

DVI-D CATx/Fiber KVM Extenders

Extend DVI-D and USB HID or USB 2.0 over affordable CATx cable.

Transmit KVM and DVI-D video signals up to 460 feet over backbone cabling.



Customer Support Information

Order toll-free in the U.S.: Call 877-877-BBOX (outside U.S. call 724-746-5500)
FREE technical support 24 hours a day, 7 days a week: Call 724-746-5500 or fax 724-746-0746
Mailing address: Black Box Corporation, 1000 Park Drive, Lawrence, PA 15055-1018
Web site: www.blackbox.com • E-mail: info@blackbox.com

FCC Statement

Federal Communications Commission and Industry Canada Radio Frequency Interference Statements

This equipment generates, uses, and can radiate radio-frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart B of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

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

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

We're here to help! If you have any questions about your application or our products, contact Black Box Tech Support at **724-746-5500** or go to **blackbox.com** and click on "Talk to Black Box." You'll be live with one of our technical experts in less than 30 seconds.

Instrucciones de Seguridad (Normas Oficiales Mexicanas Electrical Safety Statement)

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc.
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico debe ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

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Specifications

Specifications

Distance — Maximum, CATx AWG 24: 400 ft. (120 m), CATx S/UTP cable, EIA/TIA 56A, TSB 36 or digital STP 17-03170, four pairs 24 AWG wiring, EIA/TIA 568A (1000BASET);
Maximum, CATx patch cable 26/7 AWG 200 ft. (60 m), CATx S/UTP cable, EIA/TIA 56A, TSB 36 or Digital STP 17-03170, four pairs 26/7 AWG wiring EIA/TIA 568A (1000BASET).

Attenuation Detect Accuracy — ± 0.05 dB/dB

CE Approval — Yes

RoHS — Yes

Connectors — Video source: DVI-D up to 1920 x 1200 @ 60 Hz;
VGA: up to 1600 x 1200 @ 60 Hz; (ACS401A family only);
Monitor: DVI-D up to 1920 x 1200 @ 60 Hz;
Keyboard: USB;
Mouse: USB 2-/3-button and wheel mouse;
LC (Fiber): 1000 Mbps, Gigabit Ethernet;
RJ-45: 1000 Mbps, EIA/TIA 568B Gigabit Ethernet.

Operating Environment — Temperature: 41 to 113° F (5 to 45° C);
Humidity: 0 to 80%, noncondensing

Power — Voltage: 100-240 VAC, 0.5A, 47-63 Hz/5 VDC-2000 mA
Local Units, Maximum: 1A @ 240V; 2A @ 100V;
Remote Units, Maximum: 1A @ 240V; 2A @ 100V

Size — Local and remote: 1.7"H x 4"W x 5.6"D x (4.3 x 10.3 x 14.3 cm)
Shipping Size: 8.7"H x 4.3"W x 2.7"D (22 x 11 x 7 cm)

Weight — Local and remote: 1.3 lb. (0.6 kg);
Shipping: 3.5 lb. (1.6 kg)

1.0 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.

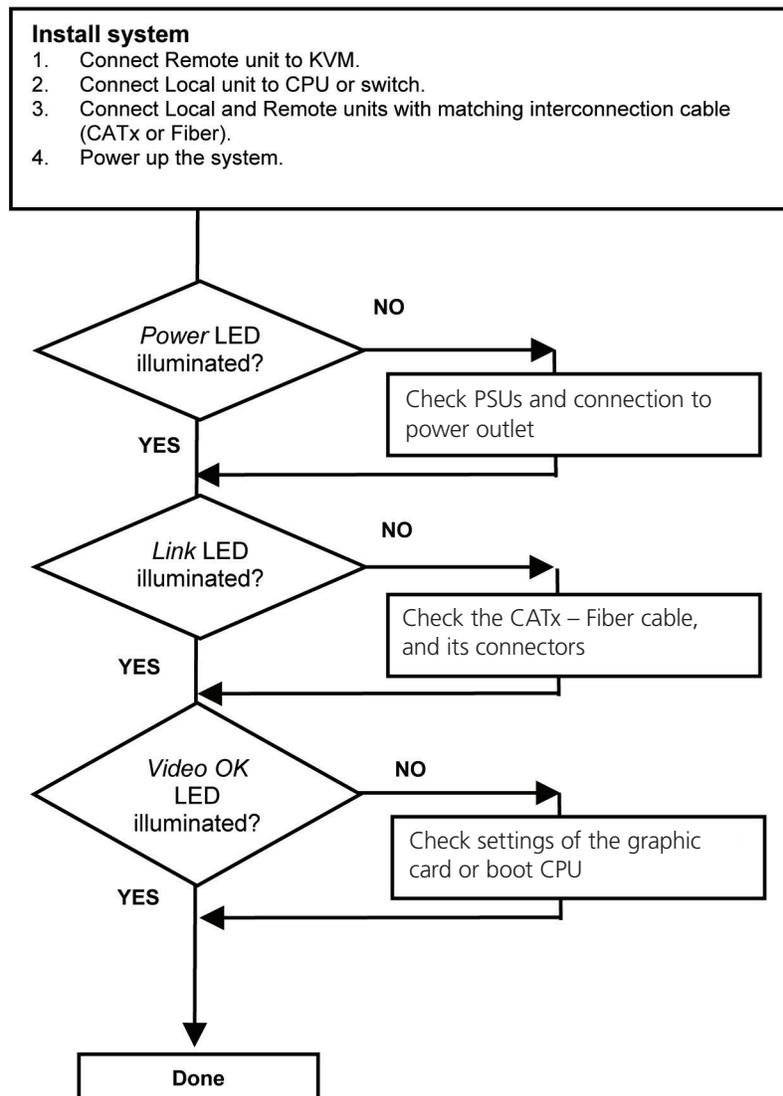


Figure 1-1. Quick Setup.

2.0 Overview

With the DVI-D/-I CATx/Fiber KVM-Extender, you can remotely locate monitors, keyboards and mice up to 140 m (459.3 ft.) away from your CPU over CATx, or up to 10 km (6.2 mi) with single-mode fiber.

Wherever long distances are required, e.g. airports, industrial plants, call-centers or in distributed computer centers, the DVI-D/-I CATx/Fiber KVM-Extenders are the ideal way to remotely locate your console. We offer two families with three different types: one family with devices for DVI-I (DVI-D/-I + VGA) and one family with USB 2.0 transparent support – CATx, multimode and single-mode.

The 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, Single-mode

ACS4004A-R2: KVM Extender DVI-D, DVI-D with 4 USB HID PORTS

ACS4004A-R2-MM: KVM Extender DVI-D, DVI-D with 4 USB HID PORTS, Multimode

ACS4004A-R2-SM: KVM Extender DVI-D, DVI-D with 4 USB HID PORTS, Single-mode

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, Single-mode

NOTE: Other models are available. For details, call Tech Support.

2.1 Introduction

A CATx/Fiber KVM Extender enables you to mount a CPU in a secure rack/cabinet or data center and access it from a remote location, up to 140 meters away. A basic KVM extension system is comprised of 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.

A CATx/Fiber KVM Extender is used to extend the maximum distance between a CPU and a keyboard/monitor/mouse. In addition, a KVM extender is beneficial in installations in electromagnetic hazardous environments (EMI). Regular KVM extender cables (and extenders using traditional cables) have inherent distance limitations, and EMI interference may reduce the maximum distance and/or reliability. With a DVI-D/-I CATx Extender system, these limitations are no longer an issue.

2.2 Glossary

The following terms are used in this guide:

Table 2-1. Glossary

Term	Definition
CATx	Any Category 5, 5e, 6, or higher cable, solid 24 AWG. Although flexible 27/7 AWG cables can be used too, the lengths of flexible cables count twice in the calculation of the total distance.
Fiber	9- μ Single-mode 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 and keyboard/mouse
Dual-Head	An extender system that supports two monitors and 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 Gbps. Signals are TMDS Level.
PSU	The desktop power supply connected to the local/remote unit.
HID	Human interface devices (HIDs) are units which are used for human access to the CPU. They are a USB-device class of their own (e.g. memory devices etc.). In addition to keyboards and mice, it includes touchscreens, light pens, fingerprint sensors, graphics tablets, etc.

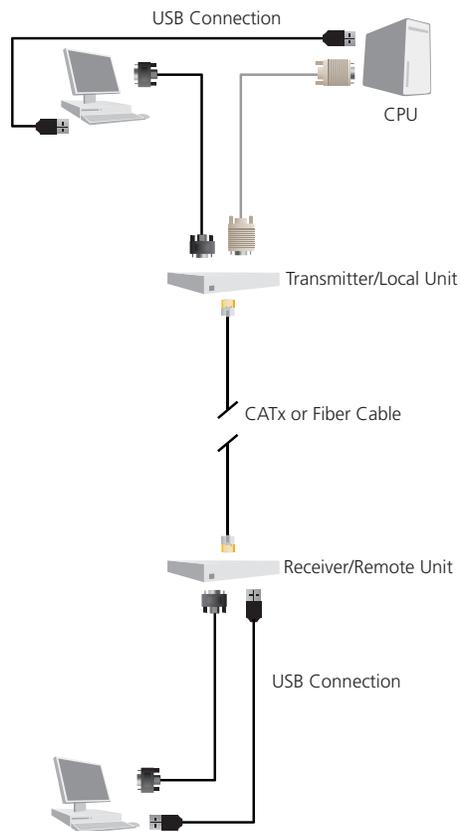


Figure 2-1: DVI-D/I CATx – KVM Extender system (example)

2.3 Features

All extenders have the following features:

- Support for DVI-D graphics cards
- Support for USB keyboards and mice (USB-HID)

NOTE: Devices with USB-HID support only keyboard and mice. It's possible that other HID's like touchscreens, graphics tablets, bar-code readers or similar are supported – but that isn't guaranteed. If you have questions, call our FREE Tech Support. The DVI-D/I CATx/Fiber KVM-Extender for USB-HID is not suitable for use with other USB devices like scanners, webcams, flash drives, etc.

NOTE: The USB-HID device never supports more than two devices – keyboard and mouse or keyboard and touchscreen, etc., but not, for example, keyboard, mouse and touchscreen simultaneously. A hub is allowed but does not increase the number of supported devices.

