Welcome to the THOR Family!

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

The THOR Small 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 Crosspoint 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 THOR Small 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 THOR Extender technology for the transmission of DVI- Monitor and USB-Keyboard and Mouse signals over CATx- cable.

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

Wherever long distances cause problems for remotely locating and switching a monitor (keyboard/mouse) signal, e.g. airports, industrial plants, call centers or in distributed computer centers, the THOR Small 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 THOR Small 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:

8port THOR Small Switch devices:

TH-SSM-CAT	THOR-SSM,SWITCH,SMALL,ON,CATx
TH-SSM-MM	THOR-SSM,SWITCH,SMALL,ON,MULTIMODE
TH-SSM-SM	THOR-SSM,SWITCH,SMALL,ON,SINGLEMODE
TH-SSM	THOR-SSM,SWITCH,SMALL,FIBER,NO,GBIC
TH-SU	THOR-SU,SWITCHING,UNIT

THOR KVM/DVI extending devices:

TH-E-KIT-1-SL-4-CAT	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,CATx
TH-E-KIT-1-SL-4-CAT-A232	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,CATx,Anal.Audio,RS232
TH-E-KIT-1-SL-4-CAT-DA	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,CATx,Dig.Audio
TH-E-KIT-1-SL-4-MM	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,MM,Fiber
TH-E-KIT-1-SL-4-MM-A232	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,MM,Fiber,Anal.Audio,RS232
TH-E-KIT-1-SL-4-MM-DA	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,MM,Fiber,Dig.Audio
TH-E-KIT-1-SL-4-SM	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,SM,Fiber
TH-E-KIT-1-SL-4-SM-A232	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,SM,Fiber,Anal.Audio,RS232
TH-E-KIT-1-SL-4-SM-DA	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,SM,Fiber,Dig.Audio
TH-E-KIT-1-SL-2-CAT	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,CATx
TH-E-KIT-1-SL-2-CAT-A232	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,CATx,Anal.Audio,RS232
TH-E-KIT-1-SL-2-CAT-DA	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,CATx,Dig.Audio
TH-E-KIT-1-SL-2-CAT-V	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,CATx,VGA/IN
TH-E-KIT-1-SL-2-MM	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,MM,Fiber

TH-E-KIT-1-SL-2-MM-A232	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,MM,Fiber,Anal.Audio,RS232
TH-E-KIT-1-SL-2-MM-DA	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,MM,Fiber,Dig.Audio
TH-E-KIT-1-SL-2-MM-V	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,MM,Fiber,VGA/IN
TH-E-KIT-1-SL-2-SM	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,SM,Fiber
TH-E-KIT-1-SL-2-SM-A232	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,SM,Fiber,Anal.Audio,RS232
TH-E-KIT-1-SL-2-SM-DA	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,SM,Fiber,Dig.Audio
TH-E-KIT-1-SL-2-SM-V	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,SM,Fiber,VGA/IN
TH-E-KIT-1-SL-24-CAT	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,CATx
TH-E-KIT-1-SL-24-CAT-A232	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,CATx,Anal.RS232
TH-E-KIT-1-SL-24-CAT-DA	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,CATx,Dig.Audio
TH-E-KIT-1-SL-24-MM	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,MM,Fiber
TH-E-KIT-1-SL-24-MM-A232	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,MM,Fiber,Anal.Audio,RS232
TH-E-KIT-1-SL-24-MM-DA	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,MM,Fiber,Dig.Audio
TH-E-KIT-1-SL-24-SM	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,SM,Fiber
TH-E-KIT-1-SL-24-SM-A232	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,SM,Fiber,Anal.Audio,RS232
TH-E-KIT-1-SL-24-SM-DA	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,SM,Fiber,Dig.Audio
TH-E-KIT-2-SL-4-CAT	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,CATx
TH-E-KIT-2-SL-4-CAT-A232	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,CATx,Anal.Audio,RS232
TH-E-KIT-2-SL-4-CAT-DA	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,CATx,Dig.Audio
TH-E-KIT-2-SL-4-MM	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,MM,Fiber
TH-E-KIT-2-SL-4-MM-A232	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,MM,Fiber,Anal.Audio,RS232
TH-E-KIT-2-SL-4-MM-DA	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,MM,Fiber,Dig.Audio
TH-E-KIT-2-SL-4-SM	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,SM,Fiber
TH-E-KIT-2-SL-4-SM-A232	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,SM,Fiber,Anal.Audio,RS232
TH-E-KIT-2-SL-4-SM-DA	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,SM,Fiber,Dig.Audio
TH-E-KIT-2-SL-24-CAT	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,CATx
TH-E-KIT-2-SL-24-CAT-A232	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,CATx,Anal.Audio,RS232
TH-E-KIT-2-SL-24-CAT-DA	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,CATx,Dig.Audio
TH-E-KIT-2-SL-24-MM	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,MM,Fiber
TH-E-KIT-2-SL-24-MM-A232	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,MM,Fiber,Anal.Audio,RS232
TH-E-KIT-2-SL-24-MM-DA	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,MM,Fiber,Dig.Audio
TH-E-KIT-2-SL-24-SM	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,SM,Fiber
TH-E-KIT-2-SL-24-SM-A232	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,SM,Fiber,Anal.Audio,RS232
TH-E-KIT-2-SL-24-SM-DA	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,SM,Fiber,Dig.Audio
TH-E-KIT-4-SL-8-CAT	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,CATx
TH-E-KIT-4-SL-8-CAT-A232	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,CATx,Anal.Audio,RS232
TH-E-KIT-4-SL-8-CAT-DA	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,CATx,Dig.Audio
TH-E-KIT-4-SL-8-MM	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,MM,Fiber

THOR-SSM

TH-E-KIT-4-SL-8-MM-A232	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,MM,Fiber,Anal.Audio,RS232
TH-E-KIT-4-SL-8-MM-DA	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,MM,Fiber,Dig.Audio
TH-E-KIT-4-SL-8-SM	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,SM,Fiber
TH-E-KIT-4-SL-8-SM-A232	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,SM,Fiber,Anal.Audio,RS232
TH-E-KIT-4-SL-8-SM-DA	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,SM,Fiber,Dig.Audio
TH-E-KIT-4-SL-24-CAT	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,CATx
TH-E-KIT-4-SL-24-CAT-A232	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,CATx,Anal.Audio,RS232
TH-E-KIT-4-SL-24-CAT-DA	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,CATx,Dig.Audio
TH-E-KIT-4-SL-24-MM	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,MM,Fiber
TH-E-KIT-4-SL-24-MM-A232	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,MM,Fiber,Anal.Audio,RS232
TH-E-KIT-4-SL-24-MM-DA	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,MM,Fiber,Dig.Audio
TH-E-KIT-4-SL-24-SM	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,SM,Fiber
TH-E-KIT-4-SL-24-SM-A232	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,SM,Fiber,Anal.Audio,RS232
TH-E-KIT-4-SL-24-SM-DA	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,SM,Fiber,Dig.Audio

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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.

EC DECLARATION OF CONFORMITY

The products listed in this manual in the form as delivered are in conformity with the provisions of the following European Directives:

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

CE-marking 2009 CE

List on page 2 and 3

Conformity to the Directives is assured through the application of the following standards:

EN 55022:	09/2006	Class A
IEC 61000-4-2:	02/2001	
IEC 61000-4-3:	05/2006	
IEC 61000-4-4:	12/2004	
IEC 61000-4-5:	11/2006	

This declaration certifies the conformity to the specified directives but contains no assurance of properties. The safety documentation noted in this manual shall be considered in detail. The length of the attached CPU- or Console Cables must not exceed 3m. The use of suggested interconnect cables is mandatory.

WARNING: This equipment has been found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at 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 fiber devices.
- Only use in dry, indoor environments.
- If the building has 3-phase AC power, try to ensure that equipment connected to the Local and Remote Units is on the same phase.
- Try not to route a CATx- link cable alongside power cables.
- The THOR Small 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.**

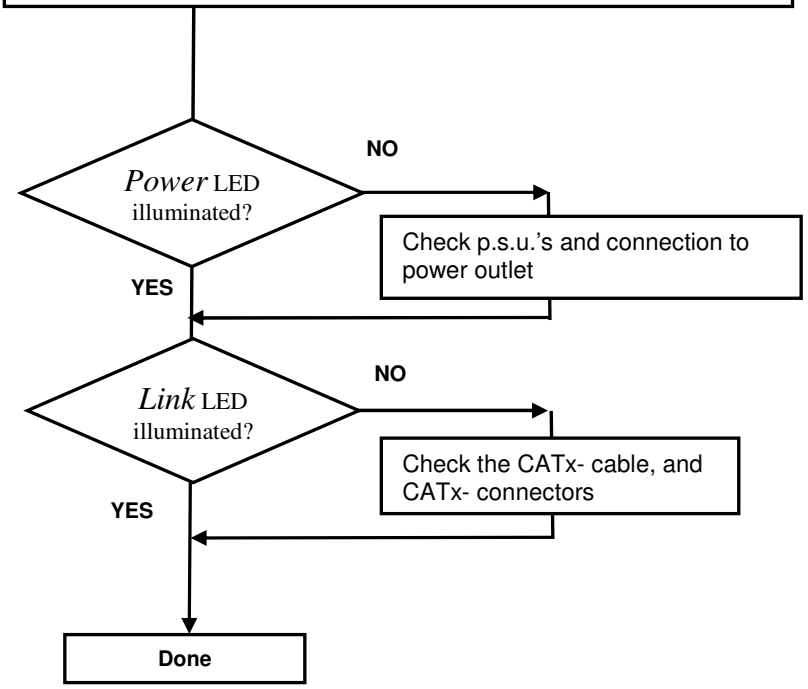
Contents

1. Quick Setup

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

Installation of the system

1. Mark the THOR Small Switch with the help of the provided stickers according to your application
2. Set the DIP-switch according to your application
3. Connect THOR Small Switch to Local unit with CATx- cable(s).
4. Connect THOR Small Switch to Remote unit with CATx- cable(s).
5. Connect the devices to the power supplies.
6. Power up the system.



2. Overview

2.1 Introduction

The THOR Small 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 Crosspoint 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 switches (a "Single-head" extender system supports 1x monitor, 1x keyboard, 1x mouse) or up to 3 Dual-head switches (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 consists of a THOR Small Switch and one or more Local/Remote Units. Optionally, THOR Small Switches can be cascaded in a maximum of two stages (master/slave). The THOR Small Switch and the Local/ Remote Units are attached by CATx cables.

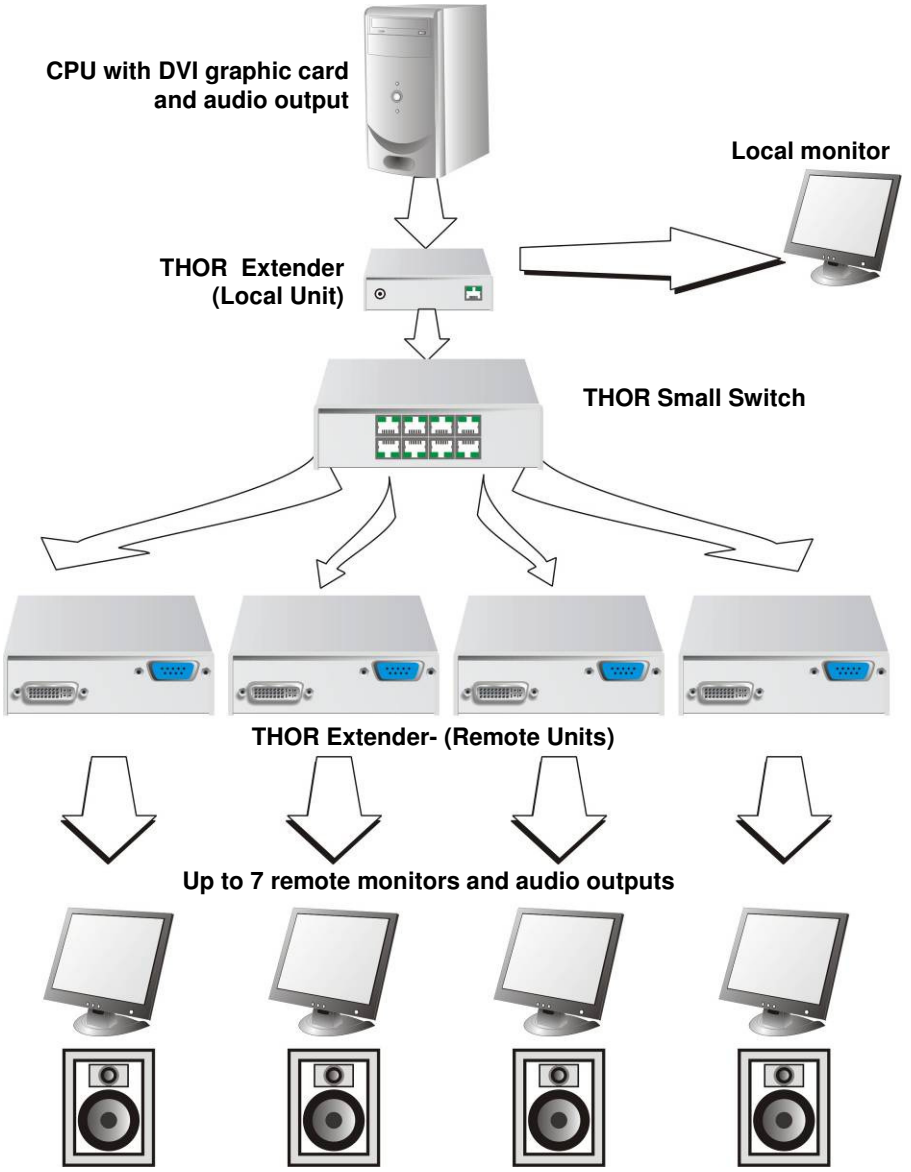
The operation of a THOR Small Switch always requires (at least) one Local Unit of a THOR Extender and up to seven Remote Units of THOR Extenders.

2.2 Glossary

The following terms are used in this guide:

CATx	Any Category 5, 5e, 6 or higher cable, solid wires type AWG24. Although flexible AWG27/7 cables can be used too, the lengths of flexible cables count twice in the calculation of the total distance. We recommend following Belden cables to be used with our product for the best performance: **Category 5e:** ➢ Belden 1583A for Non Plenum ➢ Belden 1585A for Plenum **Category 6:** ➢ Belden 2412 for Non Plenum Belden 2413 for Plenum
Fiber	Singlemode or Multimode fiber cable.
Multimode	50µ/62,5µ Multimode fiber cable.
Singlemode	9µ Singlemode fiber cable.
KVM	Keyboard, Video and Mouse.
Console	Keyboard, Mouse and Monitor
Dual Access	A system allowing connection of Local and Remote User Consoles.
Single-head	An extender system that supports one Monitor + Keyboard/ Mouse
Dual-head	An extender system that supports two Monitors + Keyboard/ Mouse
DVI	Digital Video standard, installed by ***Digital Display Working Group*** (***www.ddwg.org***) R, G, B, CLOCK in a data stream with up to 3x1,6 Gbit/sec. Signals are TMDS Level.
PSU	The desktop power supply connected to the THOR Small 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 THOR Small Switch System



Example application for a THOR Small Switch System
(Multiplex-Repeater or Crosspoint-Switch)

2.4 Features

All members of the THOR Small Switch Series offer the following features:

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

THOR 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 THOR KVM is NOT suitable for use with other USB- devices such as scanners, web- cams, data sticks etc.

THOR 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 cable from a Local Unit to a THOR Small Switch, between two THOR Small Switches or from a THOR Small Switch to a Remote Unit).
  - 140m (400ft) with CATx- cable
  - 200m with Multimode 62.5µm
  - 400m with Multimode 50µm
  - 10,000m with Singlemode 9µm
- Maximum Resolution (DVI):
  - 1920x1200@60Hz
- Supports:
  - 16 Bit/24 Bit auto switching or fixed 24 Bit color depth (user selectable)
  - Optional bidirectional serial/audio support
- Status indicator LEDs for *Power* and *Link* on each device.
- Small footprint chassis.
- Rack mount options available.
- International power supplies included.
- Optional support for audio (serial/RS232).

2.5 Product Range

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

THOR Switch and accessories	
TH-SSM-CAT	THOR Small Switch for CATx
TH-SSM-MM	THOR Small Switch for MultiMode
TH-SSM-SM	THOR Small Switch for SingleMode
TH-SU	THOR Switching Unit
TH-SSM	THOR Small Switch for fiber (w/o GBIC)
SFP-MM	MultiMode GBIC for TH-SSM
SFP-SM	SingleMode GBIC for TH-SSM
Media-Extender Kits - CATx	
TH-E-KIT-1-SL-4-CAT	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,CATx
TH-E-KIT-1-SL-4-CAT-A232	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,CATx,Anal.Audio,RS232
TH-E-KIT-1-SL-4-CAT-DA	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,CATx,Dig.Audio
TH-E-KIT-1-SL-2-CAT	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,CATx
TH-E-KIT-1-SL-2-CAT-A232	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,CATx,Anal.Audio,RS232
TH-E-KIT-1-SL-2-CAT-DA	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,CATx,Dig.Audio
TH-E-KIT-1-SL-2-CAT-V	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,CATx,VGA/IN
TH-E-KIT-1-SL-24-CAT	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,CATx
TH-E-KIT-1-SL-24-CAT-A232	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,CATx,Anal.RS232
TH-E-KIT-1-SL-24-CAT-DA	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,CATx,Dig.Audio
TH-E-KIT-2-SL-4-CAT	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,CATx
TH-E-KIT-2-SL-4-CAT-A232	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,CATx,Anal.Audio,RS232
TH-E-KIT-2-SL-4-CAT-DA	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,CATx,Dig.Audio
TH-E-KIT-2-SL-24-CAT	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,CATx

TH-E-KIT-2-SL-24-CAT-A232	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,CATx,Anal.Audio,RS232
TH-E-KIT-2-SL-24-CAT-DA	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,CATx,Dig.Audio
TH-E-KIT-4-SL-8-CAT	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,CATx
TH-E-KIT-4-SL-8-CAT-A232	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,CATx,Anal.Audio,RS232
TH-E-KIT-4-SL-8-CAT-DA	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,CATx,Dig.Audio
TH-E-KIT-4-SL-24-CAT	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,CATx
TH-E-KIT-4-SL-24-CAT-A232	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,CATx,Anal.Audio,RS232
TH-E-KIT-4-SL-24-CAT-DA	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,CATx,Dig.Audio

Media-Extender Kits – Fiber MutiMode

TH-E-KIT-1-SL-4-MM	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,MM,Fiber
TH-E-KIT-1-SL-4-MM-A232	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,MM,Fiber,Anal.Audio,RS232
TH-E-KIT-1-SL-4-MM-DA	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,MM,Fiber,Dig.Audio
TH-E-KIT-1-SL-2-MM	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,MM,Fiber
TH-E-KIT-1-SL-2-MM-A232	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,MM,Fiber,Anal.Audio,RS232
TH-E-KIT-1-SL-2-MM-DA	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,MM,Fiber,Dig.Audio
TH-E-KIT-1-SL-2-MM-V	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,MM,Fiber,VGA/IN
TH-E-KIT-1-SL-24-MM	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,MM,Fiber
TH-E-KIT-1-SL-24-MM-A232	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,MM,Fiber, Anal.Audio,RS232
TH-E-KIT-1-SL-24-MM-DA	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,MM,Fiber, Dig.Audio
TH-E-KIT-2-SL-4-MM	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,MM,Fiber
TH-E-KIT-2-SL-4-MM-A232	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,MM,Fiber,Anal.Audio,RS232
TH-E-KIT-2-SL-4-MM-DA	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,MM,Fiber,Dig.Audio
TH-E-KIT-2-SL-24-MM	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,MM,Fiber
TH-E-KIT-2-SL-24-MM-A232	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,MM,Fiber, Anal.Audio,RS232
TH-E-KIT-2-SL-24-MM-DA	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,MM,Fiber,

	Dig.Audio
TH-E-KIT-4-SL-8-MM	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,MM,Fiber
TH-E-KIT-4-SL-8-MM-A232	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,MM,Fiber,Anal.Audio,RS232
TH-E-KIT-4-SL-8-MM-DA	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,MM,Fiber,Dig.Audio
TH-E-KIT-4-SL-24-MM	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,MM,Fiber
TH-E-KIT-4-SL-24-MM-A232	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,MM,Fiber, Anal.Audio,RS232
TH-E-KIT-4-SL-24-MM-DA	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,MM,Fiber, Dig.Audio

Media-Extender Kits – Fiber SingleMode

TH-E-KIT-1-SL-4-SM	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,SM,Fiber
TH-E-KIT-1-SL-4-SM-A232	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,SM,Fiber,Anal.Audio,RS232
TH-E-KIT-1-SL-4-SM-DA	THOR,E,EXTENDER,KIT,1Mon,SL,4xHID,SM,Fiber,Dig.Audio
TH-E-KIT-1-SL-2-SM	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,SM,Fiber
TH-E-KIT-1-SL-2-SM-A232	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,SM,Fiber,Anal.Audio,RS232
TH-E-KIT-1-SL-2-SM-DA	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,SM,Fiber,Dig.Audio
TH-E-KIT-1-SL-2-SM-V	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,SM,Fiber,VGA/IN
TH-E-KIT-1-SL-24-SM	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,SM,Fiber
TH-E-KIT-1-SL-24-SM-A232	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,SM,Fiber,Anal.Audio,RS232
TH-E-KIT-1-SL-24-SM-DA	THOR,E,EXTENDER,KIT,1Mon,SL,2xHID,4xUSB2,SM,Fiber,Dig.Audio
TH-E-KIT-2-SL-4-SM	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,SM,Fiber
TH-E-KIT-2-SL-4-SM-A232	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,SM,Fiber,Anal.Audio,RS232
TH-E-KIT-2-SL-4-SM-DA	THOR,E,EXTENDER,KIT,2Mon,SL,4xHID,SM,Fiber,Dig.Audio
TH-E-KIT-2-SL-24-SM	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,SM,Fiber
TH-E-KIT-2-SL-24-SM-A232	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,SM,Fiber,Anal.Audio,RS232
TH-E-KIT-2-SL-24-SM-DA	THOR,E,EXTENDER,KIT,2Mon,SL,2xHID,4xUSB2,SM,Fiber,Dig.Audio
TH-E-KIT-4-SL-8-SM	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,SM,Fiber

TH-E-KIT-4-SL-8-SM-A232	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,SM,Fiber,Anal.Audio,RS232
TH-E-KIT-4-SL-8-SM-DA	THOR,E,EXTENDER,KIT,4Mon,SL,8xHID,SM,Fiber,Dig.Audio
TH-E-KIT-4-SL-24-SM	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,SM,Fiber
TH-E-KIT-4-SL-24-SM-A232	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,SM,Fiber,Anal.Audio,RS232
TH-E-KIT-4-SL-24-SM-DA	THOR,E,EXTENDER,KIT,4Mon,SL,2xHID,4xUSB2,SM,Fiber,Dig.Audio

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 scroll-wheel mice.

The THOR KVM devices with USB connectors supports 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 THOR KVM is NOT suitable for use with other USB- devices such as scanners, web- cams, data sticks etc.

The THOR KVM supports 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.

- **Fiber / CATx devices:** It is possible, to equip a THOR fiber device with fiber and CATx GBIC's. So it is possible to switch both topologies within a single device.

It is NOT possible to connect devices from different topologies (CATx and fiber) and run them together. Even though the signals are routed through – the data format is incompatible.

2.7 How to Use This Guide

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

Connection & Compatibility

The individual THOR Small Switch components consist of:

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

Please see also **Package Contents** (Page 25).

For information about connection and installation, see page 28.

DDC Information

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

To modify the DDC-Setup, see **DDC / color depth** (page 62).

Selecting the moment of switching to the next frame

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

Selection of Color reduction for transfer speed

You can select whether 24 Bit colors (=full color depth) are always transmitted or whether the compression algorithm automatically switches between 16 and 24 Bit colors to accelerate the data transfer (default). Normally the difference between 24 Bit and 16 Bit is not recognizable but under some special circumstances e.g. in photo processing installations there might be disturbing color aberrations. However, the automatic color switching enhances the count of frames transmitted per second; fixed 24 Bit color depth gives smooth color grades under all circumstances. Please select the best mode for you. To modify the color depth, see **DDC/ color depth** (page 62).

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 THOR System more conveniently.

3.1 Package Contents

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

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

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

- THOR KVM/ Media Local Unit
- 1x 5V DC universal power supply for the THOR KVM/ Media Local Unit
- 1x 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 THOR KVM devices:

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

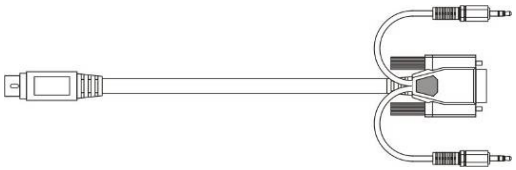
Additionally with the THOR Media/ KVM devices +audio:

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

- 2 audio cables 1.8m

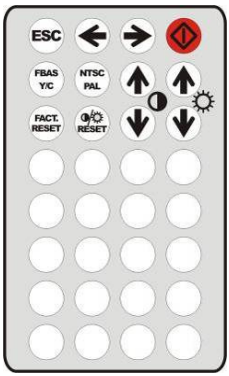
Additionally with THOR KVM Dual-Head and Media devices with Audio:

- 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



Additionally with the THOR KVM DVI-I Devices:

- Infrared Remote Control (IR-RC)



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

- THOR KVM/ Media Remote Unit
- 1x 5V DC universal power supply for the THOR KVM/ Media Remote Unit
- 1x power cord

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

3.2 Cable Connection Requirements

To connect the THOR 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.).

To connect the THOR KVM 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 THOR 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.

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, and 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.

