Draco vario Repeater

485 Series

(Cross) Repeater

User Manual

Edition: 2021-10-14

IHSE GmbH ■ Benzstraße 1 ■ 88094 Oberteuringen ■ Germany
info@ihse.com ■ www.ihse.com ■ phone: +49 7546-9248-0 ■ fax: +49 7546-9248-48

Contents

1 About This Manual 5
1.1 Scope 5
1.2 Validity 5
1.3 Cautions and Notes 5
1.4 EU Declaration of Conformity 5
2 Safety Instructions 6
3 Description 7
3.1 Application 7
3.2 System Overview 8
3.3 Product Range 9
3.3.1 Chassis 9
3.3.2 (Cross) Repeater Modules 10
3.4 Accessories Chassis 11
3.5 Device Views 12
3.5.1 2-fold Vario Chassis 474-BODY2/2R 12
3.5.2 2-fold Vario Chassis 474-BODY2N 13
3.5.3 4-fold Vario Chassis 474-BODY4/4R 14
3.5.4 6-fold Vario Chassis 474-BODY6BP 16
3.5.5 6-fold Vario Chassis 474-BODY6BPF 17
3.5.6 21-fold Vario Chassis 474-BODY21/4U 18
3.5.7 Model 485-BC 19
3.5.8 Model 485-BS 19
3.5.9 Model 485-BX 19
3.5.10 Model 485-BCC 20
3.5.11 Model 485-BSS 20
3.5.12 Model 485-BXX 21
3.6 Status LEDs 22
3.6.1 Status (Cross) Repeater Module 22
4 Installation 23
4.1 Package Contents 23

4.2 System anschließen ... 23
4.2.1 (Cross) Repeater Setup ... 23
4.3 Example Applications ... 24
5 Configuration ... 26
6 Operation ... 26
7 Specifications ... 27
7.1 Interfaces ... 27
7.1.1 RJ45 (Interconnect) ... 27
7.1.2 Fiber SFP Type LC (Interconnect) ... 27
7.2 Interconnect Cable ... 28
7.2.1 Cat X ... 28
7.2.2 Fiber ... 29
7.3 Connector Pinouts ... 30
7.4 Power Supply ... 31
7.5 Environmental Conditions ... 31
7.6 Size ... 32
7.7 Shipping Weight ... 33
8 Troubleshooting ... 34
8.1 General Failures ... 34
9 Technical Support ... 35
9.1 Support Checklist ... 35
9.2 Shipping Checklist ... 35
10 Certificates ... 36
10.1 North American Regulatory Compliance ... 36
10.2 Product Safety ... 37
10.3 WEEE ... 37
10.4 RoHS/RoHS 2 ... 37
11 Glossary ... 38

1 About This Manual

1.1 Scope

This manual describes how to install your (Cross) Repeater, how to operate it and how to perform trouble shooting.

1.2 Validity

This manual is valid for all devices listed on the front page. The product code is printed on the base of the devices.

1.3 Cautions and Notes

The following symbols are used in this manual:

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

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

This symbol indicates best practice information to show recommended and optimal ways to use this product in an efficient way.

1.4 EU Declaration of Conformity

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

A copy of the original, product-specific EU Declaration of Conformity can be provided upon request.

2 Safety Instructions

To ensure reliable and safe long-term operation of your (Cross) Repeater please note the following guidelines:

Installation

- ➔ Only use in dry, indoor environments.
- ➔ Only use the device according to this User Manual. Failure to follow these procedures could result in damage to the equipment or injury to the user or installer.
- ➔ The (Cross) Repeater and the power supply units can get warm. Do not install components in an enclosed space without any airflow.
- ➔ Do not place the power supply directly on top of the device.
- ➔ Do not obscure ventilation holes.
- ➔ Only use power supplies originally supplied with the product or manufacturer-approved replacements. Do not use a power supply if it appears to be defective or has a damaged chassis.
- ➔ Connect all power supplies to grounded outlets. In each case, ensure that the ground connection is maintained from the outlet socket through to the power supply's AC power input.
- ➔ Do not connect the link interface to any other equipment, particularly network or telecommunications equipment.
- ➔ Take any required ESD precautions.

In order to disconnect the device completely from the electric circuit, all power cables have to be removed.

Repair

- ➔ Do not attempt to open or repair a power supply unit.
- ➔ Do not attempt to open or repair the (Cross) Repeater. There are no user serviceable parts inside.
- ➔ Please contact your dealer or manufacturer if there is a fault.

3 Description

3.1 Application

The (Cross) Repeater is basically used in order to double the maximum cabling distance between a KVM extender CON or CPU Unit or even a KVM matrix. In addition to that the device can also be used for media conversion from Cat X to fiber or vice versa.

