



ACS4002A-R2
ACS4002A-R2-MM, ACS4002A-R2-SM
ACS4011A-R2
ACS4011A-R2-MM, ACS4011A-R2-SM

**DVI-D-CATx/Fiber KVM-Extender
with USB 2.0 transparent support**

DVI-I-CATx/Fiber KVM-Extender

Manual

<http://www.blackbox.com>

Welcome to the DVI-D/-I CATx/Fiber KVM-Extender Family!

Thank you for purchasing a DVI-D/-I CATx/Fiber KVM-Extender! We appreciate your business, and we think you'll appreciate the many ways that your enhanced RGB Graphic system will save you money, time, and effort.

That's because our DVI-D/-I CATx/Fiber KVM-Extender is all about breaking away from the traditional model of attaching a new display to DVI graphic source. Using the DVI-D/-I CATx/Fiber KVM-Extender, you can remotely locate monitor, keyboard and mouse up to 140m (@ CATx) away from your CPU. Singlemode fibers allow up to 10km!

Wherever long distances are required, e.g. airports, industrial plants, call-centres or in distributed computer centres, the DVI-D/-I CATx/Fiber KVM-Extender is the best way, to solve all problems in remotely locating your console. 2 families with 3 different types are available: one family with devices for DVI-I (DVI-D/-I + VGA) and one family with USB 2.0 transparent support – CATx, Multimode and Singlemode.

This manual will tell you all about your new DVI-D/-I CATx/Fiber KVM-Extender, including how to install, operate, and troubleshoot it. For an introduction to the Converter, see **Chapter 2**. The Converter product codes covered in this manual are:

ACS4002A-R2:	KVM-Extender DVI-D, USB-HID + USB 2.0, CATx
ACS4002A-R2-MM:	KVM-Extender DVI-D, USB-HID + USB 2.0, Multimode
ACS4002A-R2-SM:	KVM-Extender DVI-D, USB-HID + USB 2.0, Singlemode
ACS4011A-R2:	KVM-Extender DVI-I (VGA), USB-HID, CATx
ACS4011A-R2-MM:	KVM-Extender DVI-I (VGA), USB-HID, Multimode
ACS4011A-R2-SM:	KVM-Extender DVI-I (VGA), USB-HID, Singlemode

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Disclaimer

While every precaution has been taken in the preparation of this manual, the manufacturer assumes no responsibility for errors or omissions. Neither does the manufacturer assume any liability for damages resulting from the use of the information contained herein. The manufacturer reserves the right to change the specifications, functions, or circuitry of the product without notice.

The manufacturer cannot accept liability for damage due to misuse of the product or due to any other circumstances outside the manufacturer's control (whether environmental or installation related). The manufacturer shall not be responsible for any loss, damage, or injury arising directly, indirectly, or consequently from the use of this product.

Cautions and Notes

The following symbols are used in this guide:



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



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

CONFORMITY

The products, mentioned in this manual are released according to the following standards:



WARNING: 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 own expense.

Safety Precautions and Installation Guidelines

To ensure reliable and safe long-term operation, please note the following installation guidelines:

- Do not use CATx-devices to link between buildings – please use fiber devices.
- Only use in dry, indoor environments.
- If the building has 3-phase AC power, try to ensure that equipment connected to the Local and Remote units is on the same phase.
- Try not to route a CATx link cable alongside power cables.
- The Remote unit, Local unit and any power supplies can get warm. Do not locate them in an enclosed space without any airflow.
- Do not place a power supply directly on top of a unit.
- Do not obstruct a unit's ventilation existing holes.



To safeguard against personal injury and avoid possible damage to equipment or property, please observe the following:

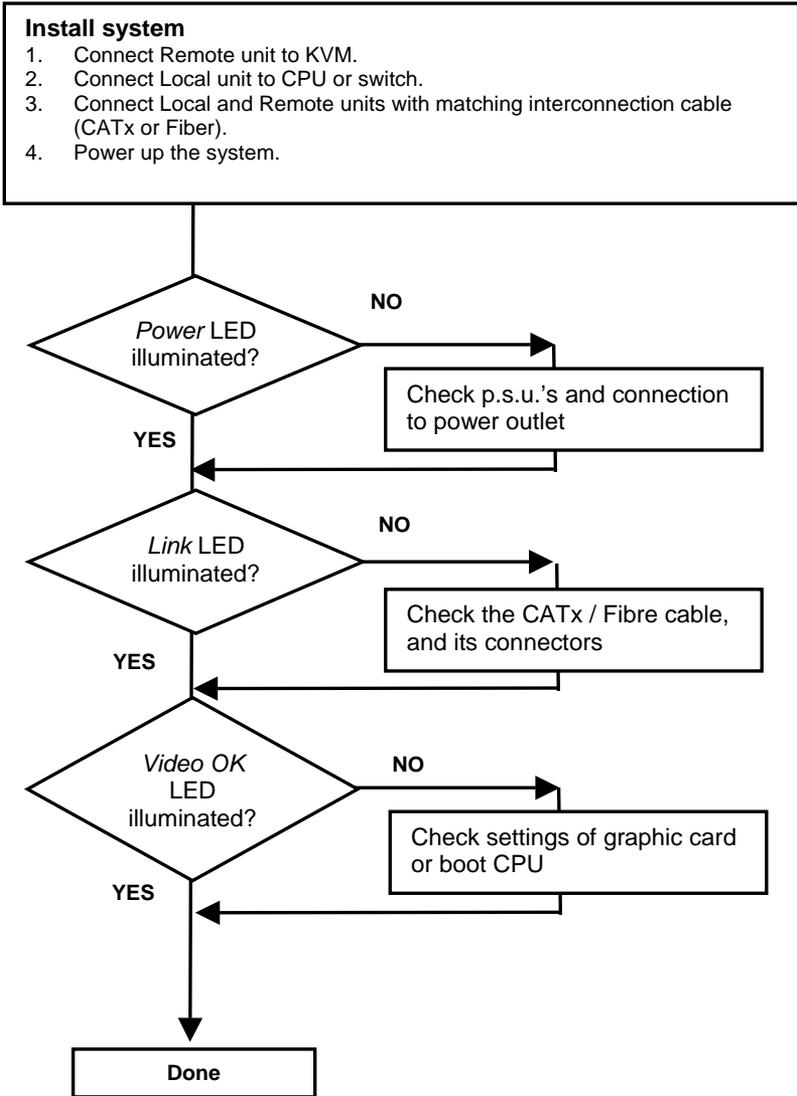
- Only use power supplies originally supplied with the product or manufacturer-approved replacements. Do not attempt to dismantle or repair any power supply. Do not use a power supply if it appears to be defective or has a damaged case.
- Connect all power supplies to grounded outlets. In each case, ensure that the ground connection is maintained from the outlet socket through to the power supply's AC power input.
- Do not attempt to modify or repair this product, or make a connection from the CATx link interface (RJ45) to any other products, especially telecommunications or network equipment.

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1. Quick Setup

This section briefly describes how to install your KVM extender system. Unless you are an experienced user, we recommend that you follow the full procedures described in the rest of this manual.



2. Overview

2.1 Introduction

A CATx/Fiber KVM Extender is mainly used, to extend the maximum distance between a CPU and his Keyboard / Monitor/ Mouse considerably. In addition they are beneficial in installations in electromagnetic hazardous environments (EMI). Regular Keyboard-/ Monitor-/ Mouse extender cables (and Extender using traditional cables) cannot go so far and EMI interferences may reduce the maximum distance and/or reliability. Using a DVI-D/-I CATx Extender system, these limitations are past. Retain your CPU in a secure rack cabinet or data center while accessing from a 140m remotely located place.

A basic KVM extension system comprises a *Local* unit and a *Remote* unit. The Local unit connects directly to the computer (or a KVM switch system) using the supplied cable(s). The user *console* (keyboard, mouse and monitor) attaches to the Remote unit. The Remote and Local units communicate video and data information along the interconnecting cables. Local units offer dual access, allowing the connection of a second monitor close to the computer.

2.2 Glossary

The following terms are used in this guide:

CATx	Any Category 5, 5e, 6 or higher cable, solid wires type AWG24. Although flexible AWG27/7 cables can be used too, the lengths of flexible cables count twice in the calculation of the total distance.
Fiber	9 μ Singlemode or 50 μ /62,5 μ Multimode fiber cable.
KVM	Keyboard, Video and Mouse.
Console	Keyboard, Mouse and Monitor
Dual Access	A system allowing connection of Local and Remote user consoles.
Single-Head	An extender system that supports one monitor + Keyboard/Mouse
Dual-Head	An extender system that supports two monitors + Keyboard/Mouse
DVI	Digital Video standard, installed by Digital Display Working Group (www.ddwg.org) R, G, B, CLOCK in a data stream with up to 3x 1,6 Gbit/sec. Signals are TMDS Level.
PSU	The desktop power supply connected to the Local/Remote unit.
HID	Human Interface Devices are units, which are used for human access to the CPU. They are a USB-device class of its own (e.g. Memory Devices etc.). Besides of keyboard and mouse also touchscreen, light pen, fingerprint sensor, graphic tablets etc. are HID devices

DVI-D/DVI-I CATX/FIBER KVM-EXTENDER

CPU with DVI-D
Graphic card

Local Console

Optional
2nd Monitor



DVI-D CATx KVM-
Extender system



Optional Serial /
Audio



Remote Console

Optional
2nd Monitor



DVI-D-I CATx – KVM Extender system (example)

2.3 Features

All members of the DVI-D/-I CATx/Fiber - DVI KVM Extender Series offer the following features:

- Support for DVI-D Graphic cards
- Support for USB-Keyboard and USB-Mouse (USB-HID)



Devices with USB-HID support ONLY Keyboard and Mouse. It's possible, that other HID devices (Human Interface Device) like touch-screens, graphics tablets, barcode readers or similar are supported – but there is no guarantee for this! The DVI-D/-I CATx/Fiber KVM-Extender for USB-HID is NOT suitable for use with other USB devices like Scanner, WEB-Cams, data sticks etc.



The USB- HID device never supports more than two devices – Keyboard and Mouse or Keyboard and Touch screen, etc. but not e.g. Keyboard, Mouse and Touch screen simultaneously. A Hub is allowed but does not raise the number of supported devices

- Maximum resolution: DVI-D: 1920x1200@60Hz over all allowed distances all resolutions below of 1600x1200 with refresh rates of at least 75Hz
- Supporting 16 Bit/24 Bit auto switching or fixed 24 Bit color depth (user selectable)
- Status indicator LEDs on each device.
- Small footprint chassis.
- CPU cables + Adapters included.
- Rack mount kit available.

ACS4002 family:

- Additional USB 2.0 transparent high speed transmission (requiring an additional CATx cable or fiber pair). 4 devices can be attached directly at the Remote Unit – more by using regular USB- Hubs.