Maximum resolution: DVI-D: 1920 x 1200 @ 60 Hz over all allowed distances all resolutions below of 1600 x 1200 with refresh rates of at least 75 Hz.

- 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 and adapters included.
- Rackmount kit available.

ACS4002A-R2 family:

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

ACS4004A-R2 family:

- Support for DVI-D video and (4) USB HID devices.

ACS4011A-R2 family

- Support for DVI-I input—either DVI-D or VGA input.
- Built-in scaler enables you to resize the input frame to fit to the attached monitor.

NOTE: Other models are available but may not be shown in this user manual.

2.4 Product Range

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

Table 2-2. Products

Product	Definition
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, Single-Mode
ACS4004A-R2	KVM Extender DVI-D, USB-HID CATx
ACS4004A-R2-MM	KVM Extender DVI-D, USB-HID, Multimode
ACS4004A-R2-SM	KVM Extender DVI-D, USB-HID, Single-Mode
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, Single-Mode
ACS1009A-RMK	19"/1U/24 IV rackmount kit to mount four 1.1"H devices
ACS2209A-RMK	19"/1U rackmount- kit to mount four devices 1.7"H

2.5 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 and 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: 3.1 What's Included.

For information about connection and installation, see 3.2 Interconnection Cable Requirements.

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 a remotely located screen and stored in the internal DDC table.

To modify the DDC setup, see 4.0 Service Setup.

Selecting the moment of switching to the next frame

The transmission of screen data is not synchronous to the screen change of the graphics 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 behavior, see 4.0 Service Setup.

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 frame count transmitted per second; fixed 24-bit color depth gives smooth color grades under all circumstances. Choose the one that's best for your application.

To modify the color depth, see 4.0 Service Setup.

3.0 Installation

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

3.1 What's included

All:

- DVI-D/I CATx/Fiber KVM-Extender pair (local and remote units)
- (2) US power cords
- (2) 5-VDC power supplies
- 6-ft. (1.8-m) USB cable
- 6-ft. (1.8-m) DVI-D video cable
- User's manual with quick-install guide

ACS4004A-R2 family (also includes):

- 6-ft. (1.8-m) USB cable

ACS4011A-R2 family (also includes):

- 6-ft. (1.8-m) VGA-to-DVI-D video cable

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.). Make sure that the connection is tension-free.
- DVI: Connect the supplied DVI CPU cable to your CPU (KVM switch, etc.). Make sure that the connection is tension-free.
- VGA/DVI: Connect the supplied VGA to DVI CPU cable to your CPU (KVM, switch, etc.). Make sure 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-pair 24 AWG connection according EIA/TIA 568A (10BASE-T). Use of cables from a higher category (CAT5e, CAT6, CAT7) is possible.

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

NOTE: The use of flexible cables (patch cable) 26 or 27 AWG is possible. Because of the higher loss of the stranded cables, the maximum distance is reduced to approximately half the value of solid cables.

NOTE: 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 (RJ-45) 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.

NOTE: The maximum distance will depend on device type and on fiber type used.

Recommended cables:

ACSxxxxA-MM: 50- μ multimode distance approximately 1312 ft. (400 m)

ACSxxxxA-MM: 62.5- μ multimode distance approximately 656 ft. (200 m)

ACSxxxxA-SM: Single-mode distance approximately 32,808 ft. (10 km)

A point-to-point connection is required. You can have one or more patch panels in the line. You can't have a connection from the fiber link interface (LC) to any other products, especially telecommunications or network equipment.

Single-mode devices often work well on multimode fibers, but the reverse isn't true. In addition, however, single-mode devices on multimode fibers may possibly double the distance on multimode fibers. There is no guarantee of this, and users are asked to perform tests within their own environments.

- Power supply: Connect the supplied 5-VDC power supplies to the plug terminal on the rear of both local and remote units.

Chapter 3: Installation

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 5-V power supply to power the unit.

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

6. To attach a local (USB) keyboard/mouse, use additional USB port(s) at your CPU or use a USB hub between the CPU and local unit's USB connector.
7. Power up the system.

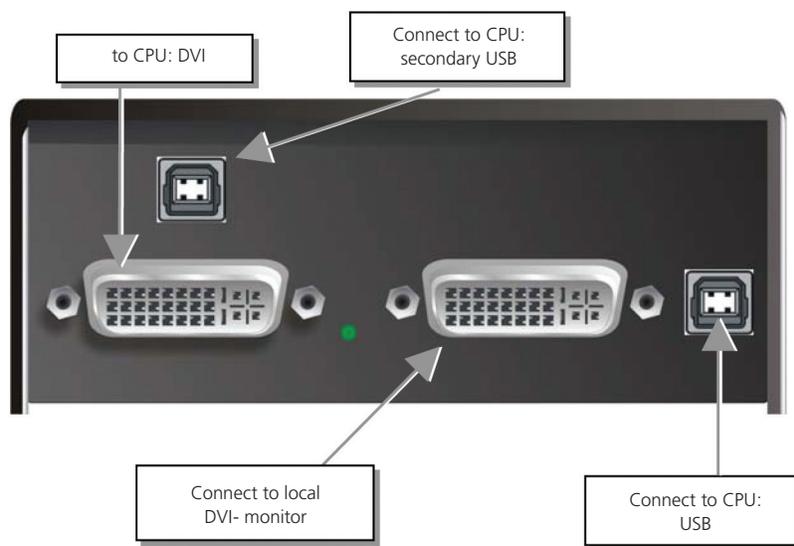


Figure 3-1. ACS4002A-R2/ACS4002A-R2-xx local unit with 2x USB-HID + 4x USB-2.0.

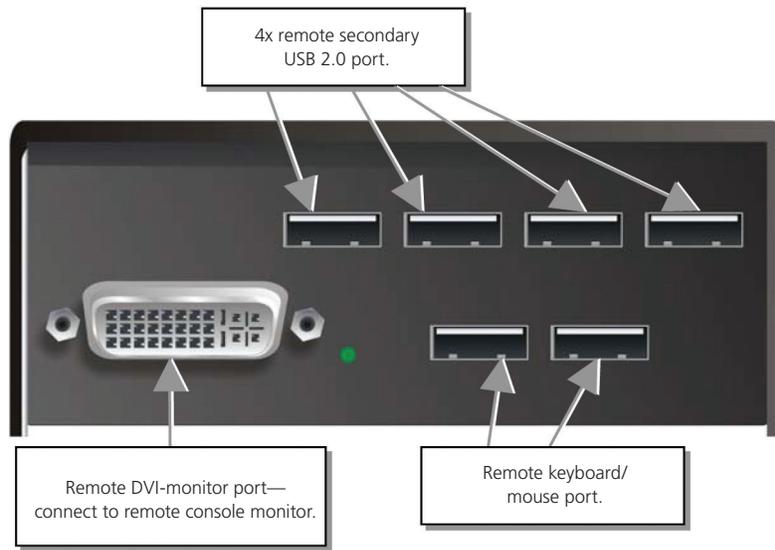


Figure 3-2. ACS4002A-R2/ACS4002A-R2-xx remote unit with 2x USB-HID + 4x USB-2.0.

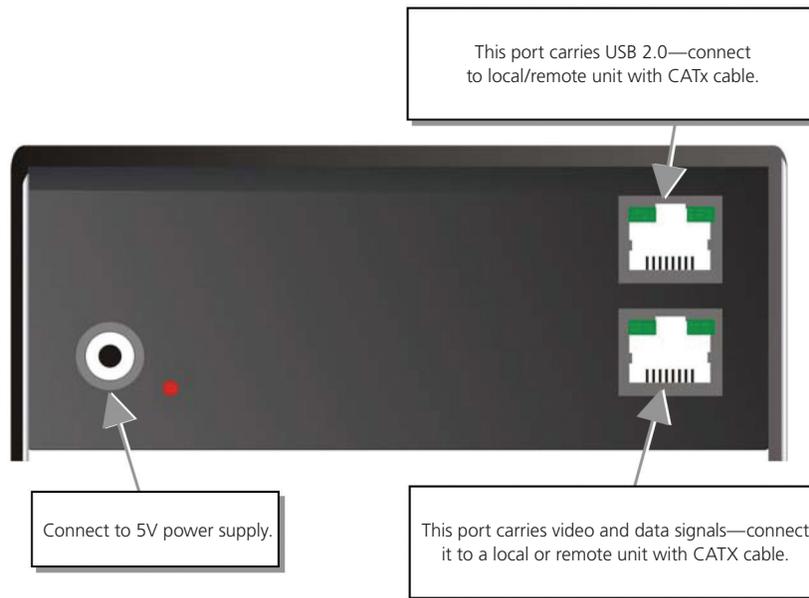


Figure 3-3. ACS4002A-R2-xx, local/remote unit: rear view CATx.

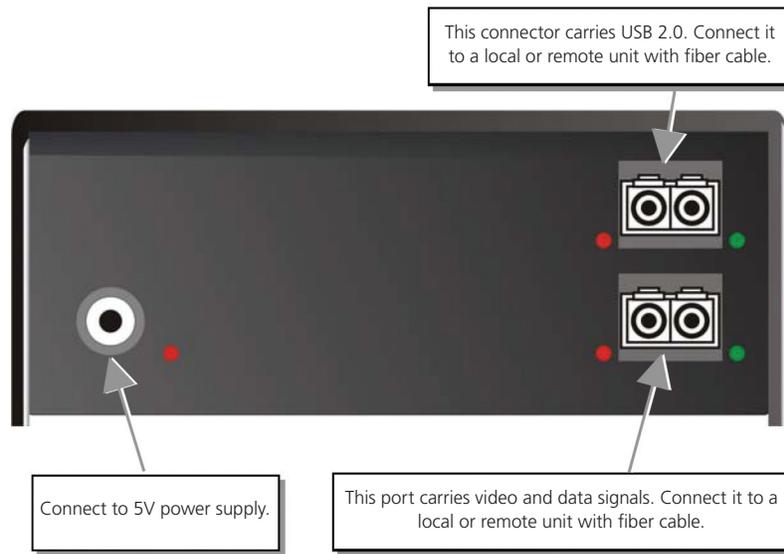


Figure 3-4. ACS4002A-R2-xx local/remote unit: rear view fiber.

