Draco vario Add-on Modules

Series 474

Introduction

This manual contains important safety instructions as well as instructions for setting up the product and operating it. Read carefully through the User Manual before you switch on the product. Observe the general safety instructions (see chapter 2, page 10) and additional instructions in the respective chapters.

Product Identification

The model and serial number of your products are indicated on the bottom of our products. Always refer to this information when you need to contact your distributor or the support of IHSE GmbH (see chapter 11, page 68).

Trademarks and Trade Names

All trademark and trade names mentioned in this document are acknowledged to be the property of their respective owners.

Validity of this Manual

This manual applies to all products of the Serie named on the cover page. Differences between the various models are clearly described. Please note the change log for this manual in chapter 15, page 76.

The manufacturer reserves the right to change specifications, functions or circuitry of the Serie described here without notice. Information in this manual can be changed, expanded, or deleted without notice. You can find the current version of the manual in the download area of our website.

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Available Documentation

Name	Format	Description	Provision
User Manual	PDF	Provides an overview of the product together with technical data and safety instructions. Contains all instructions required to operate the product to a basic level.	Download from website.
Quick Setup	Print	Provides a quick installation guide and safety instructions.	Contained in the scope of delivery.

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Table of Contents

1 Important Information

1.1 Firmware and Software

The information in this manual refers to the latest extender firmware available at the date of manual release. Please refer to the change log (see chapter 15, page 76) for user manual updates.

1.2 Symbols for Warnings and Helpful Information

The meaning of the symbols used for warnings and helpful information in this manual is described below:

⚠ WARNING
WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION
CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE
NOTICE identifies information, if not observed, endangers the Functionality of your device or the security of your data.

This symbol indicates instructions for procedures recommended by the manufacturer for an effective utilization of the device potential.

This symbol indicates information about special features on the device or when using device and Function variants.

1.3 Terms and Spellings

Uniform terms and spellings are used in this manual for better readability or easier assignment.

The following spellings are used for products and system descriptions:

Term	Description
Source	Computer, graphics card (USB, video, audio, data)
Sink	Console (monitor, keyboard, mouse, video, audio, data)
CPU Unit	Encoder to connect to the source.
CON Unit	Decoder to connect at the peripherals.

The following text formats are used for keyboard commands:

Keyboard command	Description
key	Key on the keyboard
key + key	Press keys simultaneously
key, key	Press keys successively
2x key	Press key quickly, twice in a row (like a mouse double-click)

The following text formats are used for, e.g., descriptions of editing files or updating firmware:

Keyboard command	Description
`Config.txt`	E.g., file name
`#CFG`	E.g., file content

1.4 Intended Use

Add-on Modules

Add-on modules are only intended for use in conjunction with extender modules and for installation in 474-BODY chassis. Add-on modules are used to embed and de-embed signals and data, e.g., audio or USB HID signals or USB 2.0 data. All signals and data are transferred via interconnection between extender modules (CPU Units and CON Units).

USB 2.0 Stand-alone Modules

USB 2.0 stand-alone modules are used to increase the distance between sources and associated consoles. The transmission range of USB 2.0 data can be extended using Cat X cables or fiber optic cables.

USB 2.0 stand-alone modules with Cat X connections are unsuitable for connection between buildings. Use a fiber optic-based extender module instead.

USB 2.0 stand-alone modules with fiber connections can also be used with applications in environments which are subject to electromagnetic interference.

Fan Cartridge Module

The fan cartridge module is used for ventilation of 474-BODY chassis.

1.5 Certificates/Directives

1.5.1 North American Regulatory Compliance

The "equipment" referred to in the "North American Regulatory" chapter consists of a fully assembled modular system and includes the chassis, extender modules and possibly add-on modules along with supplied cables. For more details about the modular system, please refer to chapter 4.1.1, page 12.

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

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

Shielded cables must be used with this equipment to maintain compliance with radio frequency energy emission regulations and ensure a suitably high level of immunity to electromagnetic disturbances.

All power supplies are certified to the relevant major international safety standards.

1.5.2 EU Declaration of Conformity

Please find the EU Declaration of Conformity for the device under:
www.ihse.com/eu-declaration-of-conformity

A copy of the original, product-specific EU Declaration of Conformity can be provided upon request. For contact details, see page 2 of this manual.

1.5.3 WEEE

The manufacturer complies with the EU Directive 2012/19/EU on the prevention of waste electrical and electronic equipment (WEEE).

The device labels carry a respective marking.

2 Safety instructions

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

- ➡ Read this user manual carefully.
- ➡ Read the manual for the chassis in which the add-on modules are installed. Also read the extender module manual for the extender modules with which you are using the add-on module. The instructions, safety and warning instructions contained in these manuals must also be observed.
- ➡ Only use the device according to this user manual. Failure to follow the instructions described can result in personal injury, damage to the device, or endanger the security of your data.
- ➡ Take any required ESD precautions.

Installation Location

While operating the device can get warm. Damage to the device can occur in a damp environment.

- ➡ Use the device only in dry, indoor environments.
- ➡ Use the device only in a room with adequate ventilation.
- ➡ Place the device at a sufficient distance from the operator.

Connection

- ➡ Check the device for visible damage before connecting it.
- ➡ Only connect the device if the device and the ports are not damaged.
- ➡ Only use cables supplied by the manufacturer or cables that comply with the technical specification, see chapter 10, page 54.
- ➡ Only connect the device to KVM devices using the interconnecting cable - not to other devices, particularly not to telecommunications or network devices.

3 Consignes de Sécurité

Pour garantir un fonctionnement fiable et sûr de votre périphérique à long terme, veuillez respecter les directives suivantes :

- Lisez attentivement ce manuel d'utilisation.
- Lisez le manuel d'utilisation du châssis dans lequel les modules d'extension sont installés. Les instructions, les consignes de sécurité et les avertissements qu'il contient doivent également être respectés.
- N'utilisez le périphérique que conformément à ce manuel d'utilisation. Le non-respect des instructions décrites peut entraîner des blessures corporelles, endommager le périphérique ou mettre en danger la sécurité de vos données
- Prenez toutes les précautions nécessaires contre les décharges électrostatiques.

Emplacement de l'installation

Pendant le fonctionnement, le périphérique peut chauffer. Le périphérique peut être endommagé dans un environnement humide.

- N'utilisez le périphérique que dans un environnement sec et intérieur.
- N'utilisez le périphérique dans un lieu correctement ventilée.
- Placez le périphérique à une distance suffisante de l'opérateur.

Connexion

- Avant de connecter le périphérique et les unités d'alimentation, vérifiez qu'ils ne présentent pas de dommages visibles.
- Seulement connectez le périphérique que si le périphérique et les ports ne sont pas endommagés.
- Seulement utilisez des câbles fournis par le fabricant ou des câbles conformes aux spécifications techniques, voir chapitre 10, page 54.
- Ne connectez le périphérique qu'à des périphériques KVM à l'aide du câble d'interconnexion - pas à d'autres périphériques, en particulier pas à des périphériques de télécommunications ou de réseau.

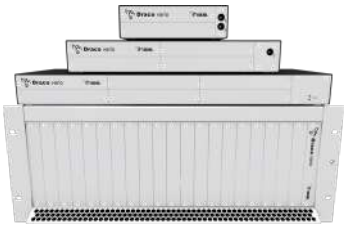
4 Description

4.1 System Overview

4.1.1 Modular Draco vario System

The Draco vario chassis are compatible with all available Draco vario extender modules and add-on modules (CPU Unit and CON Unit), CWDM modules, repeaters, fan modules, and SNMP modules for standalone or rack-mounted configuration. The flexible, modular system allows custom integration of equipment to meet specific installation requirements. Chassis are available in sizes for 2, 4, 6 and 21 individual modules.

Therefore, please first select a chassis, then select one or more extender module(s), then select one or more add-on module(s) if required.
The Draco System Designer, available on the IHSE website at https://dsd.ihse.com, will help you with system configuration.



For more information, please refer to the manual 474-BODY.

Described in this manual.

For more information, please refer to the respective extender module manual.

4.1.2 System Structure and Terms

A KVM pair consists of 2 KVM extender modules, each with at least one CPU extender module and at least one CON extender module. The various extender modules are installed respectively in a Draco vario chassis (2-slot, 4-slot, 6-slot, or 21-slot) on the CPU side (CPU Unit) and console side (CON Unit). With 2-slot, 4-slot and 6-slot chassis add-on modules are placed above an extender, with 21-slot chassis, add-on modules are placed to the right of an extender module. An add-on module will not work if it is mounted above an empty slot.

The assignment of add-on module and USB 2.0 stand-alone modules can be recognized by the article number:

- Add-on module/USB 2.0 stand-alone module for the CPU Unit: **L**4XX (L = Local)
- Add-on module/USB 2.0 stand-alone module for the CON Unit: **R**4XX (R = Remote)

An add-on module can contain up to 2 independent function parts (part A and B), one on the left and one on the right, see Fig. 1.

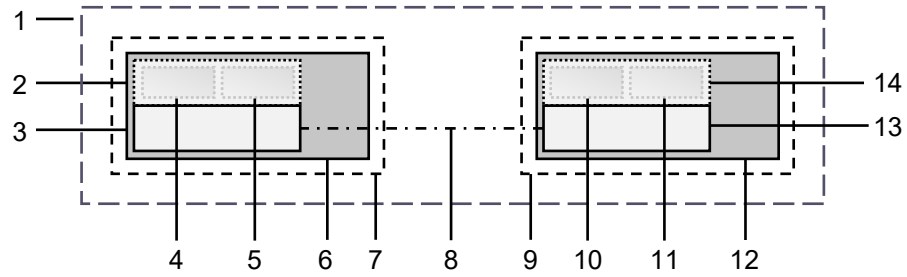


Fig. 1 KVM Extender pair with CPU Unit and CON Unit

1 KVM Extender pair
2 Add-on module/USB 2.0 stand-alone module (optional)
3 Extender module
4 Part A of the CPU add-on module (optional)
5 Part B of the CPU add-on module (optional)
6 Chassis
7 CPU Unit
8 Interconnect cable
9 CON Unit
10 Part A of the CON add-on module (optional)
11 Part B of the CON add-on module (optional)
12 Chassis
13 Extender module
14 Add-on module/USB 2.0 stand-alone module (optional)

4.1.3 Embedded Signals

If optional add-on modules are used, signals such as e.g., audio (analog, serial, digital or symmetrical) or USB 2.0 are transferred to the underlying extender module and embedded as well as transmitted via the link connection to the CON Unit. The embedded signals are extracted in the CON Unit, transferred to the add-on module above and output there separately.

Example with optional Add-on Module L- /R474-BAE

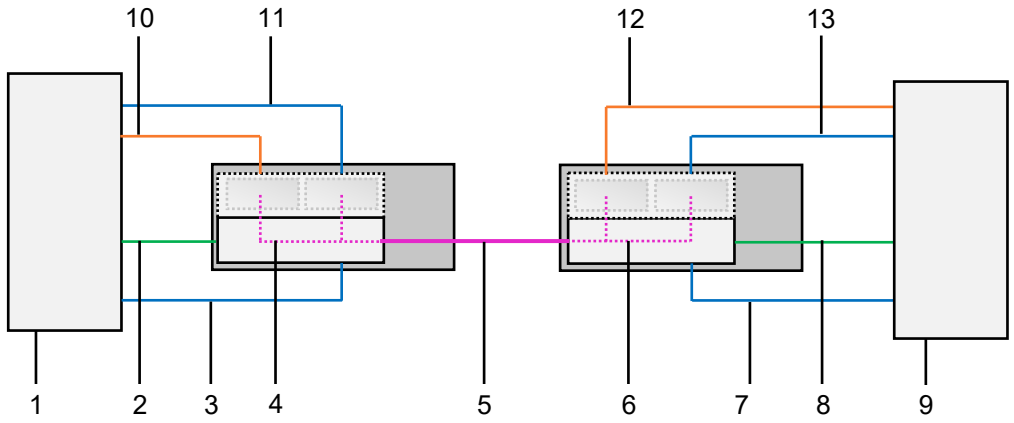


Fig. 2 Embedding/de-embedding of signals in a KVM extender pair (example L- /R474-BAE)

1 Source
2 Video signal with embedded audio signal
3 USB HID signal
4 Embedding the audio and USB 2.0 signal
5 Interconnect cable
6 De-embedding the audio and USB 2.0 signal
7 USB HID signal
8 Video signal with embedded audio signal
9 Sink (console with monitor, keyboard, and mouse)
10 Audio signal
11 USB 2.0 signal
12 Audio signal, de-embedded
13 USB 2.0 signal, de-embedded

Example with optional Add-on Module R474-BDX

To output an audio signal with separate speakers, there is only the optional audio add-on module for the CON Unit required.

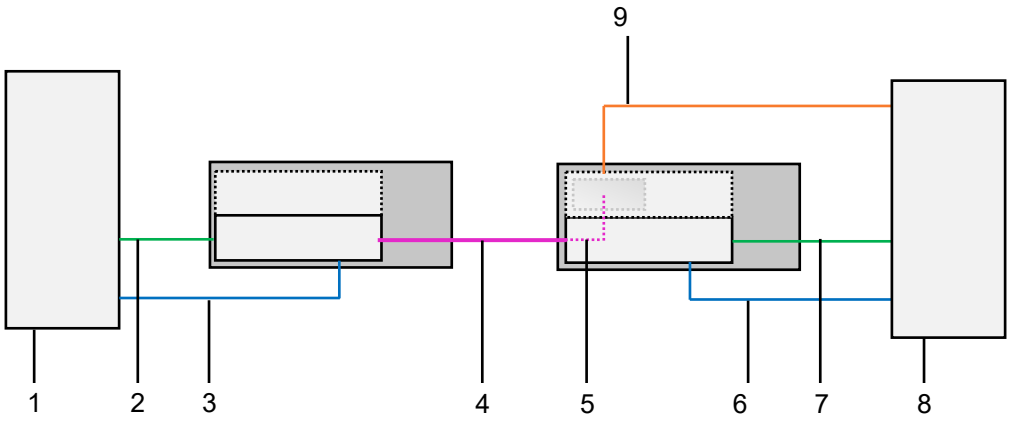


Fig. 3 De-embedding of audio signals in a KVM extender pair (example R474-BDX)

1 Source
2 Video signal with embedded audio
3 USB HID signal
4 Interconnect cable
5 De-embedding digital audio signal
6 USB HID signal
7 Video signal with embedded audio
8 Sink (console with monitor, keyboard, mouse, and speakers)
9 De-embedded digital audio signal

4.1.4 Overview Add-on Modules

This section illustrates an overview of the available types of add-on modules for KVM extender modules.