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

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

- Recommended cables:

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

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

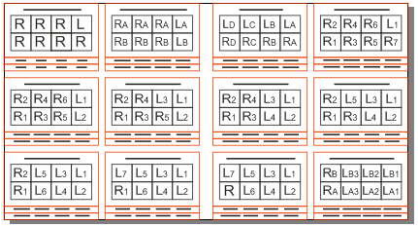
Our experiences show that Singlemode devices regularly work well on Multimode Fibers where vice versa it will never do. In addition, we found that Singlemode devices on Multimode fibers may extend the allowed distance on Multimode fibers to twice the regular length. Anyway this cannot be guaranteed and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

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

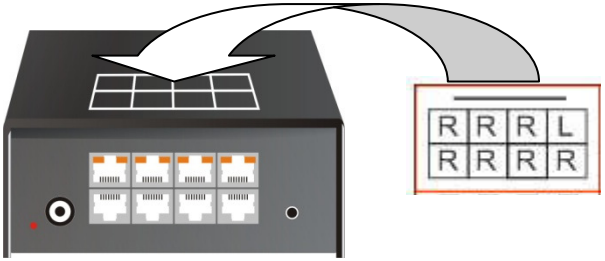
3.3 System Setup

To install your THOR Small Switch system:

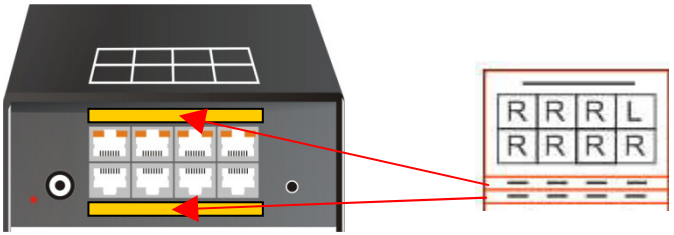
1. Switch off all devices.
2. Connect your keyboard, monitor(s) and mouse to the Remote Unit (depending on device type).
3. Connect the CPU/signal source to the Local Unit using the supplied cable(s).
4. Connect the devices with INTERCONNECT cables (fiber or CATx)
5. Take the THOR Small Switch out of the packaging and also the sheet with the product stickers.



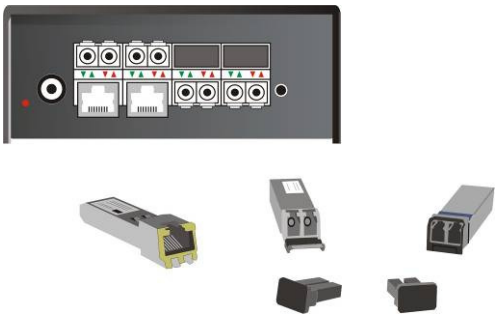
6. According to your application, peel the corresponding sticker from the sheet and stick it on the top panel:



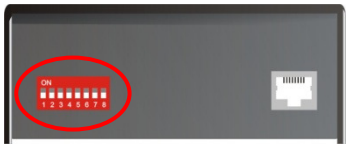
7. Use the associated stickers to label the interface ports:



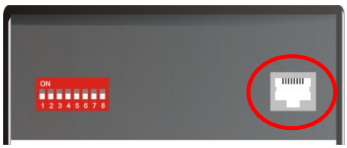
8. **Type TH-SSM only**: Please plug the SFP's into the free cage positions. Keep in mind your desired configuration when equipping the SFP's.



9. 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**



10. Attach the connection cables (CATx- cable) between the THOR Small Switch and Local Unit and between the THOR Small Switch and Remote Unit. Use the provided crossover CATx- cable or insert the provided crossover cable with the provided CATx- coupler before/after your CATx- wiring.
11. 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 **81**, **88, and 98.**



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

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

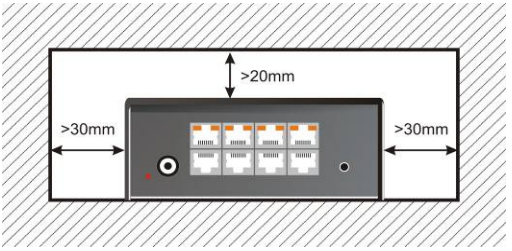
13. For a dual access system, connect the monitor for the local console to the appropriate port on the Local Unit. The port may also be used to feed into a KVM switch.

    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.

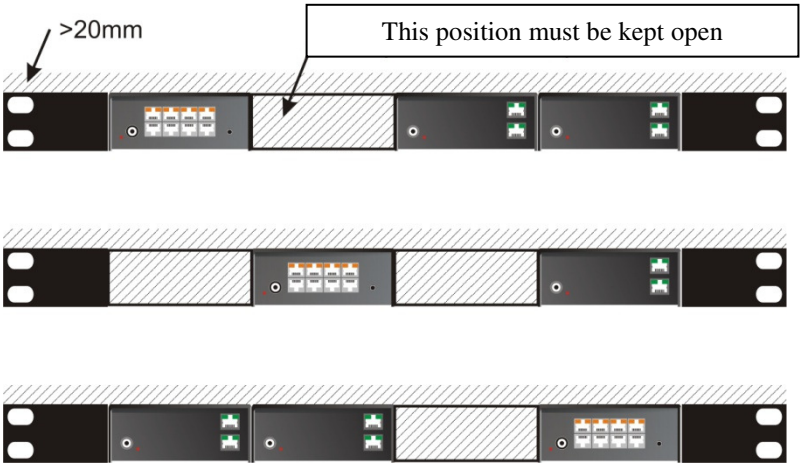
14. Power up the system.

3.4 Installation Instructions

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



In 19" rack cabinets: the area to the right and left from the THOR Small Switch must be kept free!



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

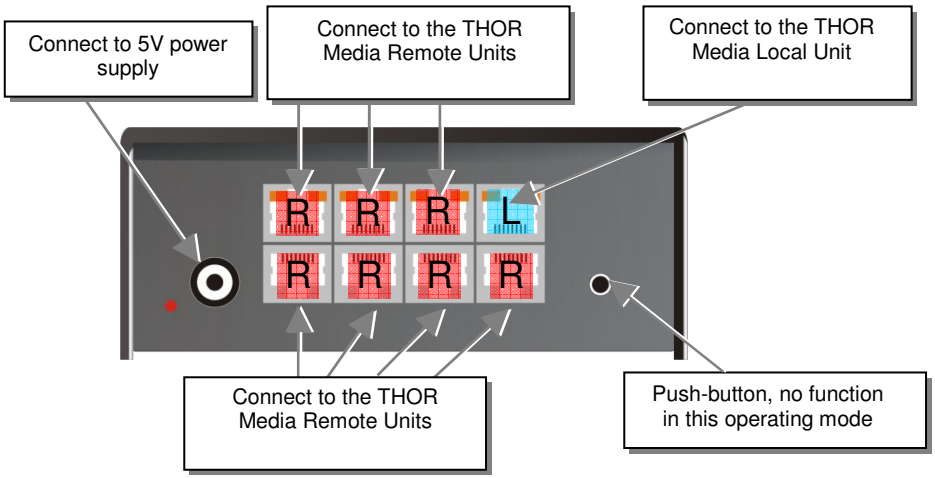
Never place the power supplies on top of the devices.

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

4. Device Views

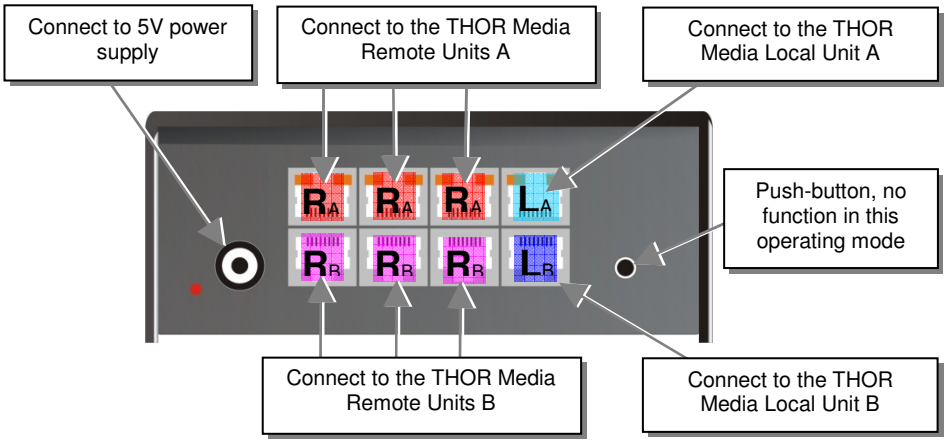
4.1 THOR Small Switch for CATx

Configuration 'Multiplex-Repeater' – 1 Source up to 7 Displays



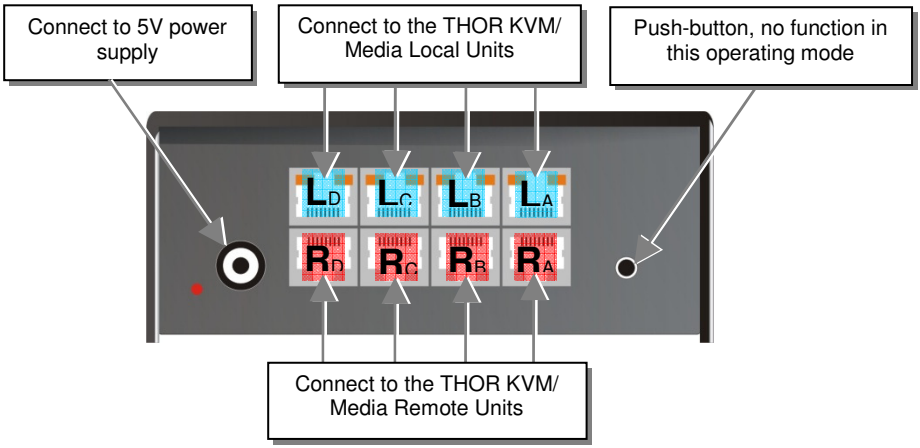
THOR Small Switch – as 1-to-7 Multiplex-Repeater

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



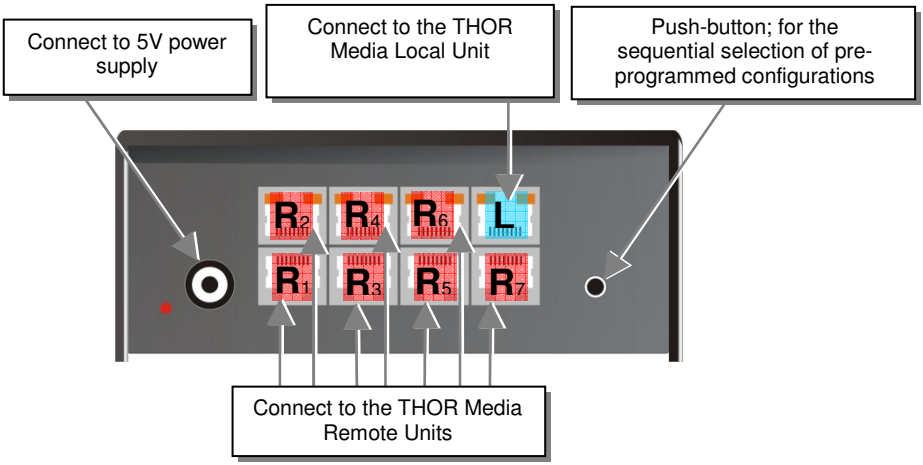
THOR Small Switch – as 2x 2-to-3 Multiplex-Repeater

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



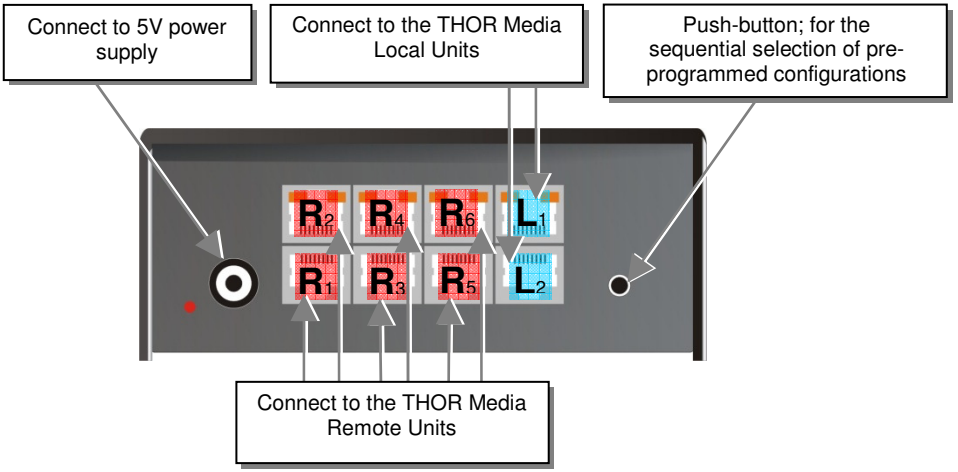
THOR Small Switch – as 4x 1-to-4 Multiplex- Repeater

Configuration 'Crosspoint-Switch' 1 Input / 7 Outputs



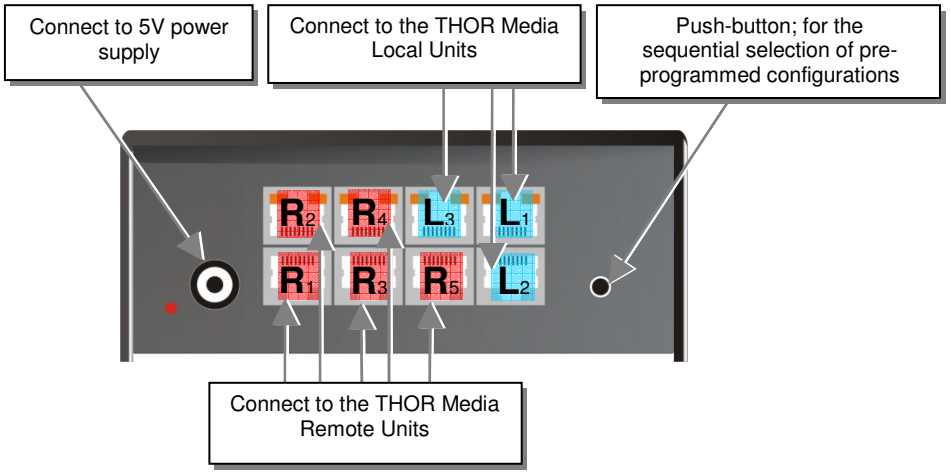
THOR Small Switch – as Crosspoint-Switch 1x7

Configuration 'Crosspoint-Switch' 2 Inputs / 6 Outputs



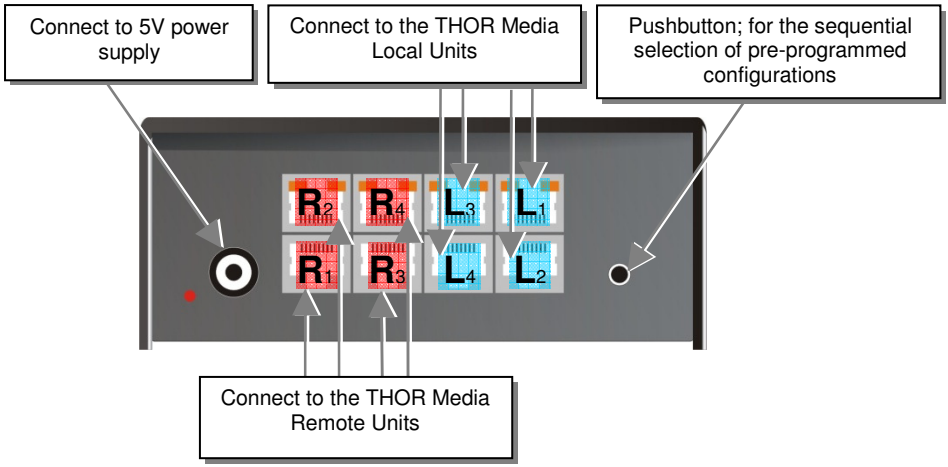
THOR Small Switch – as Crosspoint-Switch 2x6

Configuration 'Crosspoint-Switch' 3 Inputs / 5 Outputs



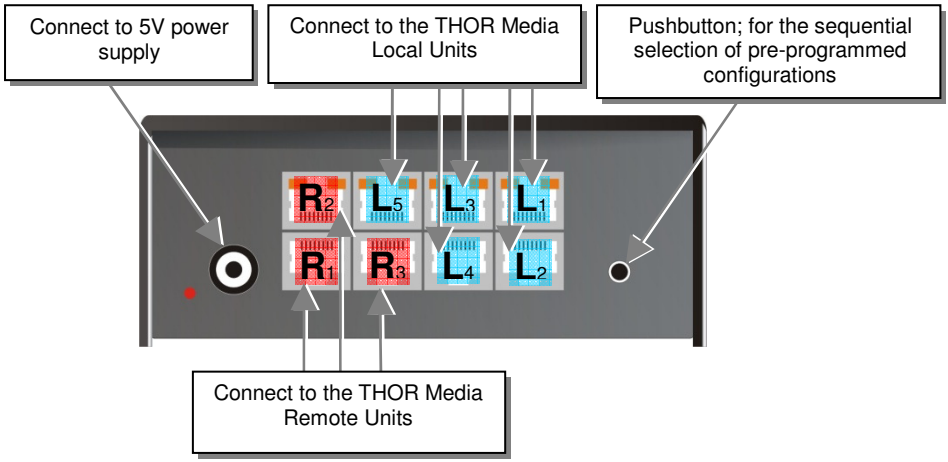
THOR Small Switch – as Crosspoint-Switch 3x5

Configuration 'Crosspoint-Switch' 4 Inputs / 4 Outputs



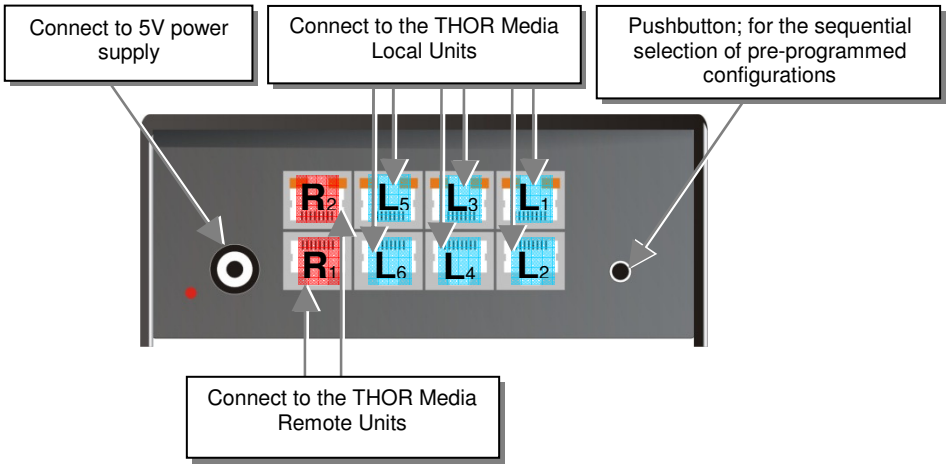
THOR Small Switch – as Crosspoint-Switch 4x4

Configuration 'Crosspoint-Switch' 5 Inputs / 3 Outputs



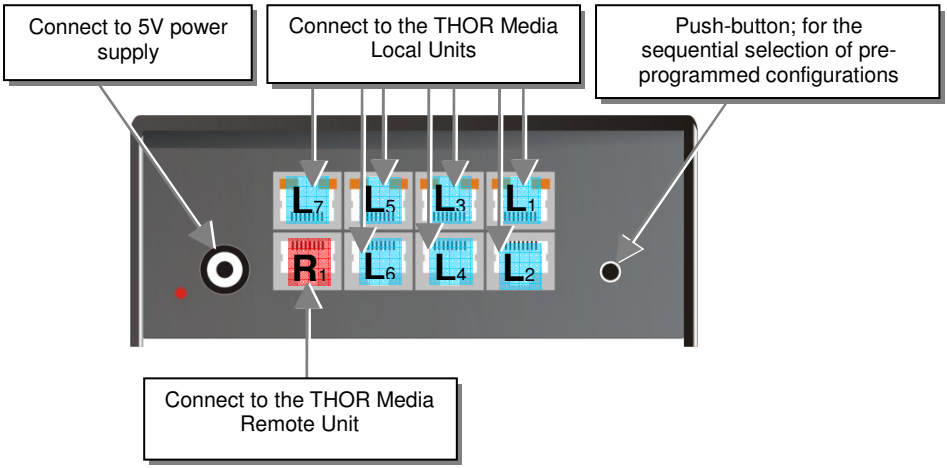
THOR Small Switch – as Crosspoint-Switch 5x3

Configuration 'Crosspoint-Switch' 6 Inputs / 2 Outputs



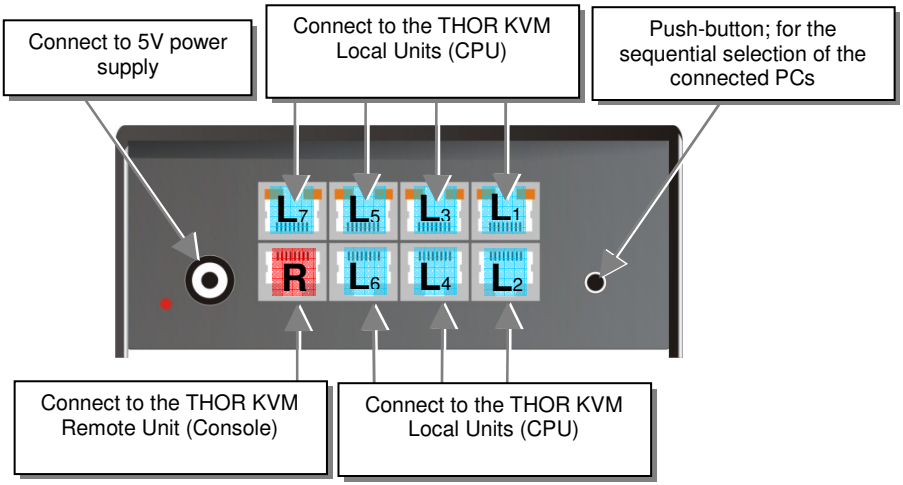
THOR Small Switch – as Crosspoint-Switch 6x2

Configuration 'Crosspoint-Switch' 7 Inputs / 1 Output



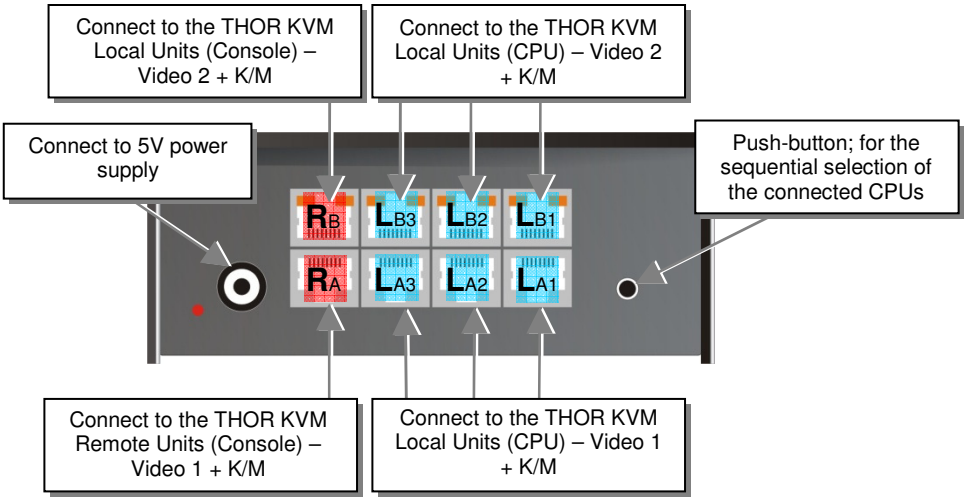
THOR Small Switch – as Crosspoint-Switch 1x7

Configuration 'Single-head KVM-Switch'

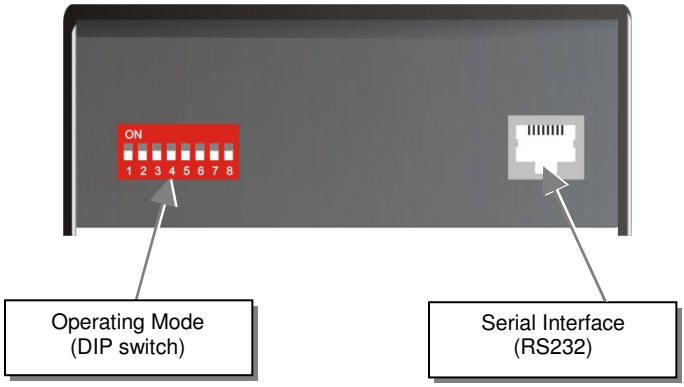


THOR Small Switch – as Single-head KVM-Switch

Configuration 'Dual-head KVM-Switch'

