

# User Manual

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## Draco KVM Extender

### Model: 474 Series



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# Contents

|          |                                                       |          |
|----------|-------------------------------------------------------|----------|
| <b>1</b> | <b>About This Manual .....</b>                        | <b>7</b> |
| 1.1      | Scope.....                                            | 7        |
| 1.2      | Validity .....                                        | 7        |
| 1.3      | Cautions and Notes .....                              | 7        |
| <b>2</b> | <b>Safety Instructions .....</b>                      | <b>8</b> |
| <b>3</b> | <b>Description .....</b>                              | <b>9</b> |
| 3.1      | Application .....                                     | 9        |
| 3.2      | System Overview .....                                 | 10       |
| 3.3      | Product Range .....                                   | 11       |
| 3.3.1    | Part Numbers.....                                     | 11       |
| 3.3.2    | Chassis .....                                         | 11       |
| 3.3.3    | KVM-Extender Modules .....                            | 12       |
| 3.3.4    | Upgrade Modules.....                                  | 13       |
| 3.3.5    | Devices for free configuration .....                  | 14       |
| 3.4      | Accessories Upgrade Kits .....                        | 15       |
| 3.5      | Accessories.....                                      | 16       |
| 3.6      | Device Views .....                                    | 16       |
| 3.6.1    | 2-fold Vario Chassis 474-BODY2/2R .....               | 16       |
| 3.6.2    | 2-fold Vario Chassis 474-BODY2N .....                 | 17       |
| 3.6.3    | 4-fold Vario Chassis 474-BODY4/4R .....               | 18       |
| 3.6.4    | 6-fold Vario Chassis 474-BODY6R .....                 | 19       |
| 3.6.5    | 6-fold Vario Chassis 474-BODY6BP .....                | 20       |
| 3.6.6    | 6-fold Vario Chassis 474-BODY6BPF .....               | 21       |
| 3.6.7    | 21-fold Vario Chassis 474-BODY21R .....               | 22       |
| 3.6.8    | Model L- / R474-BSHC / -BVHC .....                    | 23       |
| 3.6.9    | Model L- / R474-BSHS / -BSHX / -BVHS / -BVHX<br>..... | 23       |
| 3.6.10   | Model L- / R474-BSHCR / -BVHCR .....                  | 24       |
| 3.6.11   | Model L- / R474-BSHSR / -BVHSR .....                  | 24       |
| 3.6.12   | Model L- / R474-BSHCV .....                           | 25       |
| 3.6.13   | Model L- / R474-BSHSV / -BSHXV .....                  | 25       |

|          |                                              |           |
|----------|----------------------------------------------|-----------|
| 3.6.14   | Model L- / R474-BXH .....                    | 26        |
| 3.6.15   | Model L- / R474-BXE .....                    | 26        |
| 3.6.16   | Model L- / R474-BUE .....                    | 26        |
| 3.6.17   | Model L- / R474-BAX / -BSX .....             | 27        |
| 3.6.18   | Model L- / R474-BAP .....                    | 27        |
| 3.6.19   | Model L- / R474-BXP .....                    | 28        |
| 3.6.20   | Model L- / R474-BDX .....                    | 28        |
| 3.6.21   | Model L- / R474-BAH .....                    | 29        |
| 3.6.22   | Model L- / R474-BDH .....                    | 29        |
| 3.6.23   | Model L- / R474-BAE .....                    | 30        |
| 3.6.24   | Model L- / R474-BDE .....                    | 30        |
| 3.6.25   | Model L- / R474-BDD .....                    | 31        |
| 3.6.26   | Model L- / R474-BDA .....                    | 31        |
| 3.6.27   | Model L- / R474-BXTC .....                   | 32        |
| 3.6.28   | Model L- / R474-BXTS .....                   | 32        |
| 3.7      | Status LEDs .....                            | 33        |
| 3.7.1    | Status KVM-Extender Module .....             | 33        |
| 3.7.2    | Status KVM-Extender Module VGA / DVI-I ..... | 34        |
| 3.7.3    | Status Upgrade Module Digital Audio .....    | 35        |
| 3.7.4    | Status Upgrade Module USB-HID .....          | 36        |
| 3.7.5    | Status Upgrade module USB 2.0 embedded ..... | 37        |
| 3.7.6    | Status Upgrade Module USB 2.0 .....          | 38        |
| <b>4</b> | <b>Installation .....</b>                    | <b>39</b> |
| 4.1      | Package Contents .....                       | 39        |
| 4.2      | System Setup .....                           | 41        |
| 4.2.1    | KVM-Extender Setup .....                     | 41        |
| 4.2.2    | Setup of Upgrade Modules .....               | 42        |
| 4.3      | Example Applications .....                   | 43        |
| 4.4      | Operating Modes .....                        | 45        |
| 4.5      | Overview Upgrade Modules .....               | 46        |
| <b>5</b> | <b>Configuration .....</b>                   | <b>47</b> |
| 5.1      | Transmission Parameters .....                | 47        |

|          |                                                |           |
|----------|------------------------------------------------|-----------|
| 5.2      | DDC Settings .....                             | 47        |
| 5.3      | Command Mode .....                             | 48        |
| 5.4      | USB-HID Ghosting .....                         | 50        |
| 5.5      | Configuration File .....                       | 51        |
| 5.5.1    | Parameters for CPU Units.....                  | 51        |
| 5.5.2    | Parameters for CON Units .....                 | 52        |
| 5.5.3    | Parameters for CPU und CON Units.....          | 53        |
| <b>6</b> | <b>Operation .....</b>                         | <b>54</b> |
| 6.1      | Download of DDC Information .....              | 54        |
| 6.2      | Parallel Operation of redundant CPU Units..... | 54        |
| <b>7</b> | <b>Specifications .....</b>                    | <b>56</b> |
| 7.1      | Interfaces .....                               | 56        |
| 7.1.1    | DVI-D Single Link.....                         | 56        |
| 7.1.2    | DVI-I Single Link .....                        | 56        |
| 7.1.3    | USB-HID .....                                  | 56        |
| 7.1.4    | PS/2 .....                                     | 57        |
| 7.1.5    | USB 2.0 (transparent) .....                    | 57        |
| 7.1.6    | RJ45 (Interconnect) .....                      | 57        |
| 7.1.7    | Fiber SFP Type LC (Interconnect) .....         | 58        |
| 7.1.8    | Serial Interface .....                         | 58        |
| 7.1.9    | Analog Audio Interface.....                    | 59        |
| 7.1.10   | Serial Interface RS422 .....                   | 60        |
| 7.1.11   | Digital Audio Interface .....                  | 61        |
| 7.2      | Interconnect Cable .....                       | 62        |
| 7.2.1    | Cat X.....                                     | 62        |
| 7.2.2    | Fiber.....                                     | 64        |
| 7.3      | Supported Peripherals .....                    | 65        |
| 7.3.1    | USB-HID Devices .....                          | 65        |
| 7.3.2    | USB 2.0 Devices.....                           | 65        |
| 7.4      | Connector Pinouts .....                        | 66        |
| 7.5      | Power Supply .....                             | 71        |
| 7.6      | Environmental Conditions .....                 | 72        |

|           |                                            |           |
|-----------|--------------------------------------------|-----------|
| 7.7       | Size .....                                 | 73        |
| 7.8       | Shipping Weight .....                      | 74        |
| <b>8</b>  | <b>Troubleshooting .....</b>               | <b>75</b> |
| 8.1       | General Failures .....                     | 75        |
| 8.2       | Blank Screen .....                         | 76        |
| 8.3       | USB-HID .....                              | 77        |
| 8.4       | Serial Connection .....                    | 78        |
| 8.5       | Analog Audio .....                         | 78        |
| 8.6       | Digital Audio .....                        | 79        |
| 8.7       | Upgrade Module USB-HID .....               | 80        |
| 8.8       | USB 2.0 embedded .....                     | 81        |
| 8.9       | USB 2.0 .....                              | 82        |
| <b>9</b>  | <b>Technical Support .....</b>             | <b>83</b> |
| 9.1       | Support Checklist .....                    | 83        |
| 9.2       | Shipping Checklist .....                   | 83        |
| <b>10</b> | <b>Certificates .....</b>                  | <b>84</b> |
| 10.1      | CE Declaration Of Conformity .....         | 84        |
| 10.2      | North American Regulatory Compliance ..... | 85        |
| 10.3      | Product Safety .....                       | 85        |
| 10.4      | WEEE .....                                 | 86        |
| 10.5      | RoHS/RoHS 2 .....                          | 86        |
| <b>11</b> | <b>Glossary .....</b>                      | <b>87</b> |

# 1 About This Manual

## 1.1 Scope

This manual describes how to install your KVM Extender, 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.

# 2 Safety Instructions

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

### Installation

- Only use in dry, indoor environments.
- The KVM Extender 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 KVM Extender. There are no user serviceable parts inside.
- Please contact your dealer or manufacturer if there is a fault.

## 3 Description

### 3.1 Application

The KVM Extender is used to increase the distance between a source (computer, CPU) and its console (keyboard, mouse, and other peripheral devices).

The KVM Extender is designed for use with Cat X (Twisted Pair) interconnect cables or fiber interconnect cables.

The KVM Extender with Cat X interconnect cables is unsuitable for connection between buildings where a fiber optic based product should be used instead.

The KVM Extender with fiber interconnect cables can also be used with applications in environments which are subject to electromagnetic interference. Electromagnetic interference can limit the maximum distance and reliability of operation.

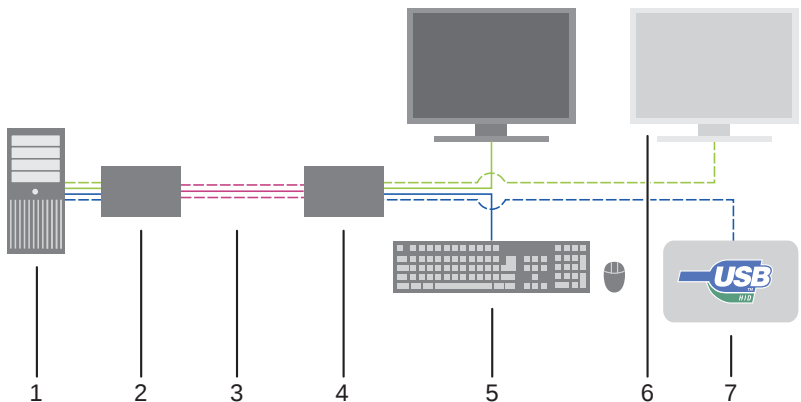
### 3.2 System Overview

The KVM Extender consists of at least one CPU module and one CON module. The various modules are summarized respectively in a vario chassis (2-fold, 4-fold or 6-fold) at CPU site and CON site (CPU and CON Unit).

The CPU module is connected directly to the source (computer, CPU) using the supplied cables.

The CON module is connected to the console (monitor, keyboard and mouse).

The CPU Unit and the CON modules communicate with each other through the interconnect cables.



#### *System Overview*

- 1 Source (computer, CPU)
- 2 KVM Extender CPU Unit
- 3 Interconnect cable
- 4 KVM Extender CON Unit
- 5 Console (monitor, keyboard, mouse)
- 6 Second monitor (option, only with Dual-Head devices)
- 7 USB-HID devices (option, only with 4x USB-HID devices)



See Chapter 4.3, Page 43 for installation examples.

## 3.3 Product Range

### 3.3.1 Part Numbers

#### Part numbers for Connections via Cat X or Fiber Cable

All devices are available in the following versions:

- Connection via Cat X cable (x = "C")
- Connection via Single-mode fiber cable (x = "S")
- High speed connection (3.125 Gbit/s) via Single-mode fiber cable (x = "X")



Fiber devices can be used with Multi-mode and Single-mode cables (see Chapter 7.2.2, Page 64).

#### Part numbers for CPU Unit and CON Unit

The part numbers for the CPU Unit and the CON Unit can be derived from the part number of the complete device.

- CPU Unit: **L474**
- CON Unit: **R474**



All devices in the K474 series are technically compatible with devices in the K477 series.