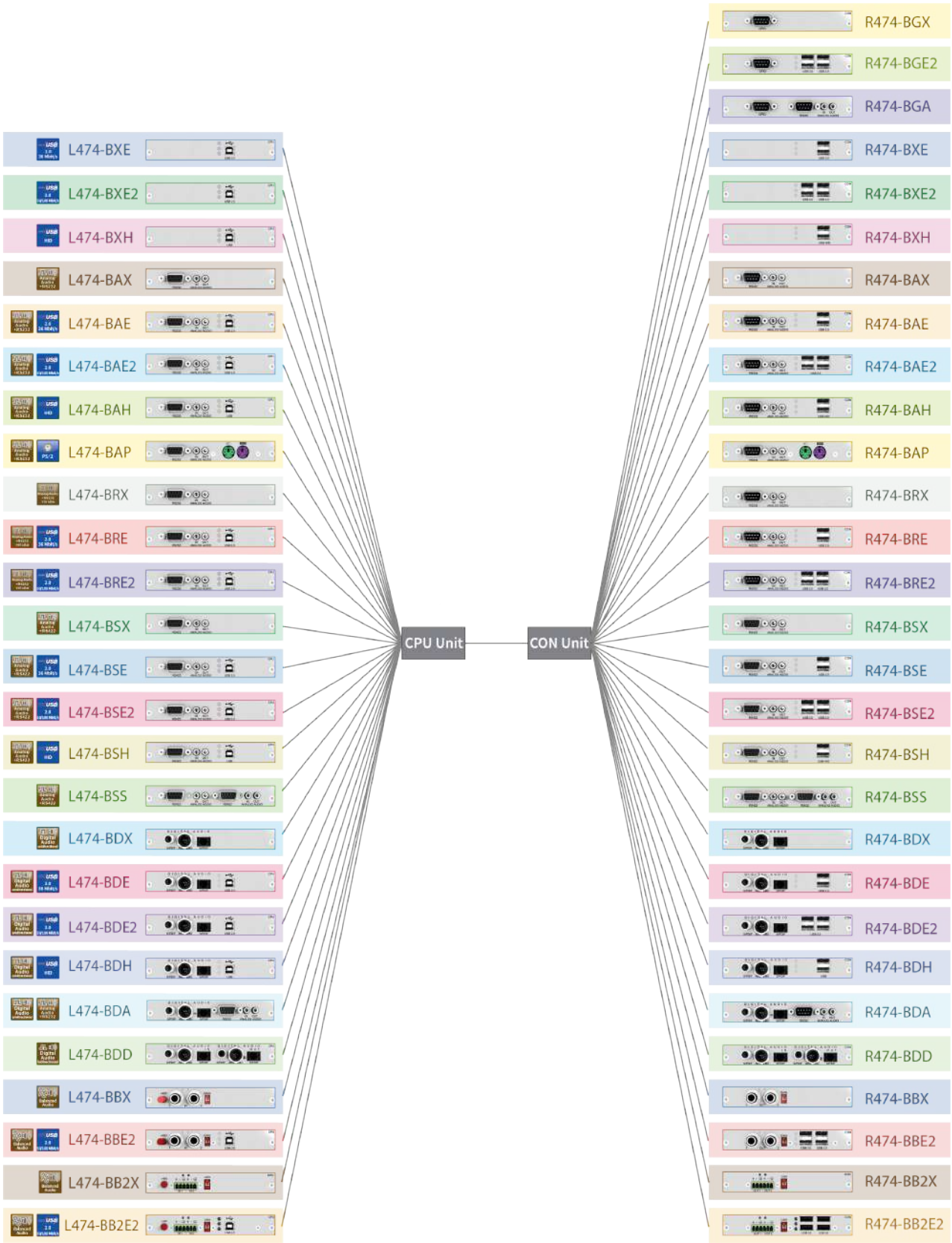


Fig. 4 Overview add-on modules

4.1.5 Audio Compatibility

The audio compatibility depends on the combination of extender modules and add-on modules, see following figure.

HDMI 1.3: 5.1-Channel LPCM digital audio, embedded/
HDMI 2.0: 2-Channel LPCM digital audio, embedded

DP 1.1: 5.1-Channel LPCM digital audio, embedded/ DP 1.2:
2-Channel LPCM digital audio, embedded

5.1-Channel PCM digital audio

Balanced audio

2-Channel analog audio + RS232 (19.2 kBd)

2-Channel analog audio + RS422 (115.2 kBd)

2-Channel analog audio + RS232 (115.2 kBd)

HDMI 1.3: 5.1-Channel LPCM digital audio, embedded/
HDMI 2.0: 2-Channel LPCM digital audio, embedded

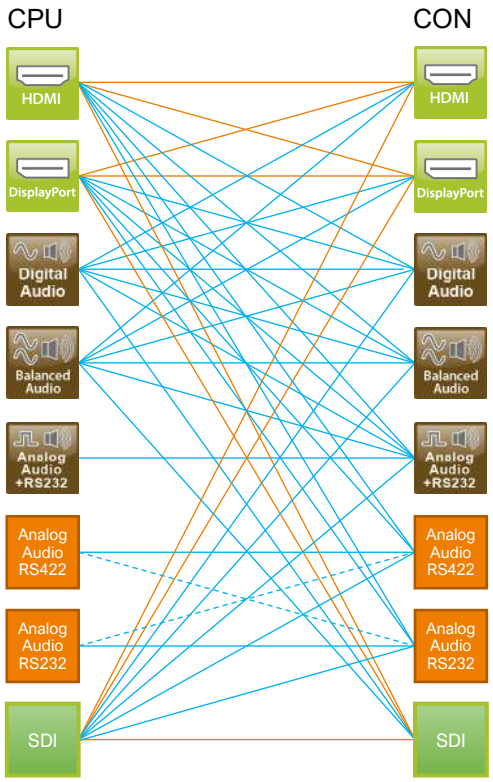


Fig. 5 Audio compatibility of extender modules and add-on modules

* Extender modules of HDMI 1.3 Serie 481/491 and DP 1.1 Serie 483/493 support 5.1 channel digital audio whereas extender modules of HDMI 2.0 Serie 495 and DP 1.2 Serie 490 only support 2-channels

Requires an audio add-on module on the CPU Unit or the CON Unit

True embedded audio

Connection is representing audio content only

Analog audio add-on modules are not necessarily audio compatible to each other since they use difference protocols. The following table lists the audio compatibility (X) and non-audio compatibility (-) for analog audio add-on modules:

	R474-BAX RS232 @ 19.2 kBd	**R474-BRX RS232 @ 115 kBd**
L474-BAX RS232 @ 19.2 kBd	X	-
L474-BRX RS232 @ 115 kBd	-	X
L474-BSX RS422 @ 115 kBd	-	X

4.2 Installation Examples

This section illustrates typical installations of KVM extender pairs.

The CPU Unit is connected directly to the source using the supplied cables. The CON Unit is connected to the console. The CPU Unit and the CON Unit communicate with each other through the interconnect cables.

4.2.1 Single-Head Installation with Add-on Module Audio

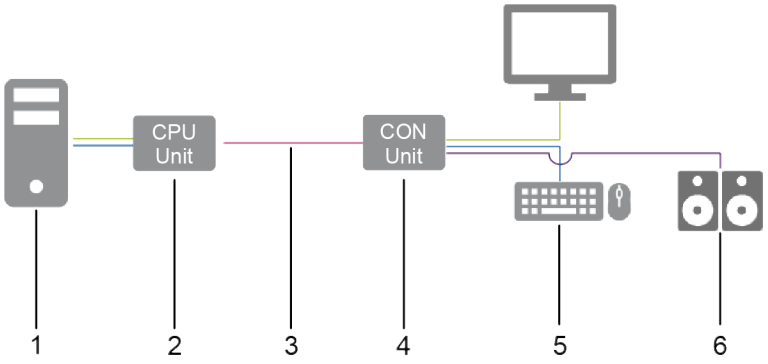


Fig. 6 Installation example (Single-Head with add-on module audio)

1 Source
2 CPU Unit
3 Interconnect cable
4 CON Unit
5 Console (monitor, keyboard, mouse)
6 Audio sink (optional, only with devices with add-on module analog audio/Serial option, digital audio, or balanced analog audio

4.2.2 Dual-Head Installation with Add-on Module USB 2.0

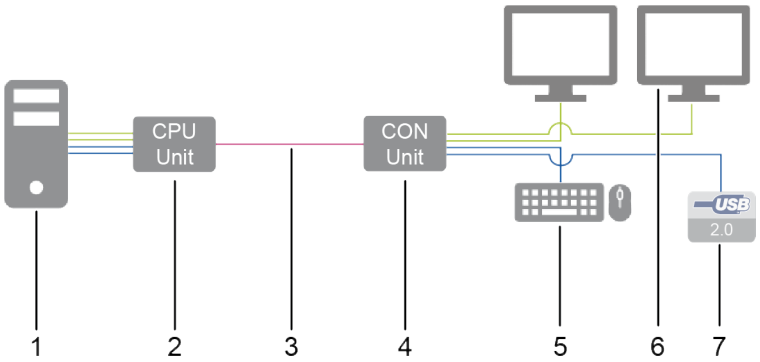


Fig. 7 Installation example (Dual-Head with add-on module USB 2.0)

1 Source
2 CPU Unit
3 Interconnect cable
4 CON Unit
5 Console (monitor, keyboard, mouse)
6 Second monitor (optional, only with Dual-Head extender modules)
7 USB 2.0 devices (optional, only with add-on modules USB 2.0)

4.3 Product Types

4.3.1 Add-on Modules

Add-on Modules USB 2.0 embedded and USB HID

Part. No.	Description
L474-BXE	Add-on module with 2x USB 2.0 embedded (up to 36 Mbit/s)
R474-BXE	
L474-BXE2	Add-on module with 4x USB 2.0 embedded (up to 50/100 Mbit/s)
R474-BXE2	
L474-BXH	Add-on module with 2x USB HID, Hot Key function available (R474-BXH)
R474-BXH	

Add-on Modules Analog Audio (bidirectional), RS232 (serial)

Part. No.	Description
L474-BAX	Add-on module with analog audio (bidirectional) and RS232 (serial)
R474-BAX	
L474-BAE	Add-on module with analog audio (bidirectional), RS232 (serial) and 2x USB 2.0 embedded (up to 36 Mbit/s)
R474-BAE	
L474-BAE2	Add-on module with analog audio (bidirectional), RS232 (serial) and 4x USB 2.0 embedded (up to 50/100 Mbit/s)
R474-BAE2	
L474-BAH	Add-on module with analog audio (bidirectional), RS232 (serial) and 2x USB HID, Hot Key function available (R474-BAH)
R474-BAH	
L474-BAP	Add-on module with analog audio (bidirectional), RS232 (serial) and PS/2
R474-BAP	
L474-BRX	Add-on module with analog audio (bidirectional) and RS232 up to 115 k (serial)
R474-BRX	
L474-BRE	Add-on module with analog audio (bidirectional), RS232 up to 115 k (serial) and 2x USB 2.0 embedded (up to 36 Mbit/s)
R474-BRE	
L474-BRE2	Add-on module with analog audio (bidirectional), RS232 up to 115 k (serial) and 4x USB 2.0 embedded (up to 50/100 Mbit/s)
R474-BRE2	

Add-on Modules Analog Audio (bidirectional), RS422 (serial)

Part. No.	Description
L474-BSX	Add-on module with analog audio (bidirectional) and RS422 (serial)
R474-BSX	
L474-BSE	Add-on module with analog audio (bidirectional), RS422 (serial) and 2x USB 2.0 embedded (up to 36 Mbit/s)
R474-BSE	
L474-BSE2	Add-on module with analog audio (bidirectional), RS422 (serial) and 4x USB 2.0 embedded (up to 50/100 Mbit/s)
R474-BSE2	
L474-BSH	Add-on module with analog audio (bidirectional), RS422 (serial) and 2x USB HID, Hot Key function available (R474-BSH)
R474-BSH	
L474-BSS	Add-on module with 2x analog audio (bidirectional) and 2x RS422 (serial)
R474-BSS	

Add-on Modules Digital Audio (unidirectional)

Part. No.	Description
L474-BDX	Add-on module with digital audio (unidirectional)
R474-BDX	
L474-BDE	Add-on module with digital audio (unidirectional) and 2x USB 2.0 embedded (up to 36 Mbit/s)
R474-BDE	
L474-BDE2	Add-on module with digital audio (unidirectional) and 4x USB 2.0 embedded (up to 50/100 Mbit/s)
R474-BDE2	
L474-BDH	Add-on module with digital audio (unidirectional) and 2x USB HID, Hot Key function available (R474-BDH)
R474-BDH	
L474-BDA	Add-on module with digital audio (unidirectional), analog audio (bidirectional) and RS232
R474-BDA	
L474-BDD	Add-on module with 2x digital audio (unidirectional)
R474-BDD	

Add-on Modules Balanced Audio

Part. No.	Description
L474-BBX	Add-on module with balanced analog audio (unidirectional)
R474-BBX	
L474-BBE2	Add-on module with balanced analog audio (unidirectional) and 4x USB 2.0 embedded (up to 50/100 Mbit/s)
R474-BBE2	
L474-BB2X	Add-on module with balanced analog audio (unidirectional) (until 12/2021)
R474-BB2X	
L474-BB2E2	Add-on module with balanced analog audio (unidirectional) and 4x USB 2.0 embedded (up to 50/100 Mbit/s) (until 12/2021)
R474-BB2E2	

Add-on Modules GPIO

Part. No.	Description
R474-BGX	Add-on module for CON Units with up to 8 configurable GPIO in-/outputs

Part. No.	Description
R474-BGA	Add-on module for CON Units with up to 8 configurable GPIO in-/outputs, with analog audio (bidirectional) and RS232 (serial)s
R474-BGE2	Add-on module for CON Units with up to 8 configurable GPIO in-/outputs and 4x USB 2.0 embedded (up to 50/100 Mbit/s)

4.3.2 USB 2.0 Stand-alone Modules

Part. No.	Description
L474-BXUC	Add-on module with 4x USB 2.0 (up to 480 Mbit/s), Cat X (Base: ICRON 2300 Core)
R474-BXUC	
L474-BXUS	Add-on module with 4x USB 2.0 (up to 480 Mbit/s), Single-Mode Fiber (Base: ICRON 2300 Core)
R474-BXUS	

4.3.3 Fan Cartridge Module

Part. No.	Description
474-MODFAN	Fan cartridge module, retrofittable for all Draco vario chassis

4.4 Accessories

Part. No.	Description	Interface
455-CK	Duplex audio cable 2 m (3.5 mm)	Audio
455-CR	Cinch cable 2.5 m	Audio
455-CT	TOSLINK cable 2.0 m	Audio
247-U1	USB cable Type A-B, 1.8 m	USB/USB HID
247-U2	USB cable Type A-B, 3.0 m	USB/USB HID
436-USB20	USB extension cable Type A-A, 3.0 m	USB/USB HID
024-3A	PS/2 cable 1.8 m	USB/USB HID
DC-DB9-MF-018	RS-232/422 data cable DB9 male/female, 1.8 m	Serial
476-CTRL4-GPIO	Remote Control for Draco vario GPIO module with 4 push buttons/LEDs (cable length approx. 3.0 m)	GPIO

4.5 Scope of Delivery

Some add-on modules consist of 2 function parts (left and right). In the case of add-on modules with 2 function parts, more cables are supplied accordingly (e.g., 2 audio parts or 1 audio part and 1 PS/2 part).