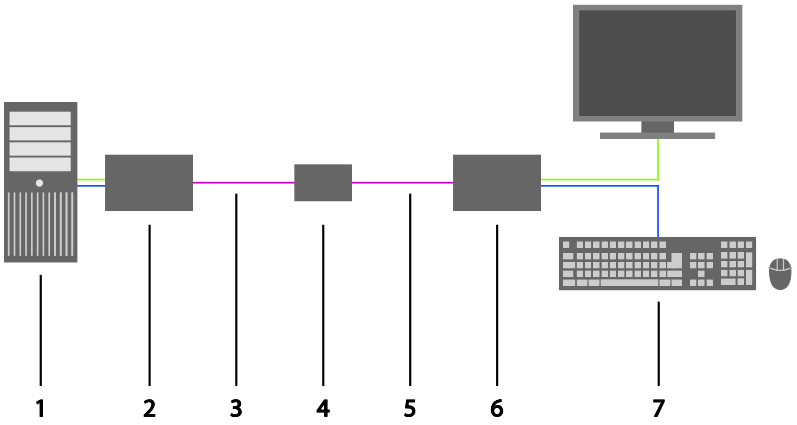
The device is available as a pure Cat X or fiber version (repeater) and as a hybrid version of Cat X and fiber (cross repeater) for an additional electrical/optical signal conversion.

3.2 System Overview

The (Cross) Repeater consists of at least one module depending on the application.

The device is connected between a KVM extender CON and CPU Unit via the interconnect cable or can be alternatively connected between a KVM extender unit and a KVM matrix.

The (Cross) Repeater communicates with both the KVM extenders and a KVM-Matrix via the interconnect cables.



System Overview

1 Source (computer, CPU)
2 KVM Extender CPU Unit
3 Interconnect cable (Cat X or fiber)
4 (Cross) Repeater
5 Interconnect cable (Cat X or fiber)
6 KVM Extender CON Unit
7 Console (monitor, keyboard, mouse)

See Chapter 4.3, Page 24 for installation examples.

3.3 Product Range

3.3.1 Chassis

Model	Description
474-BODY2	Empty chassis for up to 2 boards, 1x external power supply unit
474-BODY2R	Empty chassis for up to 2 boards, 1x external power supply unit, preparation for redundancy for a second power supply unit (external)
474-BODY2N	Empty chassis for up to 2 boards, 1x internal power supply unit, preparation for redundancy for a second power supply unit (external)
474-BODY4	Empty chassis for up to 4 boards, 1x external power supply unit
474-BODY4R	Empty chassis for up to 4 boards, 1x external power supply unit, preparation for redundancy for a second power supply unit (external)
474-BODY6R-R1	Empty chassis for up to 6 boards, 1x internal power supply unit, preparation for redundancy for a second power supply unit (external)
474-BODY6BP	Empty chassis for up to 6 boards, active backplane, 2x internal power supply unit (redundancy)
474-BODY6BPF	Empty chassis for up to 6 boards, active backplane, 2x internal power supply unit (redundancy) with connectors on rear side
474-BODY21/4U	Empty chassis for up to 21 boards, 1x internal power supply unit, preparation for redundancy for a second power supply unit (internal)

3.3.2 (Cross) Repeater Modules

Model	Description
485-BC	Repeater module Cat X for range extension up to 280 m
485-BS	Repeater module fiber (Single-Mode) for range extension up to 20,000 m*
485-BX	Repeater module Cat X/fiber (Single-Mode) for an electrical/optical media conversion, maximum extension 10,140 m*
485-BCC	Dual repeater module Cat X for range extension up to 280 m
485-BSS	Dual repeater module fiber (Single-Mode) for range extension up to 20,000 m*
485-BXX	Repeater module Cat X/fiber (Single-Mode) for an electrical/optical media conversion, maximum extension 10,140 m*
* For detailed information for the maximum transmission range, see Chapter 7.2.2, Page 29.	

3.4 Accessories Chassis

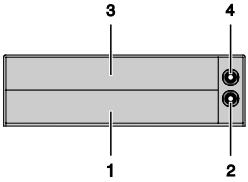
Model	Description
474-2RMK	19"/1U rack mount kit for 2-fold chassis
474-2NRMK	19"/1U rack mount kit for 2-fold chassis with internal PSU
474-4RMK	19"/1U rack mount kit for 4-fold chassis
474-6RMK	19"/1U rack mount kit for 6-fold chassis
474-VPLATE	Fastening strips for screw or snap on for 2-, 4- and 6-fold chassis
474-BRACKET	Mounting bracket with screws for 2-, 4- and 6-fold chassis
474-PSU2	Power supply for 2-fold chassis (spare or redundancy)
474-PSU4	Power supply for 4-fold chassis (spare or redundancy)
474-PSU6	Power supply for 6-fold chassis (spare or redundancy)
474-PSU21	Power supply for 6-fold-chassis (spare or redundancy)
474-BLND1	Blind plate 3U/4HP for 2-, 4- and 6-fold chassis
474-BLND2	Blind plate 3U/8HP for 2-, 4- and 6-fold chassis
474-6FAN	Fan option for chassis 474-BODY6BP/F
260-5G	International power supply unit 100...240VAC / 5VDC / 3A
260-5M	International power supply unit 100...240VAC / 5VDC / 5A
474-IECLOCK	IEC connection cable for power supply lockable

(Cross) Repeaters and the power supply units can get warm and must not be installed in closed rooms with no air circulation. For rack-mount installations, at least 0.5 U (height unit) is required above the (Cross) Repeater for ventilation.

