ACX4000

DVI-D-CatX-

Multiplex Repeater
Cross point Switch
Single head KVM- Switch
Dual head KVM- Switch

Manual

http://www.blackbox.com

Welcome to the ACX4000 Family!

Thank you for purchasing a ACX4000 Switch! We appreciate your business, and we think you'll appreciate the many ways that your ACX4000 system will save you money, time, and effort.

The ACX4000 Switch offers three fundamental uses:

- As a Multiplex Repeater: the DVI signals (+optional audio) coming from a signal source are equalized and distributed on up to 7 equivalent outputs. A control is not necessary. Distributed display systems can be realized (Digital Signage).
- As an 8-port Cross point Switch: each port can be switched optionally as an input or output. You can, for example, switch and distribute the signals from 3 signal sources on up to 5 displays (allowing simultaneous presentations on several displays). Alternatively, signals coming from 7 signal sources can be switched in turn to a single display. The changeover can be triggered remotely using the serial interface (RS232) and/or by a push-button at the device.
- As a 7-port KVM Switch: up to 7 Single head ports (a "Single head" extender system supports 1x monitor, 1x keyboard, 1x mouse) or up to 3 Dual head ports (a Dual head extender system supports 2x monitor, 1x keyboard, 1x mouse). The changeover can be triggered remotely using the serial interface (RS232) and/or by a push-button at the device.

Cascade multiple devices in two stages for all applications to give up to 49/1 connections.

The ACX4000 Switch has the advantage that it can be positioned up to 140m away from both your signal source and display device. This becomes possible by using the proven ACX4000-Extender technology for the transmission of DVI- Monitor and USB-Keyboard and Mouse signals over CATx- cable.

The operation of a ACX4000 Switch always requires at least one Local Unit and up to seven Remote Units from the ACX4000-Extenders range.

Wherever long distances cause problems for remotely locating and switching a monitor (keyboard/mouse) signal, e.g. airports, industrial plants, call centres or in distributed computer centres, the ACX4000 Switch is the best solution. Its flexibility allows it to tackle many tasks.

In addition, there are 4 Media Extenders (DVI + optional audio) and 8 KVM- Extenders (DVI+USB keyboard mouse + optional audio) available. The transmission of the signals requires connecting CATx cable.

This manual will tell you all about your new ACX4000 Switch, 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:

ACX4000: 7-port Switch

ACS4100A-T: ACX4000 DVI only Local Unit
ACS4122A-T: ACX4000 DVI + serial/audio Local Unit
ACS4001A-T: ACX4000- DVI + USB-HID Local Unit, Single head
ACS4201A-T: ACX4000- DVI + USB-HID Local Unit, Dual head
ACS4022A-T: ACX4000- DVI + USB-HID + serial/Audio Local Unit, , Single head
ACS4222A-T: ACX4000- DVI + USB-HID + serial/Audio Local Unit, , Dual head

ACS4100A-R: ACX4000 DVI only Remote Unit
ACS4122A-R: ACX4000 DVI + serial/audio Remote Unit
ACS4001A-R: ACX4000- DVI + USB-HID Remote Unit, Single head
ACS4201A-R: ACX4000- DVI + USB-HID Remote Unit, Dual head
ACS4022A-R: ACX4000- DVI + USB-HID + serial/Audio Remote Unit, , Single head
ACS4222A-R: ACX4000- DVI + USB-HID + serial/Audio Remote Unit, , Dual head

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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.

EUROPEAN UNION DECLARATION OF CONFORMITY

This is to certify that, when installed and used according to the instructions in this manual, together with the specified cables and the maximum CPU- cable length <3m, the Units:

ACX4000

ACS4100A-T, ACS4122A-T, ACS4001A-T, ACS4201A-T, ACS4022A-T, ACS4222A-T,
ACS4100A-R, ACS4122A-R, ACS4001A-R, ACS4201A-R, ACS4022A-R, ACS4222A-R,

are shielded against the generation of radio interferences in accordance with the application of Council Directive 89/336/EEC as well as these standards:

EN 55022:	1999	Class A
EN 55024:	1999	
IEC 61000-4-2:	2001	
IEC 61000-4-3:	2001	
IEC 61000-4-4:	2001	
EN 61000-3-2	2001	
EN 61000-3-3	2002	

The device was tested in a typical configuration with CPU.

CE

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

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 fibre 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 Switch Unit, 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 obscure a unit's ventilation holes.

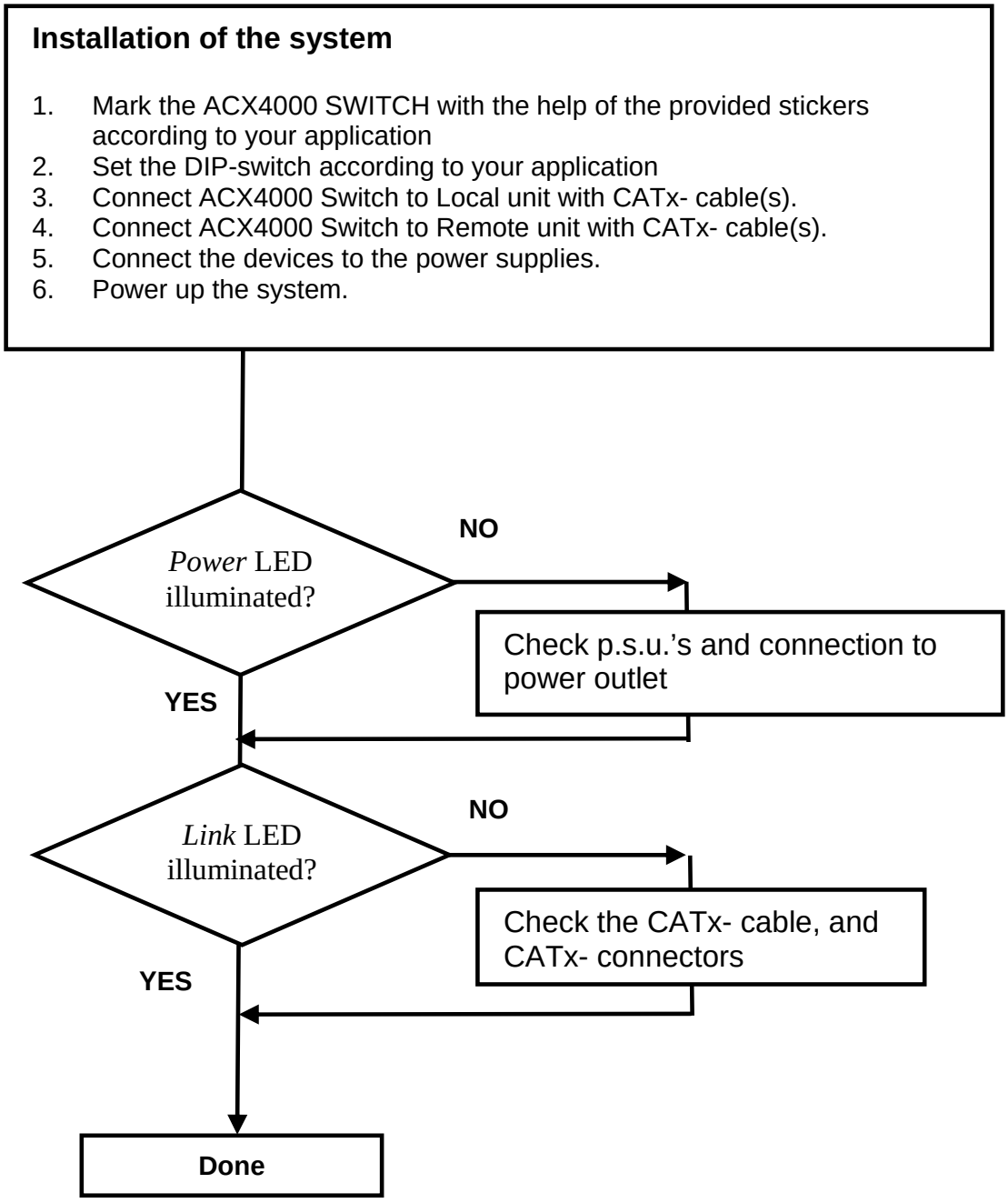
To safeguard against personal injury and avoid possible damage to equipment or property, please observe the following:

- 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.

Contents

1. Quick Setup

This section briefly describes how to install your ACX4000 Switch 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

The ACX4000 Switch can be set up in three configurations:

- **As a Multiplex Repeater**: - the DVI signals (+optional audio) coming from a signal source are equalized and distributed on up to 7 equivalent outputs. A control is not necessary. Distributed display systems can be realized (digital signage). There are three operating modes: 1 link (1 source to 7 screens), 2 links (1 source to 3 screens each) and 4 links (1 source to 1 screen each): a pure length booster.
- **As an 8-port Cross point Switch**: each port can be switched optionally as an input or output so you can, for example, switch and distribute the signals from 3 signal sources on up to 5 displays (allowing simultaneous presentations on several displays). Alternatively, signals coming from 7 signal sources can be switched in turn to a display. The changeover can be triggered remotely using the serial interface (RS232) and/or by a push-button at the device.
- **As a 7-port KVM Switch**: up to 7 Single head Ports (a “Single head” extender system supports 1x monitor, 1x keyboard, 1x mouse) or up to 3 Dual head Ports (a Dual head extender system supports 2x monitor, 1x keyboard, 1x mouse). The changeover can be triggered remotely using the serial interface (RS232) and/or by a push-button at the device.

A Multiplex Repeater system comprises a ACX4000 Switch and one or more Local/Remote Units. Optionally, several ACX4000 Switches can be cascaded in maximally two stages (master/slave). The ACX4000 Switch and the Local/ Remote Units are attached by CATx interconnection cables.

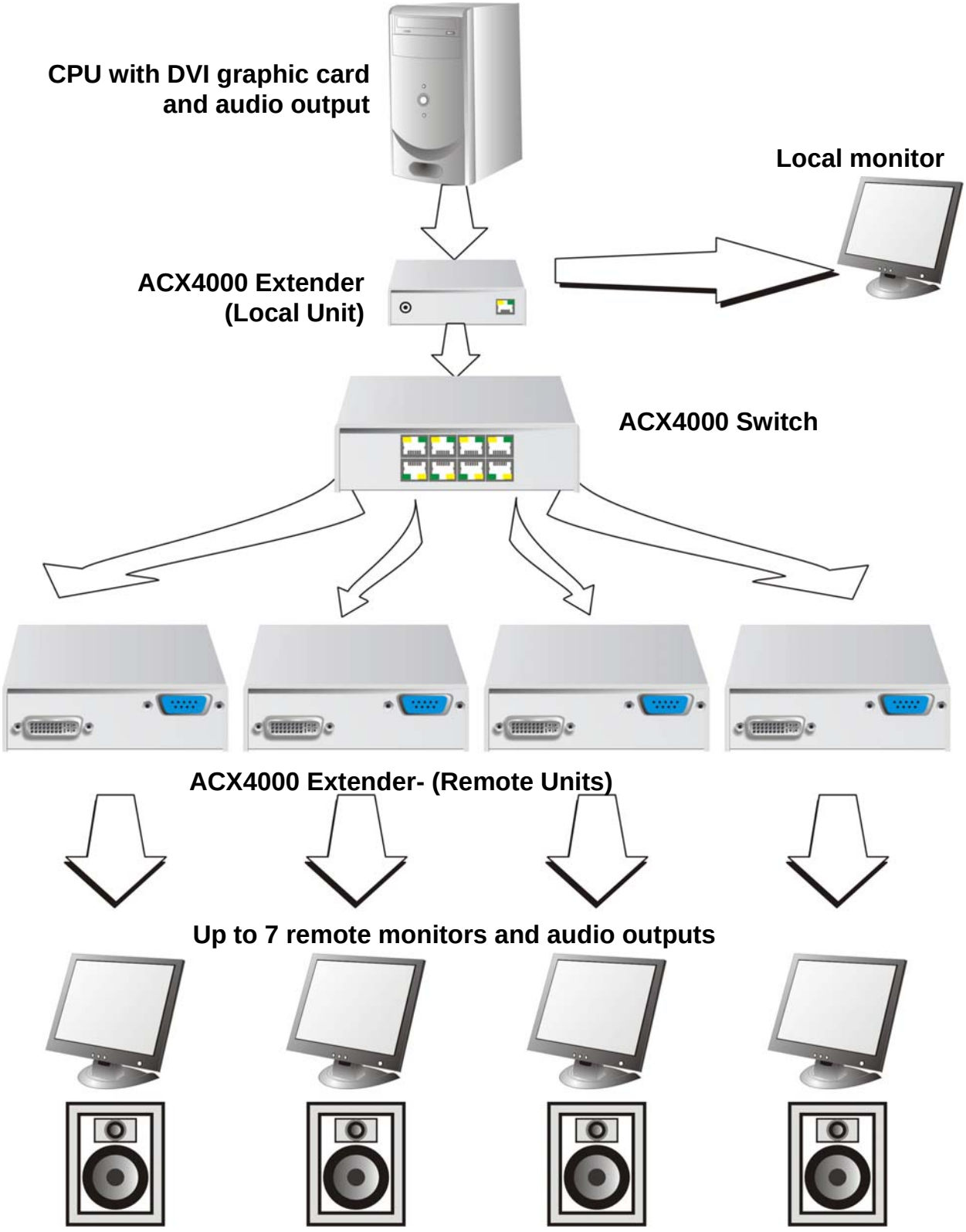
The operation of a ACX4000 Switch always requires (at least) one Local Unit of a ACX4000-Extender and up to seven Remote Units of ACX4000-Extenders.

2.2 Glossary

The following terms are used in this guide:

CATx	Any Category 5, 5e, 6 or higher cable, solid wires type AWG24.
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 3x1,6 Gbit/sec. Signals are TMDS Level.
PSU	The desktop power supply connected to the ACX4000- Switch or to the Local/ Remote Unit.
HID	Human Interface Devices are units, which are used for human access to the CPU: keyboard and mouse, touch-screen, light pen, fingerprint sensor, graphic tablets etc.

2.3 Example of a ACX4000- Switch System



Example application for a ACX4000 Switch System
(Multiplex-Repeater or Cross point-Switch)

2.4 Features

All members of the ACX4000 Switch Series offer the following features:

- Support for DVI-D Graphic cards (all devices)
- Support for USB-Keyboard and USB-Mouse (KVM-Extender)

ACX4000- KVM devices with USB- connectors support the extension of keyboard and mouse ONLY; use with other HID devices (Human Interface Device) such as touch screens, graphics tablets, barcode readers or similar may be successful – but there is no guarantee for this! The ACX4000- KVM is NOT suitable for use with other USB- devices such as scanners, web-cams, data sticks etc.

ACX4000- KVM devices support only two devices simultaneously – keyboard and mouse or keyboard and touch-screen, etc. but not e.g. keyboard, mouse and touch-screen simultaneously. You can extend a USB hub but this does not raise the number of supported devices.

- Maximum length of interconnection cable from a Local Unit to a ACX4000- Switch, between two ACX4000- Switches or from a ACX4000- Switch to a Remote Unit).
  - 140m (400ft) with CATx- cable
- Maximum Resolution (DVI):
  - 1920x1200@60Hz
- Supporting 16 Bit/24 Bit auto switching or fixed 24 Bit color depth (user selectable)
- Optional support for audio.
- Optional: On Single head devices, transparent serial port enables any serial device to be extended (up to 19.2K Baud). The serial port may be used to extend one device (requiring handshaking lines) or up to three simple serial devices (no handshaking). Dual head Units support Tx/Rx only (XON/XOFF)Status indicator LEDs for *Power* and *Link* on each device.
- Small footprint chassis.
- Rack mount options available.
- International power supplies included.

2.5 Product Range

There are 13 products in the range and various upgrade kits:

ACX4000- Switch	
ACX4000	DVI-D Switch for CATx
Media- Extender DVI (+ optional serial/audio)	
ACS4100A-T	ACX4000 DVI only Local Unit
ACS4122A-T	ACX4000 DVI + serial/audio Local Unit
ACS4100A-R	ACX4000 DVI only Remote Unit
ACS4122A-R	ACX4000 DVI + serial/audio Remote Unit
KVM- Extender DVI + USB-HID (+ optional serial/audio) Local Units	
ACS4001A-T	ACX4000- DVI + USB-HID Local Unit, Single head
ACS4201A-T	ACX4000- DVI + USB-HID Local Unit, Dual head
ACS4022A-T	ACX4000- DVI + USB-HID + serial/Audio, Local Unit, Single head
ACS4222A-T	ACX4000- DVI + USB-HID + serial/Audio, Local Unit, Dual head
KVM- Extender DVI + USB-HID (+ optional serial/audio) Remote Units	
ACS4001A-R	ACX4000- DVI + USB-HID Remote Unit, Single head
ACS4201A-R	ACX4000- DVI + USB-HID Remote Unit, Dual head
ACS4022A-R	ACX4000- DVI + USB-HID + serial/Audio, Remote Unit, Single head
ACS4222A-R	ACX4000- DVI + USB-HID + serial/Audio, Remote Unit, Dual head
Upgrade Kits	
ACS1009A-RMK	19”/1HE rack mount kit to mount up to 4 Single head devices
ACS2209A-RMK	19”/1HE rack mount kit to mount up to 4 Dual head devices/ ACX4000 switch devices
ACS2209A-PS	19“mountable power supply for up to three ACX4000- devices.

2.6 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.

The ACX4000- KVM devices with USB-connectors support the extension of keyboard and mouse ONLY; use with other HID devices (Human Interface Device) such as touch screens, graphics tablets, barcode readers or similar may be successful – but there is no guarantee for this! The ACX4000- KVM is NOT suitable for use with other USB- devices such as scanners, web-cams, data sticks etc.

The ACX4000- KVM support only two devices simultaneously – keyboard and mouse or keyboard and touch-screen, etc. but not e.g. keyboard, mouse and touch-screen simultaneously. You can extend a USB hub but this does not raise the number of supported devices.

2.7 How to Use This Guide

This guide describes the installation and configuration of the ACX4000 Switch. Although the connection and operation of the system is relatively straightforward, you should consider the following before getting started:

Connection & Compatibility

The individual ACX4000 Switch components consist of:

- ACX4000 Switch for CATx: includes the device and power supply.
- ACX4000- KVM/ Media Local Unit: includes the device, power supply and all the cable required to connect the ACX4000- KVM/ Media Local Unit to your CPU/ Signal source.
- ACX4000- KVM/ Media Remote Unit: includes the device and power supply

Please see also **Package Contents** (Page 20).
For information about connection and installation, see page 22.

DDC Information

Normally it is not necessary to make any adjustments to the ACX4000- KVM/ Media device. However, in some circumstances, it may be necessary to redefine the source of DDC information for the CPU. By default, the ACX4000- KVM/ Media 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 can be downloaded from the remotely located screen and stored in the internal DDC table.
To modify the DDC-Setup, see **Setup at the Local Unit** (Page 46).

Selecting the moment of switching to the next frame

The transmission of screen data is not synchronous to the screen changes of the graphic card. Normally, the transmission is terminated during the display of 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 is possible that you will see horizontal screen breaks at the moment of switching (default). On the other hand, if the device idles until the actual frame is displayed completely (until VSYNC) then the number of frames per second transmitted reduces.

To modify the switching behaviour, see **Loading the DDC Information from the Remote Monitor into the internal DDC Table** (Page 47).

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 abberations. 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 you choice the better mode.

To modify the color depth, see **Selection of Color depth** (page **47**).

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 ACX4000 System more conveniently.

3.1 Package Contents

You should receive the following items in your ACX4000 Switch for CATx package:

- ACX4000 Switch
- 1x 5V DC universal power supply for the ACX4000 Switch
- 1x serial cable RJ45 / DB9 Female (for switching purpose)
- 1x US type power cord
- 1x sheet of product stickers
- User manual (Quick Setup)

The following parts should be in your ACX4000- KVM/ Media Local Unit package:

- ACX4000- KVM/ Media Local Unit
- 1x 5V DC universal power supply for the ACX4000- KVM/ Media Local Unit
- 1x US type power cord
- DVI-I (1.8m) video cable (DVI-I dual link male-to-male)

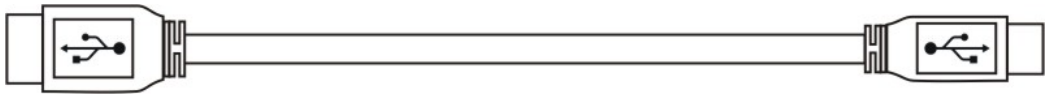
- User manual (Quick Setup)

Additionally with the Dual head devices:

- DVI-I (1.8m) video cable (DVI-I dual link male-to-male)

Additionally with the ACX4000-KVM devices:

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



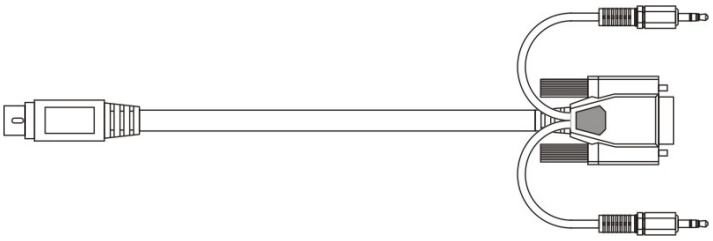
Additionally with the ACX4000- KVM single head devices +audio:

- Serial cable 1.8m (Serial DB9-male/female)

- 2 audio cables 1.8m

Additionally with the ACX4000-Media/ KVM dual head devices +audio:

- 1x Serial link/ audio ZIP-type cable (1.8m) with one side DSUB9pin female connector + 2x 3.5mm stereo plugs – other side miniDIN8pin male connector



The following parts should be in your ACX4000- KVM/ Media Remote Unit package:

- ACX4000- KVM/ Media Remote Unit
- 1x 5V DC universal power supply for the ACX4000- KVM/ Media Remote Unit
- 1x US type power cord
- User manual (Quick Setup)

If anything is missing, please contact Technical Support (see **Appendix E: Calling Technical Support**

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3.2 Interconnection Cable Requirements

To connect the ACX4000-Media Local Unit to your CPU/signal source you will need (Please ensure that the connection is tension-free!):

DVI: Connect the supplied DVI- cable 1.8m (DVI-I male to DVI-I male) to your CPU (KVM- Switch, DVI- signal source, etc.).

USB: Connect the supplied USB- cable 1.8m (USB Type A to USB Type B) to your CPU (KVM- Switch, DVI- signal source, etc.).

To connect the ACX4000- KVM Local Unit with serial/audio you will additionally need (Please ensure that the connection is tension-free!):

Serial cable: Connect the supplied serial cable to your CPU/signal source. +
Audio cable: Connect the supplied audio cable to your CPU.

or

Serial link/ audio ZIP-type cable

CATx- cable: Recommended cable: S/UTP (Cat5) according EIA/TIA 56A, TSB 36 or Digital STP 17-03170. Four pairs AWG 24. Wiring 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.

You may use flexible cables (patch cable) type AWG26/8 but because of the higher loss of the stranded cables, the maximum extension distance is reduced to approximately half the value of solid cables.

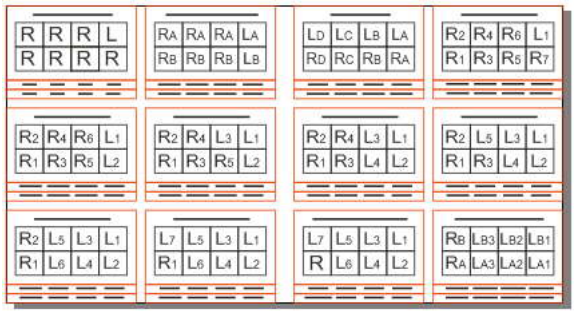
A point-to-point connection is required. You may use one or more patch panels in the line. Do not connect the CATx- link interface (RJ45) to any other products, especially telecommunications or network equipment.

Power Supply: Connect the supplied 5V/DC power supplies to the ***Plug*** terminal on the rear of ACX4000- Local Unit, ACX4000 Switch or ACX4000- Remote Unit.

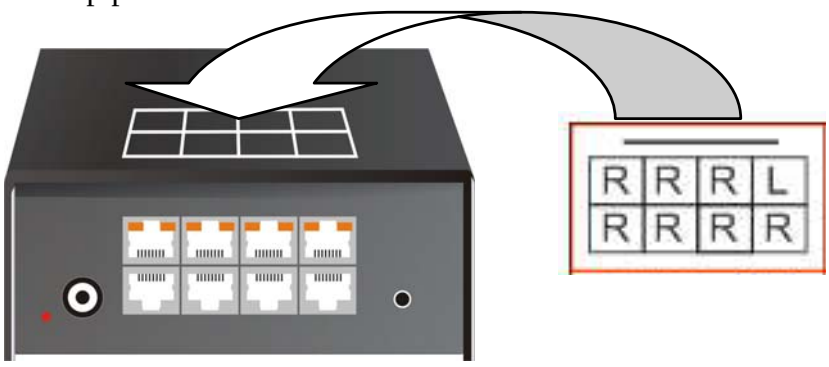
3.3 System Setup

To install your ACX4000 Switch system:

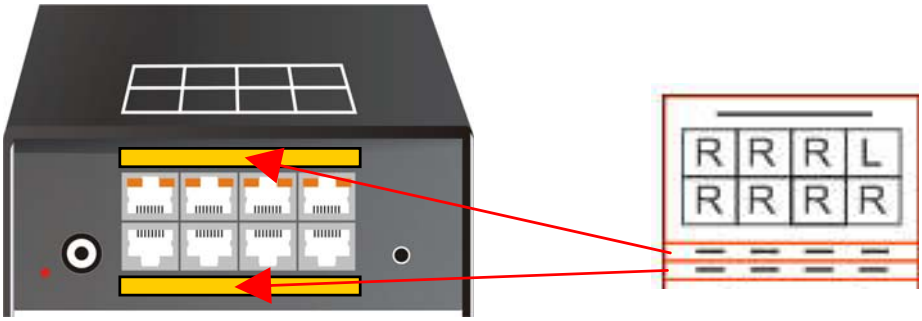
1. Switch off all devices.
2. Connect your keyboard, monitor(s) and mouse to the Remote Unit (depending on device type).
3. Connect the CPU/signal source to the Local Unit using the supplied cable(s).
4. Attach the connection cables (CATx- cable) between the ACX4000 switch and Local Unit and between the ACX4000 switch and Remote Unit. Use for this either the provided crossed CATx- cable or insert the provided crossed cable with the help of the provided CATx- coupler before/after your CATx- wiring.
5. Take the ACX4000 switch from the packing and also the sheet with the product stickers.



6. According to your application, peel the corresponding sticker from the sheet and stick it on the top panel:

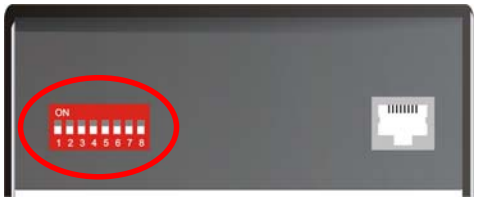


7. Use the associated stickers to label the interface ports:



8. Set the DIP-switches to the positions which correspond to your desired application. Information for the DIP switch set-up can be found under **Operating Mode Selection**

9. on page **43.**



10. Depending upon your application, it may be necessary to make a connection to a controller over the serial interface. Attach the provided RJ45 to DSUB 9-pin cable at the socket of the serial interface and connect it with your controller. More information for control through the serial interface can be found on pages 55, 65 or 75.

11. Connect the 5V power supplies to the units.

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

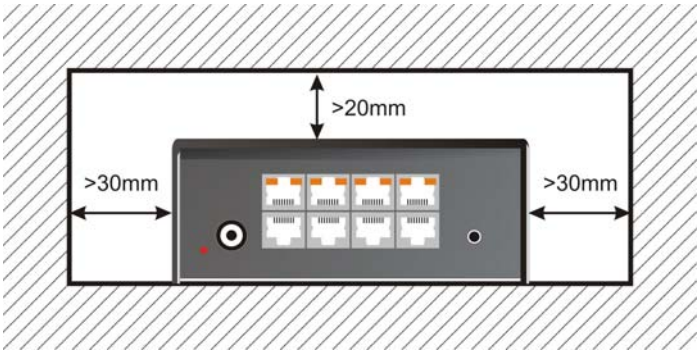
12. For a dual access system, connect the monitor for the local console to the appropriate port on the Local Unit. The port may also be used to feed into a KVM switch.

    To attach a local (USB-) keyboard/mouse, please use additional USB port(s) at your CPU or use a USB hub between the CPU and Local Unit's USB- connector.

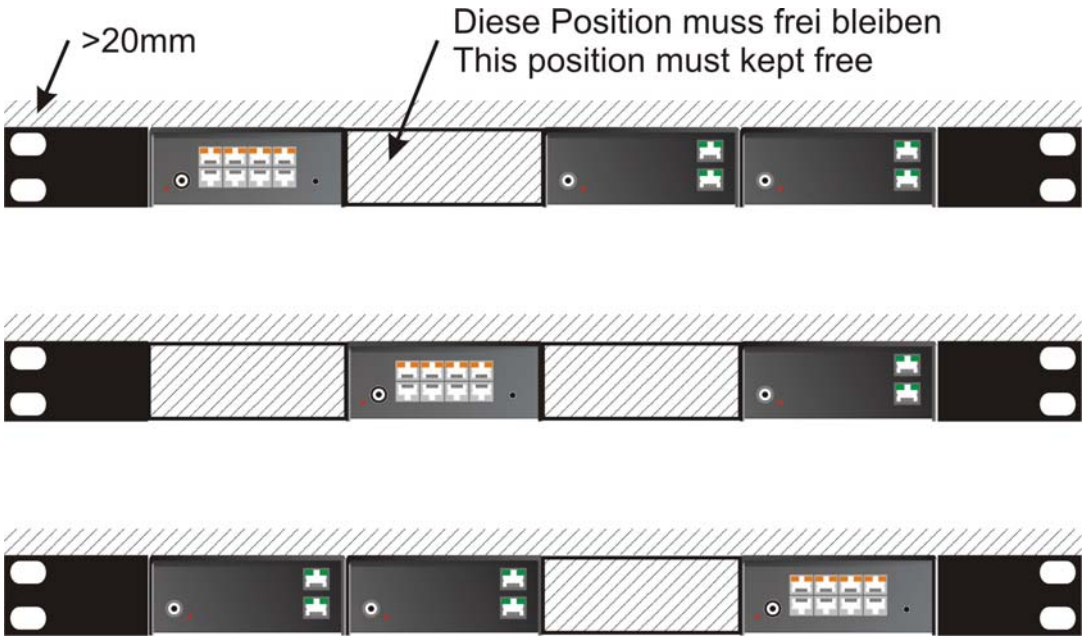
13. Power up the system.

3.4 Installation Instructions

Please ensure that the ACX4000- Switch has sufficient ventilation space by ensuring the following distances between the unit and other devices and/or mounting parts:



If mounted into 19” racks: the space to the left and to the right side of the ACX4000 must kept free!



The ACX4000 Switch, its extenders and power supplies may become warm. Do not install the unit in closed areas without adequate ventilation.

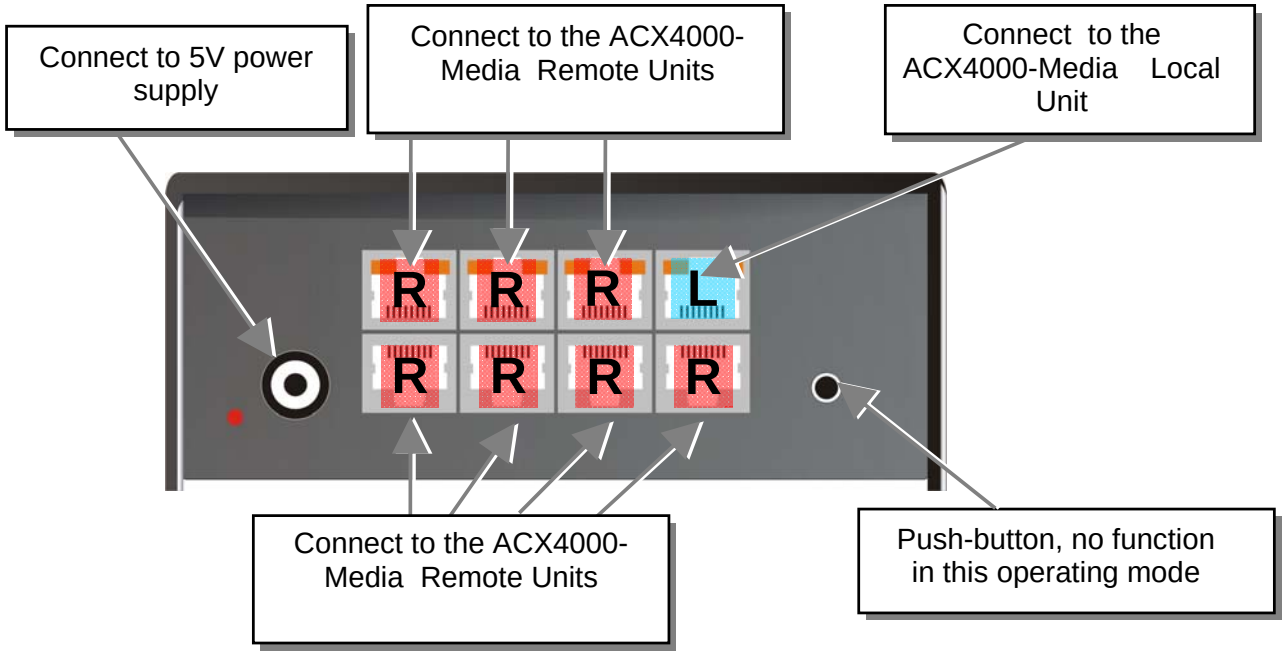
Never place the power supplies on top of the devices.

