Switch is now available as a flash drive at the computer with the serial number of the respective device.

Export of DDC Information

3.   Now you can use the DDC files "DDC-MON.BIN" of the monitor and "DDC-DEV.BIN" of the CPU Switch by copying them to a local data storage device.

> To open the binary file, you have to install a suitable software. Therefore contact your dialer.

Import of DDC Information

4.   Copy special DDC information as a binary file to the flash drive of the CPU Switch.

    The existing DDC information in the file "DDC-EDID.BIN" will be overwritten and is now available exclusively for the active port.

6.3   Shared Operation
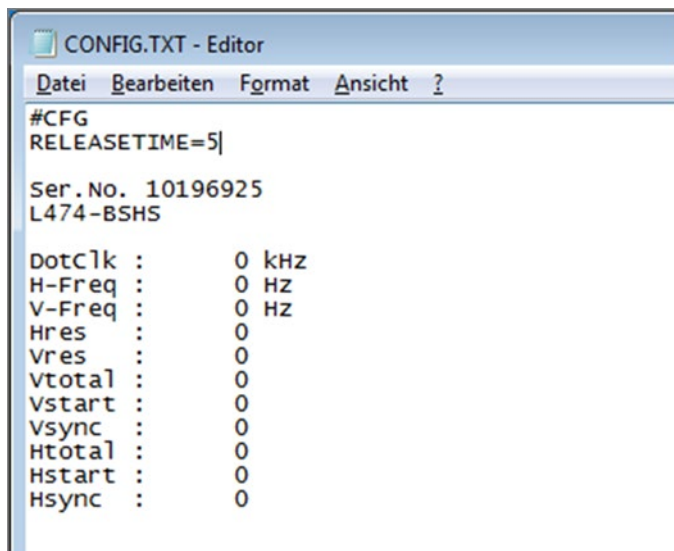
CPU Units with a redundant connector for interconnect cables offer the possibility for a competing control by two connected CON Units.

Taking over control is performed using a keyboard and/or mouse. The release timer function determines the release time of the input devices at one of the CON Units after that control can be taken over from the second CON Unit.

In order to configure a redundant CPU Unit for the operation with two competing CON Units, proceed as follows:

1.   Connect a redundant CPU Unit to any source (computer, CPU) by using a mini USB connection.

2.   Open the file "Config.txt" that is located on the appearing flash drive of the extender.

3. Activate the release timer by writing the parameter **RELEASETIME=n** into the second line.
The variable "n" defines the time in seconds and has to be replaced by the numbers 0 to 9 (e.g. RELEASETIME=5). If this parameter is not activated at all, the release time is set to 2 seconds by default.
The parameter **RELEASETIME=X** deactivates the shared operation.

4. Save your changes.

5. Reboot the CPU Unit.

```
CONFIG.TXT - Editor

Datei  Bearbeiten  Format  Ansicht  ?

#CFG
RELEASETIME=5|

Ser.No. 10196925
L474-BSHS

DotClk :        0 kHz
H-Freq :        0 Hz
V-Freq :        0 Hz
Hres   :        0
Vres   :        0
Vtotal :        0
Vstart :        0
Vsync  :        0
Htotal :        0
Hstart :        0
Hsync  :        0
```

*Example View – **Config.txt***

When using redundant CPU Units in combination with a KVM matrix, the function of competing control will be automatically deactivated in the extender and will have to be performed by the KVM matrix.

7 Specifications

7.1 Interfaces

7.1.1 VGA

The video interface supports the VGA protocol. All signals that comply to DVI-D Single Link norm can be transmitted. This includes e.g. monitor resolutions such as 1920x1200@60Hz, Full HD (1080p) or 2K HD (up to 2048x1152). Data rate is limited to 165 MPixel/s.

7.1.2 USB-HID

Our devices with USB-HID interface support a maximum of two devices with USB-HID protocol. Each USB-HID port provides a maximum current of 100 mA.

Keyboard

Compatible with most USB keyboards. Certain keyboards with additional functions may require custom firmware to operate. Keyboards with an integral USB Hub (Mac keyboards e.g.) are also supported.

7.1.3 USB 2.0 (transparent)

CPU Switch models with transparent USB 2.0 support allow the connection of **all** types of USB 2.0 devices (without restriction). USB 2.0 data transfer is supported, depending on the upgrade module, with USB high speed (max. 480 Mbit/s) or USB full speed (max. 36 Mbit/s).

