IP Gateway

Including

IP Gateway Board

IP Gateway CON Extender

Draco CON App

User Manual

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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 13, page 92).

Trademarks and Trade Names

All trademarks 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 named on the cover page. Please note the change log for this manual in chapter 17, page 98.

The manufacturer reserves the right to change specifications, functions or circuitry of the series and boards 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.

Copyright

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 (hardware only)	Contained in the scope of delivery

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1 Important Information

1.1 Purpose of this manual

This manual describes the hardware of a Draco vario IP Gateway CON with either HDMI video interface (series 481) or DisplayPort video interface (series 483) and the configuration to set it up for use with Draco tera IP Gateway (matrix with an IP Gateway board). Also described in this manual is the Draco CON App which needs a connection to an IP Gateway board.

1.2 Firmware and Software

The information in this manual refers to the latest extender module firmware available at the date of manual release. Please refer to the change log (see chapter 17, page 98) for user manual updates.

1.3 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 information about special features on the device or when using device and function variants.

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

1.4 Terms and Spellings

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

The following terms are used for products and system descriptions:

Term	Description
Management software	Tera Tool, software to configure, monitor and operate the device
Source	Computer, graphics card (USB, video, audio, data)
Sink	Console (monitor, keyboard, mouse; optionally also video, audio, data sources)
CPU Unit	Encoder to connect to the source.
CON Unit	Decoder to connect at the peripherals.
IP Gateway	Draco tera IP Gateway, a Draco tera matrix containing an IP Gateway board
IP Gateway CON	Draco vario IP Gateway CON, a Draco vario extender module (decoder) containing the IP Gateway technology
Draco CON App	Client software for connecting via matrix to a CPU unit

The following spellings 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 spelling is 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

The following spellings are used for software descriptions:

Spelling	Description
Bold print	Description of terms that are used in the Tera Tool software, e.g., menus and buttons
Bold print > Bold print	Management software: selection of a menu item in the menu bar or the toolbar, e.g., **Extras > Options**

Mouse button	Description
Left mouse button	Primary mouse button* (default in most operating systems)
Right mouse button	Secondary mouse button*
* Unless you have customized your mouse settings in the used operating system.	
Descriptions containing "click", "mouse click" or "double-click" each means a click with the primary (left) mouse button. If the right mouse button has to be used, this is explicitly declared in the description.	

1.5 Intended Use

The IP Gateway System enables the seamless connection of Draco tera matrix systems of series enterprise and flex to IP networks. Thus, network infrastructure can be used efficiently to operate matrix systems via IP in a grid. Additionally, single workplaces can be connected via IP Gateway CON units. Most flexible access to the matrix is accomplished through the Draco CON app, which enables you to connect to and operate a computer that is connected to a matrix from a Windows or Linux based computer via KVMA connection.

Extender modules are used to increase the distance between sources and associated consoles. The signals can be extended using Cat X cables or fiber optic cables for both proprietary and TCP/IP network transmission.

Extender modules with Cat X Interface:
Extender modules with Cat X connections are unsuitable for connection between buildings. Use a fiber optic-based extender module instead.

Extender modules with Fiber Interface:
Extender modules with fiber connections can also be used with applications in environments which are subject to electromagnetic interference.

NOTICE
Interferences when the immunity limit values are exceeded If the limit values listed in EN55024 are exceeded, reliable and fault-free functioning of the devices cannot be guaranteed.

NOTICE

Radio interference in a domestic environment

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

➡ Follow the safety and installation instructions given in this manual.

➡ Use connection cables according to the specifications for the length and type given in this manual.

1.6 Certificates/Directives

1.6.1 North American Regulatory Compliance

The "equipment" referred to in the "North American Regulatory" section 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 section 3.1.1, page 11.

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.

1.6.2 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.

1.6.3 WEEE

The device label carries a symbol (crossed-out dustbin) for marking electrical and electronic equipment. The manufacturer complies with the EU Directive 2012/19/EU on the prevention of waste electrical and electronic equipment (WEEE). The manufacturer is a WEEE registered company (registration number DE39900275).

Equipment Dispose/Take-back

➡ The symbol of a crossed-out dustbin displayed on electrical and electronic equipment indicates that product and the supplied electronic accessories (e.g., power supply units, cables) must not be disposed of with household or commercial waste at the end of its service life.

➡ By disposing of the product irresponsibly you may enable unauthorized persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.

➡ The manufacturer takes back old devices and guarantees adequate waste disposal. Please contact the manufacturer's technical support to register the return for a device to be disposed.

➡ It is the customer's own responsibility to delete personal data on the equipment to be disposed of.

2 Safety instructions / Consignes de Sécurité

2.1 English

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 extender modules are installed. The instructions, safety and warning notes contained therein 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 12, page 82.

2.2 Français

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 12, page 82.

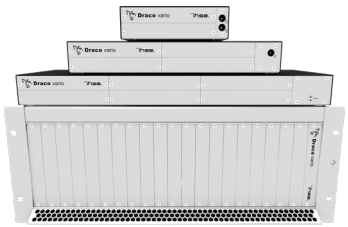
3 Description

3.1 System Overview

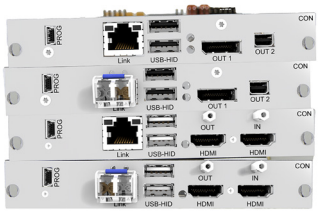
3.1.1 Modular Draco vario System

Draco vario chassis permit individual Draco vario series extender modules to be combined in stand-alone or rack mounted configuration. The flexible, modular system allows customized integration of devices to meet specific installation requirements. Chassis are available in sizes to accommodate 2, 4, 6 and 21 individual modules.

Therefore, please first select a chassis, then select one or more extender module(s).
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.



IP CON extender modules, described in this manual.

IP Gateway board, described in this manual

3.1.2 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).

The assignment of the extenders can be recognized by the article number:

- Extender module for the CPU Unit: **L**4XX (L = Local)
- Extender module for the IP CON Unit: IP-**R**4XX (R = Remote)

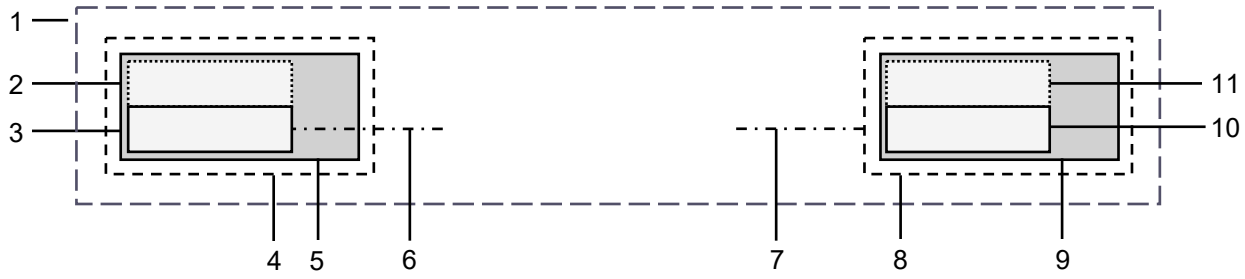


Fig. 1 KVM Extender pair with CPU Unit and CON Unit

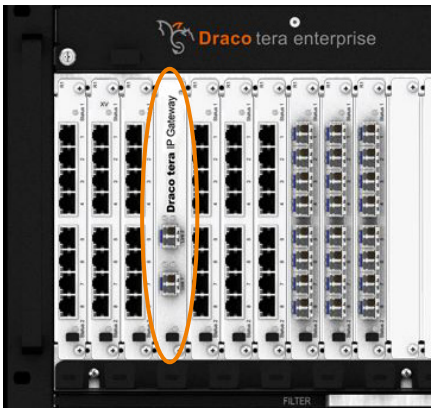
1 KVM Extender pair
2 Extender module (optional)
3 Extender module
4 Chassis
5 CPU Unit
6 Interconnection cable to the matrix
7 Network cable to the LAN
8 CON Unit
9 Chassis
10 Extender module
11 Extender module (optional)

3.2 Compatibility

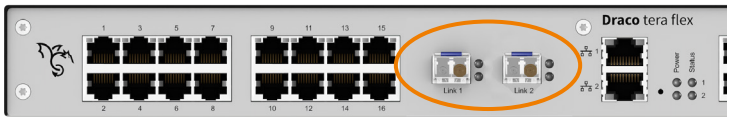
3.2.1 IP Gateway System Compatibility

IP Gateway CONs described in this manual are compatible with the following products:

- Draco tera flex: K480-C32G, K480-F32G, K480-C16F16G, etc. and F480-G (IP Gateway board for Custom Design)
- Draco tera enterprise: with 480-IPG (Draco tera enterprise IP Gateway board)



K480-160 with 480-IPG



K480-C32G

Fig. 2 Example: Matrices with IP Gateway board

3.2.2 IP Gateway CON Video Compatibility

IP Gateway CONs operate with different firmware and technology and are not completely compatible with each other. The following table lists video compatibility (X) (see footnotes).

		L474*	L477*	L481*	L482*	L483*	L486*	L488*
		SH	SH	SH	SH	SH	SH	SH
IP-R483	DH	X	X	X	X	X	X	X
IP-R481*	SH	X	X	X	X	X	X	X

* Please contact the sales team for availability.

- Compatibility is based on video/USB-HID signals only.
- Compatible up to the maximum specified resolution of the console.
- Compatible up to the maximum transmission speed and interface compatibility (see section 3.2.3, page 13).
- Compatible with add-on modules (see section 3.2.4, page 13).
- If using CPU Unit and CON Unit with different video signals (e.g., a DP 1.1 CON Unit with an HDMI CPU Unit), transmitting the EDID to the CPU Unit may cause errors due to protocol differences.

3.2.3 Interconnection Compatibility

IP Gateway CONs are available in the following connection versions. The type of interconnection of extenders can be recognized by the article number:

- Interconnection (1.25 Gbit/s = "1G") via Cat X cable ("C")
- Interconnection (1.25 Gbit/s = "1G") via single-mode fiber cable ("S")

Fiber devices can be used with Multi-mode and Single-mode cables (see section 12.2.2, page 85).

IP Gateway CONs are not compatible with the bridge card (1G to 3G) for Draco tera enterprise.

3.2.4 Add-On Modules compatibility

The following add-on modules can be used with the IP Gateway CONs.

		BAX	BAE2	BXE2
IP-R483	DH	X	X	X
IP-R481	SH	X	X	X

3.3 Installation Examples

This section illustrates typical installations of IP Gateway with and without IP Gateway CONs.

The CPU Unit is connected directly to the source using the supplied cables. The IP Gateway CON Unit is connected to the console (monitor, keyboard, mouse). The CPU Unit is connected to the matrix, the CON Unit to the local network. Both communicate with each other through the interconnection cable via IP over an IP Gateway board in the matrix and a network switch.

3.3.1 Single Head Installation

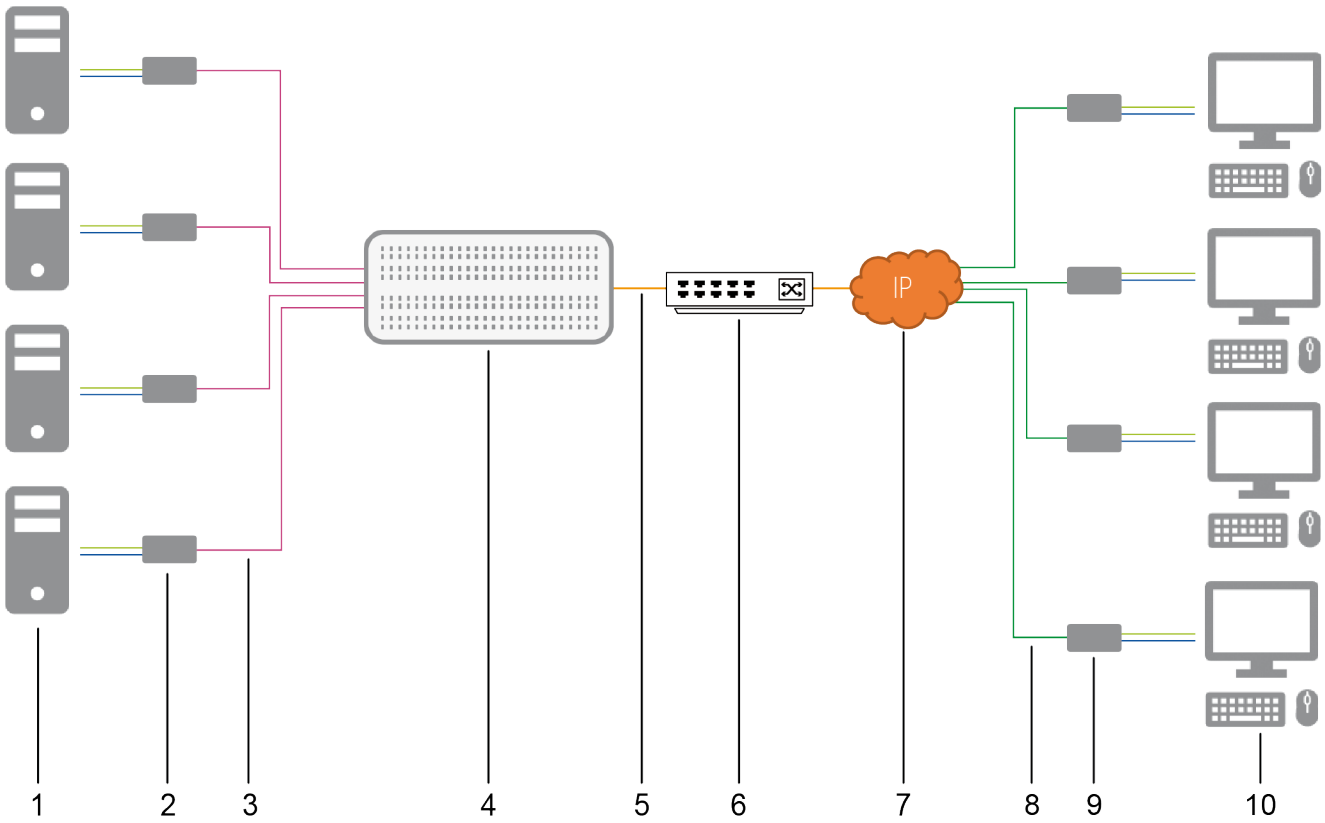


Fig. 3 Installation example (single head)

1 Sources
2 CPU Units
3 Interconnection cable
4 Matrix with IP Gateway board
5 10G network connection
6 Network Switch
7 Distributed network
8 1G network connection
9 IP Gateway CON
10 Sinks (monitor, keyboard, mouse)