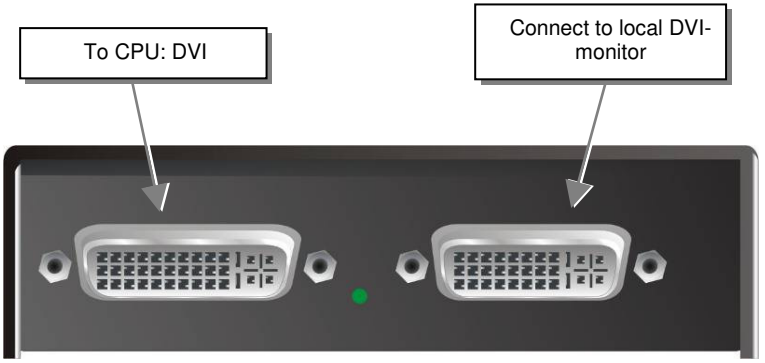


THOR Small Switch – as Dual-head KVM-Switch

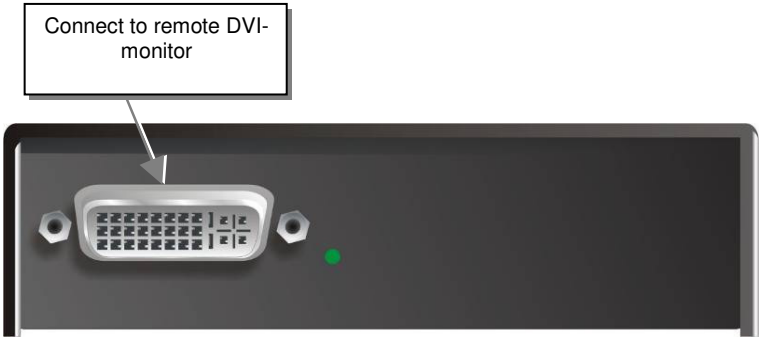


THOR Small Switch rear view

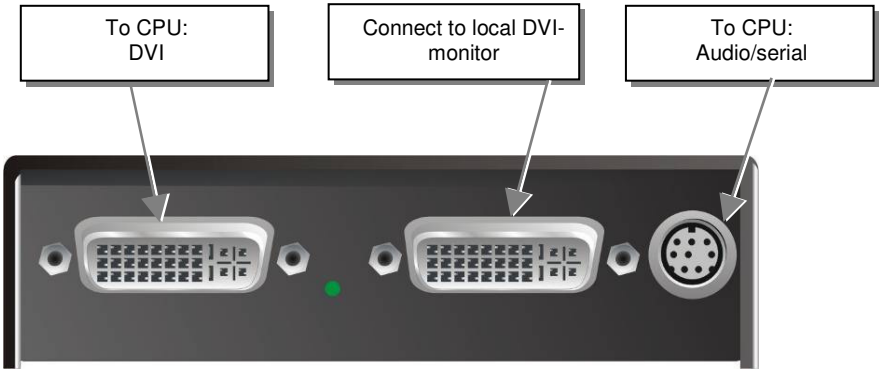
4.2 THOR Media Extender



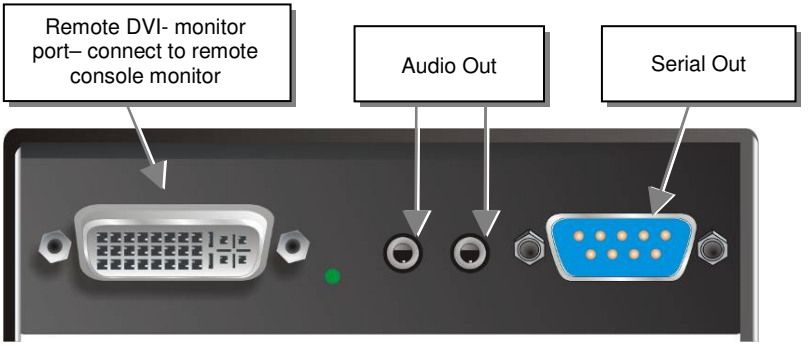
THOR Media Local Unit



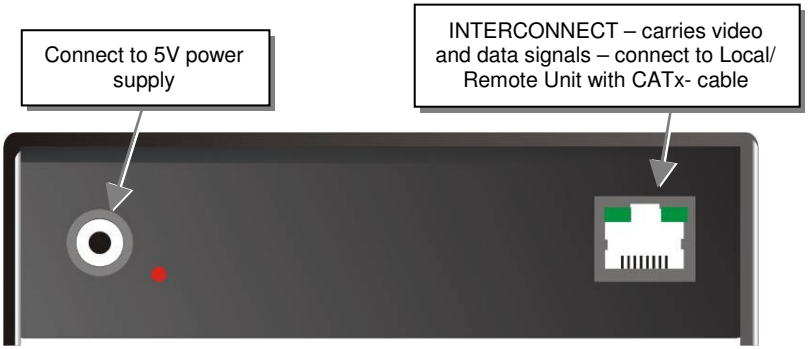
THOR Media Remote Unit



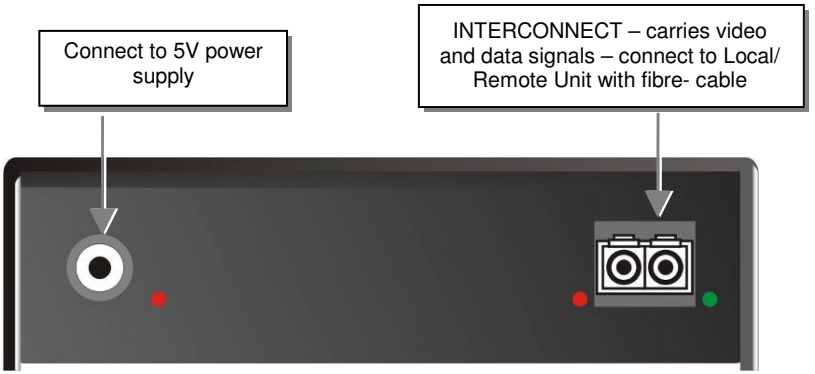
THOR Media (+ Audio) Local Unit



THOR Media Remote Unit (with Audio)

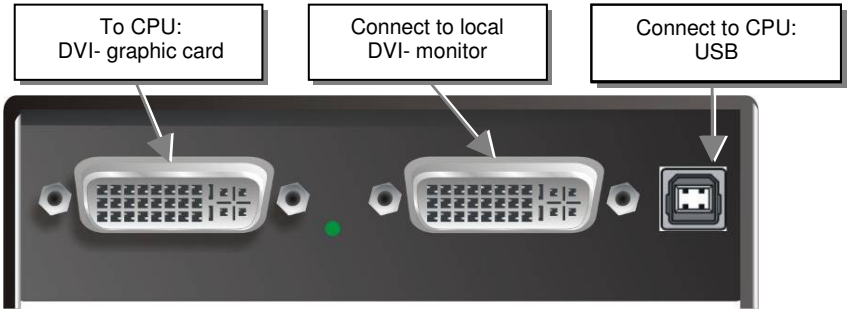


THOR Media Local/ Remote Unit – rear view

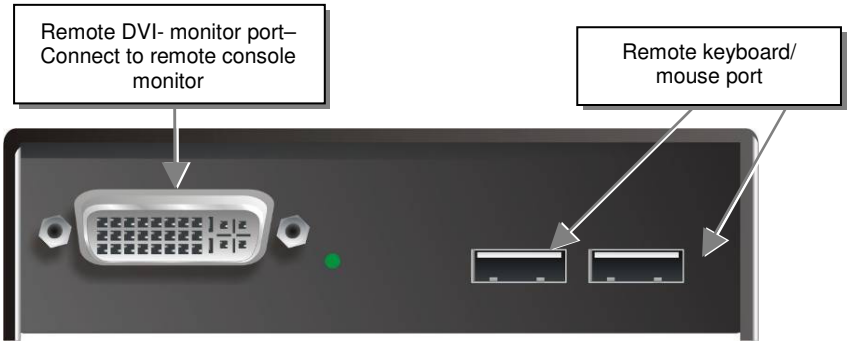


THOR Media Local/ Remote Unit – rear view

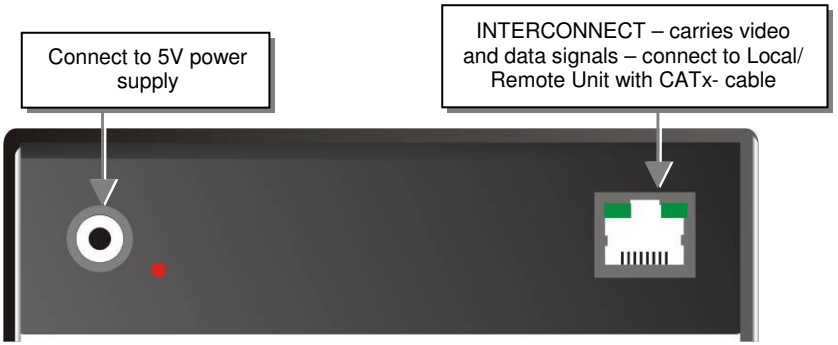
4.3 THOR KVM Extender



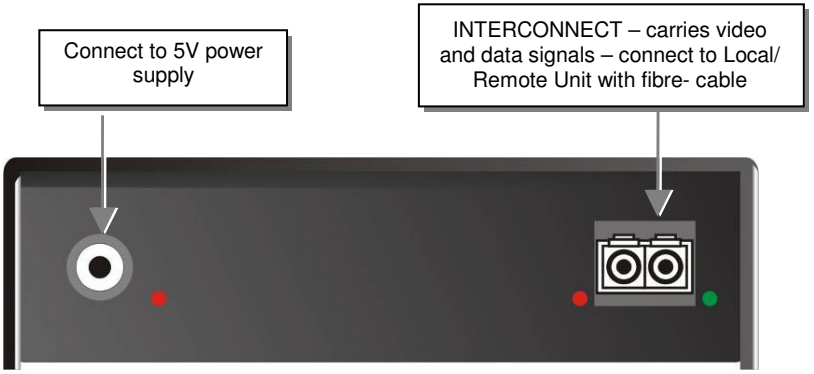
THOR KVM Local Unit



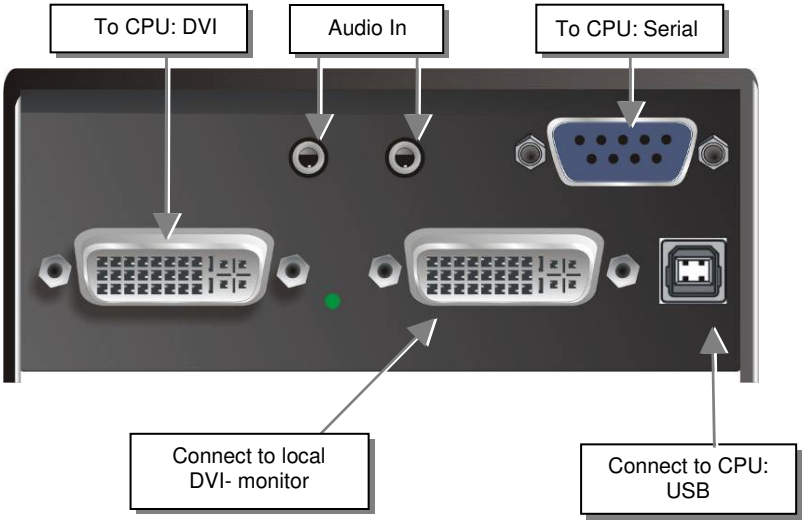
THOR KVM Remote Unit



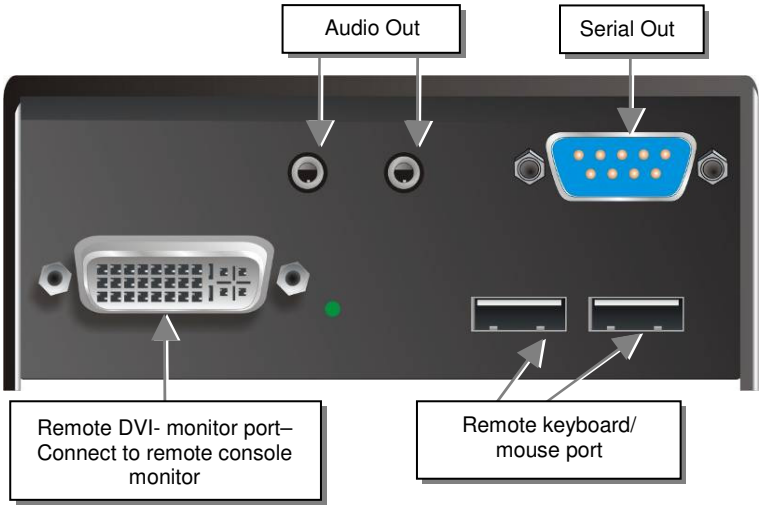
THOR KVM Local/ Remote Unit – rear view



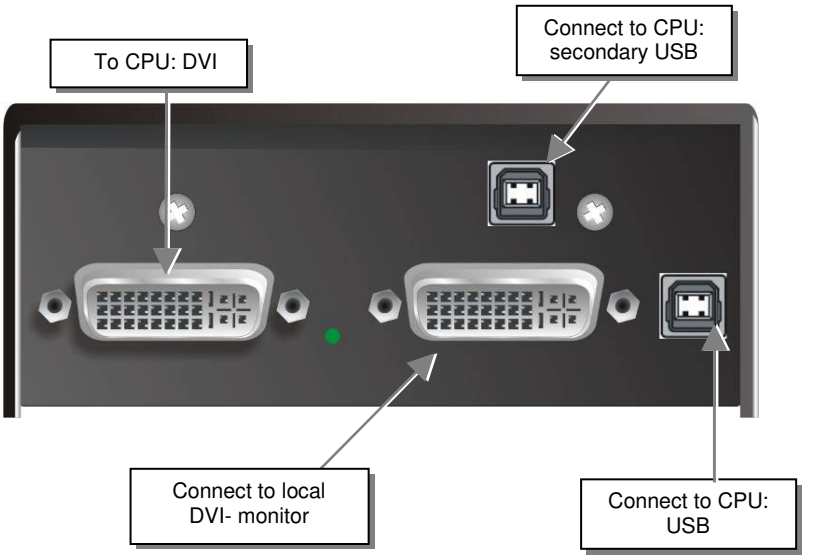
THOR KVM Local/ Remote Unit – rear view



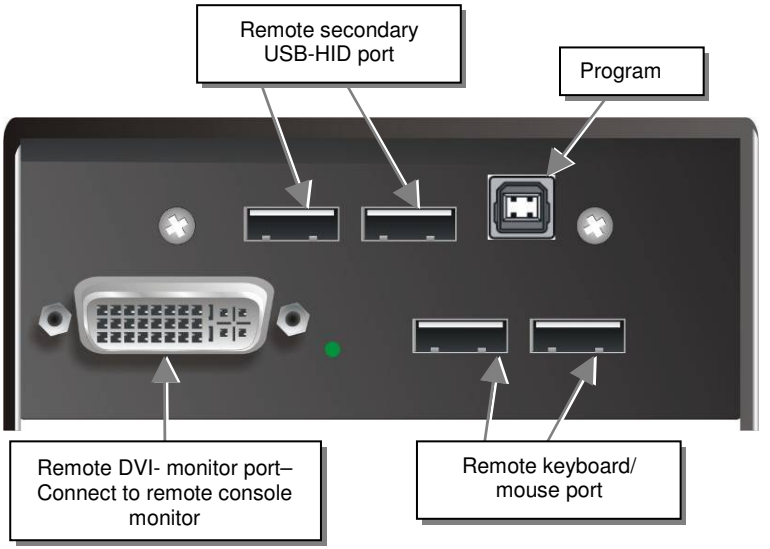
THOR KVM Local Unit with audio



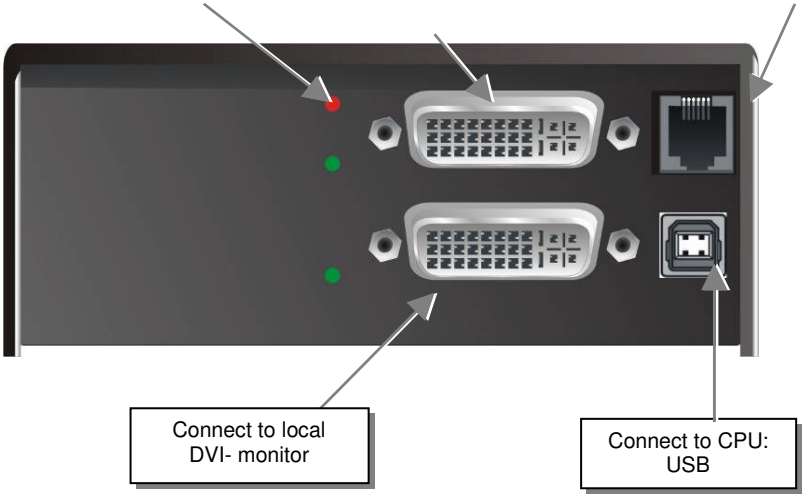
THOR KVM Remote Unit with Audio



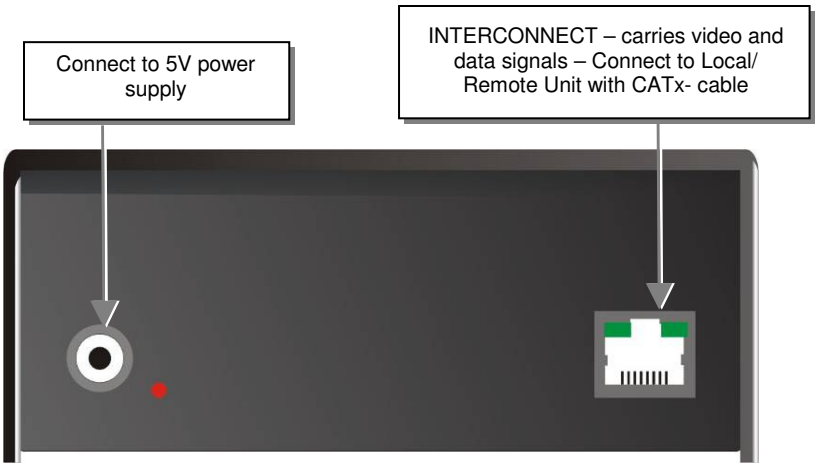
THOR KVM Local Unit with 4x USB-HID



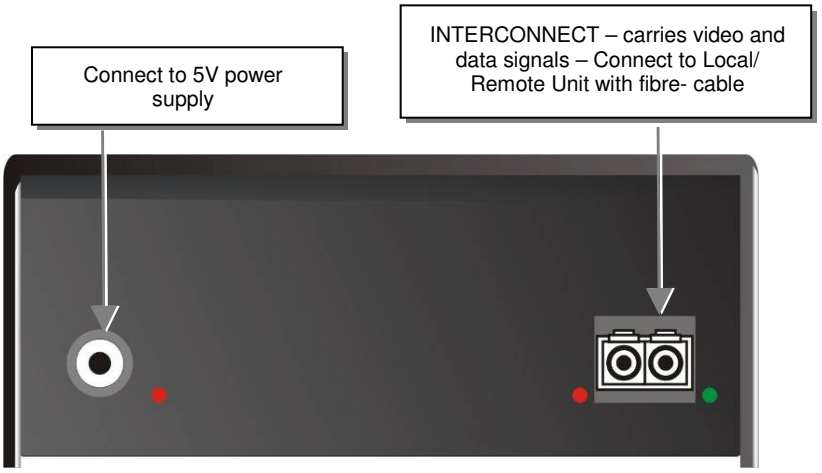
THOR KVM Remote Unit with 4x USB-HID



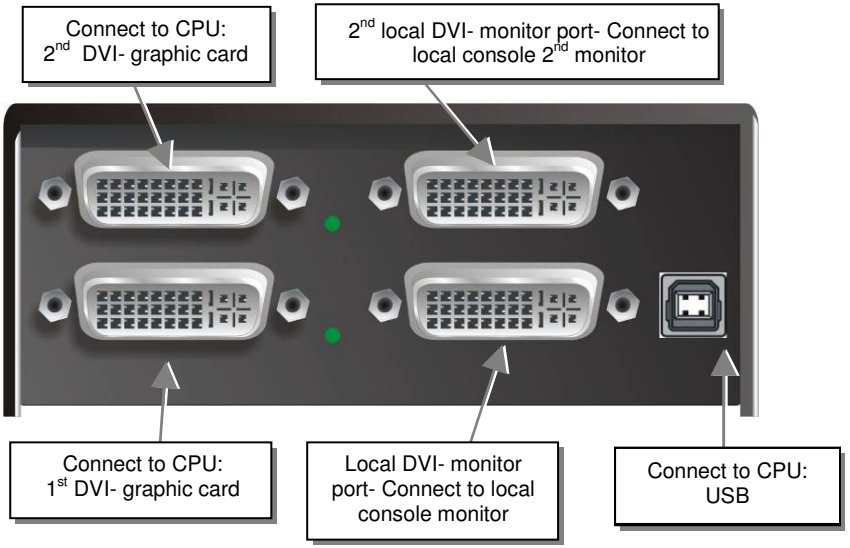
THOR KVM Local Unit with DVI-I Input (DVI-D + VGA)



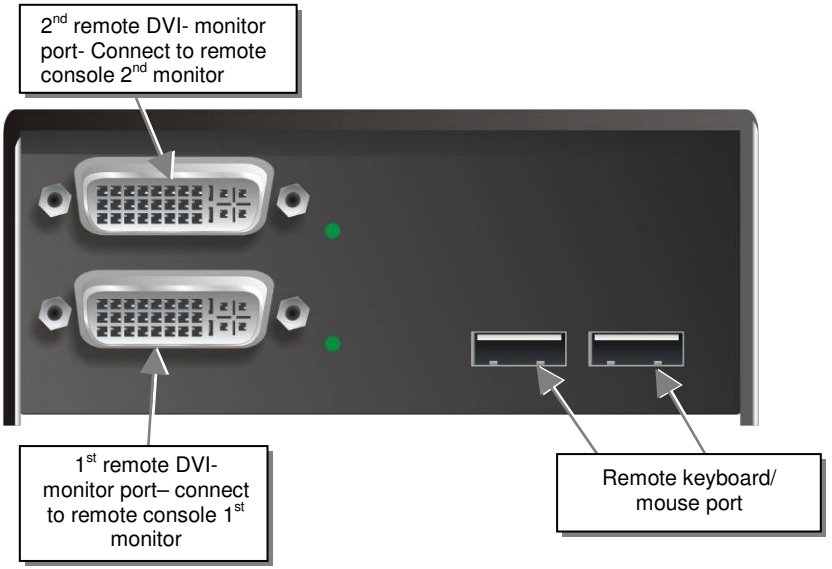
THOR KVM Local/ Remote Unit with audio – rear view



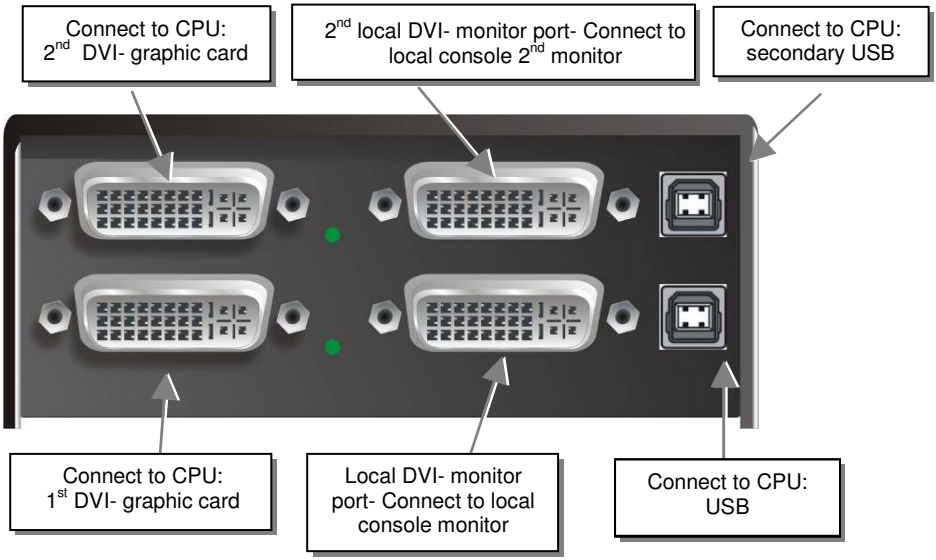
THOR KVM Local/ Remote Unit with audio – rear view



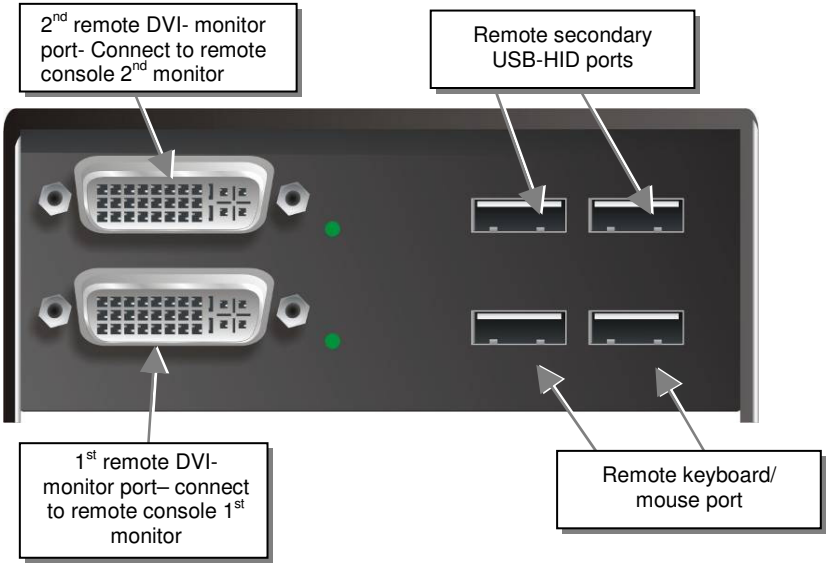
THOR KVM Dual-head Local Unit



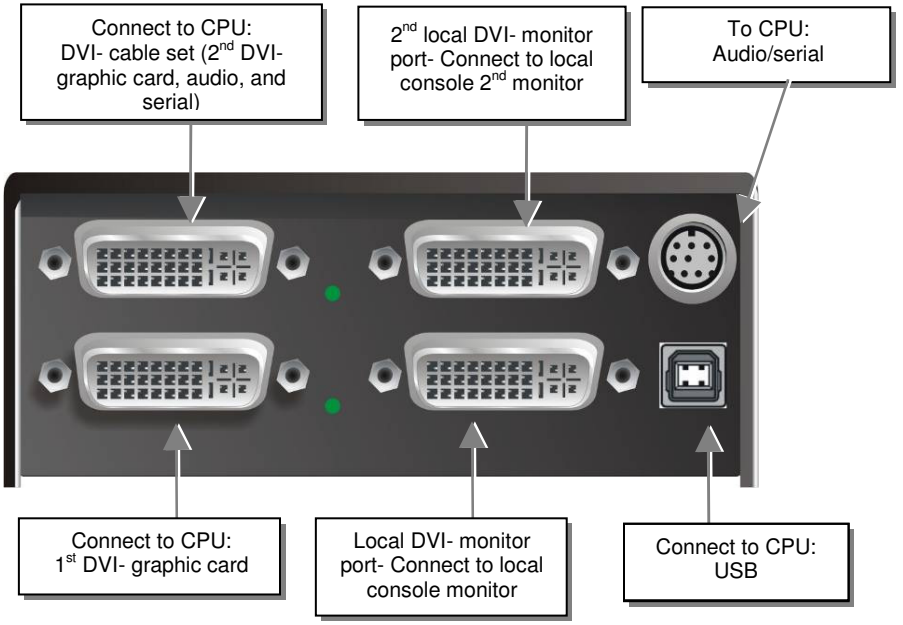
THOR KVM Dual-head Remote Unit



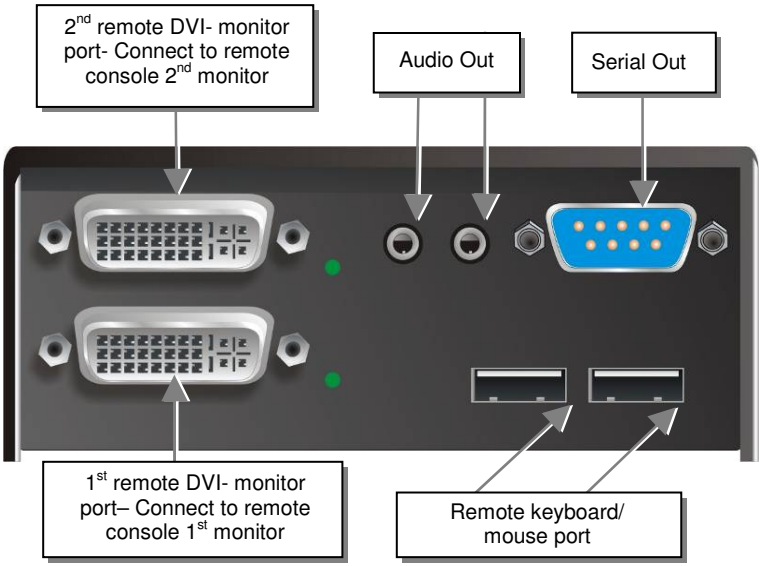
THOR KVM Dual-Head Local Unit with 4x USB-HID