### 3.3.2 Chassis

| Model      | Description                                                                                                                           |
|------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 474-BODY2  | Empty chassis for up to 2 boards, 1x external power supply unit                                                                       |
| 474-BODY2R | Empty chassis for up to 2 boards, 1x external power supply unit, preparation for redundancy for a second power supply unit (external) |
| 474-BODY2N | Empty chassis for up to 2 boards, 1x internal power supply unit, preparation for redundancy for a second power supply unit (external) |
| 474-BODY4  | Empty chassis for up to 4 boards, 1x external power supply unit                                                                       |
| 474-BODY4R | Empty chassis for up to 4 boards, 1x external power supply unit, preparation for redundancy for a second power supply unit (external) |

| Model         | Description                                                                                                                            |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------|
| 474-BODY6R    | Empty chassis for up to 6 boards, 1x internal power supply unit, preparation for redundancy for a second power supply unit (external)  |
| 474-BODY6BP   | Empty chassis for up to 6 boards, active backplane, 2x internal power supply unit (redundancy)                                         |
| 474-BODY6BPF  | Empty chassis for up to 6 boards, active backplane, 2x internal power supply unit (redundancy) with connectors on rear side            |
| 474-BODY21/4U | Empty chassis for up to 21 boards, 1x internal power supply unit, preparation for redundancy for a second power supply unit (internal) |

### 3.3.3 KVM Extender Modules

| Model      | Description                                                                                                                                       |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| L474-BSHx  | Single-Head module for 1x DVI-D Single Link (up to 1920x1200) with 2x USB-HID                                                                     |
| R474-BSHx  |                                                                                                                                                   |
| L474-BSHxR | Single-Head module for 1x DVI-D Single Link (up to 1920x1200) with 2x USB-HID and redundant connector for interconnect cables                     |
| R474-BSHxR |                                                                                                                                                   |
| L474-BSHxV | Single-Head module for 1x DVI-I (VGA / DVI) Single Link (up to 1920x1200) with 2x USB-HID                                                         |
| R474-BSHxV |                                                                                                                                                   |
| L474-BVHx  | Single-Head module for 1x DVI-I (VGA / DVI onboard) Single-Link (up to 1920x1200) with 2x USB-HID                                                 |
| L474-BVHxR |                                                                                                                                                   |
|            | Single-Head module for 1x DVI-I (VGA / DVI onboard) Single-Link (up to 1920x1200) with 2x USB-HID and redundant connector for interconnect cables |

### 3.3.4 Upgrade Modules

| Model     | Description                                                                                  |
|-----------|----------------------------------------------------------------------------------------------|
| L474-BXH  | Upgrade module with 2x USB-HID                                                               |
| R474-BXH  |                                                                                              |
| L474-BXE  | Upgrade module with 2x USB 2.0                                                               |
| R474-BXE  |                                                                                              |
| L474-BAX  | Upgrade module with Analog Audio / Serial RS232 (bidirectional)                              |
| R474-BAX  |                                                                                              |
| L474-BAP  | Upgrade module with Analog Audio / Serial RS232 (bidirectional) and PS/2                     |
| R474-BAP  |                                                                                              |
| L474-BSX  | Upgrade module with Analog Audio / Serial RS422 (bidirectional)                              |
| R474-BSX  |                                                                                              |
| L474-BXP  | Upgrade module with PS/2 (only available with upgrade module Analog Audio / Serial)          |
| R474-BXP  |                                                                                              |
| L474-BDX  | Upgrade module with Digital Audio (unidirectional)                                           |
| R474-BDX  |                                                                                              |
| L474-BAH  | Upgrade module with Analog Audio / Serial RS232 (bidirectional) and 2x USB-HID               |
| R474-BAH  |                                                                                              |
| L474-BUE  | Upgrade module with Analog Audio (bidirectional) and 2x USB 2.0                              |
| R474-BUE  |                                                                                              |
| L474-BAE  | Upgrade module with Analog Audio / Serial RS232 (bidirectional) and 2x USB 2.0               |
| R474-BAE  |                                                                                              |
| L474-BDH  | Upgrade module with Digital Audio (unidirectional) and 2x USB-HID                            |
| R474-BDH  |                                                                                              |
| L474-BDE  | Upgrade module with Digital Audio (unidirectional) and 2x USB 2.0                            |
| R474-BDE  |                                                                                              |
| L474-BDD  | Upgrade module with Digital Audio (bidirectional)                                            |
| R474-BDD  |                                                                                              |
| L474-BDA  | Upgrade module with Digital Audio (unidirectional) and Analog Audio / Serial (bidirectional) |
| R474-BDA  |                                                                                              |
| L474-BXTx | USB 2.0 upgrade module with 4x USB 2.0                                                       |
| R474-BXTx |                                                                                              |

### 3.3.5 Devices for free configuration

| Model             | Description                                                                                                                                                         |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DRACO VARIO 2     | Draco extender for free configuration in a 2-slot vario chassis, external power supply unit                                                                         |
| DRACO VARIO 2R    | Draco extender for free configuration in a 2-slot vario chassis, external power supply unit, preparation for redundancy for a second external power supply unit     |
| DRACO VARIO 2N    | Draco extender for free configuration in a 2-slot vario chassis, internal power supply unit, preparation for redundancy of an external power supply unit            |
| DRACO VARIO 4     | Draco extender for free configuration in a 4-slot vario chassis, external power supply unit                                                                         |
| DRACO VARIO 4R    | Draco extender for free configuration in a 4-slot vario chassis, external power supply unit, preparation for redundancy of a second external power supply unit      |
| DRACO VARIO 6R    | Draco extender for free configuration in a 6-slot vario chassis, internal power supply unit, preparation for redundancy of an external power supply unit            |
| DRACO VARIO 6BP   | Draco extender for free configuration in a 6-slot vario chassis, active backplane, 2x internal power supply unit (redundancy)                                       |
| DRACO VARIO 6BPF  | Draco extender for free configuration in a 6-slot vario chassis, active backplane, 2x internal power supply unit (redundancy) with connectors on rear side          |
| DRACO VARIO 21/4U | Draco extender for free configuration in a 21-slot 4U vario chassis, internal power supply unit, preparation for redundancy for a second external power supply unit |



When using redundant power supply units, the load will be shared between units.

### 3.4 Accessories Upgrade Kits

| Model      | Description                                                                                     |
|------------|-------------------------------------------------------------------------------------------------|
| 474-2RMK   | 19"/1U rack mount kit for 2-fold chassis                                                        |
| 474-2NRMK  | 19"/1U rack mount kit for 2-fold chassis with internal PSU                                      |
| 474-4RMK   | 19"/1U rack mount kit for 4-fold chassis                                                        |
| 474-6RMK   | 19"/1U rack mount kit for 6-fold chassis                                                        |
| 474-VPLATE | Fastening strips for screw or snap on for 2-, 4- and 6-fold chassis                             |
| 474-OPTRED | Retrofitting for redundant power supply option (without power supply) for 2- and 4-fold chassis |
| 474-PSU2   | Power supply for 2-fold chassis (spare or redundancy)                                           |
| 474-PSU4   | Power supply for 4-fold chassis (spare or redundancy)                                           |
| 474-PSU6   | Power supply for 6-fold chassis (spare or redundancy)                                           |
| 474-PSU21  | Power supply for 6-fold-chassis (spare or redundancy)                                           |
| 474-BLND1  | Blind plate 3U/4HP for 2-, 4- and 6-fold chassis                                                |
| 474-BLND2  | Blind plate 3U/8HP for 2-, 4- and 6-fold chassis                                                |



KVM Extenders and the power supply units can get warm and must not be installed in closed rooms with no air circulation. For rack-mount installations, at least 0.5 U (height unit) is required above the extenders for ventilation.

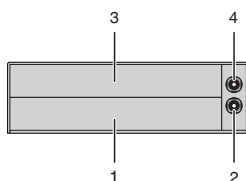
## 3.5 Accessories

| Model  | Description                                               |
|--------|-----------------------------------------------------------|
| 026-2A | Serial cable 1.8 m (RS232)                                |
| 247-U1 | USB cable 1.8 m (Type A to B)                             |
| 260-5G | International power supply unit 100...240VAC / 5VDC / 3 A |
| 260-5U | International power supply unit 100...240VAC / 5VDC / 4 A |
| 436-AA | VGA cable 1.8 m (VGA to DVI-I)                            |
| 436-ID | DVI-D cable 1.8 m (DVI-D)                                 |
| 445-2H | DVI-D splitter cable                                      |
| 455-CK | Stereo jack cable 1.6 m (3.5 mm Stereo)                   |
| 455-CR | RCA cable 2.5 m (Cinch male connector)                    |
| 455-CT | TOSLINK cable 1.8 m (F05 male connector)                  |
| 455-CX | Mini-XLR cable 1.8 m (3 pole)                             |

## 3.6 Device Views

### 3.6.1 2-fold Vario Chassis 474-BODY2/2R

#### CPU and CON Unit

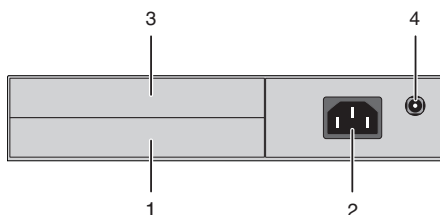


#### Rear View

- 1 Slot for modules #1
- 2 Connect to 5VDC power supply (standard)
- 3 Slot for modules #2
- 4 Connect to 5VDC power supply (redundancy, optional)

### 3.6.2 2-fold Vario Chassis 474-BODY2N

#### CPU and CON Unit



#### Rear View

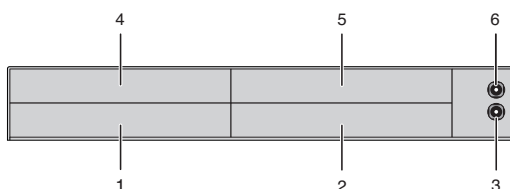
- 1 Slot for modules #1
- 2 Connect to power supply (standard)
- 3 Slot for modules #2
- 4 Connect to 5VDC power supply (redundancy)



The 2-fold vario chassis with an internal power supply is not equipped with a fuse on its primary side. Therefore the protection against excessive currents has to be provided by the electrical installation of the building.

### 3.6.3 4-fold Vario Chassis 474-BODY4/4R

#### CPU and CON Unit



#### *Rear View*

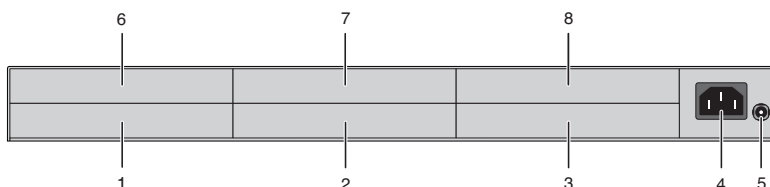
- 1 Slot for modules #3
- 2 Slot for modules #1
- 3 Connect to 5VDC power supply (standard)
- 4 Slot for modules #4
- 5 Slot for modules #2
- 6 Connect to 5VDC power supply (redundancy, optional)



For operation with three KVM Extender CON modules and a USB 2.0 CON module in a 4-fold vario chassis, two power supplies are necessary. In this case, redundancy is inapplicable.

### 3.6.4 6-fold Vario Chassis 474-BODY6R

#### CPU and CON Unit



#### Rear View

- 1 Slot for modules #5
- 2 Slot for modules #3
- 3 Slot for modules #1
- 4 Connect to power supply (standard)
- 5 Connect to 5VDC power supply (standard)
- 6 Slot for modules #6
- 7 Slot for modules #4
- 8 Slot for modules #2



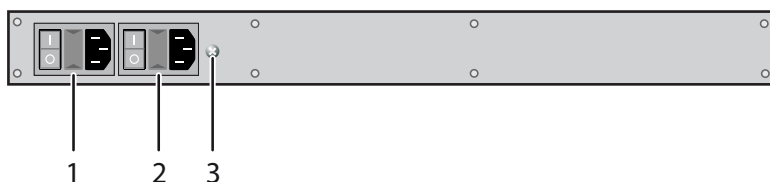
For operation with KVM Extender modules in a 6-fold vario chassis, two power supplies are necessary. In this case, redundancy is inapplicable.



The 6-fold vario chassis is not equipped with a fuse on its primary side. Therefore the protection against excessive currents has to be provided by the electrical installation of the building.

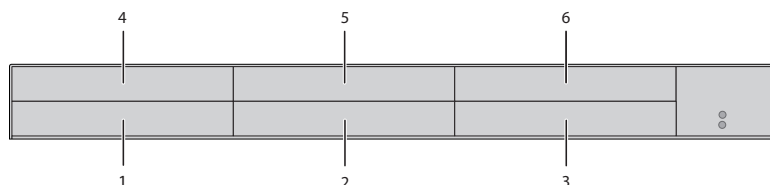
### 3.6.5 6-fold Vario Chassis 474-BODY6BP

#### CPU and CON Unit



#### Front View

- 1 Connect to power supply 1
- 2 Connect to power supply 2 (redundancy)
- 3 Grounding

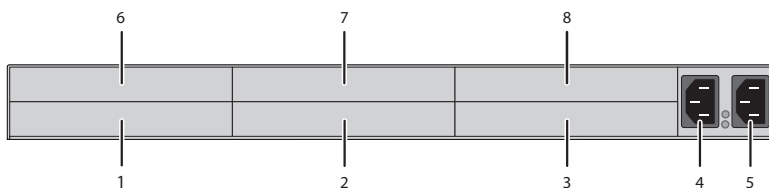


#### Rear View

- 1 Slot for modules #5
- 2 Slot for modules #3
- 3 Slot for modules #1
- 4 Slot for modules #6
- 5 Slot for modules #4
- 6 Slot for modules #2

### 3.6.6 6-fold Vario Chassis 474-BODY6BPF

#### CPU and CON Unit

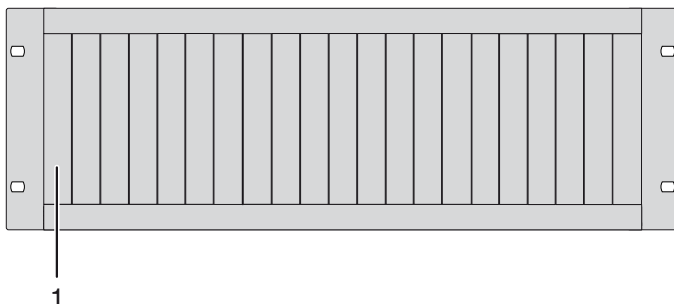


#### Rear View

- 1 Slot for modules #5
- 2 Slot for modules #3
- 3 Slot for modules #1
- 4 Connect to power supply 1
- 5 Connect to power supply 2 (redundancy)
- 6 Slot for modules #2
- 7 Slot for modules #4
- 8 Slot for modules #6

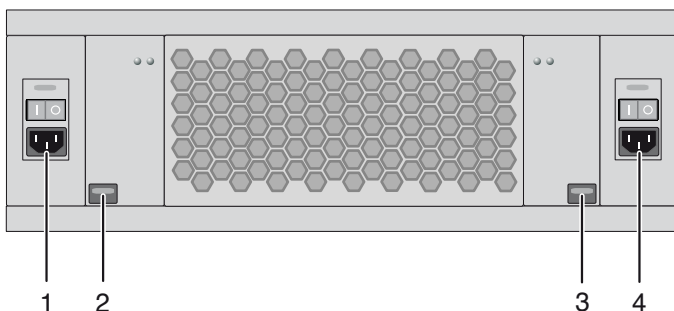
### 3.6.7 21-fold Vario Chassis 474-BODY21R