3.3.2 Dual Head Installation

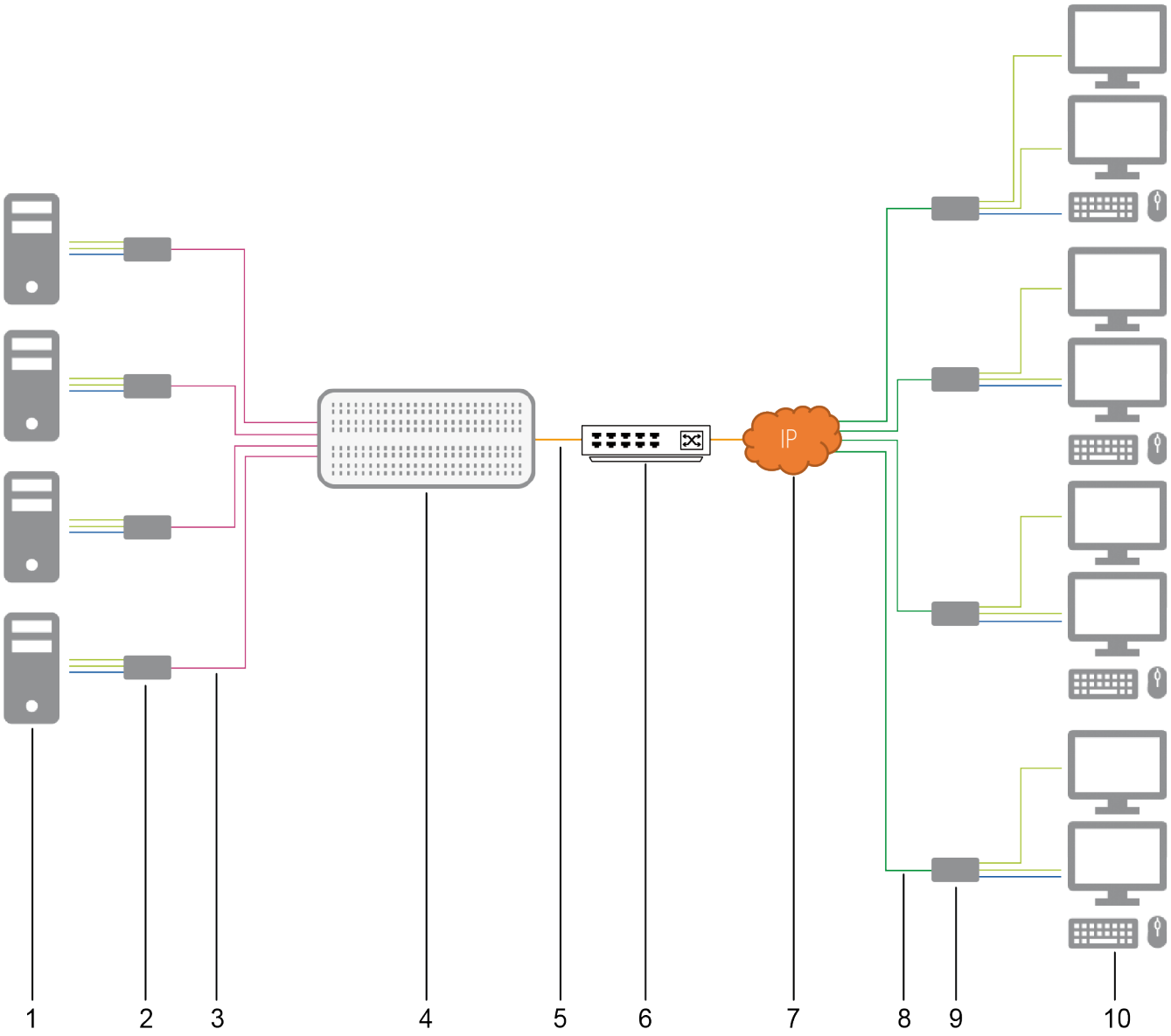


Fig. 4 Installation example (dual head)

1 Sources
2 CPU Units
3 Interconnection cable
4 Matrix with IP Gateway board
5 10G network connection
6 Network Switch
7 Distributed network
8 1G network connection
9 IP CON Units
10 Sinks (monitor, keyboard, mouse)

3.3.3 Matrix Grid connected via IP Gateway Boards

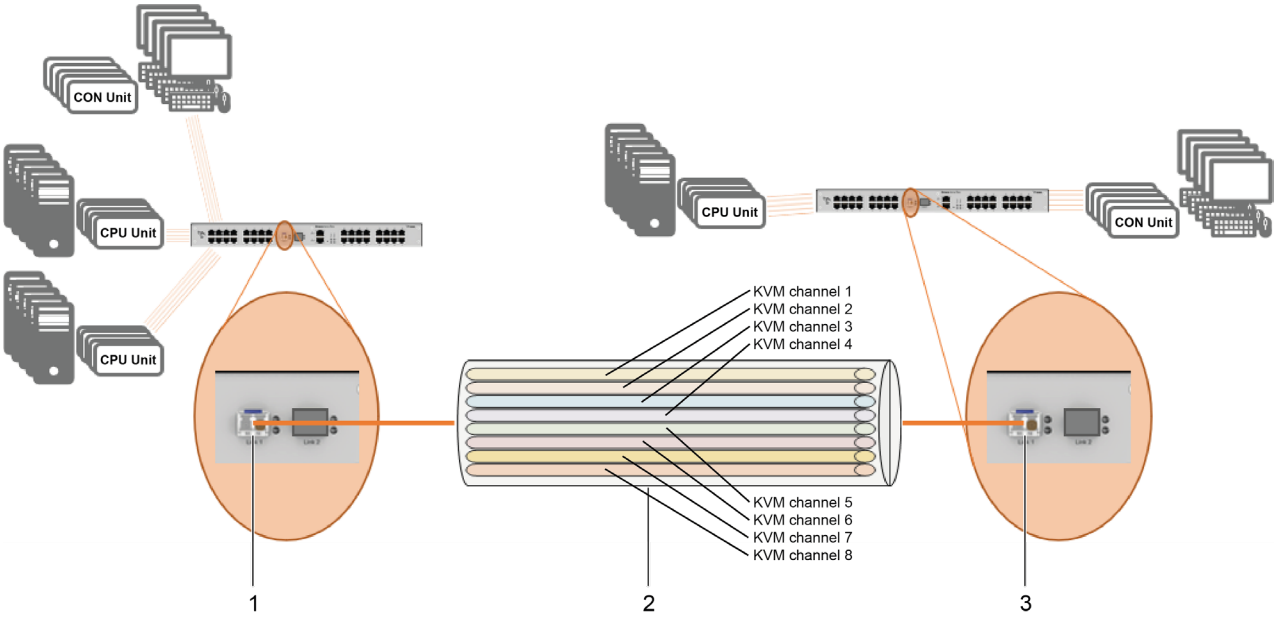


Fig. 5 Example - Matrix Grid Installation with two Matrices connected via IP Gateway boards

1 Draco tera flex, with 10G IP Gateway board, configured for eight 1G KVM channels

2 10G straight fiber cable with eight 1G KVM channels

3 Draco tera flex, with 10G IP Gateway board, configured for eight 1G KVM channels

3.3.4 Matrix Grid with two Matrices and IP Gateway CONs connected via IP Gateway

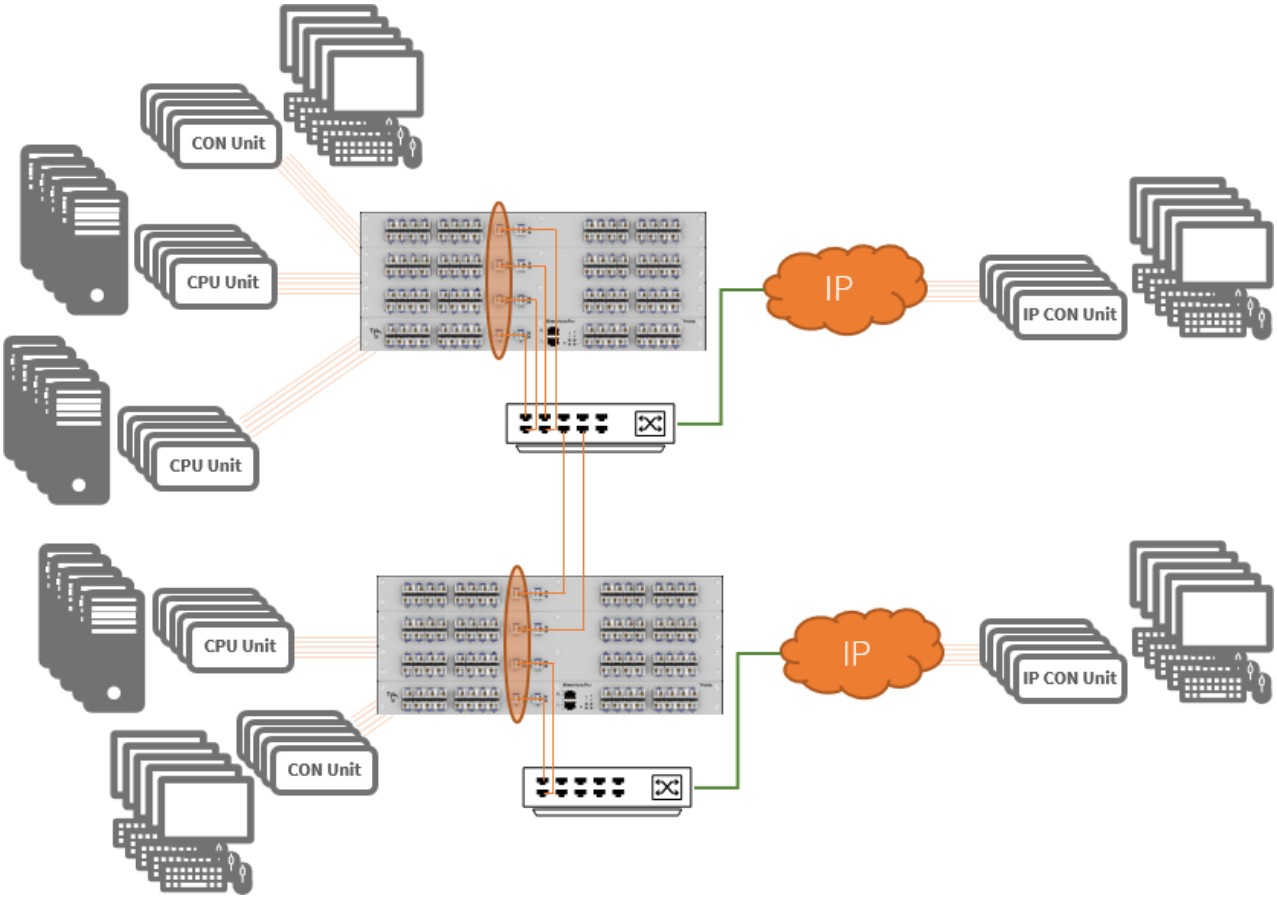


Fig. 6 Matrix Grid with two matrices and IP Gateway CONs connected via IP Gateway boards

3.4 Product Types

Article Number	Description
IP-R481-BUHCL	Draco vario IP Gateway CON module HDMI 1.4, USB-HID, Cat X 1G SH up to 4K30 for input and output Integrated 2-channel PCM Audio 1x HDMI 1.4 out, 1x HDMI 1.4 in, 2x USB type A, 1x Mini-USB 1x RJ45 Cat X 1G ≤ 140 m, link data rate 1G
IP-R481-BUHSL	Draco vario IP Gateway CON module HDMI 1.4, USB-HID, fiber 1G SH up to 4K30 for input and output Integrated 2-channel PCM Audio 1x HDMI out, 1x HDMI in, 2x USB type A, 1x Mini-USB 1x Duplex LC SM fiber 1G ≤ 10 km, link data rate 1G
IP-R483-B2HS	Draco vario IP Gateway CON module DP 1.1, DH, USB-HID, fiber 1G SH up to 4K30, DH 2x 1920 x 1200 @ 60 Hz Integrated 2-channel PCM Audio 1x DP, 1x Mini DP, 2x USB type A, 1x Mini-USB 1x Duplex LC SM fiber 1G ≤ 10 km, link data rate 1G
IP-R483-B2HC	Draco vario IP Gateway CON module DP 1.1, DH, USB-HID, Cat X 1G SH up to 4K30, DH 2x 1920 x 1200 @ 60 Hz Integrated 2-channel PCM Audio 1x DP, 1x Mini DP, 2x USB type A, 1x Mini-USB 1x RJ45 Cat X 1G ≤ 140 m, link data rate 1G
K480-C32G	Draco tera flex KVM matrix with 32 Cat X 1G ports and one IP Gateway board
K480-F32G	Draco tera flex KVM matrix with 32 1G fiber ports and one IP Gateway board
K480-C16F16G	Draco tera flex KVM matrix with 16 Cat X 1G ports and 16 1G fiber ports and one IP Gateway board
F480-G	Draco tera flex IP Gateway board fiber 10G for Custom Design
Draco tera flex with min. one F480-G board	Custom design Draco tera flex matrices up to 4 RU (see Draco tera flex user manual)
480-IPG	Draco tera enterprise IP Gateway board for inserting in each Draco tera enterprise matrix (see Draco tera enterprise user manual)
	Valid for all IP Gateway boards/CONs: – transmission of up to 8 KVM connections @ 1G – configurable for Grid and IP Gateway CON connectivity via IP L3 – backward compatible to L1 Grid using separate firmware – 2x SFP+ interface – 1x 10G SFP+ Single Mode LC ≤ 10 km

NOTICE

Dual Head operation depends on the transmission rate (only series 483 (DisplayPort))

Dual Head operation is only possible with the transmission rate RBR (see section 12.1.1, page 82). If the primary channel (DisplayPort) is controlled in dual head operation with the transmission rate HBR, no picture is displayed on the secondary channel (Mini DisplayPort).

3.5 Accessories

Part. No.	Description	Interface
VC-DP2DP-020-MM	DisplayPort cable male/male, 2.0 m	Video
VC-DP2MDP	DisplayPort cable to Mini DP male/male, 2.0 m	Video
436-DPDV	DisplayPort cable to DVI male/male, 2.0 m (VGA/DVI-I)	Video
436-HD	HDMI cable, 1.8 m	Video
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
459-1C	SFP, bidirectional, 1G	Cat X, 1G
459-1S	SFP single mode, LC duplex, bidirectional, 1G	Fiber, 1G
459-10X	SFP single mode, LC duplex, bidirectional, 10G compatible with 3G fiber extender modules	Fiber, 10G

3.6 Scope of Delivery

3.6.1 IP Gateway CON Modules

Product type	Scope of delivery
IP Gateway CON	• 1x IP Gateway CON in Draco vario chassis • Quick Setup

☑ For information about the scope of delivery for the chassis, please refer to the user manual 474-BODY.

3.6.2 IP Gateway Matrices

Product type	Scope of delivery
Draco tera flex	• 1x Draco tera flex matrix with minimum one IP Gateway board • 2x IEC country-specific power cord, lockable, 2.0m • 2x mounting brackets • Quick Setup
Draco tera enterprise	• 1x Draco tera enterprise with minimum one IP Gateway board • 1x or 2x IEC country-specific power cord(s) C13, lockable, 2.0m • 1x programming cable (RJ10 to D-Sub 9) • Quick Setup
480-IPG	• Slide-in IP Gateway board for IP upgrade of Draco tera enterprise matrices

3.7 Product Views

3.7.1 IP Gateway CONs

3.7.1.1 Extender Modules HDMI IP-R481

Sink side (CON module)

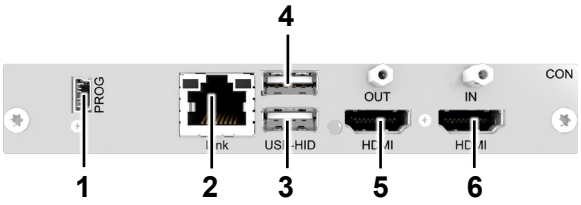
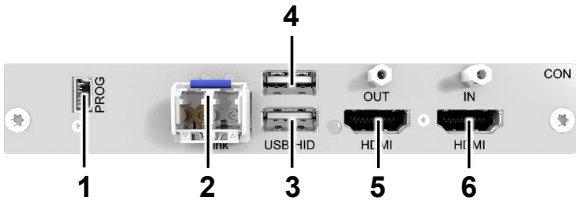


Fig. 7 Interface side IP-R481-BUHCL

1 Mini-USB, service interface
2 Cat X, interconnection
3 USB Type A, USB-HID device 1
4 USB Type A, USB-HID device 2
5 HDMI, output
6 HDMI, input (for local connection of a PC)



Interface side IP-R481-BUHSL

1 Mini-USB, service interface
2 Fiber, interconnection
3 USB Type A, USB-HID device 1
4 USB Type A, USB-HID device 2
5 HDMI, output
6 HDMI, input (for local connection of a PC)

3.7.1.2 Extender Modules DisplayPort IP-R483

Sink side (CON module)

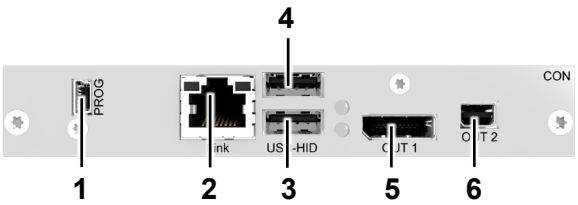
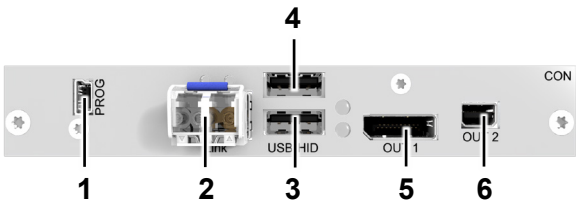


Fig. 8 Interface side IP-R483-B2HC

1 Mini-USB, service interface
2 Cat X, interconnection
3 USB Type A, USB-HID device 1
4 USB Type A, USB-HID device 2
5 DisplayPort 1.1, output (primary channel)
6 Mini-DisplayPort 1.1, output (secondary channel)



Interface side IP-R483-B2HS

1 Mini-USB, service interface
2 Fiber, interconnection
3 USB Type A, USB-HID device 1
4 USB Type A, USB-HID device 2
5 DisplayPort 1.1, output (primary channel)
6 Mini-DisplayPort 1.1, output (secondary channel)