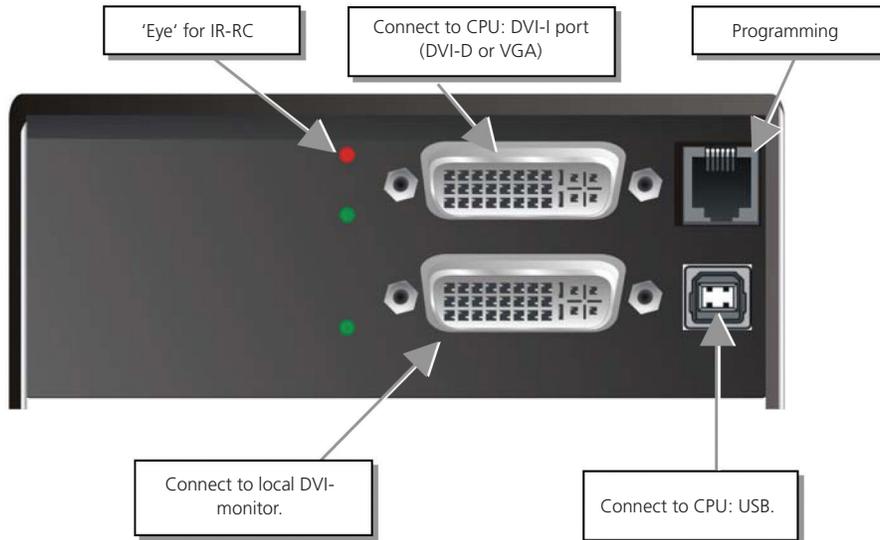


Figure 3-5. ACS4002A-R2/ACS4011A-R2-xx, local unit with DVI-I input (DVI-D + VGA).

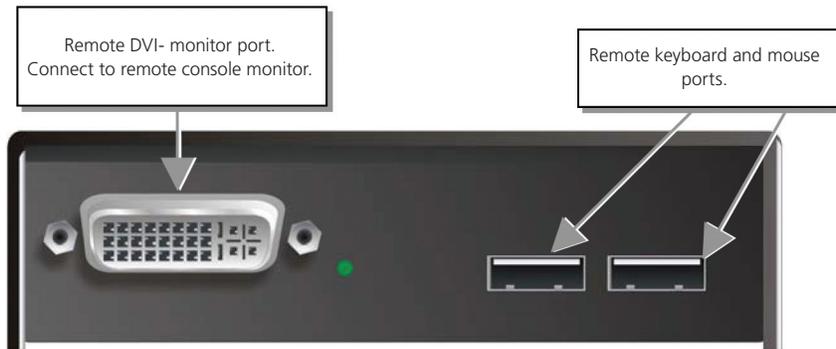


Figure 3-6. ACS40011A-R2 /ACS40011A-R2-xx remote unit.

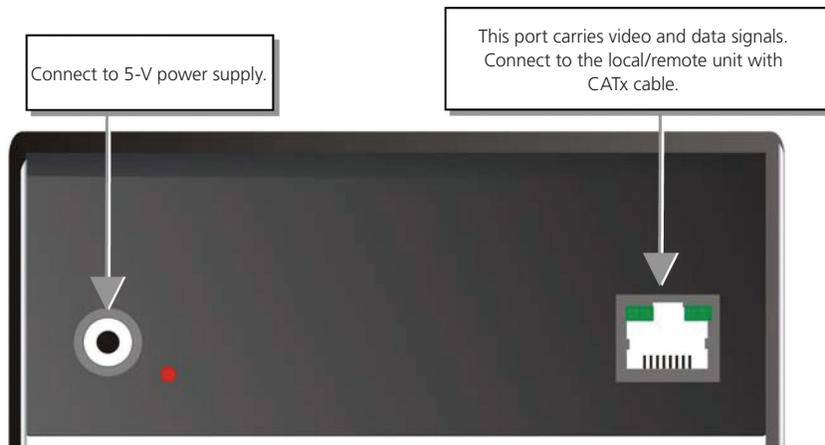


Figure 3-7. ACS40011A-R2-xx local unit (CATx): rear view.

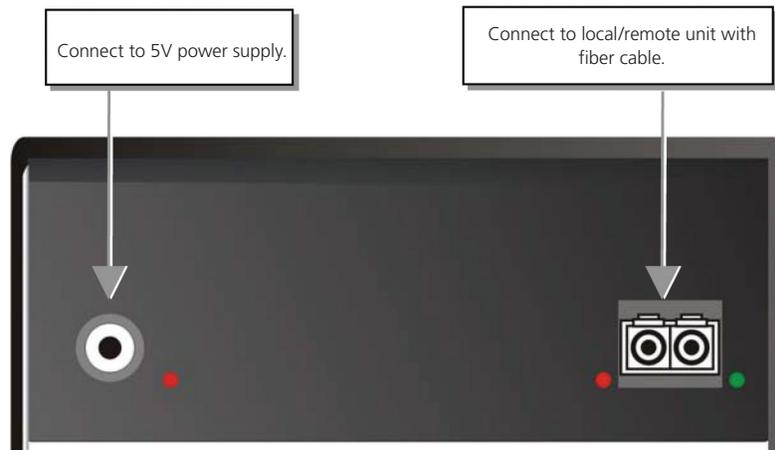


Figure 3-8. ACS40011A-R2-xx local unit (fiber): rear view.

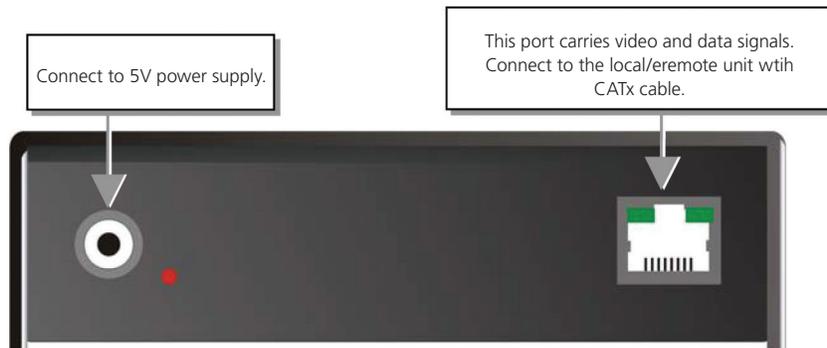


Figure 3-9. ACS40011A-R2-xx remote unit (CATx): rear view.

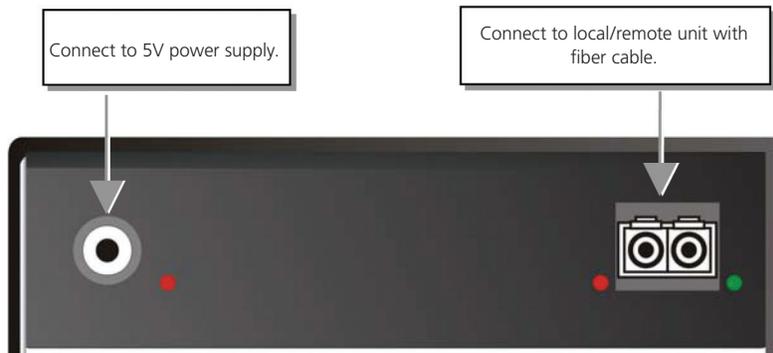


Figure 3-10. ACS40011A-R2-xx remote unit (fiber): rear view.

3.4 Diagnostic LEDs

Each DVI-D/I CATx KVM-Extender has indicator LEDs for Power, Video OK, Data Error, and Link Status. The Power LEDs are built into the Power switch. The location of the LEDs is shown below:



Figure 3-11. Power, Data, and Link LEDs.

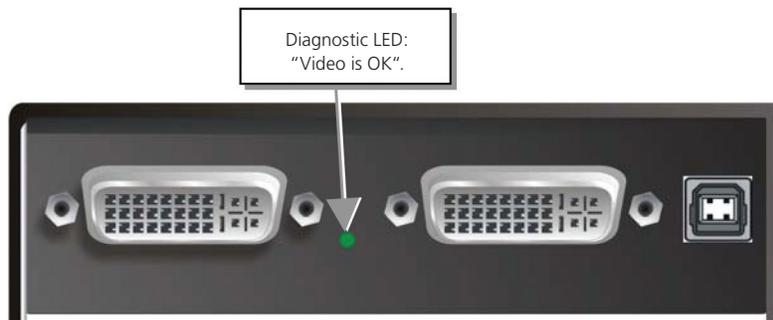


Figure 3-12. Diagnostic Video LED.

Table 3-1. LED Information

LED	Appearance	Diagnostics
Power LED (Red LED)	Off On	Device not ready Device ready
Video OK (Green LED)	Off On	No signal or invalid video signal detected Device ready
Power LED (Green LED)	Blinking On	No CATx connection Device ready
Power LED (Green LED)	Off Blinking/on	Device ready Errors through data transmission over CATx cable (Cable too long, too high attenuation or too much EMI interference)

4.0 Service Setup

For standard applications, you should not need to make any adjustments to your DVI-D 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 separate the lower and upper shells of the case.



Figure 4-1. Location of fastening screws.

4.1 Setup at the Local Unit

After unscrewing and opening the upper shell, place the device so the CATx connectors are on the right and the electrical connectors are on the left. The main circuit board then will look like this:

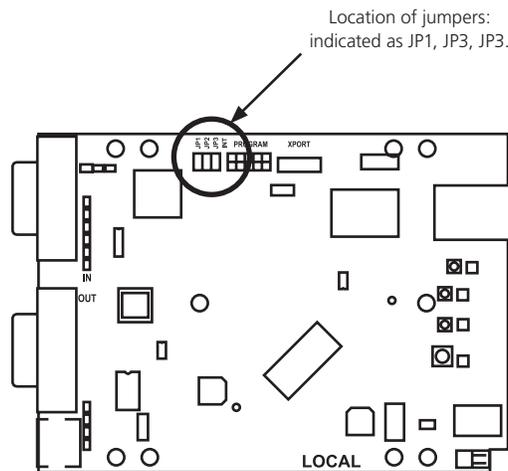


Figure 4-2. Schematic of the interior of the local unit. Note the position of the jumpers.

DDC

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

Table 4-1. DDC Information

LED	Diagnostics	
From internal table		 
From local monitor	 	
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)		

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:

- 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; for dual-head devices, remove the cables from both monitors.
- Make sure all monitors are turned on.
- Plug the video cable of the remote monitor(s) into the remote unit and any local units.
- The DDC information from the remote monitors will be 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 will blink rapidly for approximately one second, indicating that you are finished.