ACS4011 family

- Supporting DVI-I input – meaning either DVI-D or VGA input.
- Built-in scaler allows to resize the input frame to fit to the attached monitor

2.4 Product Range

There are six products in the range and various upgrade kits:

DVI-D/-I CATx - Extender

ACS4002A-R2:	KVM-Extender DVI-D, USB-HID + USB 2.0, CATx
ACS4002A-R2-MM:	KVM-Extender DVI-D, USB-HID + USB 2.0, Multimode
ACS4002A-R2-SM:	KVM-Extender DVI-D, USB-HID + USB 2.0, Singlemode
ACS4011A-R2:	KVM-Extender DVI-I (VGA), USB-HID, CATx
ACS4011A-R2-MM:	KVM-Extender DVI-I (VGA), USB-HID, Multimode
ACS4011A-R2-SM:	KVM-Extender DVI-I (VGA), USB-HID, Singlemode

Upgrade Kits

ACS2209A-RMK	19"/1U Rack mount- Kit to mount one devices
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2.5 Compatibility

Interface Compatibility

- **Digital Video (DVI-D):** Digital Video standard, installed by Digital Display Working Group (www.ddwg.org) R, G, B, CLOCK in a data stream with up to 3x 1,6 GBit/sec. Signals are TMDS Level.
- **USB Keyboard:** Compatible with all standard keyboards. Certain keyboards with enhanced features may also be supported with custom firmware. Keyboards with built-in hub are also supported – but there are never more than two HID devices supported.
- **USB Mouse:** Compatible with all standard 2-button, 3-button and wheel mice.
- **USB HID:** Human Interface Devices like touch-screens, graphics tablets, barcode readers or similar are supported – but there is no guarantee for this! The USB-HID is NOT suitable for use with other USB devices like Scanner, webcams, data sticks etc



Devices with USB-HID support ONLY Keyboard and Mouse. It's possible, that other HID devices (Human Interface Device) like touch-screens, graphics tablets, barcode readers or similar are supported – but there is no guarantee for this! The DVI-D/-I CATx/Fiber KVM-Extender for USB-HID is NOT suitable for use with other USB devices like Scanner, webcams, data sticks etc.



The USB-HID device never supports more than two devices – Keyboard and Mouse or Keyboard and Touch screen, etc. but not e.g. Keyboard, Mouse and Touch-screen simultaneously. A hub is allowed but does not raise the number of supported devices.

2.6 How to Use This Guide

This guide describes the installation and configuration of the DVI-D/-I CATx/Fiber – Extender Series. Although the connection and operation of the system is relatively straightforward, you should consider the following before getting started:

Connection & Compatibility

If you have purchased an *Extender Kit*, this will contain all the cables required to connect the Local unit to your PC or KVM switch. Please see also: **Package Contents** (page 15)

For information about connection and installation, see **Interconnection Cable Requirements**, page 16.

DDC Information

Normally it is not necessary to make any adjustments to the DVI-D/-I CATx/Fiber- Extender. However, in some circumstances, it may be necessary to redefine the source of DDC Information for the CPU. By default, the DVI-D/-I CATx/Fiber KVM-Extender uses its own internal DDC table. If this setting does not satisfy your requirements, the DDC table can either be switched to the locally attached screen or could be downloaded from remotely located screen and stored in the internal DDC table.

To modify the DDC-Setup, see **Service Setup** (page 25).

Selecting the moment of switching to the next frame

The transmission of screen data is not synchronous to the screen change of the graphic card. Normally, the transmission is terminated during displaying a frame on the screen. If the device switches to the new frame during the displaying period of the old frame (somewhere on the screen), it's possible, and that you can see horizontal screen breaks in the moment of switching (default). On the other hand the device must idle, until the actual frame is displayed completely (until VSYNC) -> the number of frames per second transmitted sinks.

To modify the switching behaviour, see **Service Setup** (page 25).

Selection of Color reduction for transfer acceleration

You can select, whether always 24 Bit colors (=full color depth) are transmitted or whether the compression algorithm automatically switches between 16 and 24 Bit colors to accelerate the data transfer (default). Normally the difference between 24 Bit and 16 Bit is not recognizable but under some special circumstances e.g. in photo processing installations there might be disturbing color aberrations. However, the automatic color switching enhances the count of frames; transmitted per second, fixed 24 Bit color depth gives smooth color grades under all circumstances. Please select to your choice the better mode.

To modify the color depth, see **Service Setup** (page 25).

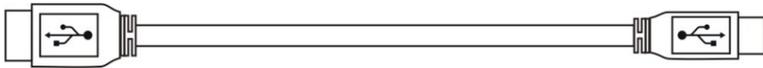
3. Installation

For first-time users, we recommend that you carry out a test placement, confined to a single room, before commencing full installation. This will allow you to identify and solve any cabling problems, and experiment with the KVM extender system more conveniently.

3.1 Package Contents

You should receive the following items in your extender package (all types):

- DVI-D/-I CATx/Fiber KVM-Extender- pair (Local Unit + Remote Unit)
- 2x US type power cords and power supplies
- User manual (Quick Setup)
- 1x USB (1,8m) cable (USB type A to type B)

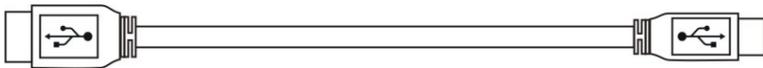


ACS4002-R2 family (additionally):

- 1x DVI-D (1,8m) video cable (DVI-D dual link male-to-male)



- 1x USB (1,8m) cable (USB type A to type B)



ACS4011-R2 family (additionally):

- 1x VGA/DVI-D (1,8m) video cable (HD15male / DVI-D dual link male)



- Infrared Remote Control (IR-RC)

If anything is missing, please contact Technical Support (see **Appendix D – Calling Technical Support**).

3.2 Interconnection Cable Requirements

To connect the Local and Remote units you will need:

- **USB:** Connect the supplied USB CPU cable to your CPU (KVM.- Switch, etc.). Please ensure that the connection is tension-free!
- **DVI:** Connect the supplied DVI CPU cable to your CPU (KVM.- Switch, etc.). Please ensure that the connection is tension-free!
- **VGA/DVI:** Connect the supplied VGA to DVI CPU cable to your CPU (KVM- Switch, etc.). Please ensure that the connection is tension-free!
- **CATx Cable:** Recommended cable: S/UTP (CATx) according EIA/TIA 56A, TSB 36 or Digital STP 17-03170. Four pairs AWG 24 connection according EIA/TIA 568A (10BaseT). Use of cables from a higher category (Cat5e, Cat6, Cat7) is possible.



The use of unshielded CATx Cable is possible, because of the higher electromagnetic noise/sensitivity the device class may not be reached



The use of flexible Cables (Patch cable) Type AWG26/7 is possible. Because of the higher loss of the stranded cables, the maximum distance is reduced to approx. half the value of solid cables.



A point to point connection is required. Having one or more patch panels in the line is possible and allowed. Not allowed is a connection from the CATx link interface (RJ45) to any other products, especially telecommunications or network equipment.

- **Fiber Cable:** Two strands of fiber are required for Single-Head devices, four strands for Dual-Head devices.



Please note that the allowed distance will depend on device type AND on used fiber type.

- Recommended cables:

ACSxxxxA-MM: Multimode type 50/125 μ	allowed distance app. 400m (1,300ft)
ACSxxxxA-MM: Multimode type 62.5/125 μ	allowed distance app. 200m (650ft)
ACSxxxxA-SM: Singlemode type 9/125 μ	allowed distance app. 10km (32,750ft)



A point to point connection is required. Having one or more patch panels in the line is possible and allowed. Not allowed is a connection from the Fiber link interface (LC) to any other products, especially telecommunications or network equipment.



Our experiences show, that Singlemode devices regularly work well on Multimode Fibers where vice versa it will never do. In addition we found, that Singlemode devices on Multimode fibers may extend the allowed distance on Multimode fibers to twice the regular length. Anyway this cannot be guaranteed and must be evaluated by the end-user at own expense.

- **Power Supply**

Connect the supplied 5V/DC power supplies to the **Plug** terminal on the rear of both Local and Remote units.

3.3 System Setup

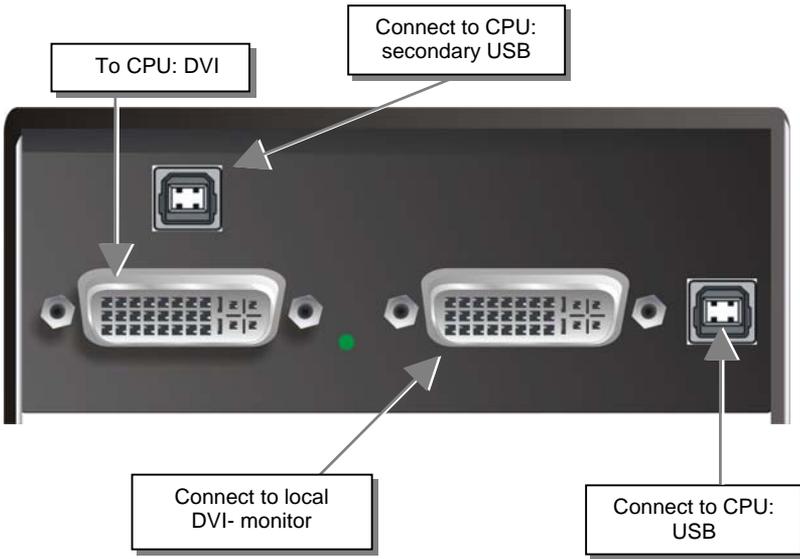
To install your DVI-D/-I CATx/Fiber – Extender system:

1. Switch off all devices.
2. Connect your keyboard, monitor(s) and mouse to the Remote unit
3. Using the supplied CPU cable(s), connect the USB and monitor connectors on the computer (or KVM switch).
4. Connect the interconnect cable to the INTERCONNECT socket(s)
5. Connect the 5V power supply to power the unit.

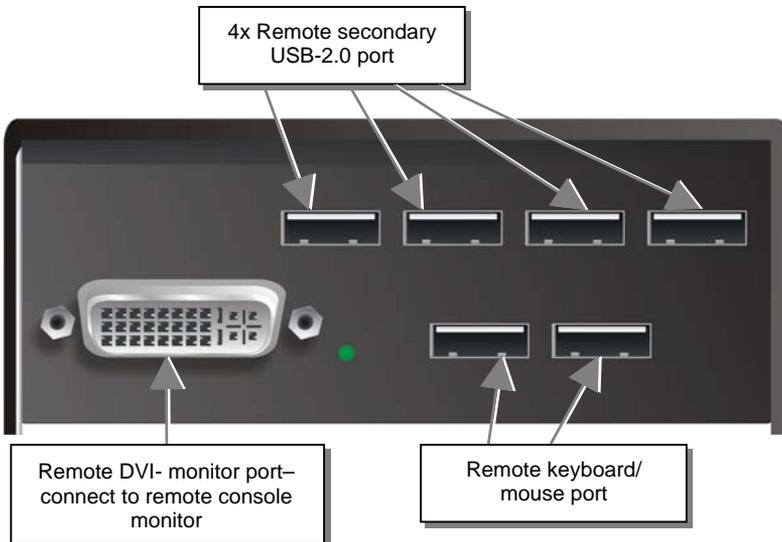


Only use the power supply originally supplied with this equipment or a manufacturer-approved replacement.