3.7.2 Matrices and IP Gateway Board

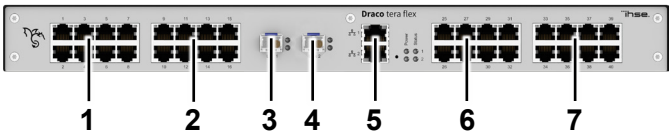
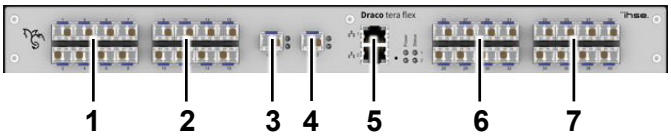


Fig. 9 Draco tera flex C32G



Draco tera flex F32G

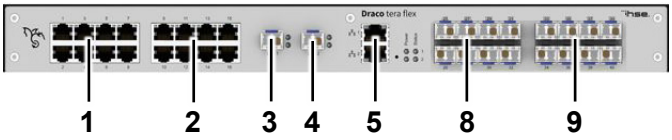


Fig. 10 Draco tera flex C16F16G

1 I/O Board 1 (ports 1 – 8) Cat X 1G
2 I/O Board 2 (ports 9 – 16) Cat X 1G
3 IP Gateway board (virtual ports 17 – 24) Fiber 10G, gateway connector
4 Not used (for future developments)
5 Controller board
6 I/O board 4 (ports 25 – 32) Cat X 1G
7 I/O board 5 (ports 33 – 40) Cat X 1G
8 I/O board 4 (ports 25 – 32) fiber 1G
9 I/O board 5 (ports 33 – 40) fiber 1G

1 I/O Board 1 (ports 1 – 8) fiber 1G
2 I/O Board 2 (ports 9 – 16) fiber 1G
3 IP Gateway board (virtual ports 17 – 24) Fiber 10 G, gateway connector
4 Not used (for future developments)
5 Controller board
6 I/O board 4 (ports 25 – 32) fiber 1G
7 I/O board 5 (ports 33 – 40) fiber 1G

IP Gateway Board for Draco tera enterprise

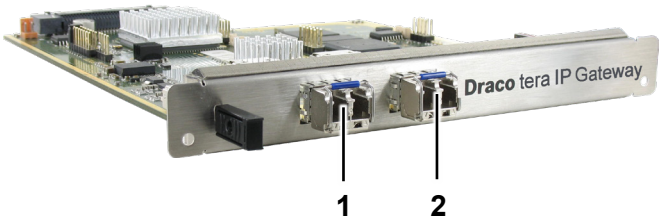


Fig. 11 Draco tera IP Gateway board

1 Fiber 10G, gateway connector
2 Not used (for future developments)

3.8 Status Indication of the Extender Modules

LED of Extender Modules on Board

The extender modules have a multicolor LED for status indication on the PCB that is visible on the front side of the chassis at the CON and CPU Unit of following chassis:

474-BODY2, 474-BODY2R, 474-BODY2N, 474-BODY4, 474-BODY4R and 474-BODY6R-R1.

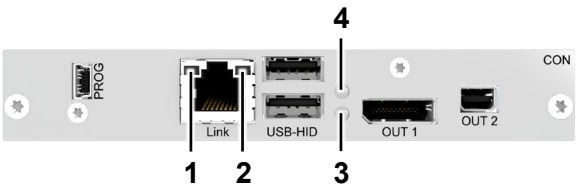
Fig. 12 Chassis front view with LEDs of modules

1 Status LED of PCBs of modules

LED Status	Description
Dark red	Video processor in failure status (e.g., incorrect firmware uploaded).
Red	No video signal available, no USB-HID connection available.
Green	Video signal available, no USB-HID connection available.
Violet	No video signal available, USB-HID connection available.
Light blue	Video signal available, USB-HID connection available.

LED of Extender Modules at the Interface Side

Sink side (483-CON module)



Sink side (481-CON module)

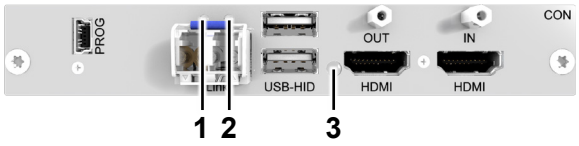


Fig. 13 Interface side extender modules - Status LEDs

1 Failure LED link at Cat X port
2 Status LED link at Cat X port
3 Status LED USB-HID and video channel 1
4 Status LED USB-HID and video channel 2

1 Failure LED link at fiber port
2 Status LED link at fiber port
3 Status LED USB-HID and video channel

3.8.1 Interconnection Cat X

The following table shows the respective Link LED states/colors (left LED 1 and right LED 2) of the extender module for the respective situation.

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).

3.8.2 Interconnection Fiber 1G

The following table shows the respective Link LED states/colors (left LED 1 and right LED 2) of the extender module for the respective situation.

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).

3.8.3 Video and USB-HID

3.8.3.1 DisplayPort Extender Modules

When extender modules are connected to a matrix, the LEDs behave differently depending on whether there is a link connection between the CON Unit/CPU Unit and the matrix, whether the CON Unit is switched to the CPU Unit, whether a video signal is present, at which transmission rate (RBR/HBR) a video signal is transmitted, or whether a USB-HID connection exists.

The following table shows the respective LED states/colors (upper LED (4) and the lower LED (3)) of the extender modules for the respective situation.

For information about the transmission rates, see section 12.1.1, page 82 and section 12.1.2, page 83.

The USB connection is missing when the command mode is started, when the OSD is opened, only Video-only Access is present, or Full Access is present in sharing operation without current USB-HID control, or the CON Unit is not switched to the CPU Unit.

LED 4	**Flashing red/violet**	**Violet**	**Flashing red/ violet**	**Flashing red/ violet**	**Flashing green/ light blue**	**Flashing green/ light blue**	**Violet**	**Light blue**	**Light blue**
LED 3	**Flashing red/violet**	**Violet**	**Flashing green/ light blue**	**Flashing green/ light blue**	**Flashing red/violet**	**Flashing green/ light blue**	**Light blue**	**Violet**	**Light blue**
Link	---	X	X	X	X	X	X	X	X
Switched to CPU Unit	---	X	---	X	X	X	X	X	X
Video with resolution/ channel	---	---	---	RBR* Channel 1	RBR Channel 2	HBR** Channel 1/ 2x RBR	RBR Channel 1	RBR Channel 2	HBR Channel 1/ 2x RBR
USB-HID	---	---	---	---	---	---	X	X	X

* RBR = Reduced Bit Rate

** HBR = High Bit Rate

3.8.3.2 HDMI Extender Module

When extender modules are connected to a matrix, the LED behaves differently depending on whether there is a link connection between the CON Unit/CPU Unit and the matrix, whether the CON Unit is switched to the CPU Unit, whether a video signal is present, or whether a USB-HID connection exists.

USB and Video Status

LED 3	**Red**	**Violet**	**Green**	**Light blue**
Link	---	X	X	X
Switched to CPU Unit	---	X	X	X
Video	---	---	X	X
USB-HID	---	---	---	X

When a PC is locally connected (only HDMI variants) and a video signal is available, the LED shines green.

For status indication of matrices refer to the respective Draco tera manual.

4 Access Options

You have the following options to configure and/or operate extender modules:

Access option	Description
Command mode	The IP CON extender modules include a command mode that enables access to several functions of connected KVM devices, e.g., Draco U-Switch or Draco tera matrix switch when using additional keyboard commands. In addition, individual extender module functions for USB-HID Ghosting and the EDID, as well as switching via command mode and additional keyboard commands can be executed.
Tera Tool	Firmware updates for extender modules and settings for IP Gateway connection can be performed via the Tera Tool software. The software Tera Tool is available as a single executable program file that does not require installation. Tera Tool can be downloaded from the link https://www.ihse.com/software. Advanced settings can be configured on the Draco tera operating system using the Tera Tool software: • Advanced configuration • Extended monitoring options • System update (firmware update) • Local backup option • Documentation • Defining macros
Mini-USB interface	Extender modules can be parametrized or updated via Mini-USB interface.

4.1 Command Mode

To start the command mode, use a keyboard sequence (Hot Key) at the keyboard of a CON Unit plugged in a KVM device.

NOTICE
While in command mode, ➡ the Caps Lock and Scroll Lock LEDs on the keyboard are flashing, ➡ the USB-HID devices are not operable, mouse and keyboard functions are deactivated, ➡ only selected keyboard commands are available.

If there is no keyboard command entered within 10 seconds after activating the command mode, it will be deactivated automatically.

The following keyboard commands are used to enter and exit the command mode, and to change the Hot Key.

Function	Keyboard command
Start the command mode	2x Left Shift (Hot Key, factory setting)
Exit the command mode	Esc and also Left Shift + Esc, if necessary
Change the Hot Key	current Hot Key, c, new Hot Key Code, Enter

NOTICE

In a combined KVM matrix/U-switch configuration, select different Hot Keys for the connected extender modules, e.g., 2x Left Shift for access to the matrix and e.g., 2x Right Shift for access to the U-Switch.

Hot Keys can be changed at the console or via Tera Tool software.

Hot Key Code

The Hot Key to start the command mode can be changed. The following table lists the Hot Key codes for the available Hot Keys.

Hot Key Code	Hot Key
0	Freely selectable, except Esc, Del, Backspace and Enter
2	2x Scroll
3	2x Left Shift (default)
4	2x Left Ctrl
5	2x Left Alt
6	2x Right Shift
7	2x Right Ctrl
8	2x Right Alt

Change the current Hot Key via Hot Key Code (exemplary)

To change the current Hot Key to, e.g., 2x Left Alt, enter Hot Key, c, 5, Enter.

Set a freely selectable Hot Key (exemplary)

To set a freely selectable Hot Key (e.g., 2x Space), enter Hot Key, c, 0, Space, Enter.

Keyboard commands are fixed to the position of the keys on the keyboard. Keyboard mapping tables may vary for country-specific layouts.

➥ Note the key position of a freely defined Hot Key when changing the keyboard layout, e.g., from QWERTZ to AZERTY. E.g., if defining 2x a as Hot Key on a German or US keyboard layout, the French keyboard layout (AZERTY) requires then 2x q as Hot Key to be pressed instead.

Reset the Hot Key

To set a Hot Key back to default settings, press Right Shift + Del within 5 s after switching on the CON Unit or plugging in a keyboard.

The Hot Key is set back to Left Shift.

4.2 Control Options via Tera Tool Software

4.2.1 Menu Structure

The main user interface elements for options and functions of the Tera Tool software are described in this chapter.

The menu structure of the Tera Tool software is subdivided into several sections:

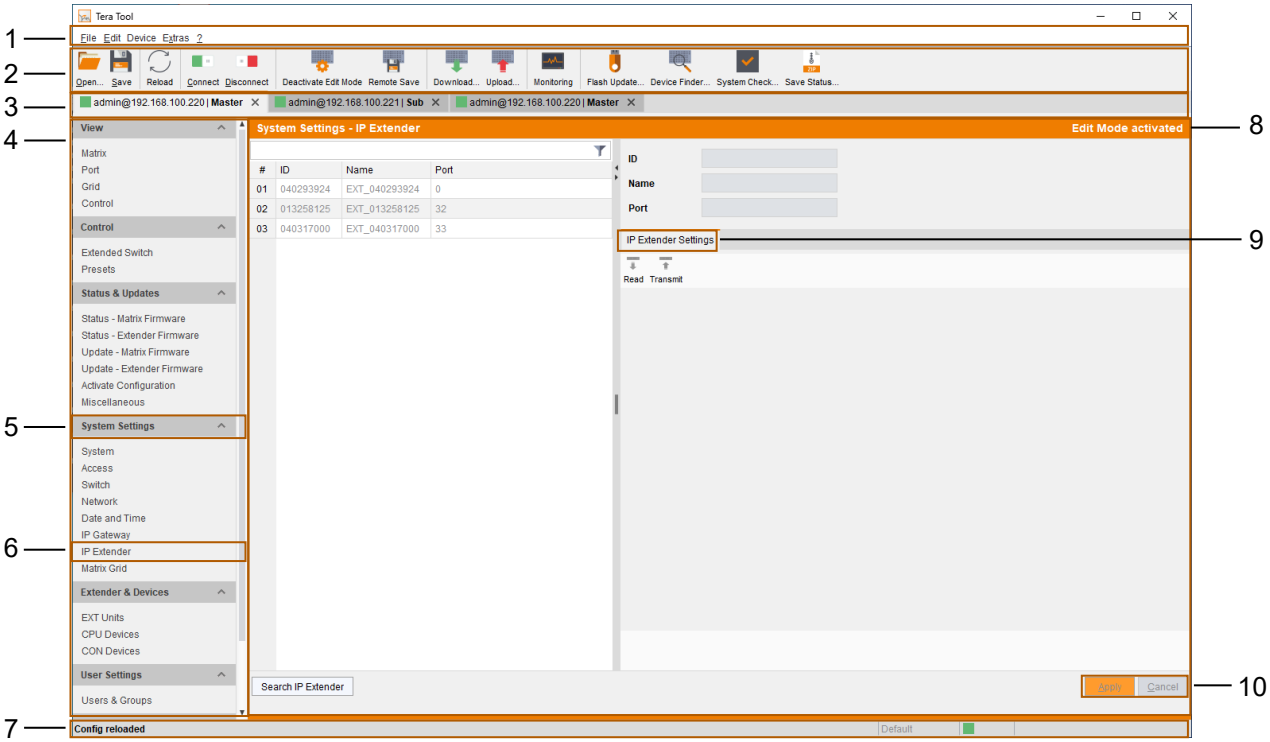


*Fig. 14 Tera Tool - **Menu Structure***

1 Menu bar
2 Toolbar
3 Tab bar (shows connections or configurations)
4 Task area
5 Task menu
6 Task menu item
7 Status bar (shows config version, activated Edit Mode and online mode)
8 Working area
9 Tab bar (for additional menus)
10 Buttons

The following control element is included in the menus:

Designation	Element	Description
Checkbox	☐	Function is not active, disabled by default or by mouse click
	☑	Function is active, enabled by default or by mouse click

The following actions are available on most of the menus:

Button	Function
Apply	Confirm changes (temporary storage of the active configuration in the volatile memory of the matrix).
Cancel	Reject changes.

Information for Operating and for Support Functions

The operation of the Tera Tool software is intuitive and corresponds to the user interface of common operating systems.

The software contains its own support function. The integrated help texts in the working area of the Tera Tool software can be activated or deactivated by ticking the checkbox in the upper right corner. Auxiliary names (tooltips) for the menu items can be activated under **Extras > Options** on the **Style** tab.

4.2.2 Toolbar

Some functions are only available if a connection to the matrix has been established (online mode). The respective functions are colored if available.

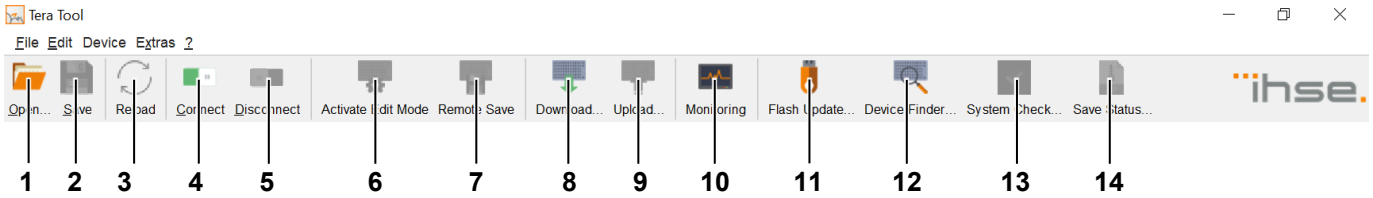


*Fig. 15 Tera Tool - **Toolbar***

1 Load a locally saved configuration
2 Save a configuration locally
3 Reload the current configuration
4 Connect to the matrix
5 Disconnect from the matrix
6 Activate/deactivate the edit mode
7 Save the active configuration on the matrix (online)
8 Download and show a predefined configuration saved on the matrix (online)
9 Upload a predefined configuration on the matrix (online)
10 Monitoring (online)
11 Flash update for single devices
12 Overview of devices in the subnet (online mode)
13 System check
14 Save status locally (online mode)

4.2.3 Mouse Control

The following mouse commands are selectable for menu functions:

Mouse command	Function
Left mouse button	Select menu, select function, open drop-down menus, enter input field, activate/deactivate option checkboxes, etc.
Double-click left mouse button	Open function specific selection menus.
Right mouse button	Open context specific selection menus.