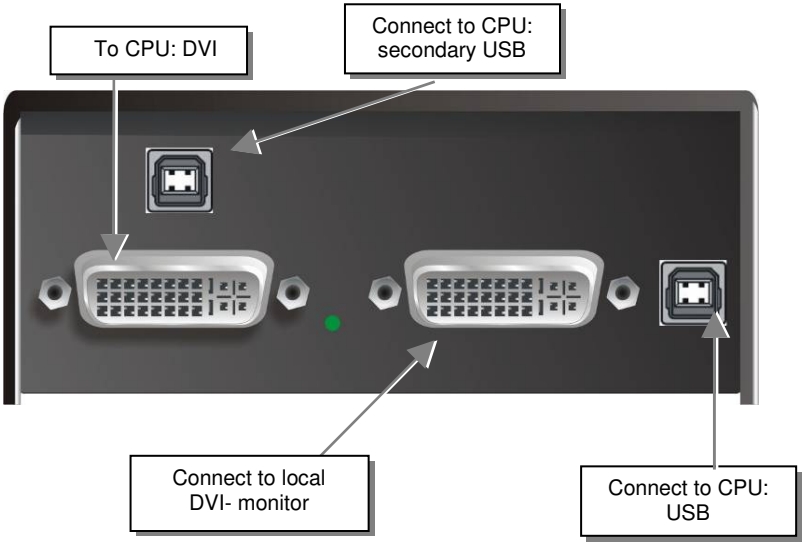
THOR KVM Dual-Head Remote Unit with 4x USB-HID



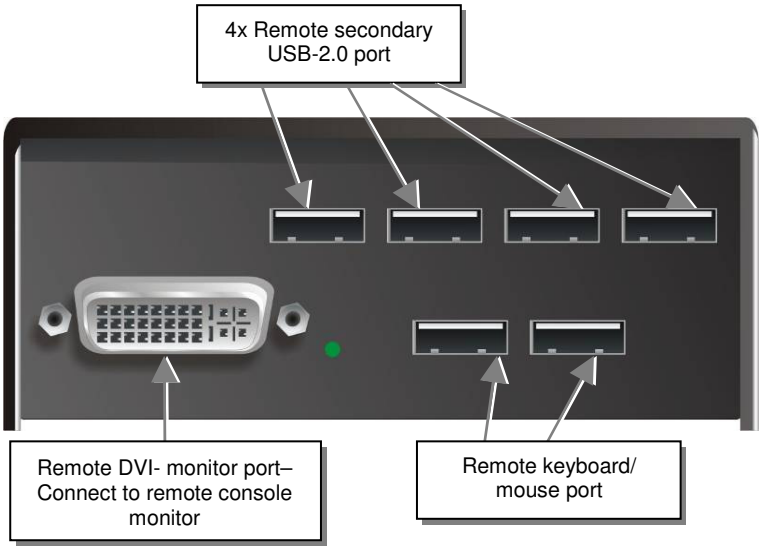
THOR KVM-Dual-head Local Unit with audio



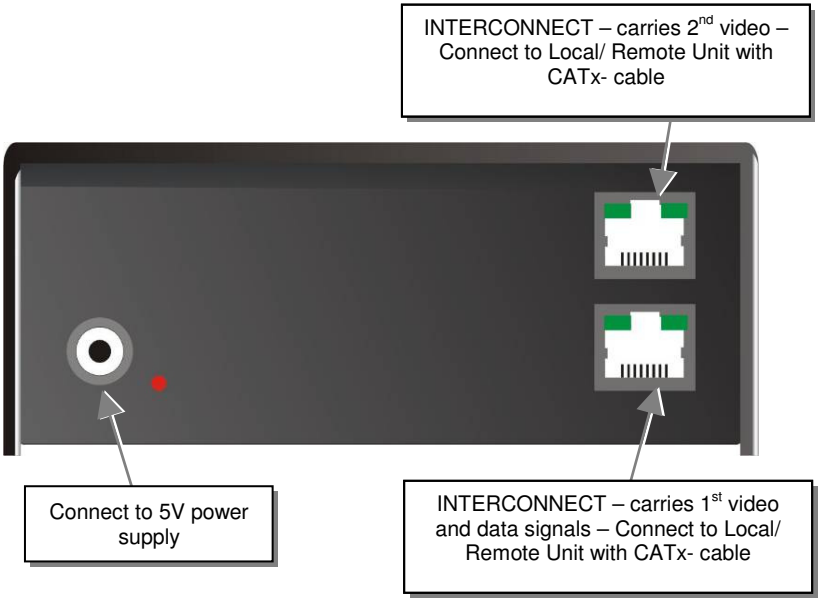
THOR KVM Dual-head Remote Unit with audio



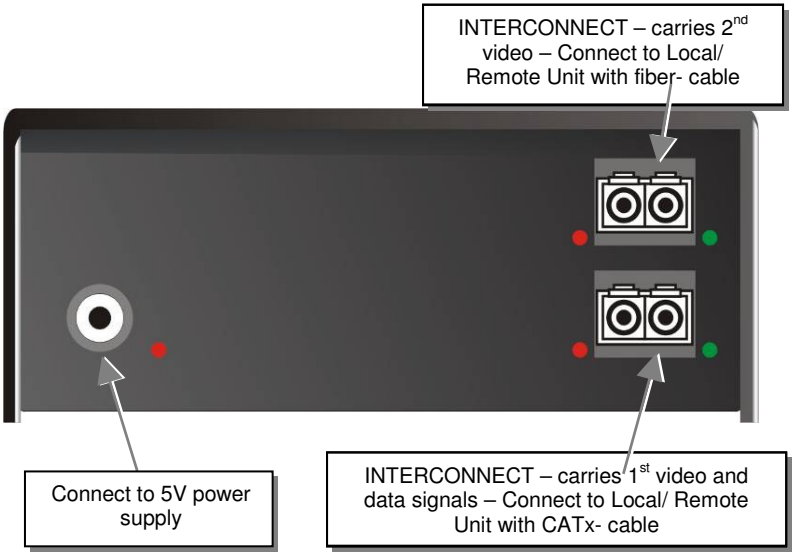
THOR KVM Local Unit with 2x USB-HID + 4x USB-2.0



THOR KVM Remote Unit with 2x USB-HID + 4x USB-2.0



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



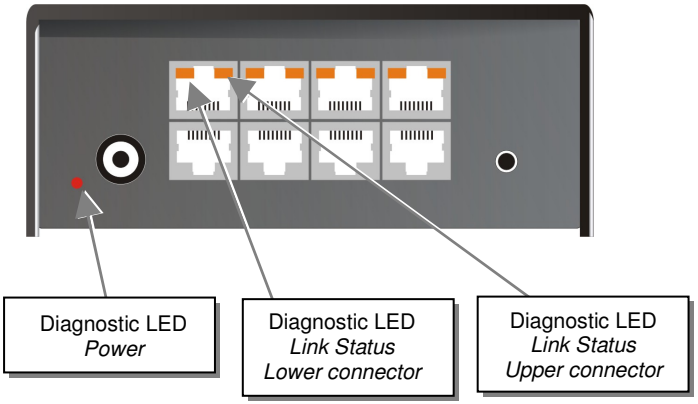
THOR KVM Dual-head, Local/ Remote Unit, with optional audio – rear view

5. Diagnostic

5.1 THOR Small Switch for CATx

Each THOR Small 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:



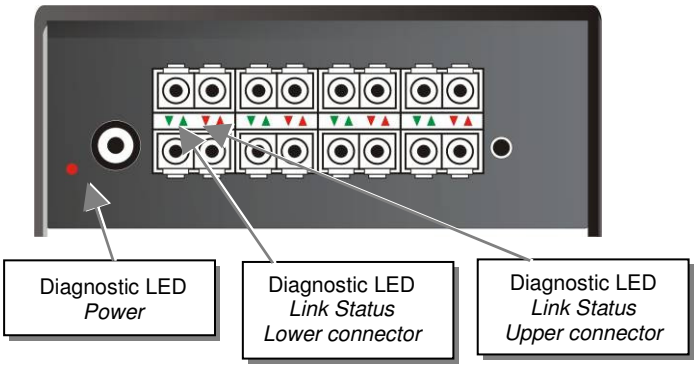
Diagnostic- LEDs at THOR Small Switch for CATx

LED	*Appearance*	*Diagnostics*
Power LED (Red LED)	Off	Device not ready
	On	Device ready
Link Status (Orange LED)	Off	No transmission over the CATx- cable attached local/remote unit is disconnected, switched off or a broken cable
	Orange On	Connection through CATx cable is OK
	Orange Blinking	Actual CPU selected by push button (**only type KVM- Switch**)
	Green On	active path (**only type KVM- Switch**)
	Green blinking	the active path has no connection through the trunk cable (**only type KVM- Switch**)

5.2 THOR Small Switch for CATx

Each THOR Small Switch is fitted with two indicator LEDs: *Power* and *Link Status:* The *Power* LED is next to the Power socket. The *Link Status* LED is located between the lower and upper fiber connector. The ▼ LED shows the status for the lower interconnection, the ▲ LED for the upper interconnection.

The position of the LEDs is shown below:



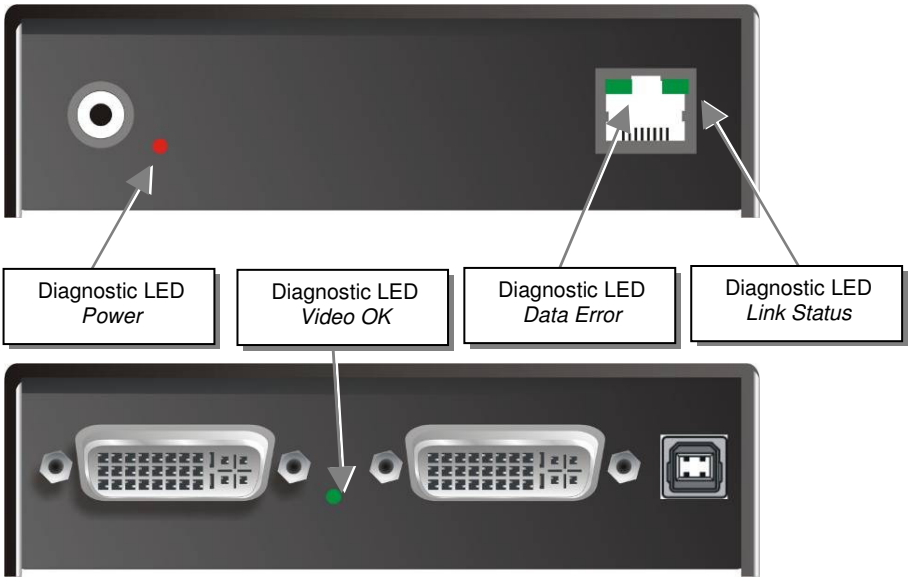
Diagnose- LEDs on THOR Small Switch for Fiber

LED	*Appearance*	*Diagnostics*
Power LED (Red LED)	Off	Device not ready
	On	Device ready
Link Status (Orange LED)	Off	No transmission over the fiber- cable attached local/remote unit is disconnected, switched off or a broken interconnect cable
	Orange On	Connection through fiber cable is OK
	Orange Blinking	Actual CPU selected by push button (**only type KVM- Switch**)
	Green On	active path (**only type KVM- Switch**)
	Green Blinking	the active path has no connection through the trunk cable (**only type KVM- Switch**)

5.3 THOR Media/ KVM Extender

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

The location of the LEDs is shown below:



Diagnostic- LEDs at THOR 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 interference)

6. Service Setup

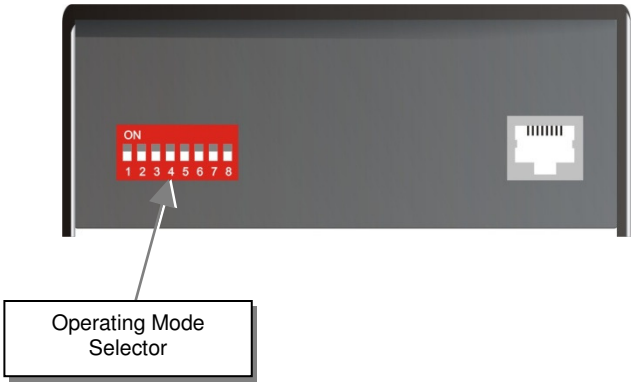
6.1 THOR Small Switch for CATx

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

In order to make these adjustments, you do not have to open the THOR Small 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:

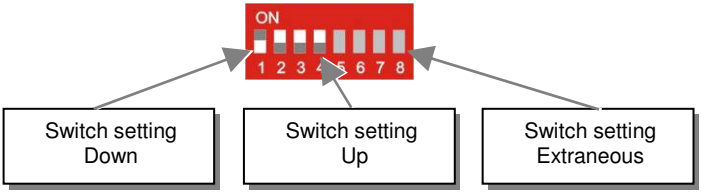
1. Switch off the THOR Small Switch.
2. Select a new operating mode according to following table.

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.
	**Crosspoint 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 THOR Small 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.

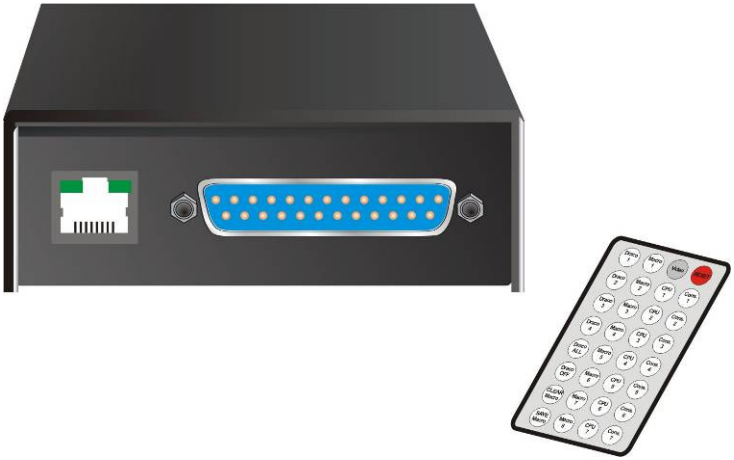
Slave: In a cascaded application in KVM- switch mode, the device is 'Slave'– i.e. it is on second level within the tree structure, seen from the Remote Unit.

Connection of THOR Control External Switching Device (Accessories)

Using the THOR Control External Switching Device you can start to realize the switching possibilities of the THOR Small Switch...

The THOR Control External Switching Device is mainly a small media control unit which allows programming and processing the switching functions of the THOR via Infrared Remote Control.

Additionally, this device has 8 digital inputs to recall macro functions (CP-mode) or for direct switching to a CPU (KVM- mode). Also, there are 8 LED driving outputs to monitor the last selected CPU or the number of the last processed macro.

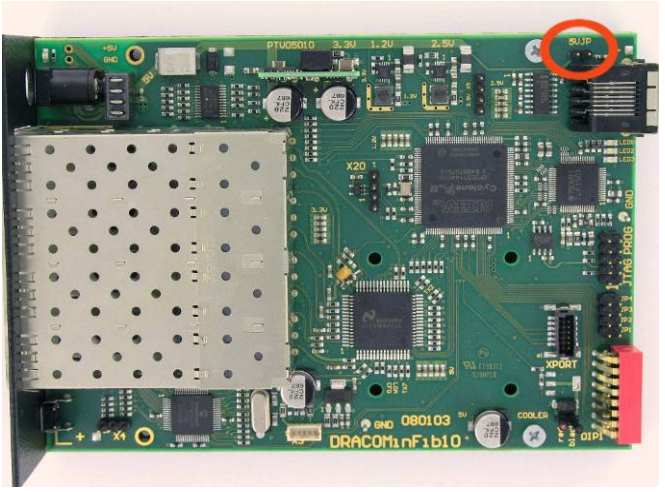


THOR Control External Switching Device with related Infrared Remote Control

This device is powered from the THOR. To provide power, an internal jumper must be set accordingly.

To set the jumper for powering the THOR Control External Switching Device, you need to open the THOR Small Switch Device. To open the unit, unscrew the Philips screws at the bottom of the device. Carefully remove the lower and upper shells of the case.

The jumper is located as shown in the following figure:



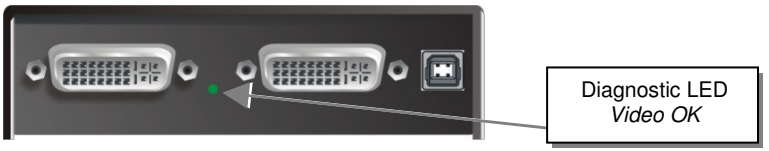
Plug the jumper on the two pins. Then close the devices and secure it by screws. Now you can connect your THOR Control External Switching Device.

6.2 THOR Media/ KVM Extender

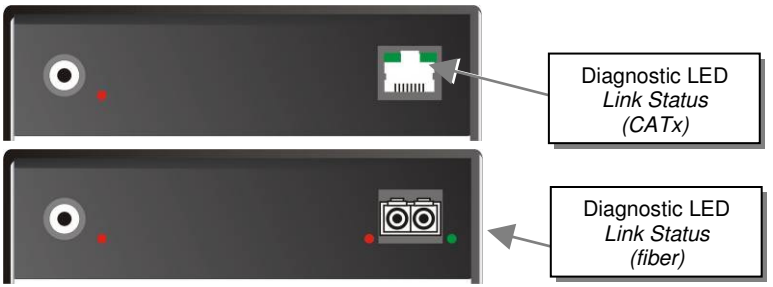
For standard applications, you shouldn't need to make any adjustments to your THOR Small Switch Media/KVM Extender. However, in certain circumstances, you may need to open the Local Unit and/or the Remote Unit. To open one of the units, unscrew the Philips-type screws at both sides at the bottom of the 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



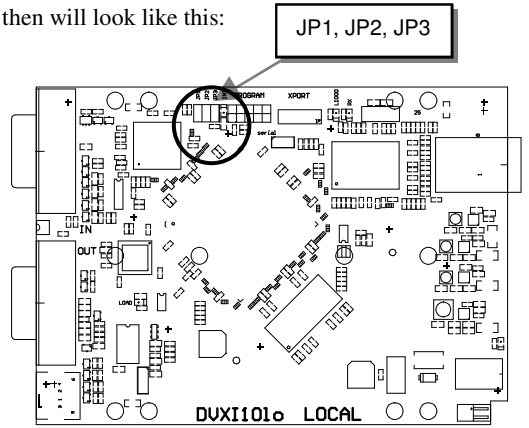
The diagnostic LED 'Video OK' is located near to the CATx- connectors



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 monitor connectors to the left.

The main PCB then will look like this:



Use the diagram to locate jumpers.

DDC / color 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 (default)		
From local monitor		
Load 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)		

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 with 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 will blink 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 is it too high of a rate, the colors are automatically reduced to 16Bit. This is auto-selected in each line of the screen picture at any time. This mode makes the best compromise between speed and color depth.

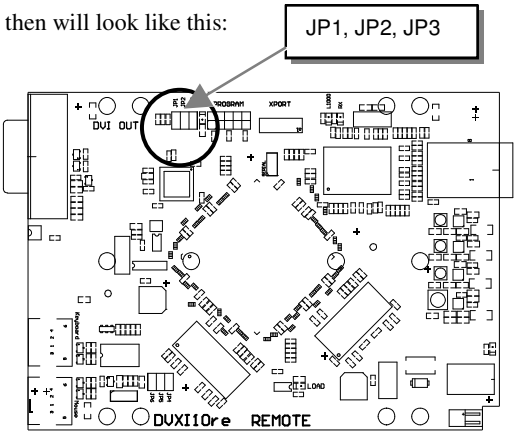
Please select 24Bit if you want to have, under all circumstances, the highest color rate- but potentially with reduced frame rates.

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 monitor connector to the left.

The main PCB then will look like this:



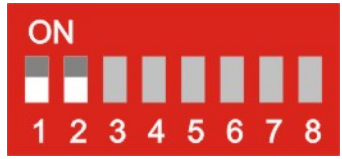
Use the diagram to locate jumpers.

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**	**Behavior**
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

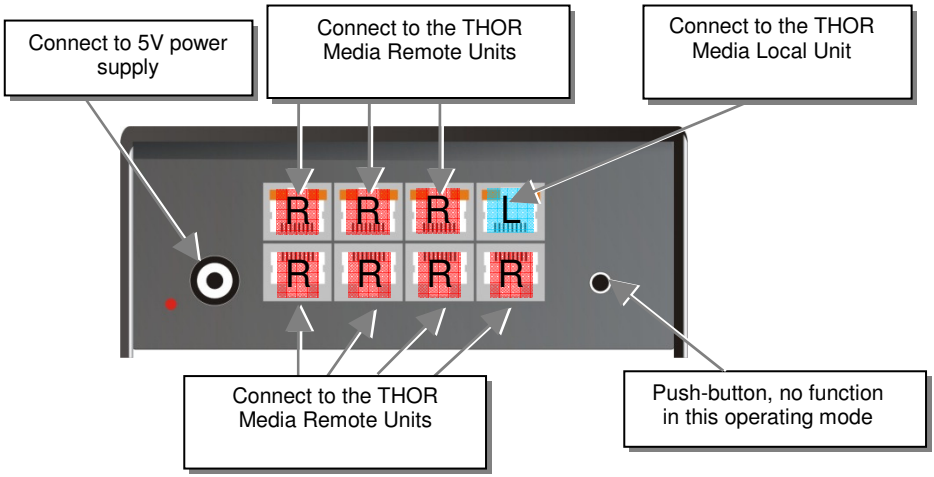


7.1 Multiplex- Repeater

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 THOR Small Switch by CATx cables. The transmission between the THOR Small Switch and up to 7 Remote Units is also done by CATx cables. Optionally, instead of Remote Units, further THOR Small 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 controlled.

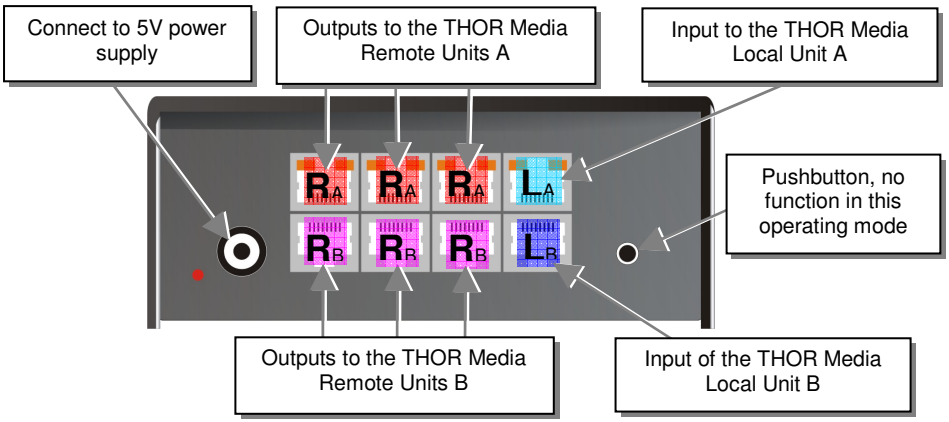
The distance between a Local Unit and THOR Small Switch or between a THOR Small Switch and Remote Unit or between two THOR Small Switches may amount to, in each case, up to 140m allowing installations in distributed applications.