3.5 Device Views

3.5.1 2-fold Vario Chassis 474-BODY2/2R

CPU and CON Unit



Rear View

1 Slot for modules #1

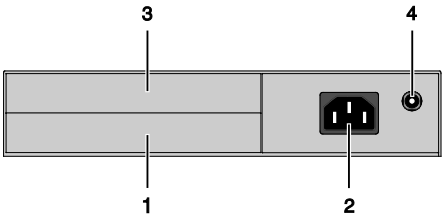
2 Connect to 5VDC power supply (standard)

3 Slot for modules #2

4 Connect to 5VDC power supply (redundancy, optional)

3.5.2 2-fold Vario Chassis 474-BODY2N

CPU and CON Unit



Rear View

1 Slot for modules #1

2 Connect to power supply (standard)

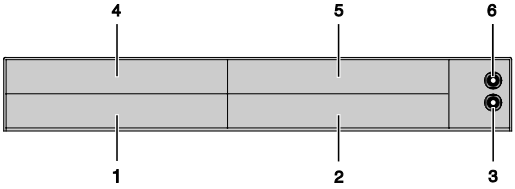
3 Slot for modules #2

4 Connect to 5VDC power supply (redundancy)

The 2-fold vario chassis with an internal power supply is not equipped with a fuse on its primary side. Therefore the protection against excessive currents has to be provided by the electrical installation of the building.

3.5.3 4-fold Vario Chassis 474-BODY4/4R

CPU and CON Unit



Rear View

1 Slot for modules #3

2 Slot for modules #1

3 Connect to 5VDC power supply (standard)

4 Slot for modules #4

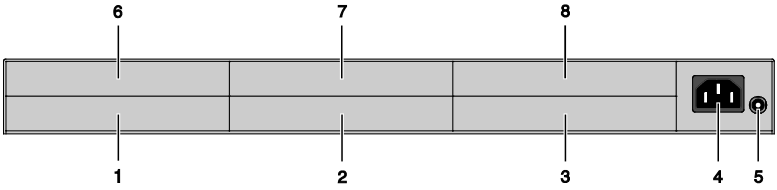
5 Slot for modules #2

6 Connect to 5VDC power supply (redundancy, optional)

For operation with three KVM Extender CON modules and a USB 2.0 CON module in a 4-fold vario chassis, two power supplies are necessary. In this case, redundancy is inapplicable.

3.5.3.1 6-fold Vario Chassis 474-BODY6R-R1

CPU and CON Unit



Rear View

1 Slot for modules #5

2 Slot for modules #3

3 Slot for modules #1

4 Connect to power supply (standard)

5 Connect to 5VDC power supply (standard)

6 Slot for modules #6

7 Slot for modules #4

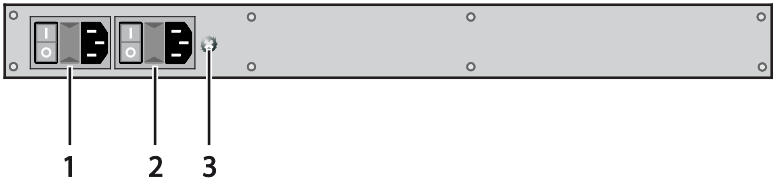
8 Slot for modules #2

For operation with KVM Extender modules in a 6-fold vario chassis, two power supplies are necessary. In this case, redundancy is inapplicable.

The 6-fold vario chassis is not equipped with a fuse on its primary side. Therefore the protection against excessive currents has to be provided by the electrical installation of the building.