4.2.4 Keyboard Control

The following keyboard commands are available for the navigation and configuration within the menus:

Keyboard command	Function
Left Arrow	Cursor to the left in input fields
Right Arrow	Cursor to the right in input fields
Up Arrow	Line up
Down Arrow	Line down
Page Up	In input or status menus with more than one page: previous page
Page Down	In input or status menus with more than one page: next page
Tab	In input menus: previous field
Left Shift + Tab	In input menus: next field
Spacebar	• Switch in selection fields between two conditions (check mark or not). • Open already marked fields with editing or selecting possibility.
Enter	• Select menu items. • In menus: save data.
Ctrl + Tab	• Leave tables. • Jump from tables into the next field.
Ctrl + Left Shift + Tab	• Leave tables. • Jump from tables into the previous field.

Several functions within the menus in the menu bar can be executed with the provided keyboard commands (e.g., press Ctrl + s to execute **Save**) that are listed to the right of the respective menu items.

4.2.5 Reload Options

The information about the current configuration of the matrix, shown in the Tera Tool software, can be reloaded in different ways:

- Press F5 on the used keyboard.
- Click **Reload** in the toolbar.
- Click **Edit >Reload** in the drop-down menu of the menu bar.
- To activate the automatic reload option, tick the **Automatic Reload** checkbox in the right panel of the **View >Matrix** menu under **Options**.

4.2.6 Context Function

The Tera Tool software offers several context functions that support user-friendly and effective operation. The context functions are described in the respective sections.

Context function	Action	Results
Execute context function	Click with the right mouse button on a field.	A context menu opens and displays functions available for the corresponding field (if existing).
	Click with the left mouse button on the desired function.	The desired function is executed.

4.2.7 Software Sort Function

Lists and tables in the Tera Tool software offer a sorting function for fast and smooth search. An active filter is indicated by an arrow in the header.

Sort function	Action	Results
Ascending sort	Click with the left mouse button once on the header of the column to be sorted.	• The table is sorted in ascending order. • The sorting status is indicated by an arrow pointing upwards.
Descending sort	Click with the left mouse button twice on the header of the column to be sorted.	• The column is sorted in descending order. • The sorting is displayed by an arrow that points downwards.
Cancel sort	Click with the left mouse button once or twice on the head of the sorted column.	The arrow displayed disappears.

4.2.8 Software Filter Function

Lists and tables in the Tera Tool software offer a filter function that supports a fast and smooth search. The filter entry field is located above the header. An active filter is indicated by a green filter symbol in the filter entry field.

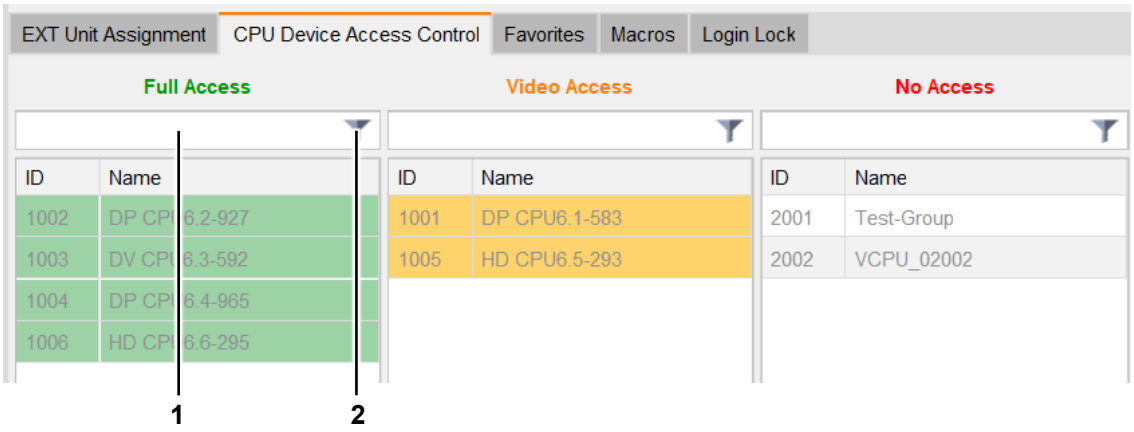


*Fig. 16 Tera Tool - **Filter function***

1 Filter entry field
2 Filter symbol

Filter function	Action	Results
Activate the filter	Click with the left mouse button in the filter entry field above the header. Write the word or part of a word to be filtered. It is possible to search for a combination of two words with space in-between.	• The filter results are shown immediately. • The filter symbol is displayed in green.
Clear the filter	Delete the text in the filter entry field.	• The list or table shows the complete content. • The filter symbol is displayed in gray.

4.2.9 Report Function

Tera Tool is equipped with a report function that shows the current switching status and all relevant parts of the matrix configuration in a PDF file.

The report function can be used in both the online and offline mode of the Tera Tool software.

1. Select **File > Report...** in the menu bar. A selection dialog appears.

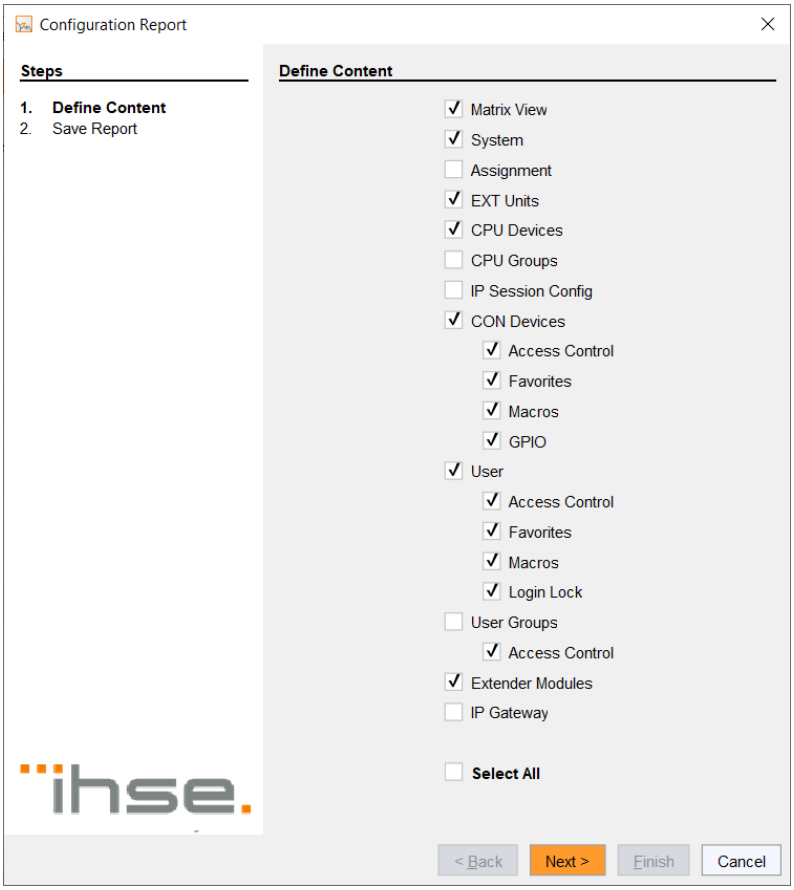


*Fig. 17 Tera Tool - **File - Report - Define Content***

2. Select contents that should be included in the report.
3. Click **Next > >** to confirm the selection.

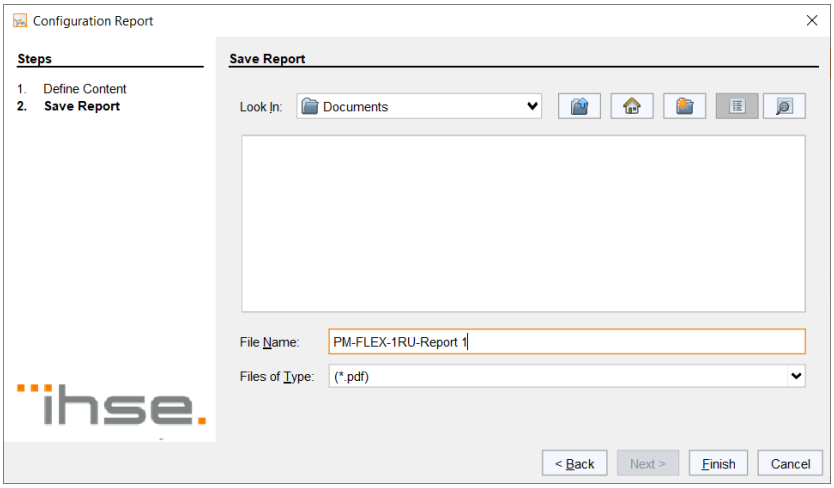


*Fig. 18 Tera Tool - **File - Report - Save Report***

4. Go to the preferred location for storage of the report.
5. Click **Finish**. The report will be created as a PDF file.

5 Installation

NOTICE
Please verify that interconnection cables, interfaces, and handling of the devices comply with the requirements (see chapter 10, page 71).

✅ We recommend that first-time users 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 enables you to experiment with your system more conveniently.

5.1 Setting up the Hardware

Requirements

The matrix firmware must be at least 04.04.

The matrix of your IP Gateway system (with an IP gateway board) has been basically configured according to the Draco tera user manual:

- The hardware of the IP Gateway system has been physically connected (matrix, controller board(s), I/O boards, CON Units, CPU Units, sources, and sinks, etc.).
- The initial configuration has been set (system settings, e.g., network settings).
- The logical devices have been created and configured (EXT Units and CON/CPU Devices, etc.).
- A status of the matrix configuration has been stored as backup file.

➡ Switch off all devices.

Installing a Network Switch

1. Connect a network switch to the IP Gateway board connector using a 10G fiber cable (left port).
2. Use a second 10G fiber or Cat X cable to connect the network switch to the Internet access point.

Installing the IP Gateway CON Unit

1. Connect the monitor(s), keyboard, and mouse to the IP Gateway CON Unit.
2. Connect a Cat X/fiber cable to the link port of the IP Gateway CON Unit and to your LAN network.
3. Connect the chassis of the CON Unit to the power supply unit(s)/power socket(s).
4. Establish the power supply voltage to the monitor and the CON Unit.

5.2 Running Tera Tool Software

The Tera Tool software is available as a single executable program file that does not require installation. For using the Tera Tool software, any computer can be used that is not part of the KVM system.

NOTICE
Connection to the matrix blocked Synchronization directories or offline directories require special attention regarding the firewall settings, e.g., Windows: roaming directories. If blocked by the firewall, no connection to the matrix can be established. ➡ Save the Tera Tool software in a locally available directory.

For configuring an IP Gateway connection, you have to connect a computer to the matrix and run the Tera Tool software.

5.2.1 Requirements for Using Tera Tool Software

For Windows

Computer/Software/Network		Requirements/Recommendations
Free memory	RAM	Recommendation: 2 GB
Operating system	Microsoft	Windows 10, Windows 11
Connection	-	Between computer and matrix with LAN cable, between computer and extender module with Mini-USB/USB A cable.

For MacOS, Linux

Computer/Software/Network		Requirements/Recommendations
Free memory	RAM	Recommendation: 2 GB
Operating system	Microsoft	e.g. Debian, Ubuntu, Mint, openSUSE
	macOS	macOS 10.14 (Mojave) or higher, Intel platform
Specification	Java	Java 11 is the minimum version required. However, we recommend using a newer version of Java. (https://adoptopenjdk.net, https://github.com/ojdkbuild/ojdkbuild)
Connection	-	Between computer and matrix with LAN cable, between computer and extender module with Mini-USB/USB A cable.

Contact your system administrator concerning JRE and network connection.

5.2.2 Setting up Network and Firewall Releases

Releasing Network Ports

The following ports are used by the IP Gateway and the IP Gateway CON depending on the configuration and have to be released at the security gateway if necessary. The ports will only have to be released if you want to use the respective function.

Function	Port
Layer 3 communication	52000 to 52100
API	5555/TCP (5565 for SSL)
Broadcast	5556/UDP (5566 for SSL)

Releasing Java Application in the Firewall

The Java application (file javaw.exe) has to be released in the firewall settings for port 5555 to use the Tera Tool software. Contact your administrator to configure the firewall settings accordingly.

Using the Tera Tool software with integrated Java Runtime, a request of the operating system could appear, e.g., when opening the Device Finder.

5.2.3 Connecting the Computer with Tera Tool Software to the Matrix

NOTICE

For a connection between the computer and matrix via switch or hub, parallelly assembled network cables are required.

➡ Only use a network connection between computer and the matrix that is not primarily used for streaming audio or video data. We strongly recommend using a computer that is not part of the KVM system (e.g., a laptop).

➡ Connect the network cable to the RJ45 ports of the computer and the controller board of the matrix.

5.2.4 Connecting the Computer with Tera Tool Software to an Extender Module

➡ Connect a Mini-USB/USB type A cable to the Mini-USB port of the extender module and a USB A port of the computer.

5.2.5 Starting the Tera Tool Software

1. Download one of the Tera Tool software zip files from our website and store it on your computer.
2. Unpack the zip file (unzip).
3. Open the unzipped folder “Tera Tool”.
4. Double-click the entry **TeraTool**.

   The Tera Tool software starts in offline mode.

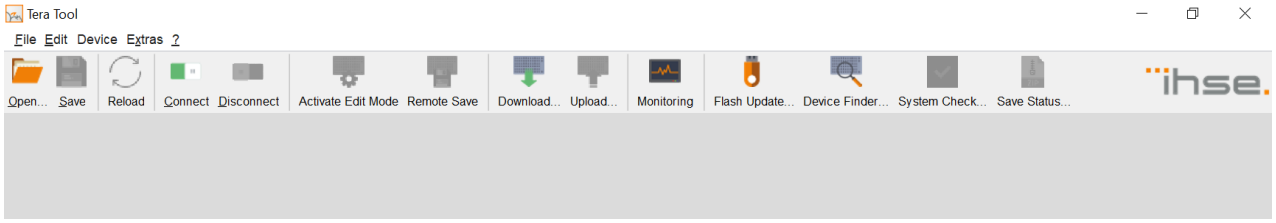


*Fig. 19 Tera Tool - **Landing page in offline mode***

There are two options to connect to a device e.g. matrix, Draco MV, SNMP board via network connection.

- Via known IP address
- Via Device Finder

5.2.6 Connecting to the Matrix with known IP Address

At least power user rights are required, and the function **External Configuration and Control** in the network menu has to be enabled (default setting).

Up to 16 connections between the matrix and the Tera Tool software can be established at the same time due to a limitation of available sockets.

1. Run the Tera Tool software.
2. Click **Connect** in the tool bar.
   A login dialog appears.

*Fig. 20 Tera Tool dialog - **Connect***

3. Enter the IP address according to the network configuration of the matrix.
   By default, the IP address of the matrix is 192.168.100.99 and DHCP is deactivated.
4. Enter the username and password of an administrator or power user.
   By default, the username is **admin**, and the password of the administrator is **admin**.
5. Click **Login** to confirm your entries.

The data must be entered each time the network connection is re-established.
Alternatively, the data can be entered and stored in the Tera Tool software under **Extras > Options** (see Tera Tool user manual).

5.2.7 Connecting to the Matrix via Device Finder

At least power user rights are required, and the function **External Configuration & Control** in the network menu has to be enabled (default setting).

Up to 16 connections between the matrix and the Tera Tool software can be established at the same time due to a limitation of available sockets.

The **Device Finder** offers the possibility to find all matrices, SNMP boards and MV42 that are in the same subnet. This is useful, e.g., if the IP address of a specific matrix is unknown and should be accessed via IP.

1. Click **Device Finder** in the tool bar.

   A window opens.