#### CPU and CON Unit



#### Rear View

- 1 Slots for modules #1 - #21

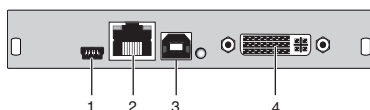


#### Front View

- 1 Connect to power supply 2  
2 Locking for power supply 2 (redundancy)  
3 Locking for power supply 1 (standard)  
4 Connect to power supply 1

### 3.6.8 Model L- / R474-BSHC / -BVHC

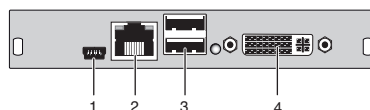
CPU Module



Rear View

- 1 Service port
- 2 Connect to interconnect cable
- 3 To CPU: USB-HID
- 4 To CPU: DVI-D,  
DVI-I (only L474-BVHC)

CON Module

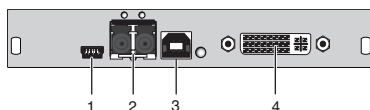


Rear View

- 1 Service port
- 2 Connect to interconnect cable
- 3 Connect to USB-HID devices
- 4 Connect to DVI monitor

### 3.6.9 Model L- / R474-BSHS / -BSHX / -BVHS / -BVHX

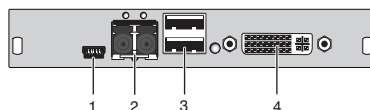
CPU Module



Rear View

- 1 Service port
- 2 Connect to interconnect cable
- 3 To CPU: USB-HID
- 4 To CPU: DVI-D,  
DVI-I (only L474-BVHS / -BVHX)

CON Module



Rear View

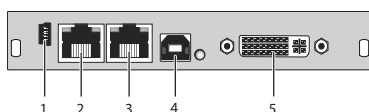
- 1 Service port
- 2 Connect to interconnect cable
- 3 Connect to USB-HID devices
- 4 Connect to DVI monitor



The configuration of the onboard DVI-I extender is described in the user manual for the Media / DVI converter K238-5V ([Download](#)).

## 3.6.10 Model L- / R474-BSHCR / -BVHCR

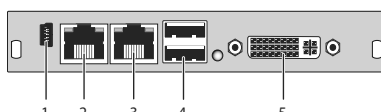
### CPU Module



#### Rear View

- 1 Service port
- 2 Connect to interconnect cable 1
- 3 Connect to interconnect cable 2
- 4 To CPU: USB-HID
- 5 To CPU: DVI-D,  
DVI-I (only L474-BVHCR)

### CON Module

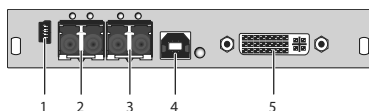


#### Rear View

- 1 Service port
- 2 Connect to interconnect cable 1
- 3 Connect to interconnect cable 2
- 4 Connect to USB-HID devices
- 5 Connect to DVI monitor

## 3.6.11 Model L- / R474-BSHSR / -BVHSR

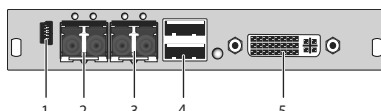
### CPU Module



#### Rear View

- 1 Service port
- 2 Connect to interconnect cable 1
- 3 Connect to interconnect cable 2
- 4 To CPU: USB-HID
- 5 To CPU: DVI-D,  
DVI-I (only L474-BVHSR)

### CON Module

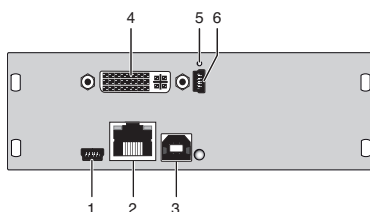


#### Rear View

- 1 Service port
- 2 Connect to interconnect cable 1
- 3 Connect to interconnect cable 2
- 4 Connect to USB-HID devices
- 5 Connect to DVI monitor

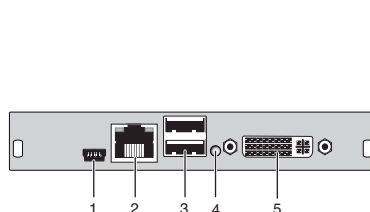
### 3.6.12 Model L- / R474-BSHCV

CPU Module

*Rear View*

- 1 Service port (KVM)
- 2 Connect to interconnect cable
- 3 To CPU: USB-HID
- 4 To CPU: DVI-I (VGA / DVI)
- 5 IR receiver for remote control
- 6 Service port (DVI-I)

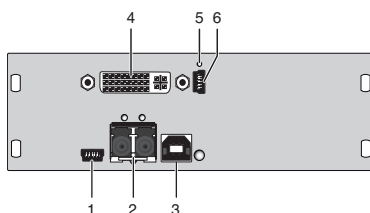
CON Module

*Rear View*

- 1 Service port
- 2 Connect to interconnect cable
- 3 Connect to USB-HID devices
- 4 IR receiver for remote control
- 5 Connect to DVI monitor

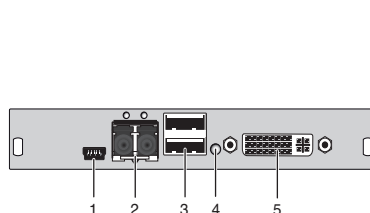
### 3.6.13 Model L- / R474-BSHSV / -BSHXV

CPU Module

*Rear View*

- 1 Service port (KVM)
- 2 Connect to interconnect cable
- 3 To CPU: USB-HID
- 4 To CPU: DVI-I (VGA / DVI)
- 5 IR receiver for remote control
- 6 Service port (DVI-I)

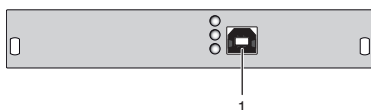
CON Module

*Rear View*

- 1 Service port
- 2 Connect to interconnect cable
- 3 Connect to USB-HID devices
- 4 IR receiver for remote control
- 5 Connect to DVI monitor

## 3.6.14 Model L- / R474-BXH

### CPU Module



#### Rear View

- 1 To CPU: USB-HID

### CON Module

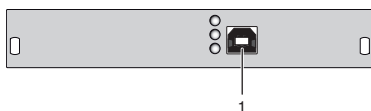


#### Rear View

- 1 Connect to USB-HID devices

## 3.6.15 Model L- / R474-BXE

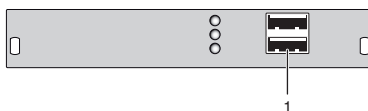
### CPU Module



#### Rear View

- 1 To CPU: USB 2.0

### CON Module

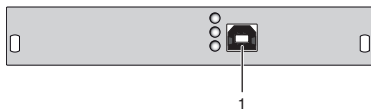


#### Rear View

- 1 Connect to USB 2.0 devices

## 3.6.16 Model L- / R474-BUE

### CPU Module



#### Rear View

- 1 To CPU: USB 2.0

### CON Module



#### Rear View

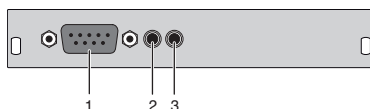
- 1 Audio IN  
2 Audio OUT  
3 Connect to USB 2.0 devices



When using USB audio within a KVM matrix, instant switching is not possible due to the deregistration and registration process of the USB.

### 3.6.17 Model L- / R474-BAX / -BSX

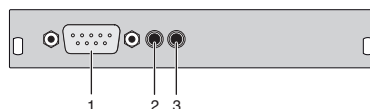
#### CPU Module



#### Rear View

- 1 Connect to serial (D-Sub 9)
- 2 Audio IN
- 3 Audio OUT

#### CON Module

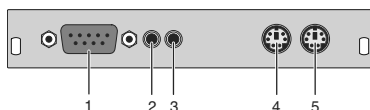


#### Rear View

- 1 Connect to serial (D-Sub 9)
- 2 Audio IN
- 3 Audio OUT

### 3.6.18 Model L- / R474-BAP

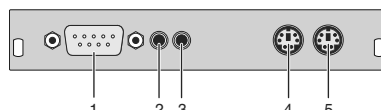
#### CPU Module



#### Rear View

- 1 Connect to serial (D-Sub 9)
- 2 Audio IN
- 3 Audio OUT
- 4 To CPU: PS/2 mouse
- 5 To CPU: PS/2 keyboard

#### CON Module

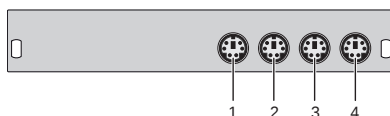


#### Rear View

- 1 Connect to serial (D-Sub 9)
- 2 Audio IN
- 3 Audio OUT
- 4 Connect to PS/2 mouse
- 5 Connect to PS/2 keyboard

## 3.6.19 Model L- / R474-BXP

**CPU Module**



*Rear View*

- 1 Connect to local PS/2 mouse
- 2 Connect to local PS/2 keyboard
- 3 To CPU: PS/2 mouse
- 4 To CPU: PS/2 keyboard

**CON Module**



*Rear View*

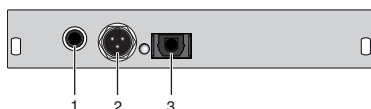
- 1 Connect to PS/2 mouse
- 2 Connect to PS/2 keyboard



The upgrade module L- / R474-BXP is only available in combination with the upgrade modules L- / R474-BAX and –BAH. A separate slot is required for each module.

## 3.6.20 Model L- / R474-BDX

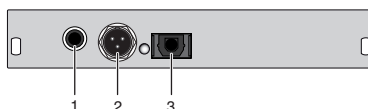
**CPU Module**



*Rear View*

- 1 S/PDIF input (RCA)
- 2 AES/EBU input (Mini-XLR)
- 3 S/PDIF input (TOSLINK)

**CON Module**

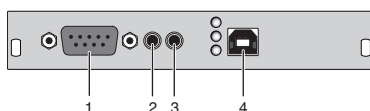


*Rear View*

- 1 S/PDIF output (RCA)
- 2 AES/EBU output (Mini-XLR)
- 3 S/PDIF output (TOSLINK)

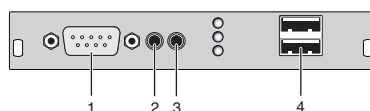
### 3.6.21 Model L- / R474-BAH

CPU Module

*Rear View*

- 1 Connect to serial (D-Sub 9)
- 2 Audio IN
- 3 Audio OUT
- 4 To CPU: USB-HID

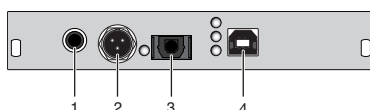
CON Module

*Rear View*

- 1 Connect to serial (D-Sub 9)
- 2 Audio IN
- 3 Audio OUT
- 4 Connect to USB-HID devices

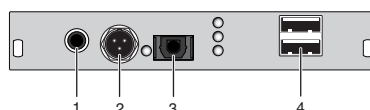
### 3.6.22 Model L- / R474-BDH

CPU Module

*Rear View*

- 1 S/PDIF input (RCA)
- 2 AES/EBU input (Mini-XLR)
- 3 S/PDIF input (TOSLINK)
- 4 To CPU: USB-HID

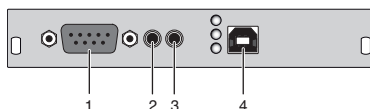
CON Module

*Rear View*

- 1 S/PDIF output (RCA)
- 2 AES/EBU output (Mini-XLR)
- 3 S/PDIF output (TOSLINK)
- 4 Connect to USB-HID devices

## 3.6.23 Model L- / R474-BAE

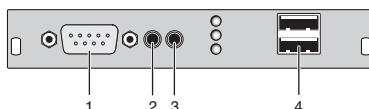
**CPU Module**



*Rear View*

- 1 Connect to serial (D-Sub 9)
- 2 Audio IN
- 3 Audio OUT
- 4 To CPU: USB 2.0

**CON Module**

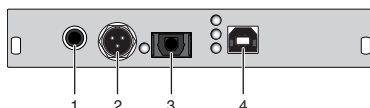


*Rear View*

- 1 Connect to serial (D-Sub 9)
- 2 Audio IN
- 3 Audio OUT
- 4 Connect to USB 2.0 devices

## 3.6.24 Model L- / R474-BDE

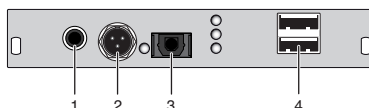
**CPU Module**



*Rear View*

- 1 S/PDIF input (RCA)
- 2 AES/EBU input (Mini-XLR)
- 3 S/PDIF input (TOSLINK)
- 4 To CPU: USB 2.0

**CON Module**

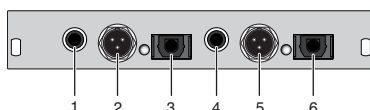


*Rear View*

- 1 S/PDIF output (RCA)
- 2 AES/EBU output (Mini-XLR)
- 3 S/PDIF output (TOSLINK)
- 4 Connect to USB 2.0 devices

### 3.6.25 Model L- / R474-BDD

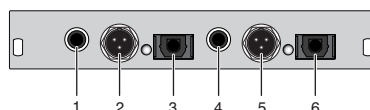
#### CPU Module



#### Rear View

- 1 S/PDIF input (RCA)
- 2 AES/EBU input (Mini-XLR)
- 3 S/PDIF input (TOSLINK)
- 4 S/PDIF output (RCA)
- 5 AES/EBU output (Mini-XLR)
- 6 S/PDIF output (TOSLINK)