Product type	Delivery scope per function part
Add-on module USB 2.0/USB 2.0 embedded	USB cable Type A-B, 1.8 m
Add-on module USB HID	USB cable Type A-B, 1.8 m
Add-on module analog audio/Serial	• 1x Serial cable 1.8 m (RS232) • 1x Duplex audio cable 2 m (3.5 mm)
Add-on module digital audio	• 1x Cinch cable 2.5 m • 1x TOSLINK cable 2.0 m
Add-on module PS/2	2x PS/2 cable 1.8 m

4.6 Product View

4.6.1 Add-on Module USB 2.0 embedded L-/R474-BXE

Source side (CPU module)

Sink side (CON module)

Fig. 8 Interface side L-/R474-BXE

1 USB Type B, USB 2.0 (up to 36 Mbit/s)

1 USB Type A, USB 2.0 (up to 36 Mbit/s)
2 USB Type A, USB 2.0 (up to 36 Mbit/s)

4.6.2 Add-on Module USB 2.0 embedded L-/R474-BXE2

Source side (CPU module)

Sink side (CON module)

Fig. 9 Interface side L-/R474-BXE2

1 USB Type B, USB 2.0 (up to 50/100 Mbit/s)

1 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
2 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
3 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
4 USB Type A, USB 2.0 (up to 50/100 Mbit/s)

4.6.3 Add-on Module USB HID L-/R474-BXH

Source side (CPU module)

Sink side (CON module)

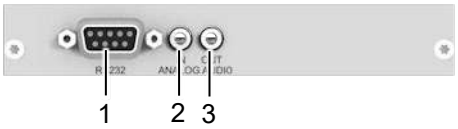
Fig. 10 Interface side L-/R474-BXH

1 USB Type B, USB HID

1 USB Type A, USB HID device 1
2 USB Type A, USB HID device 2

4.6.4 Add-on Module Analog Audio (bidirectional) L-/R474-BAX/-BRX

Source side (CPU module)



Sink side (CON module)

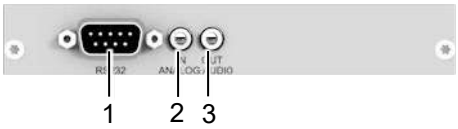


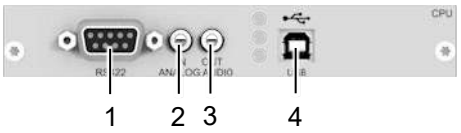
Fig. 11 Interface side L-/R474-BAX/-BRX

1 D-Sub 9, female socket, RS232 serial
2 3.5 mm jack socket, analog audio, input
3 3.5 mm jack socket, analog audio, output

1 D-Sub 9, male socket, RS232 serial
2 3.5 mm jack socket, analog audio, input
3 3.5 mm jack socket, analog audio, output

4.6.5 Add-on Module Analog Audio (bidirectional) L-/R474-BAE/-BRE

Source side (CPU module)



Sink side (CON module)

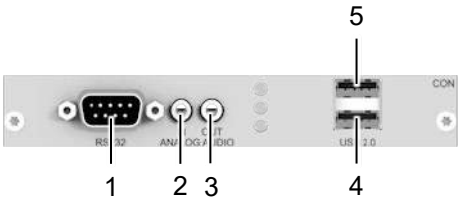


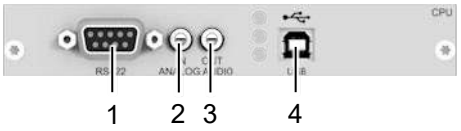
Fig. 12 Interface side L-/R474-BAE/-BRE

1 D-Sub 9, female socket, RS232 serial
2 3.5 mm jack socket, analog audio, input
3 3.5 mm jack socket, analog audio, output
4 USB Type B, USB 2.0 (up to 36 Mbit/s)

1 D-Sub 9, male socket, RS232 serial
2 3.5 mm jack socket, analog audio, input
3 3.5 mm jack socket, analog audio, output
4 USB Type A, USB 2.0 (up to 36 Mbit/s)
5 USB Type A, USB 2.0 (up to 36 Mbit/s)

4.6.6 Add-on Module Analog Audio (bidirectional) L-/R474-BAE2/-BRE2

Source side (CPU module)



Sink side (CON module)

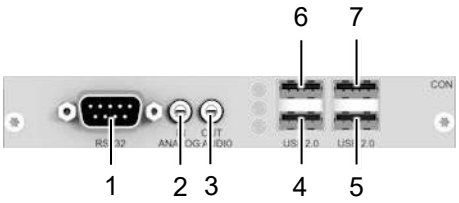


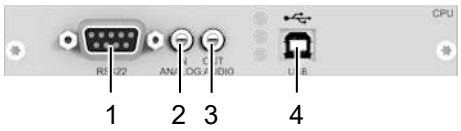
Fig. 13 Interface side L-/R474-BAE2/-BRE2

1 D-Sub 9, female socket, RS232 serial
2 3.5 mm jack socket, analog audio, input
3 3.5 mm jack socket, analog audio, output
4 USB Type B, USB 2.0 (up to 50/100 Mbit/s)

1 D-Sub 9, male socket, RS232 serial
2 3.5 mm jack socket, analog audio, input
3 3.5 mm jack socket, analog audio, output
4 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
5 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
6 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
7 USB Type A, USB 2.0 (up to 50/100 Mbit/s)

4.6.7 Add-on Module Analog Audio (bidirectional) L-/R474-BAH

Source side (CPU module)



Sink side (CON module)

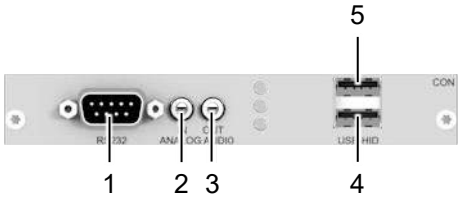


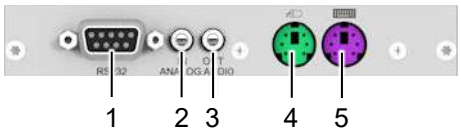
Fig. 14 Interface side L-/R474-BAH

1 D-Sub 9, female socket, RS232 serial
2 3.5 mm jack socket, analog audio, input
3 3.5 mm jack socket, analog audio, output
4 USB Type B, USB HID

1 D-Sub 9, male socket, RS232 serial
2 3.5 mm jack socket, analog audio, input
3 3.5 mm jack socket, analog audio, output
4 USB Type A, USB HID device 1
5 USB Type A, USB HID device 2

4.6.8 Add-on Module Analog Audio (bidirectional) L-/R474-BAP

Source side (CPU module)



Sink side (CON module)

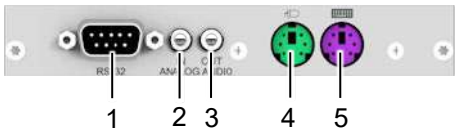


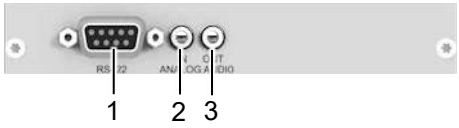
Fig. 15 Interface side L-/R474-BAP

1 D-Sub 9, female socket, RS232 serial
2 3.5 mm jack socket, analog audio, input
3 3.5 mm jack socket, analog audio, output
4 PS/2, output mouse
5 PS/2, output keyboard

1 D-Sub 9, male socket, RS232 serial
2 3.5 mm jack socket, analog audio, input
3 3.5 mm jack socket, analog audio, output
4 PS/2, input mouse
5 PS/2, input keyboard

4.6.9 Add-on Module Analog Audio (bidirectional) L-/R474-BSX

Source side (CPU module)



Sink side (CON module)

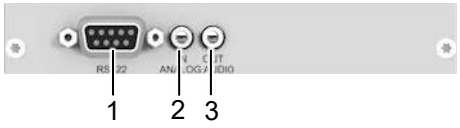


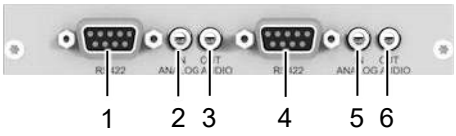
Fig. 16 Interface side L-/R474-BSX

1 D-Sub 9, female socket, RS422 serial
2 3.5 mm jack socket, analog audio, input
3 3.5 mm jack socket, analog audio, output

1 D-Sub 9, female socket, RS422 serial
2 3.5 mm jack socket, analog audio, input
3 3.5 mm jack socket, analog audio, output

4.6.10 Add-on Module Analog Audio (bidirectional) L-/R474-BSS

Source side (CPU module)



Sink side (CON module)

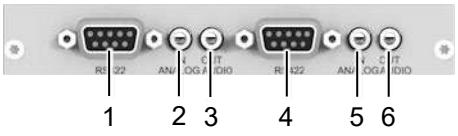


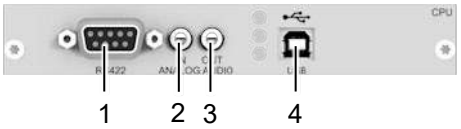
Fig. 17 Interface side L-/R474-BSS

1	D-Sub 9, female socket, RS422 serial
2	3.5 mm jack socket, analog audio, input
3	3.5 mm jack socket, analog audio, output
4	D-Sub 9, female socket, RS422 serial
5	3.5 mm jack socket, analog audio, input
6	3.5 mm jack socket, analog audio, output

1	D-Sub 9, female socket, RS422 serial
2	3.5 mm jack socket, analog audio, input
3	3.5 mm jack socket, analog audio, output
4	D-Sub 9, female socket, RS422 serial
5	3.5 mm jack socket, analog audio, input
6	3.5 mm jack socket, analog audio, output

4.6.11 Add-on Module Analog Audio (bidirectional) L-/R474-BSE

Source side (CPU module)



Sink side (CON module)

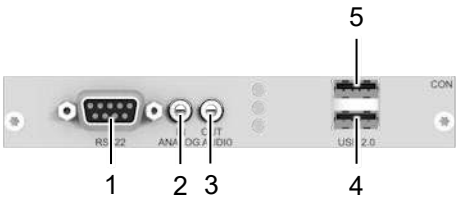


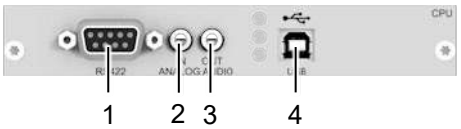
Fig. 18 Interface side L-/R474-BSE

1	D-Sub 9, female socket, RS422 serial
2	3.5 mm jack socket, analog audio, input
3	3.5 mm jack socket, analog audio, output
4	USB Type B, USB 2.0 (up to 36 Mbit/s)

1	D-Sub 9, male socket, RS422 serial
2	3.5 mm jack socket, analog audio, input
3	3.5 mm jack socket, analog audio, output
4	USB Type A, USB 2.0 (up to 36 Mbit/s)
5	USB Type A, USB 2.0 (up to 36 Mbit/s)

4.6.12 Add-on Module Analog Audio (bidirectional) L-/R474-BSE2

Source side (CPU module)



Sink side (CON module)

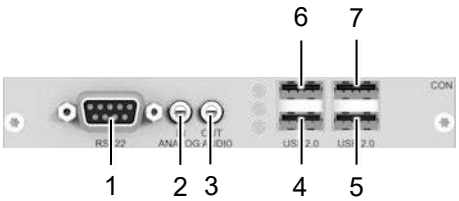


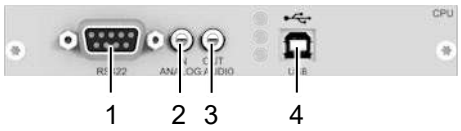
Fig. 19 Interface side L-/R474-BSE2

1	D-Sub 9, female socket, RS422 serial
2	3.5 mm jack socket, analog audio, input
3	3.5 mm jack socket, analog audio, output
4	USB Type B, USB 2.0 (up to 50/100 Mbit/s)

1	D-Sub 9, male socket, RS422 serial
2	3.5 mm jack socket, analog audio, input
3	3.5 mm jack socket, analog audio, output
4	USB Type A, USB 2.0 (up to 50/100 Mbit/s)
5	USB Type A, USB 2.0 (up to 50/100 Mbit/s)
6	USB Type A, USB 2.0 (up to 50/100 Mbit/s)
7	USB Type A, USB 2.0 (up to 50/100 Mbit/s)

4.6.13 Add-on Module Analog Audio (bidirectional) L-/R474-BSH

Source side (CPU module)



Sink side (CON module)

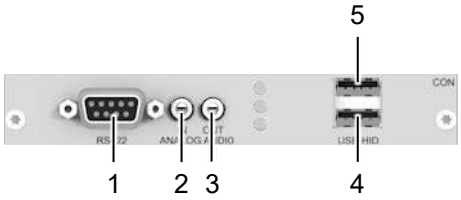


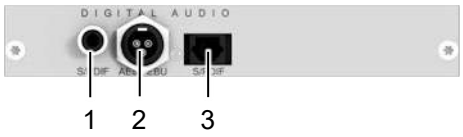
Fig. 20 Interface side L-/R474-BSH

1 D-Sub 9, female socket, RS422 serial
2 3.5 mm jack socket, analog audio, input
3 3.5 mm jack socket, analog audio, output
4 USB Type B, USB HID

1 D-Sub 9, female socket, RS422 serial
2 3.5 mm jack socket, analog audio, input
3 3.5 mm jack socket, analog audio, output
4 USB Type A, USB HID device 1
5 USB Type A, USB HID device 2

4.6.14 Add-on Module Digital Audio (unidirectional) L-/R474-BDX

Source side (CPU module)



Sink side (CON module)

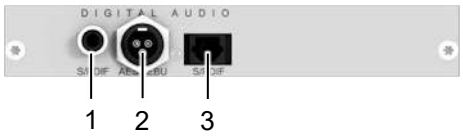


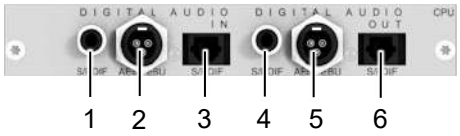
Fig. 21 Interface side L-/R474-BDX

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

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

4.6.15 Add-on Module Digital Audio (unidirectional) L-/R474-BDD

Source side (CPU module)



Sink side (CON module)