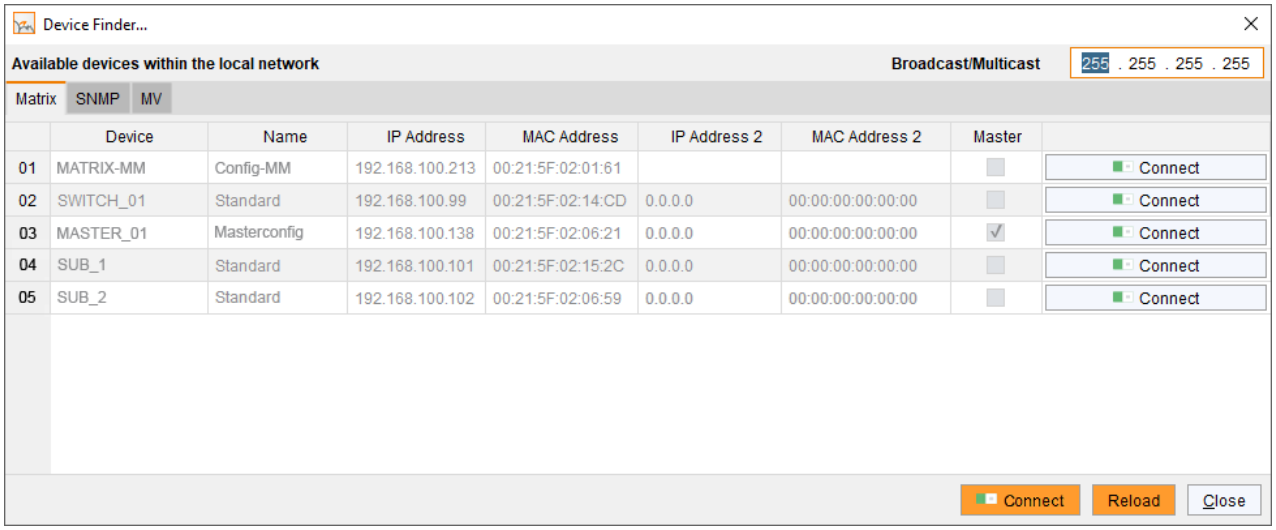


*Fig. 21 Tera Tool menu - **Device Finder***

The following device information is shown in the Device Finder:

Information	Description
Broadcast/Multicast	Search parameters for finding devices. Search via broadcast: 255.255.255.255 (default). Input for search within a multicast group: multicast address
Device	Name of the device
Name	Name of the active configuration
IP Address	Current IP address of the device
MAC Address	MAC address of the device
Master	Identifies the master matrix

The last column of the Device Finder can be used to connect to the respective matrix directly clicking **Connect**.

2. For searching within a multicast group, enter the multicast address. By default, the search is set via broadcast: 255.255.255.255.
3. Click **Connect** in the last column of the **Device Finder** to establish direct connection to the respective device within the same subnet or press Enter.
4. Enter the username and password of the administrator or power user.

   By default, the username is admin, and the password of the administrator is admin.
5. Click **Login** to confirm your entries.
6. Close the **Devic Finder** window.

6 Configuring IP Gateway Connections

6.1 Configuration via Tera Tool Software

The configuration of the IP Gateway CON is saved in the flash drive of the IP Gateway CON and is available after connecting to another matrix.

IP Gateway CON Configurations can be included when storing a matrix backup (via **Save Status**) by ticking the option **Save EXT Units Settings** in the backup dialog (see matrix or Tera Tool user manual).

6.1.1 Prerequisites for Setting an IP Gateway Connection to an IP Gateway Extender

Setting the Channel Type

The type “EXT Unit” creates a fixed connection to an IP Gateway CON extender or to the Draco CON App on a specific computer. The type “Dynamic EXT Unit” can be used by any Draco CON App installations on any computer.

1. Connect to the matrix with the respective IP Gateway board and run the Tera Tool software.
2. Click **System Settings > IP Gateway** in the task area.
3. Click **Activate Edit Mode** in the toolbar.

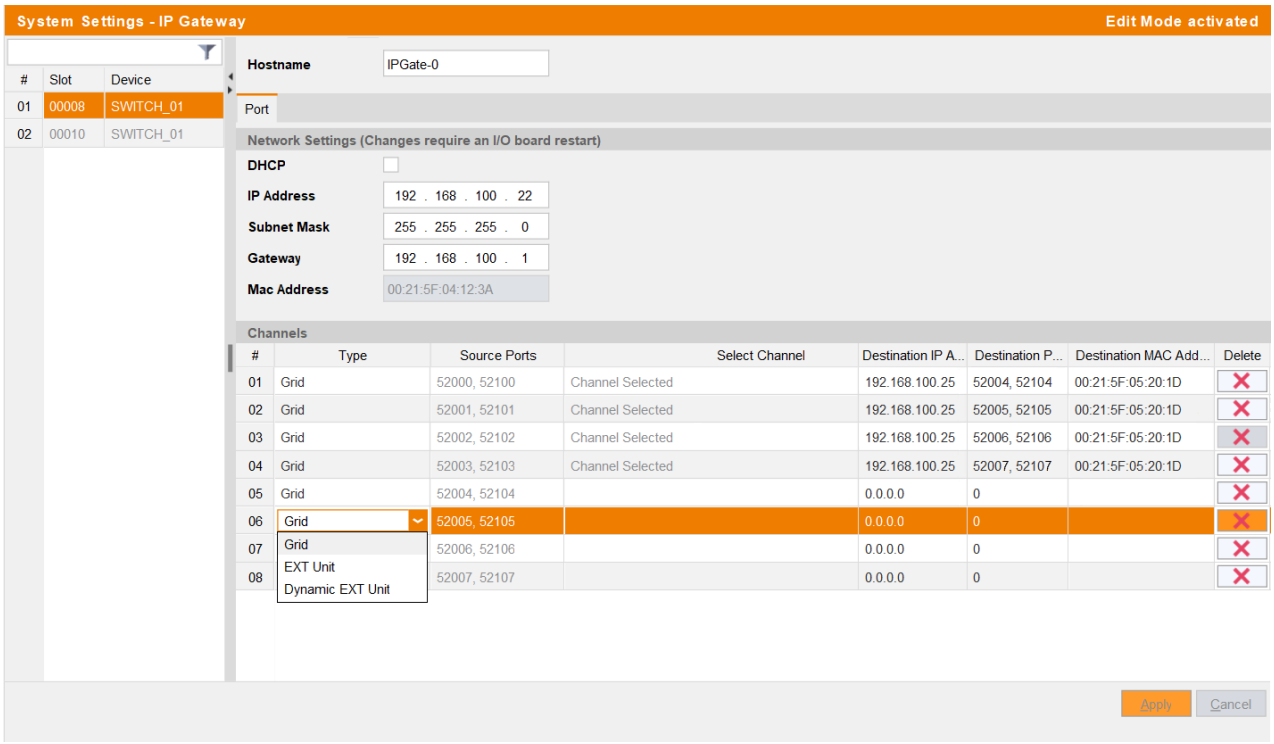


*Fig. 22 Tera Tool menu - **System Settings - IP Gateway** - Select channel type EXT Unit*

4. The matrix in this example has two IP Gateway boards, one in slot 8 and one in slot 10. Click the slot under **Slot** for which an IP Gateway CON connection has to be set up.
5. By default, the channel type is set to **Grid**. Double-click on the corresponding field of the channel to be connected within the **Type** column and select **EXT Unit**.
6. Click **Apply** to confirm the entries.

6.1.2 Setting Gateway Connection for IP Gateway Devices in Same Network

1. Connect a computer to the matrix and run the Tera Tool Software.
2. Click **System Settings > IP Extender** in the task area.
3. Click **Activate Edit Mode** in the toolbar.
4. Click the button **Search IP Extender**.

   The **Search IP Extender** dialog appears, listing all IP Gateway CONs that are recognized in the same subnet.
5. Click the desired IP Gateway CON.

   The IP Gateway CON network settings are displayed on the right side of the dialog.

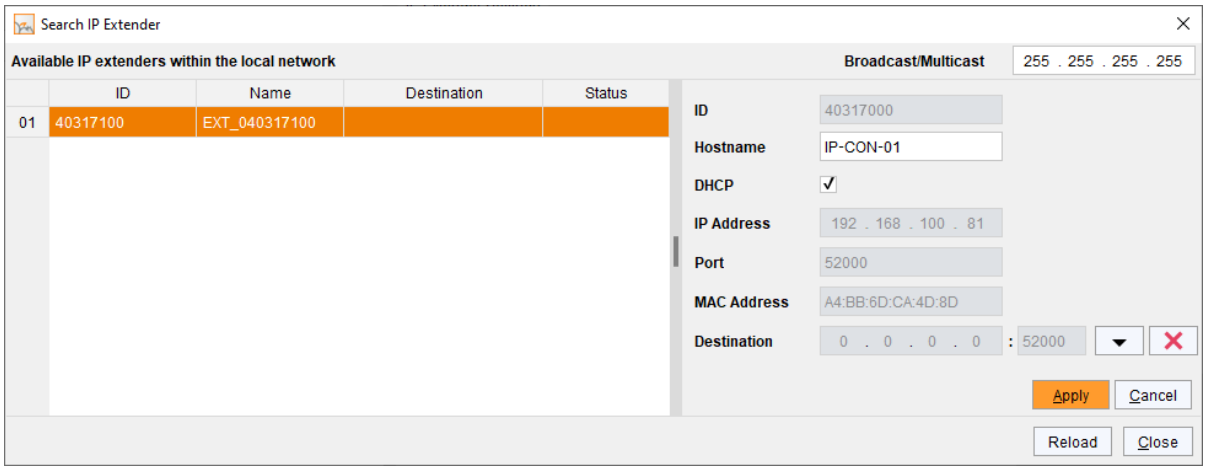


*Fig. 23 Tera Tool dialog - **IP Extender - Search IP Extender** - IP Gateway CON*

Network Settings for an IP Gateway CON

Field	Entry	Description
ID	Text	Serial number of the KVM extender module The ID is provided by the extender module (serial number) and cannot be changed.
Name	Text	Name of the EXT Unit, retrieved automatically.
Hostname	Text	Name of the extender module for IP Gateway connection. This is the hostname in the network.
DHCP	Activated	The network settings are automatically supplied by a DHCP server (default). **Note:** If DHCP is activated and there is no physical network connection available, the boot times might increase.
	Deactivated	Function not active.
IP Address	Numerical	IP address if DHCP is not active (default: 192.168.100.81).
Port	Numerical	Communication port.
MAC Address	Numerical	Unchangeable, is retrieved automatically.
Destination	Numerical	IP address of the IP Gateway board to be connected to in the form "192.168.1.1"
		Port: Gateway port of the IP Gateway board to be connected to.

6. Change the hostname if desired.
7. Set the IP address if DHCP has to be deactivated.

✅ If using a system without DHCP server, we recommend deactivating DHCP and entering a static IP address different from the default IP address 192.168.100.81.
➡ Note: The IP Gateway CON will restart and will only be found when connecting to the respective network.

8. Click the down arrow ▾ to assign a destination.

   A window appears showing all channels of IP Gateway boards available for IP Gateway CON connection via IP.

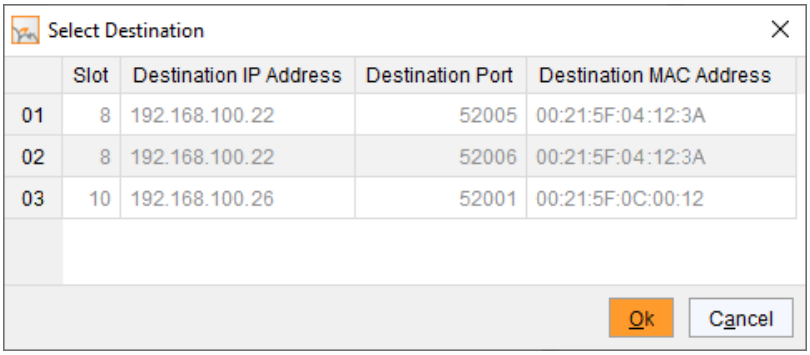


*Fig. 24 Tera Tool dialog - **Select Destination***

9. Select the desired channel in the list.
10. Click **Ok** to confirm the selection.

    The selected destination is stated in the **Destination** fields.

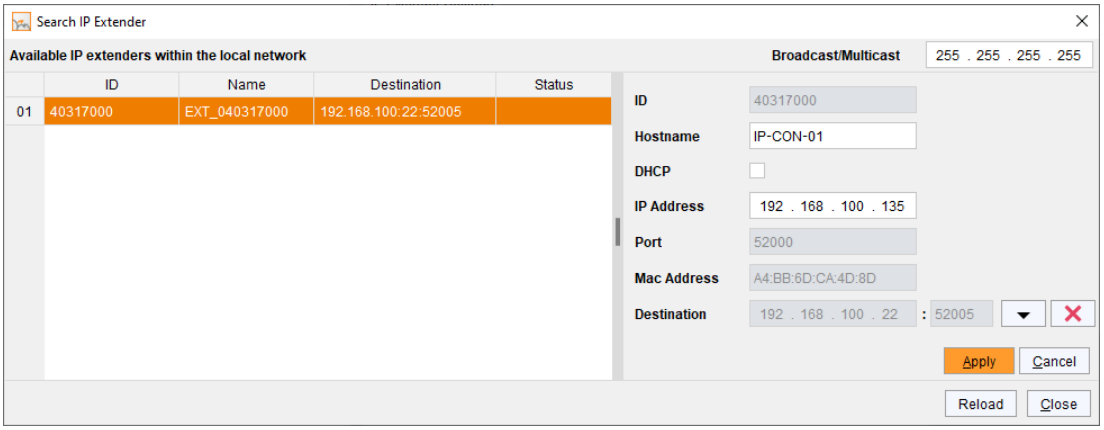


*Fig. 25 Tera Tool dialog - **IP Extender - Search IP Extender** - Selected destination*

11. Click **Apply** to confirm the IP Gateway CON settings.
12. Click **Reload** in the toolbar or press F5.
13. Click **Close** to return to the **IP Extender** menu.

    The assigned IP Gateway CON is listed in the **IP Extender** list.

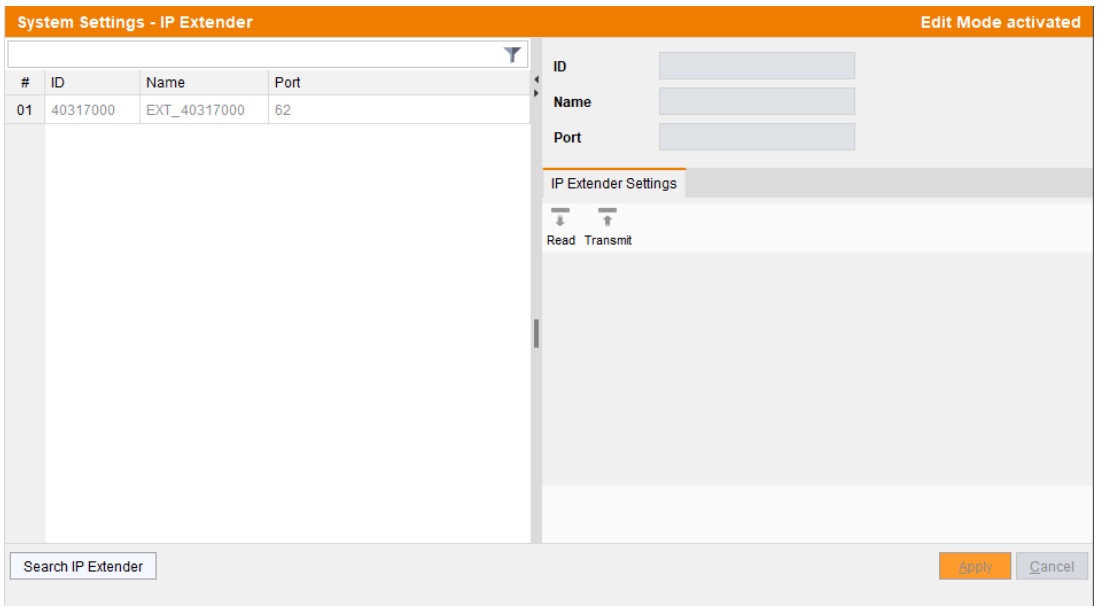


*Fig. 26 Tera Tool menu - **System Settings** - **IP Extender list** with recognized IP Gateway CON*

The port number stated here is derived from the slot the IP Gateway board is in (here: slot 8). The 8 channels are numbered in the same way as 8 ports of an I/O board in this slot would be numbered.

The IP Gateway Channels table now looks like this:

Channels

#	Type	Source Ports	Select Channel	Destination IP Add...	Destination P...	Destination MAC A...	Delete
01	Grid	52000, 52100	Channel Selected	192.168.100.25	52004, 52104	00:21:5F:05:20:1D	
02	Grid	52001, 52101	Channel Selected	192.168.100.25	52005, 52105	00:21:5F:05:20:1D	
03	Grid	52002, 52102	Channel Selected	192.168.100.25	52006, 52106	00:21:5F:05:20:1D	
04	Grid	52003, 52103	Channel Selected	192.168.100.25	52007, 52107	00:21:5F:05:20:1D	
05	Grid	52004, 52104		0.0.0.0	0		
06	EXT Unit	52005, 52105	Channel Selected	192.168.100.135	52000, 52100	A4:BB:6D:CA:4D:8D	
07	EXT Unit	52006, 52106		0.0.0.0	0		
08	Grid	52007, 52107		0.0.0.0	0		

*Fig. 27 Tera Tool - **IP Gateway Channels** table with one IP Gateway CON EXT Unit connected*

By clicking **Reload**, the MAC address was automatically retrieved and written into the table.