6. To attach a local (USB-) Keyboard/Mouse, please use additional USB port(s) at your CPU or use a USB Hub in-between CPU and Local unit's USB connector.
7. Power up the system.

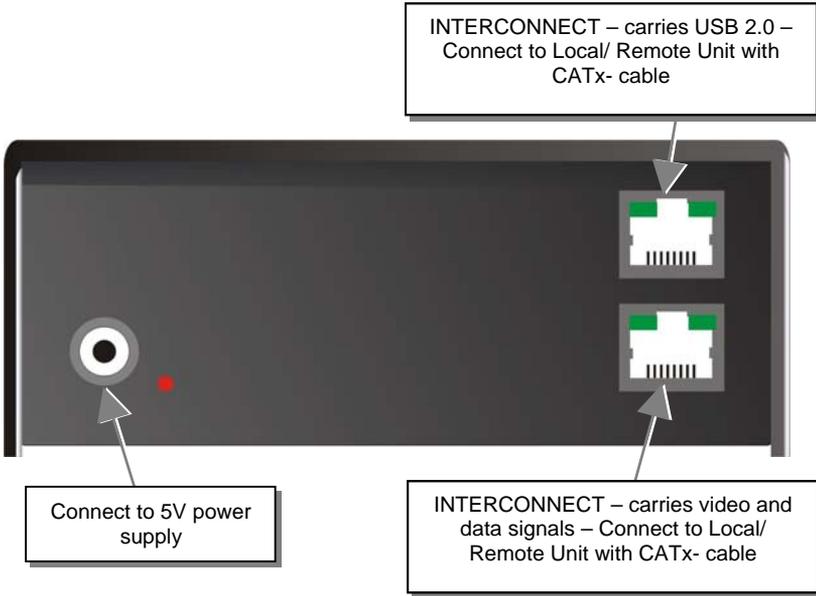


ACS4002A-R2/ACS4002A-R2-xx Local Unit with 2x USB-HID + 4x USB-2.0

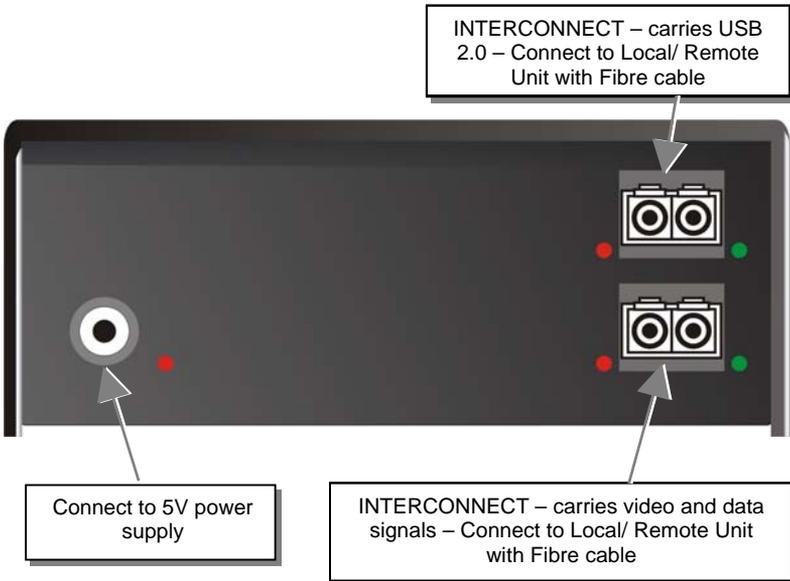


ACS4002A-R2/ACS4002A-R2-xx Remote Unit with 2x USB-HID + 4x USB-2.0

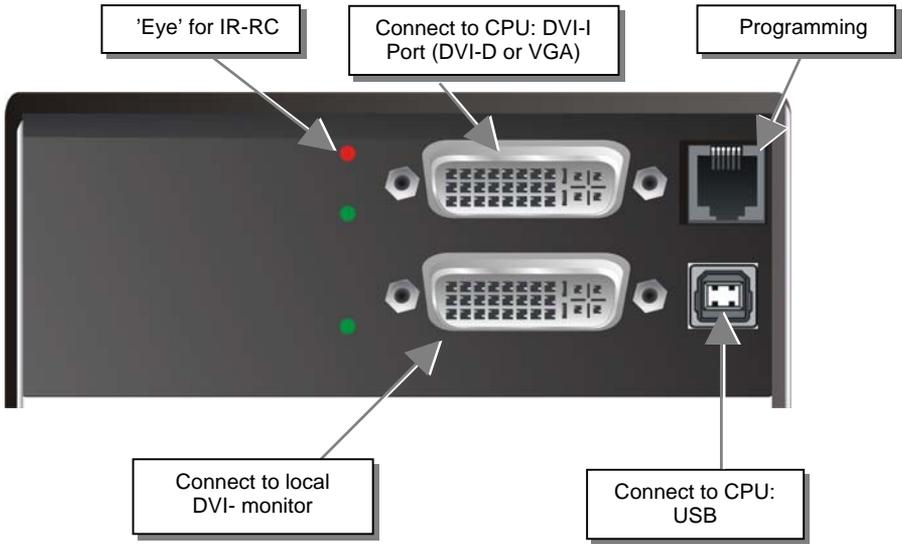
DVI-D/DVI-I CATX/FIBER KVM-EXTENDER



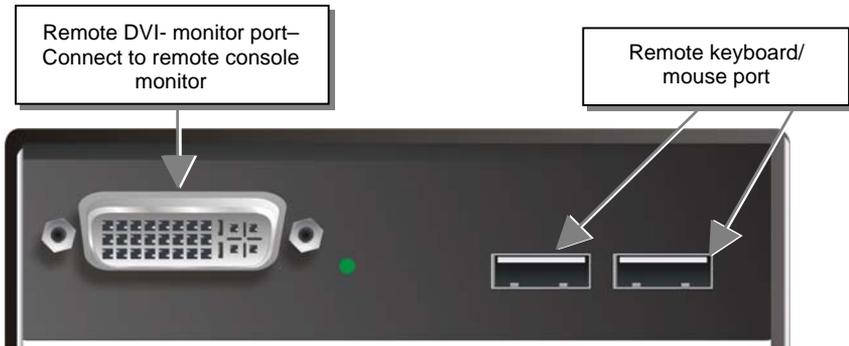
ACS4002A-R2, Local/ Remote Unit – rear view CATx



ACS4002A-R2-xx, Local/ Remote Unit – rear view Fiber

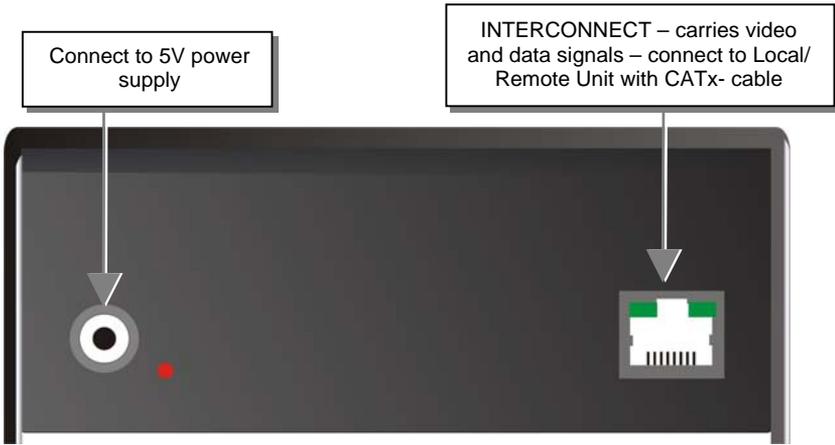


ACS4011A-R2/ACS4011A-R2-xx Local Unit with DVI-I Input (DVI-D + VGA)

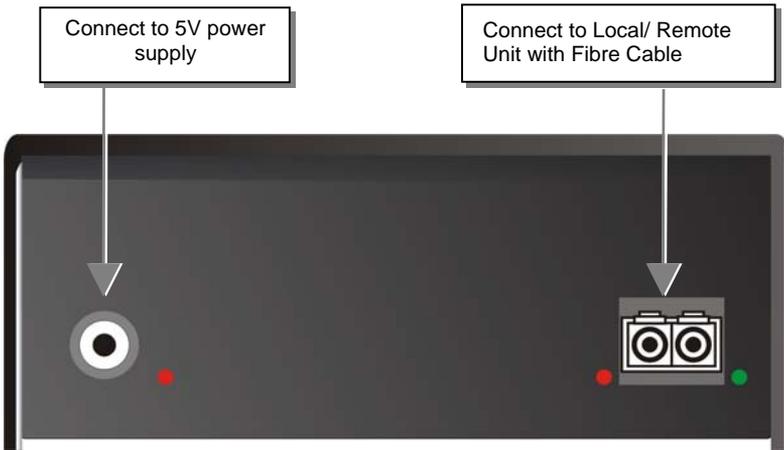


ACS4011A-R2/ACS4011A-R2-xx Remote Unit

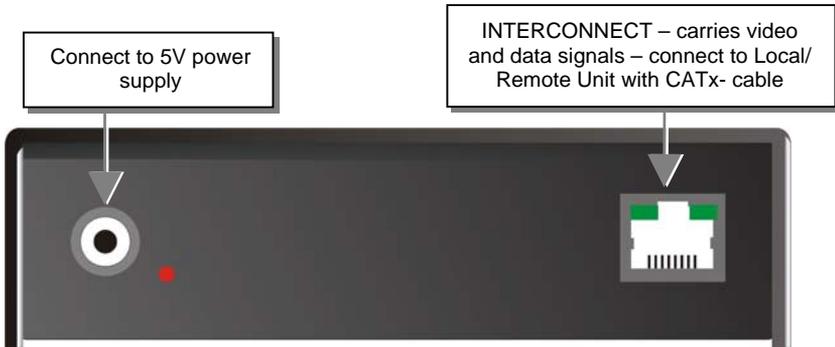
DVI-D/DVI-I CATX/FIBER KVM-EXTENDER



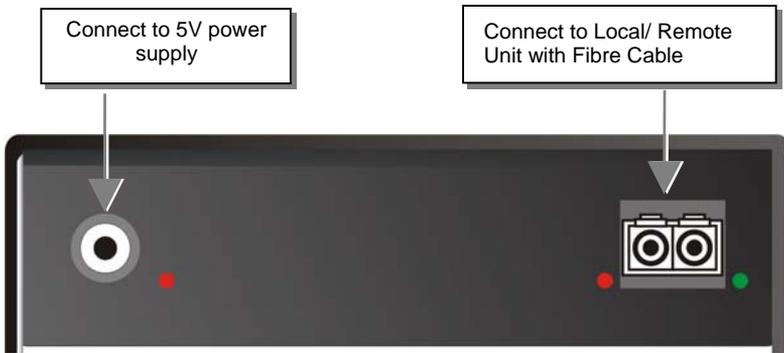
ACS4011A-R2 Local Unit (CATx) – Rear View