Configuration 'Multiplex-Repeater' – 1 Source up to 7 Displays



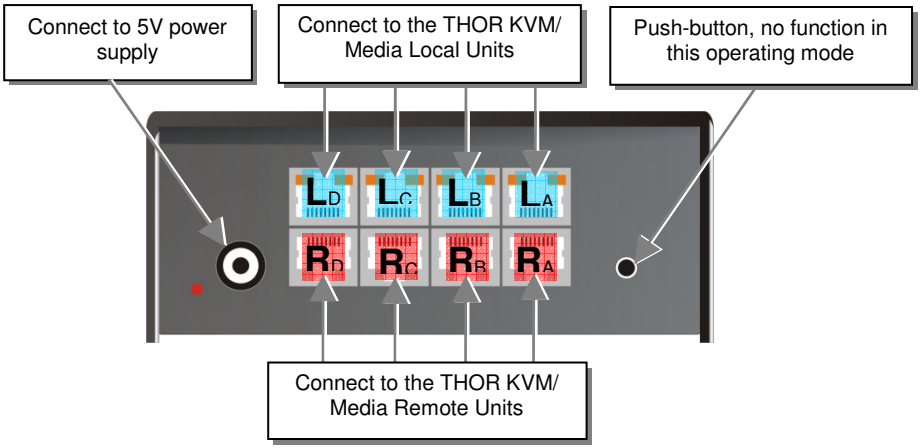
A single signal from a Local Unit is distributed on up to 7 outputs and transferred over CATx- cables on up to 7 Remote Units. Using a second stage of Multiplex Repeaters, up to 49 monitors can be supplied with video (and optionally audio).

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



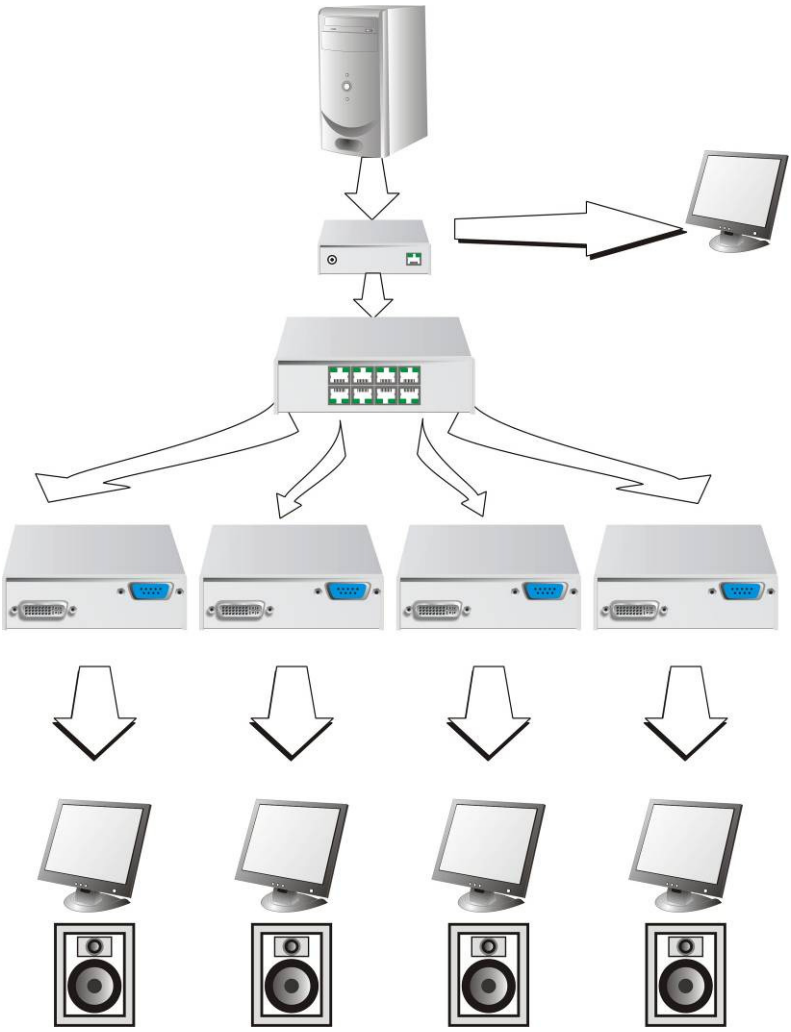
Two different signals from two Local Units are each distributed to 3 outputs and transferred over CATx- cables to 3 Remote Units. Using a second stage of Multiplex Repeaters up to 2x9 (2x21) monitors can be supplied with video (and optionally audio).

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

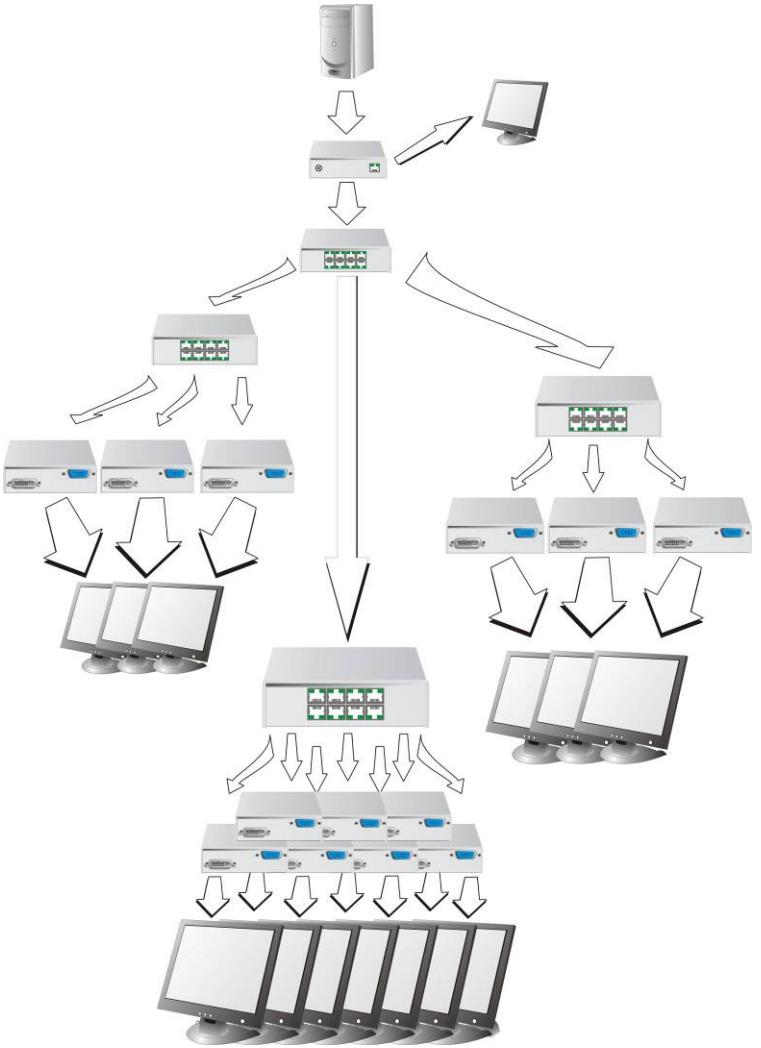


Four different signals from four Local Units are transferred over CATx- cables to one equivalent Remote Unit. This allows an extension of the cable length if the usual 140m distance by CATx- cables is not sufficient.

Example Applications:



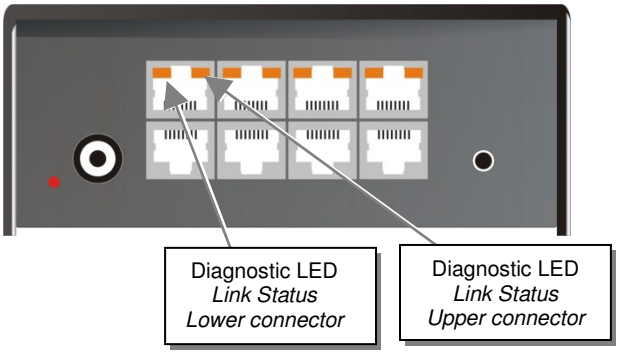
A video/audio source is switched over the THOR Small Switch to 4 different screens/loudspeakers. Additionally a control monitor can be attached at the Local Unit.



Three cascaded THOR Small 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:

LED	*Appearance*	*Diagnostics*
Power LED (Red LED)	Off On	Device not ready Device ready
Link Status (Orange LED)	Off	No transmission over the CATx- cable attached local/remote unit is disconnected, switched off or a broken interconnect cable
	Orange On	Connection through CATx cable is OK

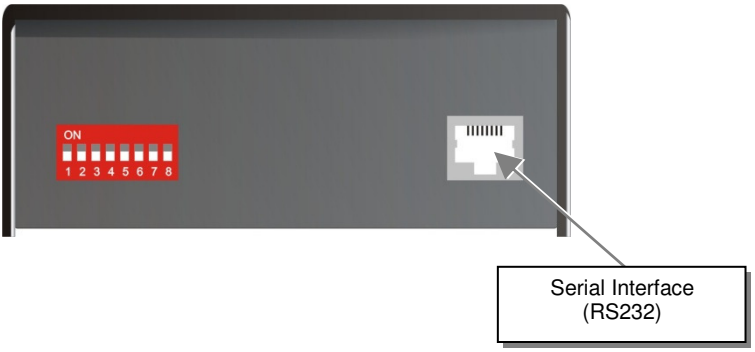
Setup

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"** on page **145**. 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 E: Protocol for command mode**

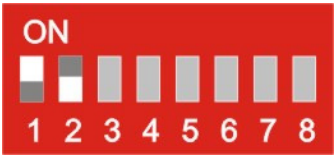
For communication, please set up the format of the serial data communication to:

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 Crosspoint- Switch

In “Crosspoint- Switch" operating mode, each port of the THOR Small Switches 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!

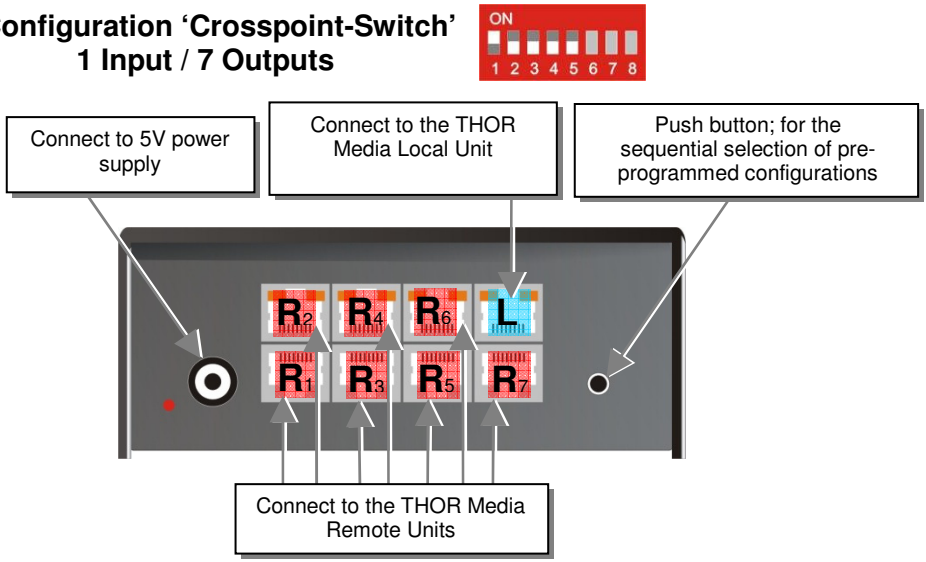
An incoming DVI (+audio) signal can be switched and extended to one or more outputs allowing you to output the signal to several displays at the same time (broadcast function). The signal from the CPU (signal source) is transmitted over a Local Unit and CATx- cables to the THOR Small Switch. From the THOR Small Switch, the transmission continues over CATx- cables to up to 7 Remote Units. Alternatively, a further THOR Small 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 THOR Small Switch or between a THOR Small Switch and Remote Unit or between two THOR Small Switches may amount to 140m; allowing installations in distributed applications.

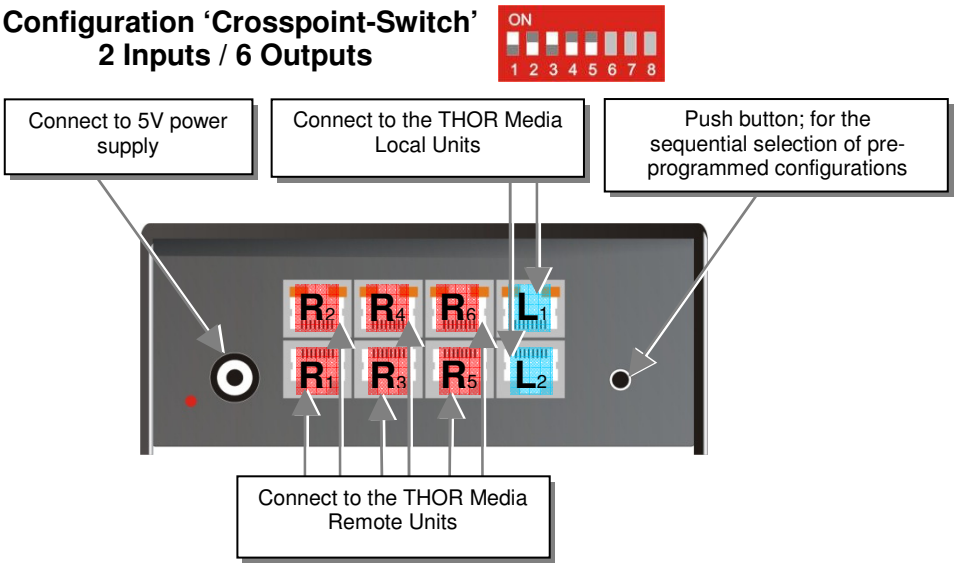
The control of the switching status is made by the integrated, serial interface. Switching commands can be converted directly here. Switching combinations can be additionally stored as macros. These can be called up with a short command or by using the push-button on the device. Using the serial interface,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

Configuration 'Crosspoint-Switch' 1 Input / 7 Outputs



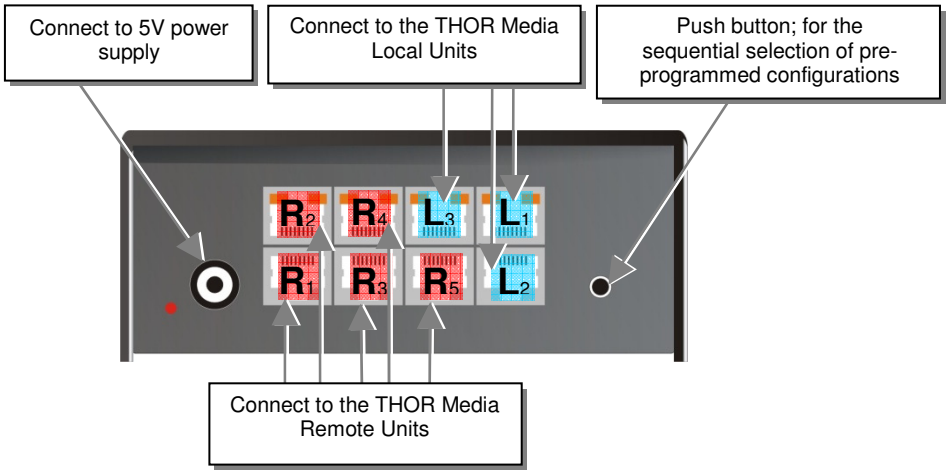
The signal of a Local Unit is switched on up to 7 outputs and transmitted over CATx- cables on up to 7 Remote Units. Optionally, a further THOR Small Switch can be inserted for a second switching stage.

Configuration 'Crosspoint-Switch' 2 Inputs / 6 Outputs



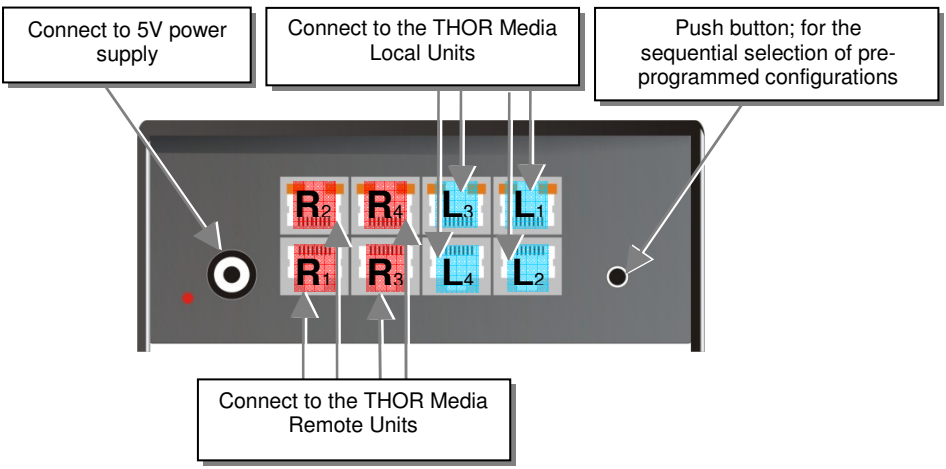
The signals of 2 Local Units are switched on up to 6 outputs and transferred over CATx-cables to 6 Remote Units. Optionally, an additional THOR Small Switch can be inserted for a second switching stage.

Configuration 'Crosspoint-Switch' 3 Inputs / 5 Outputs



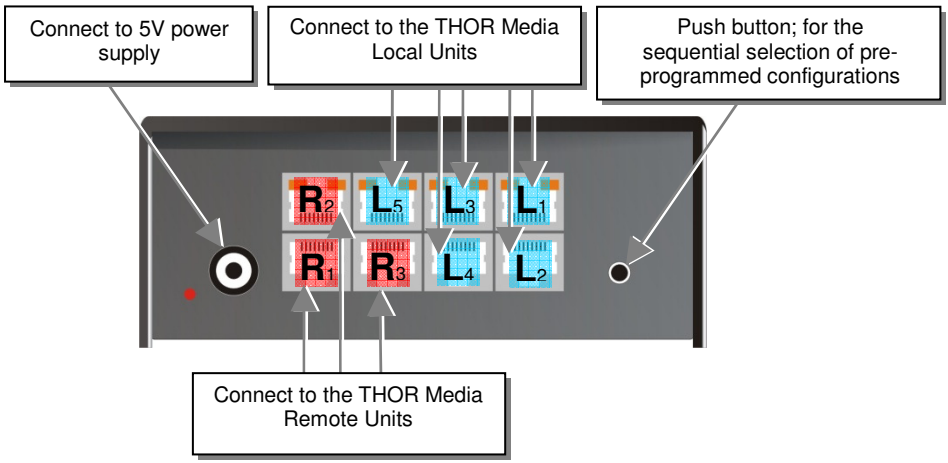
The signals of 3 Local Units are switched on up to 5 outputs and transferred over CATx-cables to 5 Remote Units. Optionally, an additional THOR Small Switch can be inserted for a second switching stage.

Configuration 'Crosspoint-Switch' 4 Inputs / 4 Outputs



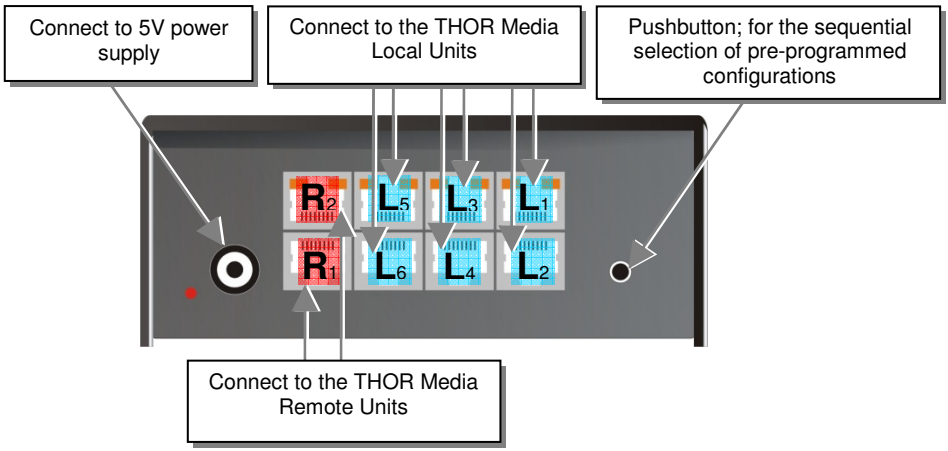
The signals of 4 Local Units are switched on up to 4 outputs and transferred over CATx-cables to 4 Remote Units. Optionally, an additional THOR Small Switch can be inserted for a second switching stage.

Configuration ‘Crosspoint-Switch’ 5 Inputs / 3 Outputs



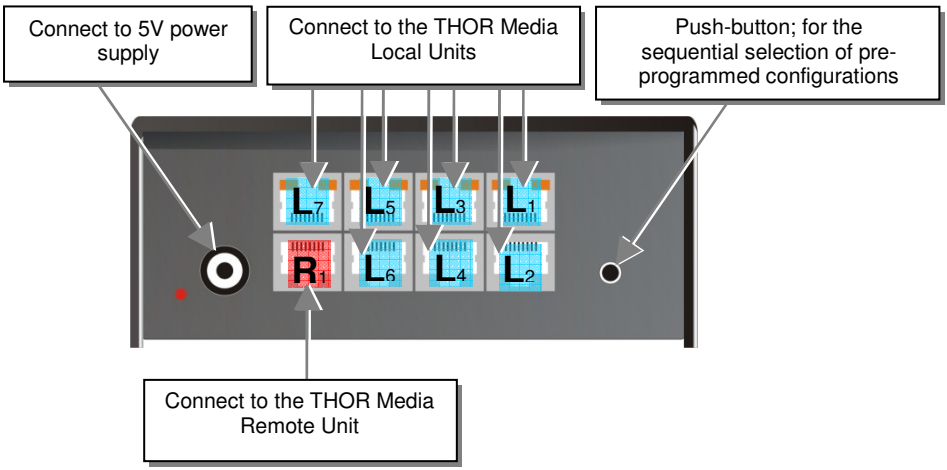
The signals of 5 Local Units can be switched on up to 3 outputs (also on several) and be transferred over CATx- cables on up to 3 Remote Units. Optionally, an additional THOR Small Switch can be inserted for a second switching stage.

Configuration ‘Crosspoint-Switch’ 6 Inputs / 2 Outputs



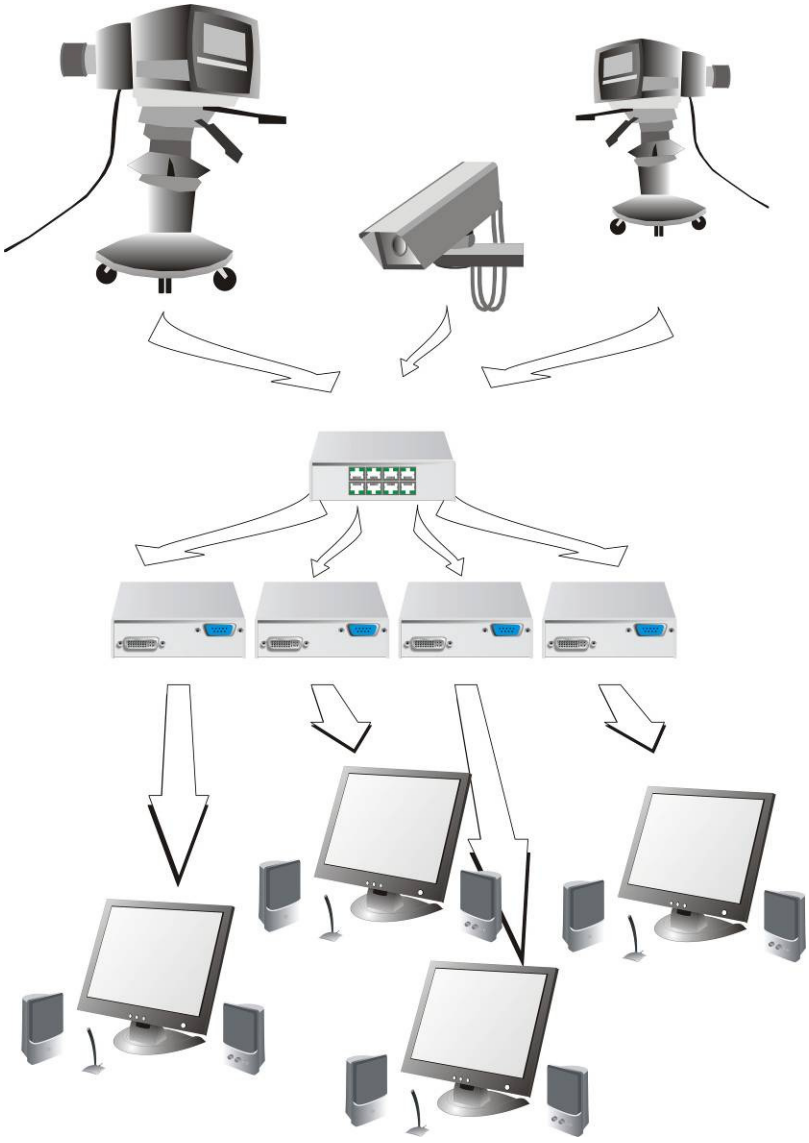
The signals of 6 Local Units can be switched on up to 2 outputs (also on several) and be transferred over CATx- cables on up to 2 Remote Units. Optionally, an additional THOR Small Switch can be inserted for a second switching stage.

Configuration ‘Crosspoint-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, an additional THOR Small Switch can be inserted for a second switching stage.