6.1.3 Setting Gateway Connection for IP Gateway Devices in different Networks

This procedure is required in two different cases:

- If the matrix is in a different network than the IP Gateway board and the IP Gateway CON.
- If the IP Gateway board is in a different network than the IP Gateway CON.

6.1.3.1 Research the Data for IP Gateway Connections of IP Gateway Devices in different Networks

1. Connect to the matrix and run the Tera Tool software.
2. Click **System Settings > IP Gateway** in the task area.
3. Note down the **IP Address** of the IP Gateway board (192.168.100.22) to be connected and the port of a free EXT Unit channel in the **Source Port** column of the **Channels** section (52006, 52001).

6.1.3.2 Configuring the IP Gateway CON to be connected

In the delivery state, the IP Gateway CON is set to DHCP. Using the IP Gateway CON in a network without DHCP server, the fallback IP address is 192.168.100.81.

1. Power on the chassis with the IP Gateway CON.
2. If using a system without DHCP server, set the IP address of your computer to 192.168.100.xxx (but not 192.168.100.81 since this is the default IP address of the IP Gateway CON)
3. Connect a network cable between link #1 of the IP Gateway CON and a computer.
4. Run the Tera Tool software on the computer.
5. Click **Extras > Search IP Extender** in the menu bar.

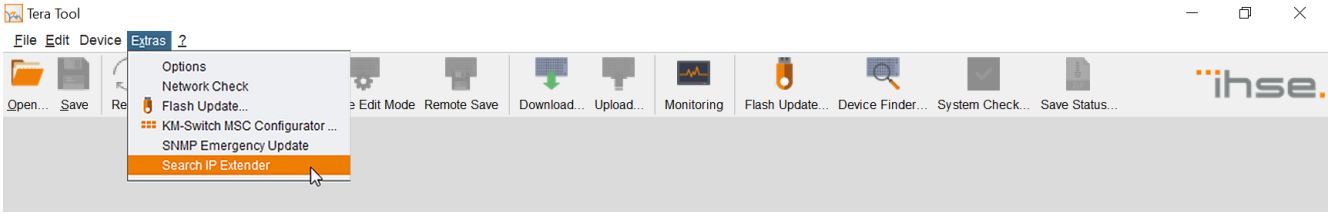


*Fig. 28 Tera Tool menu bar - **Extras - Search IP Extender***

The **Search IP Extender** dialog appears, listing all IP Gateway CONs that are recognized in the same subnet.

6. Click the desired IP Gateway CON.

   The IP Gateway CON network settings are displayed on the right side of the dialog.

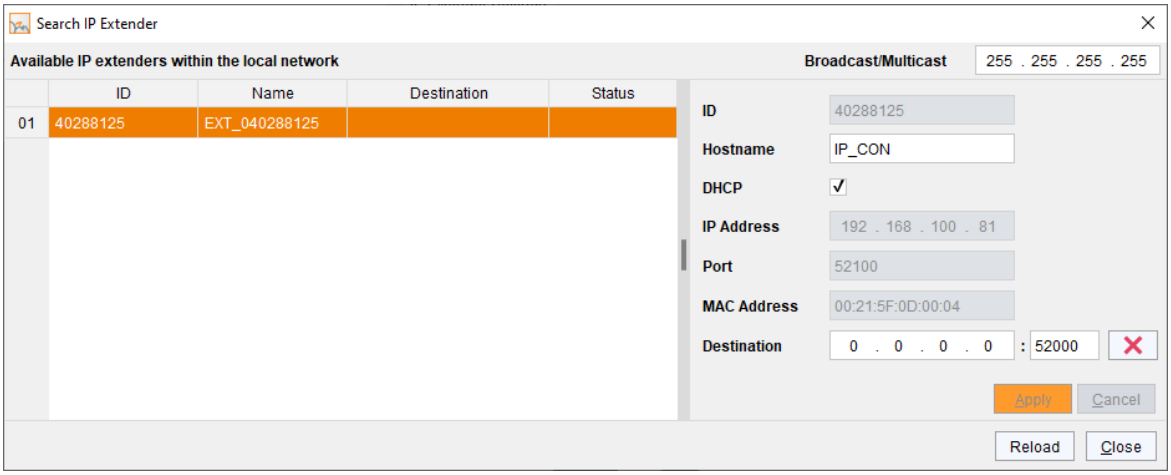


*Fig. 29 Tera Tool dialog - **Search IP Extender - IP Gateway CON Default Settings***

7. Change the hostname if desired.
8. Set the IP address if DHCP has to be deactivated.

☑ If using a system without DHCP server, we recommend deactivating DHCP and entering a static IP address different from the default IP address 192.168.100.81.

➡ Note: The IP Gateway CON will restart and will only be found when connecting to the respective network (change IP address of computer if necessary).

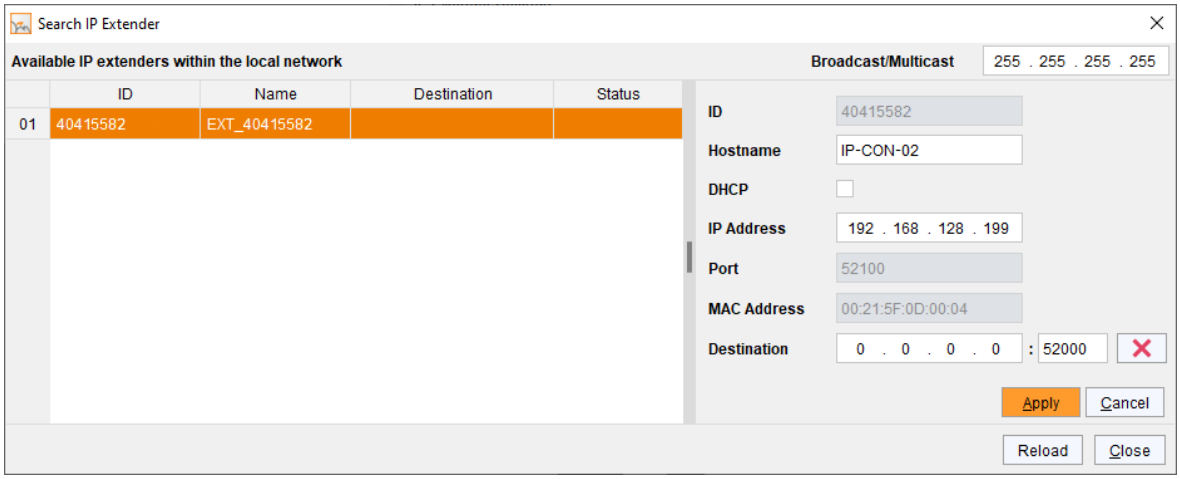


*Fig. 30 Tera Tool dialog - **Search IP Extender** - Hostname and IP address changed*

9. Enter the destination IP address (192.168.100.22) and the destination port (52006) of the channel of the IP Gateway board to be connected to.

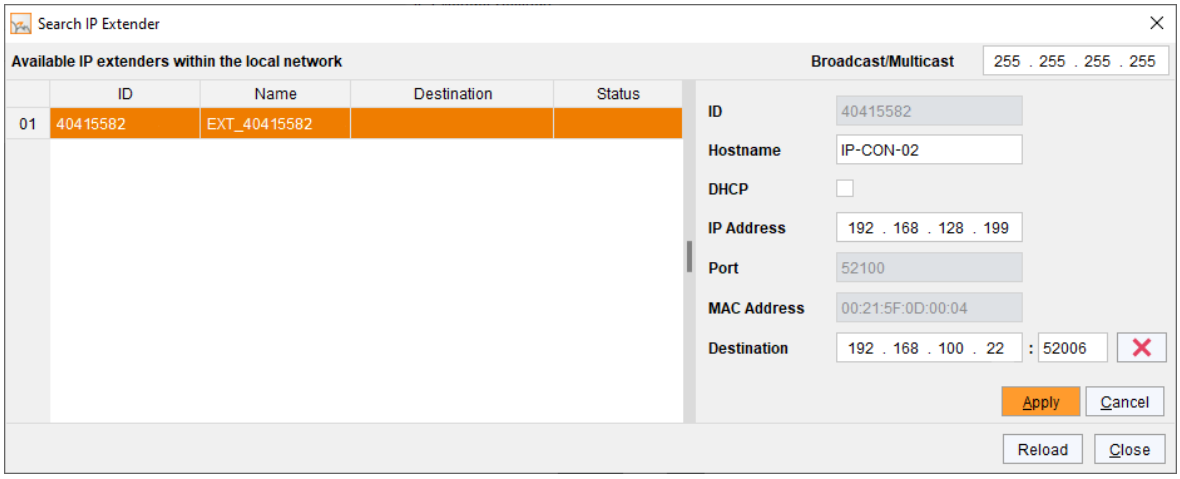


*Fig. 31 Tera Tool dialog **Search IP Extender** - Destination data entered*

10. Click **Apply** to confirm the IP Gateway CON settings.

    The IP Gateway CON will be restarted. Restarting the IP Gateway CON might take several minutes, and the IP Gateway CON is not available during the restart.

11. Note down the data of the IP Address (here: 192.168.128.199), Port (52100) and MAC Address (00:21:5F:0D:00:04) of the IP Gateway CON.

12. The assigned IP Gateway CON is listed in the **IP Gateway CON** list of the **System Settings > IP Extender** menu.

6.1.3.3 Configuring the Settings of the IP Gateway Board

1. Connect your computer to the matrix with the respective IP Gateway board and start the Tera Tool software.
2. Click **Activate Edit Mode** in the toolbar.
3. Click **System Settings > IP Gateway** in the task area.

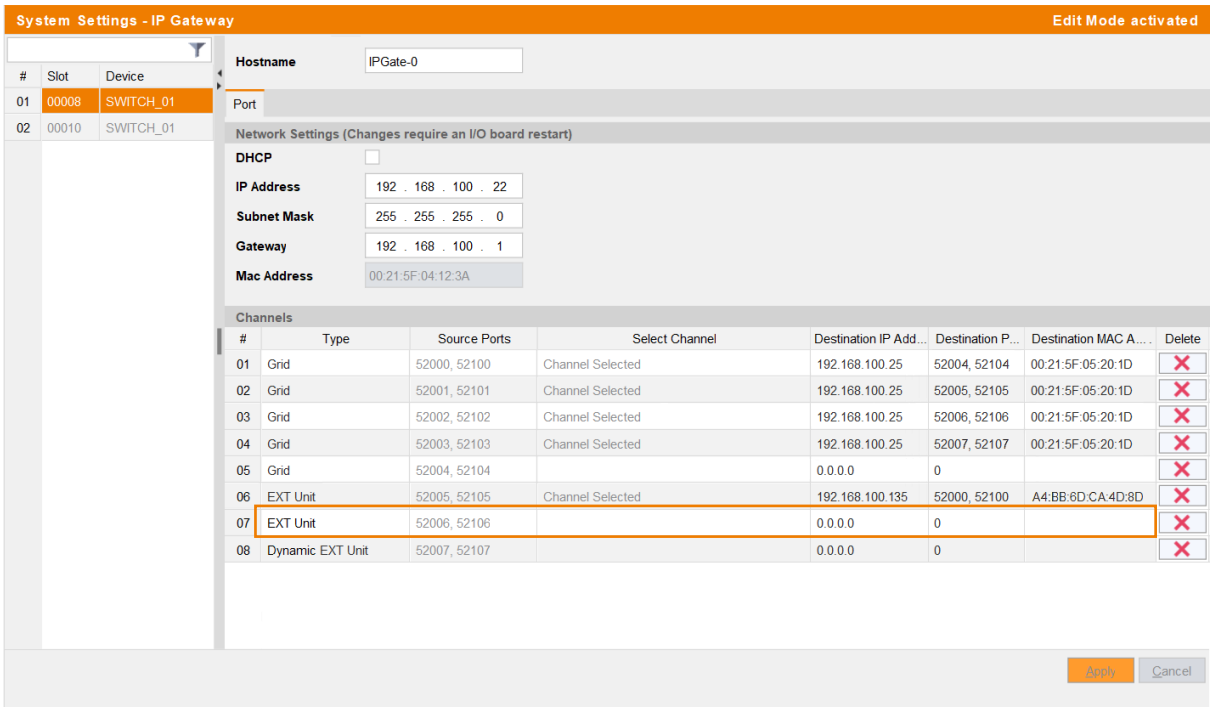


*Fig. 32 Tera Tool menu - **System Settings - IP Gateway** - Enter destination data*

4. Select device and slot of the desired IP Gateway board.
5. Double-click in the respective **Destination IP Address** field and enter the IP address of the IP Gateway CON.
6. Double-click in the respective **Destination Port** field and select the destination port of the IP Gateway CON from the drop-down list.
7. Double-click in the respective **Destination MAC Address** field and enter the MAC address of the IP Gateway CON.
8. Click **Apply** to confirm the entries.
9. Click **Deactivate Edit Mode** in the toolbar.

The IP Gateway Channels table now looks like this:

Channels

#	Type	Source Ports	Select Channel	Destination IP Add...	Destination P...	Destination MAC A...	Delete
01	Grid	52000, 52100	Channel Selected	192.168.100.25	52004, 52104	00:21:5F:05:20:1D	
02	Grid	52001, 52101	Channel Selected	192.168.100.25	52005, 52105	00:21:5F:05:20:1D	
03	Grid	52002, 52102	Channel Selected	192.168.100.25	52006, 52106	00:21:5F:05:20:1D	
04	Grid	52003, 52103	Channel Selected	192.168.100.25	52007, 52107	00:21:5F:05:20:1D	
05	Grid	52004, 52104		0.0.0.0	0		
06	EXT Unit	52005, 52105	Channel Selected	192.168.100.135	52000, 52100	A4:BB:6D:CA:4D:8D	
07	EXT Unit	52006, 52106	Channel Selected	192.168.128.199	52000, 52100	00:21:5F:0D:00:04	
08	Dynamic EXT Unit	52007, 52107		0.0.0.0	0		

*Fig. 33 Tera Tool - **IP Gateway Channels** table with two IP Gateway CON EXT Units connected*

6.1.4 Changing the Name of the EXT Unit of the IP Gateway CON

We recommend renaming the automatically created EXT Unit directly after connecting the IP Gateway CON.

There are two ways to change the name of an IP Gateway CON that has been initially connected to a matrix:

- via menu **Extender & Devices > EXT Units**,
- via the following possibility:

1. Connect to the matrix and start Tera Tool software.
2. Click **System Settings > IP Extender** in the task area.
3. Click **Activate Edit Mode** in the toolbar.
4. Select the IP Gateway CON in the **IP Extender** list whose name is to be changed.
5. Enter the new name for the IP Gateway CON in the **Name** field.