#### CON Module

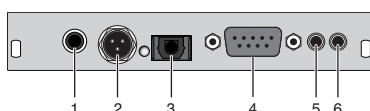


#### Rear View

- 1 S/PDIF output (RCA)
- 2 AES/EBU output (Mini-XLR)
- 3 S/PDIF output (TOSLINK)
- 4 S/PDIF input (RCA)
- 5 AES/EBU input (Mini-XLR)
- 6 S/PDIF input (TOSLINK)

### 3.6.26 Model L- / R474-BDA

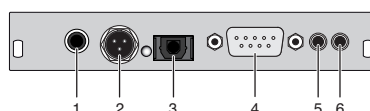
#### CPU Module



#### Rear View

- 1 S/PDIF input (RCA)
- 2 AES/EBU input (Mini-XLR)
- 3 S/PDIF input (TOSLINK)
- 4 Connect to serial (D-Sub 9)
- 5 Audio IN
- 6 Audio OUT

#### CON Module

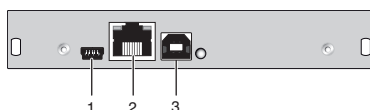


#### Rear View

- 1 S/PDIF output (RCA)
- 2 AES/EBU output (Mini-XLR)
- 3 S/PDIF output (TOSLINK)
- 4 Connect to serial (D-Sub 9)
- 5 Audio IN
- 6 Audio OUT

## 3.6.27 Model L- / R474-BXTC

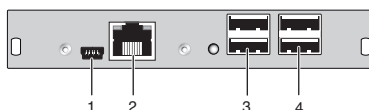
### CPU Module



#### Rear View

- 1 Service port
- 2 Connect to interconnect cable
- 3 To CPU: USB 2.0

### CON Module

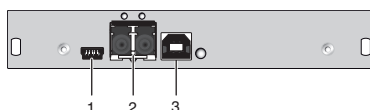


#### Rear View

- 1 Service port
- 2 Connect to interconnect cable
- 3 Connect to USB 2.0 devices

## 3.6.28 Model L- / R474-BXTS

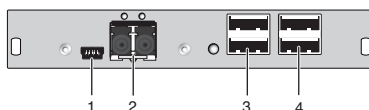
### CPU Module



#### Rear View

- 1 Service port
- 2 Connect to interconnect cable
- 3 To CPU: USB 2.0

### CON Module



#### Rear View

- 1 Service port
- 2 Connect to interconnect cable
- 3 Connect to USB 2.0 devices



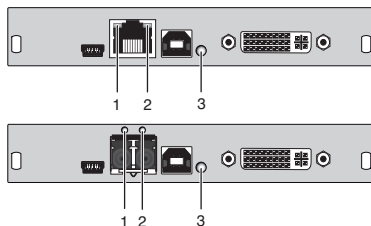
Only one USB 2.0 CON module may be installed per chassis.

## 3.7 Status LEDs

### 3.7.1 Status KVM Extender Module

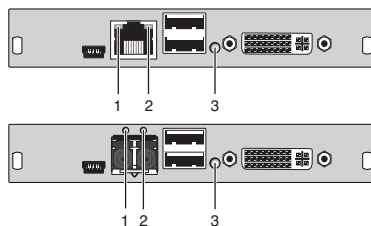
The KVM Extender module is fitted with a multi color LED on both sides for overall status indication and with two further LEDs on the back side for indication of the connection status.

**CPU Module**



*Rear View*

**CON Module**



*Rear View*

#### LED 1 and 2: Connection Status

| Pos. | LED                           | Status         | Description                                                                 |
|------|-------------------------------|----------------|-----------------------------------------------------------------------------|
| 1    | <b>Failure LED</b><br>(green) | Off            | Connection available                                                        |
|      |                               | On or Flashing | Connection failure (flashing for about 20 s following a connection failure) |
| 2    | <b>Status LED</b><br>(green)  | Flashing       | No connection via interconnect cable                                        |
|      |                               | On             | Connection available                                                        |

#### LED 3: USB and Video Status

| LED color  |                                                                                     | Description                                                   |
|------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------|
| Red        |  | Device ready                                                  |
| Violet     |  | Connection and USB signal (interconnect) available            |
| Green      |  | Connection and video signal available                         |
| Light Blue |  | Connection, USB and video signal available (operating status) |

3.7.2 Status KVM Extender Module VGA / DVI-I

The KVM Extender module with VGA / DVI-I input is fitted with a multi-color LED on the front side of the CPU Unit for indication of connection status. Further information is available via on screen display (OSD) (see manual for the Media / DVI Converter K238-5V ([Download](#))).

CPU Module



Front View

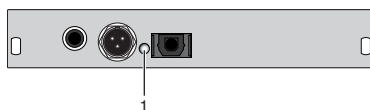
LED 1: Connection Status VGA / DVI-I

| LED color  |                                                                                     | Description                                      |
|------------|-------------------------------------------------------------------------------------|--------------------------------------------------|
| Dark Red   |    | No video signal; monitor not detected            |
| Red        |    | Video signal not supported; monitor not detected |
| Green      |    | Video signal supported; monitor not detected     |
| Blue       |    | No video signal; monitor detected                |
| Violet     |  | Video signal not supported; monitor detected     |
| Light Blue |  | Video signal supported; monitor detected         |

### 3.7.3 Status Upgrade Module Digital Audio

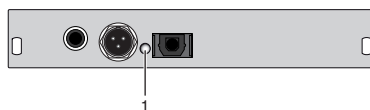
The upgrade module digital audio is fitted with a further multi-color LED on the rear side for indication of the connection status:

**CPU Module**



*Rear View*

**CON Module**



*Rear View*

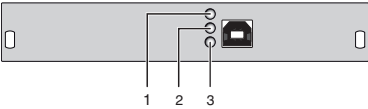
#### LED 1: Digital Audio Status

| LED color  |                                                                                   | Description                                   |
|------------|-----------------------------------------------------------------------------------|-----------------------------------------------|
| Red        |  | No signal                                     |
| Light Blue |  | CPU Unit: S/PDIF signal (RCA) available       |
| Violet     |  | CPU Unit: AES/EBU signal (Mini-XLR) available |
| Blue       |  | CPU Unit: S/PDIF signal (TOSLINK) available   |
| Green      |  | CON Unit: Signal available                    |

3.7.4 Status Upgrade Module USB-HID

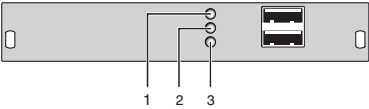
The upgrade module USB-HID is fitted with three further LEDs on the rear side for indication of the connection status:

CPU Module



Rear View

CON Module



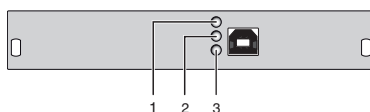
Rear View

| Pos. | LED                 | Status          | Description                                                                                                                                                                        |
|------|---------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1, 2 | Device LED (orange) | Off             | No USB-HID device or not supported USB device connected                                                                                                                            |
|      |                     | Flashing fast   | USB-HID device active                                                                                                                                                              |
|      |                     | On              | USB-HID device ready or KVM Extender in command mode                                                                                                                               |
| 3    | Status LED (orange) | Off             | <ul style="list-style-type: none"><li>No power supply voltage</li><li>CPU Unit: KVM Extender in command mode or no connection</li><li>CON Unit: Keyboard in command mode</li></ul> |
|      |                     | Flashing slowly | CON Unit: KVM Extender in command mode or no connection                                                                                                                            |
|      |                     | Flashing fast   | Operating status                                                                                                                                                                   |

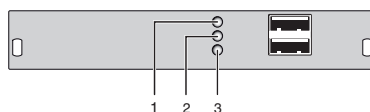
### 3.7.5 Status Upgrade module USB 2.0 embedded

The upgrade module USB 2.0 embedded is fitted with three further LEDs on the rear side for indication of the connection status:

**CPU Module**



**CON Module**



*Rear View*

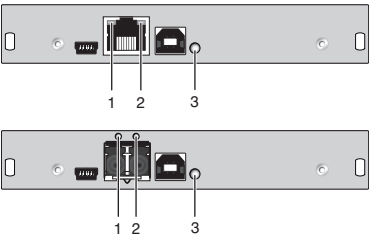
*Rear View*

| Pos. | LED                | Status          | Description                                                                                                                               |
|------|--------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Status LED (green) | Off             | No USB 2.0 device connected                                                                                                               |
|      |                    | Flashing slowly | USB 2.0 device connected                                                                                                                  |
| 2    | Status LED (green) | Off             | No connection to source (computer, CPU) available                                                                                         |
|      |                    | Flashing slowly | <ul style="list-style-type: none"> <li>• Connection to source (computer, CPU) available</li> <li>• No USB 2.0 device connected</li> </ul> |
|      |                    | On              | <ul style="list-style-type: none"> <li>• Connection to source (computer, CPU) available</li> <li>• USB 2.0 device(s) connected</li> </ul> |
| 3    | Status LED (green) | Off             | No connection between CON and CPU module                                                                                                  |
|      |                    | On              | Connection between CON and CPU module available                                                                                           |

3.7.6 Status Upgrade Module USB 2.0

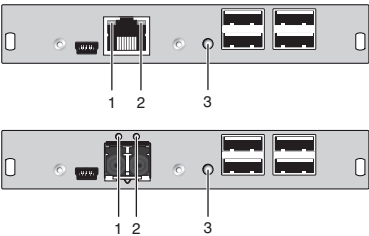
The upgrade module USB 2.0 is fitted with a multi color LED on both sides for overall status indication and with two further LEDs on the back side for indication of the connection status.

CPU Module



Rear View

CON Module



Rear View

| Pos. | LED                    | Status            | Description                                                                    |
|------|------------------------|-------------------|--------------------------------------------------------------------------------|
| 1    | Failure LED<br>(green) | Off               | Connection available                                                           |
|      |                        | On or<br>Flashing | Connection failure (flashing for about<br>20 s following a connection failure) |
| 2    | Status LED<br>(green)  | Off               | No connection via interconnect cable                                           |
|      |                        | On                | Connection available                                                           |

LED 3: USB 2.0 Status

| LED color                         |                                                                                     | Description                                                   |
|-----------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------|
| Red                               |  | Device ready                                                  |
| Green                             |  | Only connection available, no USB 2.0 signal                  |
| Green /<br>light blue<br>flashing |  | Connection available, no USB 2.0 device<br>connected          |
| Light blue                        |  | Connection and USB 2.0 signal available<br>(operating status) |

## 4 Installation

### 4.1 Package Contents

Your extender package contains the following items:

#### KVM Extender:

- KVM Extender pair (CPU Unit and CON Unit) in the vario chassis
- 1x (redundancy 2x) 5VDC international power supply unit per KVM Extender unit
- 1x (redundancy 2x) country-specific power cord
- Quick Setup
- DVI video cable (1.8 m, DVI-D male-to-male)

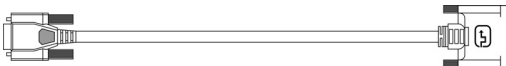


- USB cable (1.8 m, type A to type B)



#### Additional content for KVM Extender module VGA / DVI-I (replaces DVI-D cable):

- VGA cable (1.8 m, VGA male to DVI-I male)



- Infrared remote control

#### Additional content for upgrade module Analog Audio / Serial:

- Serial cable (1.8 m, D-Sub 9 male connector)

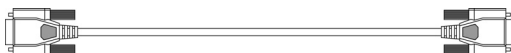


- Stereo jack cable (1.6 m, 3.5 mm male connector)



### **Additional content for upgrade module serial (RS422):**

- Serial cable (1.8 m, D-Sub 9 male connector)



### **Additional content for upgrade module Digital Audio:**

- RCA cable (2.5 m, Cinch male connector)



- TOSLINK cable (1.8 m, F05 male connector)



### **Additional content for upgrade module USB-HID:**

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



### **Additional content for upgrade module PS/2:**

- 2x PS/2 cable (1.8 m, 6-pole connector)



### **Additional content for upgrade module USB 2.0 embedded:**

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



### **Additional content for upgrade module USB 2.0:**

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



If anything is missing, contact your dealer.

## 4.2 System Setup



First time users are recommended to setup the system with the CPU Unit and the CON Unit in the same room as a test setup. This will allow you to identify and solve any cabling problems, and 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 56).

### 4.2.1 KVM Extender Setup

1. Switch off all devices.

#### CON Unit Installation

2. Connect your monitor(s), keyboard and mouse to the CON Unit.
3. Connect the CON Unit with the interconnect cable(s).
4. Connect the 5VDC power supply to the CON Unit.

#### CPU Unit Installation

5. Connect the source (computer, CPU) to the CPU Unit with the supplied cables. Please ensure the cables are not strained.
6. Connect the CPU Unit to the interconnect cable(s).
7. Connect the 5VDC power supply to the CPU Unit.
8. Power up the system.



To power up the system, the following sequence is recommended:  
Monitor – CON Unit – CPU Unit – source.



The basic module with VGA / DVI-I input is connected as above. For a complete and detailed description of the setup and configuration of the VGA option, see the manual of the Media- / DVI-Converter K238-5V ([Download](#)).

### 4.2.2 Setup of Upgrade Modules

The modules can be hot plugged.

#### **Upgrade Module Analog Audio / Serial:**

1. Connect the audio source to the CPU Unit (e.g. CPU audio output with audio input, CPU audio input with audio output).
2. Connect the audio output on the CON Unit to headphones or suitable speakers.
3. Connect the audio input on the CON Unit to a suitable microphone.