Example Application:



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

Setup

The following configurations are possible in the 'Crosspoint-Switch' operating mode:

Operating mode after Reset/Power ON

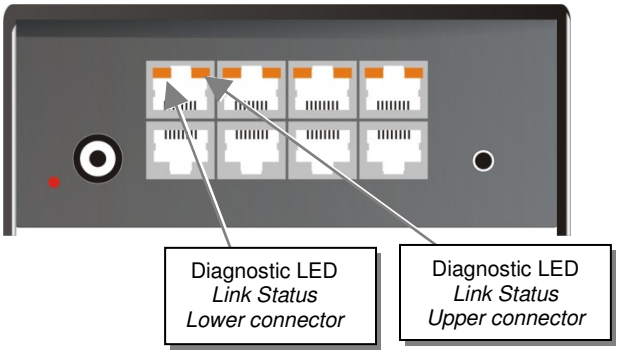
After a reset the respective DEFAULT- Mode is selected:

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 'Crosspoint-Switch' operating mode:



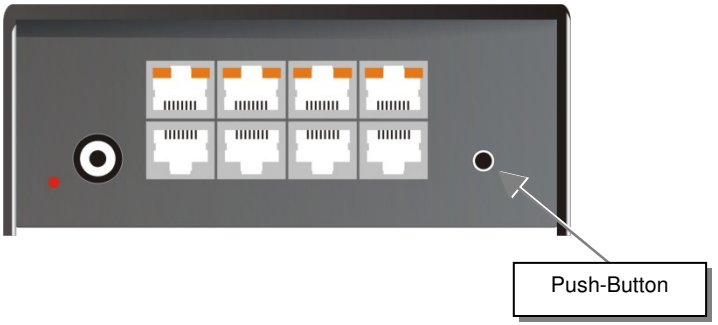
Meaning of the diagnostic LEDs:

LED	*Appearance*	*Diagnostics*
Power LED (Red LED)	Off On	Device not ready Device ready
Link Status (Orange LED)	Off	No transmission over the CATx- cable attached local/remote unit is disconnected, switched off or a broken interconnect cable
	Orange On	Connection through CATx cable is OK
	Green blinking	Actually selected macro

Operation

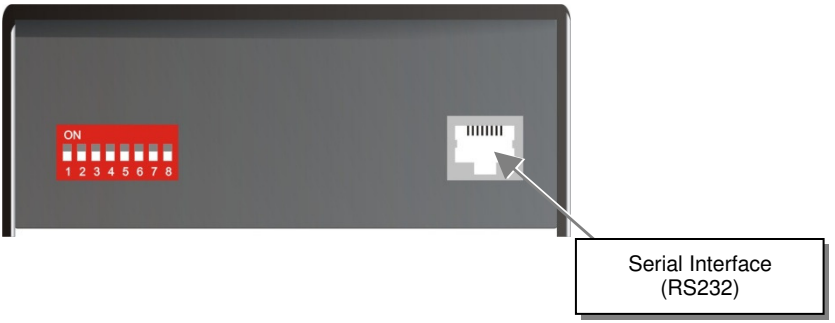
The following operations are possible in the 'Crosspoint-Switch' operating mode:

a) By push button:



With the first key press, the macro display is switched on. The LED with the number of the active selected macro flashes green. With each key press, the display will switch to the next LED. 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. If the push button is released for longer than 2 seconds, the operation is cancelled. 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 **145**. 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 E: 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 'Crosspoint- 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 Crosspoint- Switch
- **STX, 0x47, <Rem-No>, <Loc-Nr>, ETX** Switch a single (remote-)output to a (local-) input
- **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:

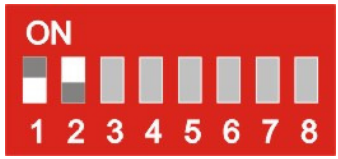
<Rem-No>	7Bit date 1 to 7
<Loc-No>	7Bit date 1 to 7
<Macro-No>	7Bit date 1 to 8

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, 0x84, 0x81, ETX	Switch (remote-)output 04 to (local-)input 01
STX, 0x47, 0x85, 0x81, ETX	Switch (remote-)output 05 to (local-)input 01 ((remote-) output 04 and 05 show the same picture now!)
STX, 0x47, 0x86, 0x81, ETX	Switch (remote-)output 06 to (local-)input 01 ((remote-) output 04 - 06 show the same picture now!)
STX, 0x47, 0x87, 0x81, ETX	Switch (remote-)output 07 to (local-)input 01 ((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, 0x48, 0x84, ETX	Open the connection between (remote-)output 04 and the equivalent (local-)input (only monitor 05 – 07 show the picture)

c) By the attached keyboard

Since Firmware Revision dated Nov-20, 2009 you can also switch the Console 1 (which is connected to Remote Unit 1) using the attached keyboard.



7.3 Single-head KVM- Switch

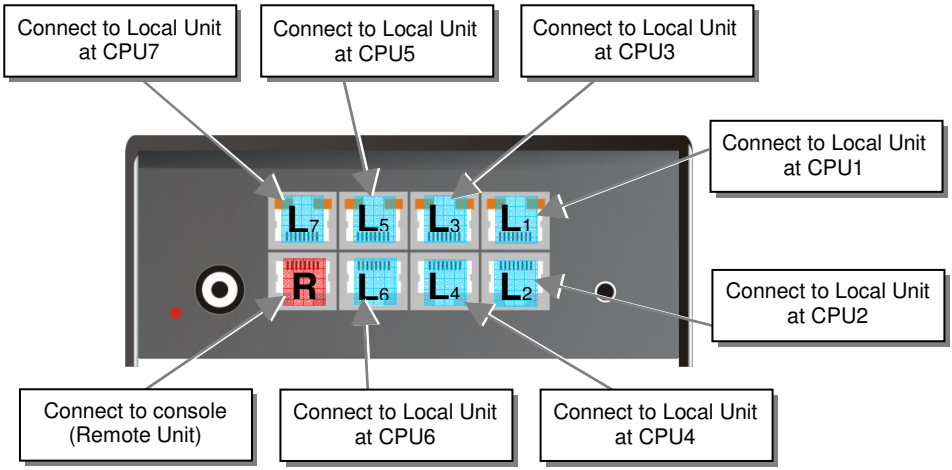
Using one console (monitor, keyboard and mouse) up to 7 CPUs can be controlled remotely. The distances between the CPU and THOR Small Switch and between THOR Small Switch and console may amount to 140m.

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

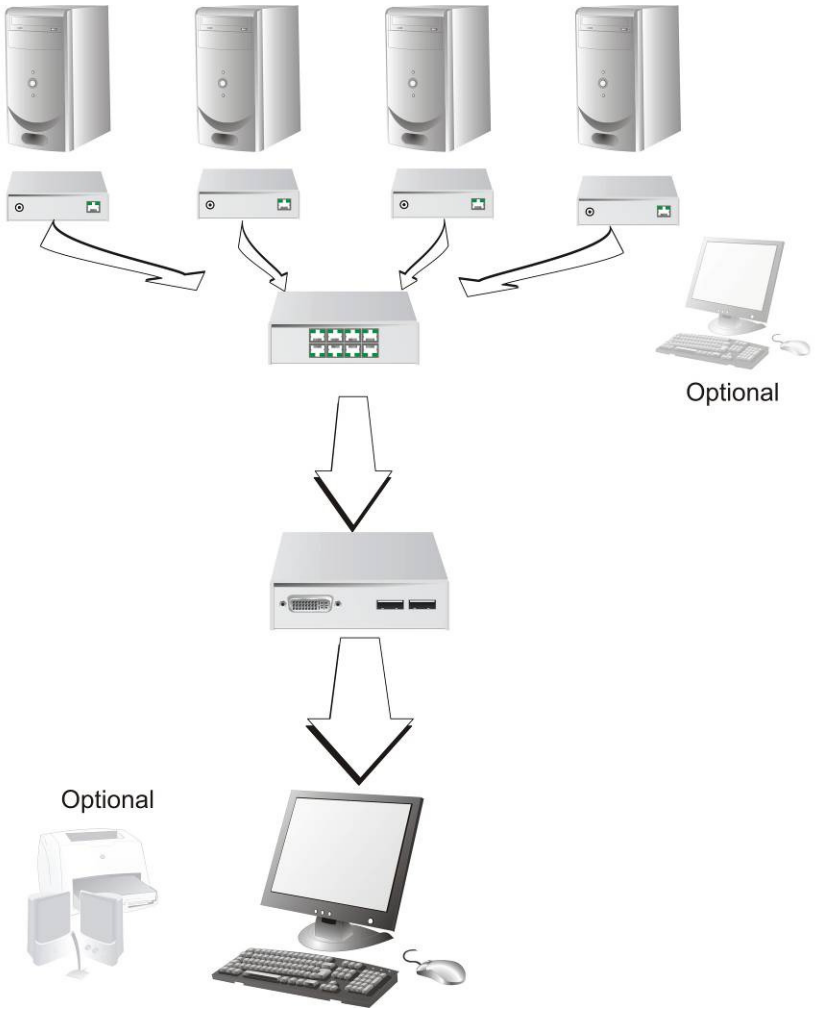
Cascading of the THOR KVM- Switch in two stages allows up to 49 CPUs to be addressed.

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

Configuration 'Single-head KVM- Switch'



Example Application:



Four CPUs are switched over the THOR Small Switch to one console.

Setup

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

Master/Slave function

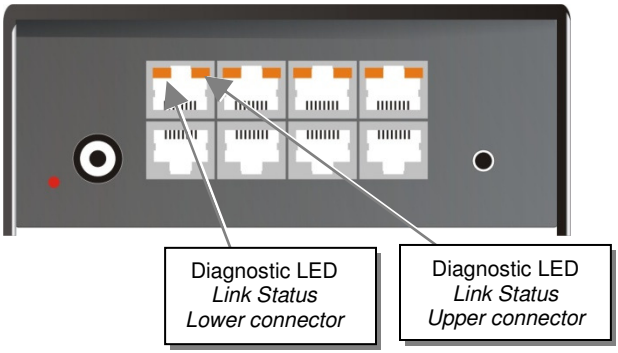
	The device is Master (default status: it is either the exclusive device in the system, or if THOR KVM Switches are cascaded, it is on the highest level (directly after the console).
	The device is Slave: if THOR KVM Switches are cascaded, it is on second level (directly after the Local Units).

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:



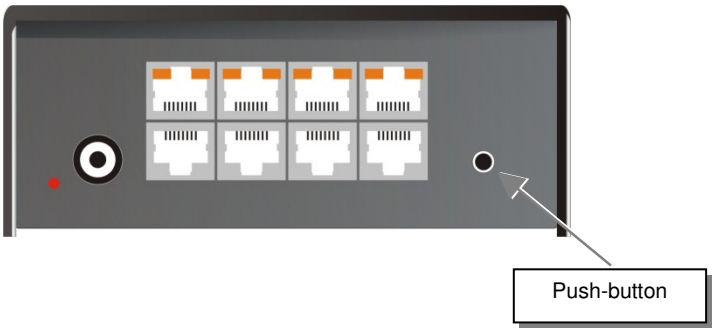
Meaning of the diagnostic LEDs:

LED	*Appearance*	*Diagnostics*
Power LED (Red LED)	Off	Device not ready
	On	Device ready
Link Status (Orange LED)	Off	No transmission over the CATx- cable attached local/remote unit is disconnected, switched off or a broken interconnect cable
	Orange On	Connection through CATx cable is OK
	Orange Blinking	Actual CPU selected by push button (**only type KVM- Switch**)
	Green On	active path (**only type KVM- Switch**)
	Green blinking	the active path has no connection through the trunk cable (**only type KVM- Switch**)

Operation

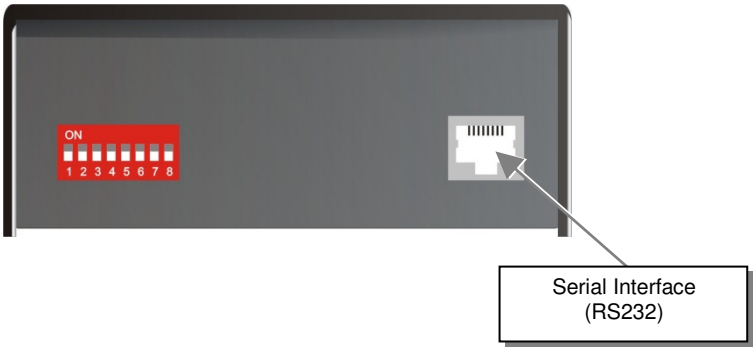
The following operations are possible in the operating mode 'Single-head KVM- Switch':

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 **145**. 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 E: 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 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 Crosspoint- Switch
• **STX, 0x4F, 0x81, < Loc-No>, ETX**	Switch (local-)input to (remote-)output, the existing connection is disconnected at the same time

where:

< Loc-No>	7Bit date 1 to 7

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, 0x4F, 0x81, 0x84, ETX	Switch console (Remote Unit) to (Local Unit) CPU 4
STX, 0x4F, 0x81, 0x85, ETX	Switch console (Remote Unit) to (Local Unit) CPU 5 (existing connection to CPU 4 is disconnected)
STX, 0x54, ETX	Reset the switch and set the connections as a function of SW7 (see above)

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 LEDs on the keyboard flash rapidly. Press <ESC> to exit the command mode.

User commands

The input of upper/lower case letters does not matter.
<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 (since firmware dated Nov-20, 2009)

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

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

Change of the initialization-string (since Nov-20, 2009)

- **<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

Call of the command mode (since Nov-20, 2009)

- **Double-click <LEFT SHIFT>**
  Enter the command mode (default-setting)

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

Change of the initialization-string (since Nov-20, 2009)

<CTRL> + <SHIFT> + <C>, <x>, <RETURN>
Change of the initialization-string for the command mode (with x = number of the initialization-string; delivery status = 3)

1: <CTRL> + <SHIFT> + <I> simultaneous
2: Double-click < Scroll lock >
3: Double-click <LEFT SHIFT>
4: Double-click < LEFT CTRL>
5: Double-click < LEFT ALT>
6: Double-click <RIGHT SHIFT>
7: Double-click < RIGHT CTRL>
8: Double-click < RIGHT ALT>

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

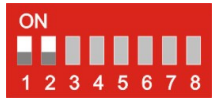
- **<BACKSPACE>**
  Switches back to the last viewed channel. Allows you to switch rapidly between two channels.

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

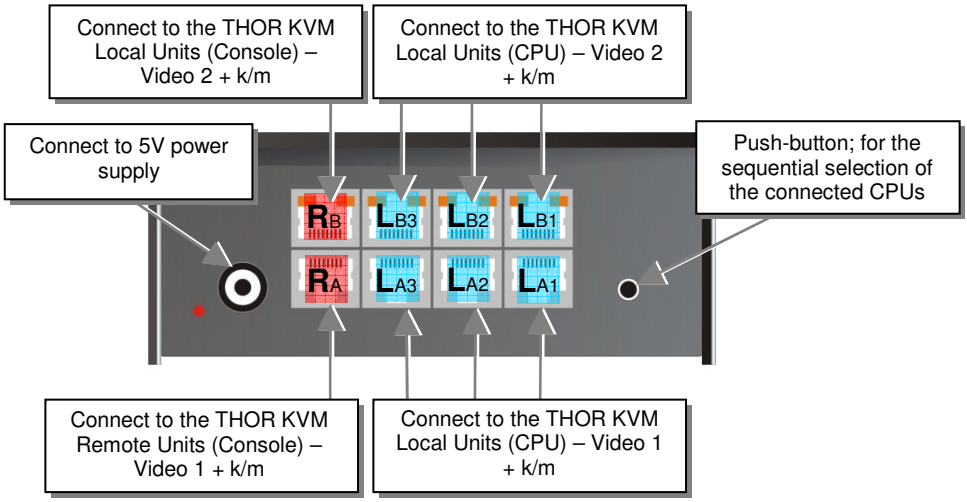
From one console (2x monitor, keyboard and mouse), you can remotely control up to 3 CPUs. The distances between the CPU and THOR Small Switch and between THOR Small Switch and console may amount to 140m.

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

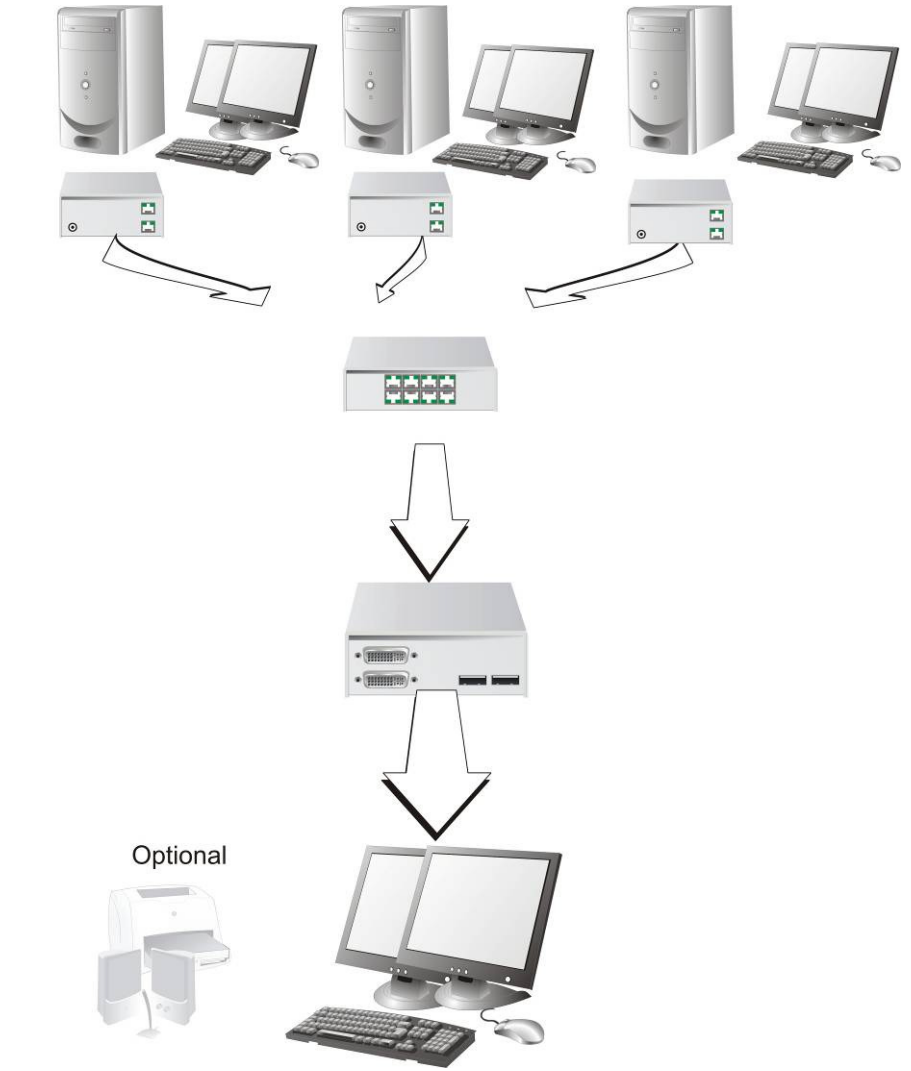
You can cascade THOR KVM- Switches in two stages for all applications, allowing up to 9 dual-head CPUs to be addressed.

In addition to the DVI- signals and USB for keyboard/mouse, bi-directional stereo-audio + serial (RS232/V24) data can be transferred by the 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 THOR Small Switch to one console.

Setup

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

Master/Slave function

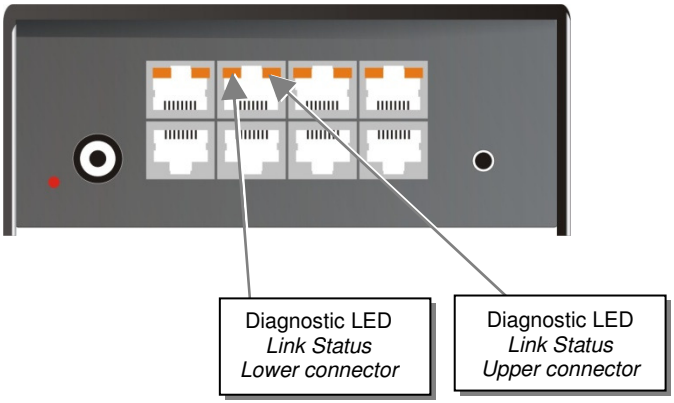
	The device is master (default status): it is either the exclusive device in the system, or if THOR KVM Switches are cascaded, it is on highest level (directly after the console).
	The device is slave: if THOR KVM Switches are cascaded, it is on second level (directly after the Local Units).

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:



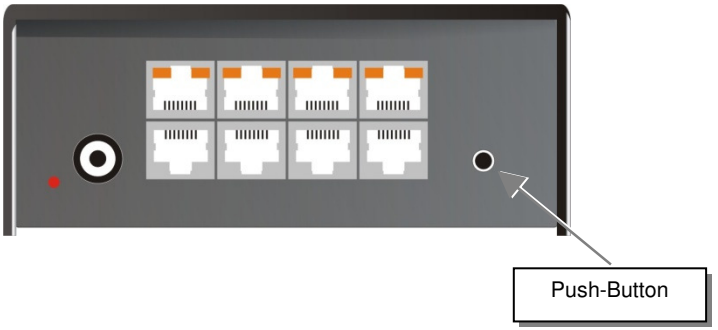
Meaning of the diagnostic LEDs:

LED	*Appearance*	*Diagnostics*
Power LED (Red LED)	Off	Device not ready
	On	Device ready
Link Status (Orange LED)	Off	No transmission over the CATx- cable attached local/remote unit is disconnected, switched off or a broken interconnect cable
	Orange On	Connection through CATx cable is OK
	Orange Blinking	Actual CPU selected by push button (**only type KVM- Switch**)
	Green On	active path (**only type KVM- Switch**)
	Green blinking	the active path has no connection through the trunk cable (**only type KVM- Switch**)

Operation

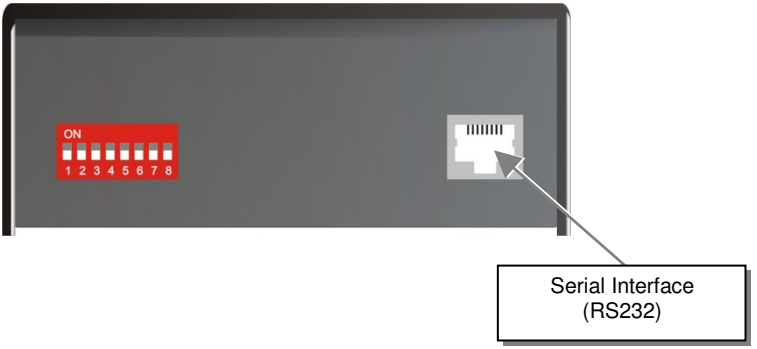
The following operations are possible in the 'Dual-head KVM- Switch' operating mode:

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 **145**. 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 E: 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 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

There are:

< Loc-No>	7Bit date 1 to 7

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, 0x4F, 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, 0x4F, 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, 0x54, ETX	Reset the switch and set the connections as a function of SW7 (see above).

c) By the attached keyboard

By executing a 'hot-key-sequence' the system is shifted into a command mode from which 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's on the keyboard flash rapidly. Press <ESC> to exit the command mode.

User commands

The input of upper and lower case letters does not make a difference.