Chapter 4: Service Setup

Selection of Color Depth

You may select between the Autoselect setting (the default setting), in which the system chooses whether 16- or 24-bit color (64 K or 16 M colors) is transmitted, or 24-bit color (16 M color).

Autoselect mode optimizes the bandwidth between speed and color depth. When Autoselect is selected, 24 bit colors are transmitted as the screen content permits high data compression. When the video data does not allow reducing data, the colors are automatically reduced to 16 bit. 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.

For the highest color depth at all times (with possibly reduced frame rates), select the 24-bit setting.

Table 4-2. Color Depth Settings

Color Depth	JP3
16-bit/24-bit Autoselect setting. (Default). Optimizes the color depth based on screen content.	
24-bit	

4.2 Setup at the Remote Unit

After unscrewing and opening the upper shell, place the device so the CATx connectors are on the right and the electrical connectors are on the left. The main circuit board then will look like this:

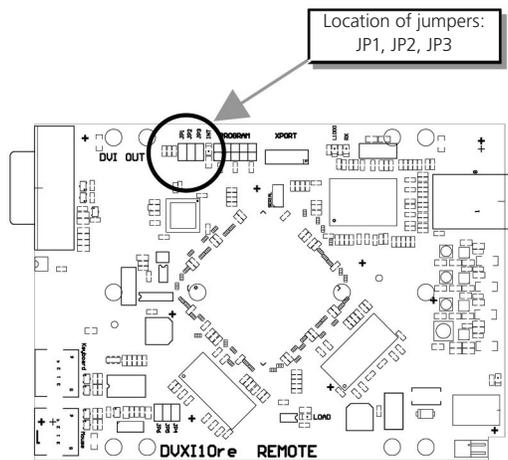


Figure 4-3. Schematic of the interior of the remote unit. Note the position of the jumpers.

Selecting the moment to switch to the next frame

The transmission of screen data is not synchronous to the screen change of the graphics card. Normally, the transmission is terminated while a frame on the screen is displayed. If the device switches to the new frame while the old frame is being displayed (somewhere on the screen), it is possible that you will see horizontal screen breaks during the switch.

On the other hand, the device must idle until the frame is displayed completely (until VSYNC) -> at which point the number of frames per second transmitted may be reduced significantly. In this case, it is possible that you will see a stepping of the frames.

Table 4-3. Color Depth Settings

Moment to Switch	JP3	Behavior
Switching during HSYNC (default)		Higher frame rate, but horizontal breaks may possibly be detectable.
Switching during VSYNC		Lower frame rate, but no horizontal breaks detectable; possibility of stepping pictures.

4.3 Setup for the ACS4011A-R2 On-screen Display (OSD)

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

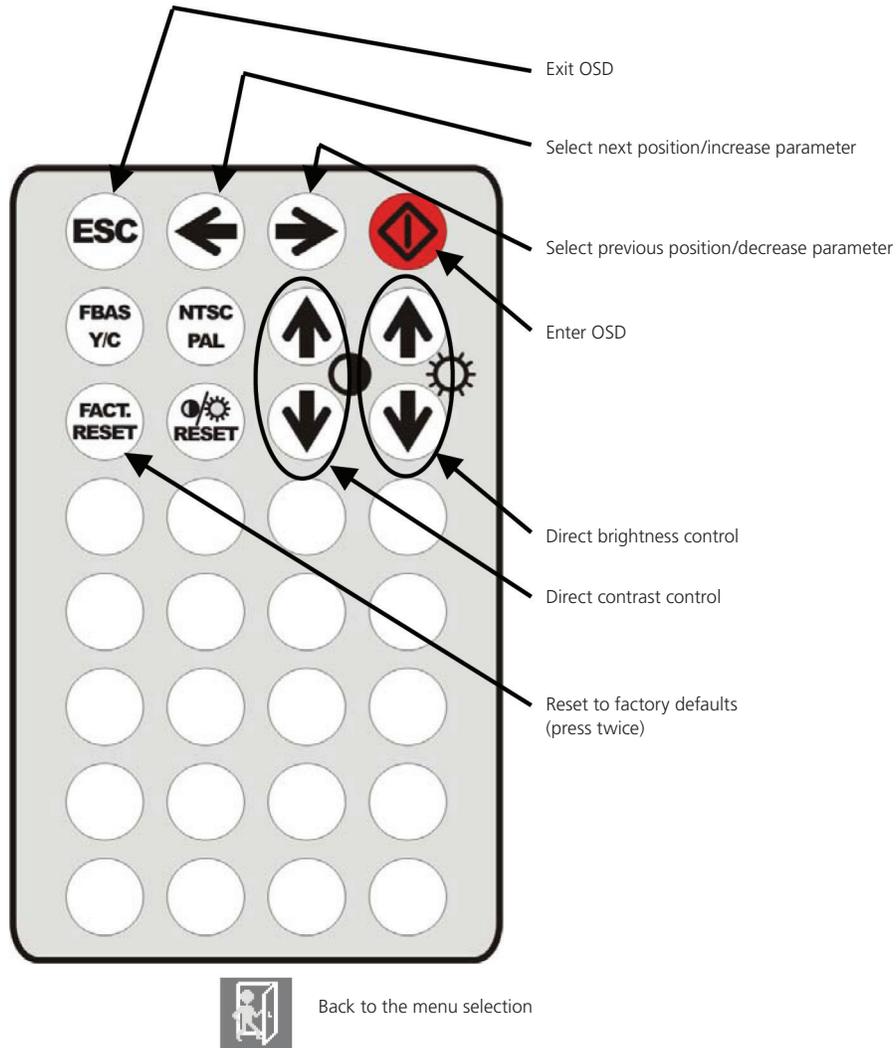


Figure 4-4. Infrared Remote Control (IR-RC).

On-Screen Display (OSD) Utility

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).

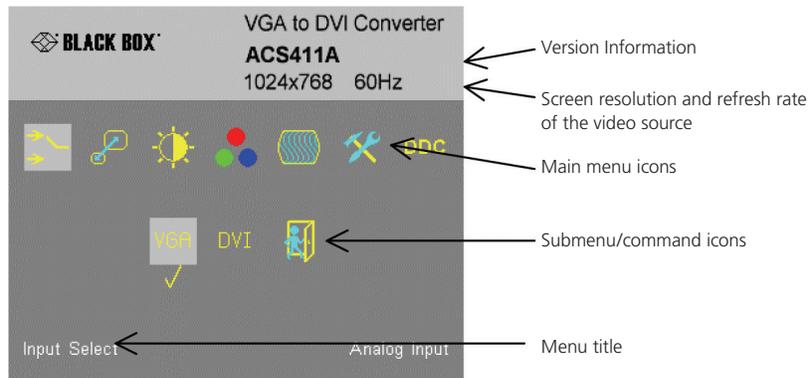


Figure 4-5. On-Screen display utility.

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

Chapter 4: Service Setup

Using the OSD

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

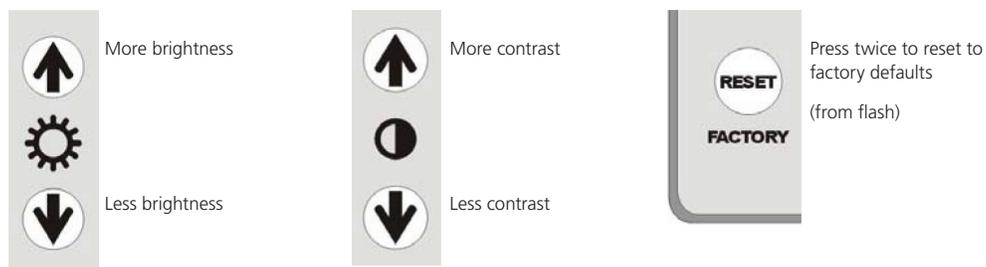


Figure 4-6. Using the IR-RC.

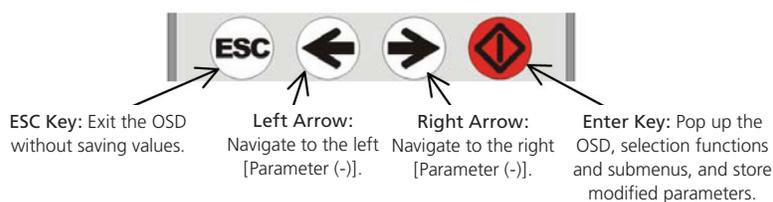


Figure 4-7. Navigating within the OSD using the IR-RC.

Icons

The OSD is an icon-based utility.

These symbols, which appear across the top of the OSD display, show the main menu categories:

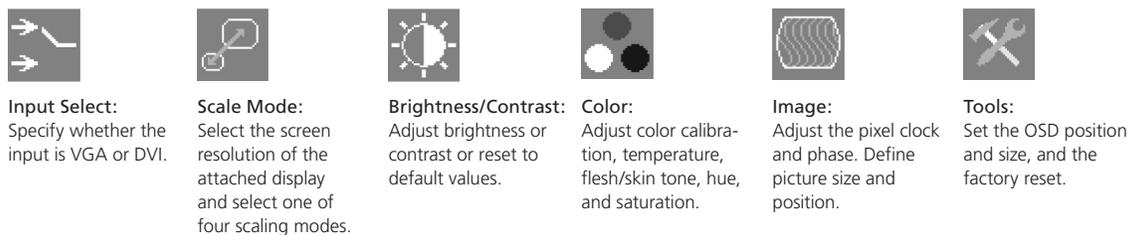


Figure 4-8. OSD menu icons.

Navigating the OSD Utility

1. Use the left and right arrow, shown in Figures 4-3 and 4-7 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:



Figure 4-9. OCD Value Bar.

5. Use the left and right arrow keys to change the value.
6. In many cases, after you have chosen a new setting, the OSD displays the following confirmation message:

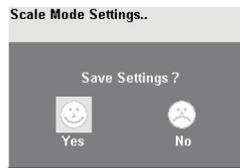


Figure 4-10. Confirmation Dialog

7. Highlight the “Yes” button and press the Enter key to confirm your choice. Or, 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 table below summarizes the keyboard actions and icons used to navigate the OSD utility, and to select and adjust the VGA to DVI Converter’s parameters:

Table 4-4. DDC Information

Key or Icon, IR-RC	Action
	Close the OSD, and restore normal keyboard and mouse functions.
	Return to the previous menu selection.
	Open the highlighted menu or submenu; also, accept the command.
	Select the previous menu or command icon; decrease the highlighted parameter.
	Select the next menu or command icon; increase the selected parameter.