#### **Upgrade Module Serial RS422:**

1. Connect the CPU to the CPU Unit by using the serial cable.
2. Connect the CON Unit to the serial connector of the input device.

#### **Upgrade Module Digital Audio:**

1. Connect the digital audio source to the audio input of the CPU Unit.
2. Connect the audio output of the CON Unit to suitable speakers or audio amplifiers.



If several active sources are connected, Mini-XLR input takes priority. The audio signal is available at all outputs.

#### **Upgrade Module USB-HID:**

1. Connect the CPU to the CPU Unit (USB-HID 2).
2. Connect the USB-HID devices to the CON Unit (Connect to USB-HID devices 2).

#### **Upgrade Module PS/2:**

1. Connect the CPU to a CPU unit with cables for PS/2 devices.
2. Connect the PS/2 devices to the CON unit (Connector to PS/2 devices).

#### **Upgrade Module USB 2.0 Embedded:**

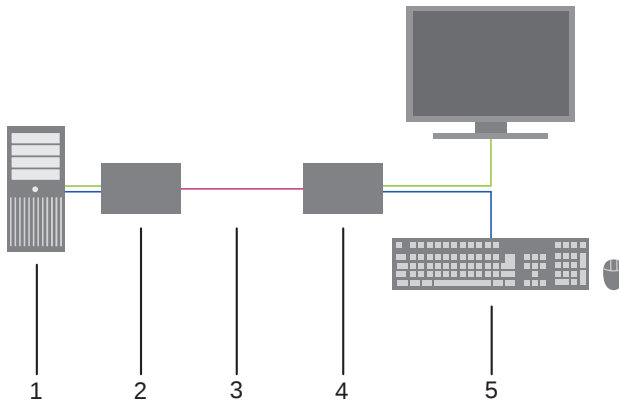
1. Connect the CPU to the CPU Unit (USB 2.0).
2. Connect the USB 2.0 devices to the CON Unit (Connect to USB 2.0 devices).

**Upgrade Module USB 2.0:**

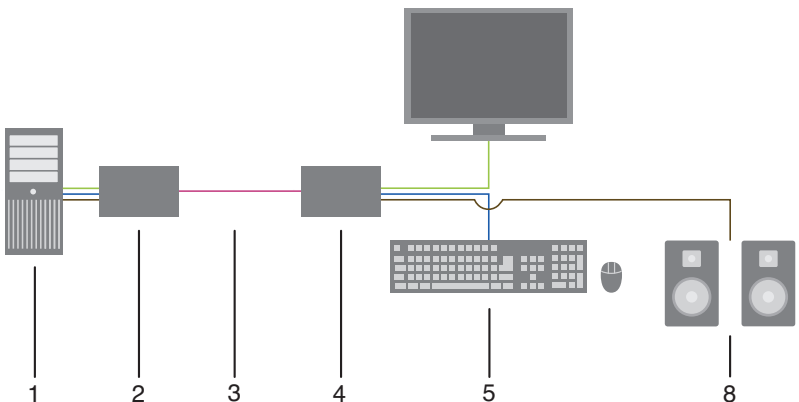
1. Connect the CPU to the CPU Unit (USB 2.0).
2. Connect the USB 2.0 devices to the CON Unit (Connect to USB 2.0 devices).

## 4.3 Example Applications

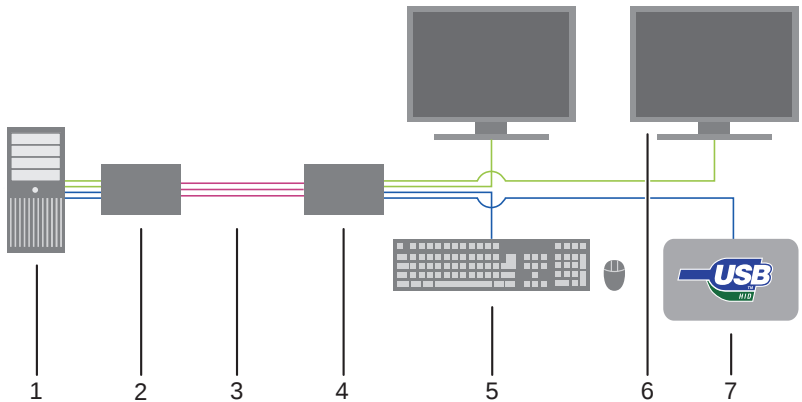
This section illustrates typical installations of KVM Extenders:



*KVM Extender (Single-Head)*



*KVM Extender (Single-Head with Digital / Analog Audio)*

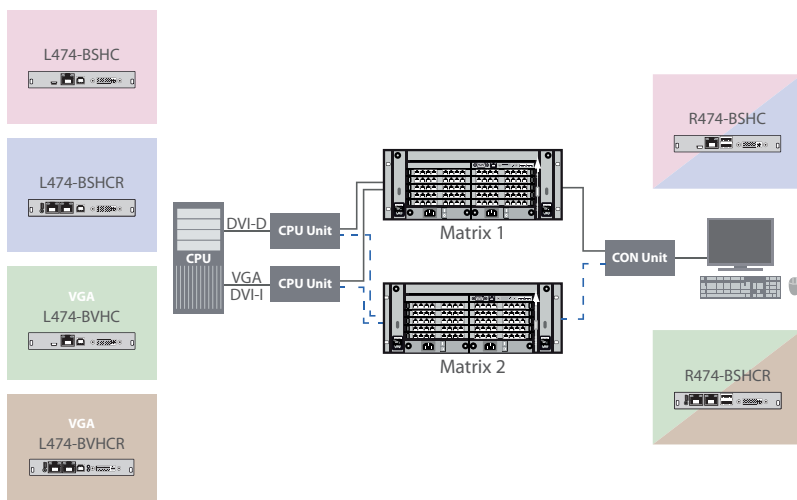


*KVM Extender (Dual-Head with 4x USB-HID)*

- 1 Source (computer, CPU)
- 2 KVM Extender CPU Unit
- 3 Interconnect cable
- 4 KVM Extender CON Unit
- 5 Console (monitor, keyboard, mouse)
- 6 Second monitor (option, only with Dual-Head devices)
- 7 USB 2.0 devices (option, only with 2x USB 2.0 devices)
- 8 Audio sink (optional, only with devices with Analog Audio / Serial option or Digital Audio option)

## 4.4 Operating Modes

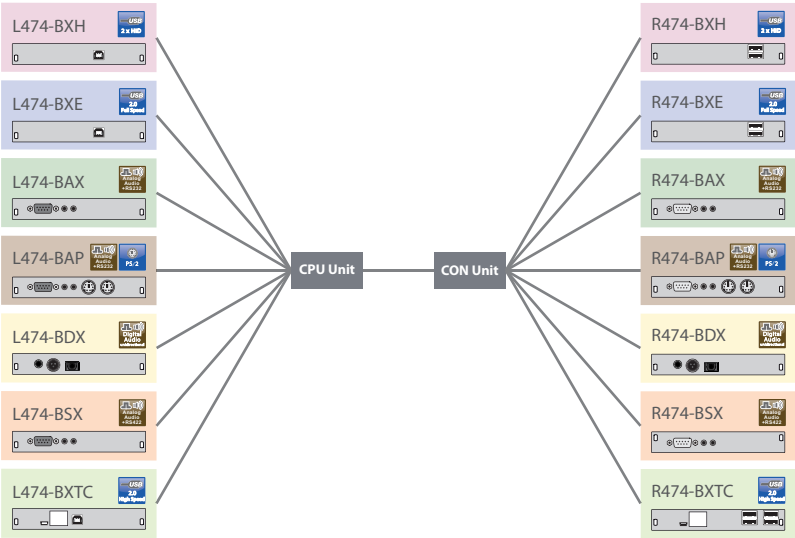
This section illustrates an overview of possible operating modes of the KVM Extender by combining the various available modules.



*Overview Operating Modes*

# 4.5 Overview Upgrade Modules

This section illustrates an overview of the available types of upgrade modules for the KVM Extender.



Overview Upgrade Modules

## 5 Configuration

### 5.1 Transmission Parameters

The device operates with a proprietary compression method.

In default configuration, the device adapts dynamically to monitor resolution and image content. This configuration is suitable for almost all conditions and should only be modified if image quality is not fully satisfactory.



In exceptional cases the displayed video image may exhibit "frame dropping" (loss of single pictures) or color effects.

### 5.2 DDC Settings

By default, the device transmits the factory preset DDC information to the CPU. This information is suitable in most cases.

Downloading of the DDC information of the console monitor can be performed during normal operation (see Chapter 6.1, Page 54).

For special requirements, DDC information can be retrieved and uploaded as a binary file to both the CPU Unit and the CON Unit.

Connect your computer with a USB mini cable to the service port of the CPU Unit or CON Unit.

The data area of the unit is now accessible as a flash drive "Extender".

#### **Uploading DDC Information**

Copy the binary file containing your specific DDC information to the flash drive of the CPU Unit or CON Unit.

The current DDC information is replaced.

#### **Retrieving DDC Information**

Copy the file "DDC-EDID.bin" on the flash drive of the CPU Unit to your computer.

To open the binary file, you have to install a suitable software, e.g. WinDDCwrite, on your computer. Contact your dealer for this purpose.

#### **Reset to Factory DDC Information**

Delete the file called "DDC-EDID.bin" on the flash drive of the CPU Unit.

By deleting this file, the factory DDC Information is restored.

## 5.3 Command Mode

During normal use, the console keyboard functions in the usual manner. However, for all KVM Extenders with USB-HID support, you can set the keyboard into a Command Mode by using a specific 'Hot Key' sequence. While in Command Mode, several functions are performed via keyboard commands. To exit Command Mode, press <Esc>.

While in Command Mode, the **Shift** and **Scroll** LEDs 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> / ('Hot Key')                                                                                                                     |
| Exit Command Mode            | <Esc>                                                                                                                                             |
| Change 'Hot Key' sequence    | <current 'Hot Key'>, <c>,<br><new 'Hot Key' code>, <Enter><br>Until 2011-30-09:<br><Left Ctrl> + <Left Shift> + <c>,<br><'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 (from 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>                      |

## 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.

## 5.4 USB-HID Ghosting

This function allows specific keyboard and mice descriptors (device descriptions) to be permanently stored in the CPU unit. This eliminates the need to register and deregister the keyboard and mouse on an operating system each time there is a shared use of a source (computer, CPU) by two or more consoles within a KVM matrix.

The following table lists the keyboard commands for the configuration of USB-HID Ghosting:

| Function                                                                                                                                                                                                                           | Keyboard Command               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Writes the device descriptions of the input devices connected to the CON Unit into the CPU Unit. Activating the emulation in the CPU Unit.                                                                                         | <'Hot Key'>, <h>, <w>, <Enter> |
| Activates the emulation of already stored device descriptions in the CPU Unit                                                                                                                                                      | <'Hot Key'>, <h>, <e>, <Enter> |
| Deactivates the emulation of active device descriptions in the CPU Unit. The input devices connected to the CON Unit will be now passed transparently to the source (computer, CPU).                                               | <'Hot Key'>, <h>, <d>, <Enter> |
| Deactivates the emulation of active device descriptions in the CPU Unit. Deletes the descriptions out of the CPU Unit. The input devices connected to the CON Unit will be now passed transparently to the source (computer, CPU). | <'Hot Key'>, <h>, <r>, <Enter> |



When using a USB combo device as a USB-HID input device, switching to a CPU Unit with activated USB-HID Ghosting may cause limited functionality.

## 5.5 Configuration File

The KVM Extender contains a configuration file (Config.txt) to set specific parameters and to read out device and video information. You can find it on the flash drive of the KVM Extender. The flash drive can be opened by a mini USB connection to a computer.

The configuration file can be edited with all common text editors.



After setting a parameter, the KVM Extender needs to be restarted.



To ensure correct identification and acceptance of the parameters, the start command **#CFG** has to be written into the first line of the Config.txt file.

### 5.5.1 Parameters for CPU Units

You can write the following parameters into the configuration file of a CPU Unit.

#### DDC-Management

| Parameter | Function                                 |
|-----------|------------------------------------------|
| ENAHPEDET | Enable hotplug switch for K238-5x series |
| LOCKEDID  | Activate DDC write protection            |

#### Digital-Audio

| Parameter | Function                                                                                       |
|-----------|------------------------------------------------------------------------------------------------|
| SRC32000  | Activate sample rate conversion, sample rate 32 kHz (only with digital audio upgrade module)   |
| SRC44100  | Activate sample rate conversion, sample rate 44,1 kHz (only with digital audio upgrade module) |
| SRC48000  | Activate sample rate conversion, sample rate 48 kHz (only with digital audio upgrade module)   |
| SRC96000  | Activate sample rate conversion, sample rate 96 kHz (only with digital audio upgrade module)   |
| SRC_NONE  | Deactivate sample rate conversion (only with digital audio upgrade module)                     |

### Compression

| Parameter | Function                         |
|-----------|----------------------------------|
| MEDCPRATE | Activate medium compression rate |
| MINCPRATE | Activate low compression rate    |
| MAXCPRATE | Activate high compression rate   |

### Parallel Operation

| Parameter     | Function                                                                                       |
|---------------|------------------------------------------------------------------------------------------------|
| KBDCON        | Activate Keyboard Connect (only with redundant CPU Units)                                      |
| MOUCON        | Activate Mouse Connect (only with redundant CPU Units)                                         |
| RELEASETIME=n | Release timer n = 0...9 seconds for Mouse and Keyboard Connect, without parameter = 10 seconds |

## 5.5.2 Parameters for CON Units

You can write the following parameters into the configuration file of a CON Unit.