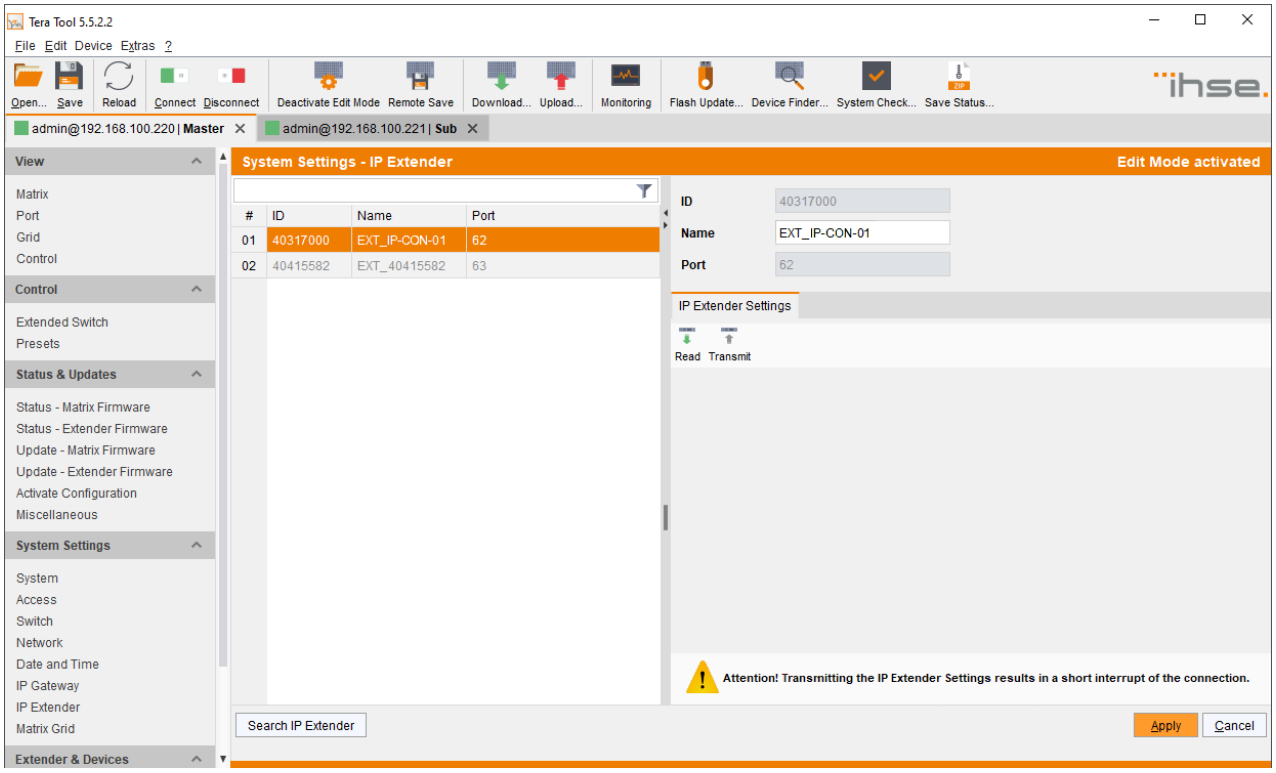


*Fig. 34 Tera Tool menu - **System Settings - IP Extender** - Changing EXT Unit name*

6. Click **Apply** to confirm the entry.

6.1.5 Creating a CON Device for the IP Gateway CON Unit

This section describes the manual creation of a CON Device for the IP Gateway CON EXT Unit. This is only necessary if the function **Auto Config** (default setting: active) is deactivated in the menu **System Settings > System > Automatic ID**. When **Auto Config** is active, creation of the CON Device and assignment of the EXT Unit is automatically done by the software. In this case, ignore steps 2, 3 and 6.

1. Open the CON Device menu by clicking on **Extender & Devices > CON Devices** in the task area.
2. In the menu that opens click the button **New Device**.
3. In the selection menu click the entry **Create a Real CON Device** and then **OK**.
   A Real CON Device is created.

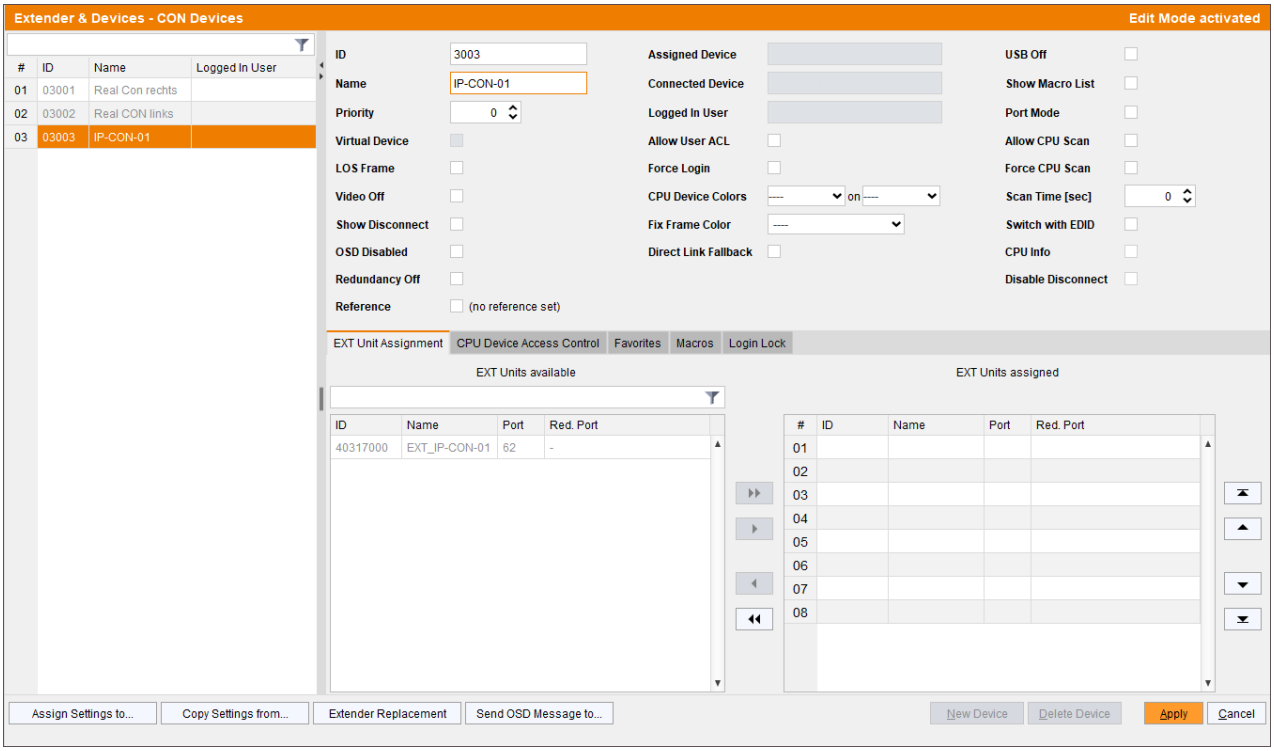


*Fig. 35 Tera Tool menu - **System Settings - Extender & Devices - CON Devices***

4. Enter a suitable name for the CON Device.
5. Set all parameters that are relevant for your CON Device. The parameters are described in detail in the Tera Tool manual.
6. Select the EXT Unit of the IP Gateway CON unit in the **EXT Units available** list and click ▶ to move the highlighted EXT Unit to the **EXT Units assigned** list.

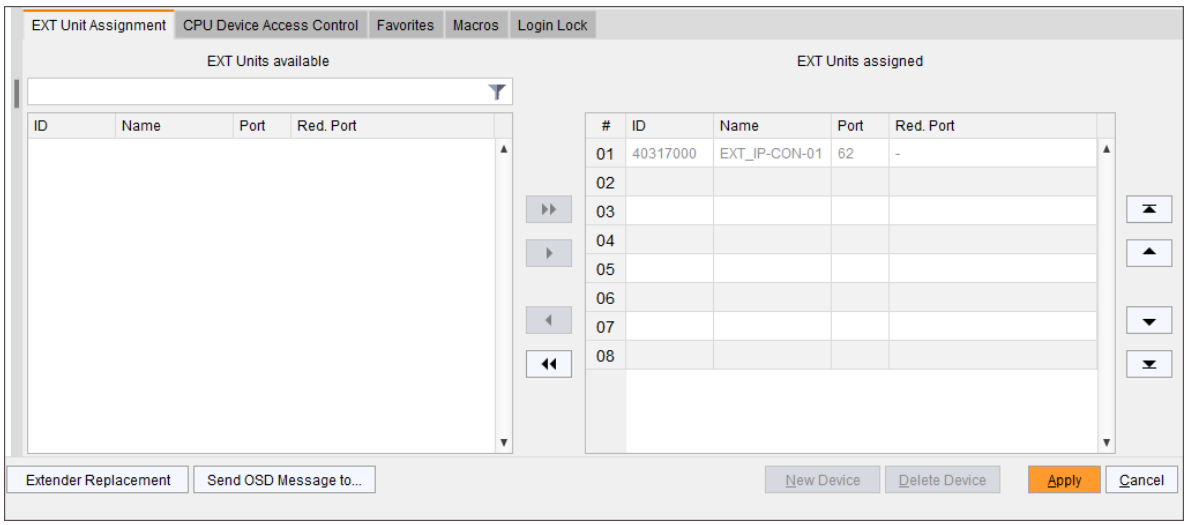


*Fig. 36 Tera Tool menu - **EXT Unit assignment***

7. Click the tab **CPU Device Access Control**.

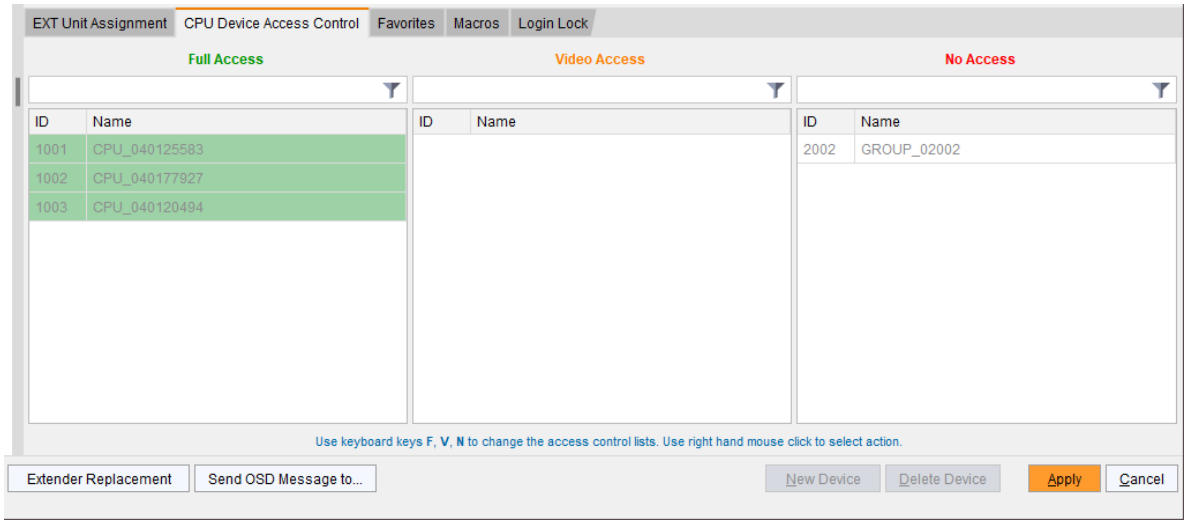


*Fig. 37 Tera Tool menu - **CPU Device Access Control***

8. By clicking with the right mouse button once on a CPU Device in one of the respective access lists (**Full Access**, **Video Access,** and **No Access**), a context menu for selection appears for changing the respective CPU Device access rights.
9. Alternatively, press f, v, or n to set the respective access rights.
10. Click **Apply** to confirm the changes.

6.1.6 Reading Parameters of a connected IP Gateway CON

Reading of parameters will result in an interruption of the connection.

1. Click **System Settings > IP Extender** in the task area.
2. Click **Activate Edit Mode** in the toolbar.
3. Select the IP Gateway CON in the **IP Extender** list whose parameters are to be displayed.
4. Click the **IP Extender Settings** tab on the right side of the working area.
5. Click **Read** in the toolbar of the tab.

   A query to read the parameters appears.
6. Click **Yes** to confirm the reading.

   The connection will be disconnected for a few seconds while the parameters of the IP Gateway CON are read out and displayed.

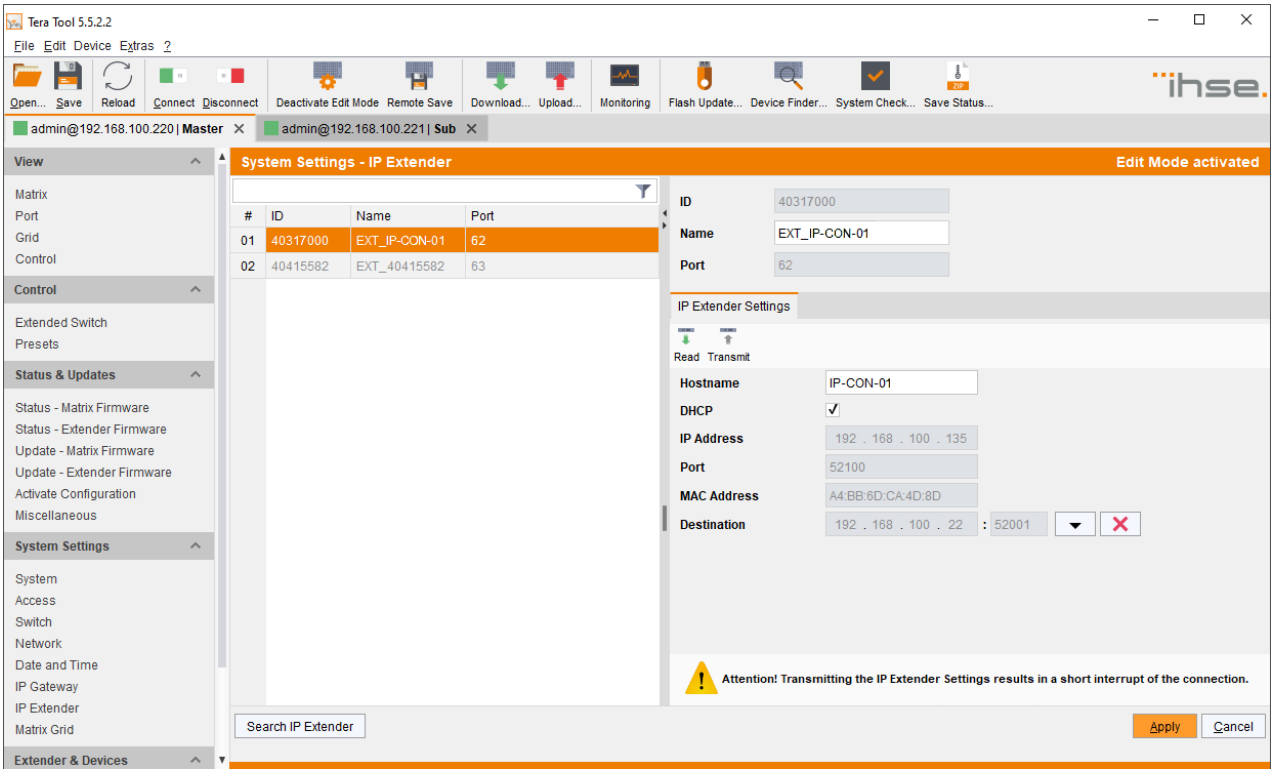


*Fig. 38 Tera Tool menu - **System Settings - IP Extender** - Parameters of an IP Gateway CON*

6.1.7 Changing/Deleting IP Gateway CON Units/Connections

After reading the IP extender settings described in the previous section, you have the following possibilities:

- Changing hostname.
- Activating/deactivating DHCP.
- If DHCP is deactivated, you can change the IP address.
- By clicking the down arrow , you can select another destination/connection.
- By clicking the delete button , you can delete the destination and thus the connection.

1. As soon as you start changing parameters, **Transmit** in the toolbar of the IP Extender Settings is activated. Click **Transmit** to save the modifications and send them to the IP extender.
   A query appears.

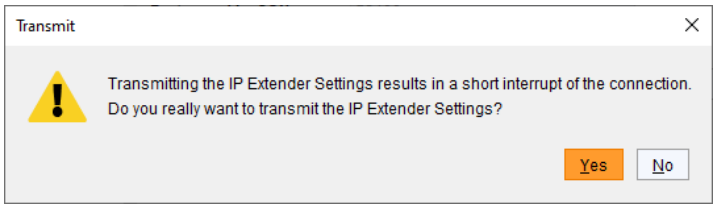


Fig. 39 ***Query about transmitting IP Extender settings***

2. Click **Yes**.

A progress window appears.

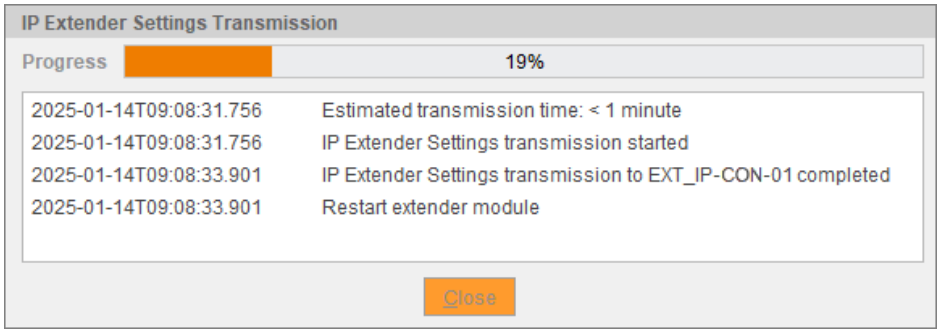


Fig. 40 ***Transmission of IP Extender settings***

3. When the transmission is finished, click **Close**.

6.2 Configuration Options for an IP Gateway CON Unit via Mini-USB Service Port

The IP Gateway CON Unit can be configured and updated via the Mini-USB service port. When a CON Unit is connected to a computer using a mini-USB cable, the CON Unit is displayed in the file manager of the computer as an external drive "40174198" (serial number).