3.5.4 6-fold Vario Chassis 474-BODY6BP

CPU and CON Unit

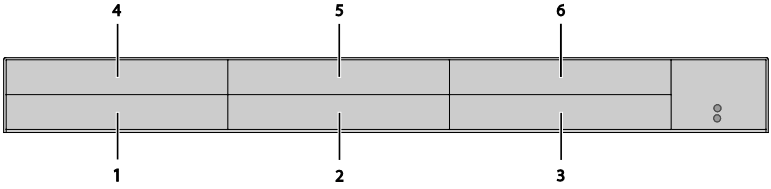


Front View

1 Connect to power supply 1

2 Connect to power supply 2 (redundancy)

3 Grounding



Rear View

1 Slot for modules #5

2 Slot for modules #3

3 Slot for modules #1

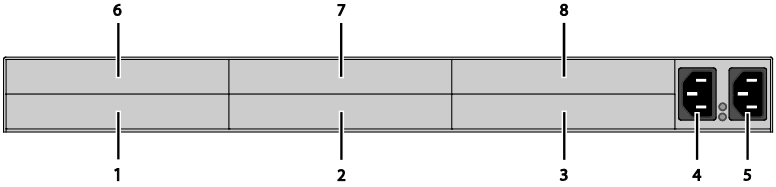
4 Slot for modules #6

5 Slot for modules #4

6 Slot for modules #2

3.5.5 6-fold Vario Chassis 474-BODY6BPF

CPU and CON Unit



Rear View

1 Slot for modules #5

2 Slot for modules #3

3 Slot for modules #1

4 Connect to power supply 1

5 Connect to power supply 2 (redundancy)

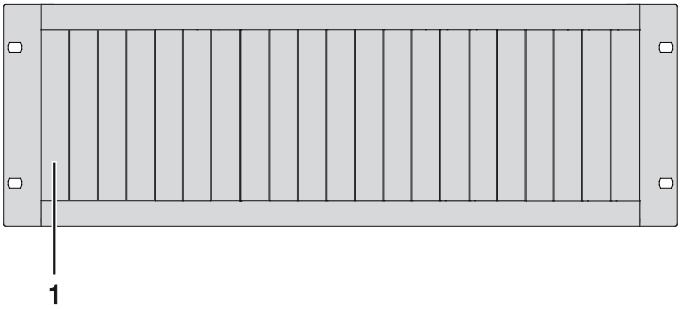
6 Slot for modules #6

7 Slot for modules #4

8 Slot for modules #2

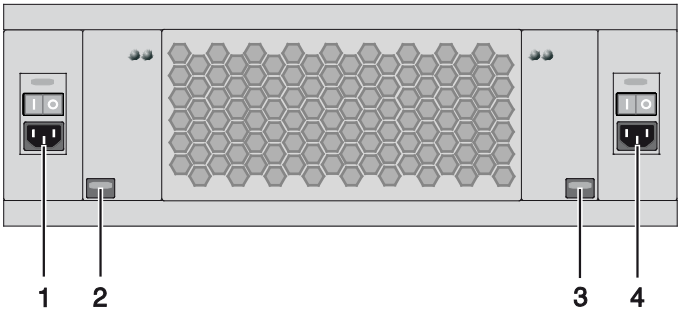
3.5.6 21-fold Vario Chassis 474-BODY21/4U

CPU and CON Unit



Rear View

1 Slots for modules #1 - #21



Front View

1 Connect to power supply 2

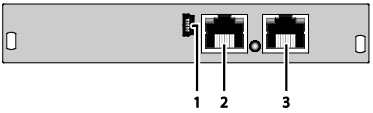
2 Locking for power supply 2 (redundancy)

3 Locking for power supply 1 (standard)

4 Connect to power supply 1

3.5.7 Model 485-BC

Module



Rear View

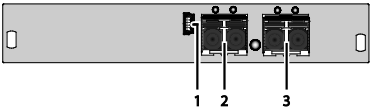
1 Service port

2 Connect to interconnect cable 1

3 Connect to interconnect cable 2

3.5.8 Model 485-BS

Module



Rear View

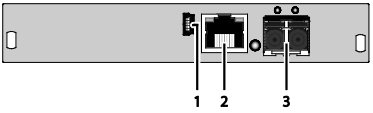
1 Service port

2 Connect to interconnect cable 1

3 Connect to interconnect cable 2

3.5.9 Model 485-BX

Module



Rear View

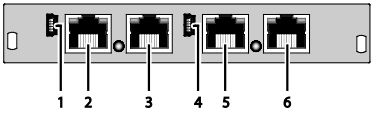
1 Service port

2 Connect to interconnect cable 1

3 Connect to interconnect cable 2

3.5.10 Model 485-BCC

Module



Rear View

1 Service port (repeater #1)

2 Connect to interconnect cable 1 (repeater #1)

3 Connect to interconnect cable 2 (repeater #1)

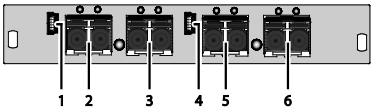
4 Service port (repeater #2)

5 Connect to interconnect cable 1 (repeater #2)

6 Connect to interconnect cable 2 (repeater #2)

3.5.11 Model 485-BSS

Module



Rear View

1 Service port (repeater #1)

2 Connect to interconnect cable 1 (repeater #1)

3 Connect to interconnect cable 2 (repeater #1)

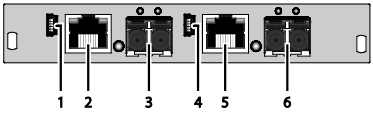
4 Service port (repeater #2)