### Output Settings

| Parameter  | Function                                                                                                                                  |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| 1080p50Hz  | Always display 50 Hz when using 1920x1080                                                                                                 |
| DISEXTOSD  | Deactivate extender OSD                                                                                                                   |
| ENAFRAME   | Show orange colored frame when losing extender connection                                                                                 |
| ENAHOLDPIC | Show last transmitted picture highlighted by an orange colored frame when losing connection                                               |
| ENADDCTX   | Activate DDC transmission by unplugging and connecting the monitor back to the CON Unit                                                   |
| CENTERMODE | Simulate the native resolution of Dual-Link monitors by an additional black frame in order to enable Instant Switching (482 series only). |

### 5.5.3 Parameters for CPU und CON Units

You have to write the following parameters into the configuration file of both CON Unit and CPU Unit.

#### Local switching

| Parameter   | Function                                                                                                                                                                    |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BLANKSCR    | Activate dark switching between local and remote console by keyboard or mouse event (only with HDMI extenders and local control by an USB-HID CON upgrade module)           |
| PRIVATEMODE | Activate switching of video and control between local and remote console by keyboard commands (only with HDMI extenders and local control by an USB-HID CON upgrade module) |

#### USB 2.0 embedded

| Parameter | Function                                                                                               |
|-----------|--------------------------------------------------------------------------------------------------------|
| ENAUUSB11 | Activate USB 1.1 mode for USB 2.0 embedded upgrade modules (only with USB 2.0 embedded upgrade module) |

## 6 Operation

### 6.1 Download of DDC Information

By default, data from the internal DDC list is reported to the source (computer, CPU). If these are not optimal settings for the display device, the DDC information of the console monitor can be downloaded and stored internally. The devices have to be configured accordingly (see Chapter 5.2, Page 47).

On all KVM Extenders with USB-HID support, the user can load the DDC information of the console monitor via keyboard command under operating conditions.

1. Enter Command Mode with the 'Hot Key' (see Chapter 5.2, Page 47).
2. Press the <a> key to download the DDC information of the console monitor.

The screen will go black for a short time.

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

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.

### 6.2 Parallel Operation of redundant CPU Units

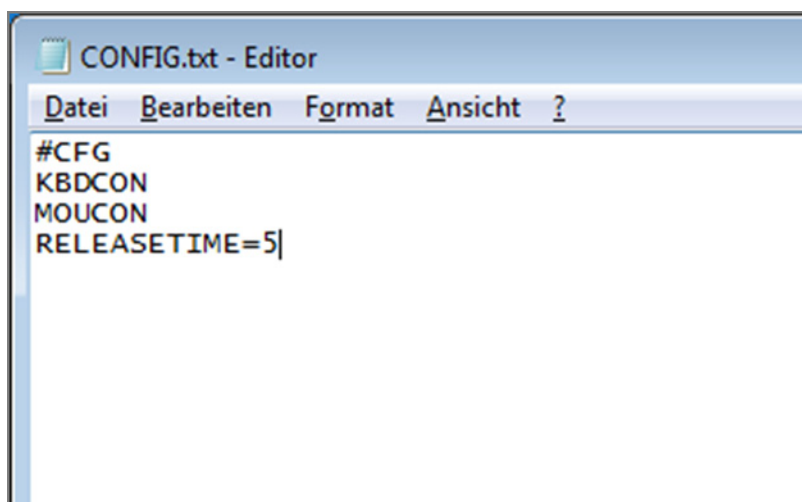
CPU Units with a redundant connector for interconnect cables offer the possibility for a competing control by two connected CON Units.

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 parallelly controlling 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. In order to activate the function of taking over control by keyboard, write the parameter **KBDCON** into the second line of the file.  
In order to activate the function of taking over control by mouse, write the parameter **MOUCON** into the second line of the file.  
In order to activate the function of taking over control by keyboard and mouse, write the parameters in the second and third line with one parameter per line.
4. Activate the release timer by writing the parameter **RELEASETIME=n** into the next free 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 10 seconds by default.
5. Save your changes.
6. Reboot the CPU Unit.



*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 DVI-D Single Link

The video interface supports the DVI-D protocol. All signals that comply with DVI-D Single Link norm can be transmitted. This includes 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 DVI-I Single Link

The video interface supports the DVI-I protocol. All analog (VGA) or digital (DVI) signals that comply to DVI-I 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.

### 7.1.3 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.

#### Mouse

Compatible with most 2-button, 3-button and scroll mice.

### Other USB-HID devices

The proprietary USB emulation also supports certain other USB-HID devices, such as specific touch screens, graphic tablets, barcode scanners or special keyboards. Support cannot be guaranteed, however, for every USB-HID device.



Only two USB-HID devices are supported concurrently, such as keyboard and mouse or keyboard and touch screen. A hub is allowed, but it does not increase the number of HID devices allowed.

To support other USB 'non-HID' devices, such as scanners, web cams or memory devices, choose our devices with transparent USB support.

## 7.1.4 PS/2

Our devices with PS/2 interface support the use of a PS/2 keyboard and mouse.

### Keyboard

Compatible with most PS/2 keyboards, even with various special keyboards. Certain keyboards with additional functions can be run with special firmware.

### Mouse

Compatible with most 2-button, 3-button and scroll mice.

## 7.1.5 USB 2.0 (transparent)

KVM Extender 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. 12 Mbits).

Each USB 2.0 port provides a maximum current of 500 mA (high power).

## 7.1.6 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.

### 7.1.7 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 ().



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.

### 7.1.8 Serial Interface

The serial interface option supports a full-duplex transmission with a real hardware handshake up to a Baud rate of 115,200 Baud.

The CON Unit is cabled as DTE (Data Terminal Equipment, like CPU output) and can be connected directly to DCE devices (Data Communication Equipment).

- A touch screen can be connected directly to the CON Unit.
- To connect to a serial printer (or any other DTE instead of DCE device), you need a null modem cable (crossed cable) between CON Unit and the device.

#### **Operation of several devices:**

The serial interface transmits 6 signals (3 for each direction). Normally, 4 of the 6 signals are handshake signals (in addition to Rx/D and Tx/D).

The following configurations, however, can be realized using special adapter splitting cables:

- Three single 2-wire transmissions
- Two transmissions with a handshake signal
- A serial mouse and a single 2-wire transmission.

In this case, choose X-ON / X-OFF software handshake for traffic control at printer and PC.

|                          |                                                                                                                                                                                                                                                  |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Connection Format</b> | DTE (Data Terminal Equipment)                                                                                                                                                                                                                    |
| <b>Speed</b>             | Up to 115,200 Baud                                                                                                                                                                                                                               |
| <b>Data Format</b>       | Format independent                                                                                                                                                                                                                               |
| <b>Data Transmission</b> | <ul style="list-style-type: none"> <li>• RxD (Receive Data)</li> <li>• TxD (Transmit Data)</li> </ul>                                                                                                                                            |
| <b>Traffic Control</b>   | <p>The following signals are transmitted (hardware handshake):</p> <ul style="list-style-type: none"> <li>• RTS (Request To Send)</li> <li>• CTS (Clear To Send)</li> <li>• DTR (Data Terminal Ready)</li> <li>• DSR (Data Set Ready)</li> </ul> |

### 7.1.9 Analog Audio Interface

The analog audio option supports a bidirectional stereo audio transmission, in near-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 to 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 also provide pre-amplification of a microphone. Open the CON Unit, locate the 'MIC' jumper on the audio board and close the pins.

## Specifications Analog Audio

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

## Specifications Analog Audio USB 2.0

|                             |                                                                                       |
|-----------------------------|---------------------------------------------------------------------------------------|
| <b>Transmission Format</b>  | Digitized virtually CD quality audio, 16 bit (8, 11.025, 16, 22.05, 32, 44.1, 48 KHz) |
| <b>Signal Level</b>         | Line-Level (5 Volt Pk-Pk maximum)                                                     |
| <b>Input Impedance</b>      | 20 KOhm                                                                               |
| <b>Connections CPU Unit</b> | 1x USB type B female connector                                                        |
| <b>Connections CON Unit</b> | 2x 3.5 mm stereo jack plug (audio in & audio out)                                     |

## 7.1.10 Serial Interface RS422

KVM Extenders with a serial interface RS422 (D-Sub 9) support a differential full duplex transmission up to a Baud rate of 115,200 Baud.

The CPU unit is designed as controlling device and can, for example, be connected directly to video or media servers.

The CON unit is designed as a controlled device and so can be connected directly to remote controllers.

|                          |                                                                                                                                                                   |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Connection Format</b> | Sony Standard                                                                                                                                                     |
| <b>Speed</b>             | Up to 115,200 Baud                                                                                                                                                |
| <b>Data Format</b>       | Format independent                                                                                                                                                |
| <b>Data Transmission</b> | <ul style="list-style-type: none"><li>• Rx + (Receive Data)</li><li>• Rx – (Receive Data)</li><li>• Tx + (Transmit Data)</li><li>• Tx – (Transmit Data)</li></ul> |

### 7.1.11 Digital Audio Interface

The digital audio option supports the unidirectional transmission of digital audio data.

Up to three sources can be connected to the CPU Unit. The active source is transmitted. If several sources are active, the XLR signal takes priority, otherwise the first active signal.

The three connectors on the CON Unit provide concurrent digital audio.

KVM Extenders with the digital audio option include an inbuilt sample rate converter that provides predefined sample frequencies at the output of the CON Unit.

The user can set directly the following parameters by using a configuration file:

- Activate or deactivate sample rate converter in the Config.txt file on the flash drive of the KVM Extender.
- If the sample rate converter is activated, the following characteristics are valid:  
140 dB dynamic range and -120 dB total harmonic distortion + noise.
- Set sample frequency of the sample rate converter by writing the parameter in a new line. The following sample frequencies are available:
  - 32.0 kHz (write **SRC32000** in Config.txt file of the CPU unit)
  - 44.1 kHz (write **SRC44100** in Config.txt file of the CPU unit)
  - 48.0 kHz (write **SRC48000** in Config.txt file of the CPU unit)
  - 96.0 kHz (write **SRC96000** in Config.txt file of the CPU unit)
- You can use a delay for converting the sample rate. The time is set in milliseconds and separated from the parameter for the sample rate by a semicolon (e.g. **SRC44100;12**). You can set the following delays for the sample rates:
  - 32.0 kHz: 3 - 60 ms
  - 44.1 kHz: 2 - 44 ms
  - 48.0 kHz: 2 - 40 ms
  - 96.0 kHz: 1 - 20 ms

- To deactivate the sample rate converter, write **SRC\_NONE** in the Config.txt file of the CPU unit.

|                           |                                                                                                                                                                        |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Compatibility</b>      | AES/EBU, S/PDIF, EIAJ CP1201, IEC 60958                                                                                                                                |
| <b>Standards</b>          | Dolby Digital, DTS, PCM                                                                                                                                                |
| <b>Bit Depth</b>          | 24 bit                                                                                                                                                                 |
| <b>Sample Rate</b>        | 32 to 192 kHz                                                                                                                                                          |
| <b>CPU Unit (Inputs)</b>  | <ul style="list-style-type: none"><li>• Mini-XLR (AES/EBU; symmetrical, lockable)</li><li>• Coaxial (S/PDIF; RCA, Cinch)</li><li>• Optical (S/PDIF; TOSLINK)</li></ul> |
| <b>CON Unit (Outputs)</b> | <ul style="list-style-type: none"><li>• Mini-XLR (AES/EBU; symmetrical, lockable)</li><li>• Coaxial (S/PDIF; RCA, Cinch)</li><li>• Optical (S/PDIF; TOSLINK)</li></ul> |

## 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.
- ➔ If the site has 3-phase AC power, try to ensure that CPU Unit and CON Unit are on the same phase.



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

|                                         |                                                                                                                                   |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>Cat X Solid-Core Cable<br/>AWG24</b> | 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).   |
| <b>Cat X Patch Cable<br/>AWG26/8</b>    | 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 Acceptable Cable Length

|                                           |                |
|-------------------------------------------|----------------|
| <b>Cat X Installation Cable<br/>AWG24</b> | 140 m (400 ft) |
| <b>Cat X Patch Cable<br/>AWG26/8</b>      | 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   | <ul style="list-style-type: none"> <li>Two fibers 9µm</li> <li>I-V(ZN)H 2E9 (in-house patch cable)</li> <li>I-V(ZN)HH 2E9 (in-house breakout cable)</li> <li>I/AD(ZN)H 4E9 (in-house or outdoor breakout cable, resistant)</li> <li>A/DQ(ZN)B2Y 4G9 (outdoor cable, with protection against rodents)</li> </ul> |
| Multi-mode 50µm   | <ul style="list-style-type: none"> <li>Two fibers 50µm</li> <li>I-V(ZN)H 2G50 (in-house patch cable)</li> <li>I/AD(ZN)H 4G50 (in-house or outdoor breakout cable, resistant)</li> </ul>                                                                                                                         |
| Multi-mode 62.5µm | <ul style="list-style-type: none"> <li>Two fibers 62.5µm</li> <li>I-V(ZN)HH 2G62.5 (in-house breakout cable)</li> <li>A/DQ(ZN)B2Y 4G62.5 (outdoor cable, with protection against rodents)</li> </ul>                                                                                                            |

### Maximum Acceptable Cable Length

| Type of cable         | Maximum Acceptable Cable Length |
|-----------------------|---------------------------------|
| Single-mode 9µm       | 10,000 m (32,800 ft)            |
| Multi-mode 50µm (OM3) | 1,000 m (3,280 ft)              |
| Multi-mode 50µm       | 400 m (1,300 ft)                |
| Multi-mode 62.5µm     | 200 m (650 ft)                  |



If you use single-mode SFPs with multi-mode fibers, you normally can double the maximum acceptable cable length.