ACS4011A-R2-xx Local Unit (Fibre) – Rear View



ACS4011A-R2 Remote Unit (CATx) – Rear View

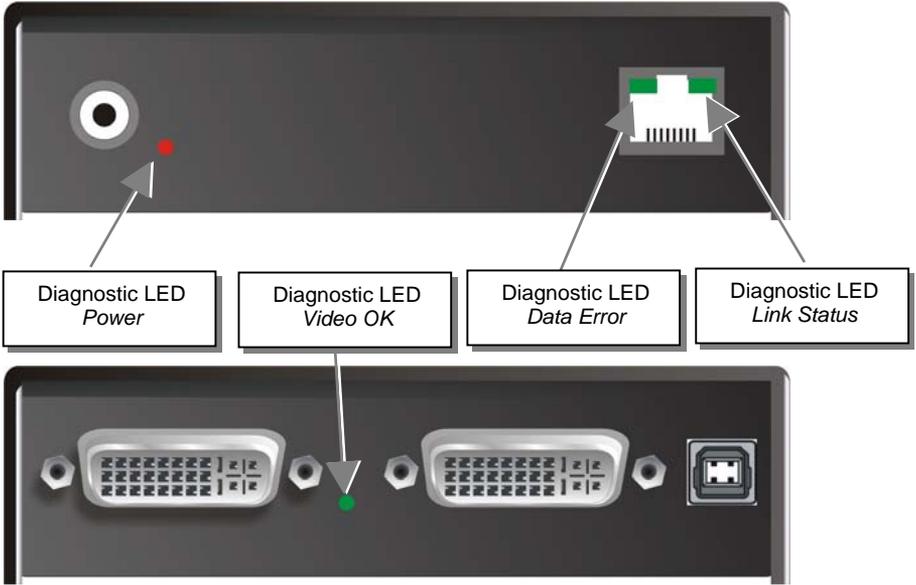


ACS4011A-R2-xx Remote Unit (Fibre) – Rear View

3.4 Diagnostic LEDs

Each DVI-D/I CATx KVM-Extender is fitted with indicator LEDs: *Power, Video OK, Data Error, Link Status*: The *Power* LEDs are built into the Power switch.

The location of the LEDs is shown below:



Diagnostic- LEDs at Draco™- KVM/ Media Extender

<i>LED</i>	<i>Appearance</i>	<i>Diagnostics</i>
Power LED (Red LED)	Off On	Device not ready Device ready
Video Okay (Green LED)	Off On	No or invalid video signal detected Device ready
Link Status (Green LED)	blinking On	No CATx- connection Device ready
Data Error (Green LED)	Off blinking / On	Device ready Errors through data transmission over CATx- cable (cable too long, too high attenuation or too much EMI interferences)

4. Service Setup

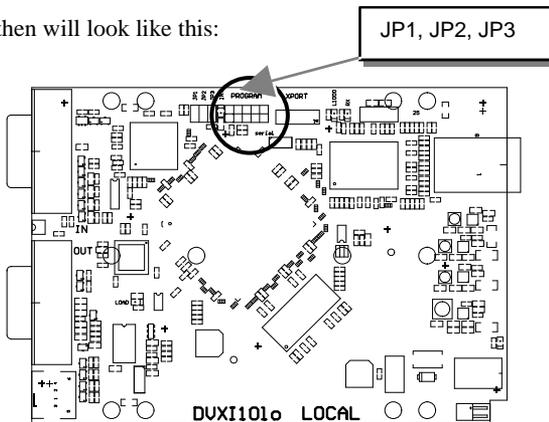
For standard applications, you shouldn't need to make any adjustments to your Draco™ major Switch Media/KVM Extender. However, in certain circumstances, you may need to open the Local Unit and/or the Remote Unit. To open one of the units, unscrew the Philips-type screws at both sides at the bottom of the device. Unscrew the UNC type screws on each side of the monitor connectors. Carefully displace the lower and upper shells of the case.



4.1 Setup at the Local Unit

After unscrewing and opening the upper shell, please place the device in this orientation: with the CATx connectors to the right and the electrical connectors to the left.

The main PCB then will look like this:



Use the diagram to locate jumpers.

DVI-D/DVI-I CATX/FIBER KVM-EXTENDER

DDC

You can select, whether the DDC is taken from internal DDC table or from local monitor or the DDC information could be downloaded from remote monitor and stored into internal table.

DDC	JP1	JP2
<i>From internal Table</i>		
<i>From local Monitor</i>		
<i>Loading the DDC Information from the Remote Monitor into the internal DDC Table (see also below: Loading the DDC Information from the Remote Monitor into the internal DDC Table) (default)</i>		

Loading the DDC Information from the Remote Monitor(s) into the internal DDC Table

To load the DDC Information from the Remote Monitor(s) into the internal DDC Table, please precede the following steps:

- Power up the CPU, the Local Unit, the Remote (cables to the CPU connected) and the Monitor
- Pull the Monitor Cable(s) from the Remote Unit (Dual-Head devices: BOTH Monitors!)
- Switch ON the Monitor(s) (if switched OFF), ALL Monitors!
- Plug the Video-Cable of the Remote Monitor(s) into the Remote unit (Remote and Local Unit powered! - ALL Monitors!)
- The DDC Information of the Remote Monitor(s) is read automatically, transferred to the Local Units and stored into the DDC-EPROM
- After a successful programming of the DDC EPROM, the ,Video-OK' LED at the Local Unit is blinking rapidly for approx. 1 second
- Done

Selection of Color depth

You can select, whether 16/24Bit AUTOSELECT colors (=64K/16M colors) are transmitted (default) or 24Bit colors (=16M colors). AUTOSELECT means that as far as the screen content allow high data compression, 24Bits are transmitted. When the video data do not allow reducing data enough, the colors are automatically reduced to 16Bit. This is auto selected in each line of the screen picture at any time. This mode makes the best compromise between speed and color depth.

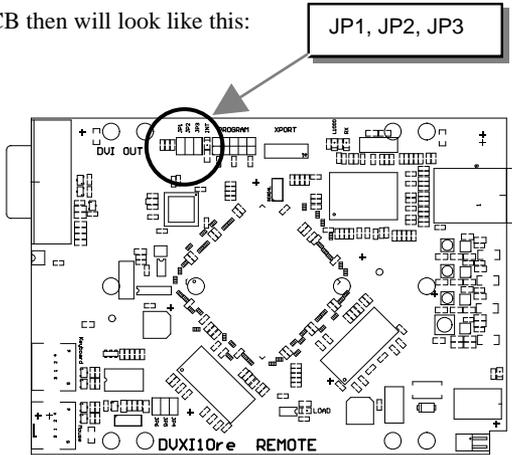
Please select 24Bit, if you want to have under all circumstances highest colours (but perhaps with reduced frame rates).

Color depth	JP3
<i>16Bit/24Bit AUTOSELECT, color depth depending on actual screen content (default)</i>	<input type="checkbox"/>
<i>24Bit</i>	<input checked="" type="checkbox"/>

4.2 Setup at the Remote Unit

After unscrewing and opening the upper shell, please place the device in this orientation: with the CATx connectors to the right and the electrical connectors to the left.

The main PCB then will look like this:



Use the diagram to locate jumpers.

Selecting the moment of switching to the next frame

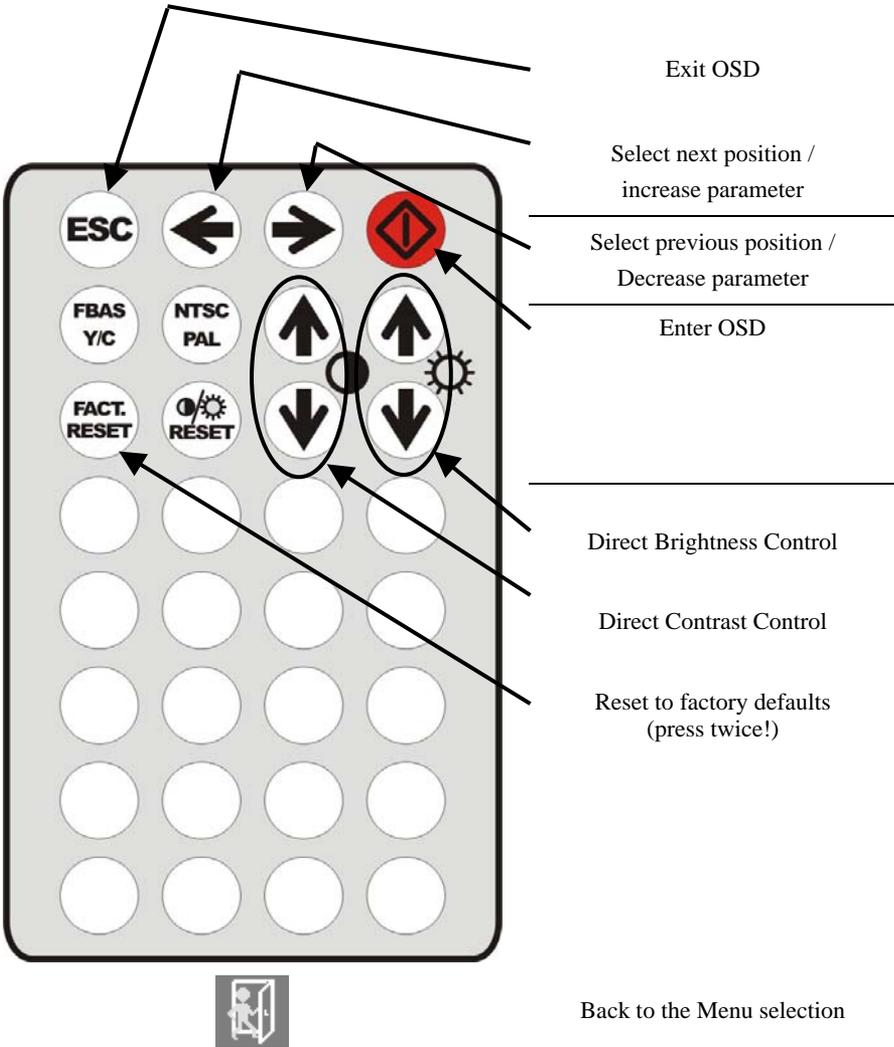
The transmission of screen data is not synchronous to the screen change of the graphic card. Normally, the transmission is terminated during displaying a frame on the screen. If the device switches to the new frame during the displaying period of the old frame (somewhere on the screen), it's possible, and that you can see horizontal screen breaks in the moment of switching. On the other hand the device must idle, until the actual frame is displayed completely (until VSYNC) -> the number of frames per second transmitted sinks.