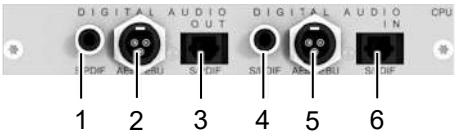


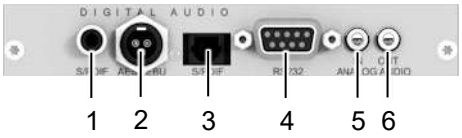
Fig. 22 Interface side L-/R474-BDD

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

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

4.6.16 Add-on Module Digital Audio (unidirectional) L-/R474-BDA

Source side (CPU module)



Sink side (CON module)

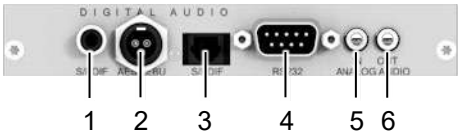


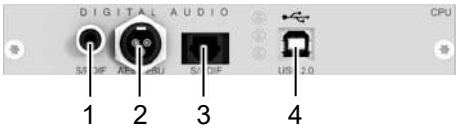
Fig. 23 Interface side L-/R474-BDA

1 RCA, S/PDIF, input
2 Mini-XLR, AES/EBU, input
3 TOSLINK, S/PDIF, input
4 D-Sub 9, female socket, RS232 serial
5 3.5 mm jack socket, analog audio, input
6 3.5 mm jack socket, analog audio, output

1 RCA, S/PDIF, output
2 Mini-XLR, AES/EBU, output
3 TOSLINK, S/PDIF, output
4 D-Sub 9, male socket, RS232 serial
5 3.5 mm jack socket, analog audio, input
6 3.5 mm jack socket, analog audio, output

4.6.17 Add-on Module Digital Audio (unidirectional) L-/R474-BDE

Source side (CPU module)



Sink side (CON module)

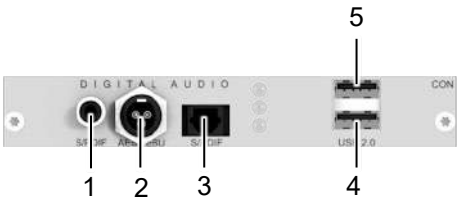


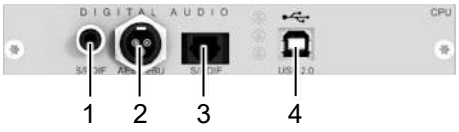
Fig. 24 Interface side L-/R474-BDE

1 RCA, S/PDIF, input
2 Mini-XLR, AES/EBU, input
3 TOSLINK, S/PDIF, input
4 USB Type B, USB 2.0 (up to 36 Mbit/s)

1 RCA, S/PDIF, output
2 Mini-XLR, AES/EBU, output
3 TOSLINK, S/PDIF, output
4 USB Type A, USB 2.0 (up to 36 Mbit/s)
5 USB Type A, USB 2.0 (up to 36 Mbit/s)

4.6.18 Add-on Module Digital Audio (unidirectional) L-/R474-BDE2

Source side (CPU module)



Sink side (CON module)

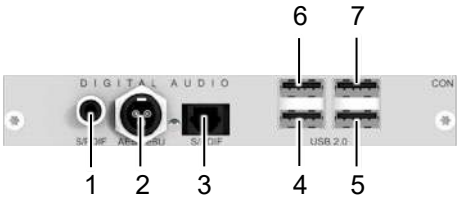


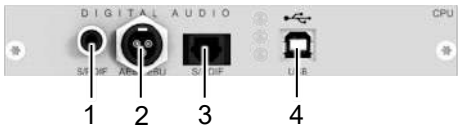
Fig. 25 Interface side L-/R474-BDE2

1 RCA, S/PDIF, input
2 Mini-XLR, AES/EBU, input
3 TOSLINK, S/PDIF
4 USB Type B, USB 2.0 (up to 50/100 Mbit/s)

1 RCA, S/PDIF, output
2 Mini-XLR, AES/EBU, output
3 TOSLINK, S/PDIF, output
4 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
5 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
6 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
7 USB Type A, USB 2.0 (up to 50/100 Mbit/s)

4.6.19 Add-on Module Digital Audio (unidirectional) L-/R474-BDH

Source side (CPU module)



Sink side (CON module)

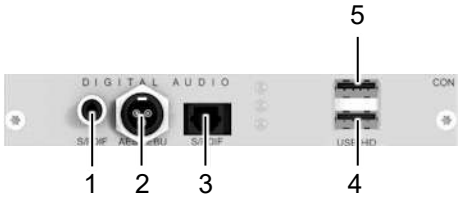


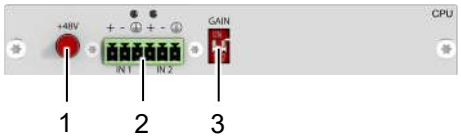
Fig. 26 Interface side L-/R474-BDH

1 RCA, S/PDIF, input
2 Mini-XLR, AES/EBU, input
3 TOSLINK, S/PDIF
4 USB Type B, USB HID

1 RCA, S/PDIF, output
2 Mini-XLR, AES/EBU, output
3 TOSLINK, S/PDIF, output
4 USB Type A, USB HID device 1
5 USB Type A, USB HID device 2

4.6.20 Add-on Module Balanced Analog-Audio L-/R474-BB2X

Source side (CPU module)



Sink side (CON module)

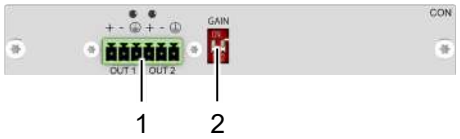


Fig. 27 Interface side L-/R474-BB2X

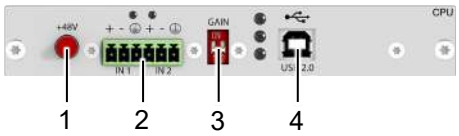
1 Switch, phantom power
2 Phoenix terminal block, 6-pin, analog-audio
3 Dip switch, pre-amplification

1 Phoenix terminal block, 6-pin, analog-audio
2 Not in use

The CPU module with balanced audio can also be used on a CON Unit, depending on the purpose.

4.6.21 Add-on Module Balanced Analog-Audio L-/R474-BB2E2

Source side (CPU module)



Sink side (CON module)

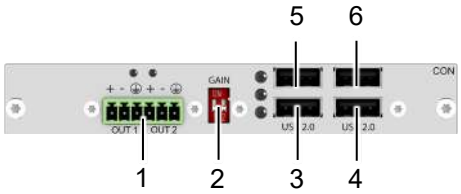


Fig. 28 Interface side L-/R474-BB2E2

1 Switch, phantom power
2 Phoenix terminal block, 6-pin, analog-audio
3 Dip switch, pre-amplification USB Type B, USB 2.0 (up to 50/100 Mbit/s)

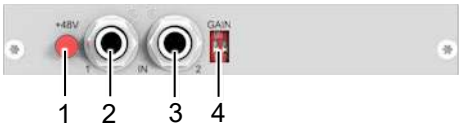
1 Phoenix terminal block, 6-pin, analog-audio
2 Not in use
3 USB-Type A, USB 2.0 (up to 50/100 Mbit/s)
4 USB-Type A, USB 2.0 (up to 50/100 Mbit/s)
5 USB-Type A, USB 2.0 (up to 50/100 Mbit/s)
6 USB-Type A, USB 2.0 (up to 50/100 Mbit/s)

The CPU module with balanced audio can also be used on a CON Unit, depending on the purpose.

4.6.22 Add-on Module Balanced Audio L-/R474-BBX

Discontinued and no longer available since 01/2022.

Source side (CPU module)



Sink side (CON module)

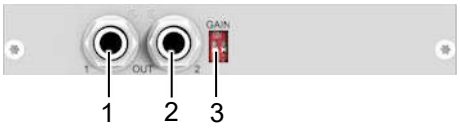


Fig. 29 Interface side L-/R474-BBX

1 Switch, phantom power
2 6.35 mm jack socket, analog audio, input 1
3 6.35 mm jack socket, analog audio, input 2
4 Dip switch, pre-amplification

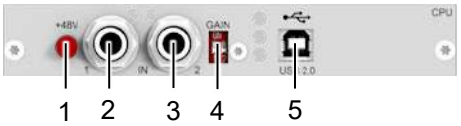
1 6.35 mm jack socket, analog audio, output 2
2 6.35 mm jack socket, analog audio, output 2
3 Not in use

The CPU module with balanced audio can also be used on a CON Unit, depending on the purpose.

4.6.23 Add-on Module Balanced Audio L-/R474-BBE2

Discontinued, and no longer available since 01/2022.

Source side (CPU module)



Sink side (CON module)

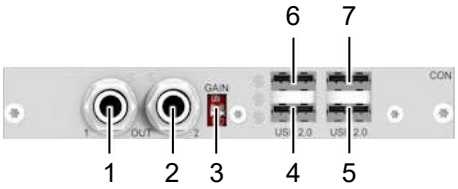


Fig. 30 Interface side L-/R474-BBE2

1 Switch for phantom power
2 6.35 mm jack socket, analog audio, input 1
3 6.35 mm jack socket, analog audio, input 2
4 Dip switch for pre-amplification
1 USB Type B, USB 2.0 (up to 50/100 Mbit/s)

1 6.35 mm jack socket, analog audio, output 1
2 6.35 mm jack socket, analog audio, output 2
3 Not in use
4 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
5 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
6 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
1 USB Type A, USB 2.0 (up to 50/100 Mbit/s)

The CPU module with balanced audio can also be used on a CON Unit, depending on the purpose.

4.6.24 Add-on Module GPIO R474-BGX

Source side (CPU module)

Fig. 31 Interface side R474-BGX

1 D-Sub 9, male socket, in-/output GPIO (for an external switching solution via dry-contact)

4.6.25 Add-on Module GPIO R474-BGA

Source side (CPU module)

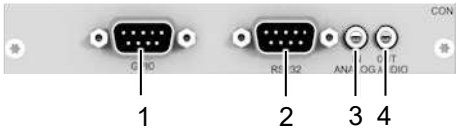


Fig. 32 Interface side R474-BGA

1 D-Sub 9, male socket, in-/output GPIO (for an external switching solution via dry-contact)
2 D-Sub 9, male socket, RS232 serial
3 3.5 mm jack socket, analog audio, input
4 3.5 mm jack socket, analog audio, output

4.6.26 Add-on Module GPIO R474-BGE2

Source side (CPU module)

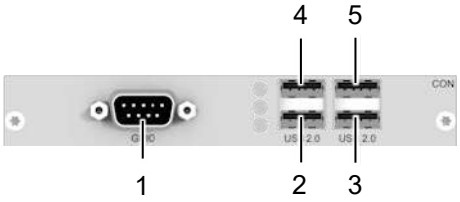
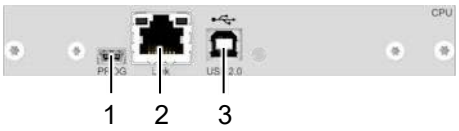


Fig. 33 Interface side R474-BGE2

1 D-Sub 9, male socket, in-/output GPIO (for an external switching solution via dry-contact)
2 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
3 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
4 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
5 USB Type A, USB 2.0 (up to 50/100 Mbit/s)

4.6.27 USB 2.0 Stand-alone Module L-/R474-BXUC

Source side (CPU module)



Sink side (CON module)

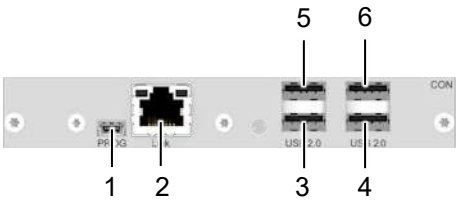


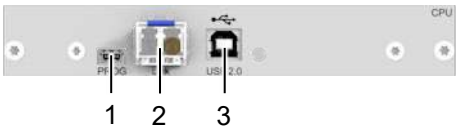
Fig. 34 Interface side L-/R474-BXUC

1 Mini-USB, service interface
2 Cat X, interconnection
3 USB Type B, USB 2.0 (up to 50/100 Mbit/s)

1 Mini-USB, service interface
2 Cat X, interconnection
3 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
4 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
5 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
6 USB Type A, USB 2.0 (up to 50/100 Mbit/s)

4.6.28 USB 2.0 Stand-alone Module) L-/R474-BXUS

Source side (CPU module)



Sink side (CON module)

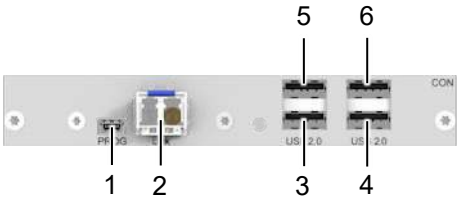


Fig. 35 Interface side L-/R474-BXUS

1 Mini-USB, service interface
2 Fiber, interconnection
3 USB Type B, USB 2.0 (up to 50/100 Mbit/s)

1 Mini-USB, service interface
2 Fiber, interconnection
3 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
4 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
5 USB Type A, USB 2.0 (up to 50/100 Mbit/s)
6 USB Type A, USB 2.0 (up to 50/100 Mbit/s)

4.6.29 Fan Cartridge Module 474-MODFAN

☑ The fan cartridge module 474-MODFAN can be installed in all slots of the chassis.
For optimal ventilation we recommend installation of the fan cartridge module in the upper slots of the chassis.

Fig. 36 Interface side 474-MODFAN

1 Mini-USB, service interface

4.7 Status Indication

The LEDs are described here once per function part of the add-on modules. Up to two function parts can be installed per add-on module, one function part on the left and one on the right.

4.7.1 Add-on Module Digital Audio

Source side (CPU module)

Sink side (CON module)

Fig. 37 Interface side add-on module digital audio - Status LEDs

1 Status LED digital audio

2 Status LED digital audio

Pos.	LED Status	Description
Red	Static	**CPU Unit and CON Unit:** no signal
Light blue	Static	**CPU Unit:** S/PDIF signal (RCA) available
	Flashing	**CPU Unit:** digital noise
Violet	Static	**CPU Unit:** AES/EBU signal (Mini-XLR) available
	Flashing	**CPU Unit:** digital noise
Blue	Static	**CPU Unit:** S/ PDIF signal (TOSLINK) available
	Flashing	**CPU Unit:** digital noise
Green	Static	**CON Unit:** signal available, digital noise

4.7.2 Add-on Module Balanced Audio

Add-on Module L-/R474-BB2X

Source side (CPU module)

Sink side (CON module)

Fig. 38 Interface side add-on module balanced audio - Status LEDs L-/R474-BB2X

1 Status LED for input 1
2 Status LED for input 2

1 Status LED for output 1
2 Status LED for output 2

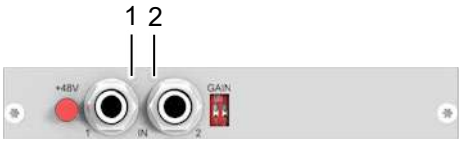
LEDs for the Audio Signal Status

Pos. 1/2	Description
Off	No signal.
Green	Audio signal available.
Orange	Audio signal level too high.

Add-on Module L-/R474-BBX

Discontinued and no longer available since 01/2022.