Ensure that the existing ventilation openings on the device are free at all times.

4. Device Views

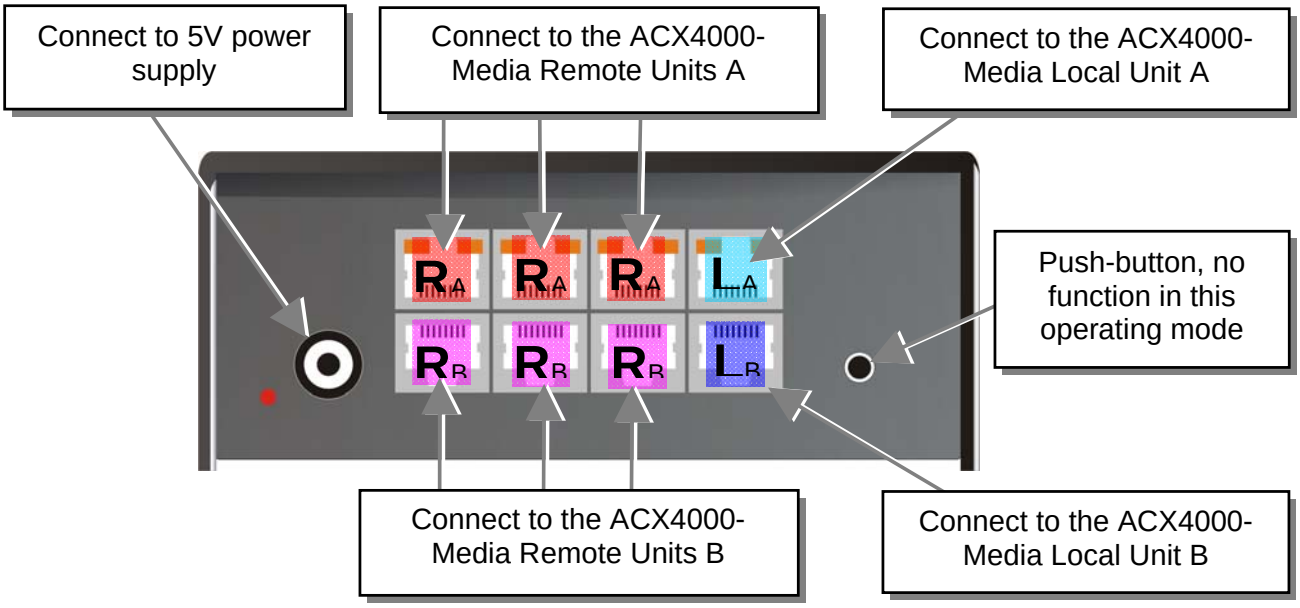
4.1 ACX4000- Switch for CATx

Configuration ‘Multiplex-Repeater’ – 1 Source up to 7 Displays



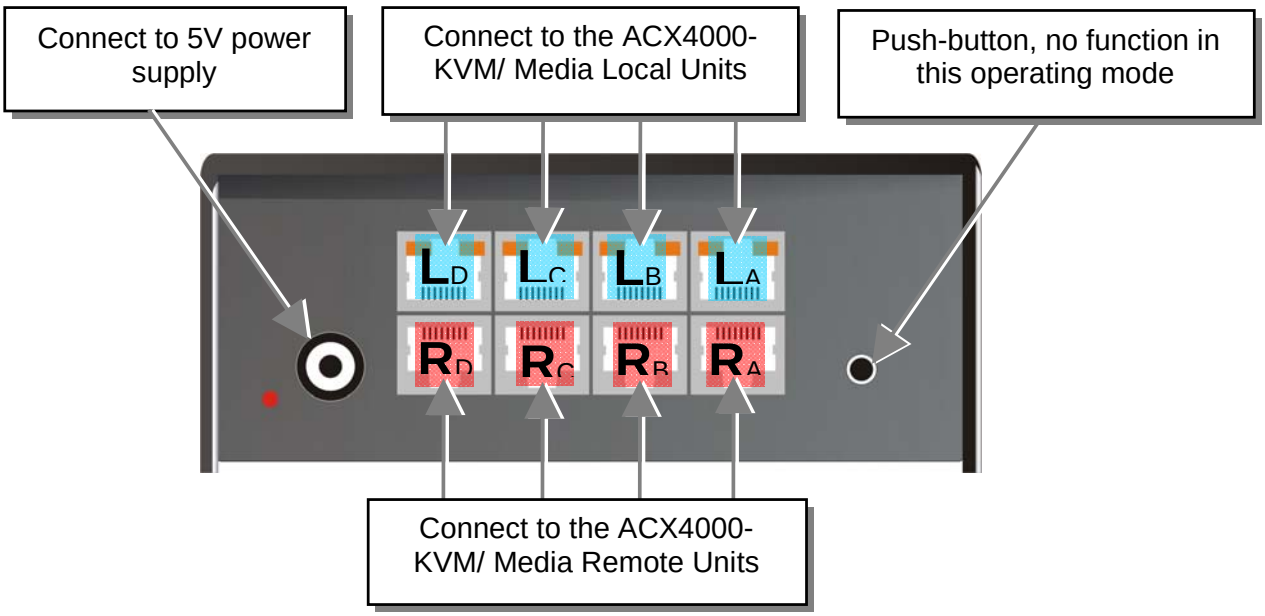
ACX4000 Switch – as 1to7 Multiplex-Repeater

Configuration ‘Multiplex-Repeater’ – 2 Sources / each up to 3 Displays



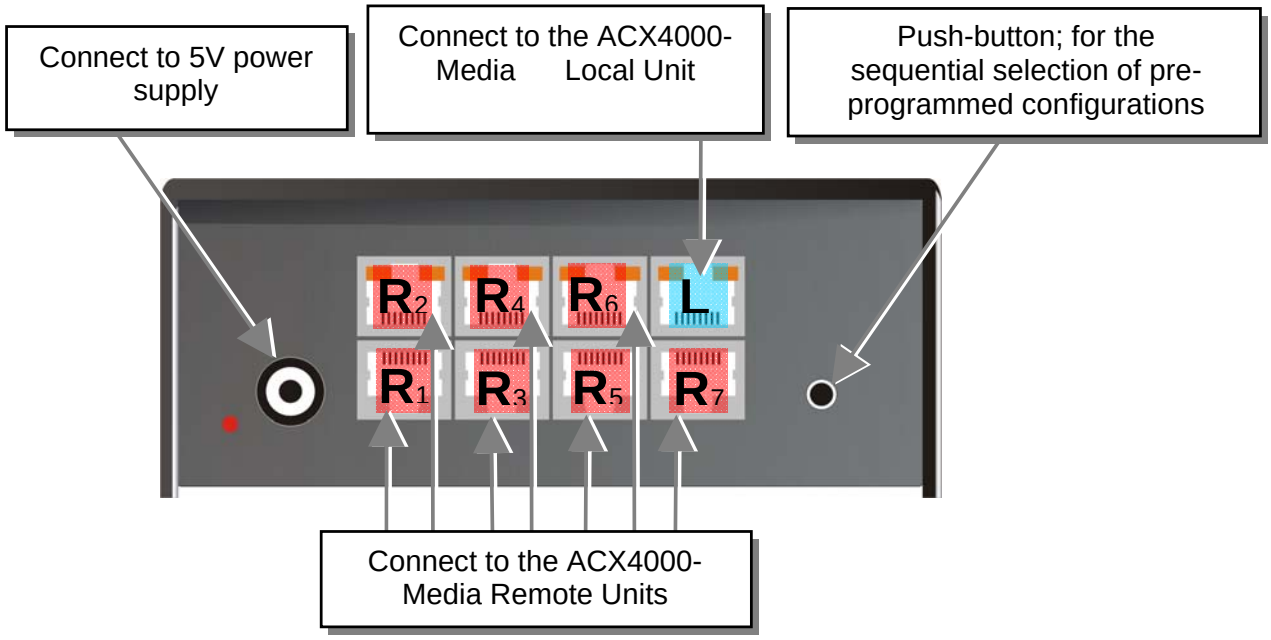
ACX4000 Switch – as 2x(2to3) Multiplex-Repeater

Configuration ‘Multiplex-Repeater’ – 4 Sources on 4 Displays



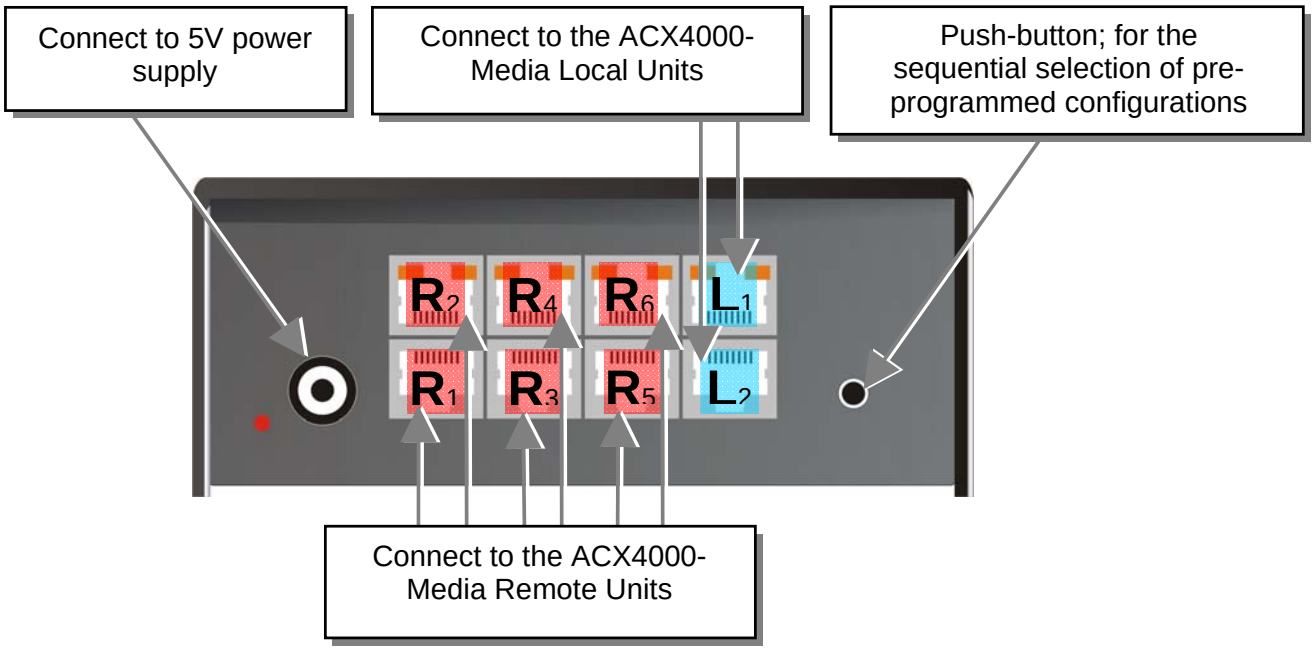
ACX4000 Switch – as 4x 1to4 Multiplex- Repeater

Configuration ‘Cross point-Switch’ 1 Input / 7 Outputs



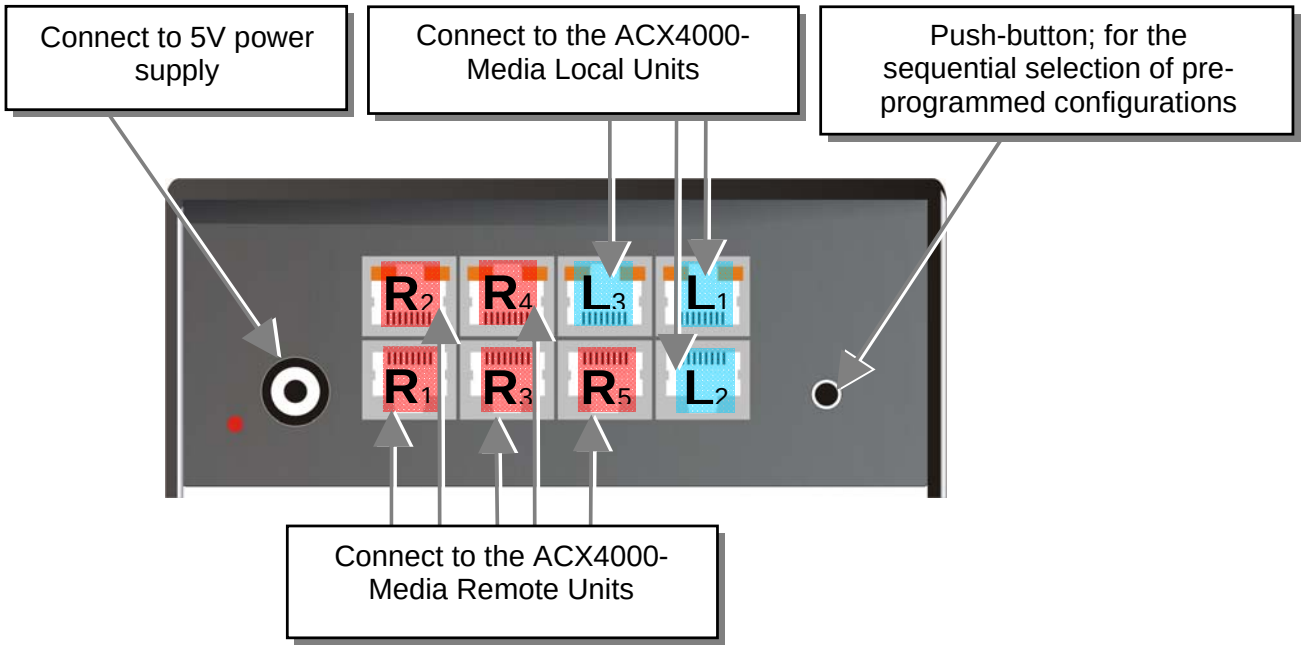
ACX4000 Switch – as Cross point-Switch 1x7

Configuration ‘Cross point-Switch’ 2 Inputs / 6 Outputs



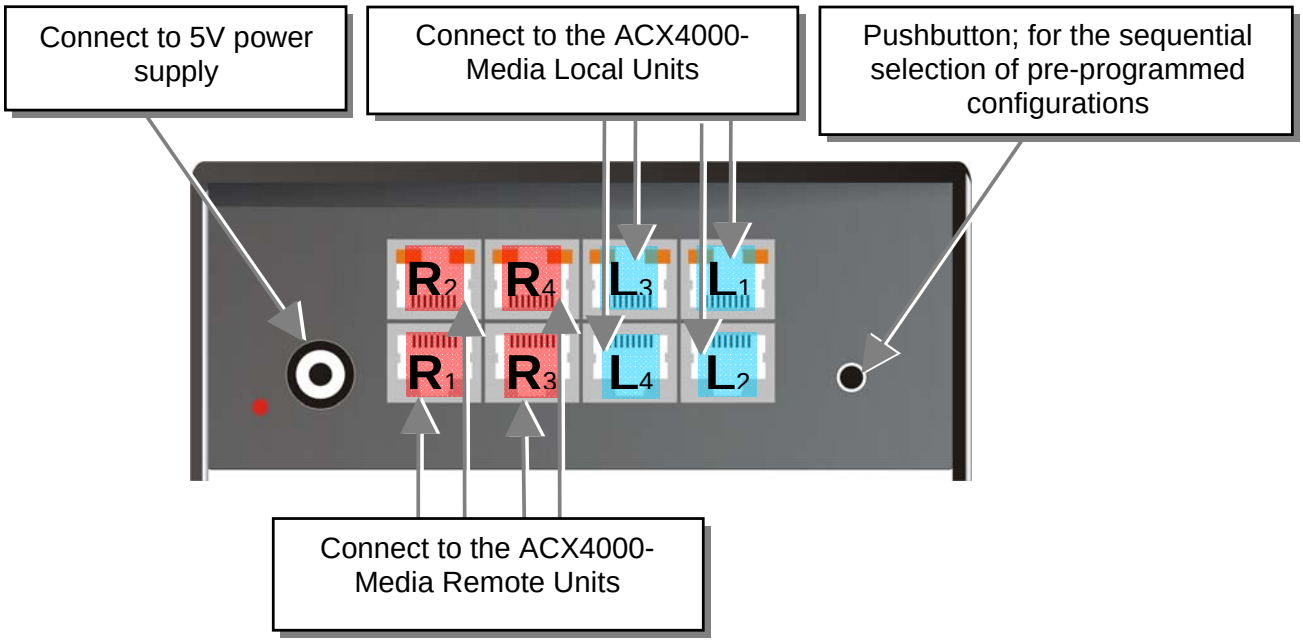
ACX4000 Switch – as Cross point-Switch 2x6

Configuration ‘Cross point-Switch’ 3 Inputs / 5 Outputs



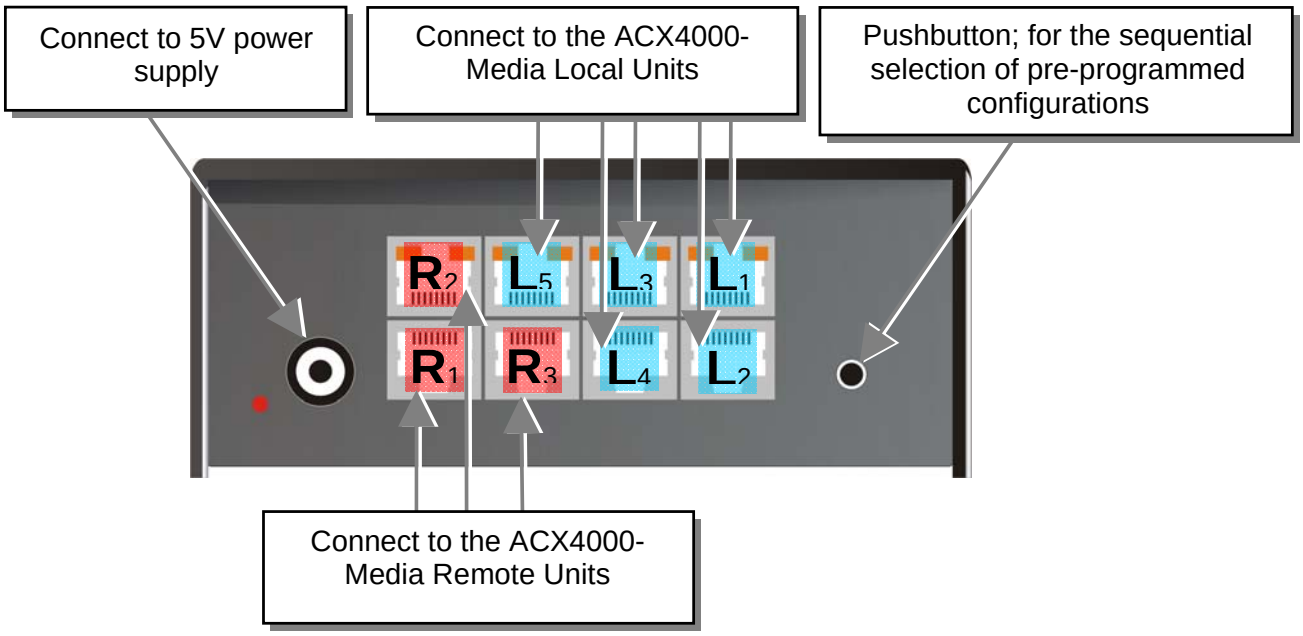
ACX4000 Switch – as Cross point-Switch 3x5

Configuration ‘Cross point-Switch’ 4 Inputs / 4 Outputs



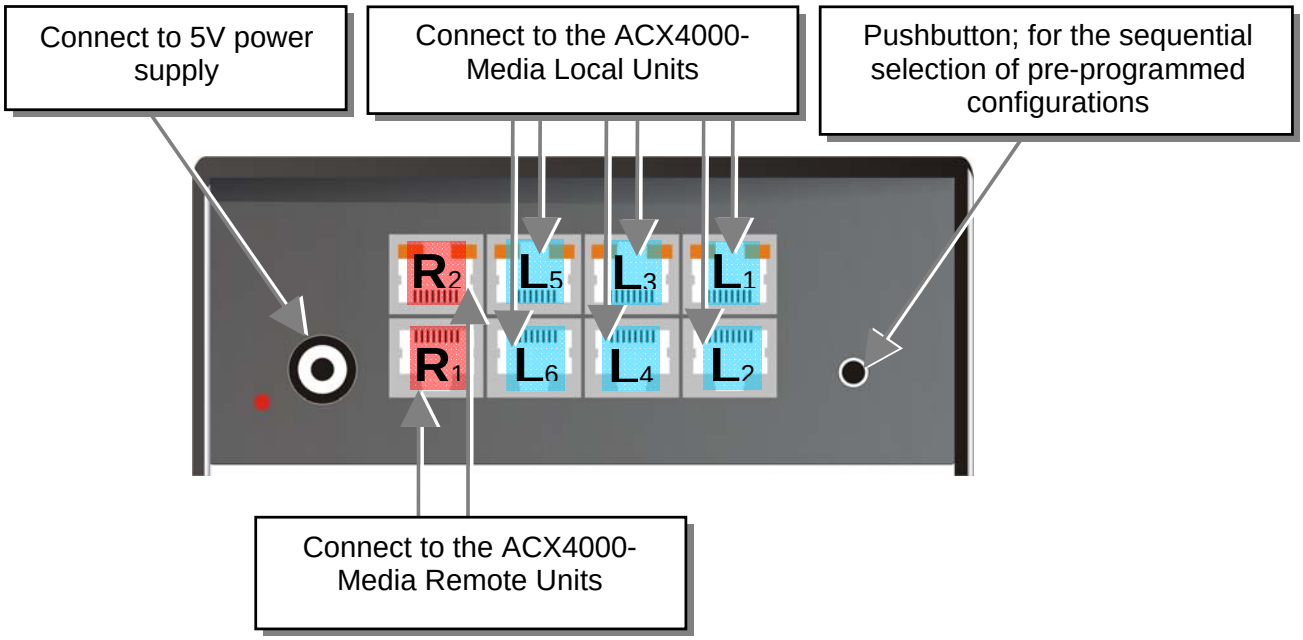
ACX4000 Switch – as Cross point-Switch 4x4

Configuration ‘Cross point-Switch’ 5 Inputs / 3 Outputs



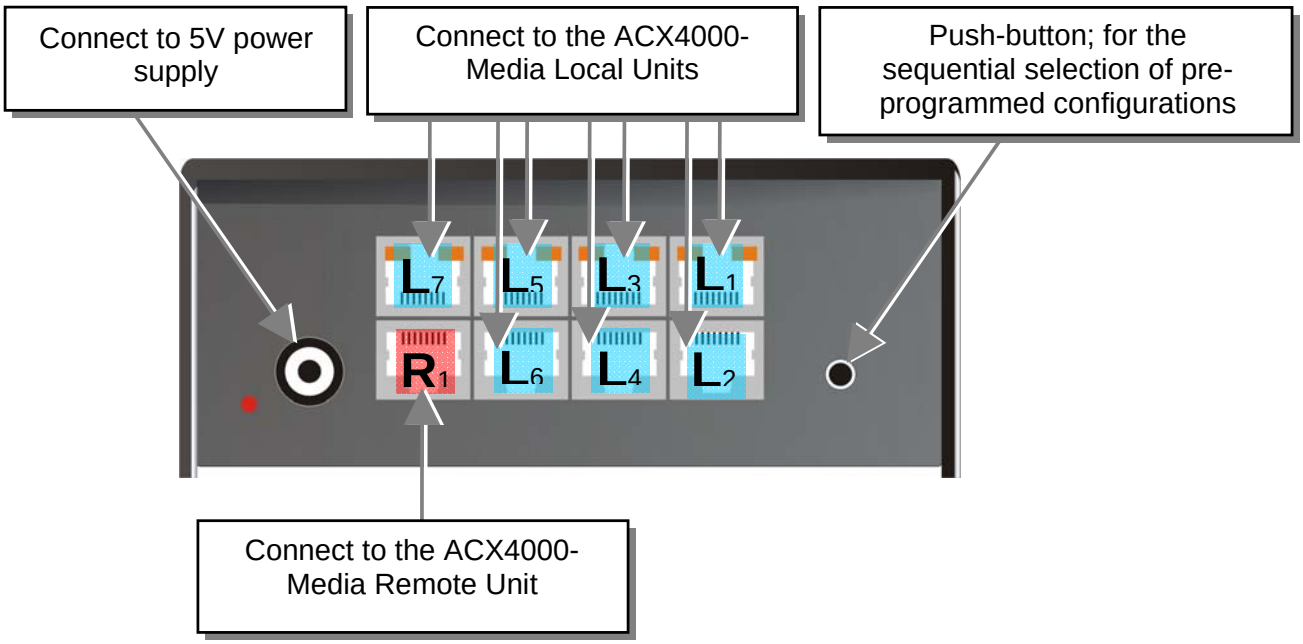
ACX4000 Switch – as Cross point-Switch 5x3

Configuration ‘Cross point-Switch’ 6 Inputs / 2 Outputs



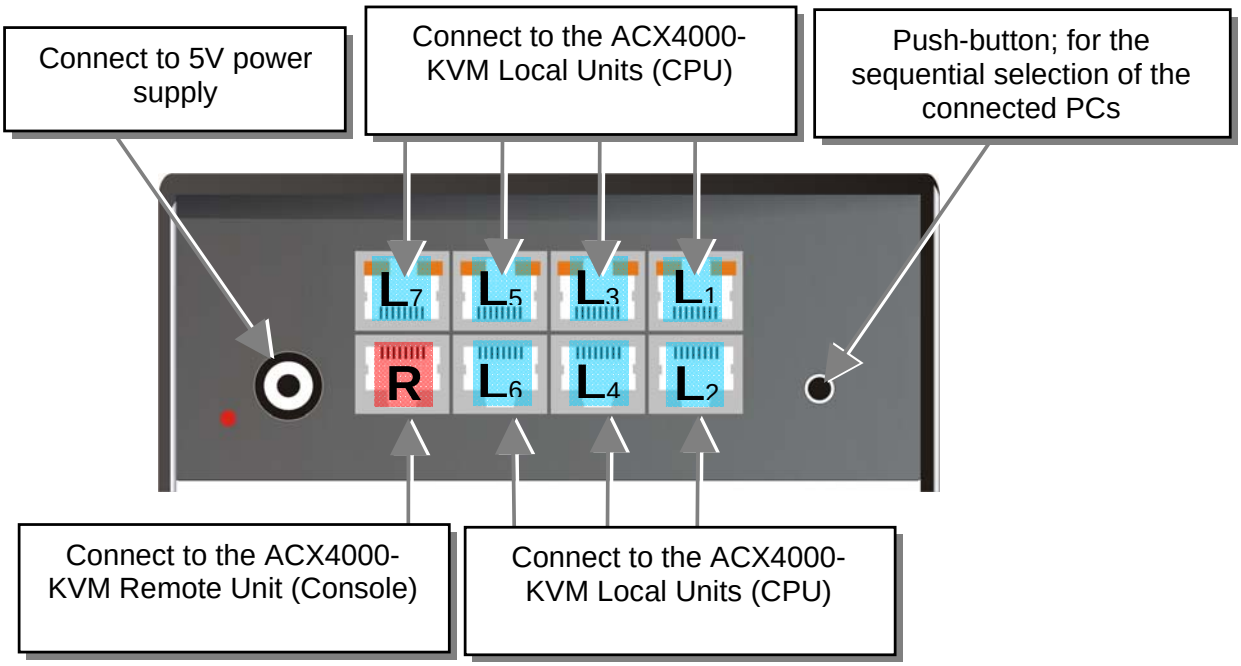
ACX4000 Switch – as Cross point-Switch 6x2

Configuration ‘Cross point-Switch’ 7 Inputs / 1 Output



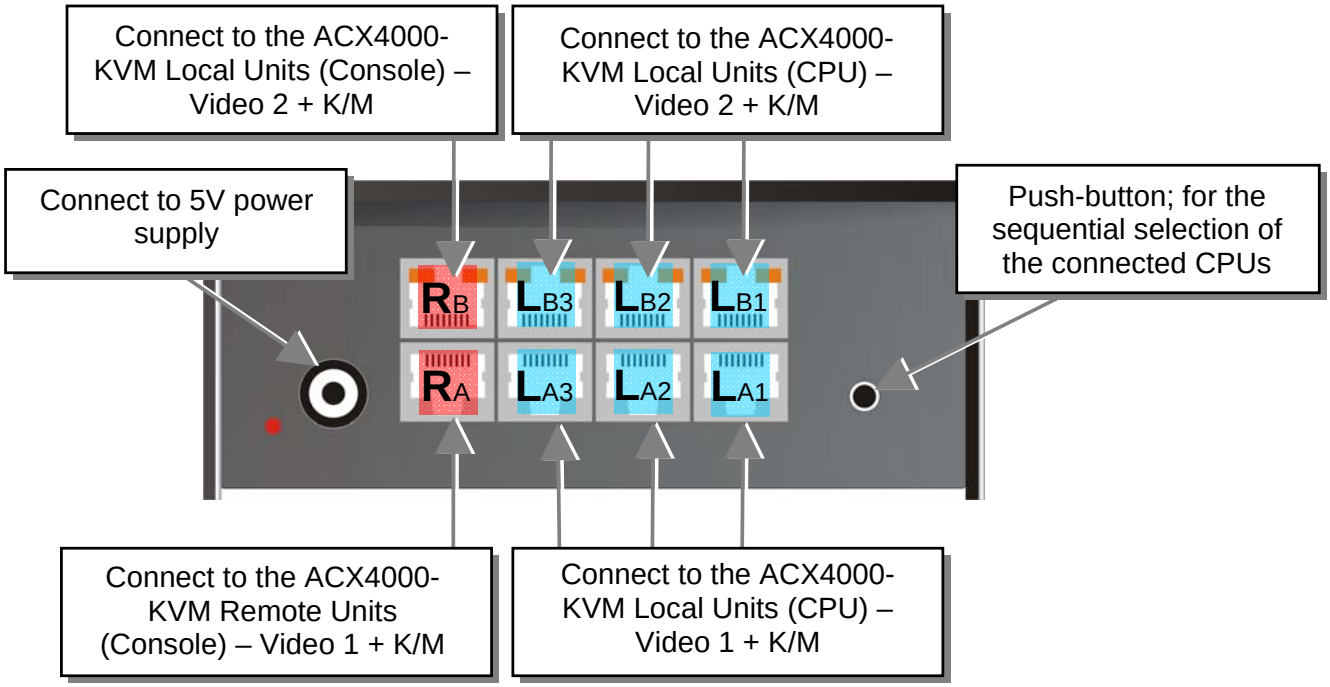
ACX4000 Switch – as Cross point-Switch 1x7

Configuration ‘Single head KVM-Switch’

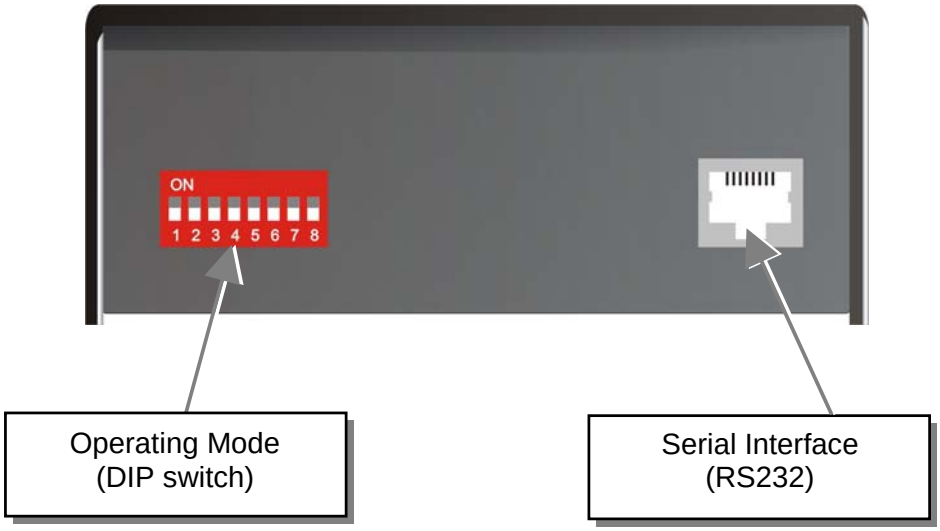


ACX4000 Switch – as Single head KVM-Switch

Configuration ‘Dual head KVM-Switch’