### Type of Connector

|           |              |
|-----------|--------------|
| Connector | LC Connector |
|-----------|--------------|

## 7.3 Supported Peripherals

### 7.3.1 USB-HID Devices

The KVM Extender will support most USB-HID devices, including the vast majority of keyboards and mice currently on the market. Many other kinds of HID devices such as bar-code scanners and touch screens may also be compatible

It is not possible to guarantee support for all available USB-HID devices. In certain cases, custom firmware may be required.

USB-HID (and other) devices that are not supported as standard will normally operate with our devices featuring transparent USB support.



Please note that concurrent operation of more than two USB-HID devices is not possible even if you use a USB hub.

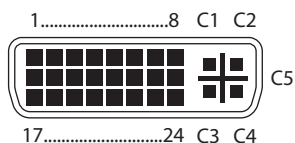
### 7.3.2 USB 2.0 Devices

KVM Extender models featuring a transparent USB 2.0 connection use Extreme USB Technology from Icron Technologies.

This technology supports **all** types of USB 2.0 devices, however the manufacturer cannot guarantee compatibility with every device on the market. Please contact your dealer if any issues are found.

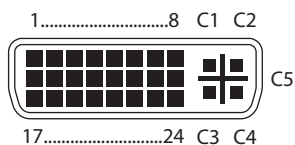
## 7.4 Connector Pinouts

### Connector DVI-D Single-Link



| Pin | Signal             | Pin | Signal               | Pin | Signal             |
|-----|--------------------|-----|----------------------|-----|--------------------|
| 1   | T.M.D.S data 2 –   | 9   | T.M.D.S data 1 –     | 17  | T.M.D.S data 0 –   |
| 2   | T.M.D.S data 2 +   | 10  | T.M.D.S data 1 +     | 18  | T.M.D.S data 0 +   |
| 3   | T.M.D.S data 2 GND | 11  | T.M.D.S data 1 GND   | 19  | T.M.D.S data 0 GND |
| 4   | n.c.               | 12  | n.c.                 | 20  | n.c.               |
| 5   | n.c.               | 13  | n.c.                 | 21  | n.c.               |
| 6   | DDC Input (SCL)    | 14  | +5VDC high impedance | 22  | T.M.D.S clock GND  |
| 7   | DDC Output (SDA)   | 15  | GND                  | 23  | T.M.D.S clock +    |
| 8   | Internal use       | 16  | Hot Plug recognition | 24  | T.M.D.S clock –    |
|     |                    |     |                      |     |                    |
| C1  | Internal use       |     |                      | C3  | Internal use       |
| C2  | n.c.               | C5  | GND                  | C4  | Internal use       |

## Connector DVI-I Single-Link

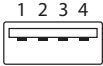


| Pin | Signal             | Pin | Signal               | Pin | Signal             |
|-----|--------------------|-----|----------------------|-----|--------------------|
| 1   | T.M.D.S data 2–    | 9   | T.M.D.S data 1–      | 17  | T.M.D.S data 0–    |
| 2   | T.M.D.S data 2+    | 10  | T.M.D.S data 1+      | 18  | T.M.D.S data 0+    |
| 3   | T.M.D.S data 2 GND | 11  | T.M.D.S data 1 GND   | 19  | T.M.D.S data 0 GND |
| 4   | n.c.               | 12  | n.c.                 | 20  | n.c.               |
| 5   | n.c.               | 13  | n.c.                 | 21  | n.c.               |
| 6   | DDC Input (SCL)    | 14  | +5VDC high impedance | 22  | T.M.D.S clock GND  |
| 7   | DDC Output (SDA)   | 15  | GND                  | 23  | T.M.D.S clock+     |
| 8   | V-sync             | 16  | Hot Plug recognition | 24  | T.M.D.S clock–     |
|     |                    |     |                      |     |                    |
| C1  | Red signal         |     |                      | C3  | Blue signal        |
| C2  | Green signal       | C5  | GND                  | C4  | H-sync             |

## Connector USB Type B

| Picture | Pin | Signal      | Color |
|---------|-----|-------------|-------|
|         | 1   | VCC (+5VDC) | Red   |
|         | 2   | Data –      | White |
|         | 3   | Data +      | Green |
|         | 4   | GND         | Black |

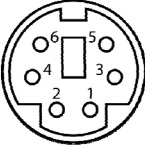
## Connector USB Type A

| Picture                                                                           | Pin | Signal      | Color |
|-----------------------------------------------------------------------------------|-----|-------------|-------|
|  | 1   | VCC (+5VDC) | Red   |
|                                                                                   | 2   | Data –      | White |
|                                                                                   | 3   | Data +      | Green |
|                                                                                   | 4   | GND         | Black |

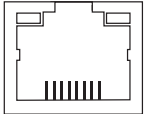
## Connector Mini USB Type B

| Picture                                                                           | Pin | Signal      | Color |
|-----------------------------------------------------------------------------------|-----|-------------|-------|
|  | 1   | VCC (+5VDC) | Red   |
|                                                                                   | 2   | Data –      | White |
|                                                                                   | 3   | Data +      | Green |
|                                                                                   | 4   | n.c.        | –     |
|                                                                                   | 5   | GND         | Black |

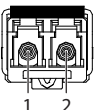
## Connector PS/2

| Picture                                                                           | Pin | Signal       |
|-----------------------------------------------------------------------------------|-----|--------------|
|  | 1   | DATA         |
|                                                                                   | 2   | GND          |
|                                                                                   | 3   | VCC (+ 5VDC) |
|                                                                                   | 4   | CLK          |
|                                                                                   | 5   | n.c.         |
|                                                                                   | 6   | n.c.         |

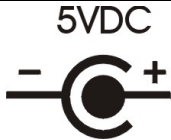
## RJ45

| Picture                                                                             | Pin | Signal | Pin | Signal |
|-------------------------------------------------------------------------------------|-----|--------|-----|--------|
|  | 1   | D1+    | 5   | D3–    |
|                                                                                     | 2   | D1–    | 6   | D2–    |
|                                                                                     | 3   | D2+    | 7   | D4+    |
|                                                                                     | 4   | D3+    | 8   | D4–    |

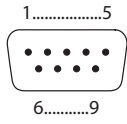
## Fiber SFP Typ LC

| Picture                                                                           | Diode | Signal   |
|-----------------------------------------------------------------------------------|-------|----------|
|  | 1     | Data OUT |
|                                                                                   | 2     | Data IN  |

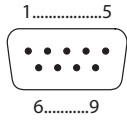
## Power Supply

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

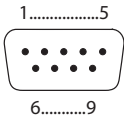
## D-Sub 9 (Serial) RS232

| Picture                                                                           | Pin | Signal | Pin | Signal |
|-----------------------------------------------------------------------------------|-----|--------|-----|--------|
|  | 1   | n.c.   | 6   | DSR    |
|                                                                                   | 2   | RxD    | 7   | RTS    |
|                                                                                   | 3   | TxD    | 8   | CTS    |
|                                                                                   | 4   | DTR    | 9   | n.c.   |
|                                                                                   | 5   | GND    |     |        |

## D-Sub 9 (Serial) RS422 Controlled Device

| Picture                                                                             | Pin | Signal | Pin | Signal |
|-------------------------------------------------------------------------------------|-----|--------|-----|--------|
|  | 1   | GND    | 6   | Rx-GND |
|                                                                                     | 2   | RxA    | 7   | RxB    |
|                                                                                     | 3   | TxB    | 8   | TxA    |
|                                                                                     | 4   | Tx-GND | 9   | n.c.   |
|                                                                                     | 5   | n.c    |     |        |

D-Sub 9 (Serial) RS422 Controlling Device

| Picture                                                                           | Pin | Signal | Pin | Signal |
|-----------------------------------------------------------------------------------|-----|--------|-----|--------|
|  | 1   | GND    | 6   | Tx-GND |
|                                                                                   | 2   | TxA    | 7   | TxB    |
|                                                                                   | 3   | RxB    | 8   | RxA    |
|                                                                                   | 4   | Rx-GND | 9   | n.c.   |
|                                                                                   | 5   | n.c.   |     |        |

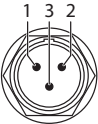
3.5 mm Stereo Jack Plug

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

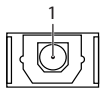
RCA (Cinch)

| Picture                                                                           | Pin | Signal        |
|-----------------------------------------------------------------------------------|-----|---------------|
|  | 1   | GND           |
|                                                                                   | 2   | Data IN / OUT |

Mini-XLR

| Picture                                                                             | Pin | Signal |
|-------------------------------------------------------------------------------------|-----|--------|
|  | 1   | GND    |
|                                                                                     | 2   | Data + |
|                                                                                     | 3   | Data - |

## TOSLINK

| Picture                                                                           | Diode | Signal        |
|-----------------------------------------------------------------------------------|-------|---------------|
|  | 1     | Data IN / OUT |

## 7.5 Power Supply

## AC Power Supply

| Model         | Max. Current  | Max. Voltage | Frequency |
|---------------|---------------|--------------|-----------|
| 474-BODY2N    | 700 mA max.   | 100-240 V    | 50/60 Hz  |
| 474-BODY6R    | 1,400 mA max. | 100-240 V    | 47-63 Hz  |
| 474-BODY6BP   | 800 mA max.   | 100-240 V    | 50/60 Hz  |
| 474-BODY6BPF  | 800 mA max.   | 100-240 V    | 50/60 Hz  |
| 474-BODY21/4U | 4,000 mA max. | 2x 100-240 V | 50/60 Hz  |

## DC Power Supply

| Model        | Max. Current | Max. Voltage |
|--------------|--------------|--------------|
| 474-BODY2/2R | 3,000 mA     | 5 VDC        |
| 474-BODY2N   | 5,000 mA     | 5 VDC        |
| 474-BODY4/4R | 5,000 mA     | 5 VDC        |
| 474-BODY6R   | 8,000 mA     | 5 VDC        |

### Power Requirement

|                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Power Requirement<br/>(per Unit)</b> | <b>KVM Extender:</b> <ul style="list-style-type: none"><li>• Single-Head devices: max. 800 mA</li><li>• Onboard DVI-I devices: max. 1,200 mA</li><li>• VGA: max. 1,700 mA</li><li>• Redundancy devices: max. 1,050 mA</li></ul> <b>Upgrade Modules:</b> <ul style="list-style-type: none"><li>• Analog Audio / Serial: max. 300 mA</li><li>• Serial(RS422): max. 150 mA</li><li>• Digital Audio: max. 300 mA</li><li>• USB-HID: max. 300 mA</li><li>• PS/2: max. 650 mA</li><li>• USB 2.0 embedded: max. 1,100 mA</li><li>• USB 2.0: max. 2,500 mA</li></ul> |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 7.6 Environmental Conditions

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

## 7.7 Size

### Devices in the 2-fold Vario Chassis 1

|                            |                                         |
|----------------------------|-----------------------------------------|
| <b>CPU Unit / CON Unit</b> | 145 x 147 x 41 mm (5.7" x 5.8" x 1.7")  |
| <b>Shipping Box</b>        | 210 x 140 x 165 mm (8.3" x 5.5" x 6.5") |

### Devices in the 2-fold Vario Chassis 2

|                            |                                           |
|----------------------------|-------------------------------------------|
| <b>CPU Unit / CON Unit</b> | 221 x 147 x 41 mm (8.7" x 5.8" x 1.7")    |
| <b>Shipping Box</b>        | 550 x 365 x 115 mm (21.7" x 14.4" x 4.5") |

### Devices in the 4-fold Vario Chassis

|                            |                                           |
|----------------------------|-------------------------------------------|
| <b>CPU Unit / CON Unit</b> | 293 x 147 x 41 mm (11.5" x 5.8" x 1.7")   |
| <b>Shipping Box</b>        | 550 x 365 x 115 mm (21.7" x 14.4" x 4.5") |

### Devices in the 6-fold Vario Chassis 6R

|                            |                                           |
|----------------------------|-------------------------------------------|
| <b>CPU Unit / CON Unit</b> | 442 x 147 x 41 mm (17.4" x 5.8" x 1.7")   |
| <b>Shipping Box</b>        | 760 x 365 x 115 mm (29.9" x 14.4" x 4.5") |

### Devices in the 6-fold Vario Chassis 6BP / 6BPF

|                            |                                           |
|----------------------------|-------------------------------------------|
| <b>CPU Unit / CON Unit</b> | 442 x 250 x 41 mm (17.4" x 9.8" x 1.7")   |
| <b>Shipping Box</b>        | 550 x 372 x 155 mm (21.7" x 14.6" x 6.1") |

### Devices in the 21-fold Vario Chassis

|                            |                                            |
|----------------------------|--------------------------------------------|
| <b>CPU Unit / CON Unit</b> | 482 x 462 x 176 mm (19.0" x 18.2" x 6.9")  |
| <b>Shipping Box</b>        | 645 x 574 x 368 mm (25.4" x 22.6" x 14.5") |

## 7.8 Shipping Weight

### Devices in the 2-fold Vario Chassis 1

|                            |                 |
|----------------------------|-----------------|
| <b>CPU Unit / CON Unit</b> | 0.4 kg (0.9 lb) |
| <b>Shipping Box</b>        | 2.2 kg (4.9 lb) |

### Devices in the 2-fold Vario Chassis 2

|                            |                 |
|----------------------------|-----------------|
| <b>CPU Unit / CON Unit</b> | 0.8 kg (1.8 lb) |
| <b>Shipping Box</b>        | 2.6 kg (5.7 lb) |