Each USB full speed port provides a maximum current of 500 mA (high power). When using a USB high speed interface with 4 USB ports, respectively 2 connectors provides a maximum of 500 mA (high power) and 2 connectors a maximum of 100 mA.

7.1.4 Analog Audio Interface

The analog audio option supports a bidirectional stereo audio transmission, in nearly CD quality.

The audio interface is a 'line level' interface and it is designed to transmit the signals of a sound card (or another 'line level' device) as well as to allow the connection of active speakers to the CON Unit.

Stereo audio can be transmitted bidirectionally at the same time.

Connection of a microphone:

Connect the microphone to the 'audio' input of the CON Unit. There are two ways to establish this connection:

- The output of the CPU Unit is connected with the microphone input of the sound card (red). Adjust the sound card to provide an additional amplification (20 dB).

- The output of the CPU Unit is connected to the audio input of the sound card (blue). Choose this connection if the microphone has its own pre-amplifier.

The CON Unit can do the pre-amplification of the microphone as well. Open the CON Unit, locate the 'MIC' jumper on the audio board and close the pins.

Transmission Format	Digitized virtually CD quality audio (16 bit, 38.4 KHz)
Signal Level	Line-Level (5 Volt Pk-Pk maximum)
Input Impedance	47 KOhm
Connections CPU Unit	2x 3.5 mm stereo jack plug (audio in & audio out)
Connections CON Unit	2x 3.5 mm stereo jack plug (audio in & audio out)

7.1.5 RJ45 (Interconnect)

Communication between Cat X devices requires a 1000BASE-T connection.

Connector wiring must comply with EIA/TIA-568-B (1000BASE-T), with RJ45 connectors at both ends. All four cable wire pairs are used.

7.1.6   Fiber SFP Type LC (Interconnect)

Communication of fiber devices is performed via Gigabit SFPs that are connected to suitable fibers fitted with connectors type LC (see Chapter 7.2.2, Page 44).

The correct function of the device can only be guaranteed with SFPs provided by the manufacturer.

SFP modules can be damaged by electrostatic discharge (ESD).
➔   Please consider ESD handling specifications.

7.2 Interconnect Cable

7.2.1 Cat X

A point-to-point connection is required. Operation with several patch fields is possible. Routing over an active network component, such as an Ethernet Hub, Router or Matrix, is not allowed.

➔ Avoid routing Cat X cables along power cables.

To maintain regulatory EMC compliance, correctly installed shielded Cat X cable must be used throughout the interconnection link.

To maintain regulatory EMC compliance, all Cat X cables need to carry ferrites on both cable ends close to the device.

Type of Interconnect Cable

The CPU Switch requires interconnect cabling specified for Gigabit Ethernet (1000BASE-T). The use of solid-core (AWG24), shielded, Cat 5e (or better) is recommended.

Type of cable	Specifications
Cat X Solid-Core Cable AWG24	S/UTP (Cat 5e) cable according to EIA/TIA-568-B. Four pairs of wires AWG24. Connection according to EIA/TIA-568-B (1000BASE-T).
Cat X Patch Cable AWG26/8	S/UTP (Cat 5e) cable according to EIA/TIA-568-B. Four pairs of wires AWG26/8. Connection according to EIA/TIA-568-B (1000BASE-T).

The use of flexible cables (patch cables) type AWG26/8 is possible, however the maximum possible extension distance is halved.

Maximum Transmission Range (End-to-End Connection

Type of cable	Maximum transmission range
Cat X Installation Cable AWG24	140 m (400 ft)
Cat X Patch Cable AWG26/8	70 m (200 ft)

7.2.2 Fiber

A point-to-point connection is necessary. Operation with multiple patch panels is allowed. Routing over active network components, such as Ethernet Hubs, Switches or Routers, is not allowed.

Type of Interconnect Cable

(Cable notations according to VDE)

Type of cable	Specifications
Single-mode 9μm	• Two fibers 9μm • I-V(ZN)H 2E9 (in-house patch cable) • I-V(ZN)HH 2E9 (in-house breakout cable) • I/AD(ZN)H 4E9 (in-house or outdoor breakout cable, resistant) • A/DQ(ZN)B2Y 4G9 (outdoor cable, with protection against rodents)
Multi-mode 50μm	• Two fibers 50μm • I-V(ZN)H 2G50 (in-house patch cable) • I/AD(ZN)H 4G50 (in-house or outdoor breakout cable, resistant)

Maximum transmission range (End-to-End-Connection)

Type of cable	Bandwidth	Maximum transmission range
Single-mode 9μm	1G	10,000 m (32,808 ft)
		2,000 m (6,560 ft) when using the integrated transparent USB interface
Single-mode 9μm	3G	5,000 m (16,404 ft)
		2,000 m (6,560 ft) when using the integrated transparent USB interface
Multi-mode 50μm (OM3)	1G/3G	1,000 m (3,280 ft)
Multi-mode 50μm	1G/3G	400 m (1,312 ft)
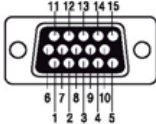
When using single-mode SFPs with multi-mode fiber optic cables, the maximum transmission range can usually be doubled.