Source side (CPU module)



Sink side (CON module)

Fig. 39 Interface side add-on module balanced audio - Status LEDs L-/R474-BBX

1 Status LED for input 1
2 Status LED for input 2

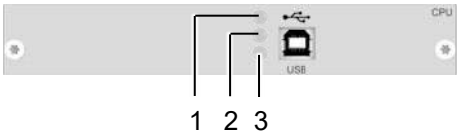
1 Status LED for output 1
2 Status LED for output 2

LEDs for the Audio Signal Status

Pos. 1/2	Description
Off	No signal.
Green	Audio signal available.
Orange	Audio signal level too high.

4.7.3 Add-on Module USB HID

Source side (CPU module)



Sink side (CON module)

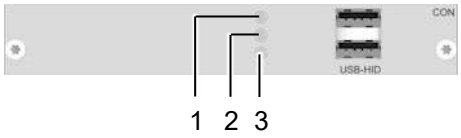


Fig. 40 Interface side add-on module USB HID - Status LEDs

1 USB HID device 1 status LED
2 USB HID device 2 status LED
3 Link status LED

1 USB HID device 1 status LED
2 USB HID device 2 status LED
3 Link status LED

The following tables show the respective LED states/colors of the CPU add-on module (column 2) and the CON add-on module (column 3) for the respective situation.

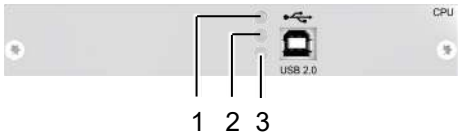
Pos.	LED CPU Unit	LED CON Unit	Description
1	Off	Off	• Link connection between add-on module and extender module available. • No link connection between CPU Unit and source available. • No USB HID device connected or not supported USB device connected.
2	Off	Off	
3	Red, slowly flashing	Red, slowly flashing	
1	Off	Off	• Link connection between add-on module and extender module, and between CPU Unit and source available. • No USB HID device or unsupported USB device connected.
2	Off	Off	
3	Red, fast flashing	Red, fast flashing	
1	Off	Off	• Link connection between add-on module and extender module, and between CPU Unit and source available. • Keyboard connected to USB HID port 1 or 2.
2	Red	Red	
3	Red, fast flashing	Red, fast flashing	
1	Red	Red	• Link connection between add-on module and extender module, and between CPU Unit and source available. • Mouse connected to USB HID port 1 or 2.
2	Off	Off	
3	Red, fast flashing	Red, fast flashing	
1	Off	Off	• Link connection between add-on module and extender module, and between CPU Unit and source available. • Keyboard connected to USB HID port 1 or 2. • Keyboard input active.
2	Red	Red, fast flashing	
3	Red, fast flashing	Red, fast flashing	

Pos.	LED CPU Unit	LED CON Unit	Description
1	Red	Red, fast flashing	• Link connection between add-on module and extender module, and between CPU Unit and source available. • Mouse connected to USB HID port 1 or 2. • Mouse active.
2	Off	Off	
3	Red, fast flashing	Red, fast flashing	

If the link connection between CPU Unit and CON Unit is missing (e.g., extender module in command mode), LED 3 flashes slowly, the LEDs for the connected USB HID devices (1 and/or 2) maintain their status.

4.7.4 Add-on Module USB 2.0 embedded L-/R474-BXE

Source side (CPU module)



Sink side (CON module)

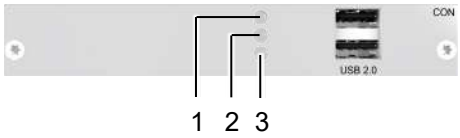


Fig. 41 Interface side add-on module USB 2.0 – Status LEDs L-/R474-BXE

1 USB 2.0 status LED
2 Connect status LED
3 Link status LED

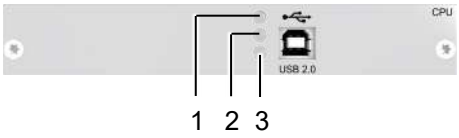
1 USB 2.0 status LED
2 Connect status LED
3 Link status LED

The following tables show the respective LED states/colors of the CPU add-on module (column 2) and the CON add-on module (column 3) for the respective situation.

Pos.	LED CPU Unit	LED CON Unit	Description of possible situations
1	Off	Off	• USB 2.0 Link connection between CPU Unit and CON Unit not available.
2	Off	Off	
3	Off	Off	
1	Off	Off	• USB 2.0 Link connection between CPU Unit and CON Unit available. • USB connection between CPU Unit and source not available.
2	Off	Off	
3	Green	Green	
1	Green, flashing	Green, flashing	• USB 2.0 Link connection between CPU Unit and CON Unit available. • USB connection between CPU Unit and source available.
2	Green	Green	
3	Green	Green	

4.7.5 Add-on Modules USB 2.0 embedded L-/R474-BXE2

Source side (CPU module)



Sink side (CON module)

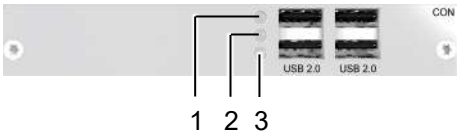


Fig. 42 Interface side add-on module USB 2.0 – Status LEDs L-/R474-BXE2

1 USB 2.0 status LED
2 Connect status LED
3 Link status LED

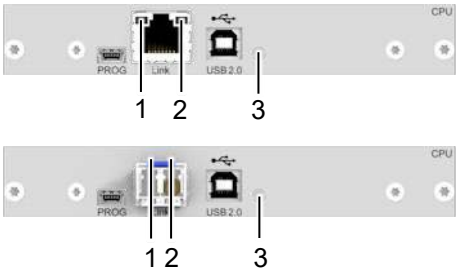
1 USB 2.0 status LED
2 Connect status LED
3 Link status LED

The following tables show the respective LED states/colors of the CPU add-on module (column 2) and the CON add-on module (column 3) for the respective situation.

Pos.	LED CPU Unit	LED CON Unit	Description of possible situations
1	Off	Off	USB 2.0 Link connection between CPU Unit and CON Unit not available.
2	Off	Off	
3	Green, flashing	Green, flashing	
1	Off	Off	• USB 2.0 Link connection between CPU Unit and CON Unit available. • USB connection between CPU Unit and source not available.
2	Off	Off	
3	Green	Green	
1	Green, flashing	Green, flashing	• USB 2.0 Link connection between CPU Unit and CON Unit available. • USB connection between CPU Unit and source available.
2	Green	Green	
3	Green	Green	

4.7.6 USB 2.0 Stand-alone Modules

Source side (CPU module)



Sink side (CON module)

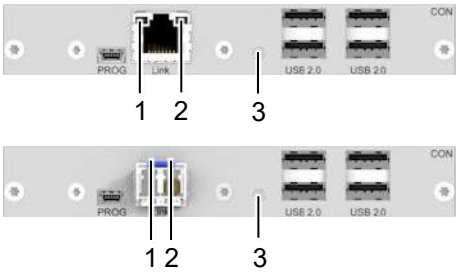


Fig. 43 Interface side USB 2.0 stand-alone modules - Status LEDs

1 Failure LED link connection
2 Status LED link connection
3 Status LED USB 2.0

1 Failure LED link connection
2 Status LED link connection
3 Status LED USB 2.0

The following tables show the respective Link LED states/colors (left LED 1, 3 and right LED 2, 4) of the CPU Unit and the CON Unit for the respective situation.

Status LEDs for Link Connection Cat X

Pos. 1	Pos. 2	Description
Off	Green	Link connection available.
Off	Flashing green	No link connection available.
Flashing green	Green	Link connection failure (flashes for approx. 20 s following each occurring connection failure).

Status LEDs for Link Connection Fiber

Pos. 1	Pos. 2	Description
Off	Green	Link connection available.
Off	Flashing red	No link connection available.
Flashing red	Green	Link connection failure (flashes for approx. 20 s following each occurring connection failure).

USB 2.0 Status LEDs

Pos. 3	Description
Red	No link connection available, no USB-2.0 signal available.
Green	**CPU Unit:** Link connection available, no USB-2.0 signal available.
Light blue	Link connection and USB 2.0 signal available (operating condition).

4.7.7 Fan Cartridge Module

Fig. 44 Interface side fan cartridge module - Status LEDs

1 Status LED

Pos. 1	Description
	Failure, fan is not operable.
Green	Fan runs with reduced speed until 40 °C (with parameter set, see chapter 7.2.4, page 44)
Light blue	Operating condition.

The light blue LED is very bright and might also appear as white.

5 Access Options

You have following options to configure and/or operate the extender module and add-on modules:

Access option	Description
Command mode	Via USB-HID interface, R474-BxH add-on modules offer the possibility to call up the command mode using a plugged-in keyboard. The command mode enables access to several functions of connected KVM devices, using additional keyboard commands if necessary. For more information about the command mode and keyboard commands, please refer to the manual of the respective extender module.
Mini-USB interface	Some modules can be parametrized or updated via Mini-USB interface.

6 Installation and Setup

NOTICE

Please verify that cables, interfaces, and handling of the devices comply with the requirements (see chapter 8, page 46).

✅ First-time users are recommended to set up the system in a test environment that is limited to a single room. This makes it easier to identify and solve any cabling problems, and experiment with your system more conveniently.

✅ Add-on modules installed in the chassis can be hot plugged.

The chassis configuration determined by customer configuration is delivered accordingly with the initial order. Installation by the customer is not intended and not necessary. In case of an extender module or add-on module replacement, please refer to the installation instructions in the 474-BODY manual.

6.1 Connecting Add-on Module Serial RS232/RS422

1. Connect the serial port of the source to the CPU Unit.
2. Connect the CON Unit to the serial port of the input device.

6.2 Connecting Add-on Module Analog Audio

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

6.3 Connecting Add-on Module Digital Audio

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

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

6.4 Connecting Add-on Module Balanced Audio

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

6.5 Connecting Add-on Module USB HID

1. Connect the source to USB HID port of the CPU Unit.
2. Connect the USB HID devices to USB HID ports of the CON Unit.

6.6 Connecting Add-on Module PS/2

1. Connect the source to the PS/2 ports of the CPU Unit.
2. Connect the PS/2 devices to the PS/2 ports of the CON Unit.

6.7 Connecting Add-on Module USB 2.0/USB 2.0 embedded

1. Connect the source to the USB 2.0 port of the CPU Unit.
2. Connect the USB 2.0 devices to the USB 2.0 ports of the CON Unit.

6.8 Connecting Add-on Module GPIO

The GPIO add-on modules R474-BGX or R474-BGE2 are configured via DIP switches. In the delivery state, all DIP switches are set to the bottom (input).

The DIP switches belong to the pins listed below:

	Pin 1	Pin2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
DIP Switch	1	2	-	3	4	5	6	7	8

There are two options to use the GPIO add-on module depending on the DIP switch positions:

- output interface for LED connection for MSC (Multi Screen Control) (5 V, 137 mA per channel)
- input interface for push button connection (Macros, Favorites, Keys)

Option 1 - LED Output Interface for MSC (Multi Screen Control)

All DIP switches must be set to upper position. The settings for the GPIO add-on module in the CON Device settings (matrix configuration) have to be set as “MSC Switch (default)” to indicate the active console (mouse position) by a LED. Please refer to the Draco tera matrix user manual.

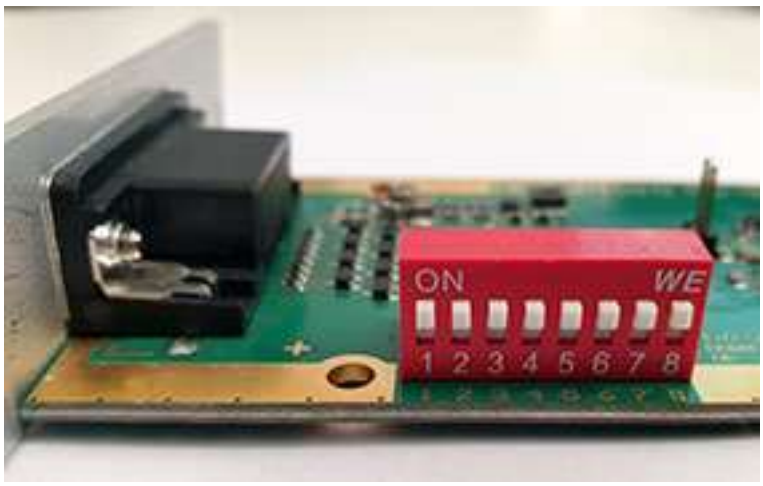


Fig. 45 Example - GPIO add-on module set as output interface

Requirements to send keyboard commands to the CPU Device

- Matrix firmware F04.00.200717 or newer
- GPIO firmware F01.03.200723 or newer
- Target device L474-BXH with HIDCPU firmware V04.03
- Re-designed hardware of R474-BGX

Option 2 - Push Button Input Interface (Macros, Favorites, Keys)

The DIP switch (all switches) must be set to lower position to use the GPIO module as an input interface with an external switching solution with up to eight push buttons.

In the CON Device settings (matrix configuration) there are three options individually for each of the eight inputs. Please refer to the Draco tera matrix user manual.

- Macro: call a macro
- Favorite: switch current CON to a favorite CPU device in Full Access mode
- Key: send a keyboard key to the connected CPU (requires additional L474-BXH)

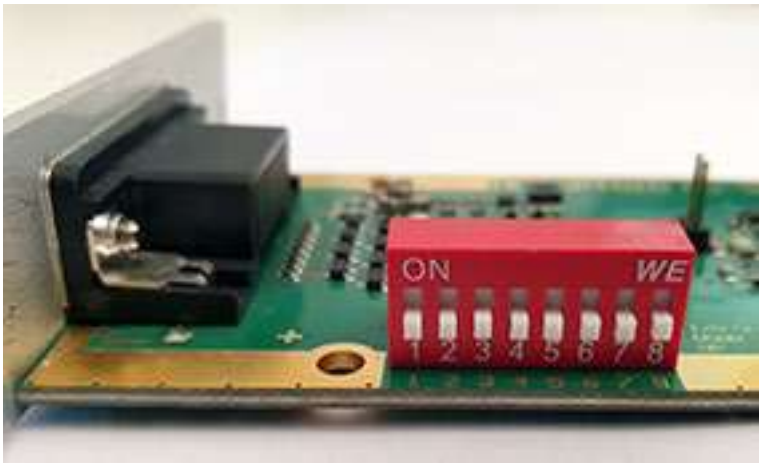


Fig. 46 Example - GPIO add-on module set as input interface

7 Configuration

7.1 Configuration File

Parameters are to be written to a configuration file (`Config.txt`):

Parameter for	Config.txt saved and managed on
Add-on modules	Flash drive of extender modules. Please refer to the extender module user manual.
Fan cartridge module	Flash drive of the fan cartridge module. See chapter 7.3, page 45.