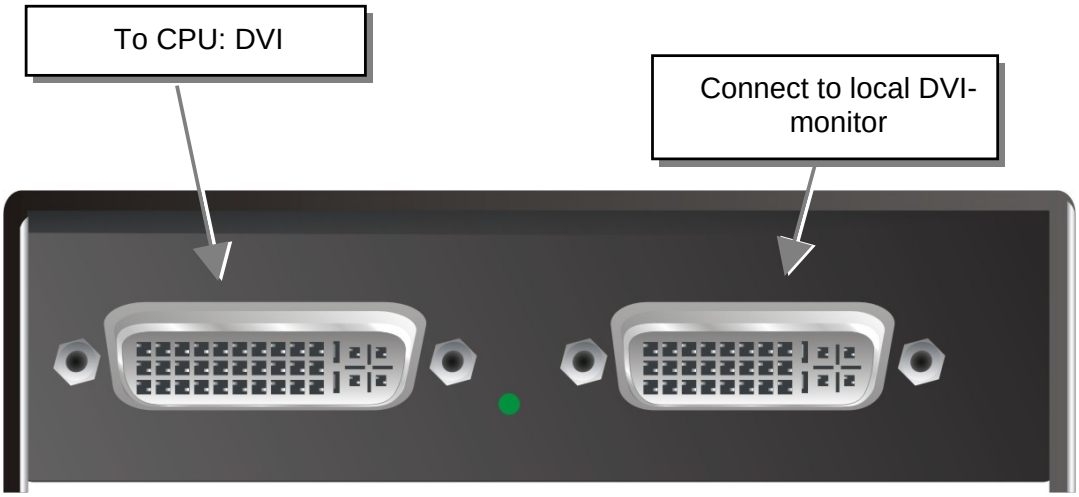


ACX4000 Switch – as Dual head KVM-Switch



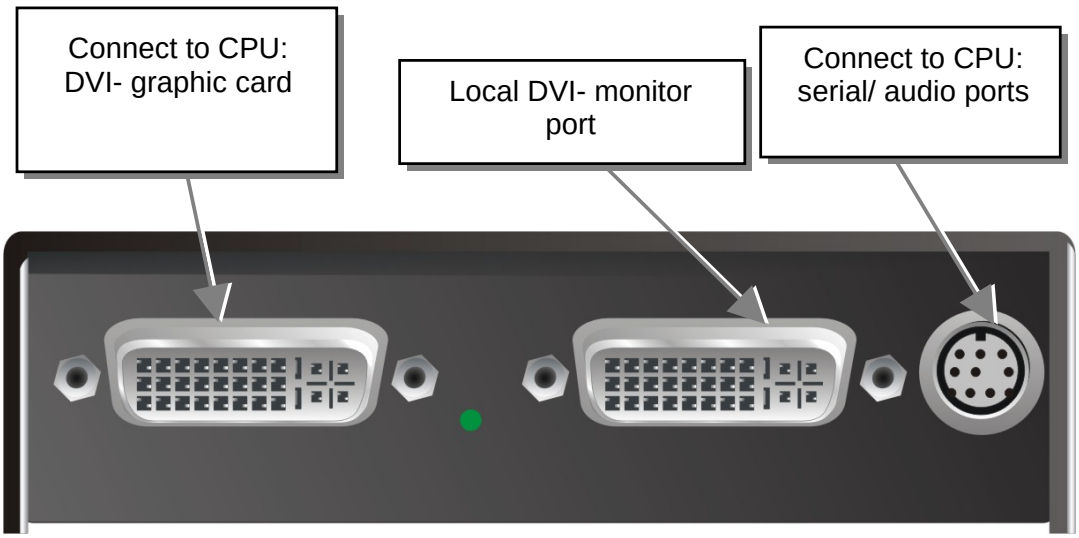
ACX4000 Switch rear view

4.2 ACX4000- Media Extender

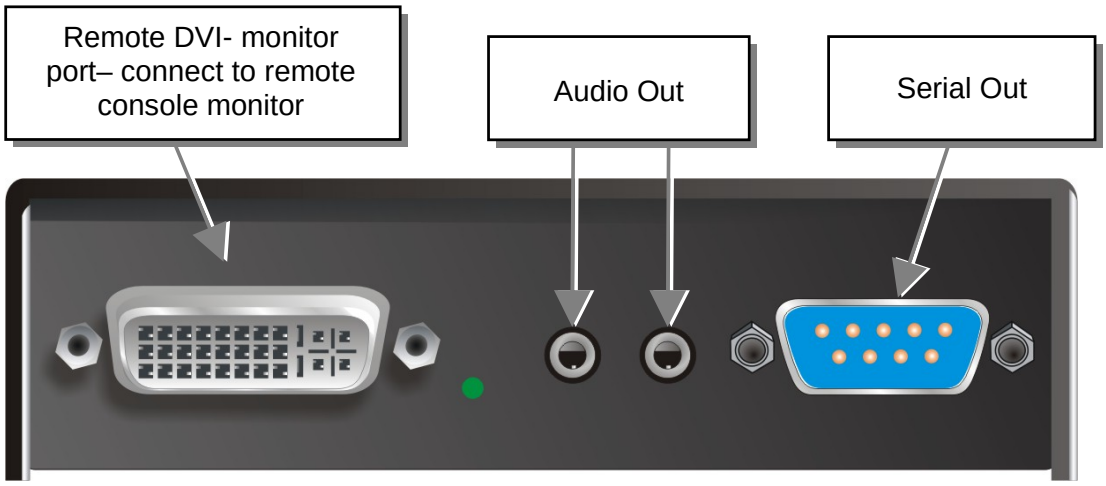


ACX4000-Media Local Unit

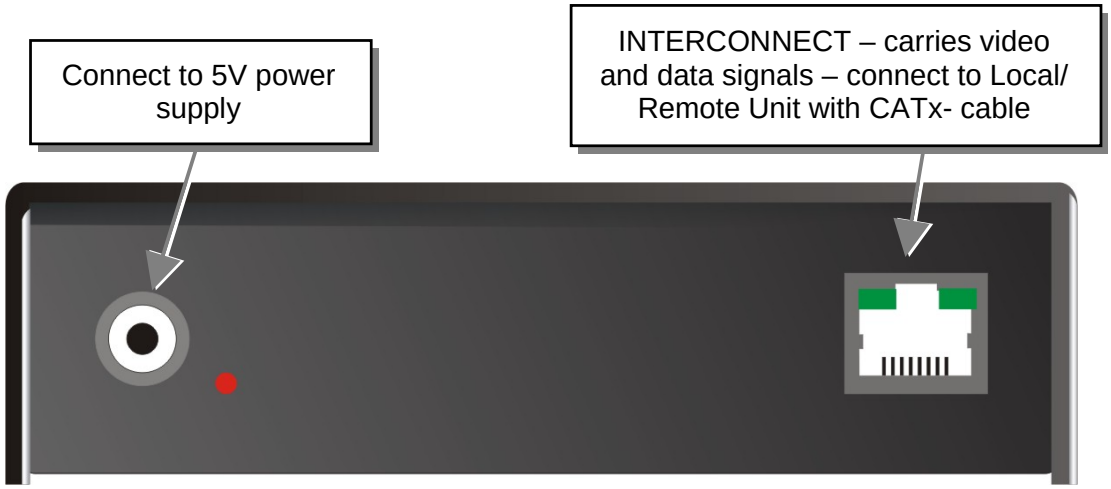
ACX4000-Media Remote Unit



ACX4000-Media Local Unit (with Audio)

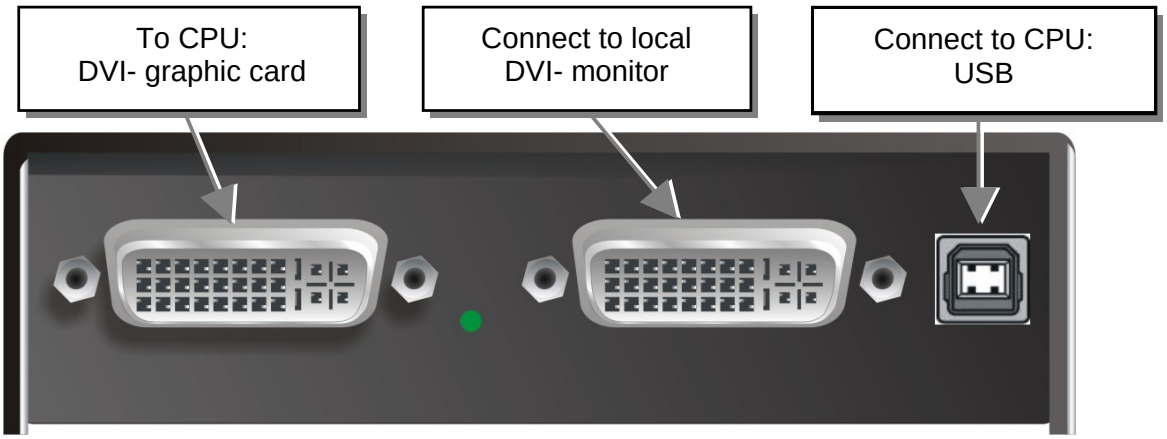


ACX4000-Media Remote Unit (with Audio)

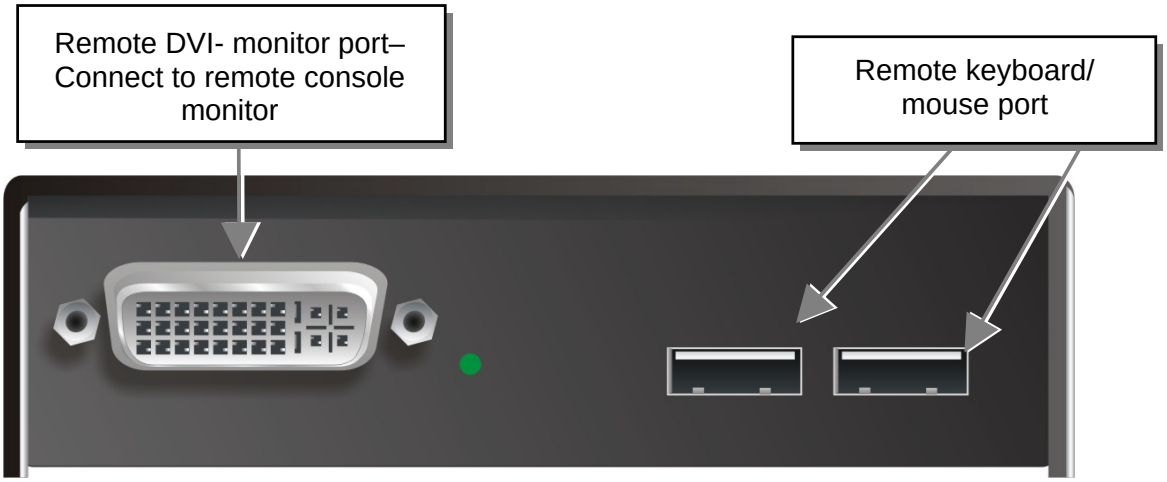


ACX4000-Media Local/ Remote Unit – rear view

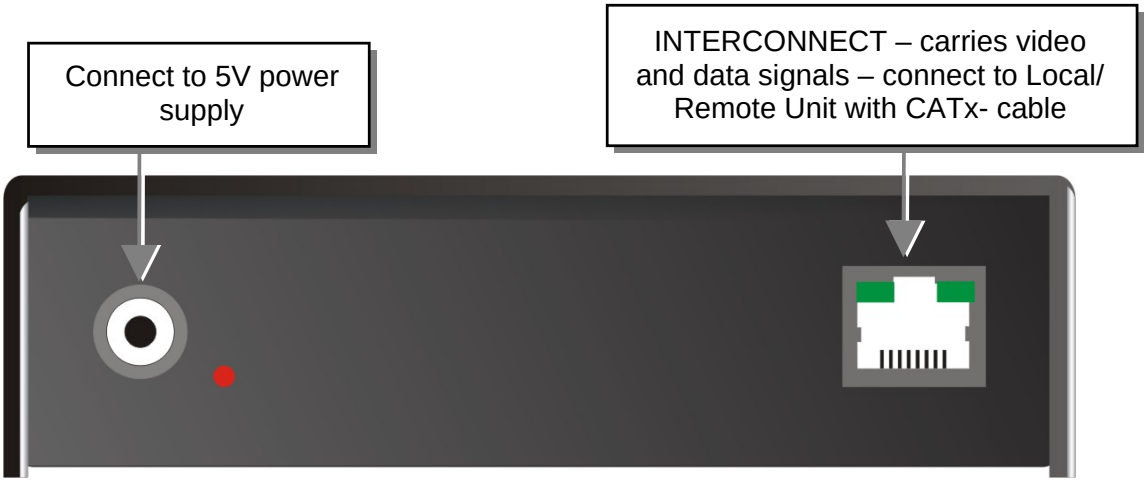
4.3 ACX4000- KVM Extender



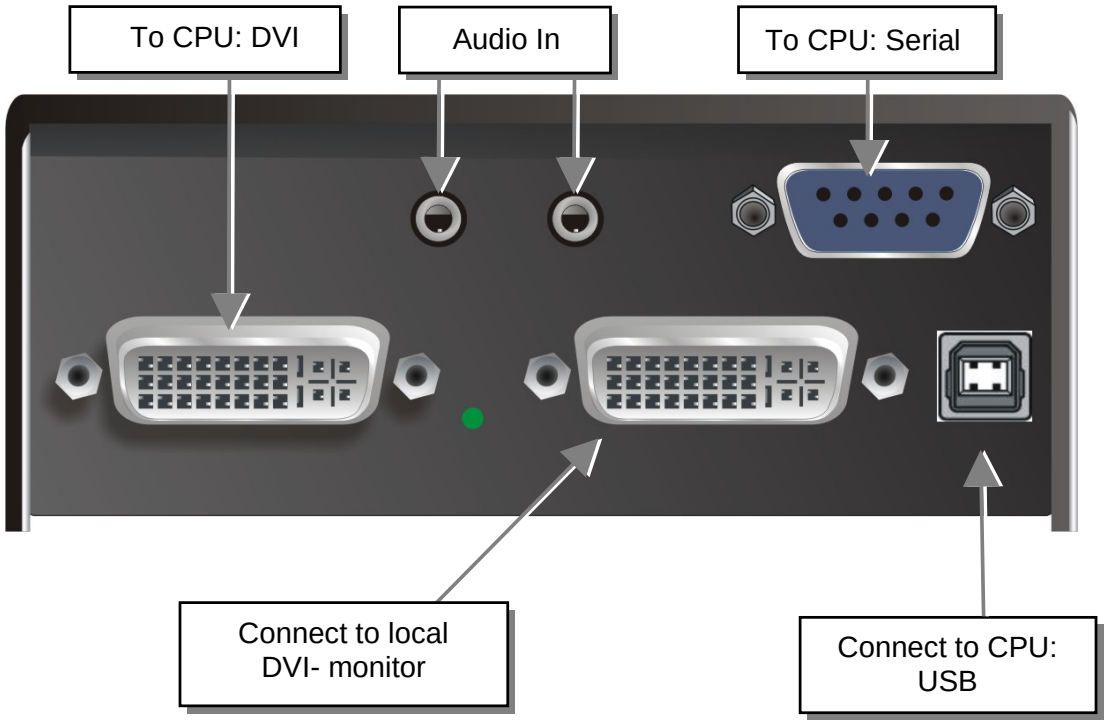
ACX4000- KVM Local Unit



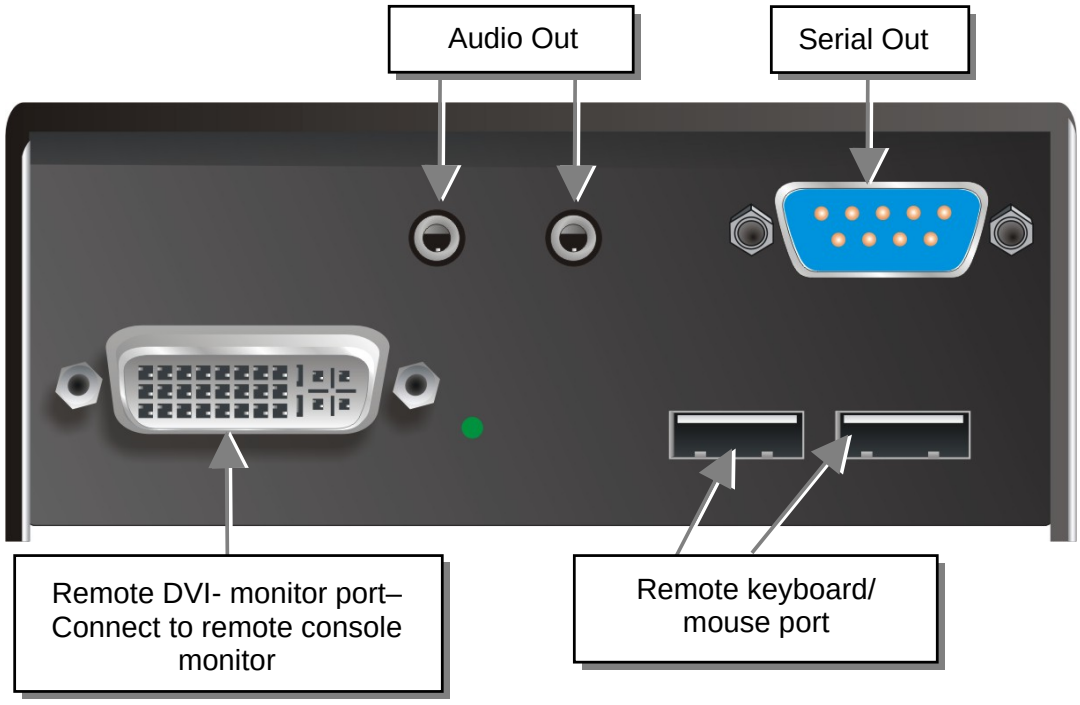
ACX4000- KVM Remote Unit



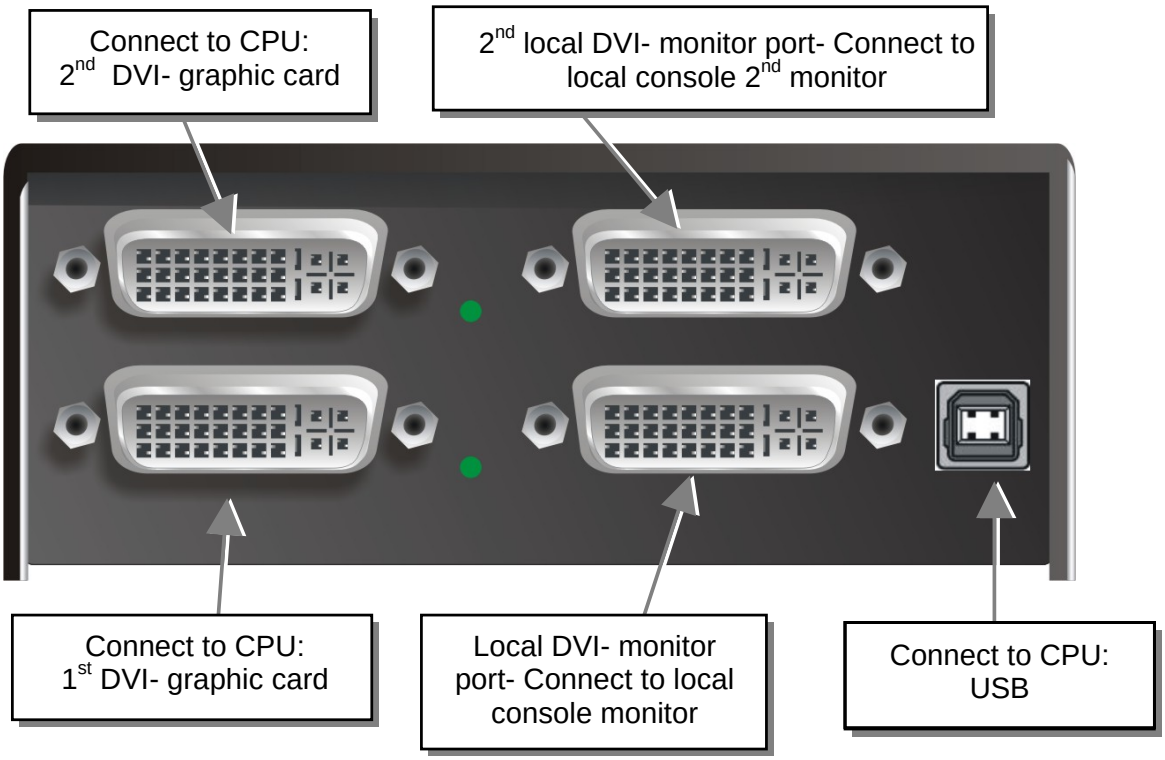
ACX4000- KVM Local/ Remote Unit – rear view



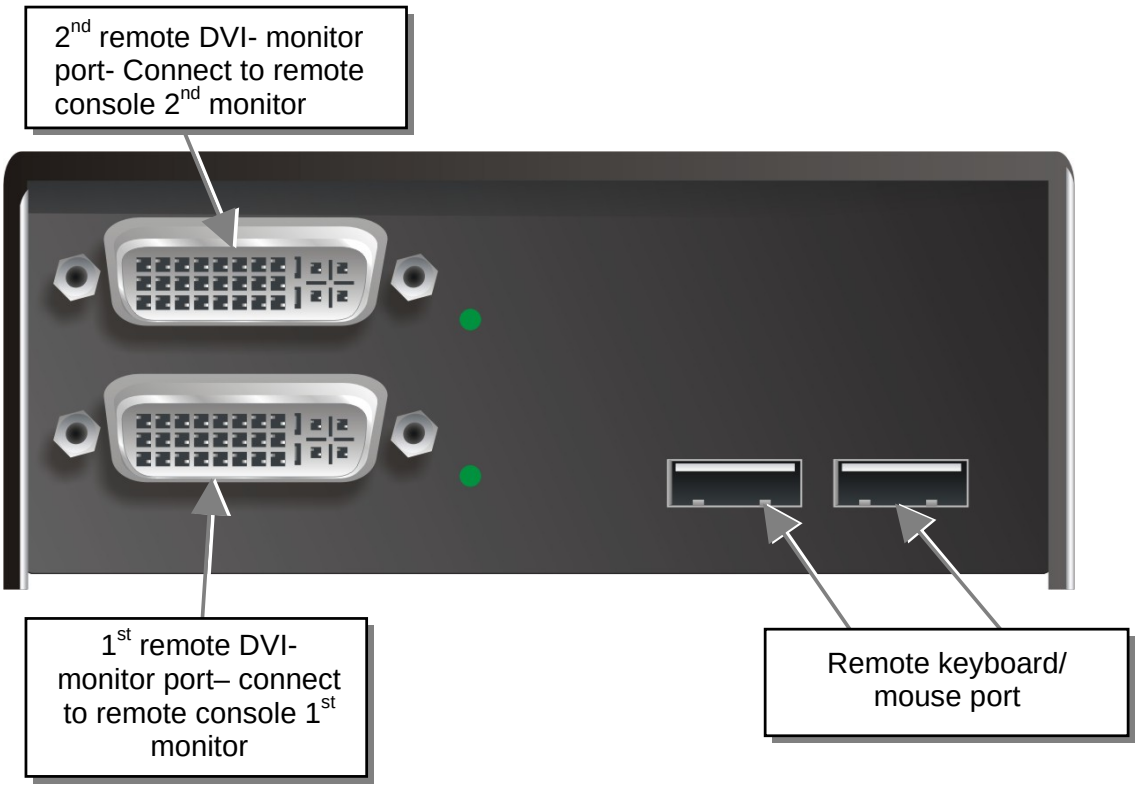
ACX4000- KVM Local Unit with audio



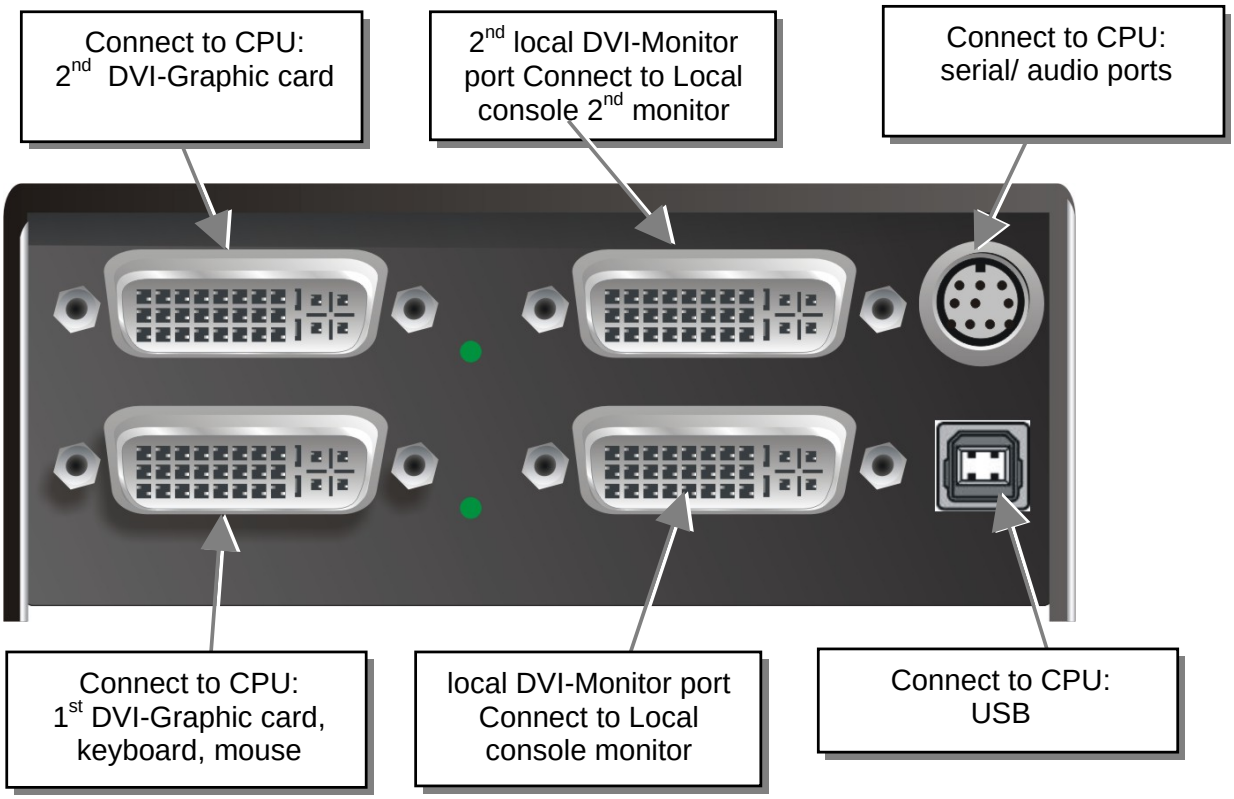
ACX4000- KVM Remote Unit with Audio



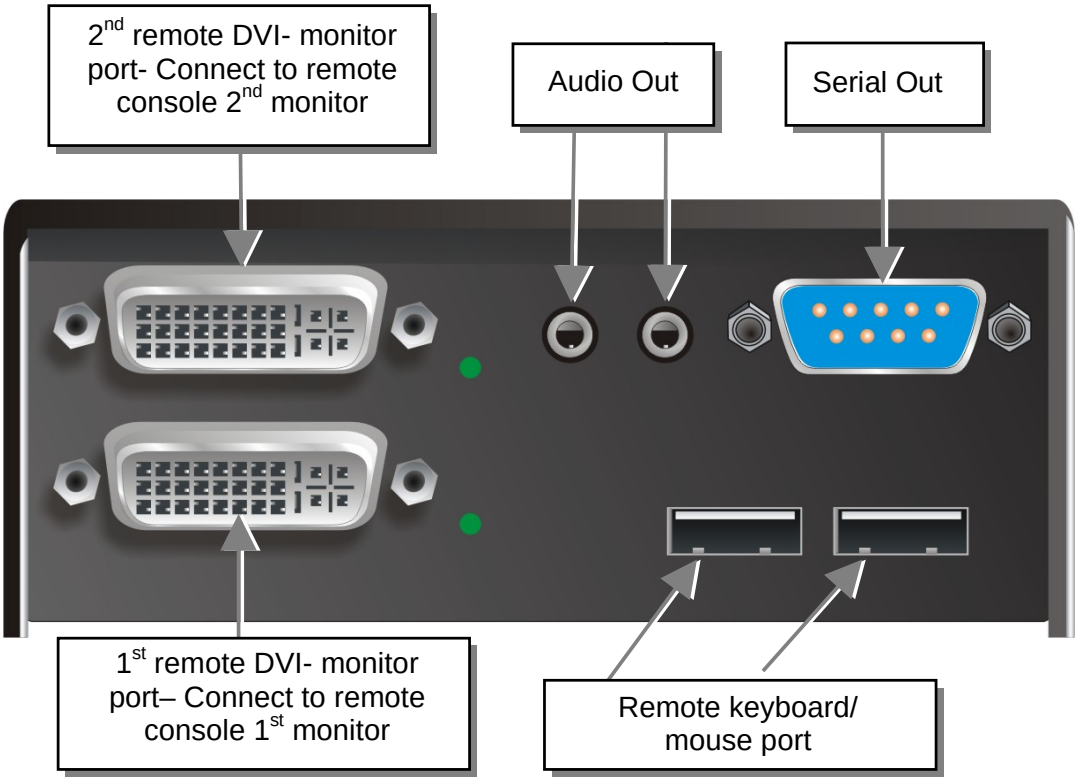
ACX4000- KVM Dual head Local Unit



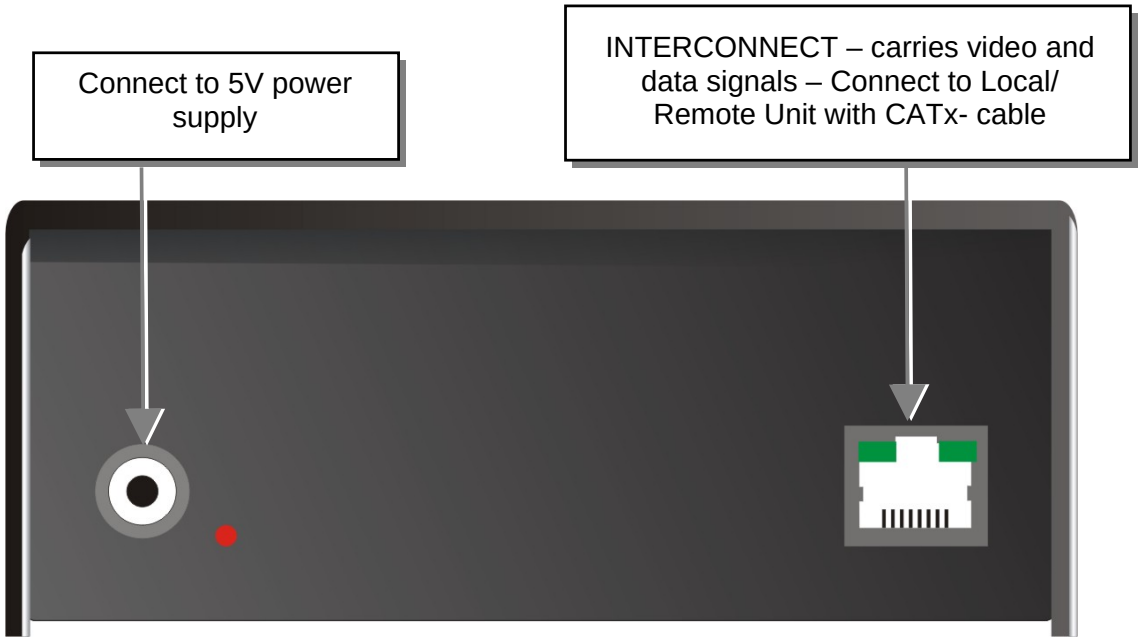
ACX4000- KVM Dual head Remote Unit



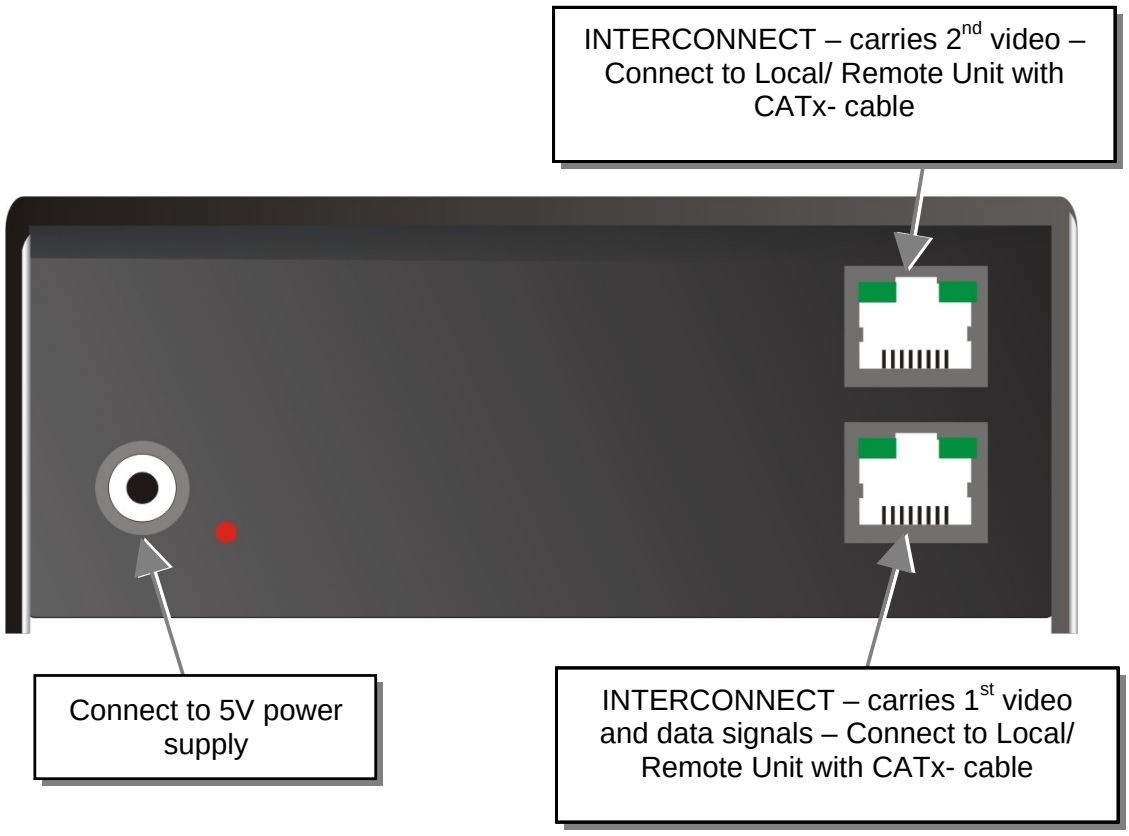
ACX4000- KVM-Dual head Local Unit with audio



ACX4000- KVM Dual head Remote Unit with audio



ACX4000- KVM Local/ Remote Unit with audio – rear view



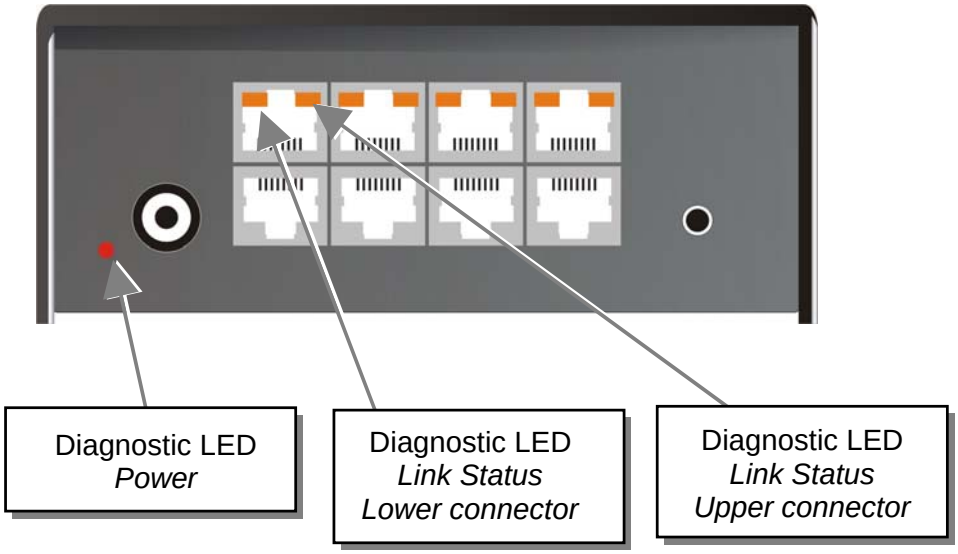
ACX4000- KVM Dual head, Local/ Remote Unit, with optional audio – rear view

5. Diagnostic

5.1 ACX4000- Switch for CATx

Each ACX4000 SWITCH is fitted with two indicator LEDs: *Power* and *Link Status:* The *Power* LED is next to the Power socket. The *Link Status* LEDs are at the upper CATx-connectors in the left and right upper corner. The LEDs in the left corners show the status for the lower CATx- connectors, the right LEDs for the upper CATx- connectors.