Moment to switch	JP3	behaviour
<i>Switching during HSYNC (default)</i>		Higher Framerate but (possibly) horizontal breaks detectable
<i>Switching during VSYNC</i>		Lower Framerate no horizontal breaks detectable but (possibly) stepping pictures

4.3 Setup ACS4011A-R2 – OSD (On Screen Display)

The following table summarizes the remote control buttons sequences used in system configuration and video tuning on the ACS4011A-R2 family.

Infrared Remote Control (IR-RC)



DVI-D/DVI-I CATX/FIBER KVM-EXTENDER

If you are using a VGA format stored in the internal table, no adjustment should be required. In other cases, you may need to optimize the output using the integrated VGA to DVI Converter's on-screen display (OSD).

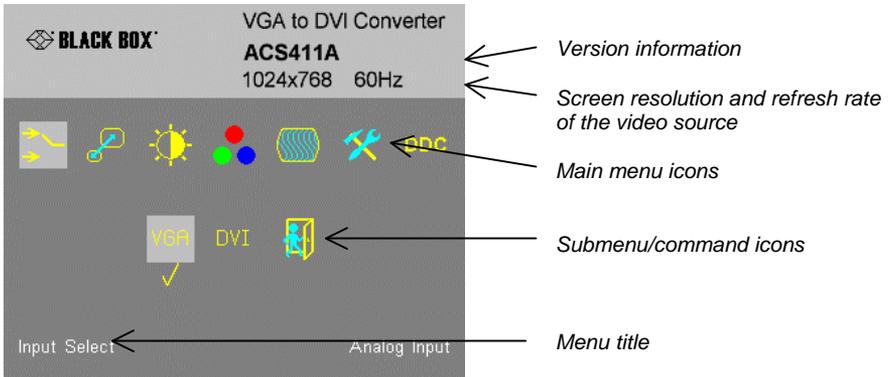


Figure 1 OSD Utility

You can adjust the following properties using the **IR-Remote Control** directly (no OSD required):

- Brightness/contrast
- Reset to factory defaults

You can adjust the following properties using the **OSD**:

- Auto Configuration ON/OFF
- Color, Color Temperature adjustments
- Brightness/contrast
- Input Image Sizing
- Output Image Scaling and Sizing
- OSD operation, factory reset.

Opening the OSD

You can access the OSD by using the equipped Infrared Remote Control (IR-RC).

Using the IR-RC

For direct brightness adjust

For direct contrast adjust



more brightness

less brightness



more contrast

less contrast

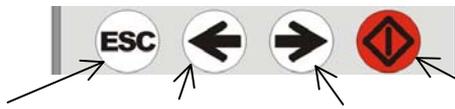
Reset to factory defaults



Reset to factory defaults (from flash)

(press twice !!)

To navigate within the OSD:



exit OSD without saving values (ESC key)

Navigate to the left, Parameter (-) (left arrow key)

Navigate to the right Parameter (+) (right arrow key)

pop up the OSD, select function/ submenus, store modified parameter (Enter-Key)

Using the OSD

The OSD is an icon-based utility. The top line of symbols shows the main menu categories:



Input Select

Specify whether the input is VGA or DVI



Scale Mode

Select the screen resolution of the attached display and select one of four scaling modes.



Brightness – Contrast

Adjust brightness or contrast or reset to default values.



Color

Adjust color calibration, temperature, flesh/skin tone, hue and saturation.



Image

Adjust pixel clock and phase. Define picture size and position.



Tools

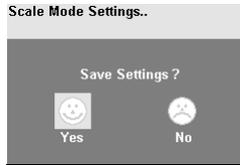
Set OSD position and size, factory reset.

1. Use the left and right arrow to highlight the icon you want. The OSD displays additional icons relating to commands in the selected menu category.
2. Press the Enter key. The OSD highlights the first command icon.
3. Use the Left and Right arrow keys to highlight the command or submenu you want. In the case of the latter, your selection will cause the OSD to display additional command icons (Color Temperature commands, for example).
4. Press the Enter key to accept a highlighted command. If this requires the increase or decrease of a value (Contrast, for example), the OSD displays a value bar:



5. Use the Left and Right arrow keys to change the value as required.

6. In many cases, after you have chosen a new setting, the OSD displays the following confirmation message (or similar):



7. Highlight the *Yes* button and press the Enter key to confirm your choice. Alternatively, highlight the *No* button and press the Enter key to discard the new setting and restore the previous value.
8. Select the Exit icon to close a submenu.
9. Press the Esc key to close the OSD, saving all settings, and restore normal mouse and keyboard functions.

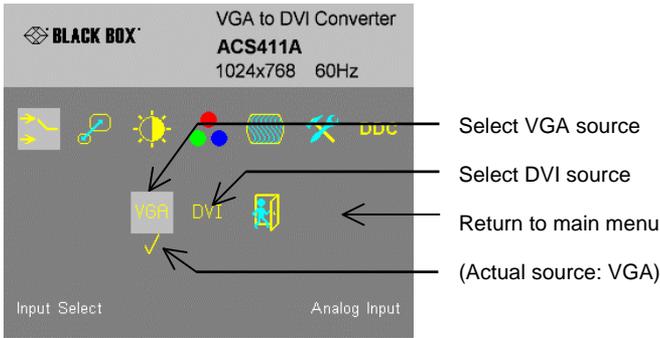
The following table summarizes the keyboard actions and icons used to navigate the OSD utility, and to select and adjust the VGA to DVI Converter's parameters:

Key/Icon	Action
IR-RC	
	Close the OSD, restore normal keyboard and mouse functions.
	Return to previous Menu selection.
	Open the highlighted menu or submenu Accept the highlighted command
	Select the previous menu or command icon Decrease the highlighted parameter
	Select the next menu or command icon Increase the selected parameter

Input Select



Choose the type of the connects graphic source

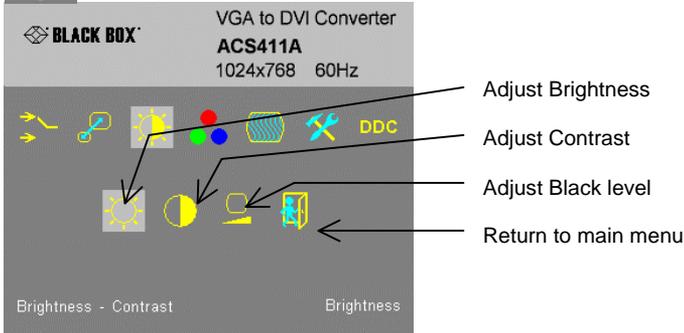


Input Select menu

Brightness/Contrast



Use this menu to adjust the brightness and contrast of the video image, or to adjust the black level of a display.

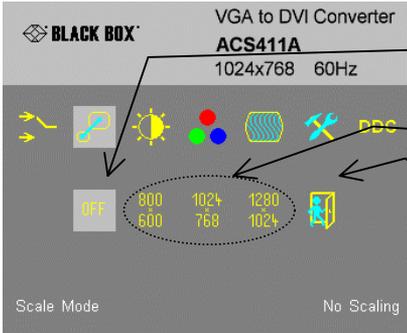


Brightness-Contrast menu

Physical Resolution of attached screen



Use the Scale Mode menu to specify the physical resolution of the attached screen; this ensures the best matching pictures on a TFT screen. Use output scaling (see below) to stretch the picture to the maximum available screen space.



No change to the resolution/refresh: The output resolution/refresh rate is the same like the input resolution/refresh rate

Choice of three fixed screen resolutions

800x600, 1024x768, 1280x1024

Return to main menu

Scale Mode menu



There is no altering in refresh rates possible. If sourcing 50Hz or 75Hz – please make sure, your monitor is able to process these refresh rates. Otherwise please select 60Hz refresh rate from your graphic card.

Please note, that rescaling any 16:9 resolution to a 4:3 resolution will cause a misalignment in aspect ratio.



While having DVI-D input and using the scaling function for downsizing the picture resolution please note, that there are limits for resizing: the input pixel clock must remain below of 1.9x output pixel clock.

This means:

Output 800x600 → max. input resolution 1024x768

Output 1024x768 → max. input resolution 1680x1050 (Reduced Blanking)

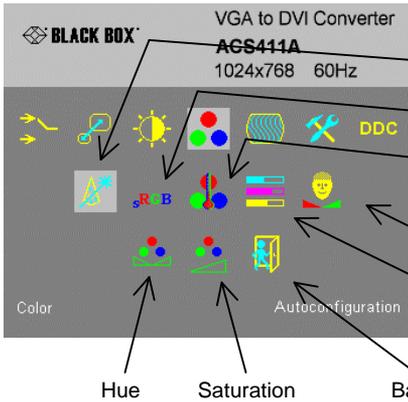
Output 1280x1024 → all input resolutions possible

When having VGA input signals, there are no limits for up- or downscaling!

Select Colors and Color Temperatures



Use the Colors menu to adjust the color balance of the video image. The menu provides a number of options including automatic calibration, manual adjustment in RGB or CMY color space, hue and saturation adjustment and the setup of flesh/skin tone.



Automatic color calibration

Standard RGB color selection

View Color temperature submenu (see **Color Temperature**, page 36)

Flesh tone/Skin tone

Set up colors in CMY space – automatically adjusts settings in RGB space

Hue

Saturation

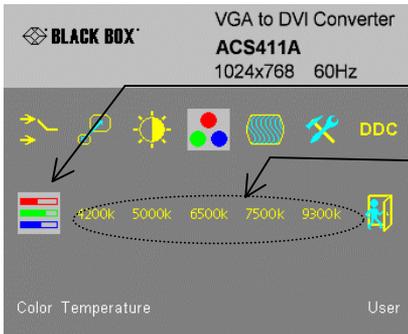
Back to main menu

Color menu

Color Temperature



Use the Color Temperature submenu to set up the color profile in RGB color space or by using one of five predefined color temperatures. To view this menu, select the Colors icon from the main menu and then select the Color Temperature icon.



Set up colors in RGB space – automatically adjusts settings in CMY space

Choice of five color temperature settings: 4200k, 5000k, 6500k, 7500k, 9300k

Back to Color menu

Color Temperature sub-menu

Image



Use the Image menu to adjust the vertical and horizontal screen position and to set the pixel clock and phase.

Automatic detection of the number of pixels per line and the best phase (best point for A/D conversion within each pixel).

Manually adjust the number of pixels per line (Pixel clock)

Manually adjust the best phase (best point for A/D conversion within each pixel)

Back to main menu

Manually adjust the vertical picture position

Manually adjust the horizontal picture position

Image menu



These features are only accessible with VGA source. While having DVI signals, these options are not selectable.

Tools



Use the Tools menu to set the position and size of the OSD window, adjust the sharpness for a fixed resolution setting, reset the VGA to DVI Converter system to its factory default settings or provide a test pattern.