Chapter 4: Service Setup

Menu Item: Input Selection

From the main menu, select this "Input Select" icon to choose the type of input source:

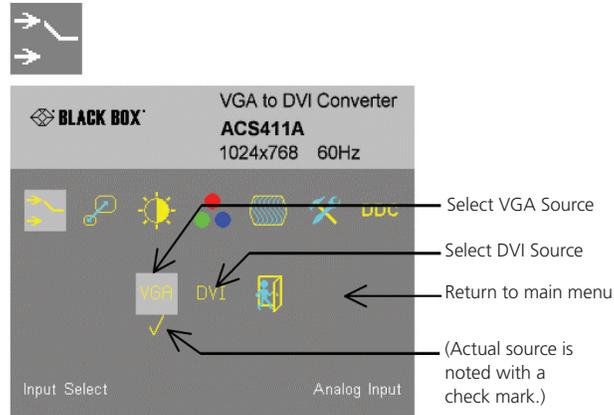


Figure 4-11. Input selection.

Menu Item: Brightness/Contrast

From the main menu, select the "Brightness/Contrast" icon to adjust the brightness and contrast of the video image, or to adjust the black level of a display:

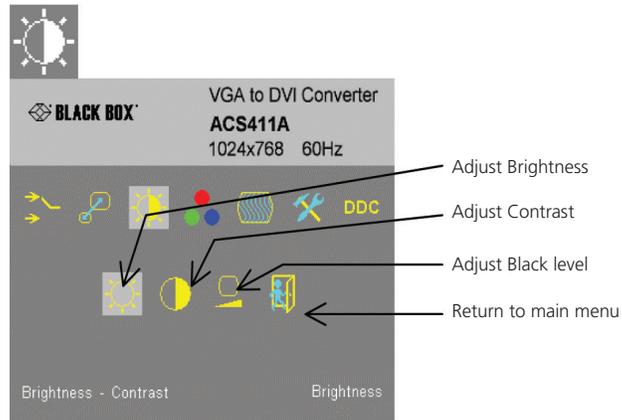


Figure 4-12. Brightness/Contrast adjustment.

Menu Item: Scale Mode

From the main menu, select the Scale Mode icon to specify the physical resolution of the attached screen. These settings enable you to best match the pictures on a TFT screen. Use “output scaling” to stretch the picture to the maximum available screen space.

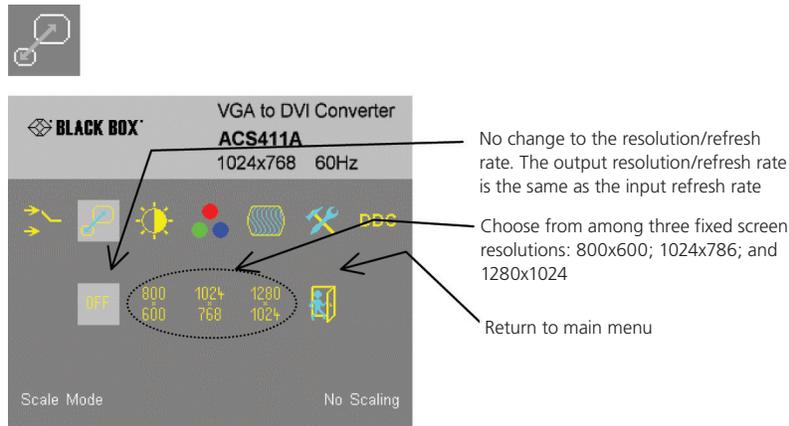


Figure 4-13. Scale Mode adjustment.

NOTE: There is no altering in refresh rates possible. If sourcing 50 Hz or 75 Hz, make certain your monitor is able to process these refresh rates. Otherwise, select 60-Hz refresh rate from your graphics card. Note that rescaling any 16:9 resolution to a 4:3 resolution will cause a misalignment in aspect ratio.

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

This means:

For output of 800 x 600, the maximum input resolution is 1024 x 768.

For output of 1024 x 768, the maximum input resolution is 1680 x 1050 (Reduced Blanking).

For output of 1280 x 1024, all maximum input resolutions are possible.

With VGA input signals, there are no limits for up- or downscaling.

Chapter 4: Service Setup

Menu Item: Color

From the main menu, select the "Color" icon 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, along with hue and saturation adjustment and the setup of flesh tones.

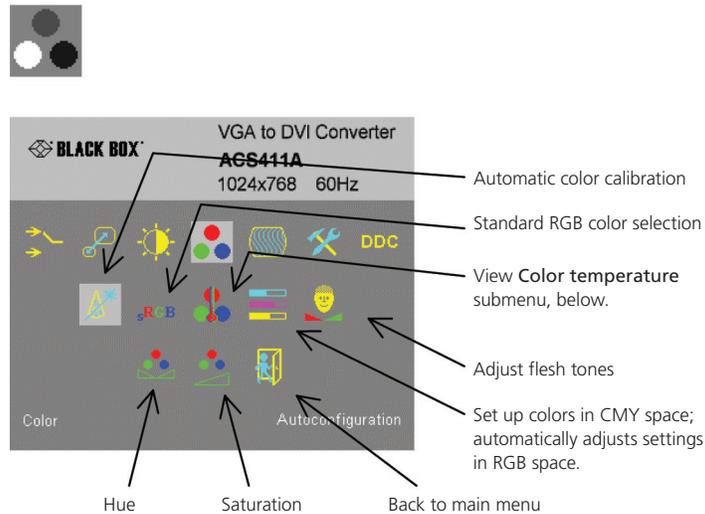


Figure 4-14. Color adjustment.

Menu Item: Color Temperature submenu

From the main menu, select the Color Temperature submenu to set up the color profile in the RGB color space, or by using one of five pre-defined color temperatures. To view this submenu, select the Colors icon from the main menu, and then select the Color Temperature icon as shown here.

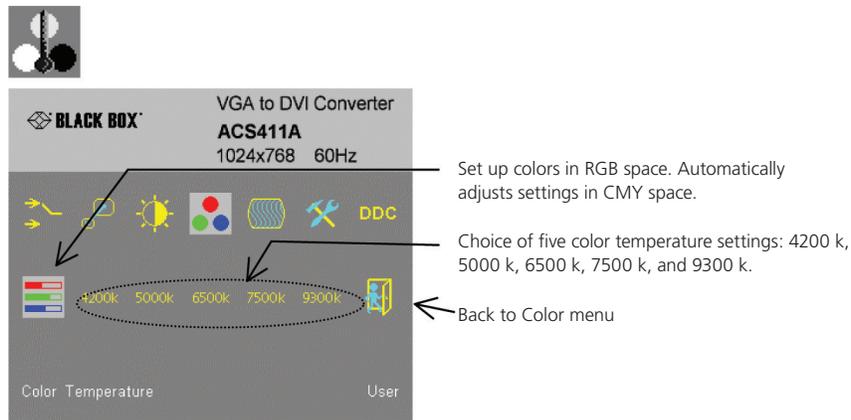


Figure 4-15. Color Temperature submenu.

Menu Item: Image

From the main menu, select the "Image" menu to adjust the vertical and horizontal screen position and to set the pixel clock and phase.

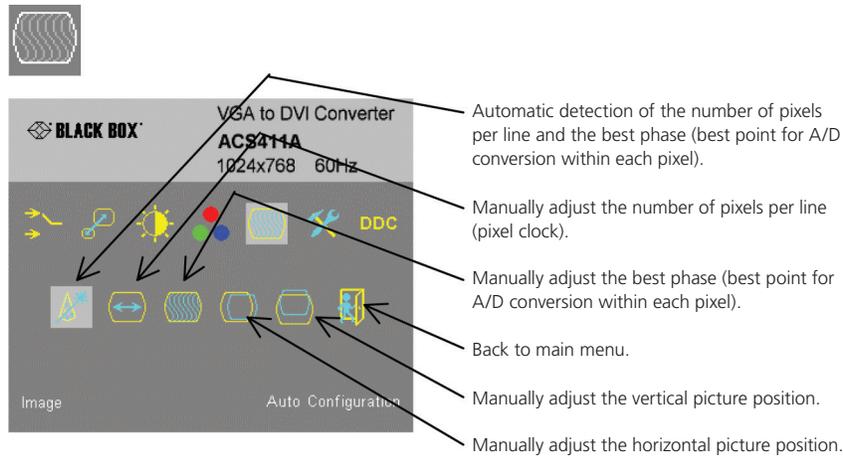


Figure 4-16. Image menu.

Menu Item: Tools

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

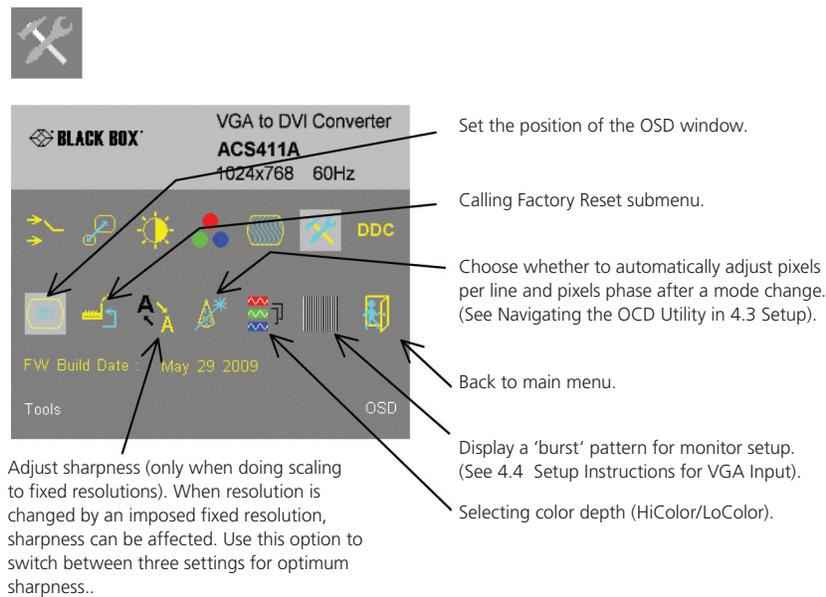


Figure 4-17. Tools menu.