The location of the LEDs is shown below:



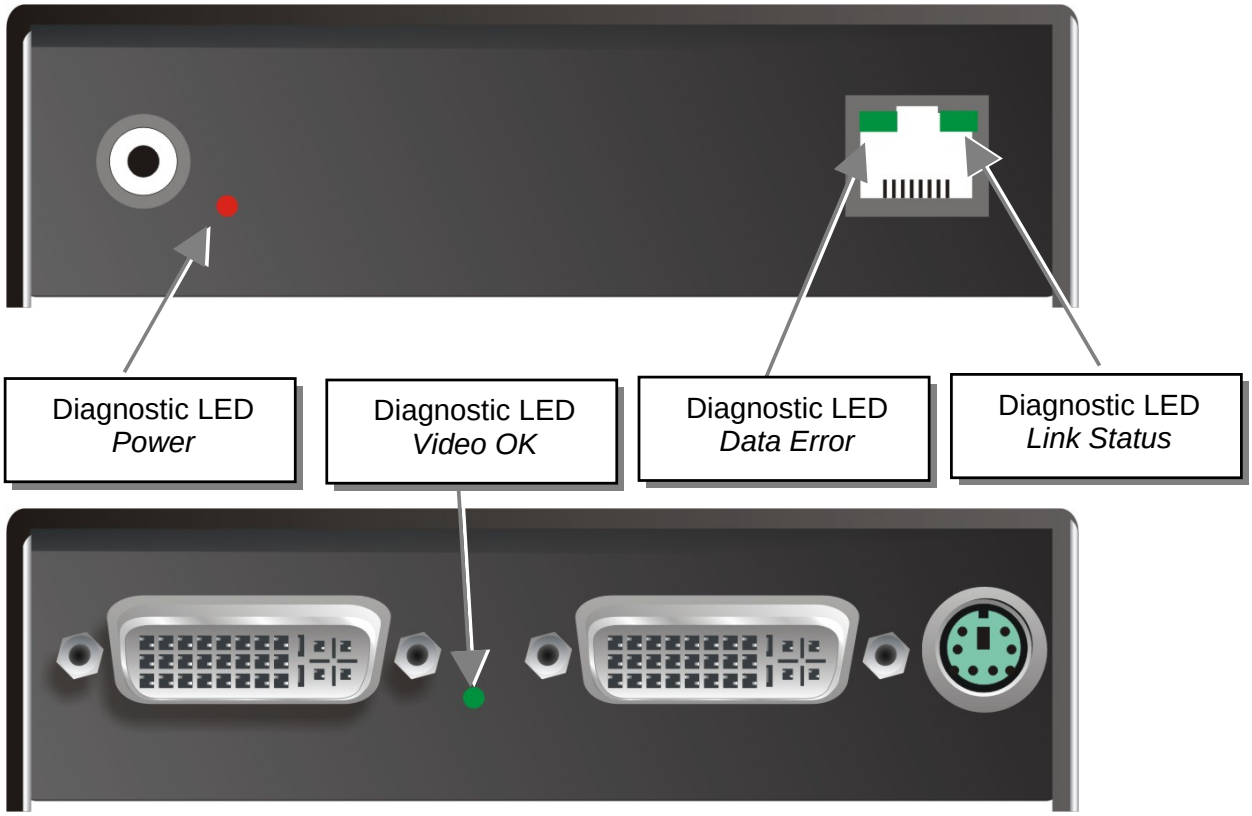
Diagnostic- LEDs at ACX4000- Switch for CATx

LED	*Appearance*	*Diagnostics*
Power LED (Red LED)	Off On	Device not ready Device ready
Link Status (Green / Orange LED)	Off	No transmission over the CATx- cable, the corresponding local/ remote unit is switched off or broken interconnect cable
	Orange ON	active connection, CATx cable is OK
	Orange blinking	Displaying the CPU port, pre-selected by the pushbutton
	Green ON	The CPU, actually displayed on the Console is online (CATx connection established)
	Green blinking	The CPU, actually displayed on the Console is offline (CATx connection is broken)

5.2 ACX4000- Media/ KVM Extender

Each ACX4000- Extender is fitted with four indicator LEDs: *Power, Video OK, Data Error, Link Status*: The *Power* LEDs are next to the power socket.

The location of the LEDs is shown below:



Diagnostic- LEDs at ACX4000- KVM/ Media Extender

LED	*Appearance*	*Diagnostics*
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)

6. Service Setup

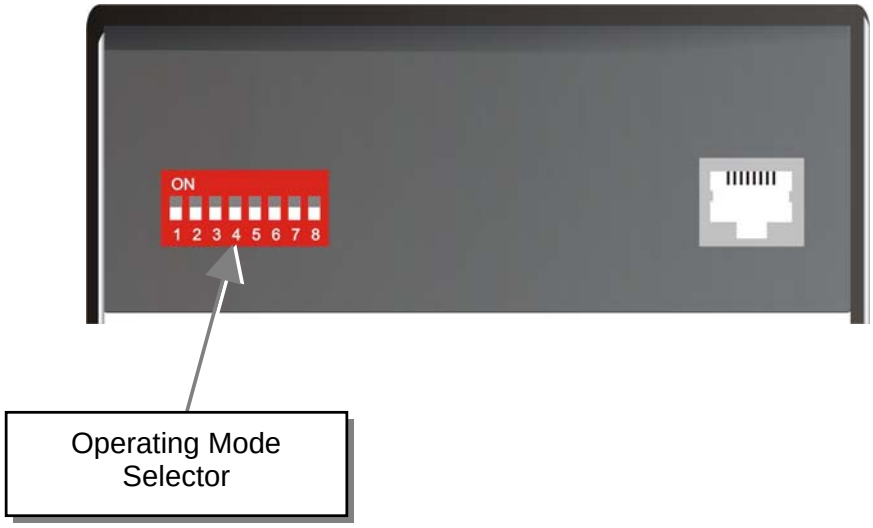
6.1 ACX4000- Switch for CATx

Normally, it is only necessary to make adjustments during installation.

In order to make these adjustments, you do not have to open the ACX4000 Switch. All settings can be made from the outside using the Operating Mode Selector (DIP switch).

By selecting a new operating mode, the allocation of inputs and outputs may be changed. In doing so, it is possible to interconnect two transmitters: this may damage the connected equipment.

The location of the operating mode selector (DIP switch) is shown below:



For the selection of a new operating mode:

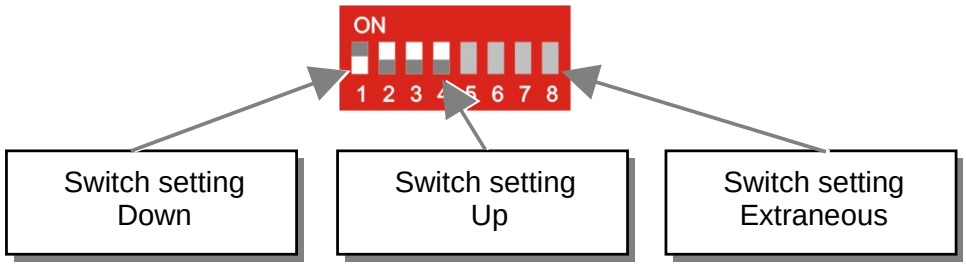
1. Switch off the ACX4000- Switch.
2. Select a new operating mode according to following table.

By selecting a new operating mode, the allocation of inputs and outputs may be changed. In doing so, it is possible to interconnect two transmitters: this may damage the connected equipment.

3. Power up the device.

Operating Mode Selection

Operating Mode Selector



Operating Mode Selector	**Operating Mode**
	**Multiplex- Repeater:** The signal(s) coming from the Local Unit is (are) equalized (and distributed) and extended over further 140m.
	 An incoming DVI (+audio) signal is distributed and extended on up to 7 outputs.
	 Two incoming DVI (+audio) signals are distributed and extended each up to 3 outputs.
	 4 incoming DVI (+audio) signals are extended.
	**Cross point Switch**: Every port can either be an input (to a Local Unit) or an output (to a Remote Unit). Each connection input/output is possible.
	 1x IN / 7x OUT The signals of one source can be switched to up to 7 displays.
	 2x IN / 6x OUT The signals of 2 sources can be switched to up to 6 displays.
	 3x IN / 5x OUT The signals of 3 sources can be switched to up to 5 displays.
	 4x IN / 4x OUT The signals of 4 sources can be switched to up to 4 displays.
	 5x IN / 3x OUT The signals of 5 sources can be switched to up to 3 displays.
	 6x IN / 2x OUT The signals of 6 sources can be switched to up to 2 displays.

	 7x IN / 1x OUT The signals of 7 sources can be switched to one display.
	**KVM- Switch 1/7 Single head:** Up to 7 CPUs (up to 49 with cascaded application) can be operated from one console.
	**KVM- Switch 1/3 Dual head:** Up to 3 CPUs with Dual head graphic card (up to 9 with cascaded application) can be operated from one console.
	**Standard operating mode**
	**Reset** the ACX4000- Switch to default settings (Factory Reset): **1.** switch power off **2.** set the DIP- switch **3.** switch power on, the device is resetting **4.** switch power off **5.** set the DIP- switch back **6.** switch power on - done
	**Operating Mode after Reset/ Power ON:** After reset, the respective DEFAULT-mode is selected.
	**Operating Mode after Reset/ Power ON:** After reset, the previous mode before reset or power off is selected.
	**Master**: In a cascaded application in KVM- switch mode, the device is 'Master'– i.e. it is on highest level within the tree structure, seen from the Remote Unit.
	**Slave**: In a cascaded application in KVM- switch mode, the device is 'Slave'– i.e. it is on second level within the tree structure, seen from the Remote Unit.

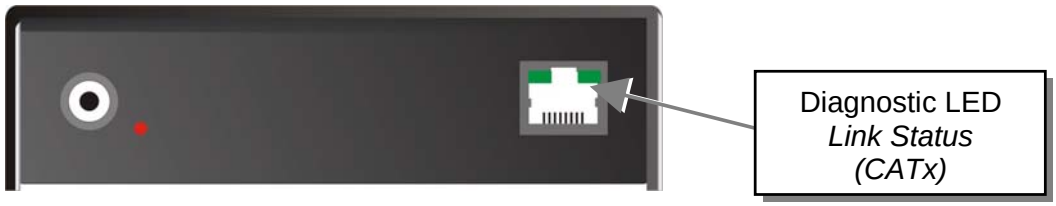
6.2 ACX4000- Switch Media/ KVM Extender

For standard applications, you shouldn't need to make any adjustments to your ACX4000 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.

The following diagnostic LEDs are used to indicate configuration changes:

The diagnostic LED ‘Video OK’ is located at the Local Unit between the both DVI-connectors

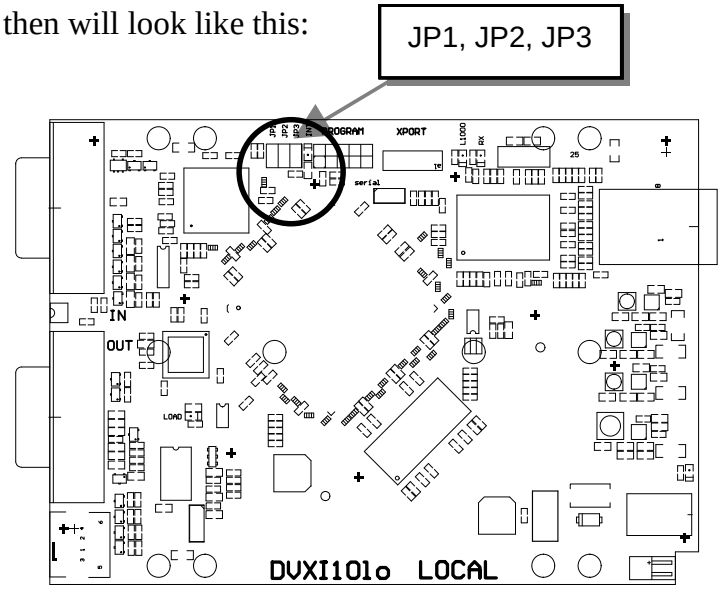
The diagnostic LED ‘Video OK’ is located near to the CATx- connectors



6.3 Setup at the Local Unit

After unscrewing and opening the upper shell, please place the device 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.

DDC / colour depth

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

DDC	JP1	JP2
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 into the internal DDC Table

To load the DDC Information from the Remote Monitor into the internal DDC Table, please proceed 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, Dual head devices: BOTH Monitors!)
- Plug the Video-Cable of the Remote Monitor(s) into the remote unit (Remote and Local Unit powered! - Dual head devices: BOTH Monitors!)
- The DDC Information of the Remote Monitor(s) is read automatically, transferred to the Local Unit 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 allows high data compression, 24Bits are transmitted. When the video data do not allow to reduce data enough, the colors are automatically reduced to 16Bit. This is autoselected in each line of the screen picture at any time. This mode makes the best compromise between speed and color depth.

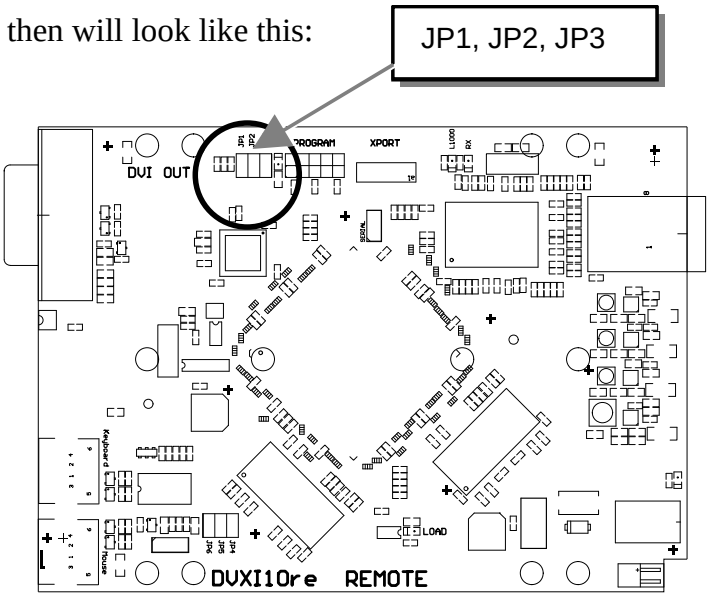
Please select 24Bit, if you want to have under all circumstances highest colours (but perhaps with reduced frame rates).

Color depth	**JP3**
16Bit/24Bit AUTOSELECT, color depth depending on actual screen content (default)	
24Bit	

6.4 Setup at the Remote Unit

After unscrewing and opening the upper shell, please place the device with the CATx-connectors to the right and the electrical connectors to the left.

The main PCB then will look like this:



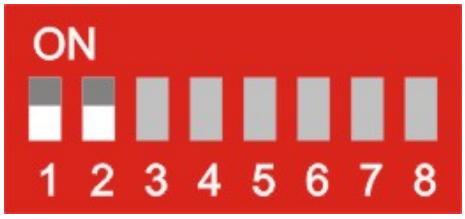
Use the diagram to locate jumpers.

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 when a frame is displayed on the screen. If the device switches to the new frame during HSYNC, the displaying period of the old frame, you may see horizontal screen breaks at the moment of switching (default). Alternatively, you can set up the units to idle until the actual frame is displayed completely, during VSYNC. Using this method, the number of frames per second transmitted is lower.

Moment to switch	**JP3**	**Behaviour**
Switching during HSYNC (default)		Higher frame rate but (possibly) horizontal breaks detectable
Switching during VSYNC		Lower frame rate, no horizontal breaks detectable but (possibly) stepping pictures

7. Operating Modes

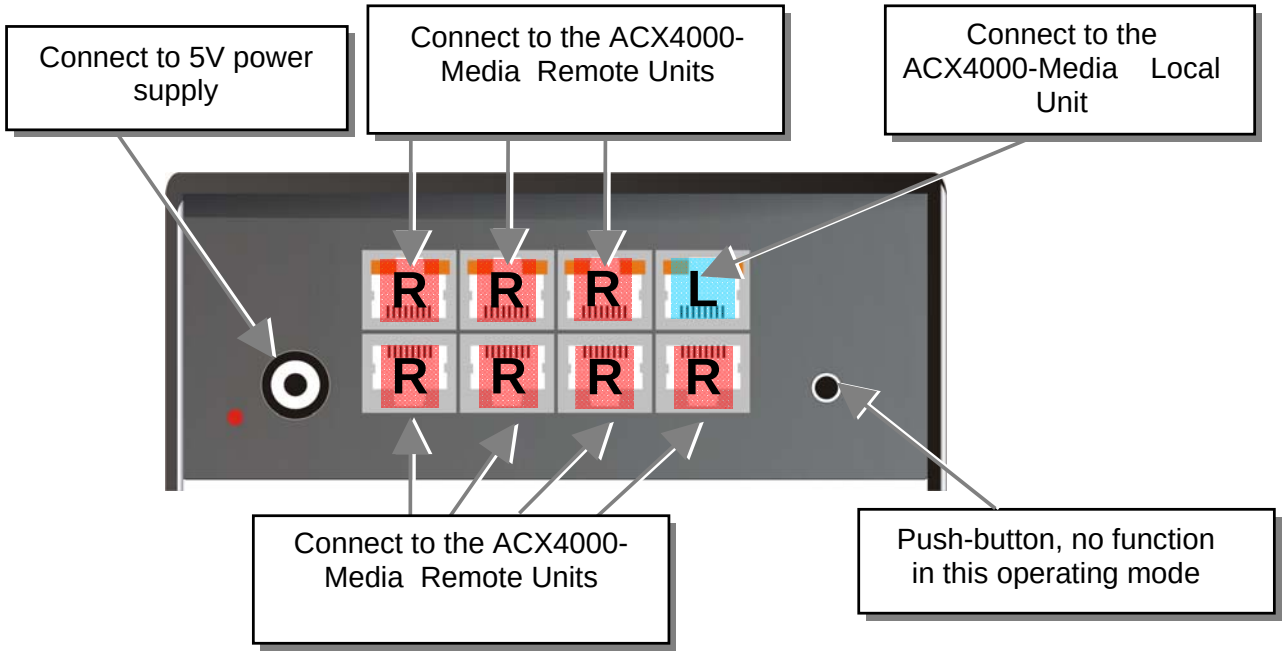


7.1 Multiplex- Repeater

The DVI signals (and optional audio) originating from a signal source are distributed and extended – depending on the configuration – on up to 7 equivalent outputs. The signals of the CPU (signal source) are transmitted to a Local Unit which is attached to the ACX4000 Switch by interconnection cables (CATx). The transmission between the ACX4000 Switch and up to 7 Remote Units is also done by interconnection cables (CATx). Optionally, instead of Remote Units, further ACX4000 Switches can be installed for a second stage of distributors. Further Remote Units can be connected to the second stage repeaters, allowing up to 49 display units to be headed.

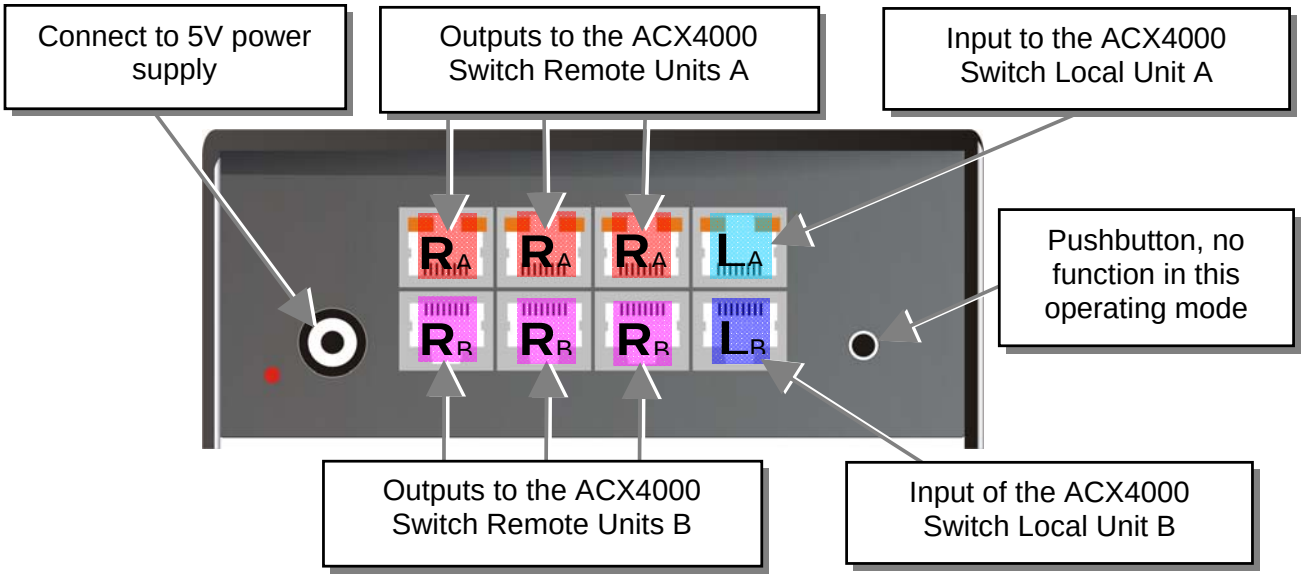
The distance between a Local Unit and ACX4000 Switch or between a ACX4000 Switch and Remote Unit or between two ACX4000 Switches may amount to in each case up to 140m allowing installations in distributed applications.

Configuration ‘Multiplex-Repeater’ – 1 Source up to 7 Displays



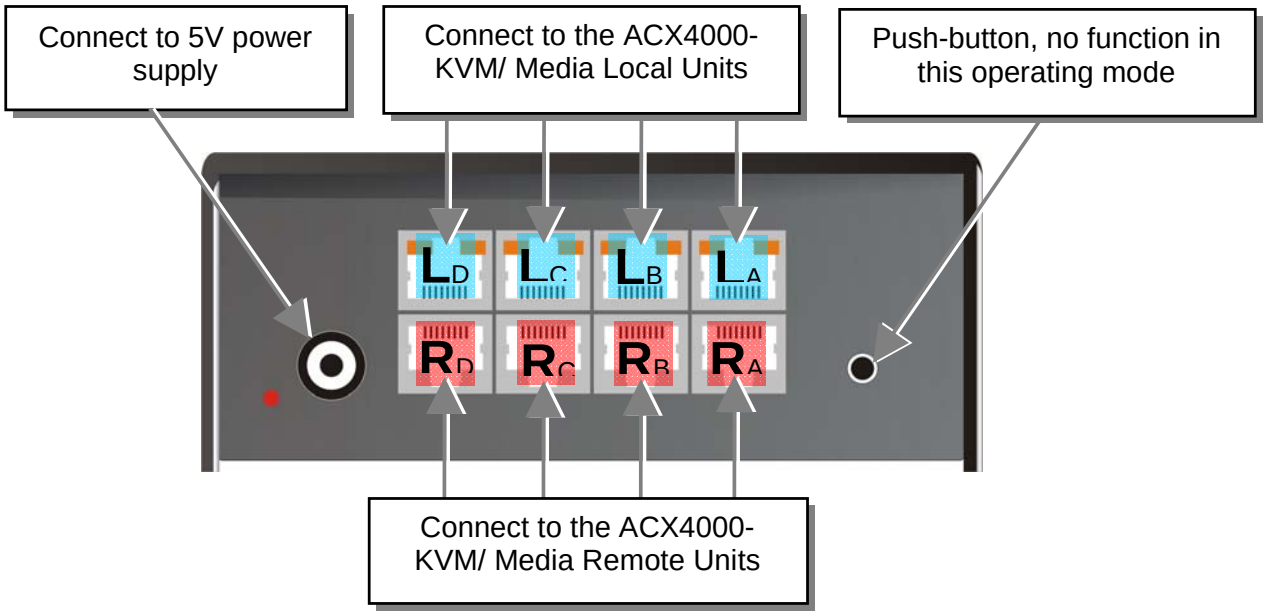
A single signal from a Local Unit is distributed on up to 7 outputs and transferred over CATx- cables on up to 7 Remote Units. Using a second stage of Multiplex Repeaters up to 49 monitors can be supplied with video (and optionally audio).

Configuration 'Multiplex-Repeater' – 2 Sources, each up to 3 displays



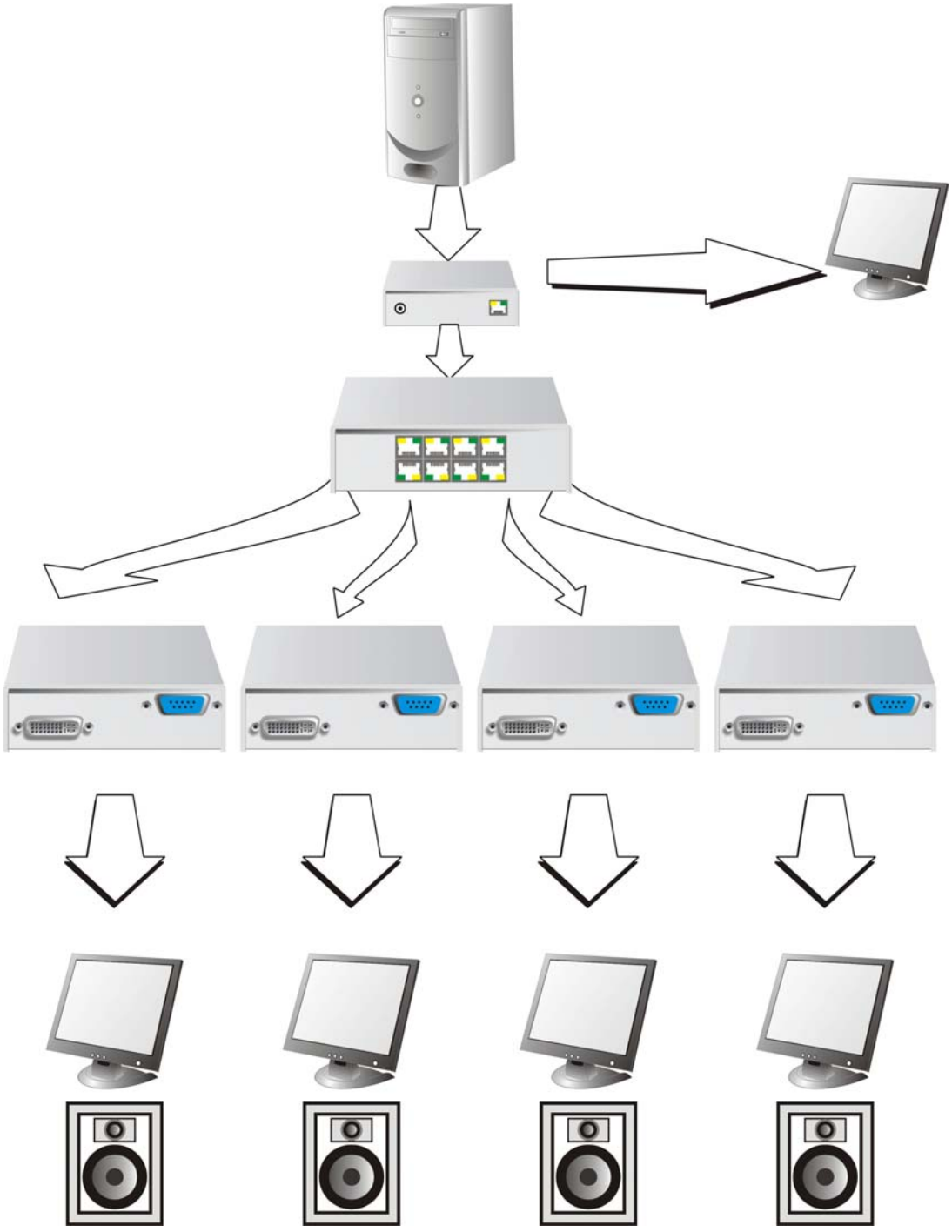
Two different signals from two Local Units are each distributed to 3 outputs and transferred over CATx- cables to 3 Remote Units. Using a second stage of Multiplex Repeaters up to 2x9 (2x21) monitors can be supplied with video (and optionally audio).