Set the position of the OSD window

Calling Factory Reset Sub-Menu

Choose whether to automatically adjust pixels per line and pixel phase after a mode change (see page 32)

Back to main menu

Display a 'burst' pattern for monitor setup (see Monitor Setup, page 34)

Selecting color depth (HiColor/LoColor)

Adjust sharpness (only when doing scaling to fixed resolutions). When resolution is changed by an imposed fixed resolution, sharpness can be affected. Use this option to switch between three settings for optimum sharpness

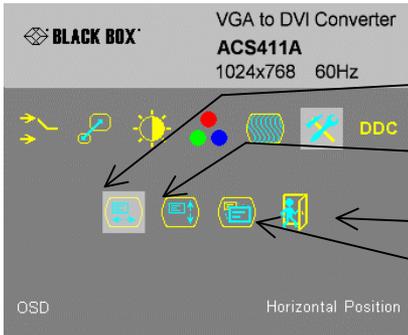
DVI-D/DVI-I CATX/FIBER KVM-EXTENDER

Tools menu

OSD



Use the OSD submenu to define the position and size of the OSD window. To view this menu, select the Tools icon from the main menu and then select the OSD icon.



Manually adjust the horizontal position of the OSD window

Manually adjust the vertical position of the OSD window

Back to Tools menu

Toggle the size of the OSD window between single and double size

OSD sub-menu

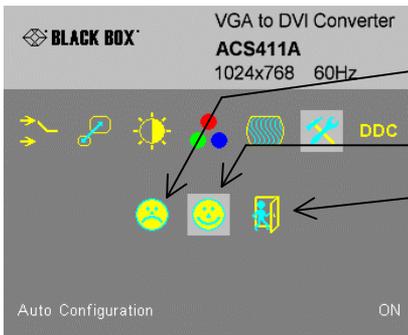
Auto Configuration



Use the Auto Configuration submenu to define whether the Converter carries out automatic detection of the number of pixels per line and the best phase after a mode change (a change of screen resolution and/or refresh rate at the graphic source).

Using automatic detection (while displaying an appropriate test pattern) ensures an optimized image but the procedure introduces a delay in the picture appearing on the attached console screen. If you want the picture to appear as fast as possible, you may want to disable this feature. Auto Configuration is disabled in the default factory settings.

To view the Auto Configuration menu, select the Tools icon from the main menu and then select the Auto Configuration icon.



Disable Automatic detection of pixels per line and phase after a mode change

Enable Automatic detection of pixels per line and phase after a mode change

Back to Tools Menu

Auto-Configuration sub-menu

DDC Configuration



Use the DDC Configuration submenu to define which DDC information is transmitted to the graphic card. As long as there is no transparent DDC communication, there is a 'virtual DDC' built into the Local unit (See therefore

Appendix E on page 55). You can either provide the DDC information of the secondary monitor attached to the Local unit or the information from the internal DDC table. Please note, that there is the possibility of loading the DDC information of the remotely attached monitor into the internal DDC table. Please refer therefore to **DDC Information** on page 14

Under some circumstances, the Local unit should identify itself as a 'VGA monitor' providing DDC information like a VGA screen (DVI-DDC and VGA-DDC are different!). In this case, you can convert the internal DDC table to a VGA-DDC by hitting the 'Create VGA' button.

To view the DDC Configuration menu, select the DDC icon from the main menu.

Annotations for the DDC Configuration menu:

- Use the information from the internal DDC table (points to 'internal' button)
- Connect DDC lines directly from locally attached monitor (points to 'Loop through' button)
- Back to main menu (points to back arrow)
- Create a VGA-DDC from DVI DDC in the internal table (points to 'Create VGA' button)

Auto-Configuration sub-menu

4.4 Setup Instructions for VGA Input

This procedure is designed to correct for discrepancies in the video signal due to analogue/digital video conversion by the VGA to DVI Converter.

1. Display from your graphic source a picture with as much detail as possible. If possible, display a ‘burst-pattern’ (see figure below) - a picture with alternating, 1-pixel wide, black and white, vertical stripes.

If you are unable to view the test card, display some black text on a white background. For example, you could open Notepad, maximize it to full screen, and fill the page with letter ‘I’s in a 12pt *sans serif* font. Proceed with step 2.

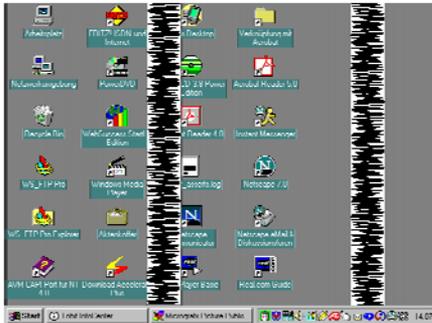
2. Display the OSD
3. Select the Image menu option:



4. Select the first command icon:
Automatic detection of number of pixels per line and the best phase.



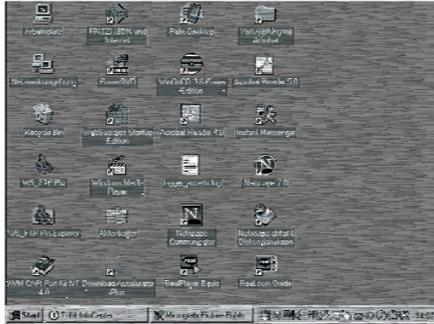
5. Assess the desktop test pattern. If the vertical stripes are sharp and without jitter or smearing, the adjustment has been successful. Go to step 9.
6. If the picture quality is not acceptable after the automatic adjustment, you will have to manually adjust the pixel clock and pixel phase (in this order).
7. With a poorly adjusted pixel clock you may see one or more vertical areas, where the lines are smeared:



- a. Return to the OSD utility and select the menu command:
Manually adjust the number of pixels per line (Pixel clock) from the Image menu.
- b. Adjust the pixel clock value until all stripes have disappeared.
- c. Confirm the setting.



8. Problems with the pixel phase will cause horizontal noise, horizontal wave-formed lines, flicker or smearing with zebra-pattern:



- a. From the OSD's Image menu, select the menu command:
Manually adjust the best phase (best point for A/D conversion within each pixel). 
 - b. Modify the phase until all distortions have disappeared.
 - c. Confirm the setting.
9. If necessary adjust the size of the visible part of the picture.
(The horizontal and vertical size is displayed in numeric values for exact adjustment)  
 10. If necessary adjust the position of the visible part of the screen.
It may be necessary to adjust the picture size (step 9) again  
 11. If appropriate, re-attach your TFT monitor and adjust its image according to the manufacturer's instructions.

5. Troubleshooting

Monitor

There isn't a picture.

Check the power supply connection at the Local and Remote unit. Is the Power (Red LED) at the Local unit illuminated (see page 24)? If not, the internal power-supply may be damaged or there may be an internal error.

Check that the Interconnection cable is connected at the Local Unit and the Remote Unit. Is the *Link Status* LED illuminated (see page 24)? If not, there may be a problem with the Interconnection cable:

Are there Errors through data transmission over CATx Cable (Cable too long, too high attenuation or too much EMI interference)? Is the *Data Error* LED illuminated or blinking (see page 24)? If yes, check cable length and environment.

Video Okay LED is dark: CPU does not provide a video signal – Check settings of the graphic card. Try out, connecting a monitor to the local output, to see, whether there is a signal or not.

'Stepping' pictures on displaying movies

On high resolutions, the amount of data transmitted each second, expires the capability of the data link. Therefore the data have to be reduced before transmitting. This is done in a first step by a so called RLE (=Run Length Encoding) algorithm. If this (loss less) compression does not reach the required amount, frames are dropped: The frame actually transmitted is transmitted completely even if the graphic card generates a new frame. This new frame is discarded. Because of this behaviour, the count of frames per second (fps) may be reduced to a value, where 'stepping' pictures are seen.

How to solve the problem: Please use a lower resolution, which is slightly higher than the resolution of the recorded movie. Please see, that most (actual) movies do have only a low resolution of approx. 720x480 (NTSC) or 704x576 (PAL) or even 320x256 (VHS). If the monitor provides a higher resolution, it may provide the scaling of the pictures. The picture quality is the same, if the monitor or the CPU does the scaling.

How to solve the problem: Set the color depth to 16/24Bit AUTOSELECT. On moving pictures, the human eye is not able, to see differences between so many colors. A reduction to 16Bit reduces the amount of data without (visible) effects.

USB-Keyboards/USB-Mouse

Your USB-keyboard/USB-mouse does not work

Although we tried to design the devices as transparent as possible, we can't ensure that all devices are running. Please ask Technical Support for a list of tested devices.

Your mouse is 'stepping' on your screen

On high resolutions, the amount of data transmitted each second, expires the capability of the data link. Therefore the data have to be reduced before transmitting. This is done in a first step by a so called RLE (=Run Length Encoding) algorithm. If this (loss less) compression does not reach the required amount, frames are dropped: Because of this, 'stepping' mouse movements are seen.

How to solve the problem: Please use a lower resolution or use a desktop background which is better suitable for compression: Avoid photos for background or horizontally graduated colors – better use monochrome backgrounds. They allow higher compression -> higher frame rates.

Your mouse is moving like 'hanging on a rubber band'

This problem derives from different single problems, which accumulate to a delay between the true mouse movement and displaying the movement of the mouse pointer on the screen. Depending to our measurements, a delay of approx. 100-150msec are recognized as disturbing.

The total delay comes from (time values are approx. values):

- 5 to 15msec for mouse movement and data transmission to CPU
- 50 to 70msec data processing time in the CPU until the changed data reach the graphic card output connector
- 15 to 45msec getting the graphic data into the Local unit of the extender system and transmitting to the Remote unit (60 to 20fps)
- 10 to 100msec data processing time in the display until the data are displayed on the screen (where 15msec normally are only reached by CRT tubes)

In total there are delay times between 85 and up to 230msec possible, where most of this delay is NOT caused by the extender system (Extender based delay is 5 to 15msec data transfer to the CPU and 15 to 45msec frame transfer to the Remote unit – in total 20 to 60msec. Depending to our experiences, even a step from 100msec delay to 140msec (i.e. by inserting an extender system to a CPU-monitor link) may cause visible effects.

Please note, that even a monitor directly connected to a CPU has a delay of 70 to 175msec. So (under special conditions) even the bare CPU/monitor link shows this 'rubber band behaviour'. If you now insert an extender system, the problem may occur and is (in false) dedicated to the extender system, where it only gives a small part to the total problem

How to solve the problem: Use a display with a low delay time (NOTE: This is NOT the reaction time indicated by the manufacturer. This reaction time is only the time the display needs, to switch a black pixel to get white or vice versa, but not how long it takes from receiving the data on the connector until they are displayed on the screen.) Please use a lower resolution or use a desktop background which is better suitable for compression: Avoid photos for background or horizontally graduated colors – better use monochrome backgrounds. They allow higher

DVI-D/DVI-I CATX/FIBER KVM-EXTENDER

compression -> higher frame rates. If – and only if the link has frame dropping, a reduction from 30fps to 60fps saves 17msec and from 20fps to 60fps saves 34msec.

USB-HID device

Your USB-HID device does not work

Although our interface supports HID devices, we can't ensure that every connected device is running. In case of a malfunction please contact our technical support.