7.2 Parameters

7.2.1 Parameters for CPU Extender Modules with Audio Add-on Module

The following parameters can be written into the configuration file of a CPU extender module to set the sample rate.

Digital Audio

Parameters available only in conjunction with add-on modules for digital audio.

Parameter	Function
SRC32000	Activate sample rate conversion, sample rate 32 kHz.
SRC44100	Activate sample rate conversion, sample rate 44.1 kHz.
SRC48000	Activate sample rate conversion, sample rate 48 kHz.
SRC88200	Activate sample rate conversion, sample rate 88.2 kHz.
SRC96000	Activate sample rate conversion, sample rate 96 kHz.
SRC176400	Activate sample rate conversion, sample rate 176.4 kHz.
SRC192000	Activate sample rate conversion, sample rate 192 kHz.
SRC_NONE	Deactivate sample rate conversion.
SRCXXXXX;X	Set a delay, enter the appropriate value X in milliseconds, both parameters separated by a semicolon, e.g., SRC32000;8. If this information exceeds the FIFO size, the highest possible value is set.

Balanced Audio

Parameters available only in conjunction with add-on modules for balanced audio.

Parameter	Function
SRC32000	Activate sample rate conversion, sample rate 32 kHz.
SRC44100	Activate sample rate conversion, sample rate 44.1 kHz.
SRC96000	Activate sample rate conversion, sample rate 96 kHz.
When using another parameter for balanced audio than the three mentioned above there will be a sample frequency of 48 kHz.	

7.2.2 Parameters for CON Extender Modules with Audio Add-on Module

The following parameter can be written into the configuration file of a CON extender module if required to configure the output setting.

Output Settings

Parameter	Function
ENAAUDIO	Enable RS232 or RS422 and analog audio during Video-only connections.

7.2.3 Parameters for CPU and CON Extender Modules with USB 2.0 embedded Add-on Module

The following parameter have to be written into the configuration file of both CON and CPU extender module if required to configure the output setting.

USB 2.0 embedded Add-on Module

Parameter	Function
ENAUSB11	Activate USB 1.1 mode for USB 2.0 embedded add-on modules (only with add-on module L474-/R474-BXE, not for L474-/R474-BXE2). Needs to be set on CPU Unit and CON Unit, mixed configurations not supported.

7.2.4 Parameters for Fan Cartridge Module 474-MODFAN

The following parameter has to be written into the configuration file of the fan cartridge module if required.

Parameter	Function
LOWSPEED	Reduce the fan speed. Up to 40 °C, the fan LED lights up green. If the temperature exceeds 40 °C, the fan runs at full speed and the fan LED lights up light blue.

The parameter must be written in lower case if the firmware version (`MODFAN.pfw`) is older than 2019-04-16.

7.3 Configuring Parameters for Fan Cartridge Module

NOTICE

If the start command `#CFG` is missing or is written to the wrong place, or if parameters are not separated in extra lines, the parameterization will fail. For a successful parameterization, the following sequence must be strictly observed.

To enter a parameter for the fan cartridge module, proceed as follows:

1. Connect the fan cartridge module to any source using a Mini-USB cable.
   The fan cartridge module opens a flash drive containing the `Config.txt` file.
2. Open the `Config.txt` file in a text editor.
3. Ensure that `#CFG` is written in the first line of the file.
4. Add a line break directly behind `#CFG`.
5. Add the parameter/s in capitals in the line below `#CFG` (one line per parameter).
6. Add a line break directly behind each parameter.
7. Delete everything that follows the entered parameter/s, including blanks and blank lines.
8. Save the `Config.txt` file.
9. Manually power off the fan cartridge module.
10. Power on the fan cartridge module dule to restart the extender module.
    The fan cartridge module starts automatically with the entered parameter.

Example

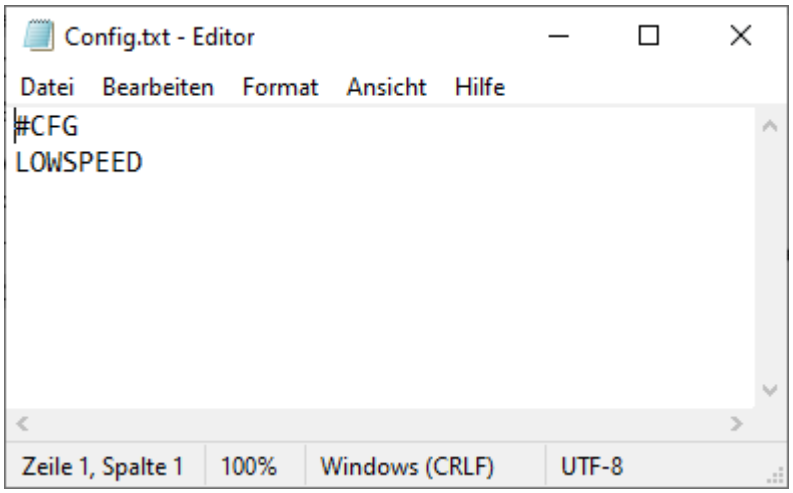


*Fig. 47 Example **Config.txt with Parameter***

8 Maintenance

8.1 Cleaning

NOTICE
Possible damage to the mechanical and electronic components The modules described in this manual as well as the accessories can be damaged by cleaning with damp or aggressive cleaning agents. If the modules are nevertheless cleaned with damp or aggressive cleaning agents and damaged in the cleaning process, the manufacturer's warranty will be voided. ➡ Remove dust deposits from the device with a dry, antistatic cloth or dehumidified air spray.

8.2 Replacing or Assembling of Modules in Chassis

For information on replacement, retrofitting of additional modules and fans, refer to the chassis user manual 474-BODY. The safety instructions and conditions described in the chassis manual must be observed to avoid personal injury and damage to components.

8.3 Updating the Firmware of Add-on Modules, USB 2.0 Stand-alone Modules and Fan Cartridge Module

8.3.1 Updating the Firmware of Add-on Modules

The most add-on modules can be updated via the Mini-USB service port of extender modules by copy & paste.

8.3.2 Updating the Firmware of USB 2.0 Stand-alone Modules

If you got information from the manufacturer’s technical support that a firmware update of a USB 2.0 stand-alone module is required, please identify the parts and cores of the module, and follow the instruction of the manufacturer’s technical support.

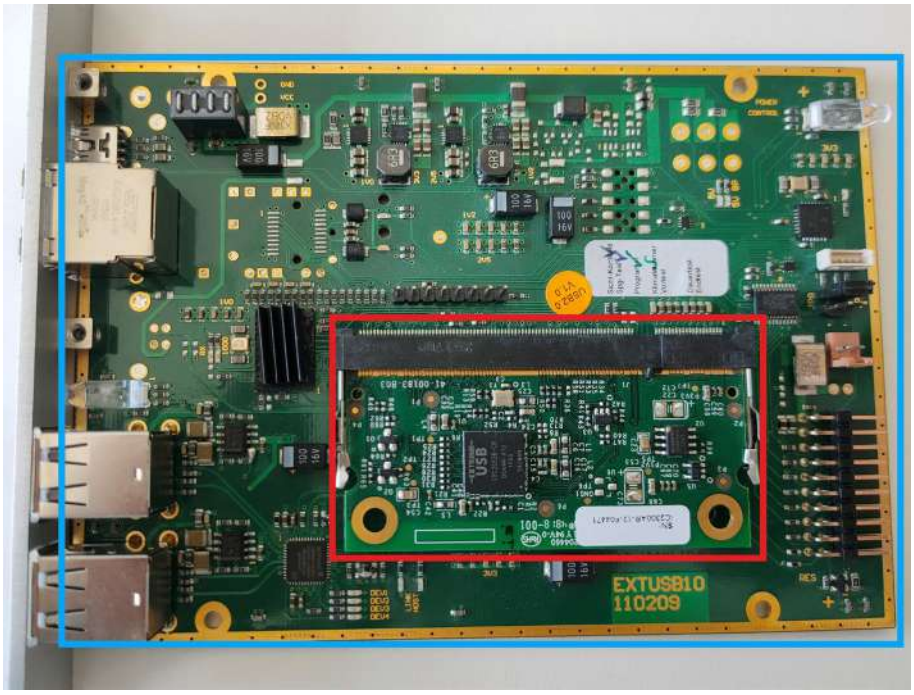


Fig. 48 Base module and USB 2.0 module of a USB 2.0 stand-alone module

An USB 2.0 stand-alone module can be divided into two parts: The base module (blue) and the USB 2.0 module (red).

8.3.3 Updating the Firmware of the Fan Cartridge Module

To update the fan cartridge module, proceed as follows using the firmware file for the fan cartridge module received from the manufacturer’s technical support:

1. Connect the fan cartridge module to any source using a Mini-USB cable.
   The fan cartridge module opens a flash drive.
2. Copy the `MODFAN.pfw` file onto the fan cartridge module without deleting the old one first (copy and overwrite).
3. Manually power off the fan cartridge module.
4. Power on the fan cartridge module.
   The fan cartridge module starts automatically with the new firmware.

8.3.4 Updating the Firmware of Analog Add-on Modules

Analog audio add-on modules cannot be field-updated via Mini-USB interface or matrix. They need to be factory programmed. However, a firmware update is usually not necessary. If you have any questions about updating add-on modules, please contact the manufacturer's technical support.

9 Troubleshooting

9.1 General Failures

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

9.2 Add-on Module, Serial Interface

Diagnosis	Possible reason	Measure
Serial device is not operational.	Settings of the serial interface are wrong.	➡ Check baud rate and general settings.
	No serial connection to the source available.	➡ Check connection via serial cable.
	No serial connection to the end device (e.g., touch screen, keyboard) available.	➡ Connect serial end device and switch it on. ➡ Check connection via serial cable.
Touchscreen is not operational.	Hardware handshake.	➡ Adjust serial interface to X-ON/X-OFF software handshake.

9.3 Add-on Module, Analog Audio

Diagnosis	Possible reason	Measure
CON Unit: No signal at audio output.	No audio connection to the audio source available.	➡ Connect an analog audio source. ➡ Check the connection of the audio cable between the CPU Unit and the audio source.
	No signal available.	➡ Switch the analog audio source on. ➡ Activate the analog output at the audio source.
	No audio connection to the audio sink (e.g., speakers) available.	➡ Connect an analog audio sink and switch it on. ➡ Check the connection of the audio cable between the CON Unit and the audio sink.

Diagnosis	Possible reason	Measure
CPU Unit: No signal at audio output (microphone).	No audio connection to the audio source (microphone) available.	➡ Connect the analog audio source (microphone). ➡ Check the connection of the audio cable between the CON Unit and the analog audio source (microphone).
	No signal available.	➡ Switch the analog audio source on. ➡ Activate the analog output at the audio source.
	No audio connection to the audio sink (e.g., computer) available.	➡ Check the connection of the audio cable between the CPU Unit and the audio sink. ➡ Check the audio configuration.

9.4 Add-on Module, Digital Audio

Source side (CPU module)

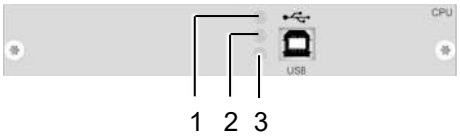
Sink side (CON module)

Fig. 49 Interface side add-on module digital audio - Failure indication

Diagnosis	Possible reason	Measure
CPU Unit: LED **1** lights up red.	No audio connection to the audio source available.	➡ Connect a digital audio source. ➡ Check the connection of the audio cable between the CPU Unit and the audio source.
	No signal available.	➡ Switch the digital audio source on. ➡ Activate the digital output at CPU/audio source.
CON Unit: LED **1** lights up red.	No audio connection to the audio sink (e.g., speakers) available.	➡ Connect the digital audio sink. ➡ Check the connection of the audio cable between the CPU Unit and the audio source.
	No signal available.	➡ Check signal at CPU Unit.
No signal: **CON Unit:** LED **1** lights up green. **CPU Unit**: LED **1** is flashing.	Digital noise at the active audio source.	➡ Check the audio format (see LED color at the CPU Unit, see chapter 4.7.1, page 32). ➡ Check the mute setting. ➡ Change the audio input.

9.5 Add-on Module, USB HID

Source side (CPU module)



Sink side (CON module)

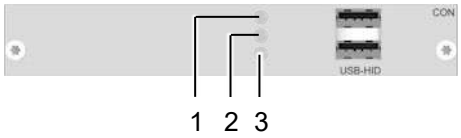


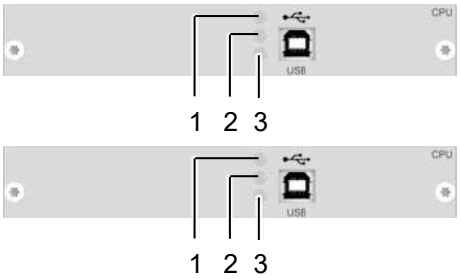
Fig. 50 Interface side add-on module USB HID - Failure indication

Diagnosis	Possible reason	Measure
All LEDs are off.	Power supply voltage not available.	➡ Check the power supply units. ➡ Check the connection to the power network.
The **Caps Lock** and **Scroll Lock** LEDs on the keyboard are flashing.	The keyboard is in command mode	➡ Press Esc to leave the command mode. ➡ Or press Left Shift + Esc to leave the command mode.

Diagnosis	Possible reason	Measure
USB device without function **CON Unit and CPU Unit:** LED **1/2** are off.	No USB HID device detected.	➡ Check the connection of the USB HID cable to the USB HID device. ➡ Connect a USB HID device. ➡ Contact your distributor if necessary.
	The USB HID device is not supported.	➡ Check the compatibility. ➡ New connection of the USB HID device. ➡ Contact your distributor if necessary.
	No USB HID connection to the source available.	➡ Check the connection of the USB cable to the source, select another USB HID port if necessary. ➡ Remove the USB and power cables, first connect the power cable, then connect the USB cable, and restart the CPU Unit.
	Problems with the USB HID connection at the CON Unit.	➡ Check the connection of the USB HID cable to the USB HID device. ➡ Remove the USB HID and power cables, connect the power cable, then connect the USB cable, and restart the CON Unit.
CON Unit: LED **3** is flashing slowly.	No connection between CON Unit and CPU Unit	➡ Check the interconnect cable. ➡ Check the connectors.