Configuration 'Multiplex-Repeater' – 4 Sources on 4 Displays

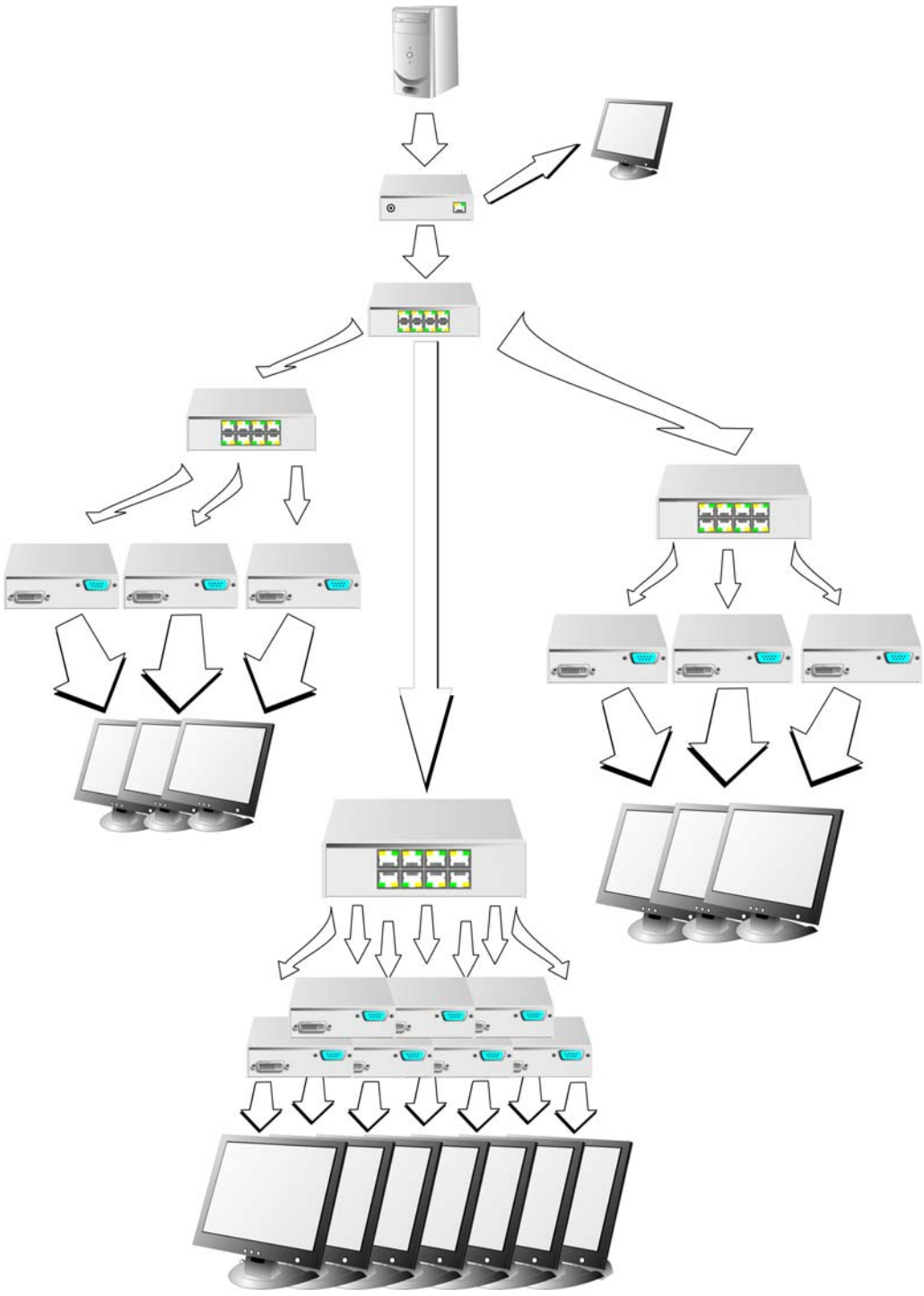


Four different signals from four Local Units are transferred over CATx- cables to one equivalent Remote Unit. This allows an extension to the cable length, if the usual 140m distance by CATx- cables is not sufficient.

Example Applications:



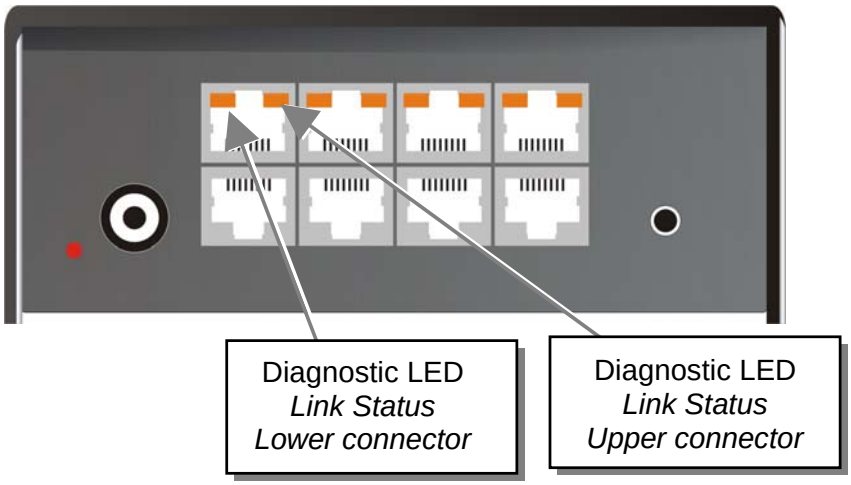
A video/audio source is switched over the ACX4000 Switch to 4 different screens/loudspeakers. Additionally a control monitor can be attached at the Local Unit.



Three cascaded ACX4000 Switches each with a local second screen and 13 screens for presentations.

Indicator LEDs

The following indicator LEDs are used in the ‘Multiplex-Repeater’ operating mode:



Meaning of the diagnostic LEDs:

OFF	Channel not busy, appropriate Local/ Remote Unit is switched off or interconnection cable disconnected.
ON Green	Channel is busy and the connection to the Local/ Remote Unit is OK.

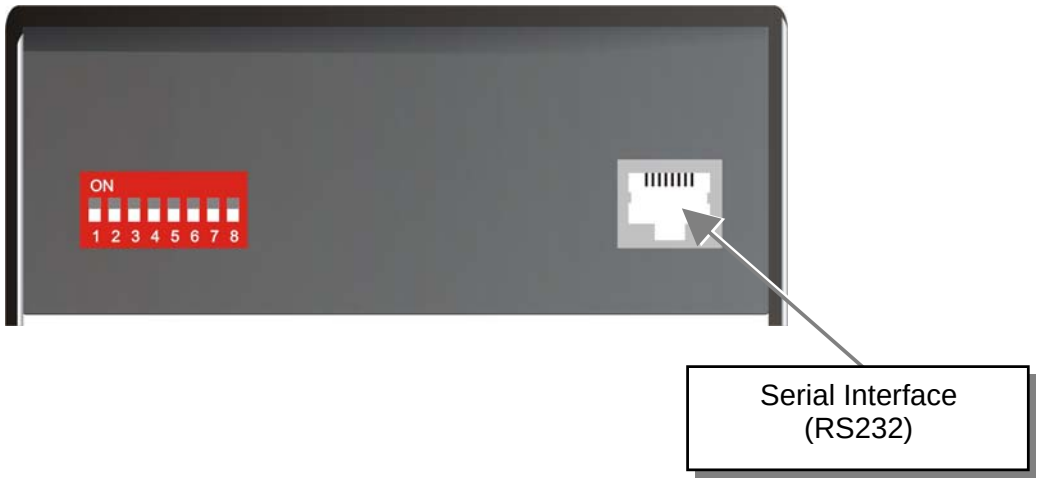
Setup

There are no other setups available in ‘Multiplex-Repeater’ operating mode.

Operation

In operating mode ‘Multiplex-Repeater’ the following operations are possible:

By serial interface



You can find the allocation of the serial interface under **“Serial Interface (external switchbox) DCE”** on page **103**. A standard cable RJ45 / DB9 to the CPU is included in delivery.

For the complete communication protocol and an explanation of the control characters please see **Appendix D: Protocol for command mode**

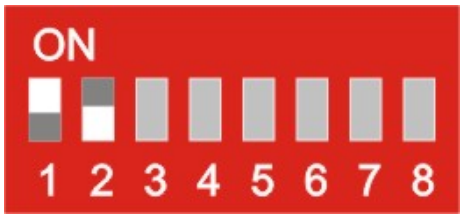
For communication, please set up the format of the serial data communication to:

115,2K,8,1,NO
(115,2 KBAUD, 8 Data bit, 1 Stop bit, NO parity)

Control commands

In the ‘Multiplex-Repeater’ operating mode, the following commands are allowed:

- **STX, 0x40, 0x80, ETX** Acknowledgment of the system information
- **STX, 0x54, ETX** Reset of the Multiplex- Repeater



7.2 Cross point- Switch

In “Cross point- Switch“ operating mode, each port of the ACX4000 Switch can be used either as an input (to a Local Unit) or as an output (to a Remote Unit). Thus any combinations between 1x input/7x output and 7x input/1x output are possible. The device offers no channel monitoring in this mode so you must ensure the correct connection of the CATx- cables. Incorrect cabling may switch two inputs or two outputs to each other and this could damage your equipment!

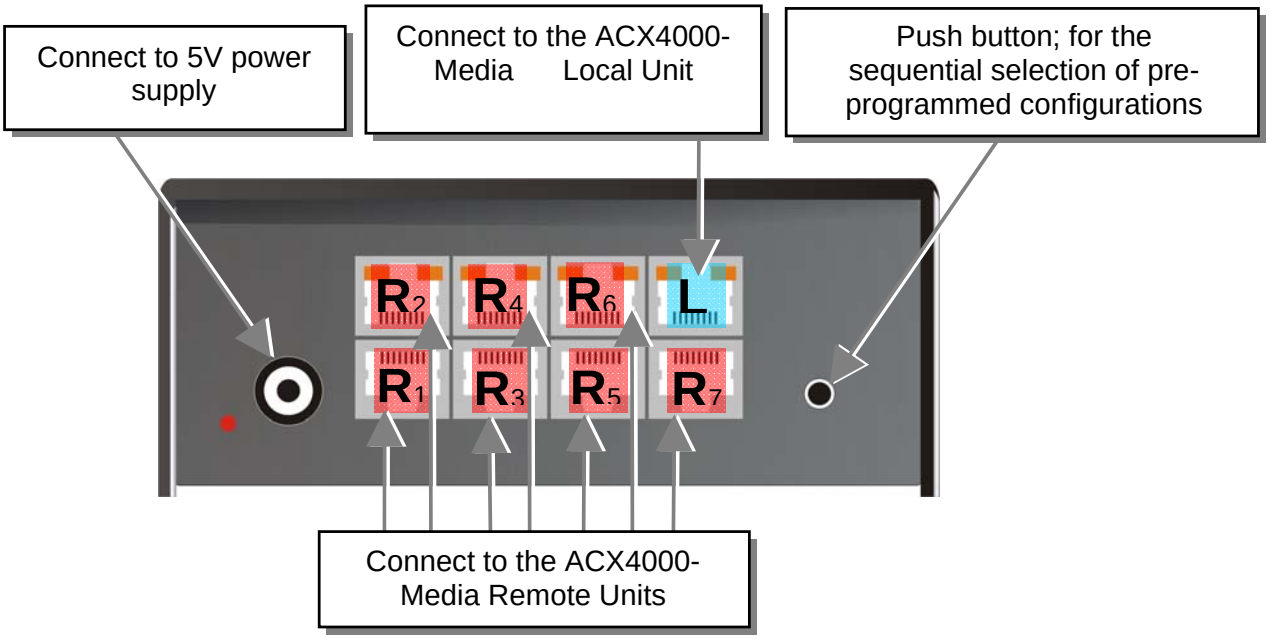
An incoming DVI (+audio) signal can be switched and extended to one or more outputs allowing you to output the signal to several displays at the same time (broadcast function). The signal from the CPU (signal source) is transmitted over a Local Unit and CATx- cables to the ACX4000 Switch. From the ACX4000 Switch, the transmission continues over CATx-cables to up to 7 Remote Units. Alternatively, a further ACX4000 Switch (slave) can be used between the first stage switch and further Remote Units. Therefore complex switching modes can be achieved.

During operation, the allocation of ports as input or output is fixed. Devices must be attached according to the following diagrams.

The distance between a Local Unit and ACX4000 Switch or between a ACX4000 Switch and Remote Unit or between two ACX4000 Switches may amount to in each case up to 140m allowing installations in distributed applications.

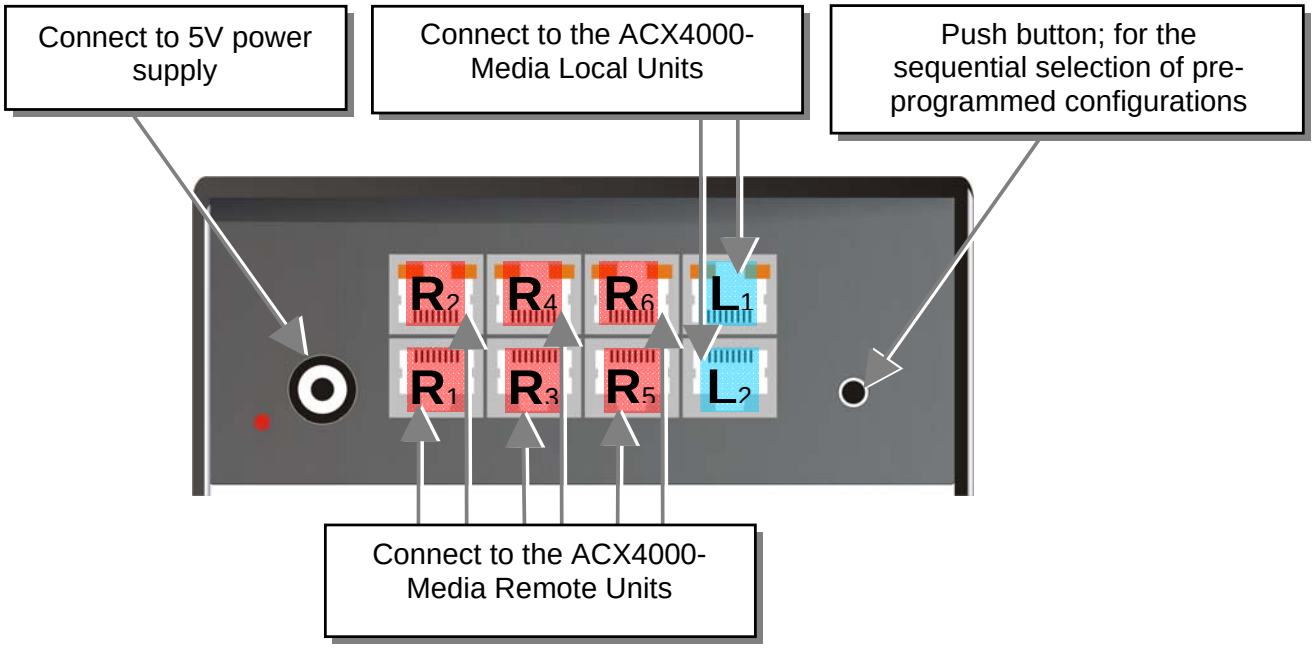
The control of the switching status is made by the integrated, serial interface. Switching commands can be converted directly here. Switching combinations can be additionally stored as macros. These can be called up with a short command or by using the push-button on the device. Using the serial interface, macros can be selected directly; with the push-button, the macros are successively activated.

Configuration ‘Cross point-Switch’ 1 Input / 7 Outputs



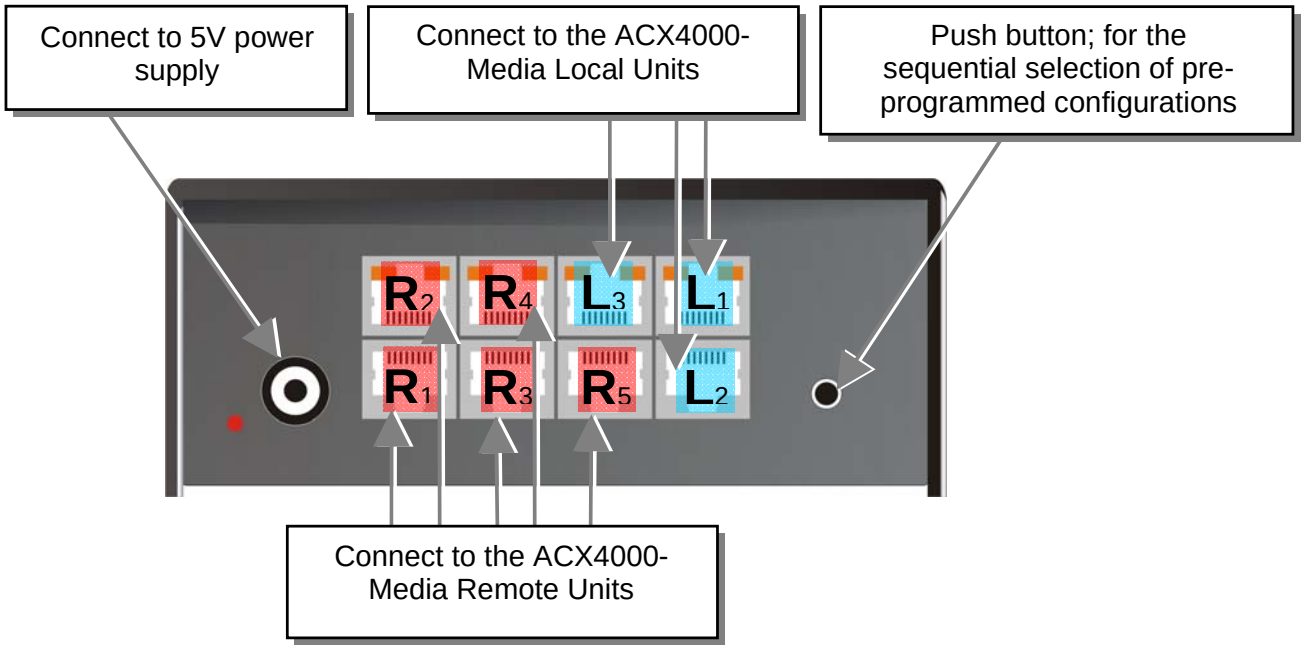
The signal of a Local Unit is switched on up to 7 outputs and transmitted over CATx- cables on up to 7 Remote Units. Optionally a further ACX4000 Switch can be inserted for a second switching stage.

Configuration ‘Cross point-Switch’ 2 Inputs / 6 Outputs



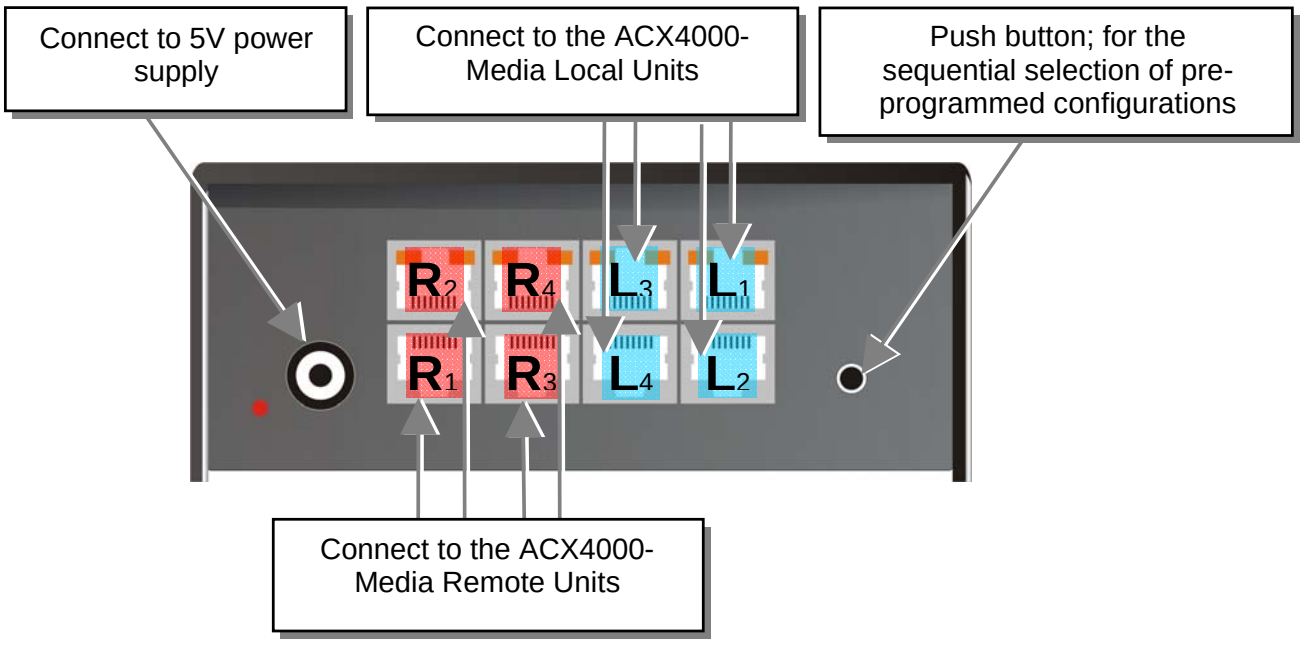
The signals of 2 Local Units is switched on up to 6 outputs and transferred over CATx- cables to 6 Remote Units. Optionally, a further ACX4000 Switch can be inserted for a second switching stage.

Configuration ‘Cross point-Switch’ 3 Inputs / 5 Outputs



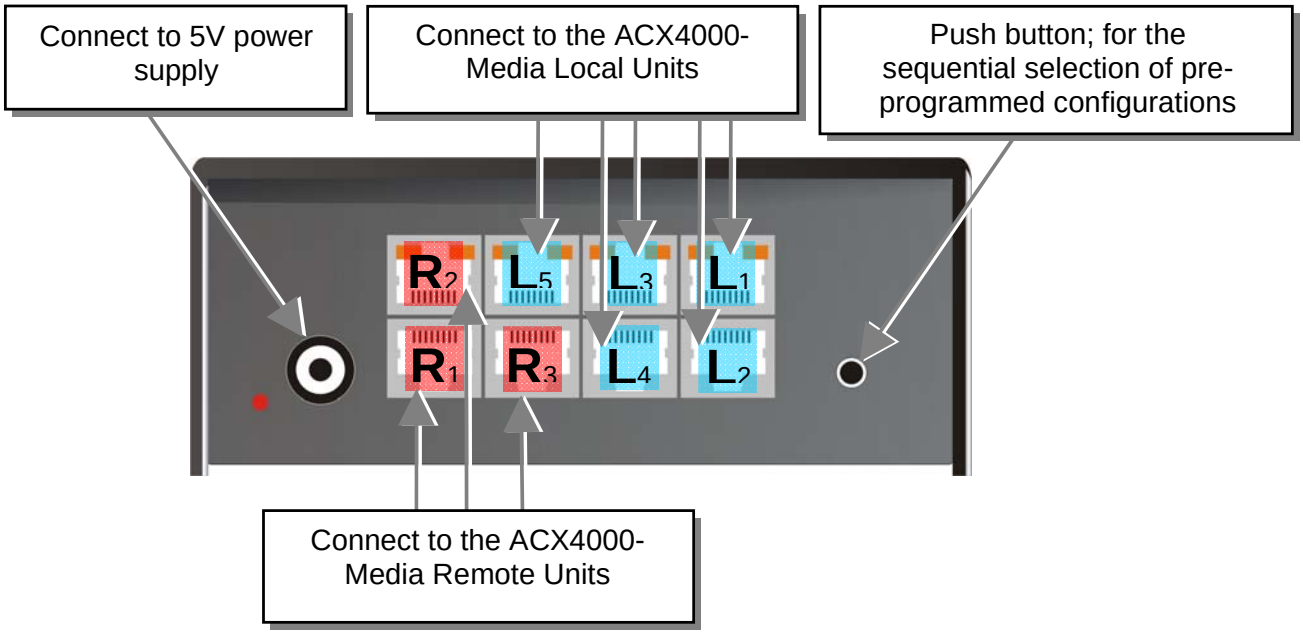
The signals of 3 Local Units is switched on up to 5 outputs and transferred over CATx- cables to 5 Remote Units. Optionally a further ACX4000 Switch can be inserted for a second switching stage.

Configuration ‘Cross point-Switch’ 4 Inputs / 4 Outputs



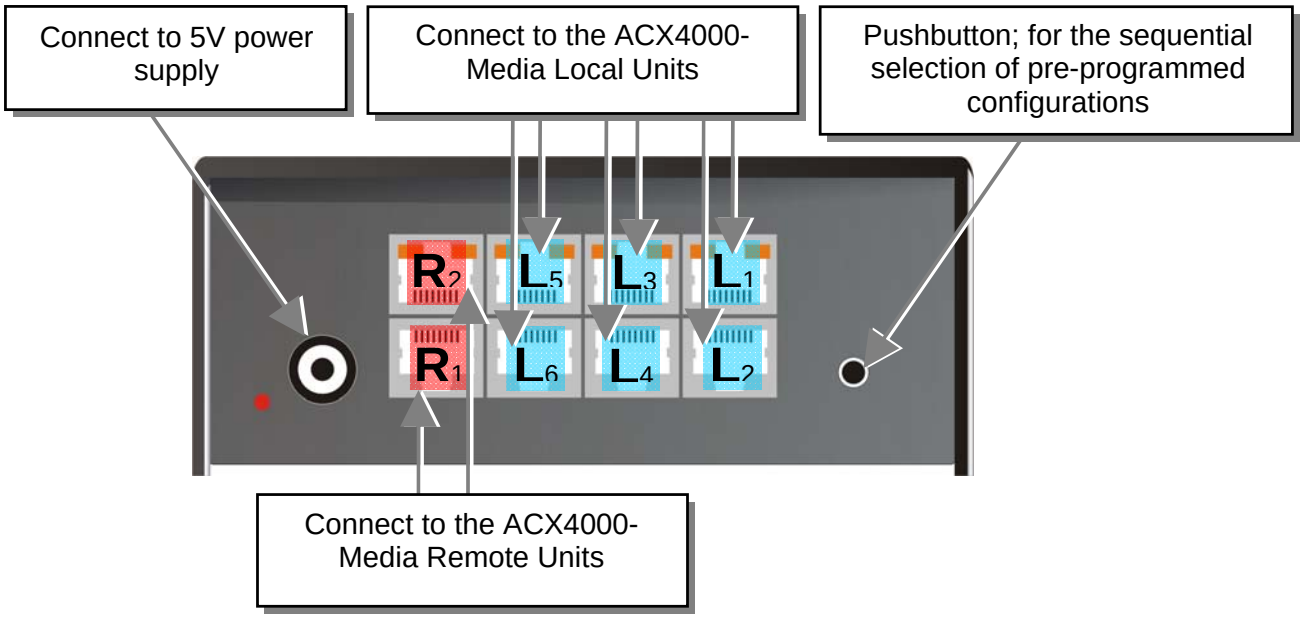
The signals of 4 Local Units is switched on up to 4 outputs and transferred over CATx- cables to 4 Remote Units. Optionally a further ACX4000 Switch can be inserted for a second switching stage.

Configuration ‘Cross point-Switch’ 5 Inputs / 3 Outputs



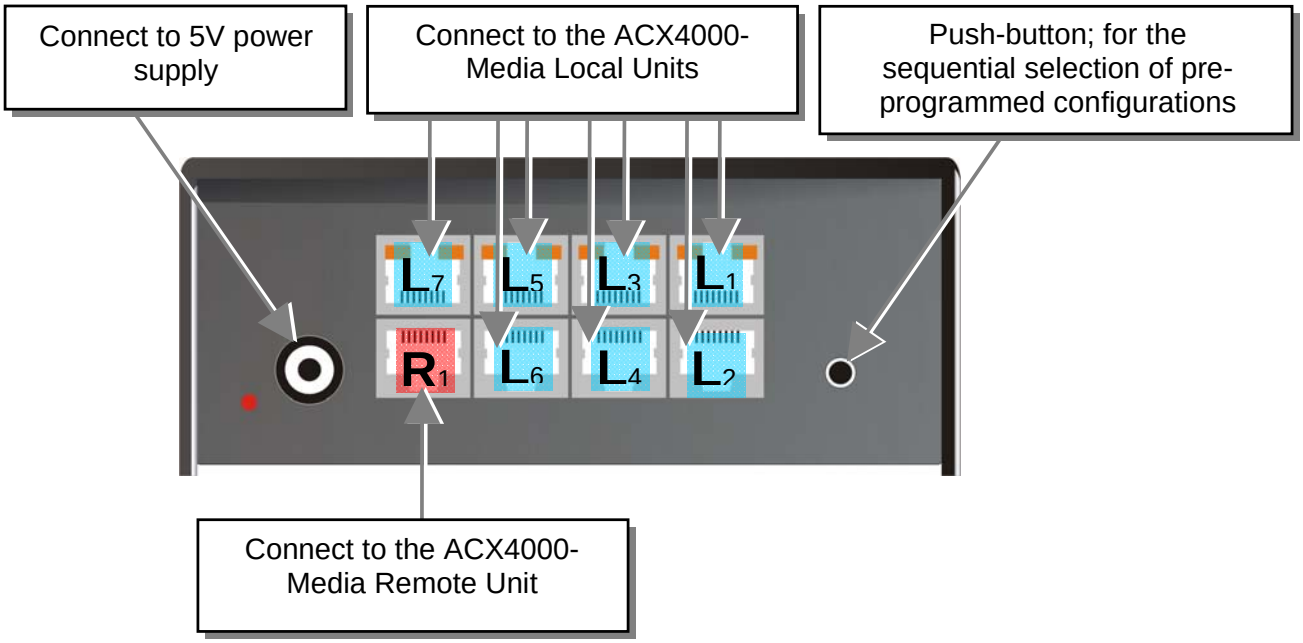
The signals of 5 Local Units can be switched on up to 3 outputs (also on several) and be transferred over CATx- cables on up to 3 Remote Units. Optionally a further ACX4000 Switch can be inserted for a second switching stage.

Configuration ‘Cross point-Switch’ 6 Inputs / 2 Outputs



The signals of 6 Local Units can be switched on up to 2 outputs (also on several) and be transferred over CATx- cables on up to 2 Remote Units. Optionally a further ACX4000 Switch can be inserted for a second switching stage.

Configuration ‘Cross point-Switch’ 7 Inputs /1 Output



The signals of 7 Local Units can be switched to one output and be transferred over CATx-cables to one Remote Unit. Optionally a further ACX4000 Switch can be inserted for a second switching stage.

Example Application:

Three video sources are switched over the ACX4000 Switch on four different screens.

Setup

The following configurations are possible in the ‘Cross point-Switch’ operating mode:

Operating mode after Reset/Power ON

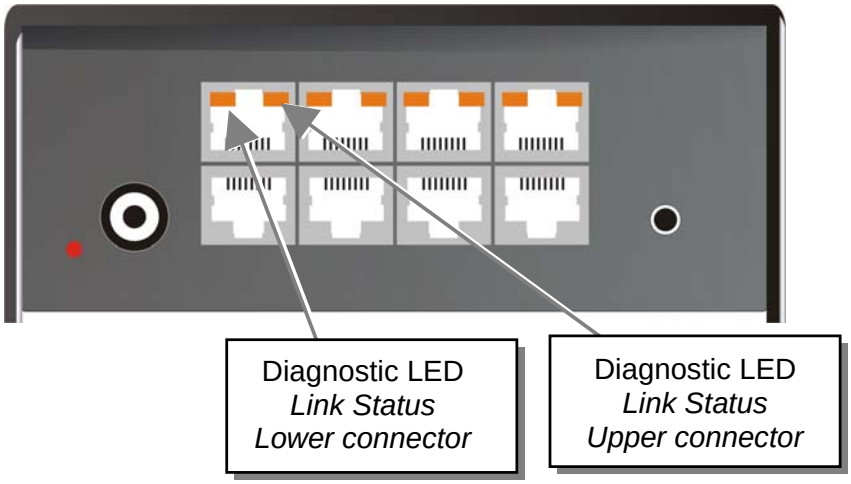
After a reset the respective DEFAULT- Mode is selected:

1x7:	Input I1 is switched to Output O1
2x6:	I1 to O1 and I2 to O2
3x5:	I1 to O1, I2 to O2 and I3 to O3
4x4:	I1 to O1, I2 to O2, I3 to O3 and I4 to O4
5x3:	I1 to O1, I2 to O2 and I3 to O3
6x2:	I1 to O1 and I2 to O2
7x1:	I1 to O1

Operating mode after Reset/Power ON: After reset, the previous mode before reset or power OFF is selected.