Other USB-devices

Your USB- device does not work

You have connected a non-HID device connected to the HID port. Using the ACS4011A-R2 model, there are HID devices only supported. All other devices are dismissed.

Using the ACS4002A-R2 model, you have in total 6 USB ports at the Remote unit. The lower two ports are USB-HID only. Please reconnect your USB device to one of the ports in the upper row.

Appendix A: Example Applications

This section illustrates some specific applications using the DVI-D/-I CATx - Extenders:

- DVI-D CATx KVM-Extender with USB 2.0 support.



DVI-D CATx KVM-Extender with USB 2.0 support

DVI-D/DVI-I CATX/FIBER KVM-EXTENDER

- DVI-I CATx KVM-Extender – supporting VGA (and DVI-D)



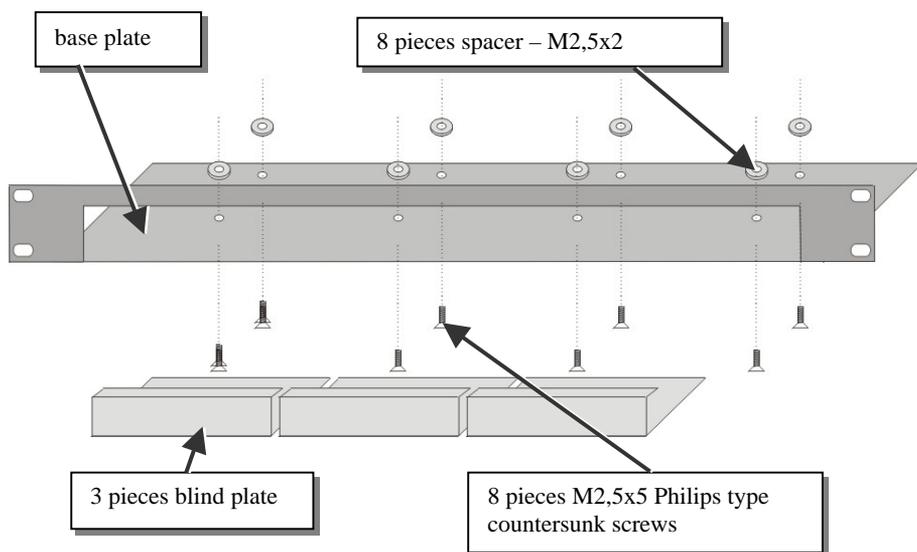
DVI-I CATx KVM-Extender – supporting VGA (and DVI-D)

Appendix B: Rack Mount Options

DVI-D KVM- Extender units can be mounted in a 19" rack using the mounting kit: **DVI-D-Rack mount Kit**. Two different versions are available – one each for Single-Head and for Dual-Head devices.

Mounting Instruction Rackmount-Kit ACS1009A-RMK

Using the Rackmount-Kit ACS1009A-RMK, up to 4 devices of the device size 103x143x29mm (Single-Head Devices) can be mounted into a 19"-Server Rack. The Rack mount Kit requires 1U Rackspace. Blind plates (in the list of parts delivered) allow covering unused device positions.



Mounting instruction:

- Align the holes on the base plate with the vacant screw holes on the base of the device.
- Fasten the base of the unit to the plate of the mounting kit



Only use the supplied, short screws, to prevent damages on the PCB's

- Close the remaining gaps with blanking plates.

DVI-D/DVI-I CATX/FIBER KVM-EXTENDER

The Rackmount-Kit ACS1009A-RMK allows, mounting a different count of devices (1...4 pieces):



Einbau 1 Gerät
mounting 1 device



Einbau 2 Geräte
mounting 2 devices



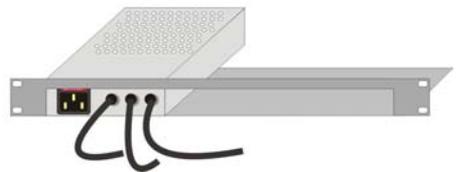
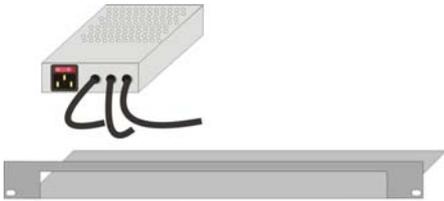
Einbau 3 Geräte
mounting 3 devices



Einbau 4 Geräte
mounting 4 devices



In the leftmost position, you can install a rack mountable p.s.u. type ACS2209A-PS instead of an extender device. This p.s.u. allows, to power up to 3 devices (Single-Head or Dual-Head)

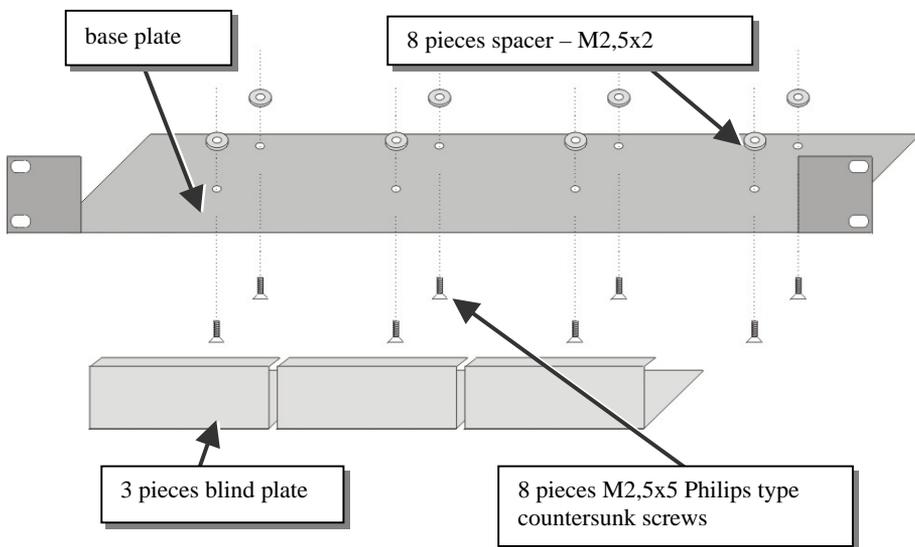


Please note:'

- Use the back moved mounting holes to fix the p.s.u.
- After mounting the p.s.u., the circuit break switch is not longer easily accessible – it is covered by the cover strip.

Mounting Instruction Rackmount-Kit ACS2209A-RMK

Using the Rackmount-Kit ACS2209A-RMK, up to 4 devices of the device size 103x143x42mm (Dual-Head Devices) can be mounted into a 19"-Server Rack. The Rackmount Kit requires 1U Rackspace. Blindplates (in the list of parts delivered) allow covering unused device positions.



Mounting instruction:

- Align the holes on the base plate with the vacant screw holes on the base of the device.
- Fasten the base of the unit to the plate of the mounting kit



Only use the supplied, short screws, to prevent damages on the PCB's

- Close the remaining gaps with blanking plates.

DVI-D/DVI-I CATX/FIBER KVM-EXTENDER

The Rackmount-Kit ACS2209A-RMK allows, mounting a different count of devices (1...4 pieces):



Einbau 1 Gerät
mounting 1 device



Einbau 2 Geräte
mounting 2 devices



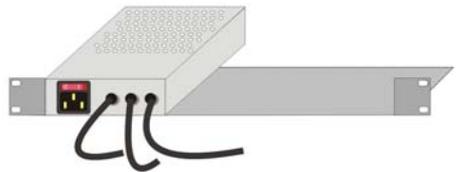
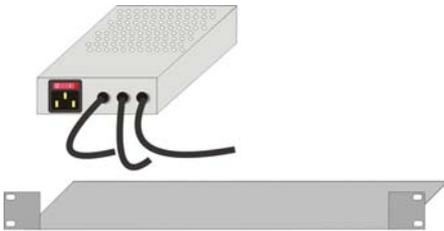
Einbau 3 Geräte
mounting 3 devices



Einbau 4 Geräte
mounting 4 devices



In the leftmost position, you can install a rack mountable p.s.u. type ACS2209A-PS instead of an extender device. This p.s.u. allows, to power up to 3 devices (Single-Head or Dual-Head)



Only use the supplied, short screws, to prevent damages on the PCB's

Appendix C: Calling Technical Support

If you determine that your DVI-D/-I KVM Extender is malfunctioning, *do not attempt to alter or repair it*. It contains no user-serviceable parts. Contact Technical Support at Black Box!

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- The firmware-revision level printed on the bottom of the Extender (very important, especially for keyboard and mouse problems); The DVI-D/-I- KVM extender's firmware revision level:

Version Number Format:

Board: ***xxLO/RE Myyy Pzzz Auuu Gvvvvvv***
 Transceiver: ***C/M/S xx Pyy Mzz***
 Keyboard/Mouse: ***P/U xx Vyyy***

- The nature and duration of the problem.
- When the problem occurs.
- The components involved in the problem—that is, what type of computers, what type of keyboard, brand of mouse, make and model of monitor, type and make of cable, etc.
- Any particular application that, when used, appears to create the problem or make it worse.
- The results of any testing you've already done.

To solve some problems, it might be necessary to upgrade the Extender's firmware. If this turns out to be the case for your difficulty, our Technical Support technicians will arrange for you to receive the new firmware and will tell you how to install it.

Shipping and Packaging

If you need to transport or ship your DVI-D/-I- KVM Extender:

- Package it carefully. We recommend that you use the original container.
- If you are shipping it for repair, please include the Unit's external power supplies. If you are returning it, please include everything you received with it. Before you ship the Extender back to your dealer for repair or return, contact him to get a Return Authorization (RA) number.