Type of Connector

Connector	LC Connector

7.3 Connector Pinouts

Connector VGA

Picture	Pin	Signal	Pin	Signal
	1	RED	9	KEY/PWR
	2	GREEN	10	GND
	3	BLUE	11	ID0/RES
	4	ID2/RES	12	ID1/SDA
	5	GND	13	HSync
	6	RED_RTN	14	VSync
	7	GREEN_RTN	15	ID3/SCL
	8	BLUE_RTN		
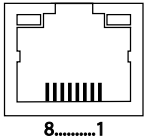
Connector Mini USB Type B

Picture	Pin	Signal	Color
	1	VCC (+5VDC)	Red
	2	Data –	White
	3	Data +	Green
	4	n.c.	–
	5	GND	Black
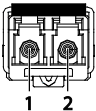
3.5 / 6.35 mm Stereo Jack Plug

Picture	Pin	Signal
	1	GND
	2	Audio IN / OUT L
	3	Audio IN / OUT R
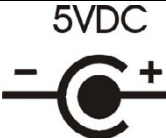
RJ45

Picture	Pin	Signal	Pin	Signal
8..........1	1	D1+	5	D3−
	2	D1−	6	D2−
	3	D2+	7	D4+
	4	D3+	8	D4−

Fiber SFP Typ LC

Picture	Diode	Signal
1 2	1	Data OUT
	2	Data IN

Power Supply

Picture	Pin	Signal
5VDC	Inside	VCC (+5VDC)
	Outside	GND

7.4   Power Supply

AC Power Supply

Model	Max. Current	Max. Voltage	Frequency
L484-8VECWR	700 mA	100-240 V	50/60 Hz
L484-8VESWR	700 mA	100-240 V	50/60 Hz

DC-Spannungsversorgung

Model	Max. Current	Max. Voltage
L484-8VECWR	5.000 mA	5 VDC
L484-8VESWR	5.000 mA	5 VDC

Power Requirement	• L484-8VECWR: max. 3.300 mA • L484-8VESWR: max. 3.350 mA

7.5   Environmental Conditions

Operating Temperature	41 to 113°F (5 to 45°C)
Storage Temperature	−13 to 140°F (−25 to 60°C)
Relative Humidity	Max. 80% non-condensing

7.6   Size

L484-8VECWR / -8VESWR

CPU Switch	444 x 143 x 43 mm (17.5" x 5.6" x 1.7")
Shipping Box	550 x 372 x 155 mm (21.7" x 14.6" x 6.1")

7.7   Shipping weight

L484-8VECWR / -8VESWR

CPU Switch	2.1 kg (4.6 lb)
Shipping Box	3.1 kg (6.8 lb)

8 Troubleshooting

8.1 Blank Screen

CPU Module

Rear View
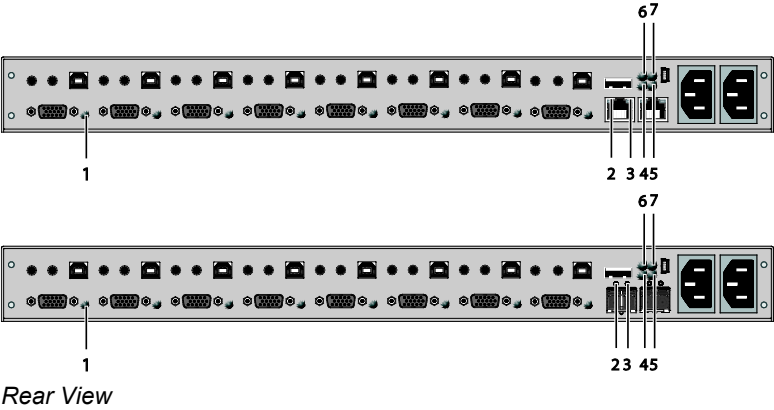
Diagnosis	Possible Reason	Measure
LED **4/6** off	Power Supply	➔ Check power supply units and the connection to the power network
LED **3** off	No monitor detected	➔ Check connection, length and quality of the DVI-D cable to monitor, tighten cable thumbscrews.
LED **5** or **7** violet	No video signal detected from CPU Unit	➔ Check VGA cable to CPU. ➔ Download DDC information from console monitorn (see Chapter 6.2, Page 35). Reboot CPU if necessary.