Indicator LEDs

The following indicator LEDs are used in the ‘Cross point-Switch’ operating mode:



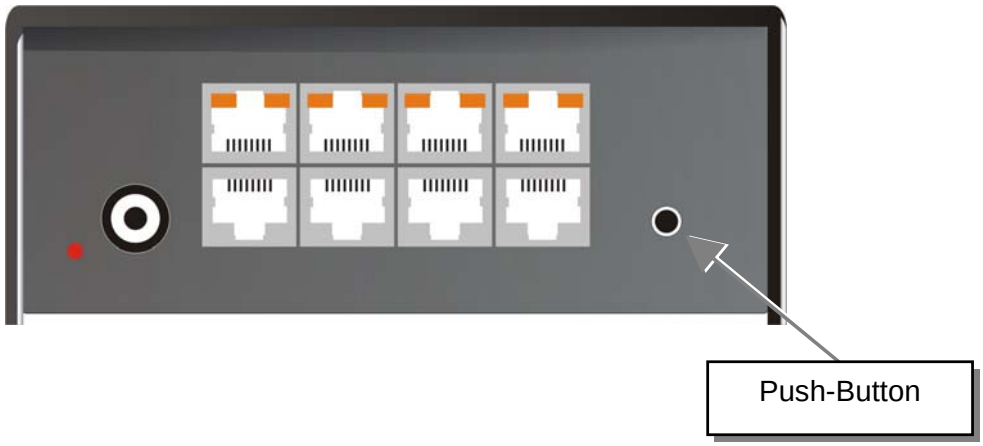
Meaning of the diagnostic LEDs:

OFF	Channel not busy, appropriate Local/ Remote Unit is switched off or interconnection cable disconnected.
BLINKING Green	Channel of the current selected CPUs.
BLINKING Orange	Selection of an inactive channel.
ON Green	Channel is busy and the connection to the Local/ Remote Unit is OK.

Operation

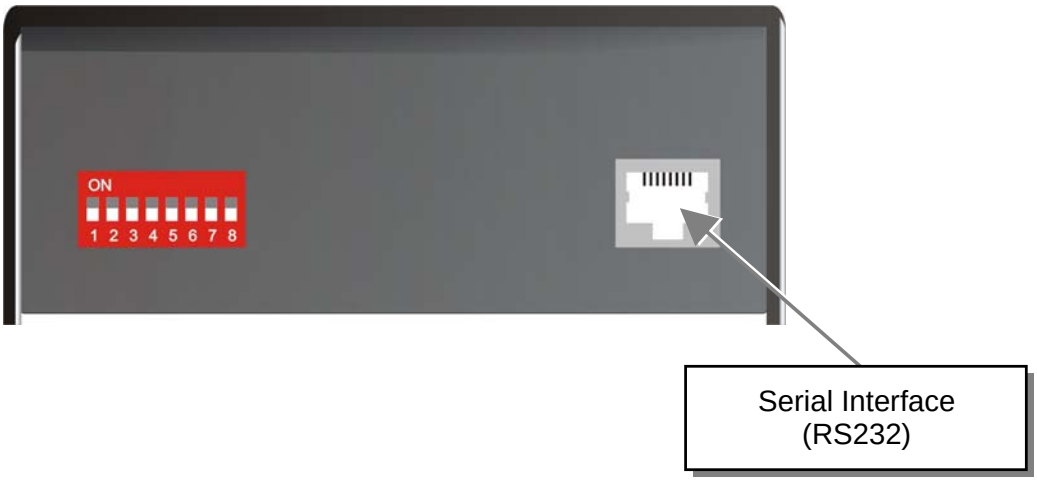
The following operations are possible in the ‘Cross point-Switch’ operating mode:

a) By push button:



With each key press, the next macro stored in the device is called and the programmed switching configuration is loaded. The macro will only be executed if the push button is not operated for longer than 2 seconds. With the first key press, the macro display is switched on. The LED with the number of the active selected macro flashes. With each key press, the display will switch to the next LED. The selection of a not (yet) programmed macro will be interpreted as a reset (see below).

b) By serial interface



You can find the allocation of the serial interface under **Serial Interface** on page **116**. A standard cable RJ45 on DB9 to a CPU is included in delivery.

For communication please set up the format of the serial data communication to:

115,2K,8,1,NO
(115,2 KBAUD, 8 Data bit, 1 Stop bit, NO parity)

Control commands

In the 'Cross point- Switch' operating mode the following control commands are allowed:

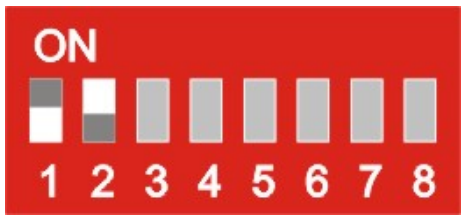
- **STX, 0x40, 0x80, ETX** Acknowledgement of the system info
- **STX, 0x45, ETX** Reset on factory settings
- **STX, 0x54, ETX** Reset the Cross point- Switch
- **STX, 0x47, <Loc-Nr>, <Rem-No>, ETX** Switch a single (local-)input to (remote-)output
- **STX, 0x48, <Rem-No>, ETX** Switch off a single (remote-)output
- **STX, 0x52, ETX** Switch off all local-/ remote-connections
- **STX, 0x66, 0x80, <Macro-No>, ETX** Save switching status to macro
- **STX, 0x67, 0x80, <Macro-No>, ETX** Load switching status from macro

where:

<Rem-No>	7Bit date 1 to 7
<Loc-No>	7Bit date 1 to 7
<Macro-No>	7Bit date 1 to 8

Examples:

STX, 0x54, ETX	Reset the switch and set the connections as a function of SW7 (see above)
STX, 0x40, 0x80, ETX	Read the system info (version number) from the switch
STX, 0x52, ETX	Switch off all local-/ remote- connections
STX, 0x47, 0x81, 0x84, ETX	Switch (local-)input 01 to (remote-)output 04
STX, 0x47, 0x81, 0x85, ETX	Switch (local-)input 01 to (remote-)output 05 ((remote-) output 04 and 05 show the same picture now!)
STX, 0x47, 0x81, 0x86, ETX	Switch (local-)input 01 to (remote-)output 06 ((remote-) output 04 - 06 show the same picture now!)
STX, 0x47, 0x81, 0x87, ETX	Switch (local-)input 01 to (remote-)output 07 ((remote-) output 04 - 07 show the same picture now!)
STX, 0x66, 0x80, 0x81, ETX	Saves active switching status as macro 1
STX, 0x52, ETX	Opens all connections (all monitors are without picture)
STX, 0x67, 0x80, 0x81, ETX	Call macro 1: (remote-)output 04 - 07 show the same picture of (local-)input 01 now
STX, 0x47, 0x84, ETX	Open the connection between (remote-)output 04 and the equivalent (local-)input (only monitor 05 – 07 show the picture)



7.3 Single head KVM- Switch

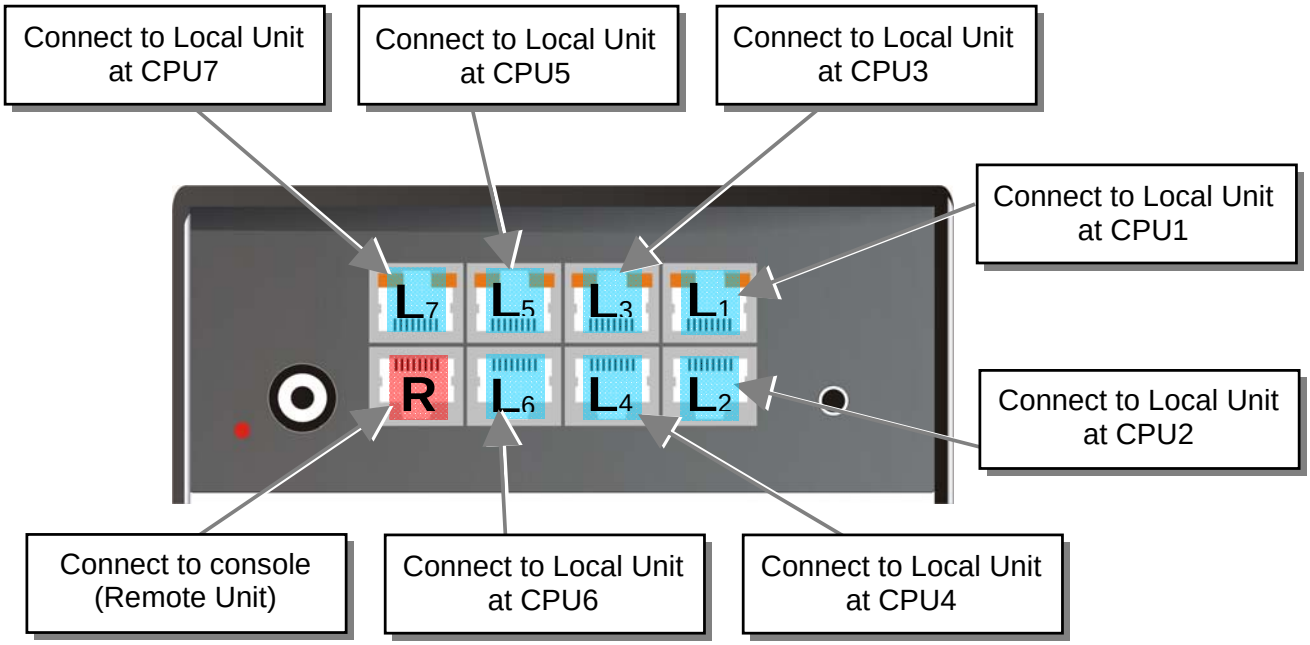
Using one console (monitor, keyboard and mouse) up to 7 CPUs can be controlled remotely. The distances between the CPU and ACX4000 Switch and between ACX4000 Switch and console may amount in each case to up to 140m.

The switching between the CPUs can be carried out at the attached keyboard, push-button at the device or over the serial interface.

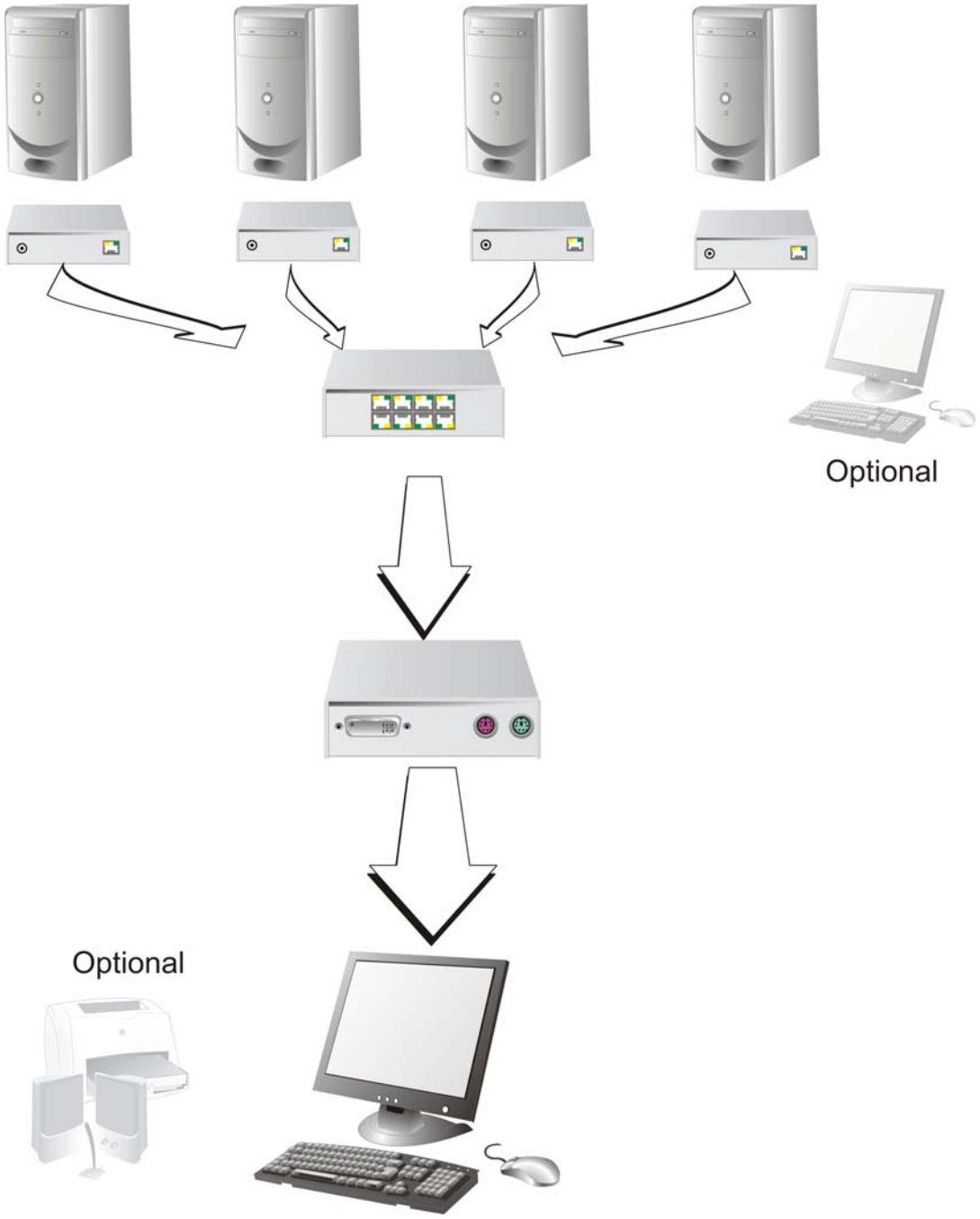
Cascading of the ACX4000 KVM- Switch in two stages is in all application areas allowed so up to 49 CPUs to be addressed.

In addition to the DVI- signals and USB for keyboard/mouse, bi-directional stereo-audio + serial (RS232/V24), can be transferred by the choice of appropriate Local/ Remote Units.

Configuration ‚Single head KVM- Switch'



Example Application:



Four CPUs are switched over the ACX4000 Switch to one console.

Setup

In ‘Single head- KVM- Switch’ operating mode the following setups are possible:

Master/Slave function

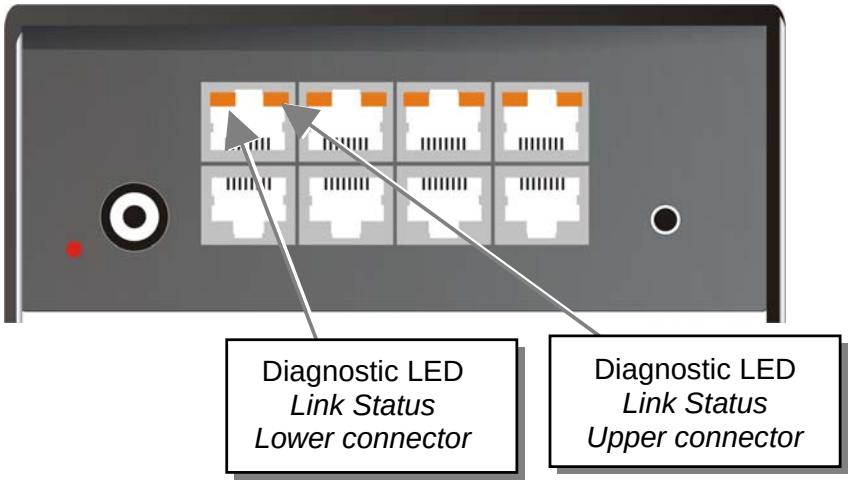
	The device is Master (default status: it is either the exclusive device in the system, or if ACX4000 KVM Switches are cascaded, it is on the highest level (directly after the console).
	The device is Slave: if ACX4000 KVM Switches are cascaded, it is on second level (directly after the Local Units).

Operating mode after Reset/Power ON

	After a reset, the DEFAULT- Mode is selected: The console (Remote Unit) is switched to input 1 (Local Unit at CPU1).
	After reset, the previous mode before reset or power OFF is selected.

Indicator LEDs

These are the indicator LEDs in the ‘Single head- KVM- Switch’ operating mode:



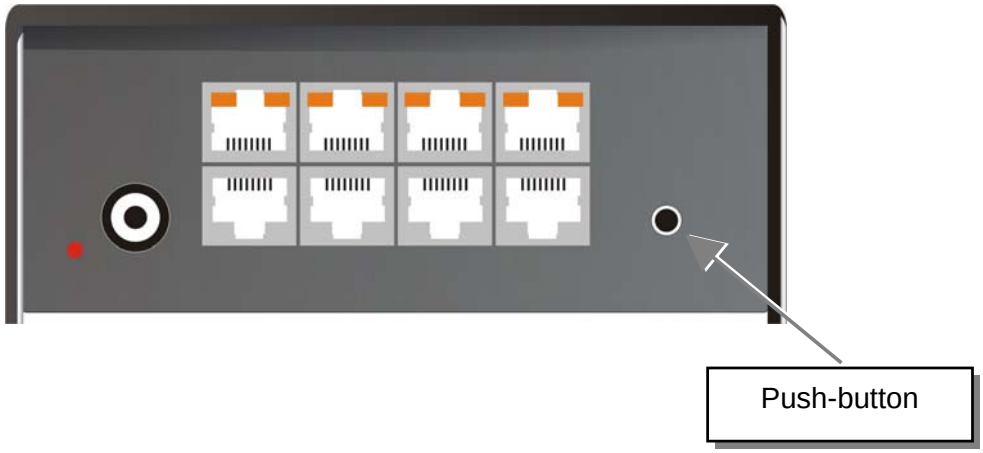
Meaning of the diagnostic LEDs:

OFF	Channel not busy, appropriate Local/ Remote Unit is switched off or the interconnection cable is disconnected.
BLINKING Green	Channel of the current selected CPUs.
BLINKING Orange	Selection of an inactive channel.
ON Green	Channel is busy and the connection to the Local/ Remote Unit is OK.

Operation

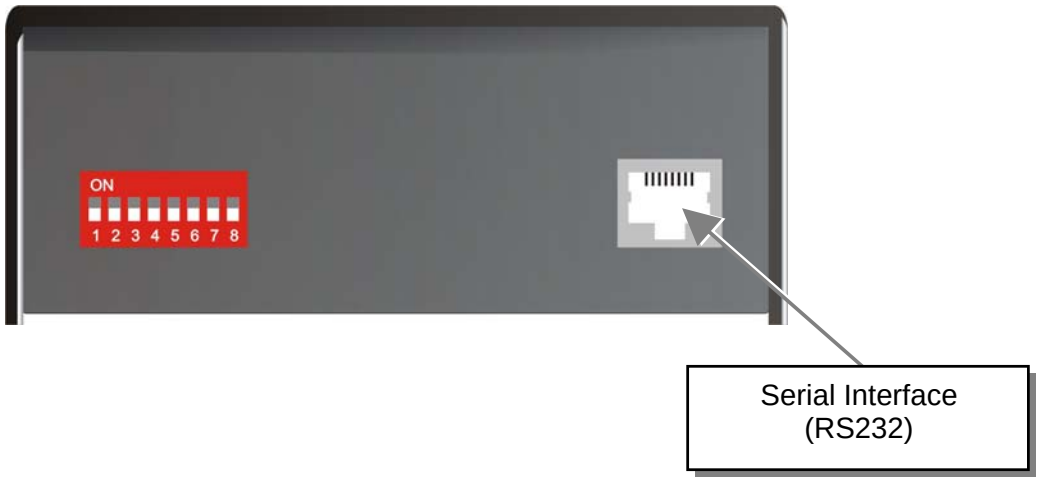
The following operations are possible in the operating mode ‘Single head KVM- Switch’:

a) By push-button:



The device switches to the next channel with each key press. The changeover will only be executed if the push-button is not operated for longer than 2 seconds. With each key press, the display will switch to the next channel as indicated by a rapidly blinking LED. If the last channel is reached, the device will cycle to the first channel.

b) By serial interface



You can find the allocation of the serial interface under **Serial Interface** on page **116**. A standard cable RJ45 on DB9 to a CPU is included in delivery.

For communication please set up the format of the serial data communication to:

115,2K,8,1,NO
(115,2 KBAUD, 8 Data bit, 1 Stop bit, NO parity)

Control commands

In Single head KVM- Switch operating mode, the following control commands are allowed:

• **STX, 0x40, 0x80, ETX**	Acknowledgement of the system info
• **STX, 0x45, ETX**	Reset on factory settings
• **STX, 0x54, ETX**	Reset the Cross point- Switch
• **STX, 0x4F, 0x81, < Loc-No>, ETX**	Switch (local-)input to (remote-)output, the existing connection is disconnected at the same time
• **STX, 0x66, 0x80, <Macro-No>, ETX**	Save switching status to macro
• **STX, 0x67, 0x80, <Macro-No>, ETX**	Load switching status from macro

where:

< Loc-No>	7Bit date 1 to 7
<Macro-No>	7Bit date 1 to 8

Examples:

STX, 0x54, ETX	Reset the switch and set the connections as a function of SW7 (see above)
STX, 0x40, 0x80, ETX	Read the system info (version number) from the switch
STX, 0x47, 0x81, 0x84, ETX	Switch console (Remote Unit) to (Local Unit) CPU 4
STX, 0x47, 0x81, 0x85, ETX	Switch console (Remote Unit) to (Local Unit) CPU 5 (existing connection to CPU 4 is disconnected)
STX, 0x66, 0x80, 0x81, ETX	Save active switching status as macro 1
STX, 0x54, ETX	Reset the switch and set the connections as a function of SW7 (see above)
STX, 0x67, 0x80, 0x81, ETX	Call macro 1: the console (Remote Unit) is re-connected to (Local Unit) CPU 5

c) By the attached keyboard

By executing a ‘hot-key-sequence', the system is shifted into a command mode. Now CPUs can be selected from the attached keyboard. Access to a switch in the second level (slave) is also possible. To show that the command mode is active, all three status LED on the keyboard flash rapidly. Press <ESC> to exit the command mode.

User commands

The input of letters does not differentiate between large and lower case.
<SHIFT> shifts between upper and lower case.

<Key1>+<Key2>+ ... means that all keys must be pressed at the same time
<Key1>, <Key2>, ... means that the keys must be pressed successively

The device is designed to work at up to two levels. In command mode, all commands are sent to the master and/ or the only device. For further extensions, input the port number prefixed with a “0”.

For fast switching within one level (master level / slave level) the direct selection of a port is possible by simultaneously pressing <SHIFT>+<Port-No> without <RETURN>.

Call of the command mode

- **<CTRL> + <SHIFT> + <I>**
  Enter the command mode(default-setting)

- **<CTRL> + <SHIFT> + <C>, <x>, <RETURN>**
  Change of the initialization-string for the command mode (with x = number of the initialization-string; delivery status = 1)

  1: <CTRL> + <SHIFT> + <I> simultaneous
  2: <Scroll lock>, <Scroll lock> press twice rapidly
  3: left <SHIFT>, left <SHIFT> press twice rapidly
  4: left <CTRL>, left <CTRL> press twice rapidly
  5: left <ALT>, left <ALT> press twice rapidly
  6: right <ALT>, right <ALT> press twice rapidly
  7: left <CTRL> + right <CTRL> simultaneous
  8: left <CTRL> + <SHIFT> + right <CTRL> + <SHIFT> simultaneous
  9: left <CTRL> + <ALT> + right <CTRL> simultaneous

- **<ESC>**
  Exit the command mode

Instructions within the command mode

Selection of the control level

- **<M> or <m>**
  The following commands are executed by the 'Master' (default after call of the command mode)

- **<S> or <s>**
  The following commands are executed by the actively connected 'Slave'

Direct selection of ports

- **<SHIFT> + <x>**
  Switch the selected device (through <M> or <S>) on port x (with x = number of the port) – Caution! Applies only to the selected level!

- **<x>, <RETURN>**

  or

- **<0>, <x>, <RETURN>**
  Switch the Remote Unit (console) to the Local Unit 0x (the port 0x) (with x = number of the port) – Caution! Applies only to the selected level!

- **<M>, <x>, <S>, <y>, <RETURN>**

  or

- **<M>, <0>, <x>, <S>, <0>, <y>, <RETURN>**
  (Only in cascaded applications!) Switch the master to port 0x and the attached slave on port 0y (with x and y = number of the ports) - Caution! Afterwards the slave is the selected level!

Sequential selection of ports (depending on the selected control level)

- <➔> (arrow key right)
  Switch the console to the next port. After reaching the last port, the first port will be selected.

- <➔> (arrow key left)
  Switch the console to the previous port. After reaching the first port, the last port will be selected.

- <↑> (arrow key up)
  Switch the console (bypassing unoccupied ports) to the next port. After reaching the last port, the first port will be selected.

- <↓> (arrow key down)
  Switch the console (bypassing unoccupied ports) to the previous port. After reaching the first port, the last port will be selected

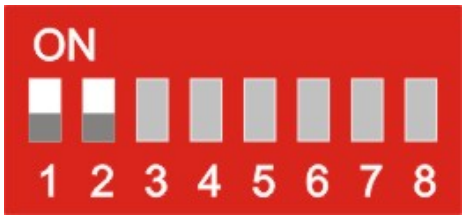
- **<BACKSPACE>**
  Switches back to the last viewed channel. Allows you to switch rapidly between two channels.

where:

x	ASCII digits ‚1' to ‚7'
y	ASCII digits ‚1' to ‚7'

Examples:

<CTRL> + <SHIFT> + <I>	Call the command mode
<SHIFT> + <3>	Switch immediately to port 3 (after call the master is selected)
<M2S5> <RETURN>	Switch the master to port 2 and the slave to 5
<3>,<RETURN>	Switch the slave to port 3 (because the slave was selected in the command before)
<BACKSPACE>	Switch the slave back to port 5
<M>	Selection of the master level
<SHIFT> + <5>	Switch (the master) immediately to port 5
<BACKSPACE>	Switch the master back to port 2
<ESC>	Exit command mode



7.4 Dual head KVM- Switch

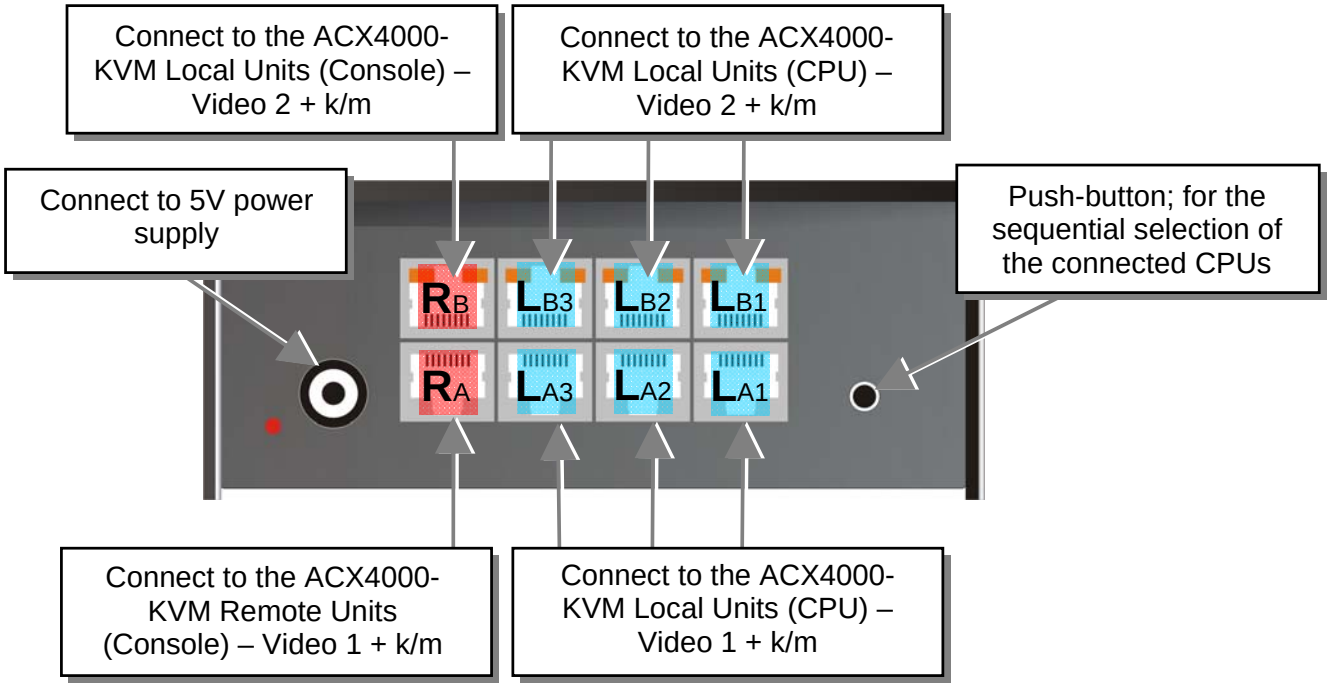
From one console (2x monitor, keyboard and mouse), you can remotely control up to 3 CPUs. The distances between the CPU and ACX4000 Switch and between ACX4000 Switch and console may amount in each case to up to 140m.

The switching between the CPUs can be carried out from the attached keyboard, push-button at the device, or over the serial interface.

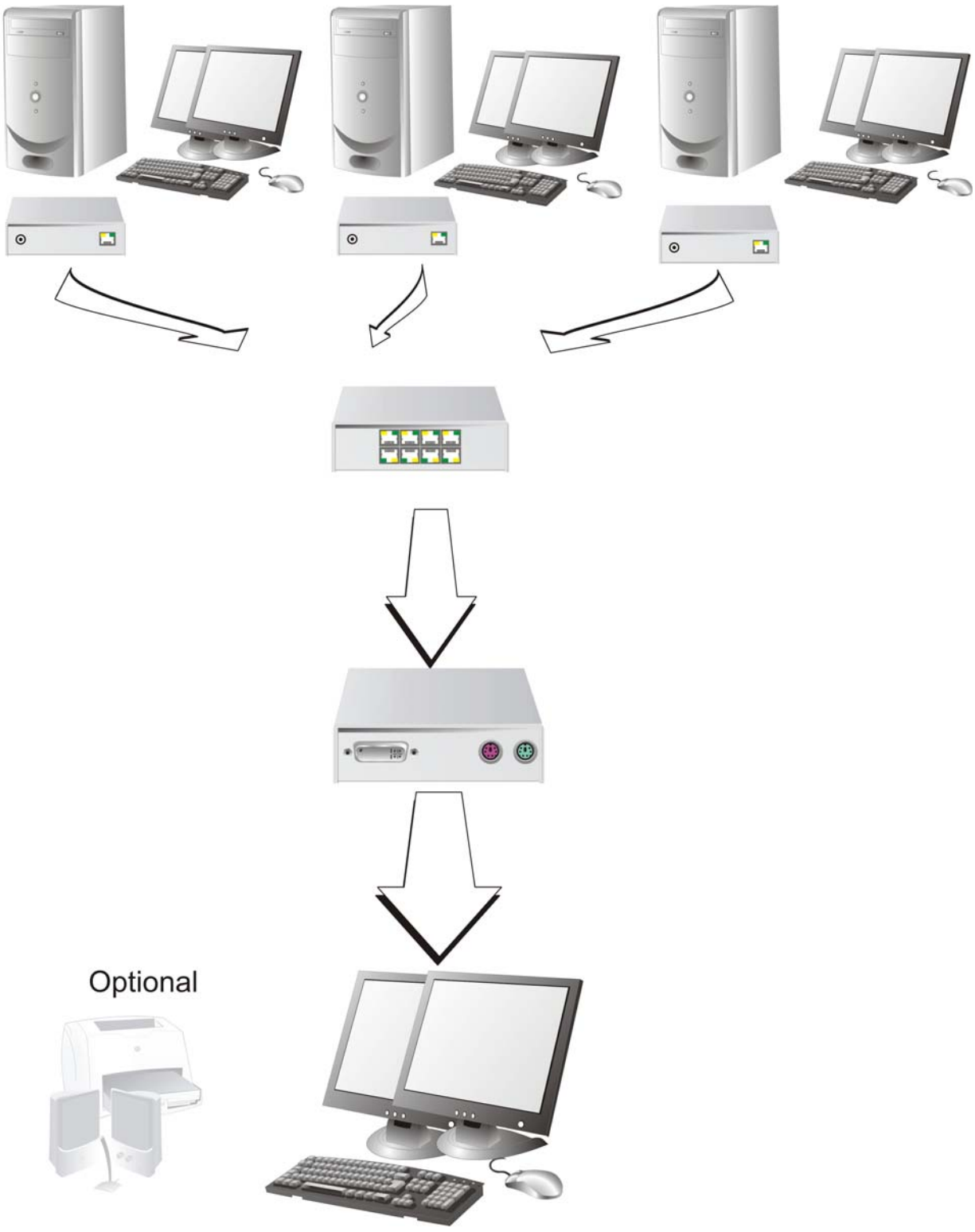
You can cascade ACX4000 KVM- Switches in two stages for all applications allowing up to 9 dual head CPUs to be addressed.

In addition to the DVI- signals and USB for keyboard/mouse, bi-directional stereo-audio + serial (RS232/V24) can be transferred by the choice of appropriate Local/ Remote Units.

Configuration of 'Dual head KVM- Switch'



Example Application:



Three CPUs with dual head graphic cards and local consoles switched over the ACX4000 Switch to one console.