### Devices in the 4-fold Vario Chassis

|                            |                 |
|----------------------------|-----------------|
| <b>CPU Unit / CON Unit</b> | 0.9 kg (2.0 lb) |
| <b>Shipping Box</b>        | 3.4 kg (7.5 lb) |

### Devices in the 6-fold Vario Chassis 6R

|                            |                  |
|----------------------------|------------------|
| <b>CPU Unit / CON Unit</b> | 1.4 kg (3.1 lb)  |
| <b>Shipping Box</b>        | 4.6 kg (10.1 lb) |

### Devices in the 6-fold Vario Chassis 6BP / 6BPF

|                            |                 |
|----------------------------|-----------------|
| <b>CPU Unit / CON Unit</b> | 2.5 kg (5.5 lb) |
| <b>Shipping Box</b>        | 3.5 kg (7.7 lb) |

### Devices in the 21-fold Vario Chassis

|                            |                   |
|----------------------------|-------------------|
| <b>CPU Unit / CON Unit</b> | 10.0 kg (22.1 lb) |
| <b>Shipping Box</b>        | 14.5 kg (32.0 lb) |

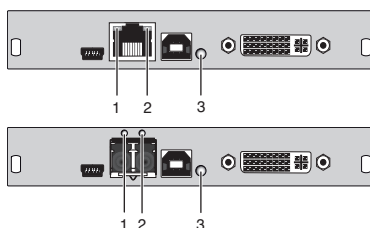
# 8 Troubleshooting

## 8.1 General Failures

| Diagnosis                             | Possible Reason               | Measure                                                            |
|---------------------------------------|-------------------------------|--------------------------------------------------------------------|
| Config.txt parameter without function | Parameter not set or saved    | ➔ Write parameter into Config.txt file and save changes.           |
|                                       | Start Command #CFG not set    | ➔ Write start command #CFG into first line of the Config.txt file. |
|                                       | Parameter written incorrectly | ➔ Check correct spelling and capitalization.                       |
|                                       | Extender not restarted        | ➔ Restart extender.                                                |

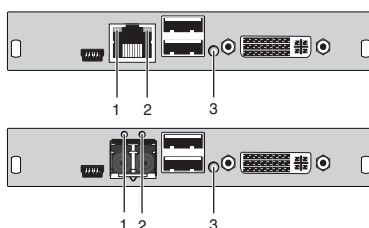
## 8.2 Blank Screen

**CPU Module**



*Rear View*

**CON Module**

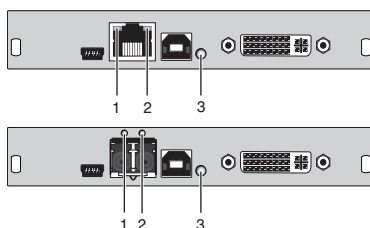


*Rear View*

| Diagnosis                        | Possible Reason                                    | Measure                                                                                                                                                                                      |
|----------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LED 3 off                        | Power supply                                       | ➔ Check power supply units and the connection to the power network.                                                                                                                          |
| LED 1 on or LED 2 off            | Connection between CON Unit and CPU Unit           | ➔ Check interconnect cables and connections.                                                                                                                                                 |
| CPU Unit:<br>LED 3 red or yellow | No video signal detected by source (computer, CPU) | ➔ Check DVI-D cable to CPU<br>➔ Download DDC information from console monitors (see Chapter 6.1, Page 54).<br>Reboot CPU if necessary.                                                       |
| CON Unit:<br>LED 3 red or yellow | No monitor detected                                | ➔ Check connection, length and quality of the DVI-D cable to monitor, tighten cable thumbscrews.                                                                                             |
|                                  | No video signal detected from CPU Unit             | ➔ Check connection, length and quality of interconnect cables between the units.<br>➔ Download DDC information from console monitors (see Chapter 6.1, Page 54).<br>Reboot CPU if necessary. |

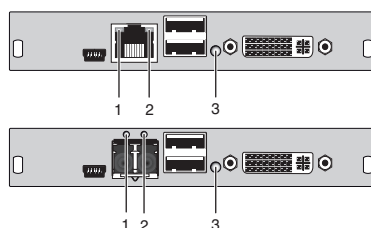
## 8.3 USB-HID

CPU Module



Rear View

CON Module



Rear View

| Diagnosis                                                 | Possible Reason                 | Measure                                                                                                                                                   |
|-----------------------------------------------------------|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Keyboard LEDs <b>Shift</b> and <b>Scroll</b> are blinking | Keyboard in Command Mode        | ➔ Press <Esc> to leave Command Mode.                                                                                                                      |
| CPU Unit:<br>LED <b>3</b> green or violet                 | No USB connection to CPU        | ➔ Check connection of USB cable to CPU; select another USB port if necessary.<br>➔ Remove USB and power cable and restart CPU. Connect power cable first. |
| CON Unit:<br>LED <b>3</b> green or violet                 | Problems with USB connection    | ➔ Check connection of USB cable to USB-HID device.<br>➔ Remove DVI and power cable and restart CON Unit. Connect power cable first.                       |
| USB device without function                               | No USB-HID device               | ➔ Connect USB-HID device.                                                                                                                                 |
|                                                           | USB-HID device is not supported | ➔ Contact dealer if necessary.                                                                                                                            |

## 8.4 Serial Connection

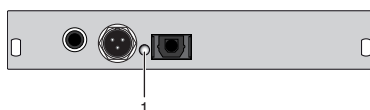
| Diagnosis                     | Possible Reason                                                  | Measure                                                                               |
|-------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Serial device not operational | Settings of the serial interface                                 | ➔ Check Baud rate and general settings.                                               |
|                               | No serial connection to CPU                                      | ➔ Check connection via serial cable.                                                  |
|                               | No serial connection to end device (e.g. touch screen, keyboard) | ➔ Connect serial end device and switch it on.<br>➔ Check connection via serial cable. |
| Touch screen not operational  | Hardware handshake                                               | ➔ Adjust serial interface to X-ON / X-OFF software handshake.                         |

## 8.5 Analog Audio

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

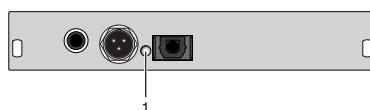
## 8.6 Digital Audio

CPU Module



Rear View

CON Module

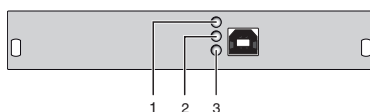


Rear View

| Diagnosis                | Possible Reason                                         | Measure                                                                                  |
|--------------------------|---------------------------------------------------------|------------------------------------------------------------------------------------------|
| CPU Unit:<br>LED 1 red   | No audio connection to<br>CPU / audio source            | ➔ Connect digital audio source.<br>➔ Check connection of audio cable.                    |
|                          | No signal                                               | ➔ Switch digital audio source on.<br>➔ Activate digital output at CPU /<br>audio source. |
| CON Unit:<br>LED 1 red   | No audio connection to<br>audio sink<br>(e.g. speakers) | ➔ Connect digital audio sink.<br>➔ Check connection of audio cable.                      |
|                          | No signal                                               | ➔ Check signal at CPU Unit.                                                              |
| No signal /<br>LEDs 1 OK | Digital Silence at active<br>audio source               | ➔ Check LEDs at CPU Unit.<br>➔ Check audio format.<br>➔ Change audio input.              |

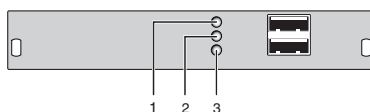
## 8.7 Upgrade Module USB-HID

**CPU Module**



*Rear View*

**CON Module**

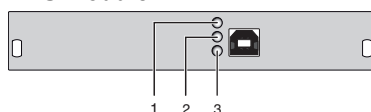


*Rear View*

| Diagnosis                          | Possible Reason                                    | Measure                                                                                                                                                                         |
|------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| LED 1 / 2 off                      | Device at higher / lower USB-HID port not detected | <ul style="list-style-type: none"> <li>➔ Check connection of USB cable to USB-HID device.</li> <li>➔ Connect USB-HID device.</li> <li>➔ Contact dealer if necessary.</li> </ul> |
| CPU Unit:<br>LED 3 off             | Connection between CON Unit and CPU Unit           | ➔ Check interconnect cable and connectors.                                                                                                                                      |
| CON Unit:<br>LED 3 off             | Keyboard in Command Mode                           | ➔ Press <Esc> to leave Command Mode.                                                                                                                                            |
| CON Unit:<br>LED 3 flashing slowly | Connection between CON Unit and CPU Unit           | ➔ Check interconnect cable and connections.                                                                                                                                     |
|                                    | Keyboard in Command Mode                           | ➔ Press <Esc> to leave Command Mode.                                                                                                                                            |

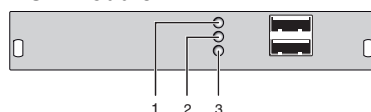
## 8.8 USB 2.0 embedded

**CPU Module**



*Rear View*

**CON Module**

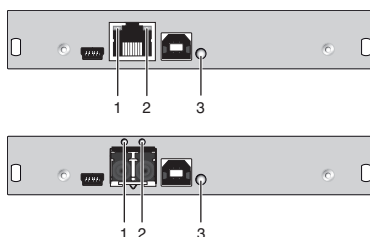


*Rear View*

| Diagnosis                                                        | Possible Reason                             | Measure                                                                                                                                                                                                        |
|------------------------------------------------------------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CPU & CON Unit:<br>LED 3 off                                     | No connection to CPU                        | <ul style="list-style-type: none"> <li>➔ Check connection USB cable to CPU; select another USB port if necessary.</li> <li>➔ Remove USB and power cable and restart CPU. Connect power cable first.</li> </ul> |
| CPU & CON Unit:<br>LED 2 off                                     | No connection between CON Unit and CPU Unit | <ul style="list-style-type: none"> <li>➔ Check interconnect cable and connectors.</li> </ul>                                                                                                                   |
| CPU & CON Unit:<br>LED 2 off and USB 2.0 device without function | No USB 2.0 device                           | <ul style="list-style-type: none"> <li>➔ Connect USB 2.0 device.</li> </ul>                                                                                                                                    |
|                                                                  | USB 2.0 device is not supported             | <ul style="list-style-type: none"> <li>➔ Check installation at the CPU, also the necessary drivers.</li> <li>➔ New connection of the USB 2.0 device.</li> <li>➔ Contact dealer if necessary.</li> </ul>        |

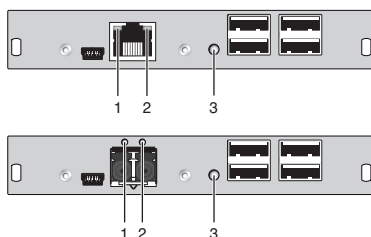
## 8.9 USB 2.0

**CPU Module**



*Rear View*

**CON Module**



*Rear View*

| Diagnosis                                                                                      | Possible Reason                             | Measure                                                                                                                                                           |
|------------------------------------------------------------------------------------------------|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CPU Unit:<br>All LEDs off                                                                      | No connection to CPU                        | <p>➔ Check connection USB cable to CPU; select another USB port if necessary.</p> <p>➔ Remove USB and power cable and restart CPU. Connect power cable first.</p> |
| CON Unit:<br>LED 3 red                                                                         | Connection between<br>CON Unit and CPU Unit | ➔ Check interconnect cable and connectors.                                                                                                                        |
| CON Unit:<br>LED 3 flashing<br>green / light<br>blue and<br>USB 2.0 device<br>without function | No USB 2.0 device                           | ➔ Connect USB 2.0 device.                                                                                                                                         |
|                                                                                                | USB 2.0 device is not<br>supported          | <p>➔ Check installation at the CPU, also the necessary drivers.</p> <p>➔ New connection of the USB 2.0 device.</p> <p>➔ Contact dealer if necessary.</p>          |

## 9 Technical Support

Prior to contacting support please ensure you have read this manual, and then installed and set-up your KVM Extender 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 Certificates

## 10.1 CE Declaration Of Conformity

The products listed below in the form as delivered comply with the provisions of the following European Directives:

2004/108/EG Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility



CE Marking 2009

Product list:

474 Series

The products comply with the following harmonized standards for Information Technology Equipment:

- EN 55022:2006 + A1:2007 (Class A)
- EN 55024:1998 + A1:2001 + A2:2003

This declaration certifies the conformity to the specified directives but contains no assurance of properties. The safety instructions and installation guidelines noted in this manual shall be considered in detail. Compliance with the specifications for cable lengths and types is mandatory.

Manufacturer:

IHSE GmbH

Maybachstrasse 11

88094 Oberteuringen

Deutschland

Oberteuringen, 26 January 2010

The Management



### Use in a Domestic Environment

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

## 10.2 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.

## 10.3 Product Safety

The product safety of the devices is proven by the compliance to the following standards:

- IEC 60950-1A1:2010
- EN 60950-1/A12:2011
- UL 60950-1-2007
- CAN/CSA-C22.2 60950-1-07

The compliance is verified and confirmed by TÜV Süd, Germany.



### 10.4 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.

### 10.5 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. |
| Dual Access     | A system to operate a source (computer, CPU) from two consoles                                                                                                                                                                                      |
| 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                                                                                                                                                                                                                 |

| Term        | Explanation                                                                                                                                                                                                           |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DVI         | Digital video standard, introduced by the Digital Display Working Group ( <a href="http://www.ddwg.org">http://www.ddwg.org</a> ). 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.<br>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.                                                        |
| 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                                                                                                                                                                                            |

| Term          | Explanation                                                                                                                                                                                                                                                                                                   |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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.<br>There is no need for a special driver during installation; "New USB-HID device found" is reported.<br>Typical HID devices include keyboards, mice, graphics tablets and touch screens. Storage, video and audio devices are <b>not</b> 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.                                                                                                     |