Chapter 4: Service Setup

Menu Item: OSD submenu

From the Tools menu, select the "OSD" submenu, to define the position and size of the OSD window.

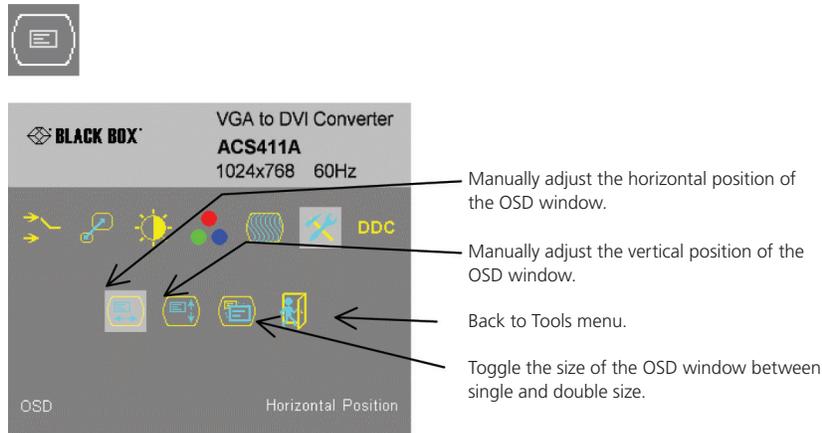


Figure 4-18. The OSD submenu, from the Tools menu.

Menu Item: Auto Configuration submenu

From the Tools menu, select the Auto Configuration icon. 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 graphics 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.

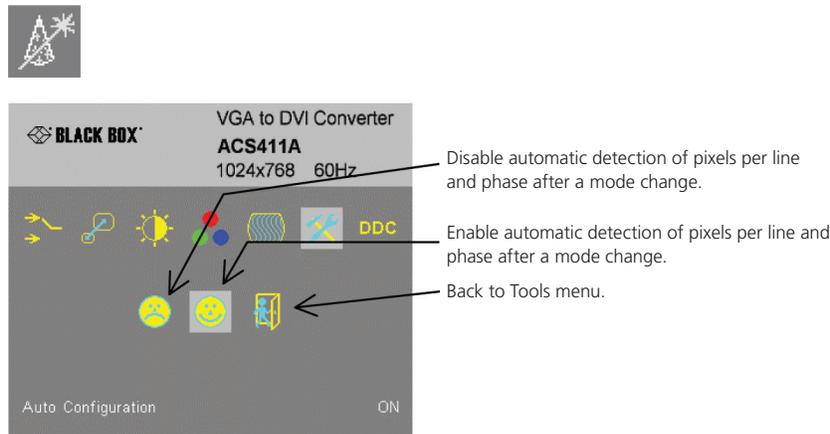


Figure 4-19. The Auto Configuration submenu, from the Tools menu.

Menu Item: DDC Configuration Menu

From the main menu, select the DDC Configuration menu, to define which DDC information is transmitted to the graphics card.

As long as there is no transparent DDC communication, there is a “virtual DDC” built into the local unit (See Appendix E: Information in Internal DDC). You can either provide the DDC information of the secondary monitor attached to the local unit or the information from the internal DDC table.

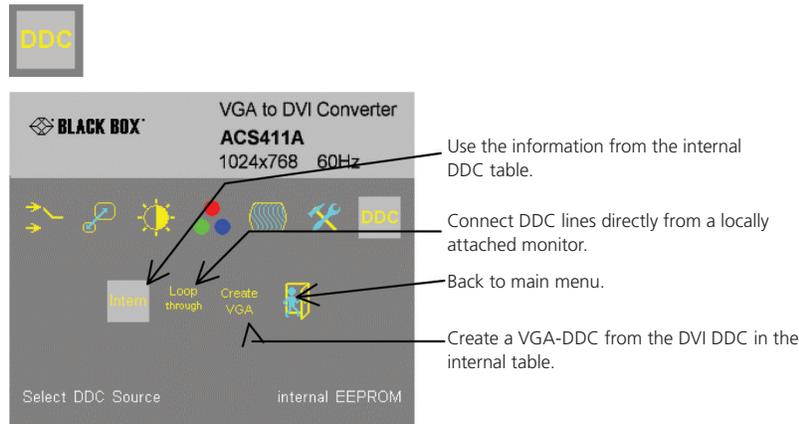


Figure 4-20. The DDC Configuration menu.

NOTE: It is possible to load the DDC information of the remotely attached monitor into the internal DDC table. Refer to DDC Information in 2.5 How to Use This Guide. 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.

4.4 Setup Instructions for VGA Input (ACS4011A-R2 Family)

When converting from analog to digital signal, this extender will give you options to adjust and compensate in order to achieve the best possible video output. This procedure is designed to correct discrepancies in the video signal from analog/digital video conversion by the VGA to DVI Converter.

1. Display from your graphics source a picture with as much detail as possible. If possible, display a “burst-pattern” (see Figure 4-21)—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 12-pt. 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:

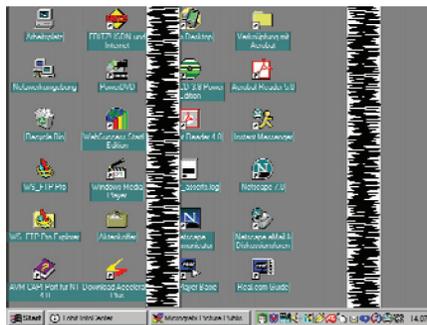


Figure 4-21. If, after allowing the OSD to automatically adjust the pixel phase, the picture quality is not successful, you may see this type of distortion. In this case, you will need to manually adjust both the pixel clock and pixel phase.

- a. Return to the OSD utility and select this 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 a zebra-pattern:

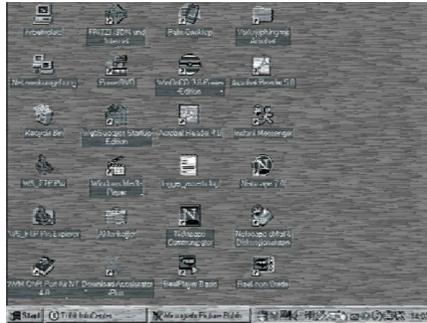


Figure 4-22. When manually adjusting the pixel phase, you may see the type of noise that's shown here. You can use the OCD command *Manually adjust the best phase* to remove this distortion.

- 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.

5.0 Troubleshooting

5.1 Monitor Errors

There isn't a picture

Check the power supply connection at the local and remote units. Is the Power (red LED) at the local unit illuminated? (See 3.4 Diagnostic LEDs.) 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 3.4 Diagnostic LEDs.) 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 3.4 Diagnostic LEDs.) If yes, check cable length and environment.

Video OK LED is dark: CPU does not provide a video signal. Check the settings of the graphics card. Connect a monitor to the local output to see whether there is a signal or not.

“Stepping” pictures on displaying videos

On high resolutions, the amount of data transmitted each second expires the capability of the data link. Therefore the data has to be reduced before transmitting. This is done in a first step by an 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 graphics card generates a new frame. This new frame is discarded. Because of this behavior, the count of frames per second (fps) may be reduced to a value, where “stepping” pictures are seen.

How to solve the problem: Use a lower resolution, which is slightly higher than the resolution of the recorded movie. Most movies only have a resolution of approximately 720 x 480 (NTSC) or 704 x 576 (PAL) or even 320 x 256 (VHS). If the monitor provides a higher resolution, it may scale these 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-/24-bit AUTOSELECT. On moving pictures, the human eye is not able to see differences between so many colors. A reduction to 16-bit reduces the amount of data without (visible) effects.

5.2 USB Keyboard and USB Mouse Errors

Your USB keyboard or mouse does not work

Although we designed the devices to be as transparent as possible, we can't ensure that all devices will be compatible.

Your mouse is “stepping” on your screen

On high resolutions, the amount of data transmitted each second exceeds the capability of the data link. Therefore the data rate must be reduced before transmitting. This is done by using an RLE (Run Length Encoding) algorithm. If this (lossless) compression is not sufficient, frames are dropped, and as a result, you will see “stepping” mouse movements.

How to solve the problem: Use a lower resolution or use a desktop background that is better suitable for compression: avoid photos for background or horizontally graduated colors. Or better yet, use monochrome backgrounds, which allow for higher compression -> higher frame rates.

Your mouse is moving like it's "hanging on a rubber band"

This problem is usually a combination of things, which adds up to a delay between the true mouse movement and the movement of the mouse pointer on the screen. Delays of up to 100–150 msec can be annoying.

The total delay comes from (time values are approximate values):

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

Total delay times between 85 to 230 msec are possible. Most of this delay is NOT caused by the extender system. The extender-based delay is 5 to 15 msec of data transfer to the CPU and 15 to 45 msec of frame transfer to the remote unit—a total of 20 to 60 msec. Even a step from a 100 msec delay to a 140 msec (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 175 msec. So (under special conditions) even the bare CPU/monitor link can have this problem. If you then add an extender system, the problem may worsen and is falsely attributed to the extender system, even though the extender is only a small part of 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.) Use a lower resolution or use a desktop background that is better suited for compression: Avoid photos for background or horizontally graduated colors. It's better to use monochrome backgrounds. They allow higher compression -> higher frame rates. If the link has frame dropping, a reduction from 30 fps to 60 fps saves 17 msec and from 20 fps to 60 fps saves 34 msec.

5.3 USB-HID Device Errors

Your USB-HID device does not work

Although our interface supports HID devices, we can't ensure that every connected device is supported. If you have problems, contact our FREE Tech Support.

5.4 Other Errors

Your USB- device does not work

You have connected a non-HID device to the HID port. For these ports, only HID devices are supported. (For example, on the ACS4002A-R2 model, there are six total USB ports at the remote unit. The two ports in the lower row are USB-HID only. Reconnect your USB device to one of the ports in the upper row.)