DVI-D/DVI-I CATX/FIBER KVM-EXTENDER

Black Box Technical Support

Country	Web Site/E-Mail	Phone	Fax
US	www.blackbox.com info@blackbox.com	724-746-5500	724-746-0746
Austria	www.black-box.at support@black-box.at	+43 1 256 98 56	+43 1 256 98 56
Belgium	www.blackbox.be support.english@blackbox.be support.french@blackbox.be support.nederlands@blackbox.be	+32 2 725 85 50	+32 2 725 92 12
Denmark	www.blackbox.dk blackbox@blackbox.dk	+45 56 63 30 10	+45 56 65 08 05
Finland	www.blackbox.fi tuki@blackbox.fi	+358 201 888 800	+358 201 888 808
France	www.blackbox.fr tech@blackbox.fr	+33 820 07 09 11	+33 820 05 07 09
Germany	www.black-box.de techsupp@black-box.de	+49 811 5541 110	+49 811 5541 499
Ireland	www.blackbox.co.uk techhelp@blackbox.co.uk	+353 1 662 2466	+353 1 662 2477
Italy	www.blackbox.it supporto.tecnico@blackbox.it	+39 02 27 404 700	+39 02 27 400 219
Netherlands	www.blackbox.nl techsupport@blackbox.nl	+31 30 241 7799	+31 30 241 4746
Norway	www.blackboxnorge.no support@blackboxnorge.no	+47 55 300 710	+47 55 300 701
Spain	www.blackbox.es tecnico@blackbox.es	+34 916590732	+34 916239784
Sweden	www.blackboxab.se support@blackboxab.se	+46 8 44 55 890	+46 08 38 04 30
Switzerland	www.black-box.ch support@black-box.ch	+41 55 451 70 71	+41 55 451 70 75
UK	www.blackbox.co.uk techhelp@blackbox.co.uk	+44 118 965 6000	+44 118 965 6001

Appendix D: Supported video modes

Description	Hres pixels	Vres lines	V-freq Hz	H-freq kHz	DotClk MHz
DOS graphic Mode	640	350	69,6	31,3	25,0
Vesa Standard	640	350	85,1	37,9	31,5
VGA	640	400	56,3	24,7	21,0
VGA	640	400	69,6	31,3	25,0
Vesa Standard	640	400	85,1	37,9	31,5
Vesa Standard	640	480	60,2	31,5	25,3
Mac Mode	640	480	67,0	35,0	31,5
Vesa Standard	640	480	72,8	37,9	31,5
Vesa Standard	640	480	75,0	37,5	31,5
Vesa Standard	640	480	85,0	43,3	36,0
DOS Text Mode	720	400	69,6	31,5	28,1
Vesa Standard	720	400	85,0	37,9	35,5
NTSC progressive	720	480	59,9	31,5	27,0
PAL progressive	720	576	50,0	31,3	27,0
Vesa Standard	800	600	56,3	35,2	36,0
Vesa Standard	800	600	60,3	37,9	40,0
Vesa Standard	800	600	72,2	48,1	50,0
Vesa Standard	800	600	75,0	46,9	49,5
Vesa Standard	800	600	85,1	53,7	56,3
Mac Mode	832	624	75,1	49,7	55,5
Vesa Standard	1024	768	60,0	48,4	65,0
Vesa Standard	1024	768	70,1	56,5	75,0
SUN Mode	1024	768	72,0	57,8	75,2
Vesa Standard	1024	768	75,0	60,0	78,8
Vesa Standard	1024	768	85,0	68,7	94,5
DMT1185	1152	864	70,0	63,8	100,0
Mode	1152	864	70,0	63,8	94,5
Vesa Standard	1152	864	75,0	67,5	108,0
SUN Mode	1152	900	66,0	61,8	94,5
Vesa CVT16:9	1280	720	60,0	44,8	74,5
WXGA	1280	768	60,0	48,1	81,2
WXGA	1280	768	60,2	47,8	80,0
WXGA16:10 CVT	1280	800	59,8	49,7	83,5
Vesa Standard	1280	960	60,0	60,0	108,0
DMT127A	1280	960	75,0	75,0	126,0
Vesa Standard	1280	960	85,0	85,9	148,5
TV	1280	1024	50,0	53,4	90,0
Vesa Standard	1280	1024	60,0	64,0	108,0
SUN mode	1280	1024	66,0	71,7	115,8
SGI	1280	1024	72,0	76,7	128,8
HP Workstation B123L	1280	1024	72,0	78,1	135,0

DVI-D/DVI-I CATX/FIBER KVM-EXTENDER

Vesa Standard	1280	1024	75,0	80,0	135,0
Vesa Standard	1280	1024	85,0	91,1	157,5
TV Mode16:9	1360	765	60,1	47,6	84,5
Plasma TV 16:9	1360	768	60,0	47,7	85,5
NVIDIA 4:3	1400	1050	59,8	65,2	121,5
TV Mode16:10	1440	900	60,0	55,6	89,0
TV Mode16:9	1600	900	59,9	55,8	118,8
SGI	1600	1024	72,0	77,6	158,3
UXGA genlocked	1600	1200	50,0	75,0	138,0
Vesa Standard	1600	1200	60,0	75,0	162,0
UXGA reduced blank	1600	1200	60,1	75,4	140,6
WSXGA+16:10 DVI	1680	1050	59,9	64,7	119,0
WSXGA+16:10 VGA	1680	1050	60,0	65,3	146,3
TV Mode16:9	1920	1080	50,0	56,4	148,5
TV Mode16:9	1920	1080	59,9	66,6	138,5
EIA861B16:9	1920	1080	60,0	67,5	148,5
WUXGA	1920	1200	60,0	74,0	154,0

Appendix E: Information in internal DDC

Standard Timings:

720 x 400	70Hz	IBM VGA
720 x 400	88Hz	IBM XGA2
640 x 480	60Hz	IBM VGA
640 x 480	67Hz	Apple Mac II
640 x 480	72Hz	VESA
640 x 480	75Hz	VESA
800 x 600	56Hz	VESA
800 x 600	60Hz	VESA
800 x 600	72Hz	VESA
800 x 600	75Hz	VESA
832 x 624	75Hz	Apple Mac II
1024 x 768	60Hz	VESA
1024 x 768	70Hz	VESA
1024 x 768	75Hz	VESA
1280 x 1024	75Hz	VESA
1152 x 870	75Hz	Apple Mac II
1280 x 720	60Hz	VESA STD
1280 x 960	60Hz	VESA STD
1280 x 1024	60Hz	VESA STD
1360 x 765	60Hz	VESA STD
1400 x 1050	60Hz	VESA STD
1600 x 900	60Hz	VESA STD

Native/preferred timing:

1024 x 768

@60Hz – VESA

Detailed Timings:

1280 x 800	60 Hz	83,5 MHz
1360 x 768	60 Hz	85,5 MHz
1680 x 1050	60 Hz	119 MHz
1600 x 1200	60 Hz	162 MHz
1920 x 1080	50 Hz	148,5 MHz
1920 x 1080	60 Hz	148,5 MHz
1920 x 1200	60 Hz	154 MHz

Appendix F: Specifications

Power Supply

<i>Voltage</i>	100-240VAC-0.5A-47-63Hz/5VDC-2000 mA
<i>Power required</i>	Local Unit : max. 1A @ 240V; 2A @ 100V Remote Unit : max. 1A @ 240V; 2A @ 100V

Interface (Depending on type of device)

<i>Video source</i>	DVI-D up to 1920x1200@60Hz VGA up to 1920x1200@60Hz
<i>Monitor</i>	DVI-D up to 1920x1200@60Hz
<i>Keyboard</i>	USB
<i>Mouse</i>	USB 2-/3-button and wheel mouse
<i>LC (Glass fibre)</i>	1000 MBit High speed transmission. Corresponds to Gigabit Ethernet
<i>RJ45</i>	1000 MBit high speed transmission. Wiring according to EIA/TIA 568B Gigabit Ethernet.

Type and Maximum Length of Interconnection Cable

<i>CATx Installation cable AWG24 max : 120m (400ft)</i>	S/UTP (CATx) cable acc. EIA/TIA 56A, TSB 36 or Digital STP 17-03170. Four pairs AWG 24 wiring acc. EIA/TIA 568A (1000BaseT).
<i>CATx Patch cable AWG26/7 max: 60m (200ft)</i>	S/UTP (CATx) cable acc. EIA/TIA 56A, TSB 36 or Digital STP 17-03170. Four pairs AWG 26/7 wiring acc. EIA/TIA 568A (1000BaseT)..

Maximum Length of Fibre Cable (LC Connector)

<i>Singlemode 9µm</i>	10.000m (32.750ft)
<i>Multimode 50µm</i>	400m (1.300ft)
<i>Multimode 62.5µm</i>	200m (650ft)

Size and Shipping Weight

<i>DVI-D/-I CATx</i>	Weight: 0,6kg (1.3lb) each
ACS4011A-R2 Remote unit	103 x 143 x 29mm (4"x5.6"x1.1")
ACS4002A-R2 Local/Remote and ACS4011A-R2 Remote unit	103 x 143 x 43mm (4"x5.6"x1.7")

<i>Shipping box</i>	Weight: 1,6 kg (3.5lb) 260x210x150mm (10.2"x8.3"x5.9")
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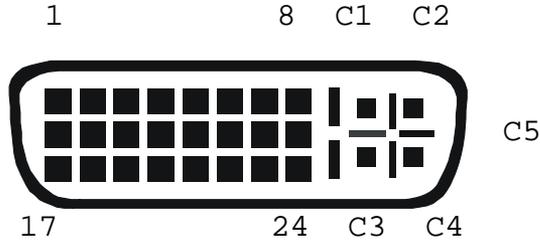
Environmental

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

Appendix G: Connectors

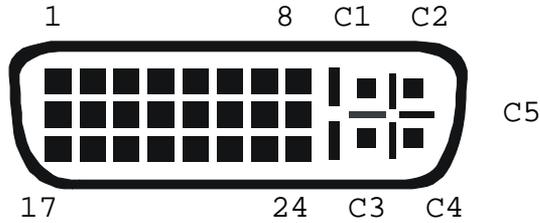
DVI-D/I CATx/Fiber KVM-Extender Connector Pin outs

DVI-I female connector (Output connector for ALL devices and Input connector of the ACS4002A-R2 device - Local unit)



<i>Pin</i>	<i>Signal</i>	<i>Pin</i>	<i>Signal</i>	<i>Pin</i>	<i>Signal</i>
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	+5V 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.

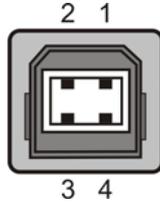
DVI-I female connector (Input connector for ACS4011A-R2 Local unit)



<i>Pin</i>	<i>Signal</i>	<i>Pin</i>	<i>Signal</i>	<i>Pin</i>	<i>Signal</i>
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		12		20	
5		13		21	
6	DDC Input (SCL)	14	+5V In for DDC	22	T.M.D.S clock GND
7	DDC Output(SDA)	15	GND	23	T.M.D.S clock +
8	Analog VSYNC	16	Hot Plug recognition	24	T.M.D.S clock -
C1	Analog Red			C3	Analog Blue
C2	Analog Green	C5	Analog GND	C4	Analog HYSNC

USB Connector, USB Type B

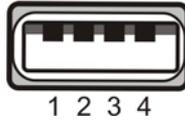
(Connector at Local Unit)



<i>Pin</i>	<i>Signal</i>	
1	VCC (+5V)	Red
2	Data -	White
3	Data +	Green
4	GND	Black

USB Connector, USB Type A

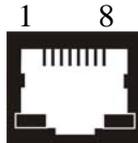
(Connector at Remote Unit)



<i>Pin</i>	<i>Signal</i>	
1	VCC (+5V)	Red
2	Data -	White
3	Data +	Green
4	GND	Black

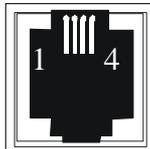
CATx- Interface

Pin out according to EIA/TIA 568A (1000BaseT).



<i>Pin</i>		<i>Pin</i>	
1	D1+	5	D3-
2	D1-	6	D2-
3	D2+	7	D4+
4	D3+	8	D4-

Programming Port



<i>Pin</i>	<i>Signal</i>
1	TxD (to PC RxD)
2	RxD (from PC TxD)
3	DTR from PC
4	GND

NOTES