Setup

In the ‘Dual head- KVM- Switch’ operating mode the following setups are possible:

Master/Slave function

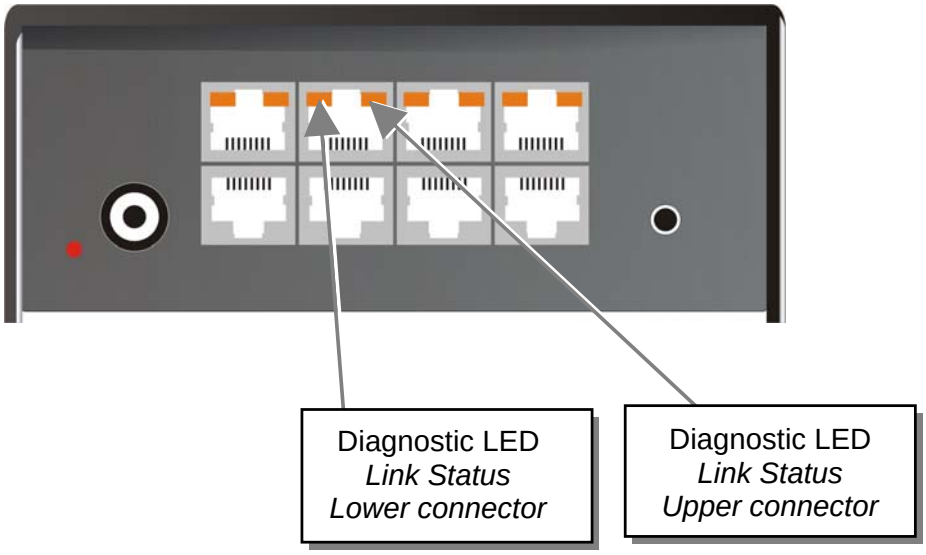
	The device is master (default status): it is either the exclusive device in the system, or if ACX4000 KVM Switches are cascaded, it is on highest level (directly after the console).
	The device is slave: if ACX4000 KVM Switches are cascaded, it is on second level (directly after the Local Units).

Operating mode after Reset/Power ON

	After a reset the DEFAULT- Mode is selected: The console (Remote Unit) is switched to input 1 (Local Unit at CPU1).
	After reset the previous mode before reset or power OFF is selected.

Indicator LEDs

In the ‘Dual head- KVM- Switch’ operating mode, the following indicator LEDs are used:



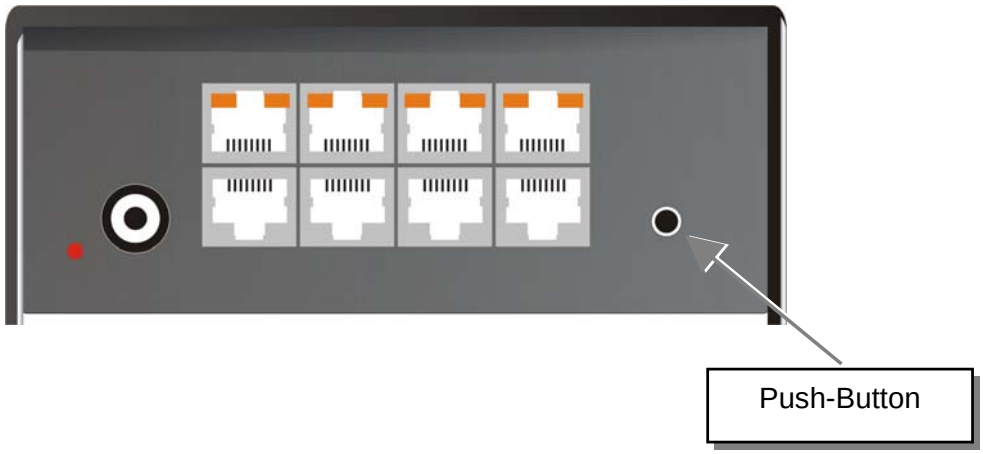
Meaning of the diagnostic LEDs:

OFF	Channel not busy or appropriate Local/Remote Unit is switched off or the interconnection cable is disconnected.
BLINKING Green	Channel of the current selected CPUs.
BLINKING Orange	Selection of an inactive channel.
ON Green	Channel is busy and the connection to the Local/ Remote Unit is OK.

Operation

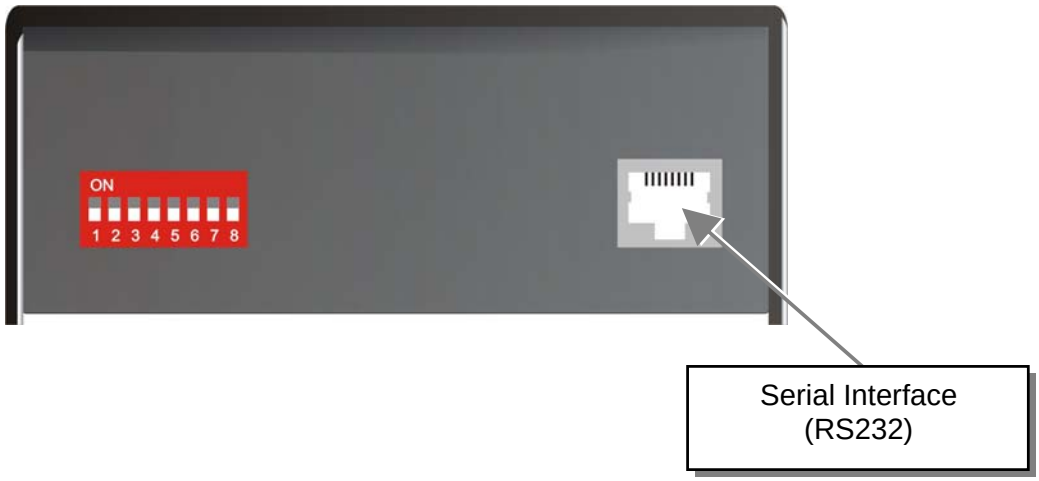
The following operations are possible in the 'Dual head KVM- Switch' operating mode:

a) By push-button:



The device switches to the next channel with each key press. The changeover will only be executed if the push-button is not operated for longer than 2 seconds. With each key press, the display will switch to the next channel indicated by a rapidly blinking LED. If the last channel is reached, the device will switch to the first channel.

b) By serial interface



You can find the allocation of the serial interface under **Serial Interface** on page **116**. A standard cable RJ45 on DB9 to a CPU is included in delivery.

For communication, please set up the format of the serial data communication to:

115,2K,8,1,NO
(115,2 KBAUD, 8 Data bit, 1 Stop bit, NO parity)

Control commands

In the Dual head KVM- Switch operating mode, the following control commands are allowed:

- **STX, 0x40, 0x80, ETX** Acknowledgement of the system info
- **STX, 0x45, ETX** Reset on factory settings
- **STX, 0x54, ETX** Reset the KVM- Switch
- **STX, 0x4F, 0x81, <Loc-No>, ETX** Switch (Local-)input to (Remote-)output, existing connection is disconnected at the same time
- **STX, 0x66, 0x80, <Macro-No>, ETX** Save switching status to macro
- **STX, 0x67, 0x80, <Macro-No>, ETX** Load switching status from macro

There are:

< Loc-No>	7Bit date 1 to 7
<Macro-No>	7Bit date 1 to 8

Examples:

STX, 0x54, ETX	Reset the switch and set the connections as a function of SW7 (see above).
STX, 0x40, 0x80, ETX	Read the system info (version number) from the switch.
STX, 0x47, 0x81, 0x81, ETX	Switch console (Remote Unit) to (Local Unit) at CPU 1. (At the same time the port for the second monitor is also switched).
STX, 0x47, 0x81, 0x83, ETX	Switch console (Remote Unit) to (Local Unit) at CPU 3 (Existing connection of CPU 1 is disconnected. At the same time the port for the second monitor is also switched).
STX, 0x66, 0x80, 0x81, ETX	Save active switching status as macro 1.
STX, 0x54, ETX	Reset the switch and set the connections as a function of SW7 (see above).
STX, 0x67, 0x80, 0x81, ETX	Call macro 1: the console (Remote Unit) is re-connected to (Local Unit) CPU 3.

c) By the attached keyboard

By executing a ‘hot-key-sequence' the system is shifted into a command mode from where CPUs can be selected using the attached keyboard. Access to a switch in a second level (slave) is also possible. To show that the command mode is active, all three status LED on the keyboard flash rapidly. Press <ESC> to exit the command mode.

User commands

The input of letters does not differentiate between large and lower case.
<SHIFT> shifts between upper and lower case.

<Key1>+<Key2>+ ... means that all keys must be pressed at the same time
<Key1>, <Key2>, ... means that the keys must be pressed successively

The device is designed to work in up to two levels. With the call of the command mode, all following commands are sent to the master and/ or the only device. For further extensions, input the port number prefixed with “0”.

For fast switching within one level (master level / slave level) the direct selection of a port is possible by simultaneously pressing <SHIFT>+<Port-No> without <RETURN>.

Call of the command mode

- **<CTRL> + <SHIFT> + <I>**
  Enter the command mode(default-setting)

- **<CTRL> + <SHIFT> + <C>, <x>, <RETURN>**
  Change of the initialization-string for the command mode (with x = number of the initialization-string; delivery status = 1)

  1: <CTRL> + <SHIFT> + <I> simultaneous
  2: <Scroll lock>, <Scroll lock> press twice rapidly
  3: left <SHIFT>, left <SHIFT> press twice rapidly
  4: left <CTRL>, left <CTRL> press twice rapidly
  5: left <ALT>, left <ALT> press twice rapidly
  6: right <ALT>, right <ALT> press twice rapidly
  7: left <CTRL> + right <CTRL> simultaneous
  8: left <CTRL> + <SHIFT> + right <CTRL> + <SHIFT> simultaneous
  9: left <CTRL> + <ALT> + right <CTRL> simultaneous

- **<ESC>**
  Exit the command mode

Instructions within the command mode

Selection of the control level

- **<M> or <m>**
  The following commands are executed by the 'master' (default after call of the command mode)

- **<S> or <s>**
  The following commands are executed by the actively connected 'slave'

Direct selection of ports

- **<SHIFT> + <x>**
  Switch the selected device (through <M> or <S>) on port x (with x = number of the port) – Caution! Applies only to the selected level!

- **<x>, <RETURN>**

  or

- **<0>, <x>, <RETURN>**
  Switch the Remote Unit (console) to the Local Unit 0x (the port 0x) (with x = number of the port) – Caution! Applies only to the selected level!

- **<M>, <x>, <S>, <y>, <RETURN>**

  or

- **<M>, <0>, <x>, <S>, <0>, <y>, <RETURN>**
  (Only in cascaded applications!) Switch the master to port 0x and the attached slave on Port 0y (with x and y = number of the ports) - Caution! Afterwards the slave is the selected level!

Sequential selection of ports (depending on the selected control level)

- <→> (arrow key right)
  Switch the console to the next port. After reaching the last port, the first port will be selected.

- <←> (arrow key left)
  Switch the console to the previous port. After reaching the first port, the last port will be selected.

- <↑> (arrow key up)
  Switch the console (bypassing unoccupied ports) to the next port. After reaching the last port, the first port will be selected.

- <↓> (arrow key down)
  Switch the console (bypassing unoccupied ports) to the previous port. After reaching the first port, the last port will be selected.

- **<BACKSPACE>**
  Switch back to the last viewed channel. Use to switch rapidly between two channels.

where:

x	ASCII digits ‚1' to ‚3'
y	ASCII digits ‚1' to ‚3'

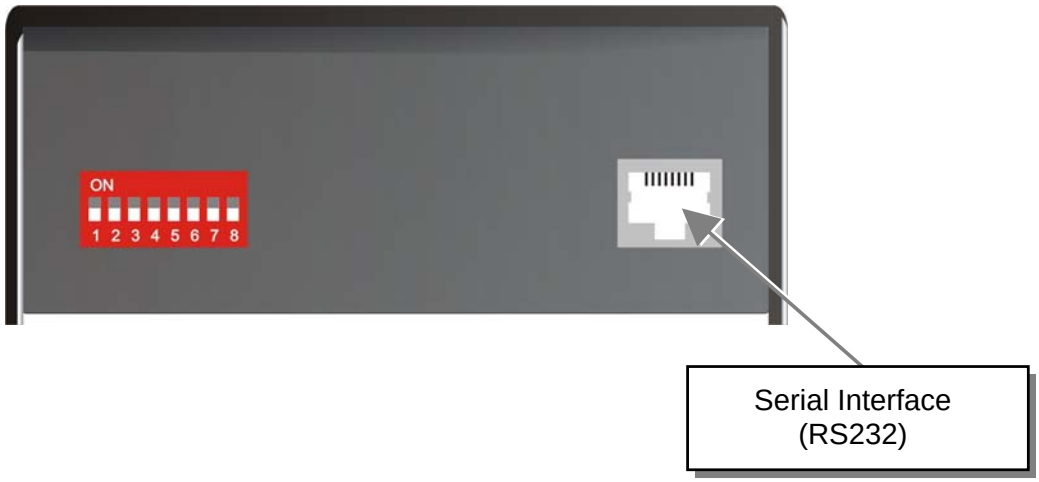
Examples:

<CTRL> + <SHIFT> + <I>	Call the command mode
<SHIFT> + <3>	Switch immediately to port 3 (after call the master is selected)
<M2S1> <RETURN>	Switch the master to port 2 and the slave to 1
<3>,<RETURN>	Switch the slave to port 3 (because the slave was selected in the command before)
<BACKSPACE>	Switch the slave back to port 1
<M>	Selection of the master level
<SHIFT> + <1>	Switch (the master) immediately to port 1
<BACKSPACE>	Switch the master back to port 2
<ESC>	Exit command mode

7.5 Systeminfo

System information can be read out over the serial interface in all four operating modes.

The location of the serial interface is shown below:



You can find the allocation of the serial interface under **Serial Interface** on page **116**. A standard cable RJ45 on DB9 to a CPU is included in delivery.

For communication, please set up the format of the serial data communication to:

115,2K,8,1,NO
(115,2 KBAUD, 8 Data bit, 1 Stop bit, NO parity)

Control command

Use the following command in any operating mode to transfer the system information:

- **STX, 0x40, 0x80, ETX** Acknowledgement of the system info

Available Information

The following information is transferred:

```
Date : Fri July 27 14:04:00 2007
File : acx4000.hex
```

7.6 Restore Factory Defaults

The device can be reset to its original factory default settings using a control sequence through the serial interface or by using a DIP-switch. Depending on the operating mode, the macro memory may also be reset.

Use DIP- switch 6 to reset the device. In the “Cross point Switch” operating mode, all macros in memory are reset.

	**Standard operating mode**
	**Reset** the ACX4000- Switch to default settings (Factory Reset): 1. switch power off 2. set the DIP switch 3. switch power on, the device is resetting 4. switch power off 5. set the DIP switch back 6. switch power on - done

Using the serial interface, execute this command to reset the device:

- **STX, 0x45, ETX** Reset to factory settings

In the “Cross point Switch” operating mode, all macros in memory are reset.

8. 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 32)? 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 32)? 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 32)? 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. 640x480 (NTSC) or 640x512 (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-Keyboard/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 45mcec 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 reacht 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 60mesec. 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 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.

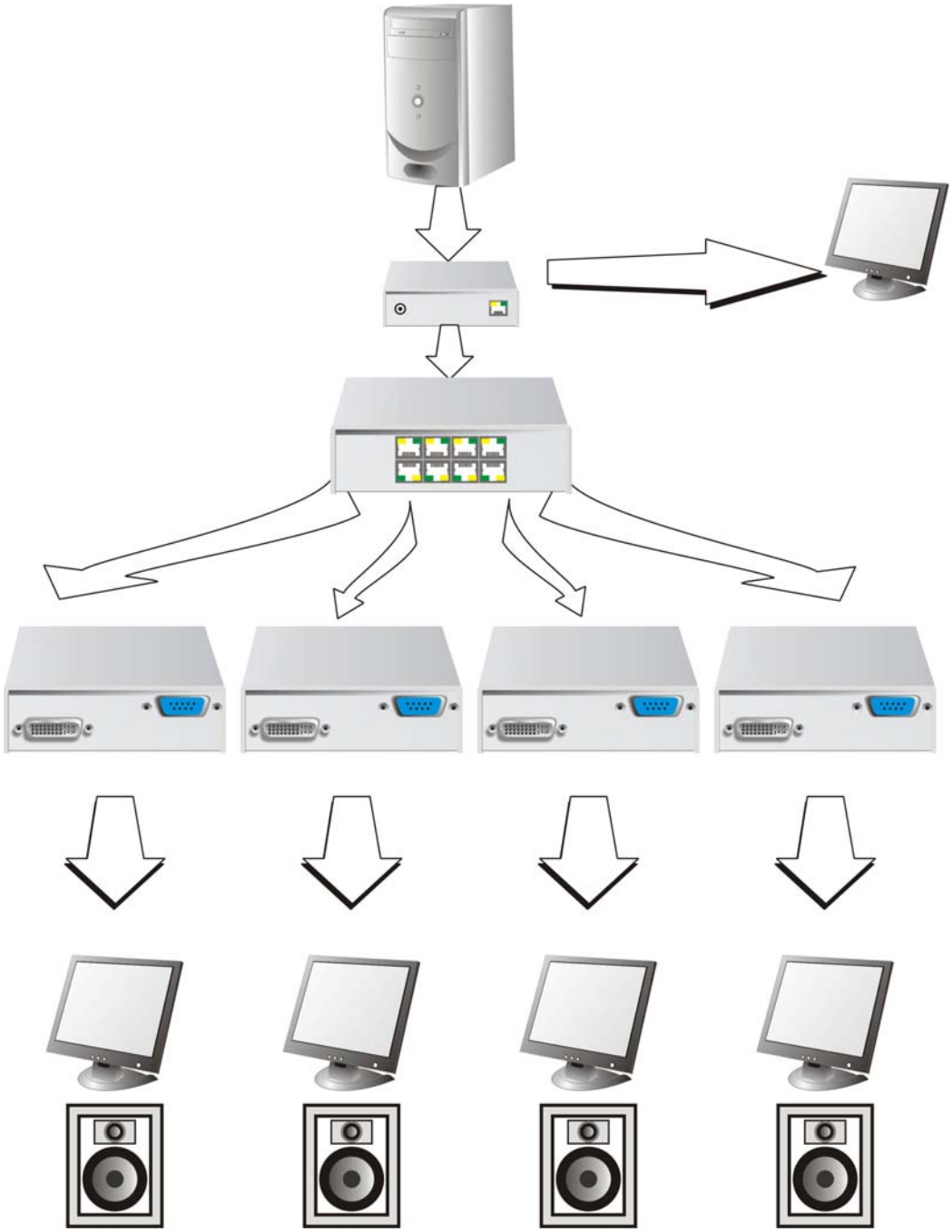
Other USB-devices

Your USB- device does not work

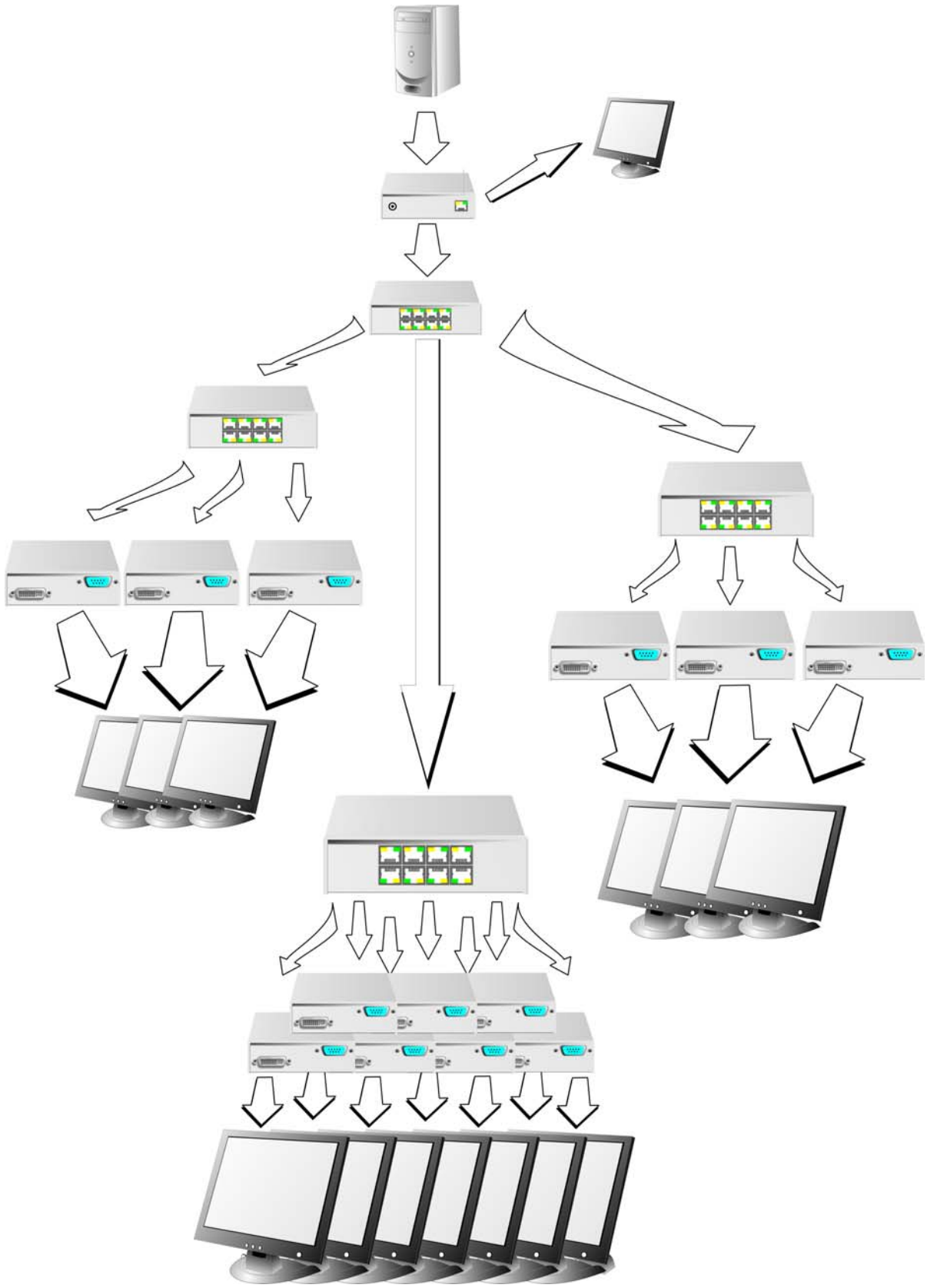
You have connected a non-HID device. There are supported HID devices only. All other devices are dismissed

Appendix A: Example Applications

This section illustrates some specific applications using the ACX4000-Minor:

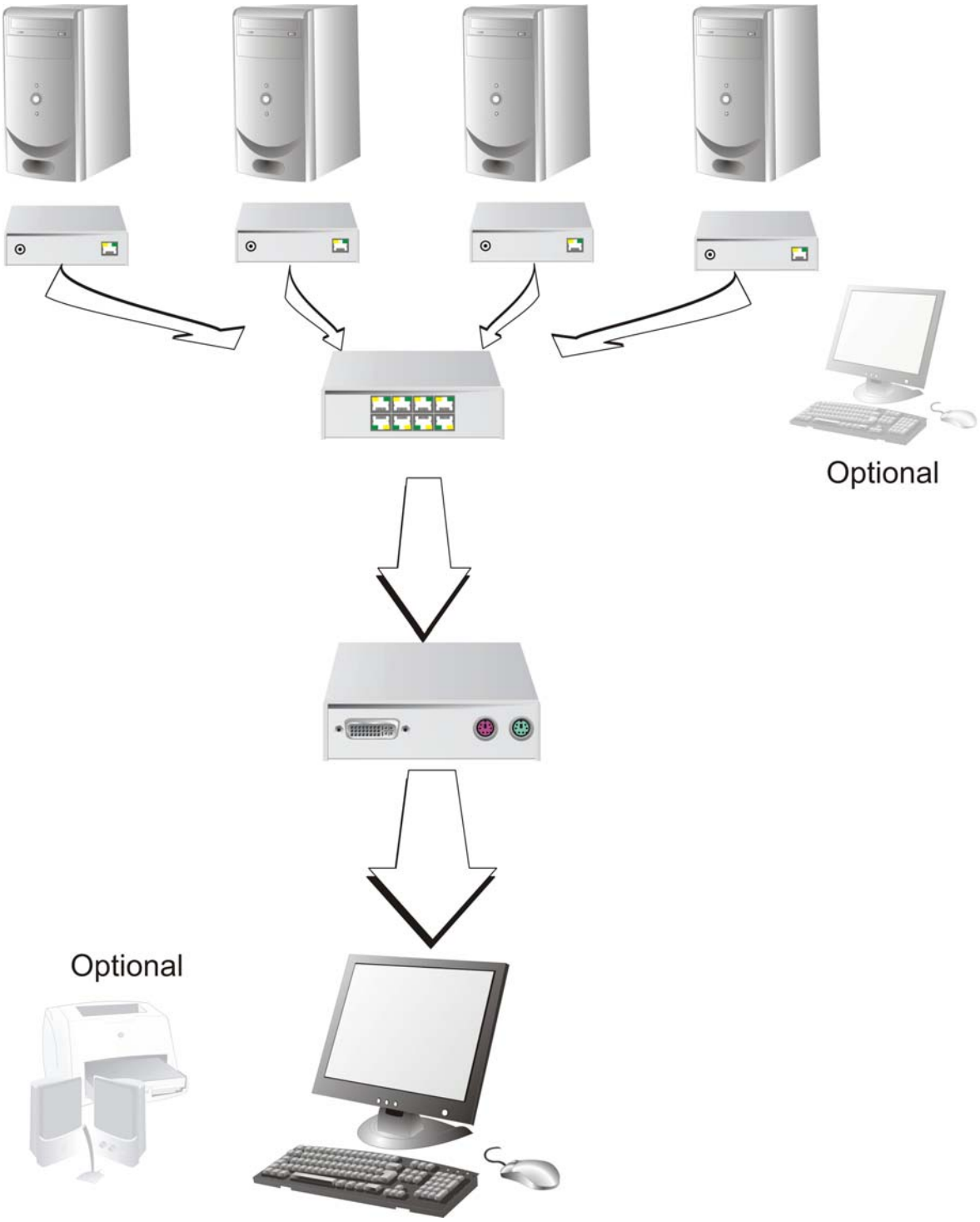


ACX4000 as Multiplex- Repeater with audio option

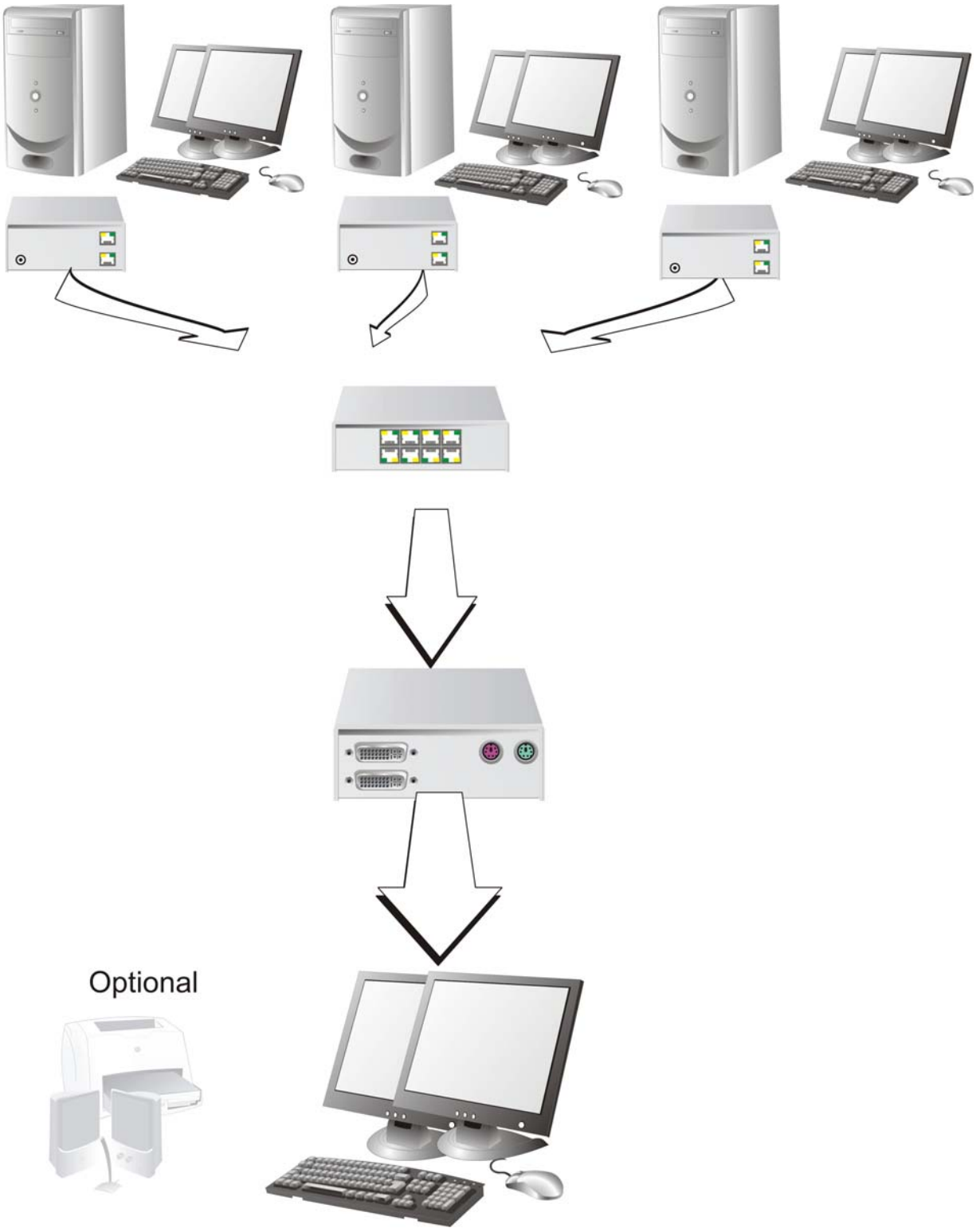


Three cascaded ACX4000 as Multiplex- Repeater and a total of 13 screens for presentations

ACX4000 as Cross point- Switch (here: 3x Input/ 4x Output)



ACX4000 as Single head KVM- Switch (to 7:1) optional with a local console and/ or serial/ audio option



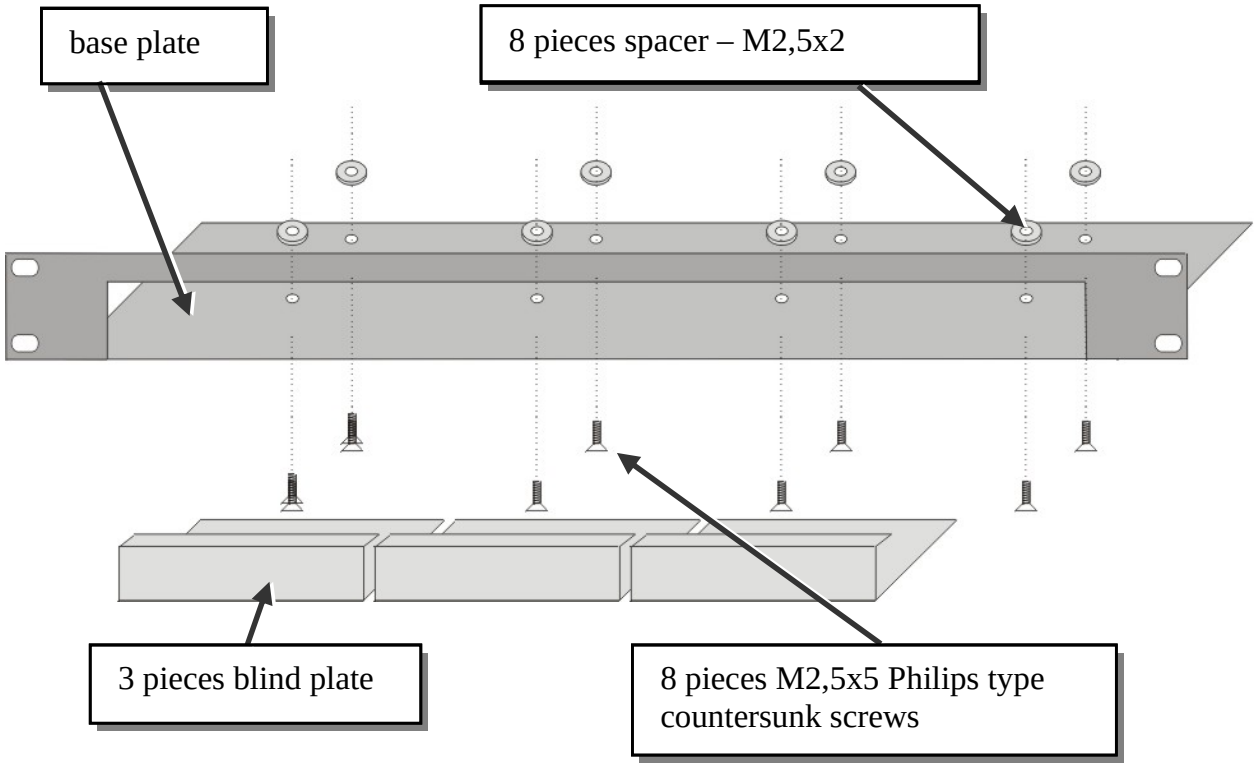
ACX4000 as Dual head KVM- Switch (to 3:1) with a local console

Appendix B: Rack Mount Options

Mounting Instruction Rack Mount Kit 455-4G

Using the rack mount kit 455-4G, 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 rack space. Blind plates (in the list of parts delivered) allow covering unused device positions.