5 Connect to interconnect cable 1 (repeater #2)

6 Connect to interconnect cable 2 (repeater #2)

3.5.12 Model 485-BXX

Module



Rear View

1 Service port (repeater #1)

2 Connect to interconnect cable 1 (repeater #1)

3 Connect to interconnect cable 2 (repeater #1)

4 Service port (repeater #2)

5 Connect to interconnect cable 1 (repeater #2)

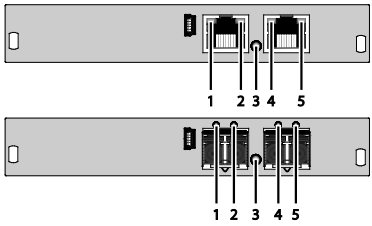
6 Connect to interconnect cable 2 (repeater #2)

3.6 Status LEDs

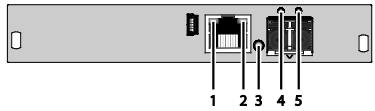
3.6.1 Status (Cross) Repeater Module

The (Cross) Repeater module is fitted with a multi color LED for overall status indication and with two further LEDs for indication of the connection status.

Module



Rear View



Rear View

LED 1/2 and 4/5: Connection Status

Pos.	LED	Status	Description
1/4	**Failure LED** (green)	Off	Connection available
		On or Flashing	Connection failure (flashing for about 20 s following a connection failure)
2/5	**Status LED** (green)	Flashing	No connection via interconnect cable
		On	Connection available

LED 3: Device Status

LED color		Description
Red		Device ready
Blue		Link 1 (left connector) available, Link 2 (right connector) not detected
Green		Link 2 (right connector) available, Link 1 (left connector) not detected
Light Blue		Link 1 (left connector) and Link 2 (right connector) available

4 Installation

4.1 Package Contents

Your extender package contains the following items:

(Cross) Repeater:

- (Cross) Repeater in the vario chassis
- 1x (redundancy 2x) 5 VDC international power supply unit per KVM Extender unit (depending on chassis)
- 1x (redundancy 2x) country-specific power cord (depending on chassis)
- Quick Setup

If anything is missing, contact your dealer.

4.2 System anschließen

First time users are recommended to setup the system in the same room as a test setup. This will allow you to identify and solve any cabling problems, and experiment with your system more conveniently.

➔ Please verify that interconnect cables, interfaces, and handling of the devices comply with the requirements (see Chapter 7, Page 27).

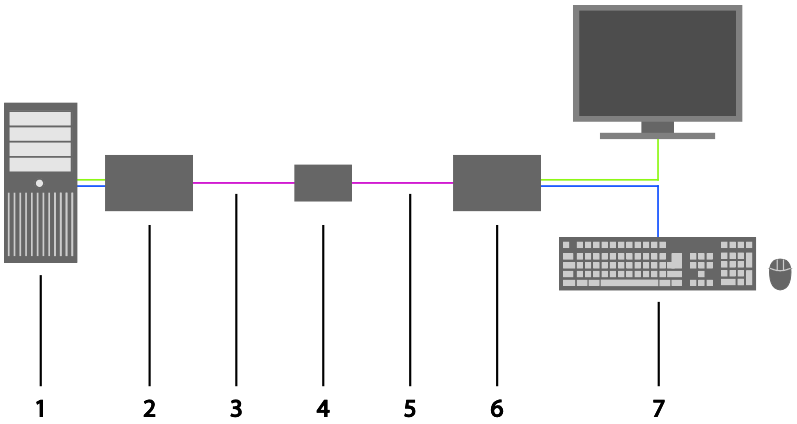
4.2.1 (Cross) Repeater Setup

1. Switch off all devices.
2. Connect the (Cross) Repeater with the interconnect cable(s).
3. Connect the chassis of the (Cross) Repeater to the power supply.
4. Power up the system.

To power up the system, the following sequence is recommended: Monitor – CON Unit – (Cross) Repeater – CPU Unit – source.

4.3 Example Applications

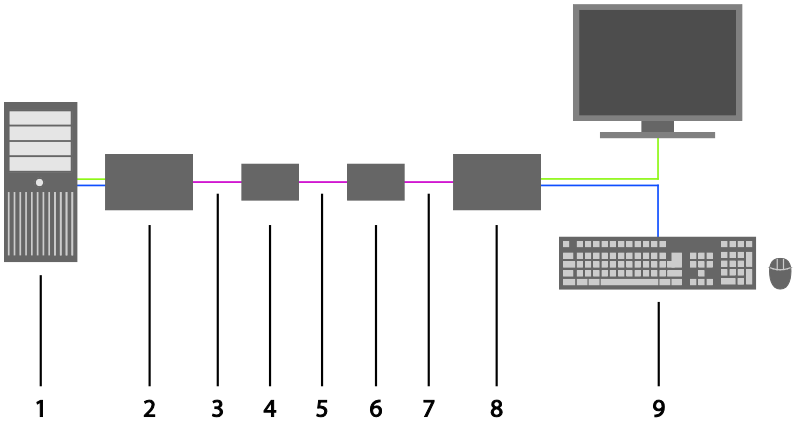
This section illustrates typical installations of (Cross) Repeaters:



Single Media Conversion

1 Source (computer, CPU)
2 KVM Extender CPU Unit
3 Interconnect cable (Cat X)
4 (Cross) Repeater
5 Interconnect cable (fiber)
6 KVM Extender CON Unit
7 Console (monitor, keyboard, mouse)

The example shown in this application scenario will be primarily recommended, if connections through KVM matrix must be bypassed in case of major matrix problems. Therefore KVM extenders with Cat X and with fiber connector can be directly connected to each other.



Dual Media Conversion

1 Source (computer, CPU)
2 KVM Extender CPU Unit
3 Interconnect cable (Cat X)
4 (Cross) Repeater #1
5 Interconnect cable (fiber)
6 (Cross) Repeater #2
7 Interconnect cable (Cat X)
8 KVM Extender CON Unit
9 Console (monitor, keyboard, mouse)

5 Configuration

The (Cross) Repeater does not require any configuration and is ready for use per default.

6 Operation

The (Cross) Repeater does not have any adjustable operating modes and is ready for use per default.

7 Specifications

7.1 Interfaces

7.1.1 RJ45 (Interconnect)

Communication between Cat X devices requires a 1000BASE-T connection.

Connector wiring must comply with EIA/TIA-568-B (1000BASE-T), with RJ45 connectors at both ends. All four cable wire pairs are used.

7.1.2 Fiber SFP Type LC (Interconnect)

Communication of fiber devices is performed via Gigabit SFPs that are connected to suitable fibers fitted with connectors type LC (see Chapter 7.2.2, Page 29).

The correct function of the device can only be guaranteed with SFPs provided by the manufacturer.

SFP modules can be damaged by electrostatic discharge (ESD).
➔ Please consider ESD handling specifications.

7.2 Interconnect Cable

7.2.1 Cat X

A point-to-point connection is required. Operation with several patch fields is possible. Routing over an active network component, such as an Ethernet Hub, Router or Matrix, is not allowed.

➔ Avoid routing Cat X cables along power cables.

To maintain regulatory EMC compliance, correctly installed shielded Cat X cable must be used throughout the interconnection link.

To maintain regulatory EMC compliance, all Cat X cables need to carry ferrites on both cable ends close to the device.

Type of Interconnect Cable

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

Type of cable	Specifications
Cat X Solid-Core Cable AWG24	S/UTP (Cat 5e) cable according to EIA/TIA-568-B. Four pairs of wires AWG24. Connection according to EIA/TIA-568-B (1000BASE-T).
Cat X Patch Cable AWG26/8	S/UTP (Cat 5e) cable according to EIA/TIA-568-B. Four pairs of wires AWG26/8. Connection according to EIA/TIA-568-B (1000BASE-T).

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

Maximum Transmission Range (End-to-End Connection

Type of cable	Maximum transmission range
Cat X Installation Cable AWG24	140 m (400 ft)
Cat X Patch Cable AWG26/8	70 m (200 ft)

7.2.2 Fiber

A point-to-point connection is necessary. Operation with multiple patch panels is allowed. Routing over active network components, such as Ethernet Hubs, Switches or Routers, is not allowed.

Type of Interconnect Cable

(Cable notations according to VDE)

Type of cable	Specifications
Single-mode 9µm	• Two fibers 9µm • 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 50µm	• Two fibers 50µm • I-V(ZN)H 2G50 (in-house patch cable) • I/AD(ZN)H 4G50 (in-house or outdoor breakout cable, resistant)

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

For the signal transmission of transparent USB 2.0, the binding specifications stated in the data sheets of the respective products apply.

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

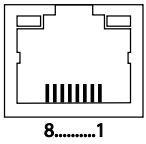
Connector	LC Connector

7.3 Connector Pinouts

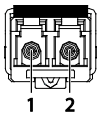
Connector Mini USB Type B

Picture	Pin	Signal	Color
	1	VCC (+5VDC)	Red
	2	Data –	White
	3	Data +	Green
	4	n.c.	–
	5	GND	Black

RJ45

Picture	Pin	Signal	Pin	Signal
	1	D1+	5	D3–
	2	D1–	6	D2–
	3	D2+	7	D4+
	4	D3+	8	D4–