8.2   Picture

Diagnosis	Possible Reason	Measure
Incorrect picture display	Incomplete or too long connection to monitor	➔ Check connection, length and quality of the DVI-D cable to monitor, tighten cable thumbscrews.
	Transmission parameters not suitable or not optimally set for conditions.	➔ Run 'Auto Configuration' (see Chapter 5.3.2, Page 23). ➔ If necessary, set parameters for picture settings manually (e.g. phase and clock) (see Chapter 5.3.2, Page 23).
Parts of the picture are missing	Incorrect picture size	➔ Optimize picture settings (see Chapter 6.1, Page 33).
Horizontal picture jitter	Incorrect phase and clock	➔ Readjust phase and clock manually (see Chapter 5.3.2, Page 23).
Characters are smeared	Incorrect phase	➔ Readjust phase manually (see Chapter 5.3.2, Page 23).
Fine vertical lines are missing	Incorrect clock	➔ Readjust clock manually (see Chapter 5.3.2, Page 23).

8.3   USB-HID

CPU Module
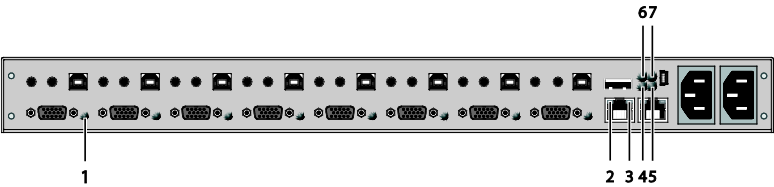
Rear View

Diagnosis	Possible Reason	Measure
Keyboard LEDs **Shift** and **Scroll** are blinking	Keyboard in Command Mode	➔ Press <Esc> to leave Command Mode.
CPU Unit: LED **5/7** green or violet	No USB connection to CPU	➔ Check connection of USB cable to CPU; select another USB port if necessary. ➔ USB- und Netzkabel entfernen und CPU Unit neu starten. Netzkabel zuerst wieder anschließen.
USB device without function	No USB-HID device	➔ Connect USB-HID device.
	USB-HID device is not supported	➔ Contact dealer if necessary.

8.4   Analog Audio

Diagnosis	Possible Reason	Measure
CON Unit: No signal at audio output	No audio connection to CPU / audio source	➜ Connect analog audio source. ➜ Check audio cable.
	No Signal	➜ Switch analog audio source on. ➜ Activate analog output at CPU / audio source.
	No audio connection to audio sink (e.g. speakers)	➜ Connect analog audio sink and switch it on. ➜ Check connection of audio cable.
CPU Unit: No signal at audio output (microphone)	No audio connection to audio source (microphone)	➜ Connect analog audio source (microphone). ➜ Check connection of audio cable.
	No signal	➜ Switch analog audio source on. ➜ Activate analog output at audio source.
	No audio connection to audio sink (e.g. CPU)	➜ Check connection to CPU. ➜ Check connection of audio cable. ➜ Check audio configuration.

9 Technical Support

Prior to contacting support please ensure you have read this manual, and then installed and set-up your CPU Switch as recommended.

9.1 Support Checklist

To efficiently handle your request it is necessary that you complete a support request checklist (Download). Please ensure that you have the following information available before you call:

- Company, name, phone number and email
- Type and serial number of the device (see bottom of device)
- Date and number of sales receipt, name of dealer if necessary
- Issue date of the existing manual
- Nature, circumstances and duration of the problem
- Components included in the system (such as graphic source/CPU, OS, graphic card, monitor, USB-HID/USB 2.0 devices, interconnect cable) including manufacturer and model number
- Results from any testing you have done

9.2 Shipping Checklist

1. To return your device, contact your dealer to obtain a RMA number (Return-Material-Authorization).
2. Package your devices carefully, preferably using the original box. Add all pieces which you received originally.
3. Note your RMA number visibly on your shipment.

Devices that are sent in without a RMA number cannot be accepted. The shipment will be sent back without being opened, postage unpaid.

10   Directives

10.1   North American Regulatory Compliance

This equipment has been found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Shielded cables must be used with this equipment to maintain compliance with radio frequency energy emission regulations and ensure a suitably high level of immunity to electromagnetic disturbances.