Appendix A: Sample Applications

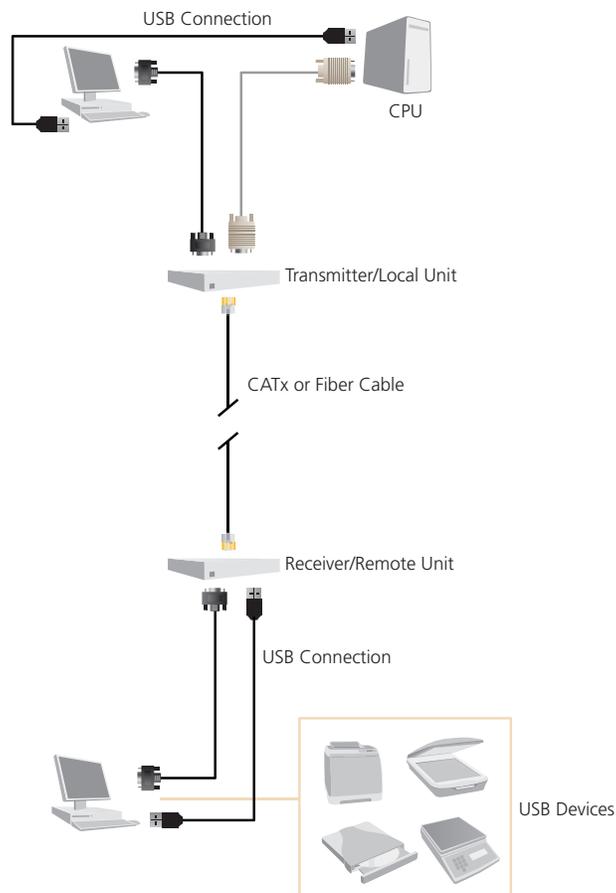


Figure A-1. DVI-D CATx KVM Extender with USB 2.0 support.

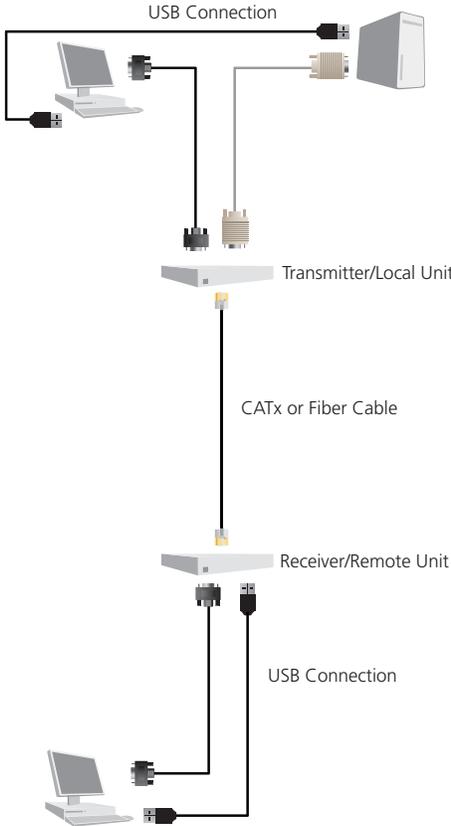


Figure A-2. DVI-D CATx KVM Extender supporting VGA and DVI-D.

Appendix B: Rackmount Options

The DVI-D CATx KVM Extender units can be mounted in a standard 19" rack using the mounting kit either of two different rackmount kits: the ACS1009A-RMK for single-head devices, and ACS2209A-RMK for dual-head devices.

Mounting the ACS1009A-RMK Rackmount-Kit

Using the ACS1009A-RMK rackmount kit, you can mount up to four 4"H x 5.6"W x 1.1"D (10.3 x 14.3 x 2.9 cm) single-head devices into a 19" server rack. The rackmount kit requires 1U of rack space. Blank plates enable you to cover unused device positions.

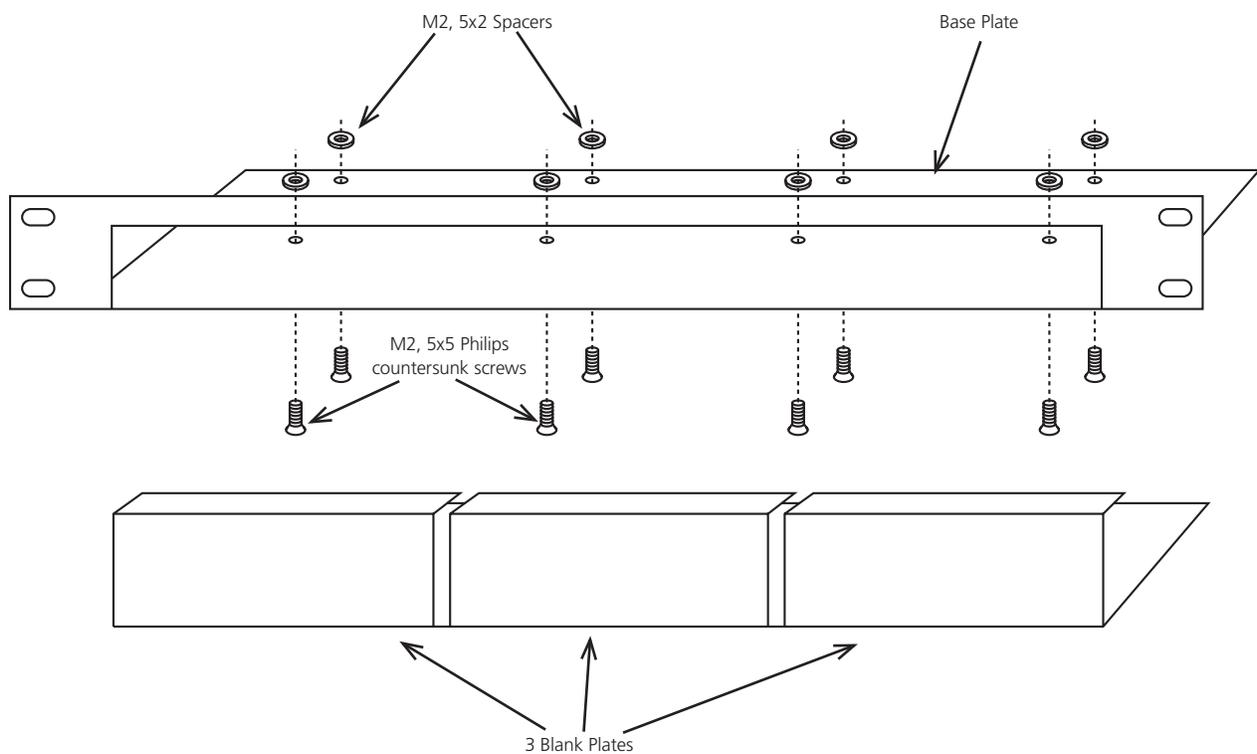


Figure B-1. Rackmount Kit.

Mounting Instructions:

- 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.
- Close the remaining gaps with blanking plates.

NOTE: Use only the supplied short screws to prevent damages on the PCBs

The Rackmount Kit (ACS1009A-RMK) enables mounting of up to four devices:

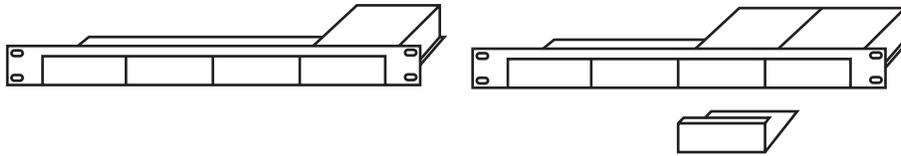


Figure B-2. Mounting for one or two devices.

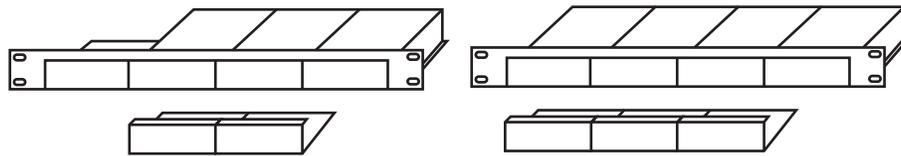


Figure B-3. Mounting for three or four devices.

NOTE: In the leftmost position, you can install a rackmountable PSU, ACS2209A-PS instead of an extender device. This PSU will enable you to power up to three single- or dual-head devices.

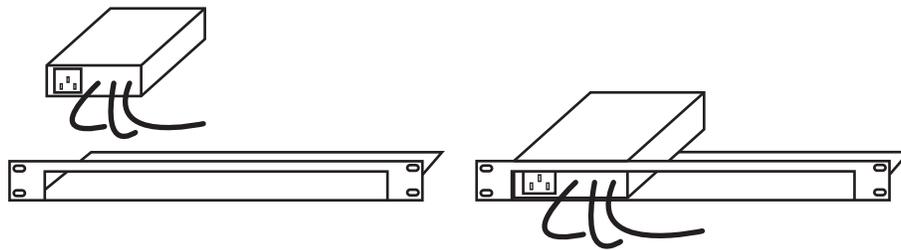


Figure B-4. Mounting the optional ACS2209A-PS.

Appendix B: Rackmount Options

Mounting the ACS2209A-RMK Rackmount Kit

Using the ACS2209A-RMK rackmount kit, you can mount up to four 4"H x 5.6"W x 1.7"D (10.3 x 14.3 x 4.2 cm) dual-head devices into a 19" server rack. The rackmount kit requires 1U of rack space. Blank plates enable you to cover unused device positions.