Fiber SFP Typ LC

Picture	Diode	Signal
	1	Data OUT
	2	Data IN

7.4 Power Supply

AC Power Supply

Model	Max. Current	Max. Voltage	Frequency
474-BODY2N	700 mA max.	100-240 V	50/60 Hz
474-BODY6R	1,400 mA max.	100-240 V	47-63 Hz
474-BODY6BP	800 mA max.	100-240 V	50/60 Hz
474-BODY6BPF	800 mA max.	100-240 V	50/60 Hz
474-BODY21/4U	4,000 mA max.	2x 100-240 V	50/60 Hz

DC Power Supply

Model	Max. Current	Max. Voltage
474-BODY2/2R	3,000 mA	5 VDC
474-BODY2N	5,000 mA	5 VDC
474-BODY4/4R	5,000 mA	5 VDC
474-BODY6R	8,000 mA	5 VDC

Power Requirement

Power Requirement (per Unit)	(Cross) Repeater: • Max. 300 mA

7.5 Environmental Conditions

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

7.6 Size

Devices in the 2-fold Vario Chassis 1

CPU Unit / CON Unit	145 x 147 x 41 mm (5.7" x 5.8" x 1.7")
Shipping Box	210 x 140 x 165 mm (8.3" x 5.5" x 6.5")

Devices in the 2-fold Vario Chassis 2

CPU Unit / CON Unit	221 x 147 x 41 mm (8.7" x 5.8" x 1.7")
Shipping Box	550 x 365 x 115 mm (21.7" x 14.4" x 4.5")

Devices in the 4-fold Vario Chassis

CPU Unit / CON Unit	293 x 147 x 41 mm (11.5" x 5.8" x 1.7")
Shipping Box	550 x 365 x 115 mm (21.7" x 14.4" x 4.5")

Devices in the 6-fold Vario Chassis 6R

CPU Unit / CON Unit	442 x 147 x 41 mm (17.4" x 5.8" x 1.7")
Shipping Box	760 x 365 x 115 mm (29.9" x 14.4" x 4.5")

Devices in the 6-fold Vario Chassis 6BP / 6BPF

CPU Unit / CON Unit	442 x 250 x 41 mm (17.4" x 9.8" x 1.7")
Shipping Box	550 x 372 x 155 mm (21.7" x 14.6" x 6.1")

Devices in the 21-fold Vario Chassis

CPU Unit / CON Unit	482 x 462 x 176 mm (19.0" x 18.2" x 6.9")
Shipping Box	645 x 574 x 368 mm (25.4" x 22.6" x 14.5")

7.7 Shipping Weight

Devices in the 2-fold Vario Chassis 1

CPU Unit / CON Unit	0.4 kg (0.9 lb)
Shipping Box	2.2 kg (4.9 lb)

Devices in the 2-fold Vario Chassis 2

CPU Unit / CON Unit	0.8 kg (1.8 lb)
Shipping Box	2.6 kg (5.7 lb)

Devices in the 4-fold Vario Chassis

CPU Unit / CON Unit	0.9 kg (2.0 lb)
Shipping Box	3.4 kg (7.5 lb)

Devices in the 6-fold Vario Chassis 6R

CPU Unit / CON Unit	1.4 kg (3.1 lb)
Shipping Box	4.6 kg (10.1 lb)

Devices in the 6-fold Vario Chassis 6BP / 6BPF

CPU Unit / CON Unit	2.5 kg (5.5 lb)
Shipping Box	3.5 kg (7.7 lb)

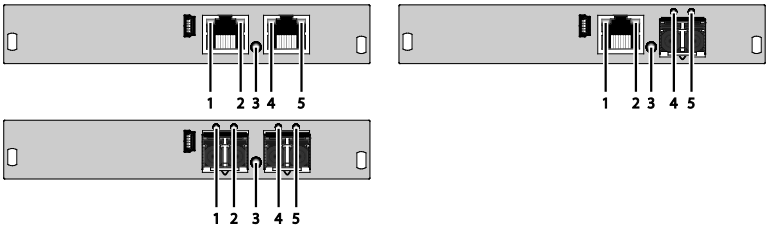
Devices in the 21-fold Vario Chassis

CPU Unit / CON Unit	10.0 kg (22.1 lb)
Shipping Box	14.5 kg (32.0 lb)

8 Troubleshooting

8.1 General Failures

Module



Rear View

Diagnosis	Possible Reason	Measure
LED **3** off	Power supply	➔ Check power supply units and the connection to the power network.
LED **2** off or LED **5** off	Connection between (Cross) Repeater and KVM extender unit or KVM matrix	➔ Check interconnect cables and connections.

9 Technical Support

Prior to contacting support please ensure you have read this manual, and then installed and set-up your (Cross) Repeater as recommended.

9.1 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 device)
- Date and number of sales receipt, name of dealer 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

9.2 Shipping Checklist

1. To return your device, contact your dealer to obtain a RMA number (Return-Material-Authorization).
2. Package your devices carefully, preferably using the original box. Add all pieces which you received originally.
3. Note your RMA number visibly on your shipment.

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

10 Certificates

10.1 North American Regulatory Compliance

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.