<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 (till firmware dated Nov-20, 2009)

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

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

Change of the initialization-string (till Nov-20, 2009)

- **<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

Call of the command mode (since Nov-20, 2009)

- **Double-click <LEFT SHIFT>**
  Enter the command mode(default-setting)

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

Change of the initialization-string (since Nov-20, 2009)

<CTRL> + <SHIFT> + <C>, <x>, <RETURN>
Change of the initialization-string for the command mode (with x = number of the initialization-string; delivery status = 3)

1: <CTRL> + <SHIFT> + <I> simultaneous
2: Double-click < Scroll lock >
3: Double-click <LEFT SHIFT>
4: Double-click < LEFT CTRL>
5: Double-click < LEFT ALT>
6: Double-click <RIGHT SHIFT>
7: Double-click < RIGHT CTRL>
8: Double-click < RIGHT ALT>

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'

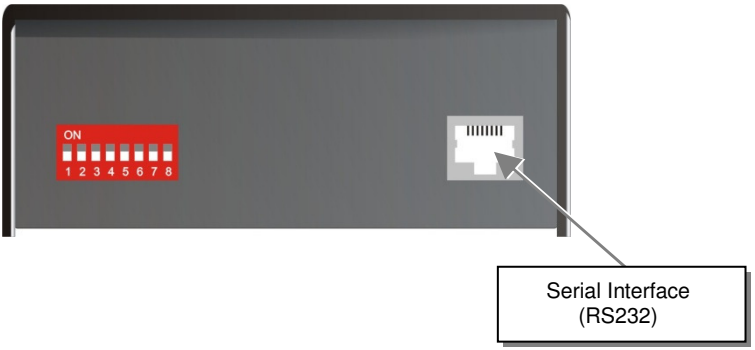
Examples:

<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 System info

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 **145**. 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 E: 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 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:

```
Fri July 27 14:04:00 2007
THOR.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 “Crosspoint Switch” operating mode, all macros in memory are reset.

	**Standard operating mode**
	**Reset** the THOR Small 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 “Crosspoint 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* LED at the Local and Remote Unit illuminated? If not, the internal power supply may be damaged or there may be an internal error.

Check that the cable is connected from the Local Unit to the Remote Unit. Is the *Link Status* LED illuminated? If not, there may be a problem with the 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? If yes, check cable length and environment.

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

'Stepping' pictures on displaying movies

With higher resolutions, the amount of data transmitted each second reduces the capability of the data link. Therefore, the data has to be reduced before transmitting. This is done 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 behavior, 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. Note 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/ 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 supported. Please check **Appendix G: List of supported USB devices** on page **135**.

Your USB- Mouse makes "jerky leaps"

With high monitor resolutions, the data volume that can be transferred may exceed the available bandwidth, so the data throughput must be reduced. For this, the device uses a RLE compression algorithm. If the necessary compression factor is not reached, not all pictures of the graphic card are transferred (frame dropping) and the mouse may make jerky leaps.

Hint: Use a lower resolution or a background which can be compressed better: Please avoid photo-backgrounds or color gradient – single-colored backgrounds are optimal and permit highest possible compression rates and highest frame rates.

Your USB- Mouse moves like it's on an "elastic"

This problem is caused by several factors which lead to a time delay between mouse movement and display on the screen. Contributions to the total delay consist of (numerical data are approx. values):

- Mouse movement/ transmission of data to the CPU (5 – 15 ms)
- Processing time in the CPU until mouse movement at the graphic output appears (50 – 70 ms)
- Transmission of the graphic data into the extender-system and transmission to the Remote Unit (15 – 45 ms)
- Processing time in the graphical output device (15 – 100 ms, where 15 ms are only reached with CRT tubes)

The difference of the delay, between 85 and 230 ms, is not a consequence of the extender-system. The extender system is responsible for 5 -15 ms mouse movement/ transmission to the CPU plus 15 – 45 ms acquiring the graphic data and transmitting it to the Remote Unit. Our measurements show that time delays greater than about 100-150 ms become noticeable and bothering. Therefore, if an extender-system increases the mouse signal delay from, say, 100ms to 140ms you may begin to experience the "elastic" delay problem.

If you use a slow response TFT screen you may already have a total response time of up to 175 ms, right at the threshold level. The addition of an extender line to such a system will appear to cause the "elastic" mouse delay problem even though the extender system is responsible for only a small part of the total problem.

Hint: Use a display with a shorter response time (please note: the response time indicated by the manufacturer is a measure of how quickly two successive pictures can be displayed, not how long it takes for a signal from the input interface to reach the screen). Use a lower resolution or a background which can be compressed better: Please avoid photo-backgrounds or color gradients – single-colored

backgrounds are optimal and permit highest possible compression rates. If the transmission needs to drop frames (because the RLE compression algorithm does not reach the required data reduction) you need to add approx. 17 ms @ 30fps and approx. 34 ms @ 20fps

USB-HID-devices

Your USB-HID device does not work

Although our interface supports HID devices, we can't ensure that every connected device will operate successfully. If you have any compatibility problems, please contact our technical support.

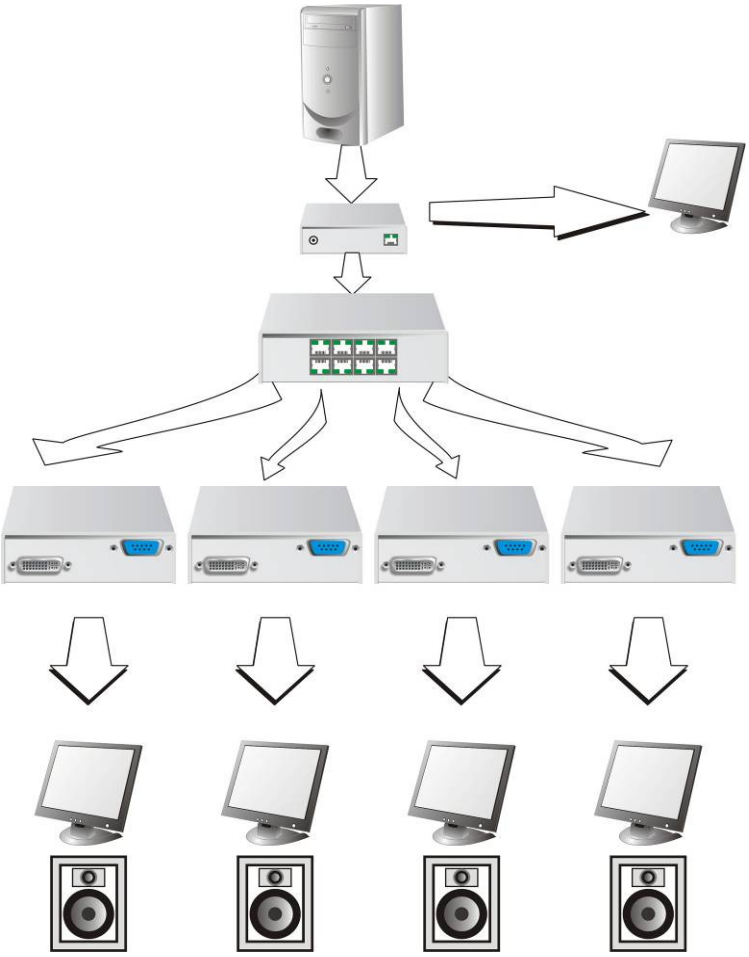
Other USB-devices

Your USB- device does not work

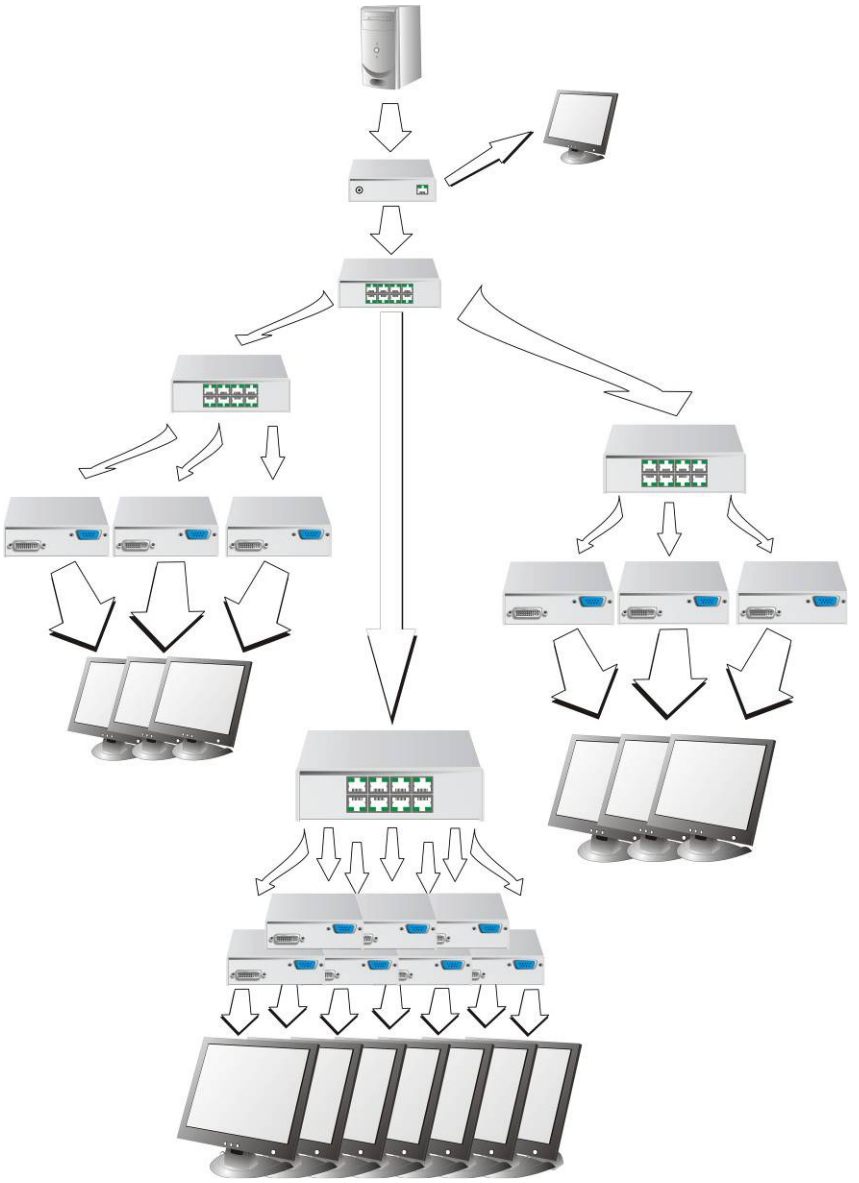
You have connected a non-HID device. The extender system supports HID devices only. All other devices are incompatible with the THOR Small Switch system.

Appendix A: Example Applications

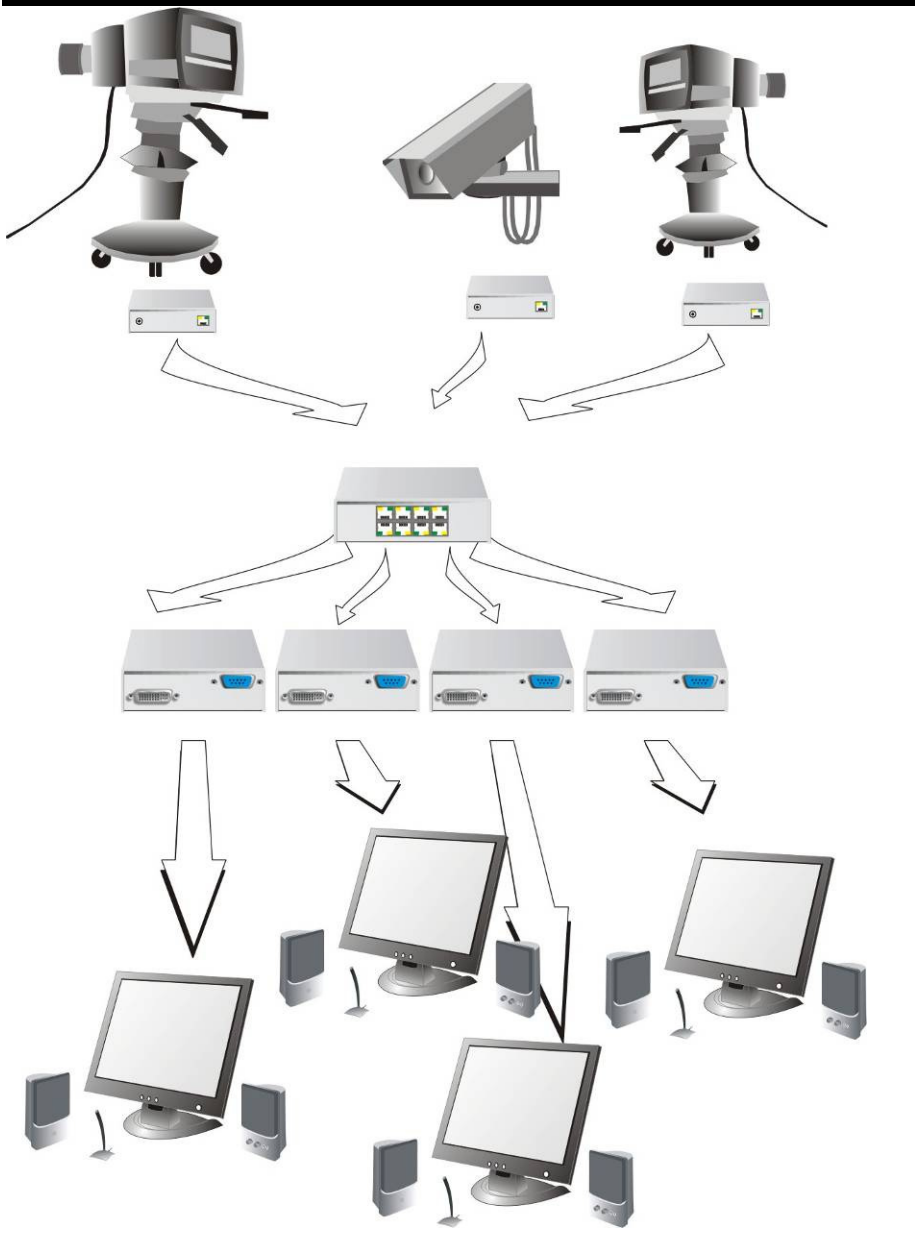
This section illustrates some specific applications using the THOR:



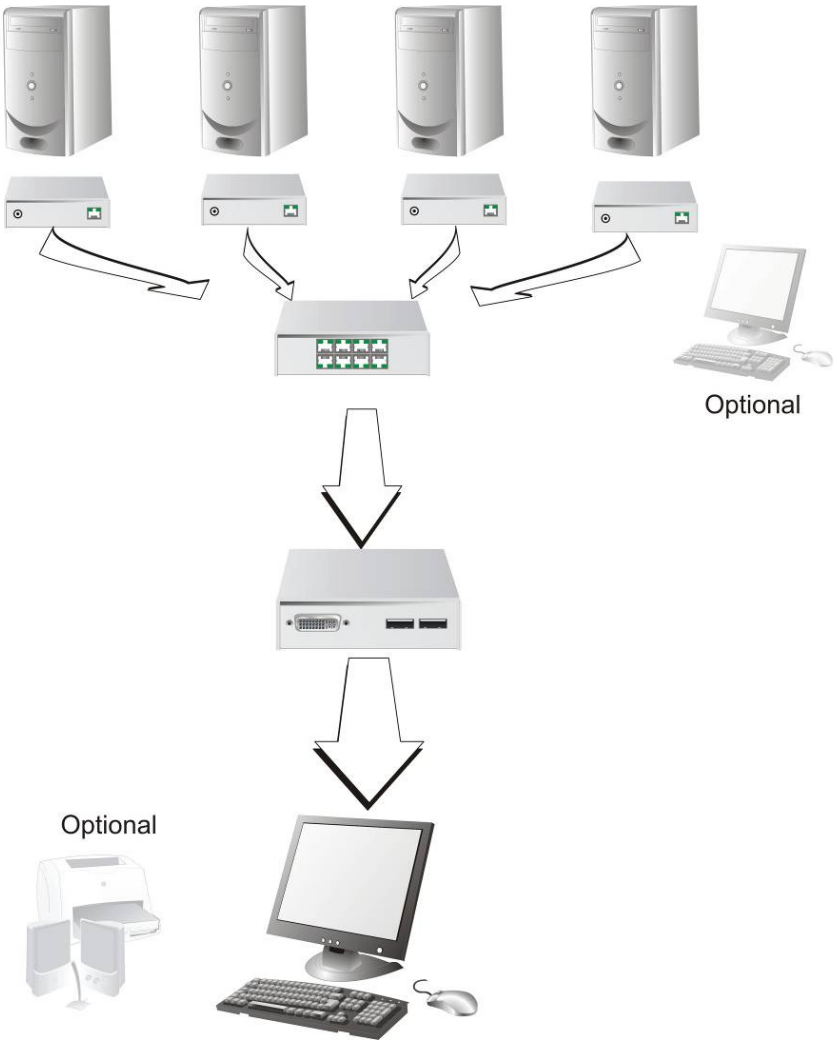
THOR as Multiplex- Repeater with audio option



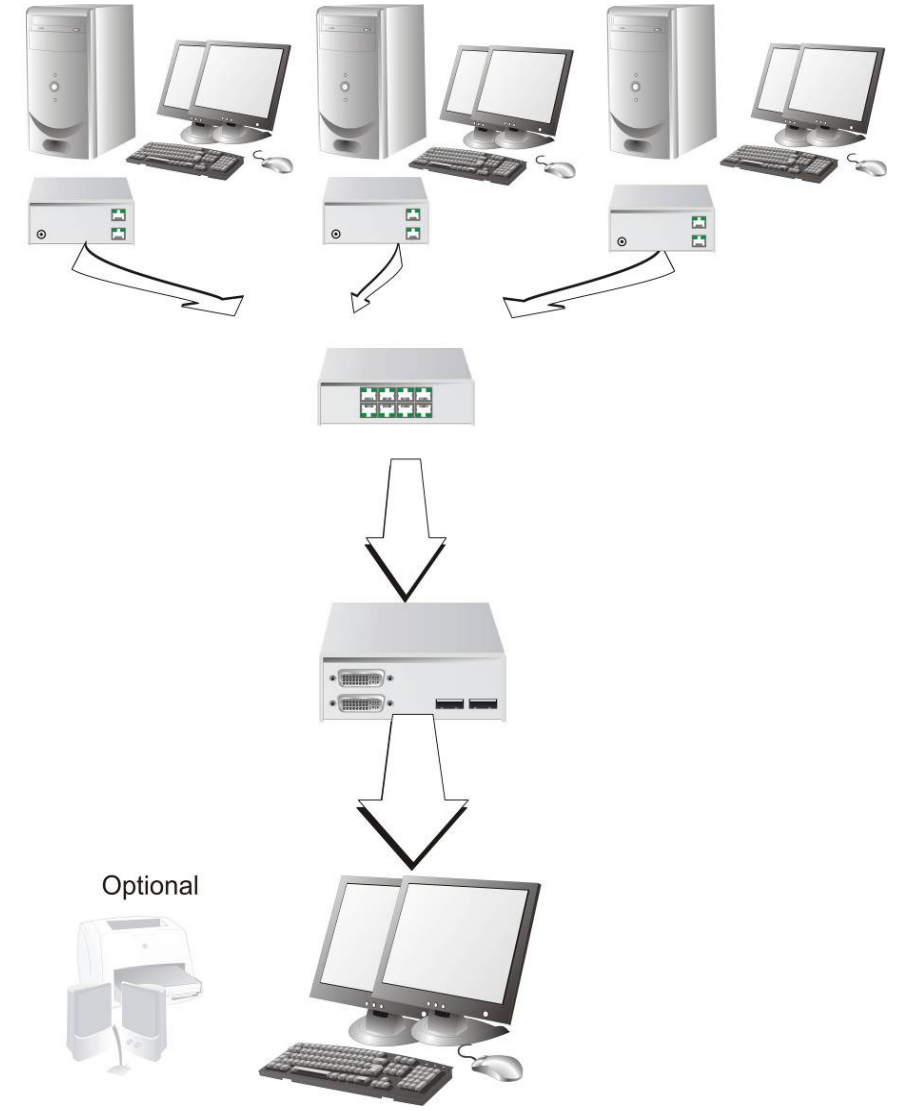
Three cascaded THOR as Multiplex- Repeater and a total of 13 screens for presentations



THOR as Crosspoint- Switch (here: 3x Input/ 4x Output)



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



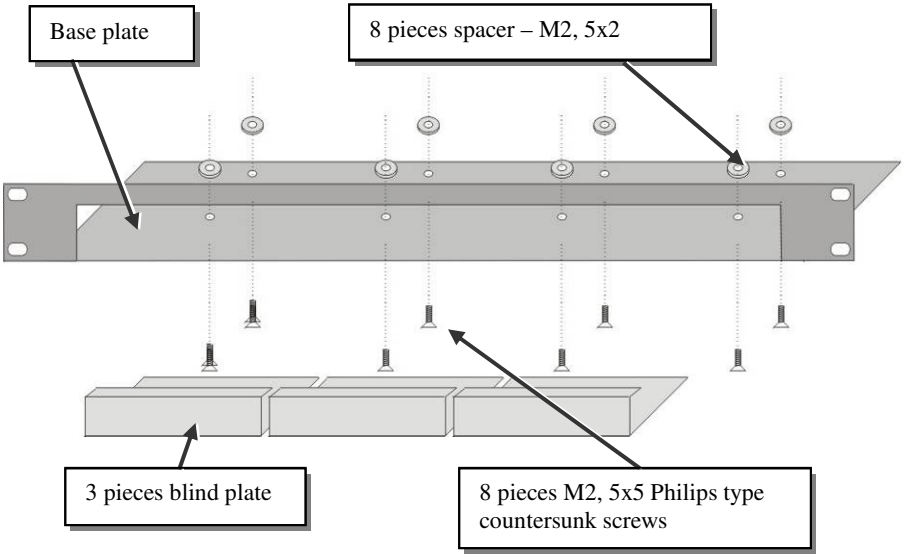
THOR as Dual-head KVM- Switch (to 3:1) with a local console

Appendix B: Rack Mount Options

Mounting Instruction Rack Mount Kit TH-ACCS-130

Using the rack mount kit TH-ACCS-130, 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 TH-ACCS-130 – List of parts delivered:



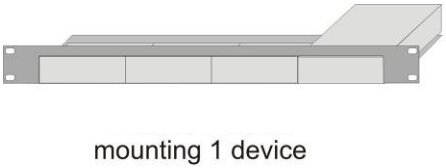
Mounting instruction:

- 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

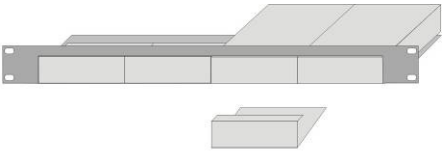
Only use the supplied, short screws, to prevent damages to the PCB's

- Close the remaining gaps with blanking plates.

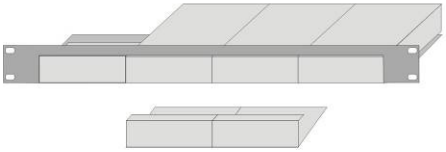
The rack mount kit TH-ACCS-130 allows mounting of up to 4 devices:



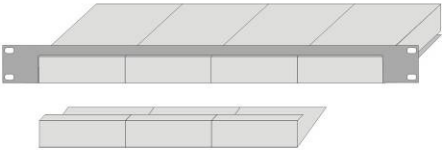
mounting 1 device



mounting 2 devices

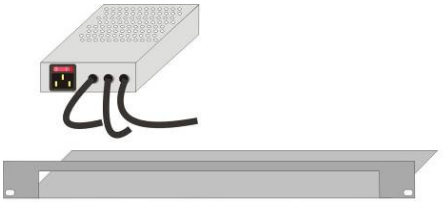


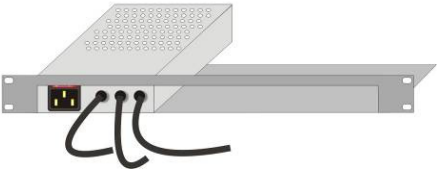
mounting 3 devices



mounting 4 devices

In the left-hand position, you can mount a rack mountable p.s.u. type TH-ACCS-132 instead of a regular device. This p.s.u. is capable of powering up to three devices.



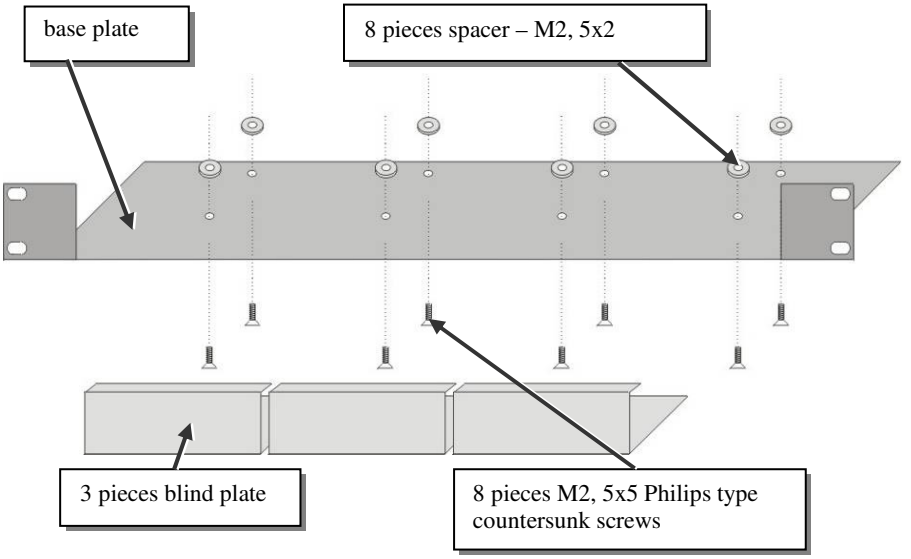


Please note:
- Use the rear mounting holes to fix the p.s.u.
- After mounting the p.s.u., the circuit break switch is no longer easily accessible – it is obstructed by the cover strip.

Mounting Instruction Rack Mount Kit TH-ACCS-131

Using the rack mount kit TH-ACCS-131, 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 TH-ACCS-131 – List of parts delivered:



Mounting instruction:

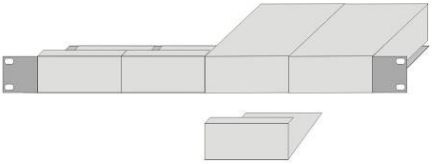
- Align the holes on the base plate with the vacant screw holes on the base of the device.
- Fasten the base of the unit to the plate of the mounting kit

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

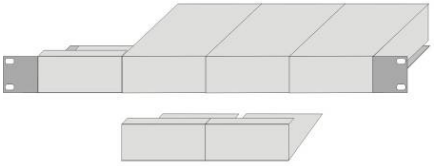
- Close the remaining gaps with blanking plates.

The rack mount kit TH-ACCS-131 allows mounting of up to 4 devices:

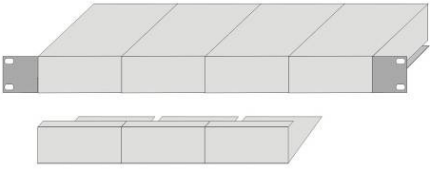
mounting 1 device



mounting 2 devices

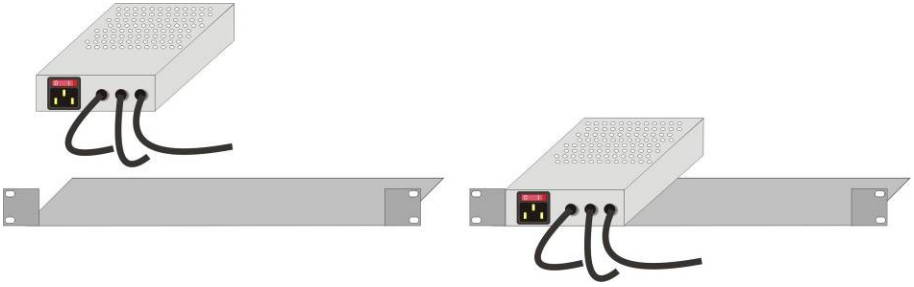


mounting 3 devices

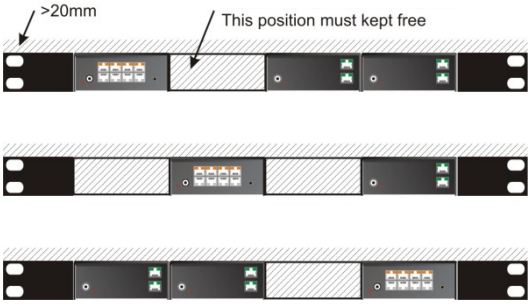


mounting 4 devices

In the left hand position you can mount a rack mountable p.s.u. type TH-ACCS-132 instead of a regular device. This p.s.u. is capable of powering up to three devices.



Mounting instructions THOR Small Switch



Appendix C: Devices with serial/audio option

The audio/serial option consists of daughter boards which allow 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 VGA/DVI video. • To set up your video, keyboard, mouse, follow the instructions in the user guide. • To set up the extender's audio and serial link, please follow all of the instructions detailed in this addendum. If you have any questions, contact our technical support.

Technical Data

Serial link:

Serial Speed:	Any up to a maximum of 19.200 Baud
Serial Data Format:	Format independent
Flow Control:	RTS, CTS, DTR, DSR are sent across link

Audio link:

Description:	Bi-directional stereo audio link
Transmission Method:	Virtual CD quality audio (16-bit, 38.4 KHz)
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. A pull-up resistor provides bias for condenser microphone. Option to set microphone amplification to +17dB

Serial Interface - Setup and Operation

No setting up or user adjustments are required. Please note that on the dual access model, 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 CPU). 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: Dual-Head KVM Extender and all Media Extender support a 3-wire- interconnection only (Tx/Rx/GND). Connected devices must support Software Handshake (XON(XOFF)

Serial Interface – Handling Multiple Serial Devices

The 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. To do this you will need to construct a custom breakout cable. Please contact technical support for further information. Select Xon/Xoff software flow control on the printer and CPU.

Audio Interface - Setup 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 setup is required unless a microphone is connected to the Remote Unit. Connect up 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:

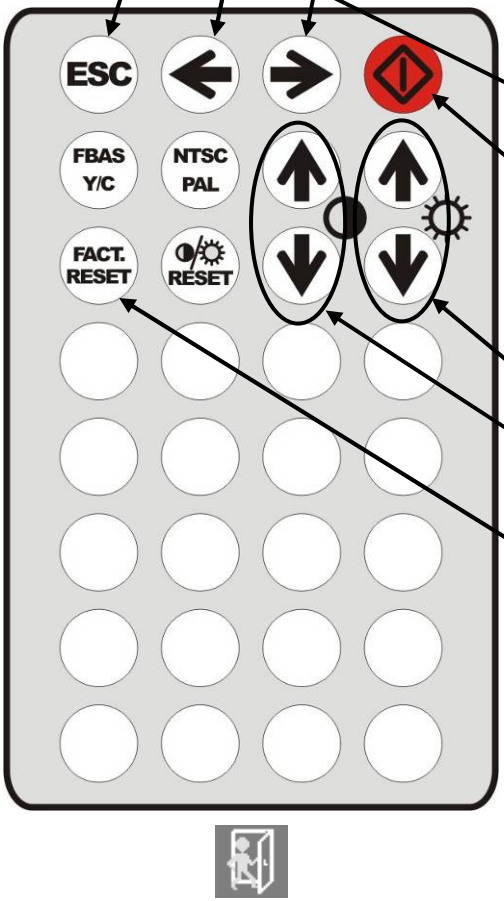
- The Local Unit's 'Line Out' connection should normally be wired to the microphone input (red) on your sound card. The sound card should then be set up to provide additional amplification (+20dB). This is the preferred connection method.
- Alternatively, the Remote Unit itself can provide microphone amplification. To set this, open up the Remote Unit and locate the jumper labeled 'MIC' on the daughterboard. 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: Setup DVI-I Local Units OSD (On Screen Display)

The following table summarizes the remote control button sequences used in system configuration and video tuning on the local unit.

Infrared Remote Control (IR-RC)



Exit OSD

Select next position / increase parameter

Select previous position / Decrease parameter

Enter OSD

Direct Brightness Control

Direct Contrast Control

Reset to factory defaults (press twice!)

Back to the Menu selection

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

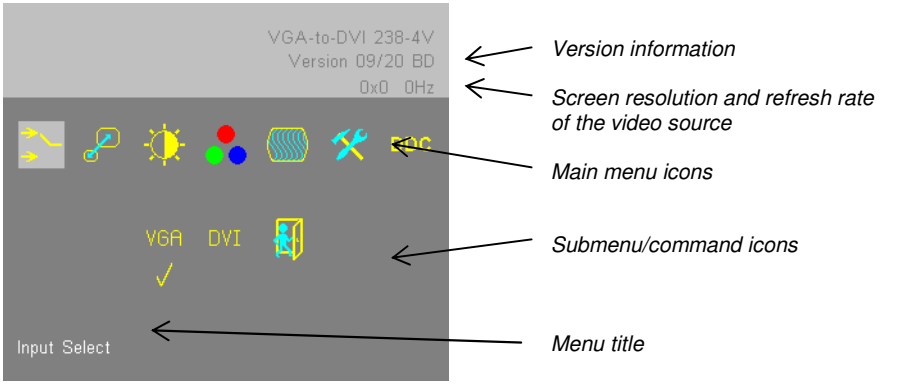


Figure 1 OSD Utility

You can adjust the following properties using the IR-Remote Control:

- Brightness/contrast
- Selection of Input Signal

You can adjust the following properties using the OSD:

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

a. Opening the OSD

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

Using the IR-RC

For direct brightness adjust

more brightness

less brightness

For direct contrast adjust

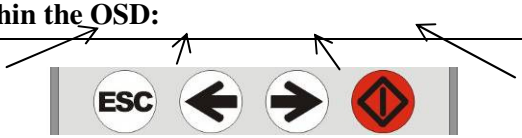
more contrast

less contrast

Reset to factory defaults

Reset to factory defaults (from flash) = resetting user presets (press twice !!)

To navigate within the OSD:



exit OSD without saving values (ESC key)

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

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

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

b. Using the OSD

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

Input Select
Specify whether the input is RGB, RGBS, RGBHV (VGA), EGA, CGA, MDA

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

Brightness – Contrast
Adjust brightness or contrast or reset to default values.

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

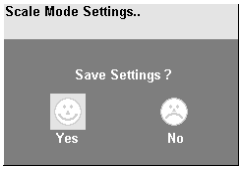
Image
Adjust pixel clock and phase. Define picture size and position.

Tools
Set OSD position and size, factory reset.

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

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

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



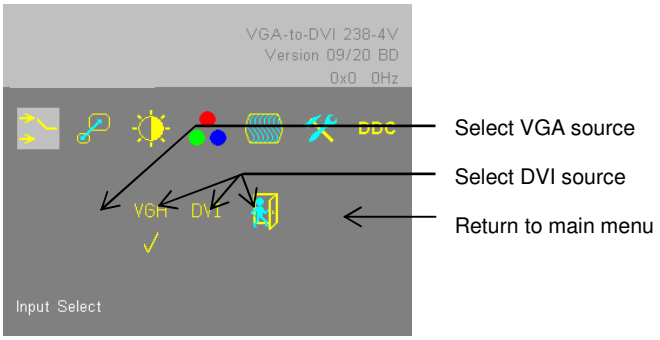
10. Highlight the *Yes* button and press the Enter key to confirm your choice. Alternatively, highlight the *No* button and press the Enter key to discard the new setting and restore the previous value.
11. Select the Exit icon to close a submenu.
12. Press the Esc key to close the OSD, saving all settings,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

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

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

Input Select

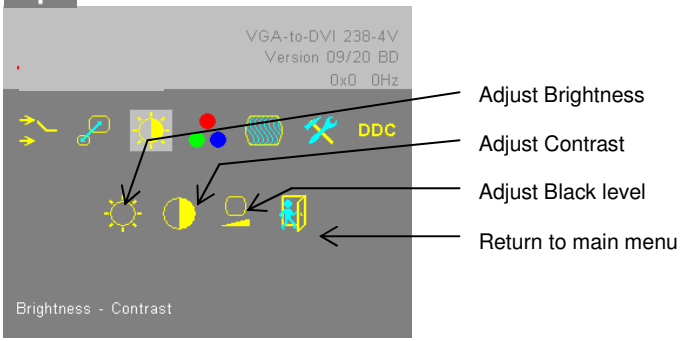
Choose the type of the connected graphic source



Input Select menu

Brightness/Contrast

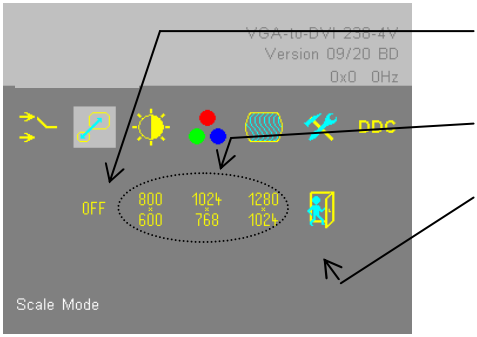
Use this menu to adjust the brightness and contrast of the video image or to adjust the black level of a display.



Brightness-Contrast menu

Scaling

Use the Output Scaling submenu to specify the best match between screen size and user requirements. Neither transparent conversion nor conversion with scaling alters the refresh rate!



No scaling: picture displayed in original size, output refresh rate = input refresh rate

Choice of 3 output resolutions for scaling (output refresh rate = input refresh rate) 800x600, 1024x768, 1280x1024

Return to previous menu

Output Scaling sub-menu

It is not possible to alter the refresh rate during conversion! If your source is 50Hz or 75Hz VSYNC – please make sure that your flat screen is able to display a picture with this refresh rate. Otherwise, please select 60Hz refresh rate in the settings of your graphics card.

Please note that scaling of a 16:9 resolution to a 4:3 resolution will result in an incorrect aspect ratio of the displayed picture.

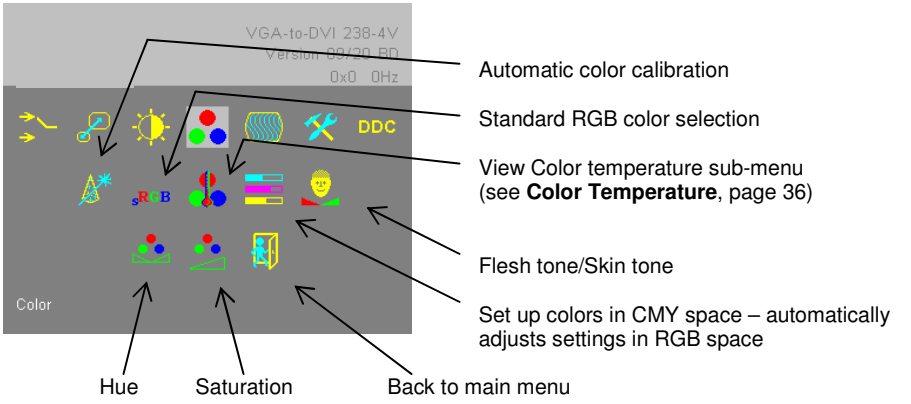
If your input signals are DVI-D, and you use scaling for downsizing your picture, there are limits for the scaling factor: The pixel clock of the input signal needs to be at maximum 1.9x output pixel clock.

This means:
Output 800x600 ➔ max. input resolution 1024x768
Output 1024x768 ➔ max. input resolution 1680x1050 (Reduced Blanking)
Output 1280x1024 ➔ each input resolution possible

If your input signals are VGA, there are no restrictions in respect to down- or upsizing your picture!

Select Colors and Color Temperatures

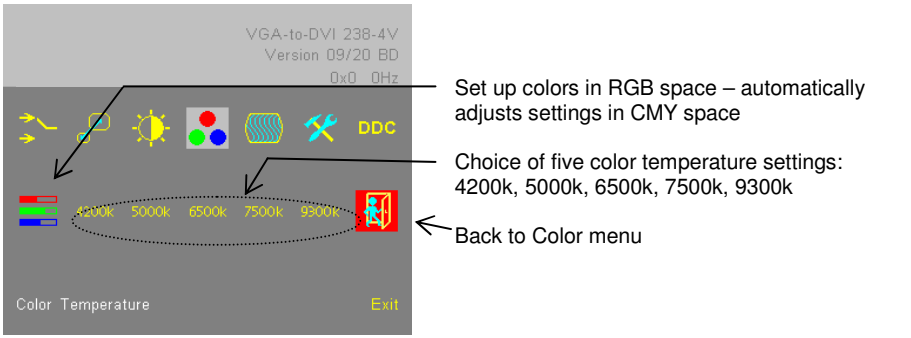
Use the Colors menu to adjust the color balance of the video image. The menu provides a number of options including automatic calibration, manual adjustment in RGB or CMY color space, hue and saturation adjustment and the setup of flesh/skin tones.



Color menu

Color Temperature

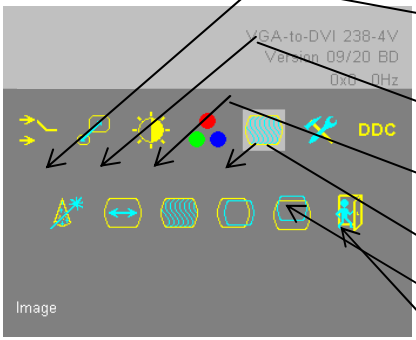
Use the Color Temperature submenu to set up the color profile in RGB color space or by using one of five predefined color temperatures. To view this menu, select the Colors icon from the main menu and then select the Color Temperature icon.



Color Temperature sub-menu

Image

Use the Image menu to adjust the vertical and horizontal screen position, picture size and to set the pixel clock and phase. Doing some tunings on SYNC problems.



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

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

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

Manually adjust the horizontal picture position

Manually adjust the vertical picture position

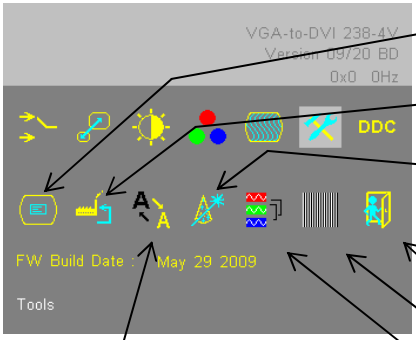
Back to main menu

Image menu

These settings are only for VGA input signals. For DVI input signals, these functions can not be selected.

Tools

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



Set the position of the OSD window (see **OSD**, page 31)

Calling Factory Reset Sub-Menu

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

Back to main menu

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

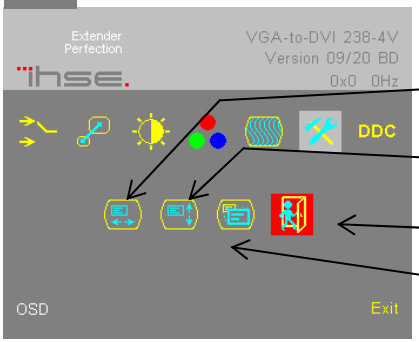
Select color depth for conversion

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

Tools menu

OSD

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



Manually adjust the horizontal position of the OSD window

Manually adjust the vertical position of the OSD window

Back to Tools menu

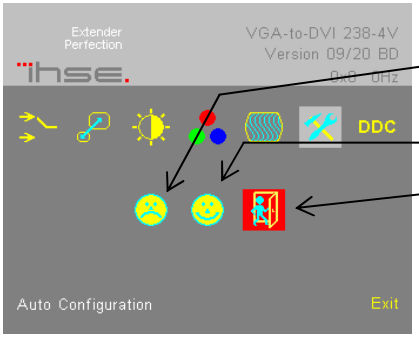
Toggle the size of the OSD window between single and double size

OSD sub-menu

Auto Configuration

Use the Auto Configuration submenu to define whether the Converter carries out automatic detection of the number of pixels per line and the best phase after a mode change (a change of screen resolution and/or refresh rate at the graphic source). Using automatic detection (while displaying an appropriate test pattern) ensures an optimized image but the procedure introduces a delay in the picture appearing on the attached console screen. If you want the picture to appear as fast as possible, you may want to disable this feature. Auto Configuration is disabled in the default factory settings.

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



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

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

Back to Tools menu

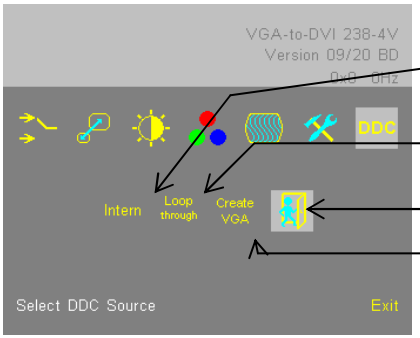
Auto-Configuration sub-menu

DDC Configuration

Use the DDC Configuration menu to select which DDC information shall be transmitted to the graphic card. The default signals of the monitor attached are transmitted. Under some circumstances, it might be necessary to send a modified table to the graphics card. In this case, please select 'INTERN'. Please note, that there is the possibility to download a foreign DDC table into the internal table.

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

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



Use the information from the internal DDC table

Connect DDC lines directly from locally attached monitor

Back to main menu

Create a VGA-DDC from DVI DDC in the internal table

DDC Configuration menu

c. Setup Instructions for RGB Input

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

13. Display a picture with as much detail as possible from your graphic source. If possible, display a 'burst-pattern' (see picture on next page) - a picture with alternating, 1-pixel wide, black and white, vertical stripes.

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

14. Display the OSD (see page 121).

15. Select the Image menu option:

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

17. Assess the desktop test pattern. If the vertical stripes are sharp and without jitter or smearing, the adjustment has been successful. Go to step 9.

18. If the picture quality is not acceptable after the automatic adjustment, you will have to manually adjust the pixel clock and pixel phase (in this order).

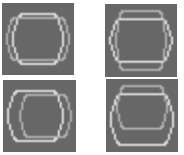
19. With a poorly adjusted pixel clock you may see one or more vertical areas, where the lines are smeared (see picture a on next page):

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

20. Problems with the pixel phase will cause horizontal noise, horizontal wave-formed lines, flicker or smearing with zebra-pattern (see picture b below):

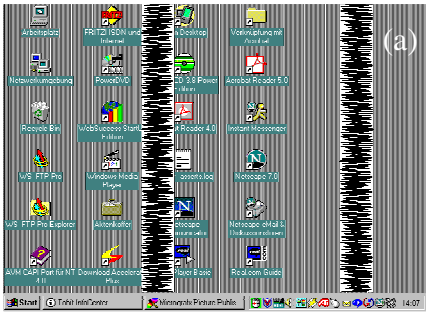
    8.4 From the OSD's Image menu, select the menu command:
    Manually adjust the best phase (best point for A/D conversion).
    8.5 Modify the phase until all distortions have disappeared.
    8.6 Confirm the setting.

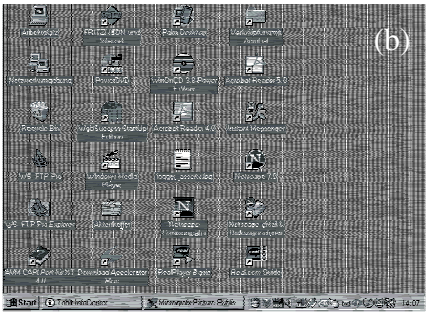
21. If necessary adjust the size of the visible part of the picture.
(The horizontal and vertical size is displayed in numeric values for exact adjustment)



22. If necessary adjust the position of the visible part of the screen.
It may be necessary to adjust the picture size (step 9) again

23. If appropriate, re-attach your TFT monitor and adjust its image according to the manufacturer's instructions.





Burst test pattern applied to desktop showing problems with (a) pixel clock setting, (b) pixel phase setting.

Appendix E: Protocol for command mode

For the control of the THOR Small 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 command

<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 control commands being sent during the transmission of binary data, data is divided into low-nibble and high-nibble. The data is 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

THOR Small 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-command with data	
	a) repeat command b) next command c) receive and process the replay-command

Commands, **global** functions

	Function	Command	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

Commands, switching functions

No	Function	Command	Answer
1	switch an OUTPUT to an INPUT	STX, 0x47, <OUTPUT -No>,, <INPUT -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 F: Calling Technical Support

If you determine that your THOR Small Switch is malfunctioning, ***do not attempt to alter or repair it***. It contains no user-serviceable parts. Please contact the technical support.

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 THOR Small 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 scenario that 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 THOR Small Switch's firmware. If this turns out to be the case for your problem, 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 THOR Small 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 Support* to get a Return Authorization (RA) number.
- * http://www.telecast-fiber.com/support/

Appendix G: List of supported USB devices

Although the USB connection's implementation allows all keyboards and mice, we cannot guarantee that all available keyboards/mice are compatible with the THOR Small Switch system.

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 (Logitech)

- Classic Keyboard 200
- Media Keyboard 600
- Wave Keyboard
- Ultra Flat Keyboard
- Cordless Desktop EX 110
- Cordless Desktop LX 710 Laser
- Cordless Desktop MX 3200 Laser

Mice (Logitech)

- Pilot Optical
- Cordless Mini
- Cordless Click! Plus
- G3 Laser
- G5 Laser
- LX3 Optical
- LX5 Cordless Optical
- LX7 Cordless Optical
- MX 620 Cordless Laser
- MX 400 Performance Laser
- MX 1000 Laser
- V100 Optical
- V150 Laser
- V220 Cordless Optical
- V320 Cordless Optical
- V450 Laser Cordless
- VX Nano
- VX Revolution

Appendix H: Specifications

A THOR Media/KVM Local/ Remote Unit

Power Supply

Voltage	AC: 90-240VAC-0.5A-47-63Hz DC: 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 / wheel mouse
RJ45	1000 Mbit High-speed transmission. Wiring acc. EIA/TIA 568B Gigabit Ethernet
LC (fiber)	1000 Mbit High-speed transmission. 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	47KOhm
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. Pull-up 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 (Hardware Handshake)
Dual-head Devices	NO flow control (XON/XOFF only– Software Handshake)

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 (1000BaseT).
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 (1000BaseT).

Maximum Length of Interconnection Cable (Fiber - LC Connectors)

Singlemode 9 µm	10.000m (32, 750ft)
Multimode 50µm	400m (1, 300ft)
Multimode 62.5µm	200m (650ft)

Size and Shipping Weight

THOR Media or THOR 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)
THOR KVM Dual-head or THOR Media w/ Audio/serial	103 x 143 x 42mm (4”x5.6”x1.1”) (2 devices) Weight Local/ Remote: 0,6kg (1.3lb) each
Shipping box	260x210x150mm (10.2”x8.3”x5.9”) Weight: 2.0 kg (4.3lb)

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 THOR Small Switch Unit

Power Supply

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

Interface

RJ45	1000 Mbit High-speed transmission. Wiring acc. EIA/TIA 568B Gigabit Ethernet
LC (fiber)	1000 Mbit High-speed transmission. Gigabit Ethernet
RJ45 – Serial (switching connector):	115.2 KBAUD, 8 bit data, 1 Stop, NO parity Software Handshake only (XON/XOFF)

Maximum Length of Interconnection Cable

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

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 (1000BaseT).
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 (1000BaseT).

Maximum Length of Interconnection Cable (Fiber - LC Connectors)

Singlemode 9 µm	10.000m (32, 750ft)
Multimode 50µm	400m (1, 300ft)
Multimode 62.5µm	200m (650ft)

Size and Shipping Weight

THOR Small Switch	103 x 143 x 42mm (4”x5.6”x1.1”) Weight: 0,6kg (1.3lb)
Shipping box	260x210x150mm (10.2”x8.3”x5.9”) Weight: 2.0 kg (4.3lb)

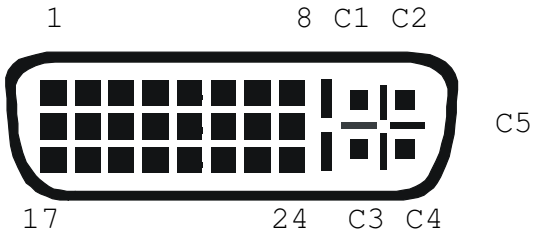
Environmental

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 I: Connectors

A THOR Media Local/ Remote Unit

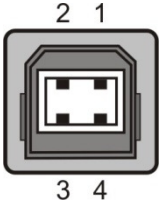
DVI-I connector



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

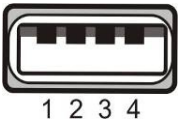
(Connector Local Unit)



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

Keyboard/ Mouse connector, USB type A

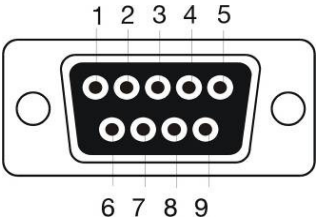
(Connector Remote Unit)



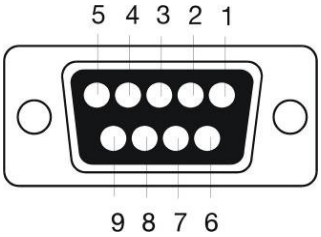
Pin	*Signal*	
1	VCC (+5V)	Red
2	Data -	White
3	Data +	Green
4	GND	Black

Serial Interface

(audio-/ serial option)



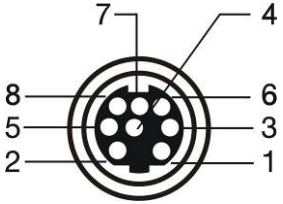
Connector (Remote Unit)



Connector (Local Unit)

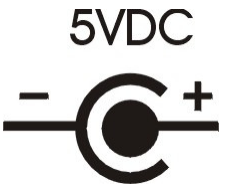
Pin	*Signal*	*Pin*	*Signal*
1	n.c.	1	n.c.
2	RxD	2	RxD
3	TxD	3	TxD
4	DTR	4	DTR
5	GND	5	GND
6	DSR	6	DSR
7	RTS	7	RTS
8	CTS	8	CTS
9	n.c	9	n.c

Audio/serial connector Audio/RS232 at Dual head Local Unit



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

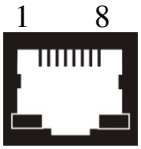


Pin	*Signal*
Inner	+5V
Outer	GND

B THOR Small Switch Unit

Serial Interface

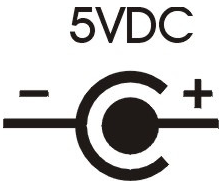
(switch socket) DCE



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 THOR Devices

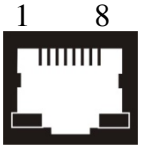
Power Supply



Pin	*Signal*
Inner	+5V
Outer	GND

CATx- Interfaces

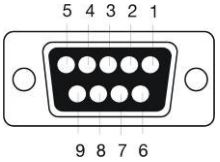
Wiring acc. EIA/TIA 568A (1000BaseT)

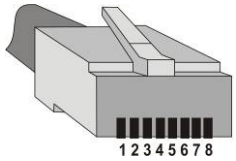


Pin		*Pin*	
1	D1+	5	D3-
2	D1-	6	D2-
3	D2+	7	D4+
4	D3+	8	D4-

Appendix J: Connection Cable

Serial cable to connect the THOR Small Switch 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