9.6 Add-on Module, USB 2.0 embedded

Source side (CPU module)



Sink side (CON module)

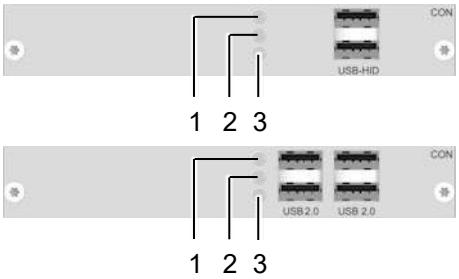
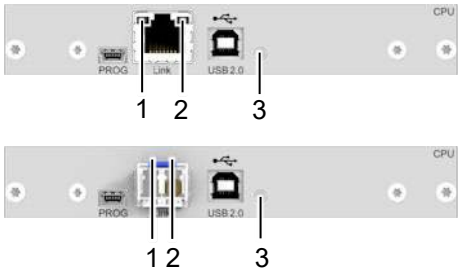


Fig. 51 Interface side add-on module USB 2.0 embedded - Failure indication

Diagnosis	Possible reason	Measure
All LEDs are off.	Power supply voltage not available.	➡ Check the power supply units. ➡ Check the connection to the power network.
	When connecting to a matrix: no USB HID connection available.	➡ Exit the OSD.
USB 2.0 device without function.	No USB 2.0 device connected.	➡ Check the cable to the USB 2.0 device. ➡ Connect a USB 2.0 device. ➡ Contact your distributor if necessary.
	The USB 2.0 device is not supported.	➡ Check the installation of the USB 2.0 device and the necessary drivers at the CPU. ➡ New connection of the USB 2.0 device. ➡ Contact your distributor if necessary.
USB 2.0 device without function **CPU Unit and CON Unit:** LED **1 and 2** are off.	No connection between CPU Unit and source available.	➡ Check the connection of the USB cable to the source, select another USB HID port if necessary. ➡ Check the connectors.

9.7 USB 2.0 Stand-alone Module

Source side (CPU module)



Sink side (CON module)

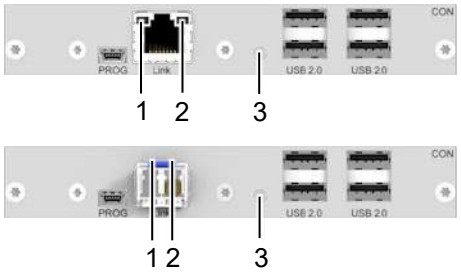


Fig. 52 Interface side USB 2.0 stand-alone modules - Failure indication

Diagnosis	Possible reason	Measure
USB 2.0 device without function.	No USB 2.0 device connected.	➡ Check the cable to the USB 2.0 device. ➡ Connect a USB 2.0 device. ➡ Contact your distributor if necessary.
	The USB 2.0 device is not supported.	➡ Check the installation of the USB 2.0 device and the necessary drivers at the CPU. ➡ New connection of the USB 2.0 device. ➡ Contact your distributor if necessary.
	No connection between CPU Unit and source available.	➡ Check the connection of the USB cable to the source, select another USB port if necessary. ➡ Remove the USB and power cables, first connect the power cable, then connect the USB cable, and restart the CPU Unit.
LED **1** flashes.	Link connection failure between CON Unit and CPU Unit.	➡ Check the interconnect cable. ➡ Check the connectors.
LED **2** flashes.	No connection between CON Unit and CPU Unit available.	➡ Check the interconnect cable. ➡ Check the connectors.
CPU Unit: LED **3** lights up green.	No connection between CPU Unit and source available.	➡ Check the connection of the USB cable to the source, select another USB port if necessary. ➡ Remove the USB and power cables, first connect the power cable, then connect the USB cable, and restart the CPU Unit.
	The source is off.	➡ Switch-on the source.
CON Unit: LED **3** lights up red.	No link connection between CON Unit and CPU Unit available	➡ Check the interconnect cable. ➡ Check the connectors.

9.8 Fan Cartridge Module

Fig. 53 Interface side fan cartridge module - Failure indication

Diagnosis	Possible reason	Measure
LED **1** lights up red.	Fan is not operable.	➡ Check the firmware version. ➡ The fan is defect. ➡ Contact your distributor if necessary.

10 Technical Data

10.1 Interfaces

10.1.1 Mini-USB

The Mini-USB interface enables a customer specified communication with some add-on modules. The firmware could also be updated using this interface.

10.1.2 USB HID

Our devices with USB HID interface support a maximum of two devices with USB HID protocol. Each USB HID port provides a maximum current of 100 mA.

Keyboard

Compatible with most USB keyboards. Certain keyboards with additional functions may require custom firmware to operate. Keyboards with an integral USB Hub (Mac keyboards e.g.) are also supported, however, a maximum of two devices are supported.

Mouse

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

Other USB HID Devices

The proprietary USB emulation supports certain other USB HID devices, such as specific touch screens, graphic tablets, barcode scanners or special keyboards. However, support cannot be guaranteed for every USB HID device. In certain cases, such devices can be operated with special firmware.

Extension

If it is required to extend the USB HID signals on CPU or console side (e.g., mounting requirement), the signals can be extended either via a 3.0 m A-B cable (247-U2) or a 3.0 m USB A-A extension cable (436-USB20). The compatibility to other extension cables cannot be guaranteed.

Only two USB HID devices are supported concurrently, such as keyboard and mouse or keyboard and touch screen. A hub is allowed, but it does not increase the number of devices allowed.
To support other USB 'non-HID' devices, such as scanners, web cams or memory devices, use the USB 2.0 interfaces.

10.1.3 PS/2

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

Keyboard

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

Mouse

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

10.1.4 USB 2.0 (transparent)

The extender module with transparent USB 2.0 interface supports almost all types of USB 2.0 devices. USB 2.0 data transfer is supported with USB high speed (max. 480 Mbit/s) or USB-embedded (up to 36/50/100 Mbit/s), depending on the add-on module.

Each USB embedded port provides a maximum current of 500 mA (high power). When using a USB high speed interface with 4 USB ports, respectively 2 connectors provide a maximum of 500 mA (high power) and 2 connectors a maximum of 100 mA.

10.1.5 GPIO

This interface can be set up both as an input and as an output, see page 41.

With the GPIO add-on module set as input interface, an external switching solution (dry contact) with up to eight push buttons can be connected. After pressing a push button, the corresponding function will be performed.

With the GPIO add-on module set as output interface, up to eight LEDs can be connected to indicate the active console (mouse position) by a LED.

The electrical specification for each channel (each LED) is 5 V and provides a maximum of 137 mA (1.1 A in total for the whole GPIO add-on module). All 8 LEDs share the +5 V pin. The -5 V connectors of the LEDs are connected to the respective ground pin of the GPIO add-on module.

10.1.6 RS232 Serial

Extender modules with serial interface option support a full-duplex transmission with a real hardware handshake up to a baud rate of 115,200 Bd.

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

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

Operation of several Devices:

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

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

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

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

Parameter	Value
Connection Format	DTE (Data Terminal Equipment)
Speed	• Up to 19,200 Bd (L- /R474-BAx) • Up to 115,200 Bd (L-/R474-BRx)
Data Format	Format independent
Data Transmission	• RxD (Receive Data) • TxD (Transmit Data)
Traffic Control	The following signals are transmitted (hardware handshake): • RTS (Request To Send) • CTS (Clear To Send) • DTR (Data Terminal Ready) • DSR (Data Set Ready)

10.1.7 RS422 Serial

Extender modules with a serial interface RS422 (D-Sub 9) support a differential full duplex transmission up to a baud rate of 115,200 Bd.

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

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

Parameter	Value
Connection Format	Sony Standard
Speed	Up to 115,200 Bd
Data Format	Format independent
Data Transmission	• Rx + (Receive Data) • Rx – (Receive Data) • Tx + (Transmit Data) • Tx – (Transmit Data)

NOTICE
The serial interface only supports one connected device per add-on module.

10.1.8 Analog Audio

Extender modules with the analog audio option support a bidirectional stereo audio transmission, in near-CD quality.

The audio interface is a 'line level' interface, and it is designed to transmit the signals of a sound card (or another 'line level' device) as well as to allow the connection of active speakers to the CON Unit.

Stereo audio can be transmitted bidirectionally at the same time.

Connection of a Microphone

Connect the microphone to the 'audio' input of the CON Unit. There are two ways to establish this connection:

- Connect the output of the CPU Unit to the microphone input of the sound card (red).
  Adjust the sound card to provide an additional amplification (20 dB).
- Connect the output of the CPU Unit is connected to the audio input of the sound card (blue).
  Choose this connection if the microphone has its own pre-amplifier.

The CON Unit can also provide pre-amplification of a microphone. To activate the pre-amplification.
Open the CON Unit.
Locate the pins marked with 'MICJP' on the audio board and close the pins with a jumper.

Specification Analog Audio

Parameter	Value
Transmission format	Digitized virtually CD quality audio (16 bit, 38.4 kHz)
Signal level	Line-Level (5 Volt Pk-Pk Maximum)
Input impedance	47 kOhm
Output impedance	270 kOhm
Connections CPU Unit	2x 3.5 mm stereo jack plug (audio IN & audio OUT)
Connections CON Unit	2x 3.5 mm stereo jack plug (audio IN & audio OUT)

Specification Analog Audio USB 2.0

Parameter	Value
Transmission Format	Digitized virtually CD quality audio, 16 bit (8/11,025/16/22,05/32/44,1/48 kHz)
Signal Level	Line-Level (0.43 Volt Pk-Pk maximum)
Input Impedance	20 kOhm
Connections CPU Unit	1x USB-B
Connections CON Unit	2x 3.5 mm stereo jack plug (audio IN & audio OUT)

10.1.9 Digital Audio

Extender modules with the digital audio option support the unidirectional transmission of digital audio data.

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

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

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

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

- Activate or deactivate the sample rate converter in the `Config.txt` file on the flash drive of the extender module. If the sample rate converter is activated, the following characteristics are valid:
  - 140 dB dynamic range,
  - 120 dB total harmonic distortion + noise.
- Set the selected sample frequency of the sample rate converter for the output by writing the parameter in a new line. The following sample frequencies are available:
  - 32,0 kHz (write **SRC32000** in the `Config.txt` file of the CPU Unit)
  - 44,1 kHz (write **SCR44100** in the `Config.txt`)
  - 48,0 kHz (write**SCR48000** in the `Config.txt` file of the CPU Unit)
  - 96,0 kHz (write**SCR96000** in the `Config.txt` file of the CPU Unit)
- You can set a delay for converting the sample rate. The time is set in milliseconds and separated from the parameter for the sample rate by a semicolon (e.g., **SRC44100;12**). You can set the following delays for the sample rates:
  - 32,0 kHz: 3 to 60 ms
  - 44,1 kHz: 2 to 44 ms
  - 48,0 kHz: 2 to 40 ms
  - 96,0 kHz: 1 to 20 ms
- To deactivate the sample rate converter, write **SRC_NONE** in the `Config.txt` file of the CPU Unit.

Specification Digital Audio

Parameter	Value
Compatibility	AES/EBU, S/PDIF, EIAJ CP1201, IEC 60958
Standards	Stereo Linear Pulse Code Modulation (LPCM), DTS, DTS-HD (5.1), Dolby Digital, Dolby Digital Plus (5.1)
Bit depth	24 bit
Sample Rate	32 to 192 kHz
CPU Unit (Inputs)	• Mini-XLR (AES/EBU; symmetrical, lockable) • Coaxial (S/PDIF; RCA, Cinch) • Optical (S/PDIF; TOSLINK)
CON Unit (Outputs)	• Mini-XLR (AES/EBU; symmetrical, lockable) • Coaxial (S/PDIF; RCA, Cinch) • Optical (S/PDIF; TOSLINK)

10.1.10 Balanced Audio

Extender modules with a balanced audio interface support a unidirectional 2-channel mono or 1-channel stereo transmission in studio quality.

The audio interface is at the same time a 'Line-Level' and 'Mic-Level' interface and is designed to transmit signals of a microphone or mixing desk for example with a high tolerance for interferences, even at larger distances. In addition to that you can connect active speakers at the CON Unit.

Each audio input port contains a 6-pole Phoenix terminal block (until 12/2021 as 6.35 mm jack socket) and can be used symmetrically or asymmetrically.

NOTICE

Microphone connection and/or speaker connection

To connect a microphone to the console, the CPU module with audio input must be installed in the CON Unit. If a loudspeaker is to be connected to the console, additionally a CON module with audio output is required.

Phantom Power of a Microphone

Phantom power is used for condenser microphones to operate the internal electronic components. The provided voltage is 48 V DC. Phantom power can only be activated on the audio input side (CPU module).

The microphone has to be connected to the audio input of the CPU module.

To activate phantom power, the switch on the CPU module has to be pressed and clicked into the pressed position.

NOTICE

Damage to audio output devices from phantom power

If audio output devices (e.g., loudspeakers) are operated with phantom power, unexpected damage can occur to the devices.

➥ Use phantom power only for microphones.

Pre-amplification of a Microphone

The balanced audio interface offers the possibility of a pre-amplification of a microphone at the audio input of the CPU module.

- The pre-amplification can be activated for each audio channel separately.
- To activate the pre-amplification, the dip switch (1 for the left and 2 for the right channel) of the respective audio channel has to be set to the ON position at the CPU module.
- The default pre-amplification is 10 dB.
- The pre-amplification can be configured in the `Config.txt` file of the extender module with the balanced audio CPU module. Therefore, the respective parameter **GAIN** has to be entered into a new line. The setting can be configured in single steps between 10 and 65 dB, for example:
  - 36 dB (enter **GAIN=36** in `Config.txt` file)
  - 48 dB (enter **GAIN=48** in `Config.txt` file)

Configuration of the Sample Rate

The sample rate of the balanced audio interface can be configured individually.

- The default sample rate is 48.0 kHz.
- The sample rate can be configured in the `Config.txt` file of the extender module with the balanced audio CPU module. Therefore, the respective parameter **SRC** has to be entered into a new line. If there is not entered any parameter, the sample rate 48.0 kHz will be used. The following additional sample rates can be configured:
  - 32.0 kHz (enter **SRC32000** in `Config.txt` file)
  - 44.1 kHz (enter **SRC44100** in `Config.txt` file)
  - 88.2 kHz (enter **SRC88200** in `Config.txt` file)
  - 96.0 kHz (enter **SRC96000** in `Config.txt` file)
  - 176.4 kHz (enter **SRC176400** in `Config.txt` file)
  - 192.0 kHz (enter **SRC192000** in `Config.txt` file)

Compatibility

Extender modules with balanced audio interface are compatible to extender modules with digital audio interface regarding the transmission of the audio standard 2-channel PCM.

- The compatibility shall be applied to the add-on module digital audio and the extender modules of the 481/491 and 483/493 Serie.
- The compatibility is regardless of the input or output side, this means that a digital audio input is compatible to a balanced audio output and vice versa.

Specification Balanced Audio

Parameter	Value
Bit depth	24 bit
Sample rate	32 to 192 kHz
Input signal level	Max. 6.4 dBu balanced (Gain: 0 dB) Max. 0.4 dBu unbalanced (Gain: 0 dB)
Output signal level	8.1 dBu (balanced) 2.1 dBu (unbalanced)
Phantom power	48 V DC
Pre-amplification	10 to 65 dB
CPU Unit (Inputs)	1x 6-pole Phoenix terminal block 2x 6.,35 mm stereo jack plug (until 12/2021)
CON Unit (Outputs)	1x 6-pole Phoenix terminal block 2x 6.35 mm stereo jack plug (until 12/2021)

10.2 Interconnect Cables

10.2.1 Cat X

NOTICE

Transmission problems

Routing over an active network component, such as an ethernet hub, switch, or router is not allowed. Operation with several patch fields is possible.