10.2 Product Safety

The product safety of the devices is proven by the compliance to the following standards:

Type	Description
474-BODY6BP	• IEC 62368-1:2014 • EN 62368-1:2014/A11:2017
474-BODY6BPF	• UL 62368-1:2014 • CAN/CSA-C22.2 No. 62368-1:2014
474-BODY2N	• EN 60950-1/A12:2011 • IEC 60950-1/A1:2010 • UL 60950-1-2007 • CAN/CSA-C22.2 No. 60950-1:2007
474-BODY6R	
474-BODY21/4U	

The compliance is verified and confirmed by TÜV Süd, Germany.

10.3 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.

10.4 RoHS/RoHS 2

This device complies with the Directive 2011/65/EU of the European Parliament and of the council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS 2, RoHS II).

The device labels carry a respective marking.

11 Glossary

The following terms are commonly used in this guide or in video and KVM technology:

Term	Explanation
AES/EBU	Digital audio standard that is officially known as AES3 and that is used for carrying digital audio signals between devices.
Cat X	Any Cat 5e (Cat 6, Cat 7) cable
CGA	Color Graphics Adapter (CGA) is an old analog graphic standard with up to 16 displayable colors and a maximum resolution of 640x400 pixels.
Component Video	Component Video (YPbPr) is a high-quality video standard that consists of three independently and separately transmittable video signals, the luminance signal and two color difference signals.
Composite Video	Composite Video is also called CVBS and it is part of the PAL TV standard.
CON Unit	Component of a KVM Extender or Media Extender to connect to the console (monitor(s), keyboard and mouse; optionally also with USB 2.0 devices)
Console	Keyboard, mouse and monitor
CPU Unit	Component of a KVM Extender or Media Extender to connect to a source (computer, CPU)
CVBS	The analog color video baseband signal (CVBS) is also called Composite Video and it is part of the PAL TV standard.
DDC	Display Data Channel (DDC) is a serial communication interface between monitor and source (computer, CPU). It allows a data exchange via monitor cable and an automatic installation and configuration of a monitor driver by the operating system.
DisplayPort	A VESA standardised 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.
Dual Access	A system to operate a source (computer, CPU) from two consoles

Term	Explanation
Dual Link	A DVI-D interface for resolutions up to 2560x2048 by signal transmission of up to 330 MPixel/s (24-bit)
Dual-Head	A system with two video connections
DVI	Digital video standard, introduced by the Digital Display Working Group (http://www.ddwg.org). Single Link and Dual Link standard are distinguished. The signals have TMDS level.
DVI-I	A combined signal (digital and analog) that allows running a VGA monitor at a DVI-I port – in contrast to DVI-D (see DVI).
EGA	The Enhanced Graphics Adapter (EGA) is an old analog graphic standard, introduced by IBM in 1984. A D-Sub 9 connector is used for connection.
Fiber	Single-mode or multi-mode fiber cables
HDMI	An interface for an all-digital transmission of audio and video data. It is differentiated between the HDMI standards 1.0 to 1.4a. The signals have TMDS level.
KVM	Keyboard, video and mouse
Mini-XLR	Industrial standard for electrical plug connections (3 pole) for the transmission of digital audio and control signals
Multi-mode	62.5µ multi-mode fiber cable or 50µ multi-mode fiber cable
OSD	The On-Screen-Display is used to display information or to operate a device.
Quad-Head	A system with four video connections
RCA (Cinch)	A non-standard plug connection for transmission of electrical audio and video signals, especially with coaxial cables
S/PDIF	A digital audio interconnect that is used in consumer audio equipment over relatively short distances.
SFP	SFPs (Small Form Factor Pluggable) are pluggable interface modules for Gigabit connections. SFP modules are available for Cat X and fiber interconnect cables.

Term	Explanation
Single Link	A DVI-D interface for resolutions up to 1920x1200 by signal transmission of up to 165 MPixel/s (24-bit). Alternative frequencies are Full HD (1080p), 2K HD (2048x1080) and 2048x1152.
Single-Head	A system with one video connection
Single-mode	9µ single-mode fiber cable
S-Video (Y/C)	S-Video (Y/C) is a video format transmitting luminance and chrominance signals separately. Thereby it has a higher quality standard than CVBS.
TOSLINK	Standardized fiber connection system for digital transmission of audio signals (F05 plug connection)
Triple-Head	A system with three video connections
USB-HID	USB-HID devices (Human Interface Device) allow for data input. There is no need for a special driver during installation; "New USB-HID device found" is reported. Typical HID devices include keyboards, mice, graphics tablets and touch screens. Storage, video and audio devices are **not** HID.
VGA	Video Graphics Array (VGA) is a computer graphics standard with a typical resolution of 640x480 pixels and up to 262,144 colors. It can be seen as a follower of the graphics standards MDA, CGA and EGA.