All power supplies are certified to the relevant major international safety standards.

10.2   WEEE

The manufacturer complies with the EU Directive 2012/19/EU on the prevention of waste electrical and electronic equipment (WEEE).

The device labels carry a respective marking.

10.3   RoHS/RoHS 2

This device complies with the Directive 2011/65/EU of the European Parliament and of the council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS 2, RoHS II).

The device labels carry a respective marking.

11   Glossary

The following terms are commonly used in this guide or in video and KVM technology:

Term	Explanation
AES/EBU	Digital audio standard that is officially known as AES3 and that is used for carrying digital audio signals between devices.
Cat X	Any Cat 5e (Cat 6, Cat 7) cable
CGA	Color Graphics Adapter (CGA) is an old analog graphic standard with up to 16 displayable colors and a maximum resolution of 640x400 pixels.
Component Video	Component Video (YPbPr) is a high-quality video standard that consists of three independently and separately transmittable video signals, the luminance signal and two color difference signals.
Composite Video	Composite Video is also called CVBS and it is part of the PAL TV standard.
CON Unit	Component of a KVM Extender or Media Extender to connect to the console (monitor(s), keyboard and mouse; optionally also with USB 2.0 devices)
Console	Keyboard, mouse and monitor
CPU Unit	Component of a KVM Extender or Media Extender to connect to a source (computer, CPU)
CVBS	The analog color video baseband signal (CVBS) is also called Composite Video and it is part of the PAL TV standard.
DDC	Display Data Channel (DDC) is a serial communication interface between monitor and source (computer, CPU). It allows a data exchange via monitor cable and an automatic installation and configuration of a monitor driver by the operating system.
DisplayPort	A VESA standardised interface for an all-digital transmission of audio and video data. It is differentiated between the DisplayPort standards 1.1 and 1.2. The signals have LVDS level.
Dual Access	A system to operate a source (computer, CPU) from two consoles

Term	Explanation
Dual Link	A DVI-D interface for resolutions up to 2560x2048 by signal transmission of up to 330 MPixel/s (24-bit)
Dual-Head	A system with two video connections
DVI	Digital video standard, introduced by the Digital Display Working Group (http://www.ddwg.org). Single Link and Dual Link standard are distinguished. The signals have TMDS level.
DVI-I	A combined signal (digital and analog) that allows running a VGA monitor at a DVI-I port – in contrast to DVI-D (see DVI).
EGA	The Enhanced Graphics Adapter (EGA) is an old analog graphic standard, introduced by IBM in 1984. A D-Sub 9 connector is used for connection.
Fiber	Single-mode or multi-mode fiber cables
HDMI	An interface for an all-digital transmission of audio and video data. It is differentiated between the HDMI standards 1.0 to 1.4a. The signals have TMDS level.
KVM	Keyboard, video and mouse
Mini-XLR	Industrial standard for electrical plug connections (3 pole) for the transmission of digital audio and control signals
Multi-mode	62.5µ multi-mode fiber cable or 50µ multi-mode fiber cable
OSD	The On-Screen-Display is used to display information or to operate a device.
Quad-Head	A system with four video connections
RCA (Cinch)	A non-standard plug connection for transmission of electrical audio and video signals, especially with coaxial cables
S/PDIF	A digital audio interconnect that is used in consumer audio equipment over relatively short distances.
SFP	SFPs (Small Form Factor Pluggable) are pluggable interface modules for Gigabit connections. SFP modules are available for Cat X and fiber interconnect cables.

Term	Explanation
Single Link	A DVI-D interface for resolutions up to 1920x1200 by signal transmission of up to 165 MPixel/s (24-bit). Alternative frequencies are Full HD (1080p), 2K HD (2048x1080) and 2048x1152.
Single-Head	A system with one video connection
Single-mode	9µ single-mode fiber cable
S-Video (Y/C)	S-Video (Y/C) is a video format transmitting luminance and chrominance signals separately. Thereby it has a higher quality standard than CVBS.
TOSLINK	Standardized fiber connection system for digital transmission of audio signals (F05 plug connection)
Triple-Head	A system with three video connections
USB-HID	USB-HID devices (Human Interface Device) allow for data input. There is no need for a special driver during installation; "New USB-HID device found" is reported. Typical HID devices include keyboards, mice, graphics tablets and touch screens. Storage, video and audio devices are **not** HID.
VGA	Video Graphics Array (VGA) is a computer graphics standard with a typical resolution of 640x480 pixels and up to 262,144 colors. It can be seen as a follower of the graphics standards MDA, CGA and EGA.