➡ Establish a point-to-point connection.

➡ Avoid routing Cat X cables along power cables.

NOTICE

Exceeding the limit of the device class

The use of unshielded Cat X cables with higher electromagnetic emissions/radiation can exceed the limit values for the specified device class.

➡ Correctly install shielded Cat X cable throughout interconnection, to maintain regulatory EMC compliance.

NOTICE

Exceeding limit values for electromagnetic radiation

The limit values for the electromagnetic radiation of the device are complied with if ferrites are mounted on both sides of all Cat X cables near the device. With installed ferrites, the devices meet the EU guidelines for electromagnetic compatibility. The operation of the devices without mounted ferrites leads to a loss of conformity with the EU directives.

➡ Mount ferrites on both sides of all Cat X cables near the device to maintain regulatory EMC compliance.

Type of Interconnect Cable

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

Type of cable	Specification
Cat X installation cable AWG24	S/UTP (Cat 5e) cable according to EIA/TIA-568, standard 568-A or 568-B. Four pairs of wires AWG24. We recommend using standard 568-A, but standard 568-B is also supported.
Cat X patch cable AWG26/8	S/UTP (Cat 5e) cable according to EIA/TIA-568, standard 568-A or 568-B. Four pairs of wires AWG26/8. We recommend using standard 568-A, but standard 568-B is also supported.

The use of flexible cables (patch cables) type AWG26/8 is possible. However, the maximum possible extension distance is halved.

Maximum Transmission Range for Video and USB HID Signals (End-to-End Connection)

Type of cable	Maximum transmission range
Cat X installation cable AWG24	140 m (460 ft)
Cat X patch cable AWG26/8	70 m (230 ft)

10.2.2 Fiber

NOTICE

Transmission problems

Routing over an active network component, such as an ethernet hub, switch, or router is not allowed. Operation with several patch fields is possible.

➡ Establish a point-to-point connection.

Type of Interconnect Cable*

Type of cable	Specification
Single-mode 9 µm	• Two fibers 9 µm • I-V(ZN)H 2E9 (in-house patch cable) • I-V(ZN)HH 2E9 (in-house breakout cable) • I/AD(ZN)H 4E9 (in-house or outdoor breakout cable, resistant) A/DQ(ZN)B2Y 4G9 (outdoor cable, with protection against rodents)
Multi-mode 50 µm	• Two fibers 50 µm • I-V(ZN)H 2G50 (in-house patch cable) I/AD(ZN)H 4G50 (in-house or outdoor breakout cable, resistant)

* Cable notations according to VDE

Maximum Transmission Range for Video and USB HID Signals (End-to-End Connection)

NOTICE

Transmission ranges when using add-on modules with transparent USB

When using L474/R474 add-on modules with transparent USB, the binding specifications stated in the data sheets of the add-on modules apply.

Type of cable	Bandwidth	Maximum transmission range
Single-Mode 9 µm	1G	10,000 m (32,808 ft)
Single-Mode 9 µm	3G	5,000 m (16,404 ft)
Multi-Mode 50 µm (OM3)	1G/3G	1,000 m (3,280 ft)
Multi-Mode 50 µm	1G/3G	400 m (1,312 ft)

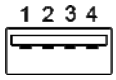
When using single-mode SFPs with multi-mode fiber optic cables, the maximum transmission range can usually be doubled.

Type of Connector

Connector	Type
Plug-in connector	LC-Connector

10.3 Connector Pinouts

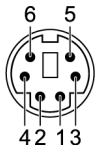
10.3.1 USB, Type A

Connector	Pin	Signal	Color
	1	+5 V (DC)	Red
	2	Data -	White
	3	Data +	Green
	4	GND	Black

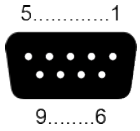
10.3.2 Mini-USB, Type B

Connector	Pin	Signal	Color
	1	+5 V (DC)	Red
	2	Data -	White
	3	Data +	Green
	4	Not connected	-
	5	GND	Black

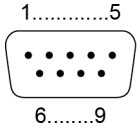
10.3.3 PS/2

Connector	Pin	Signal	Pin	Signal
	1	DATA	4	CLK
	2	GND	5	Not connected
	3	+5 V (DC)	6	Not connected

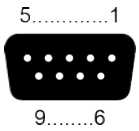
10.3.4 D-Sub 9 (Serial RS232) DCE, CPU Modules

Connector	Pin	Signal	Pin	Signal
	1	Not connected	6	DTR (out)
	2	TxD (out)	7	CTS (in)
	3	RxD (in)	8	RTS (out)
	4	DSR (in)	9	Not connected
	5	GND	-	-

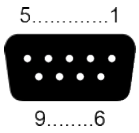
10.3.5 D-Sub 9 (Serial RS232) DTE, CON Modules

Connector	Pin	Signal	Pin	Signal
	1	Not connected	6	DSR (out)
	2	RxD (in)	7	RTS (in)
	3	TxD (out)	8	CTS (out)
	4	DTR (out)	9	Not connected
	5	GND	-	-

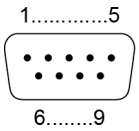
10.3.6 D-Sub 9 (Serial RS422), CPU Modules

Connector	Pin	Signal	Pin	Signal
	1	GND	6	Rx-GND
	2	Rx(A)- (in)	7	Rx(B)+ (in)
	3	Tx(B)+ (out)	8	Tx(A)- (out)
	4	Tx-GND	9	GND
	5	Not connected	-	-

10.3.7 D-Sub 9 (Serial RS422), CON Modules

Connector	Pin	Signal	Pin	Signal
	1	GND	6	Tx-GND
	2	Tx(A)- (out)	7	Tx(B)+ (out)
	3	Rx(B)+ (in)	8	Rx(A)- (in)
	4	Rx-GND	9	GND
	5	Not connected	-	-

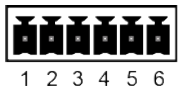
10.3.8 D-Sub 9 (GPIO)

Connector	Pin	Signal	Color
	1	1	Ground
	2	1	Ground
	3	-	+5 V (DC)
	4	2	Ground
	5	2	Ground
	6	3	Ground
	7	3	Ground
	8	4	Ground
	9	4	Ground

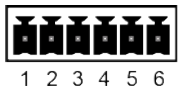
10.3.9 3.5/6.35 mm Stereo Jack Plug

Connector	Pin	Signal
	1	GND
	2	Audio IN/OUT L
	3	Audio IN/OUT R

10.3.10 Phoenix Terminal Block, 6-pole, CPU Modules

Connector	Pin	Signal
	1	IN 1, +
	2	IN 1, -
	3	IN 1, GND
	4	IN 2, +
	5	IN 2, -
	6	IN 2, GND

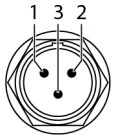
10.3.11 Phoenix Terminal Block, 6-pole, CON Modules

Connector	Pin	Signal
	1	OUT 1, +
	2	OUT 1, -
	3	OUT 1, GND
	4	OUT 2, +
	5	OUT 2, -
	6	OUT 2, GND

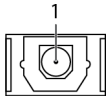
10.3.12 RCA (Cinch)

Connector	Pin	Signal
	1	GND
	2	Data IN/OUT

10.3.13 Mini-XLR

Connector	Pin	Signal
	1	GND
	2	Data +
	3	Data -

10.3.14 Toslink

Connector	Diode	Signal
	1	Data IN/OUT

10.4 Current Draw and Power Consumption (per Function Part)

NOTICE

Exceeding the maximum permissible current consumption

In addition to the current consumption of the extender and additional modules, there is also the current consumption by the connected periphery.

➡ Observe the maximum current consumption of the chassis (see chassis manual 474-BODY).

The current draw is specified here per function part of the add-on modules. Up to two function parts can be combined per add-on module, one on the left and one on the right. The current draw of the add-on modules behaves accordingly with combined function parts. E.g., the maximum current draw for CPU module L-474-BAH (analog audio with USB HID) is 160 mA.

	CPU module		CON module	
Interface	Maximum current draw	Maximum power consumption	Maximum current draw	Maximum power consumption
Analog audio (RS232)	70 mA	0.3 W	70 mA	0.3 W
Analog audio (RS422)	70 mA	0.3 W	70 mA	0.3 W
Digital audio	100 mA	0.5 W	100 mA	0.5 W
Symmetrical audio	500 mA	2.3 W	370 mA	1.7 W
USB 2.0 embedded (up to 36 Mbit/s)	90 mA	0.4 W	170 mA	0.8 W
USB 2.0 embedded (up to 50/100 Mbit/s)	110 mA	0.5 W	290 mA	1.3 W
USB 2.0 stand-alone, Cat X (up to 480 Mbit/s)	490 mA	3 W	530 mA	4 W
USB 2.0 embedded, fiber (up to 480 Mbit/s)	420 mA	3 W	400 mA	3 W
USB HID	90 mA	0.4 W	280 mA	1.3 W
PS/2	0 mA	0 W	200 mA	0.9 W
GPIO	-		10 mA	0 W

Product type	Maximum current draw	Maximum power consumption
474-MODFAN	220 mA	1.0 W

10.5 Dimensions Add-on Modules

Product type	Dimension
Add-on modules	128.6 x 20 x 145 mm (5.1" x 0.8" x 5.7")
Stand-alone modules	128.6 x 20 x 145 mm (5.1" x 0.8" x 5.7")
Fan cartridge module	128.6 x 20 x 145 mm (5.1" x 0.8" x 5.7")

10.6 Weight

10.6.1 Add-on Modules

Product type	Max. weight L474-	Max. weight R474-
BDH	70 g	70 g
BAH/BSH/BDX	75 g	75 g
BXH/BAX/BRX/BSX	85 g	85 g
BXE/BXE2/BDE2	90 g	90 g
BDE/BDD/BBX/BB2X	95 g	95 g
BAP/BRE/BSE/BDA	100 g	100 g
BSE2/BSS	110 g	110 g
BBE2	115 g	115 g
BAE/BAE2/BRE2	120 g	120 g
BGX	n/a	105 g
BGA	n/a	95 g
BGE2	n/a	100 g

10.6.2 USB 2.0 Stand-alone Modules

Product type	Max. weight L474-	Max. weight R474-
BXUC	130 g	135 g
BXUS	135 g	140 g

10.6.3 Fan Cartridge Module

Product type	Weight
474-MODFAN	60 g

10.7 Environmental Conditions and Emissions

Parameter	Value
Operating temperature	5 to 45 °C (41 to 113 °F)
Storage temperature	-25 to 60 °C (-13 to 140 °F)
Relative humidity	Max. 80% non-condensing
Operating altitude	Max. 2.500 m (7,500 ft)
Heat dissipation	Corresponds to power consumption in Watt (W)

10.8 MTBF

Specific MTBF values (mean time between failure) can be requested from the manufacturer’s technical support if required.

11 Technical Support

Prior to contacting support, please ensure you have read this manual, and then installed and set-up your KVM extender as recommended.

11.1 Support Checklist

To efficiently handle your request, it is necessary that you complete a support request checklist (Download). Please ensure that you have the following information available before you call:

- Company, name, phone number and email,
- Type and serial number of the device (see bottom of the device),
- Date and number of sales receipt and name of your distributor, if necessary,
- Issue date of the existing manual,
- Nature, circumstances, and duration of the problem,
- Components included in the system (such as graphic source/CPU, OS, graphic card, monitor, USB HID/USB 2.0 devices, interconnect cable) including manufacturer and model number,
- Results from any testing you have done.

11.2 Shipping Checklist

1. To return your device, you need an RMA number (Return-Material-Authorization). Therefore, please contact your distributor.
2. Package your devices carefully. Add all pieces which you received originally. Preferably use the original box.
3. Note your RMA number visibly on your shipment.

Devices that are sent in without an RMA number will not be accepted. The shipment will be sent back without being opened, postage unpaid.

12 Glossary

The following terms are commonly used in this manual or in video and KVM technology.

Term	Description
AES/EBU	Interface specification for the transmission of digital stereo, two-channel, or mono audio signals between different devices according to the AES3 standard.
Cat X	Any Cat 5e (Cat 6, Cat 7) cable.
CON Device	Logical object that summarizes several EXT Units of physical extender modules (CON Units) to switch more complex sink systems via matrix.
CON Unit	Decoder extender module to connect to the console (monitor(s), keyboard, and mouse; optionally also with USB 2.0 devices).
Console	Monitor, keyboard, mouse, media control, external switching solution, etc.
CPU Device	Logical object that summarizes several EXT Units of physical extender modules (CPU Units) to switch more complex source systems via matrix.
CPU Unit	Encoder extender module to connect to a source.
Dual-Head	A system with two video ports.
EDID	Extended Display Identification Data (EDID) is a metadata format (128 Byte) for display devices to describe their capabilities to a video source (e.g., graphics card).
Fiber	Single-mode or multi-mode fiber cables.
KVM	Keyboard, video, and mouse.
LPCM	LPCM (Linear Pulse Code Modulation) is a pulse modulation method, also known as an uncompressed data format. The LPCM method is used for converting analog audio into digital audio with evenly large value ranges.
Mini-DisplayPort	A VESA standardized interface for an all-digital transmission of audio and video data. It is differentiated between the DisplayPort standards 1.1 and 1.2. The signals have LVDS level.
Mini-XLR	Industrial standard for electrical plug connections (3 pole) for the transmission of digital audio and control signals.
MTBF	Mean Time Between Failure (MTBF) is measured in power-on hours and describes the system reliability.
Multi-Mode	50 µm multi-mode fiber cable.
RCA (Cinch)	A non-standard plug connection for transmission of electrical audio and video signals, especially with coaxial cables.
S/PDIF	Interface for electrical or optical transmission of digital stereo audio signals between different devices used in consumer electronics.
SFP	SFPs (Small Form Factor Pluggable) are pluggable interface modules for Gigabit connections. SFP modules are available for Cat X and fiber cables.
Single-Head	A system with one video port.

Term	Description
Single-Mode	9 µm single-mode fiber cable.
TOSLINK	Standardized fiber connection system for digital transmission of audio signals (F05 plug connection).
USB HID	USB HID devices (Human Interface Device) allow users to interact with computers. There is no need for a special driver during installation. When connecting, the message “New USB HID device found” is reported. Typical USB HID devices include keyboards, mice, graphics tablets and touch screens. Storage, video, and audio devices are not USB HID devices.

13 Index

14 Table of Figures

15 Change Log

This table offers an overview about the most important changes available, such as new functions, changed configuration or operation.

Edition	Date	Chapter	New functions/changes
REV01.01	2022-10-17	4.2.2	Figure legend correction
REV01.00	2022-08-19	-	Initial user manual for 474 add-on modules.