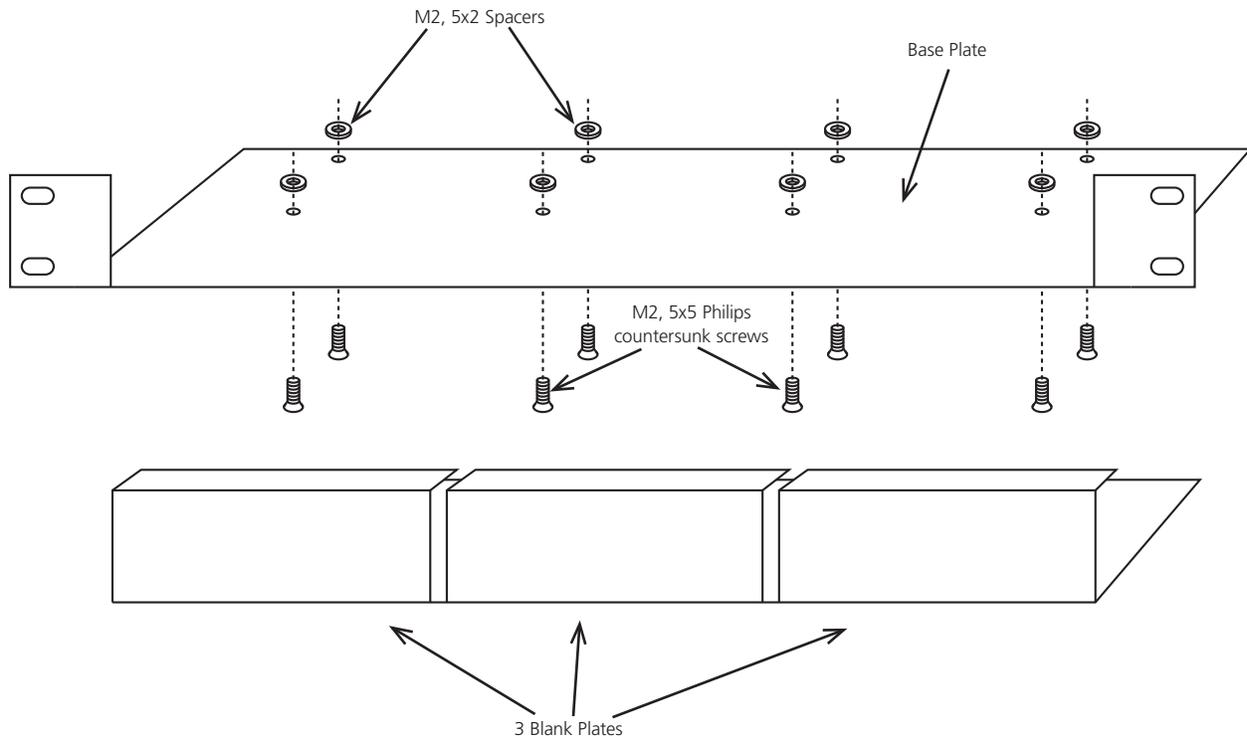


Figure B-5. Mounting with the ACS2209A-RMK Rackmount Kit.

Mounting Instructions:

- 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.
- Close the remaining gaps with blank plates.

NOTE: Use only the supplied short screws to prevent damages on the circuit boards.

The ACS2209A-RMK rackmount kit enables mounting of up to four devices in the following manner:

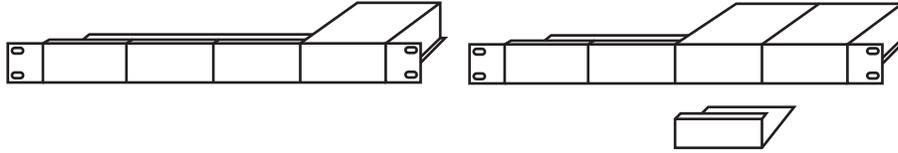


Figure B-6. Mounting for one or two devices.

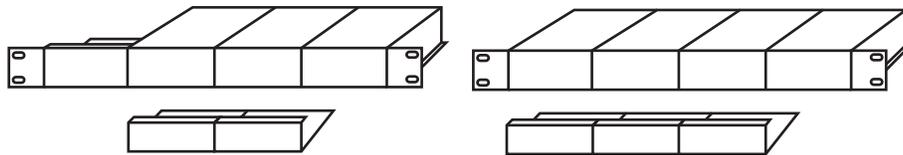


Figure B-7. Mounting for three or four devices.

NOTE: In the leftmost position, you can install a rackmountable power supply unit (PSU) (ACS2209A-PS) instead of an extender device. This PSU will enable you to power up to three single- or dual-head devices.

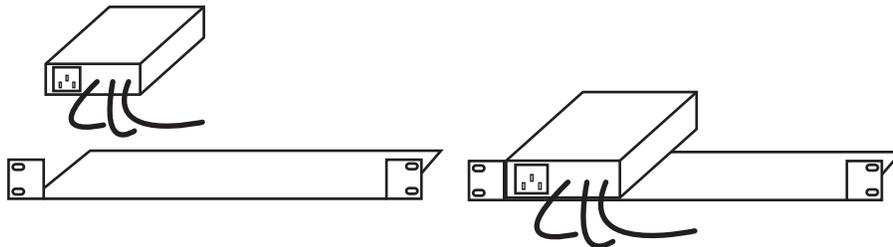


Figure B-8. Mounting the optional ACS2209A-PS.

Appendix C: 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 call, 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 Gvvvvv**

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—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. Our Tech 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 extender's external power supplies. If you are returning it, please include everything you received with it. Before you ship the extender back to Black Box for repair or return, contact Tech Support to get a return authorization (RA) number.

Black Box Technical Support

Table C-1. Black Box Technical Support Contact Information.

Country	Web Site and Email	Phone	Fax
US	www.blackbox.com info@blackbox.com	724-746-5500	724-746-0746
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Appendix D: Supported Video Modes

Appendix D: Supported Video Modes

Table D-1. Supported Video Modes.

Description	Hres pixels	Vres lines	V-freq HZ	Hfreq 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	37.0
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	72.2	57.8	75.2
VESA Standard	1024	768	72.0	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 CVT 16:9	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
WXGA 16:10 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

Table D-1. Supported Video Modes, continued.

Description	Hres pixels	Vres lines	V-freq HZ	Hfreq kHz	DotClk Mhz
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
HG Workstation B123L	1280	1024	72.0	78.1	135.0
VESA Standard	1280	1024	75.0	80.0	1325.0
VESA Standard	1280	1024	85.0	91.1	157.5
TV Mode 16:9	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 Mode 16:10	1440	900	60.0	55.6	89.0
TV Mode 16:9	1600	900	59.9	55.8	118.8
SGI	1600	1024	72.0	77.6	158.3
USGA genlocked	1600	1200	50.0	75.0	138.0
VESA Standard	1600	1200	60.0	75.0	162.0
USGA 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 Mode 16:9	1920	1080	50.0	56.4	148.5
TV Mode 16:9	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

Table E-1. Standard Timings.

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

Native/Preferred Timing: 1024 x 768 @ 60 Hz, VESA

Table E-2. Detailed Timings.

Resolution	Refresh Rate	Bandwidth
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 1200	50 Hz	148.5 MHz
1920 x 1200	60 Hz	148.5 MHz
1920 x 1200	60 Hz	154 MHz

Appendix F: Connectors

DVI-D/-I CATx/Fiber KVM-Extender Connector Pinouts

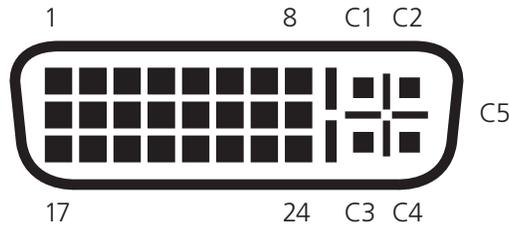


Figure F-1. DVI-I female connector (Output connector for all devices and Input connector for the ACS4002A-R2 device - local unit).

Table F-1. DVI-I Female Connector.

Pin	Signal	Pin	Signal	Pin	Signal
1	TMDS data 2-	9	TMDS data 1-	17	TMDS data 0-
2	TMDS data 2+	10	TMDS data 1+	18	TMDS data 0+
3	TMDS data 2 ground	11	TMDS data 1 ground	19	TMDS data 0 ground
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	TDMS clock ground
7	DDC Output (SDA)	15	Ground	23	TDMS clock +
8	Internal use	16	Hot plug recognition	24	TDMS clock -
C1	Internal use			C3	Internal use
C2	n.c.	C5	Ground	C4	Internal use

Appendix F: Connectors

DVI-I Female Input Connector for the ACS4011A-R2 Local Unit

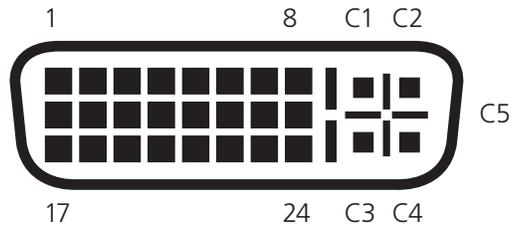


Figure F-2. DVI-I female connector (Input connector for the ACS4002A-R2 local unit).

Table F-2. DVI-I Female Connector.

Pin	Signal	Pin	Signal	Pin	Signal
1	TMDS data 2-	9	TMDS data 1-	17	TMDS data 0-
2	TMDS data 2+	10	TMDS data 1+	18	TMDS data 0+
3	TMDS data 2 ground	11	TMDS data 1 ground	19	TMDS data 0 ground
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	TDMS clock ground
7	DDC Output (SDA)	15	Ground	23	TDMS clock +
8	Analog VSYNC	16	Hot plug recognition	24	TDMS clock -
C1	Analog Red			C3	Analog Blue
C2	Analog Green	C5	Analog Ground	C4	Analog HSYNC

USB Connector, USB Type B (Connector at the Local Unit)

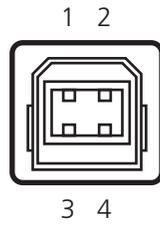


Figure F-3. USB Connector at the Local Unit, USB Type B.

Table F-3. USB Connector at the Local Unit.

Pin	Signal	
1	VCC (+5V)	Red
2	Data -	White
3	Data +	Green
4	Ground	Black

USB Connector, USB Type A (Connector at the Remote Unit)

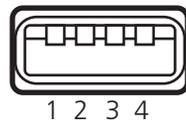


Figure F-4. USB Connector at the Remote Unit, USB Type A.

Table F-4. USB Connector at the Remote Unit.

Pin	Signal	
1	VCC (+5V)	Red
2	Data -	White
3	Data +	Green
4	Ground	Black

Appendix F: Connectors

CATx- Interface: Pinout according to EIA/TIA 568A (1000BASE-T)

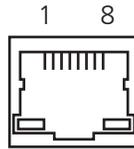


Figure F-5. 1000BASE-T Pinout.

Table F-5. USB Connector at the Remote Unit.

Pin		Pin	
1	D1+	5	D3-
2	D1-	6	D3+
3	D2+	7	D4+
4	D2-	8	D4-

Programming Port



Figure F-6. Programming Port.

Table F-6. Programming Port Pinout.

Pin	Signal
1	TxD (to PC RxD)
2	RxD (from PC TxD)
3	DTR from PC
4	Ground-

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