Rack mount kit 455-4G – List of parts delivered:



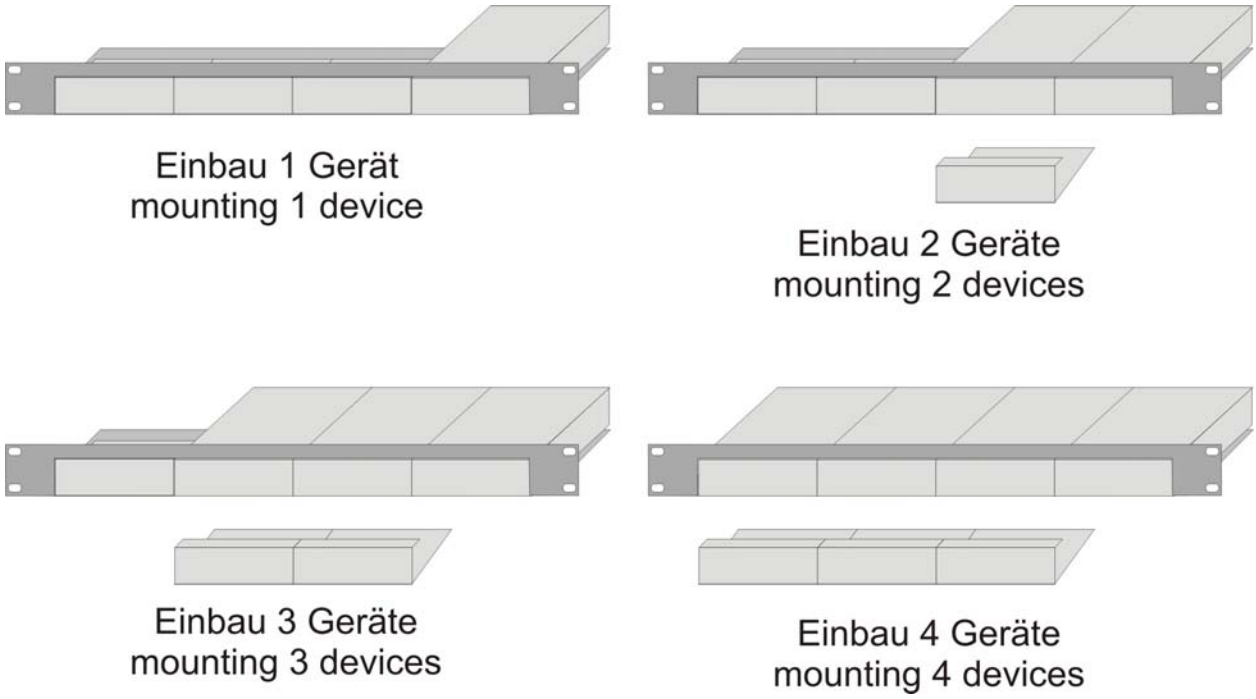
Mounting instruction:

- 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

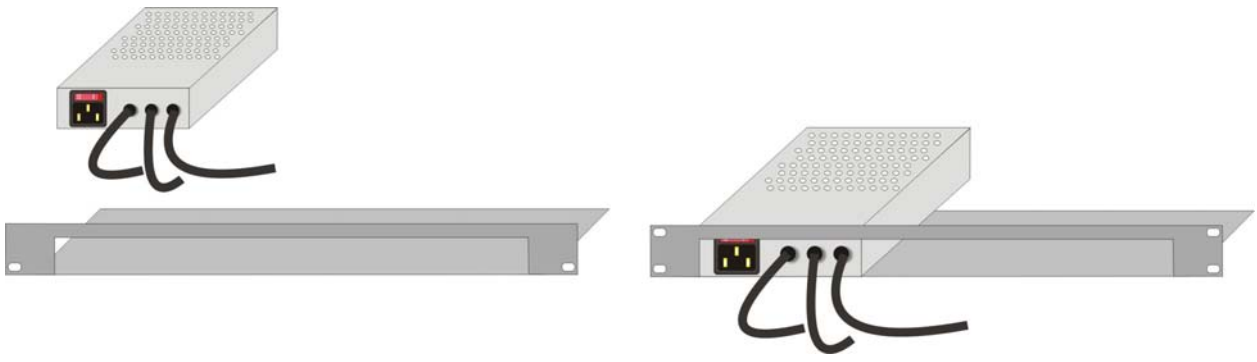
Only use the supplied, short screws, to prevent damages on the PCB’s

- Close the remaining gaps with blanking plates.

The rack mount kit 455-4G allows mounting of up to 4 devices:



In the lefthand position, you can mount a rack mountable p.s.u. type 455-PS instead of a regular device. This p.s.u. is capable of powering up to three devices.

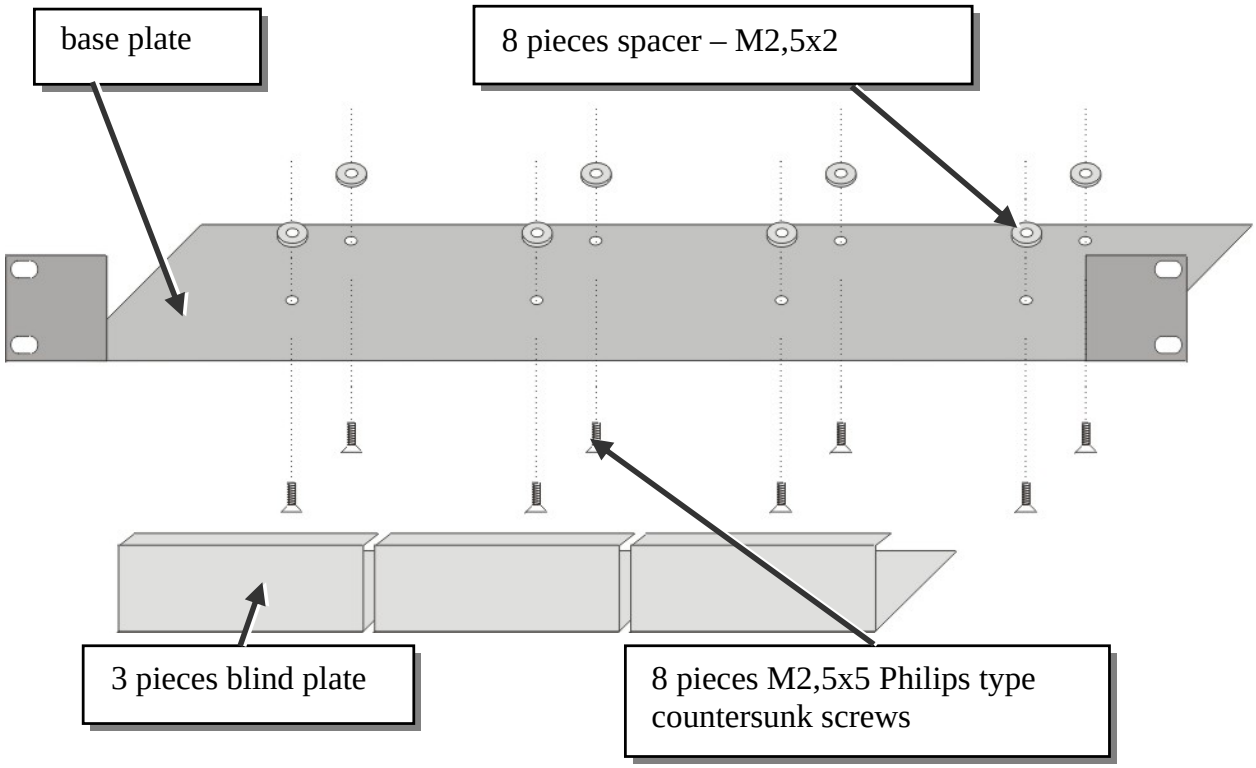


Please note:
- Use the rear mounting holes to fix the p.s.u.
- After mounting the p.s.u., the circuit break switch is no longer easily accessible – it is obstructed by the cover strip.

Mounting Instruction Rack Mount Kit 455-8G

Using the rack mount kit 455-8G, up to 4 devices of the device size 103x143x42mm (dual head devices) can be mounted into a 19“- server rack. The rack mount kit requires 1U rack space. Blind plates (in the list of parts delivered) allow covering unused device positions.

Rack mount kit 455-8G – List of parts delivered:



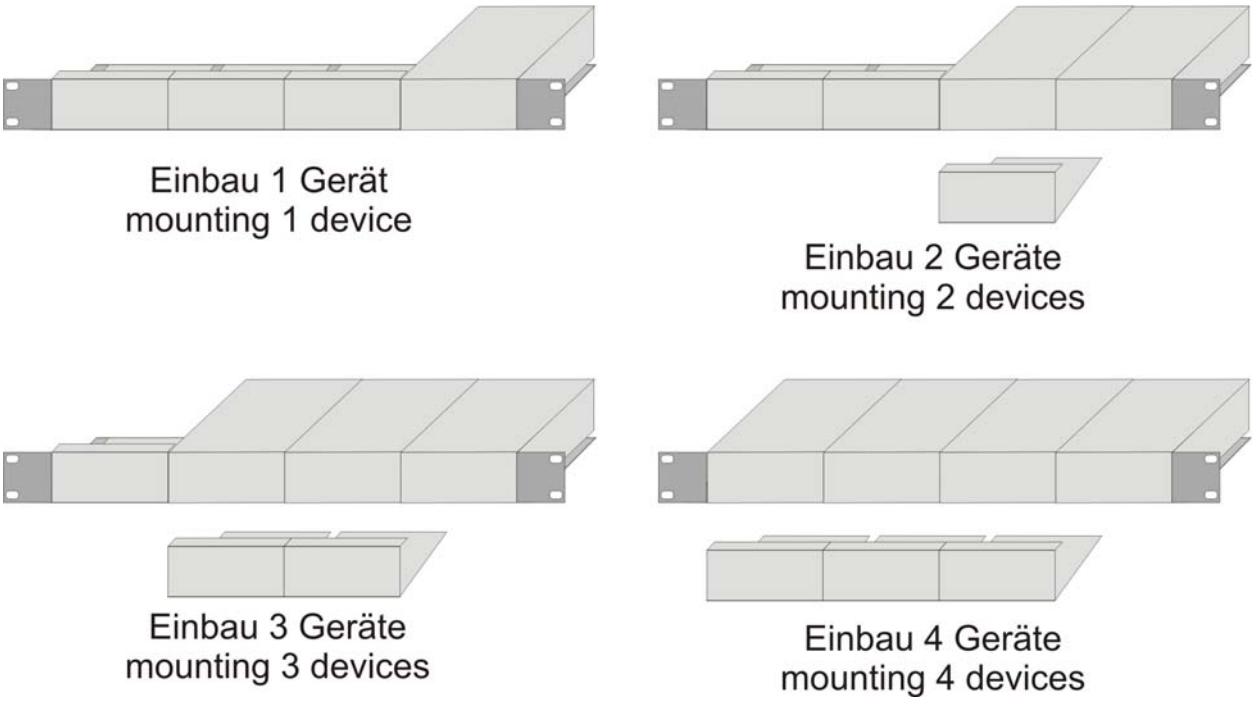
Mounting instruction:

- 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

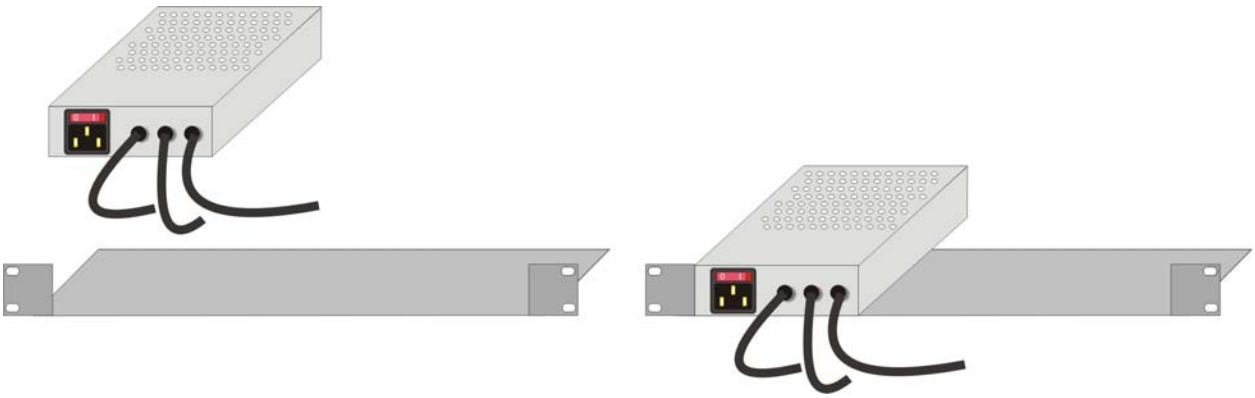
Only use the supplied short screws to prevent damage to the PCBs

- Close the remaining gaps with blanking plates.

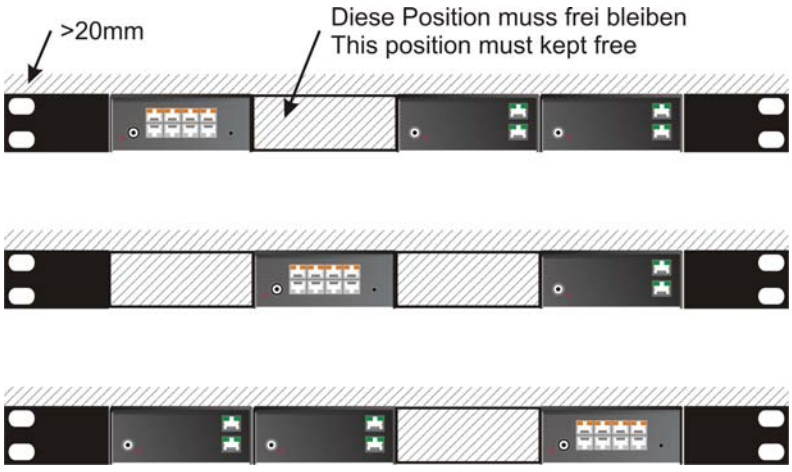
The rack mount kit 455-8G allows mounting of up to 4 devices:



In the lefthand position you can mount a rack mountable p.s.u. type 455-PS instead of a regular device. This p.s.u. is capable of powering up to three devices.



19“ rack mounting instruction ACX4000 Switch



Appendix C: Devices with serial/audio option

Single head KVM devices:

The Audio/Serial allows bi-directional stereo audio and a full-duplex serial data link to be sent across the regular interconnection cable in addition to keyboard, mouse and DVI video.

Dual head KVM devices and Media devices (no USB):

The Audio/Serial allows bi-directional stereo audio and a 3 wire (Tx/Rx - XON/XOFF) serial data link to be sent across the regular interconnection cable in addition to keyboard, mouse and DVI video.

To set up the extender's audio and serial link, please follow all of the instructions detailed in this appendix. If you have any questions, contact Technical Support.

Serial Interface - Set Up and Operation

No setting up or user adjustments are required. Please note that the serial link is always active.

Please bear in mind that the Remote Unit's serial port is wired as DTE (i.e. the same as that on a PC). To connect a serial printer (or other DTE rather than DCE device) to the Remote Unit, you will need a Null-Modem (crossover) cable between the Remote Unit and the printer.

A serial touch screen may be plugged directly into the Remote Unit.

Please note, that media- and Dual head KVM Extender support a 3-wire- connection only (Tx/Rx/GND). Attached devices must support software handshake (XON(XOFF).

Serial Interface - Handling Multiple Serial Devices (Single head KVM devices only!)

The extender's serial interface transmits/receives six signals (3 signals in each direction). Normally four of these signals are used for hardware handshaking (in addition to TX & RX). However, because each handshaking line can support signals up to 19,200 Baud it is possible to configure the serial interface to handle up to three simple 2-wire (Tx/Rx only) serial links. Select XON/XOFF software flow control on the remote device and PC.

To do this you will need to construct a custom breakout cable. Please contact technical support for further information.

Audio Interface - Set Up and Operation

The audio interface is line-level and is designed to take the output from a sound card (or other line-level) source and be connected to a set of powered speakers at the other end of the link. Stereo audio may be transmitted either way across the link (simultaneously). No set up is required unless a microphone is connected to the remote unit.

Connect up the extender as follows:

Take the line-level output from your sound card (green connector) and connect to ‘Line In’ on the extender.

A set of powered speakers may be connected directly to ‘Line Out’ at the opposite end of the link.

Audio Interface - Using a Microphone

A microphone may be plugged into the ‘Line In’ connector on the Remote Unit.

There are two ways of setting up a microphone:

- The Local Unit’s ‘Line Out’ connection should normally be wired to the microphone input (Red) on your sound card. The sound card should then be set up to provide additional amplification (+20dB). This is the preferred connection method.
- Alternatively, the Remote Unit itself can provide microphone amplification. To set this, open up the Remote Unit and locate the jumper labeled ‘MIC’ on the daughter board. Connect this jumper across the pins. The Local Unit’s ‘Line Out’ connection should then be wired to ‘Line In’ (Blue) on your sound card.

If your microphone is already amplified, follow the second method but DO NOT install the amplification jumper in the Remote Unit.

Appendix D: Protocol for command mode

For the control of the ACX4000 Switch device following parameters are used:

For communication please set up the format of the serial data communication to:

115,2K,8,1,NO
(115,2 KBAUD, 8 Data bit, 1 Stop bit, NO parity)

Structure of telegram

<STX>, <command byte (CMD)>, [data bytes (D0..DN)], <ETX>

[ ] = optional elements

Parameter description

Command byte in the range of 0x40...0x6F (see the list of allowed commands below)

Data Bytes **a) Binary data:** in order to prevent that, during the transmission of binary data, control statements or control commands are transferred, the data are divided into low-nibble and high-nibble. The data are distributed to the low-nibbles of two bytes and provided with an offset by 0x60 e.g. 0x1F => 0x61 + 0x6F
b) 7bit-data (0x0...0x7F) are provided with an offset by 0x80, e.g. 0000011 => 0x83
c) ASCII-data => 0x20… 0x7E are unencrypted transmitted

(Special-)Character

ACK	0x06
NAK	0x15
STX	0x02
ETX	0x03
CR	0x0D
ESC	0x1B

Sequence of data communication

ACX4000 Switch	Control-CPU
	Sending a command
Acquiring command Processing the command, Blocking further commands	
a) Errors occurred <NAK> b) No errors <ACK> c) Optional : reply-telegram with data	
	a) repeat telegram b) next command c) receive and process the replay-telegram

Telegrams, **global** functions

	Function	Telegram	Answer
1	Reset to factory settings	STX, 0x45, ETX	ACK
2	Software reset	STX, 0x54, ETX	ACK
3	Show version-string	STX, 0x40, 0x80, ETX	STX, 0x40, <ASCII-data version-string>, ETX

Switching functions

Glossary:

INPUT	= Input	= to a Local Unit	=CPU
OUTPUT	= Output	= to a Remote Unit	=WS
	(= Workstation	= KVM	= Console)

The INPUT- numbers are valid (depends on operating mode) in the range of 1..7
The OUTPUT- numbers are valid (depends on operating mode) in the range of 1..7
The INPUT- and OUTPUT- numbers are to encrypt in 7bit-data

Telegrams, switching functions

No	Function	Telegram	Answer
1	switch an INPUT to OUTPUT	STX, 0x47, < INPUT -No>, < OUTPUT -No>, ETX	ACK
2	switch off a single OUTPUT	STX, 0x48, < OUTPUT -No>, ETX	ACK
3	switch a single OUTPUT feedback channel to INPUT	STX, 0x4B, < INPUT -No>, < OUTPUT -No>, ETX	ACK
4	switch off a single OUTPUT feedback channel	STX, 0x4C, < INPUT -No>, ETX	ACK
5	switch single bi-directional INPUT – OUTPUT-connection	STX, 0x4F, < OUTPUT -No>, < INPUT -No>, ETX	ACK
6	switch off single bidirectional INPUT-OUTPUT-connection	STX, 0x50, < OUTPUT -No>, ETX	ACK
7	switch off all INPUT-OUTPUT-connections	STX, 0x52, ETX	ACK
8	save switching status to macro	STX, 0x66, 0x80, <1Byte, 7-Bit-Makro-No>, ETX	ACK
9	load switching status from macro	STX, 0x67, 0x80, <1Byte, 7-Bit-Makro-No>, ETX	ACK

Appendix E: Calling Technical Support

If you determine that your ACX4000 Switch is malfunctioning, ***do not attempt to alter or repair it***. It contains no user-serviceable parts. Please contact the 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 is printed on the bottom of the ACX4000 Switch (very important):

  Version Number Format:
  Board: ***xxLO/RE Myyy Pzzz Auuu Gvvvvvv***
  Transceiver: ***C/M/S xx Pyy Mzz***

- 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 ACX4000 Switch'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 ACX4000 Switch:

- 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.

APPENDIX E: CALLING TECHNICAL SUPPORT

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 F: List of supported USB devices

Although the USB connection's implementation allows all keyboards and mice, we can not guarantee that all available keyboards/mice are compatible with the ACX4000.

The implementation is constructed for "HID" devices. HID is a device class enabling inputs to a CPU. Touch screens, graphic tablets, fingerprint sensors are also HID devices.

Some devices install additional devices, e.g. to set parameters. Such devices are NOT supported by our extenders.

Please note: installing more than two devices is not possible even if you use a USB hub.

The following devices are tested and have been found correct:

Keyboards

-

Mice

-

Appendix G: Specifications

A ACX4000-Media/KVM Local/ Remote Unit

Power Supply

Voltage	90-240VAC-0.5A-47-63Hz/5VDC-2000 mA
Power required	Local Unit: max. 5V/750mA Remote Unit: max. 5V/750mA

Interface (depending on type of device)

Video source/Monitor	DVI up to 1920x1200@60Hz
Keyboard	USB (depending on model)
Mouse	USB (depending on model) 2-/3-button and wheel mouse
RJ45	1000 Mbit High-speed transmission. Wiring acc. EIA/TIA 568B Gigabit Ethernet

Audio Interface

Description	Bi-directional stereo audio link
Transmission Method	Digitized virtually CD quality audio (16-bit, 38.4KHz)
Signal Levels	Line-Level (5 Volts Pk-Pk maximum)
Input Impedance	47K
Local Unit Connectors	2 x 3.5mm stereo jack socket (Line In & Line Out)
Remote Unit Connectors	2 x 3.5mm stereo jack socket (Line/Mic In & Line Out)
Microphone Support	A microphone may be connected to the Remote Unit. Pullup resistor provides bias for condenser microphone. Option to set microphone amplification to +17dB.

Serial Interface

Serial Speed	Up to a maximum of 19,200 Baud
Serial Data Format	Format Independent
Flow Control	
Single head Devices	RTS, CTS, DTR, DSR are sent across link
Dual head Devices	NO flow control (XON/XOFF)

Maximum Length of Interconnection Cable

CATx installation cable AWG24 (solid cable)	140m (400ft)
CATx patch cable AWG26/8 (stranded cable)	70m (200ft)

Type of Interconnection Cable

CATx installation cable AWG24 (solid cable)	S/UTP (Cat5) cable acc. EIA/TIA 56A, TSB 36 or Digital STP 17-03170. Four pairs AWG 24. Wiring acc. EIA/TIA 568A (10BaseT).
CATx patch cable AWG26/8 (stranded cable)	S/UTP (Cat5) cable acc. EIA/TIA 56A, TSB 36 or Digital STP 17-03170. Four pairs AWG 26/8. Wiring acc. EIA/TIA 568A (10BaseT).

Size and Shipping Weight

ACX4000- Media or ACX4000- KVM Single head	103 x 143 x 29mm (4”x5.6”x1.1”) (2 devices) Weight Local/ Remote: 0,6kg (1.3lb) each
Shipping box	210x140x165mm (8.3”x5.5”x6.5”) Weight: 1,6 kg (3.5lb)
ACX4000- KVM Dual head or ACX4000- Media w/ Audio/serial	103 x 143 x 42mm (4”x5.6”x1.7”) (2 devices) Weight Local/ Remote: 0,6kg (1.3lb) each
Shipping box	460x250x120mm (18.1”x9,8”x4,7”) Weight: 1,6 kg (3.5lb)

Environmental

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

B ACX4000- Switch Unit

Power Supply

Voltage	90-240VAC-0.5A-47-63Hz/5VDC-2000 mA
Power required	2000mA

Interface

RJ45 (INTERCONNECT)	1000 Mbit High-speed transmission. Wiring acc. EIA/TIA 568B Gigabit Ethernet
RJ45 – Serial (remote switching):	115,2 KBAUD, 8 data bit, 1 stop bit, NO parity restricted Handshake (DSR)

Maximum Length of Interconnection Cable

CATx installation cable AWG24 (solid cable)	140m (400ft)
CATx patch cable AWG26/8 (stranded cable)	70m (200ft)

Type of Interconnection Cable

CATx installation cable AWG24 (solid cable)	S/UTP (Cat5) cable acc. EIA/TIA 56A, TSB 36 or Digital STP 17-03170. Four pairs AWG 24. Wiring acc. EIA/TIA 568A (10BaseT).
CATx patch cable AWG26/8 (stranded cable)	S/UTP (Cat5) cable acc. EIA/TIA 56A, TSB 36 or Digital STP 17-03170. Four pairs AWG 26/8. Wiring acc. EIA/TIA 568A (10BaseT).

Size and Shipping Weight

ACX4000 Switch	103 x 143 x 42mm (4”x5.6”x1.7”) Weight: 0,6kg (1.3lb)
Shipping box	460x250x120mm (18.1”x9,8”x4,7”) Weight: 1,6 kg (3.5lb)

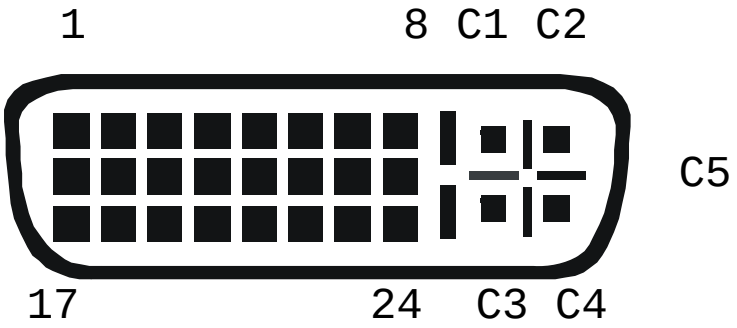
Environmental

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

Appendix H: Connectors

A ACX4000-Media Local/ Remote Unit

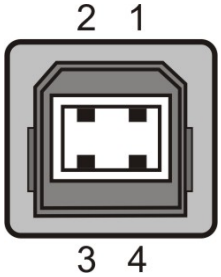
DVI-I connector



Pin	*Signal*	*Pin*	*Signal*	*Pin*	*Signal*
1	T.M.D.S data 2-	9	T.M.D.S data 1-	17	T.M.D.S data 0-
2	T.M.D.S data 2+	10	T.M.D.S data 1+	18	T.M.D.S data 0+
3	T.M.D.S data 2 GND	11	T.M.D.S data 1 GND	19	T.M.D.S data 0 GND
4	n.c.	12	n.c.	20	n.c.
5	n.c.	13	n.c.	21	n.c.
6	DDC Input (SCL)	14	+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 detect	24	T.M.D.S clock -
C1	Internal use.			C3	Internal use.
C2	n.c.	C5	GND	C4	Internal use.

Keyboard/ Mouse connector, USB type B

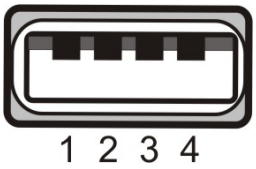
(Signal Output Local Unit)



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

Keyboard/ Mouse connector, USB type A

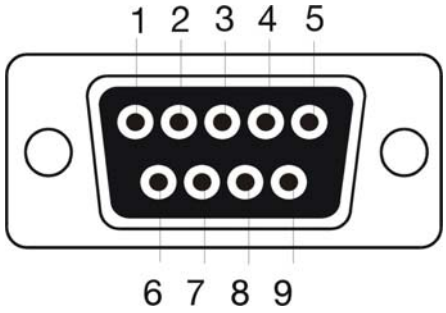
(Signal Output Remote Unit)



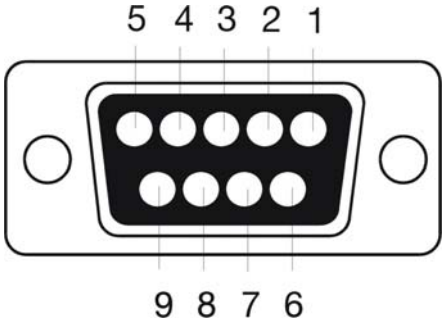
Pin	*Signal*	
1	VCC (+5V)	Red
2	Data -	White
3	Data +	Green
4	GND	Black

Serial Interface (Single head KVM devices only)

(audio-/ serial option)



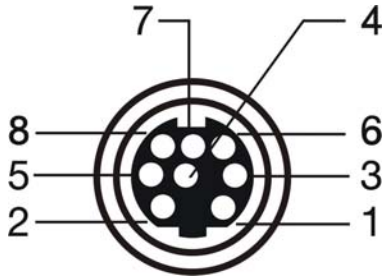
Connector (Remote Unit)



Connector (Local Unit)

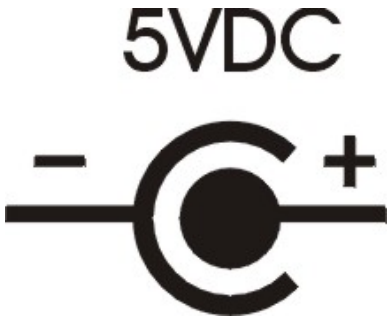
Pin	*Signal*	*Pin*	*Signal*
1	n.c.	1	n.c.
2	RxD	2	RxD
3	TxD	3	TxD
4	DTR	4	DTR
5	GND	5	GND
6	DSR	6	DSR
7	RTS	7	RTS
8	CTS	8	CTS
9	n.c	9	n.c

Audio/serial connector Audio/RS232 (Dual head and Media Local Unit only)



Pin	
1	AUDIO GND
2	RS232 GND
3	AUDIO OUT RIGHT CHANEL
4	AUDIO OUT LEFT CHANEL
5	RS232 RxD
6	AUDIO IN RIGHT CHANEL
7	AUDIO IN LEFT CHANEL
8	RS232 TxD

Power Supply

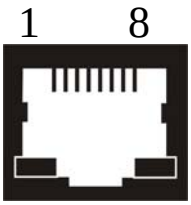


Pin	*Signal*
Inner	+5V
Outer	GND

B ACX4000- Switch Unit

Serial Interface

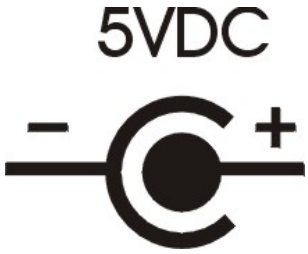
(switch socket) DCE



Pin		*Pin*	
1	+5V (Out)	5	TxD (Out)
2	n.c.	6	RxD (In)
3	DSR (In)	7	n.c.
4	GND	8	n.c.

C All ACX4000- Devices

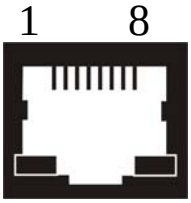
Power Supply



Pin	*Signal*
Inner	+5V
Outer	GND

CATx- Interfaces

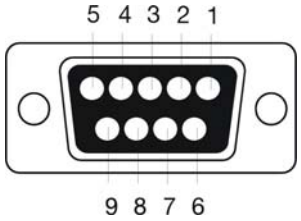
Wiring acc. EIA/TIA 568A (10BaseT)

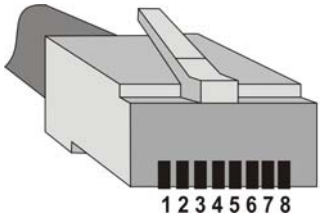


Pin		*Pin*	
1	D1+	5	D3-
2	D1-	6	D2-
3	D2+	7	D4+
4	D3+	8	D4-

Appendix I: Connection Cable

Serial cable to connect the external switchbox to CPU





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

Pin	*Signal*
1	+5V
2	n.c.
3	DSR
4	GND
5	TxD
6	RxD
7	n.c.
8	n.c.

NOTES