This directory contains the configuration file `Config.txt`, the EDID and firmware files.

The `Config.txt` file shows the serial number, the manufacturing p/n, and the video signal details. If present, additional configuration parameters are displayed in the line directly below `#CFG`.

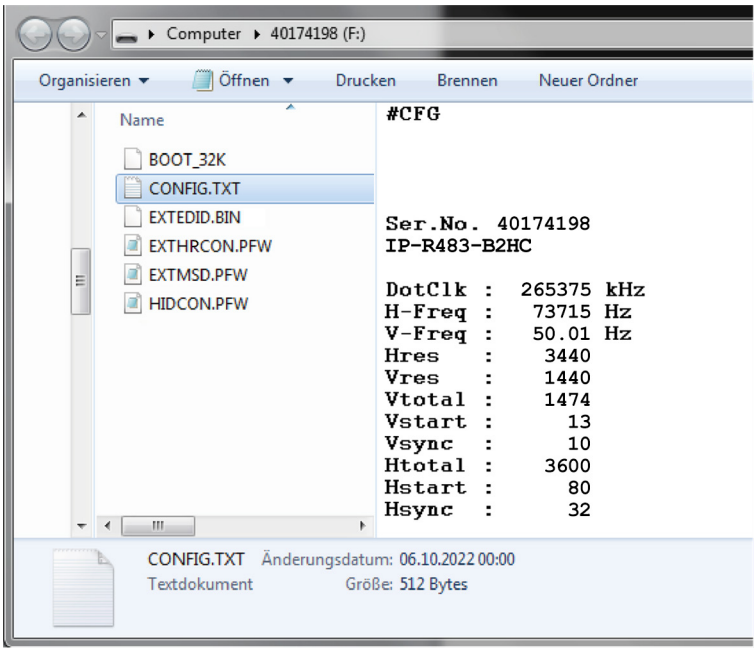


Fig. 41 Example: Opened Flash drive of an IP Gateway CON Unit

6.2.1 Configuration File

The extender module contains a configuration file (`Config.txt`) to set specific parameters and to read out device and video information. The configuration file is located on the flash drive of the extender module. The flash drive can be opened by a Mini-USB connection to a computer. The configuration file can be edited with all common text editors.

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 successful parameterization, the following sequence must be strictly observed.

To enter or change a parameter of an extender module, proceed as follows:

1. Connect the extender module to any source using a Mini-USB cable.
   The extender 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 extender module.
10. Power on the extender module to restart the extender module.
    The extender module starts automatically, and the extender module parameters will be rewritten in the `Config.txt` file.

Example

Fig. 42 Example: Config.txt with parameters

6.2.2 Parameters

Transmission Parameters

The device operates with a proprietary compression method.

In default configuration, the device adapts dynamically to monitor resolution and image content. This configuration is suitable for almost all conditions and should only be modified if image quality is not fully satisfactory.

NOTICE
In exceptional cases the displayed video image may exhibit "frame dropping" (loss of single pictures) or color effects.

Parameters for a CON Unit

The following parameters can be written into the configuration file of a CON Unit.

Output Settings

Parameter	Function
DISEXTOSD	Deactivates extender module OSD.
ENAFRAME	Shows orange colored frame when losing extender module connection.
ENAHOLDPIC	Shows the last transmitted picture highlighted by an orange-colored frame when losing connection.
ENALOSTMR	Activates LOS timer, starts counting when the video signal is lost.
ENADDCTX	Activates EDID transmission by unplugging and connecting the monitor back to the CON Unit.
For 481 series only	
ENADVI	Output of a DVI signal with HDMI extenders if DVI monitors are connected and automatic monitor detection does not work.
ENAHDMI	Output of an HDMI signal with HDMI extenders if HDMI monitors are connected and automatic monitor detection does not work.
1080p50Hz	At 1920x1080 always output 50 Hz.

6.3 Reprogramming an IP Gateway Board

An IP Gateway board can be converted into a normal Grid board without IP functionality to be included in existing matrix grids. This is achieved by changing the firmware of the board. Please contact our Tech Support for suitable firmware files.

1. Connect a computer with Tera Tool to the matrix containing the IP Gateway board.
2. Start Tera Tool and connect to the matrix.
3. Click **Status & Updates > Miscellaneous** in the task area.
4. Click **Activate Edit Mode** in the toolbar.
5. Click the tab **Convert I/O Board Firmware**.

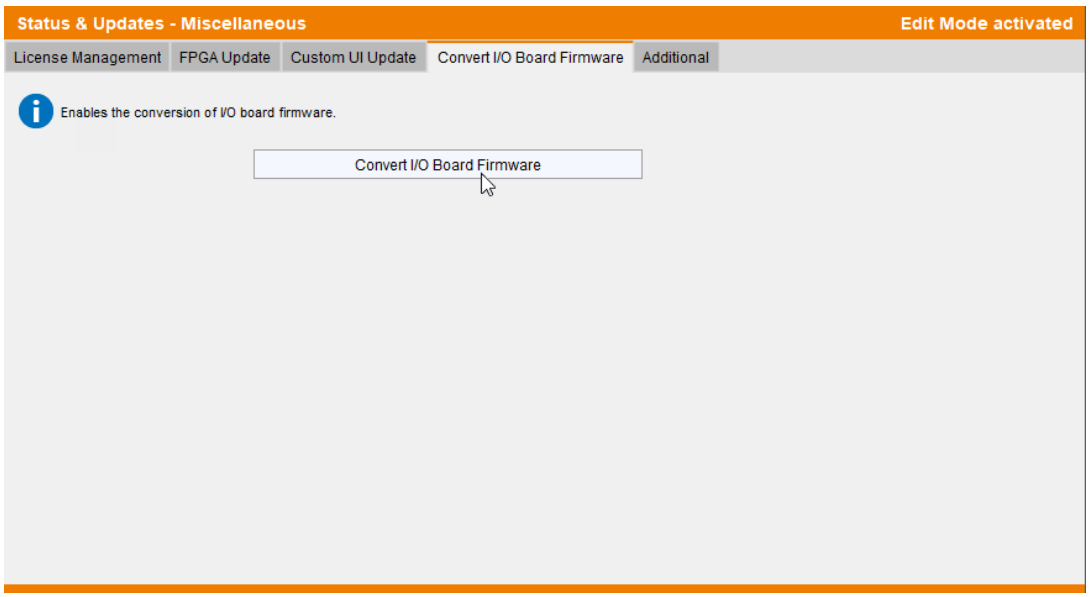


*Fig. 43 Tera Tool menu - **Status & Updates - Miscellaneous - Convert I/O Board Firmware***

6. Click the button **Convert I/O Board Firmware**.
   The following window appears.

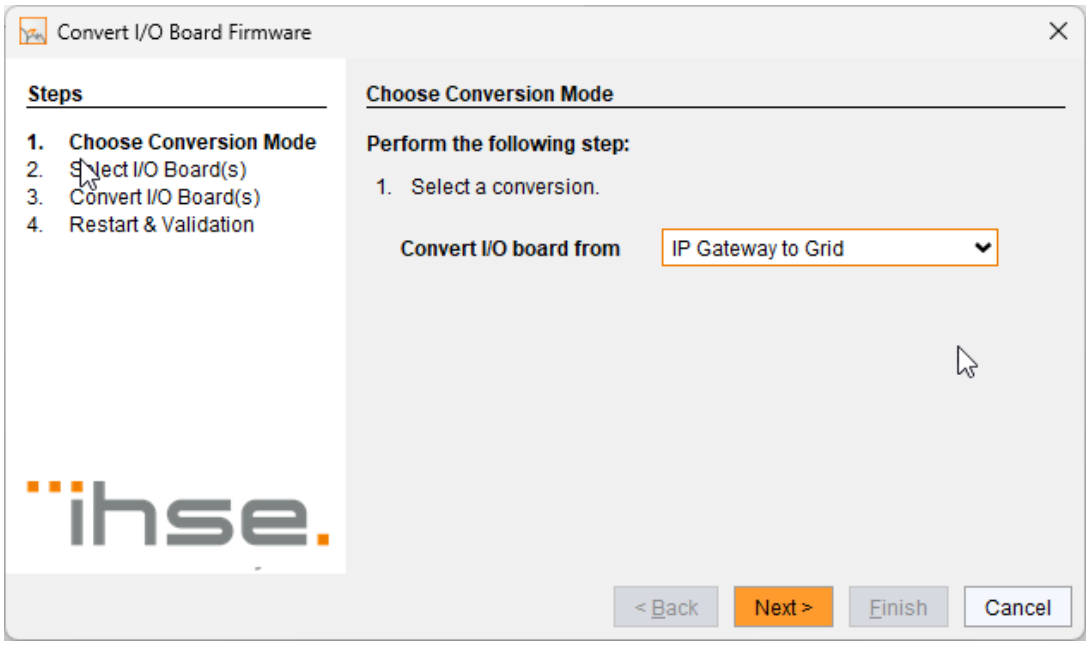


*Fig. 44 Tera Tool - **Convert I/O Board Firmware - Choose Conversion Mode***

7. Select the conversion mode **IP Gateway to Grid** in the drop-down menu.
8. Click **Next**.

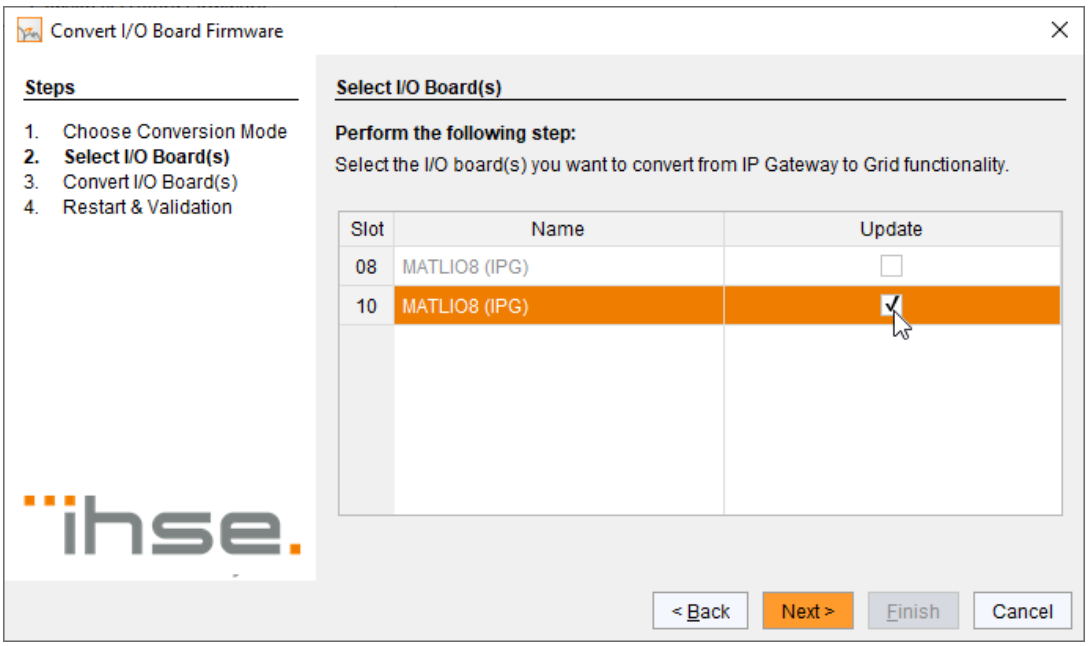


*Fig. 45 Tera Tool - **Convert I/OBoard Firmware - Select I/O Board(s)***

Slot and current firmware type of each IP Gateway board are listed.

9. In the column **Update** tick all IP Gateway boards you wish to convert.
10. Click **Next**.
11. Click **Browse** and go to the location of the firmware file.
12. Select the firmware file MATLLNC.tfw and click **Select**.
13. Click **Update**.
    The conversion process starts, progress is displayed, and log messages appear in the white field.
14. Click **Save Log Messages** if you want to store the log messages.
15. When the conversion is finished, click on **Finish**.
16. Follow the instructions on-screen and restart the IP Gateway board(s).
    They can now be used as simple Grid boards without IP functionality in existing matrix grids.

It is of course possible to reverse this process using the same wizard.

➡ Proceed as described above. In step 7 select **Grid to IP Gateway** instead of IP Gateway to Grid.

7 Operation

7.1 Downloading the EDID

In the delivery state, the factory-set EDID in the CPU Unit is reported to the source. If these are not the optimal settings for the console monitor, the EDID can be loaded from the console monitor and stored in the internal memory of the CPU Unit.

On extender modules with USB-HID ports, you can load the EDID of the console monitor via keyboard command under operating conditions.

1. Enter the Hot Key to start the command mode (see section 4.1, page 24).

   The **Caps Lock** and **Scroll Lock** LEDs on the keyboard are flashing.

2. Press a to load the EDID of the console monitor into the CPU Unit.

   The screen will go black for a short time and the LEDs of the CPU Unit and CON Unit flash briefly.
   At the same time the command mode is closed, and the keyboard LEDs return to previous status.

3. Restart the corresponding source.

   The video mode has been readjusted. Screen quality should be optimal. The source should now show the console monitor as the current screen, together with the available video resolutions.

   If the EDID was loaded once, the EDID can be reloaded by repeating the process.

Keyboard commands are fixed to the position of the keys on the keyboard. Keyboard mapping tables may vary for country-specific layouts.
E.g., press Hot Key + q on a French keyboard layout (AZERTY) instead of Hot Key + a to download the EDID of the monitor connected to the CON Unit into the CPU Unit.

7.2 Switching to a Computer

Prerequisites

- A connection between the IP Gateway CON and the IP Gateway board on a matrix is established.
- An EXT Unit and a CON Device for the IP Gateway CON have been created and configured (e.g. CPU access rights).

1. Start the command mode by entering the Hot Key (default: 2x Left Shift).

   The **Caps Lock** and **Scroll Lock** LEDs on the keyboard are flashing.

2. Press o to open the OSD. The CPU selection menu appears in a translucent window.

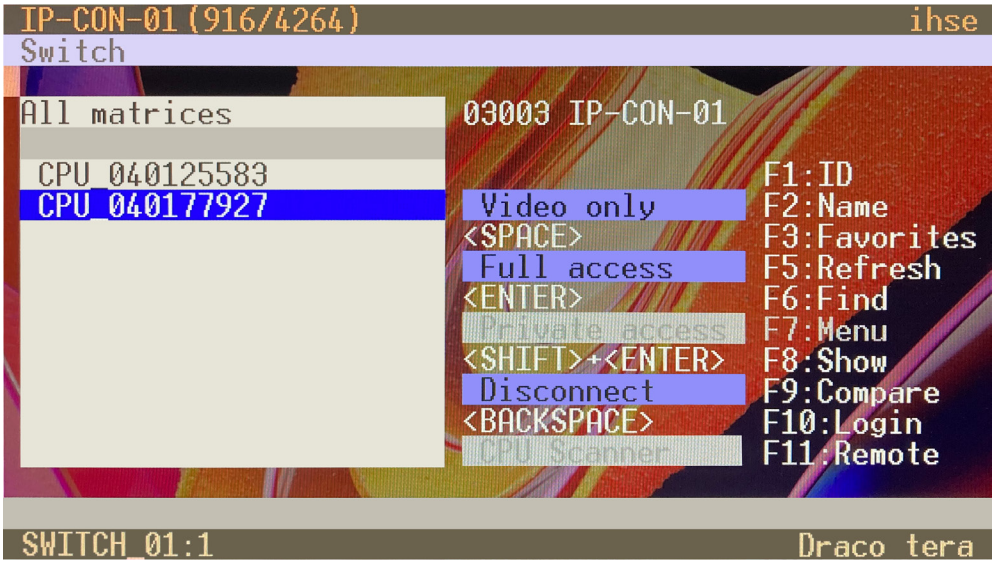


Fig. 46 OSD - Translucent OSD with CPU Device selection list

3. Select the desired CPU Device/Computer in the list.
4. Press the respective key to execute the desired switching operation, Enter for full access (video and keyboard/mouse control) or Space for Video only.

8 Summary of Keyboard Commands

In the following you find a summary of keyboard commands that can be used in conjunction with 481 and 483 extender modules.

Keyboard commands are fixed to the position of the keys on the keyboard. Keyboard mapping tables may vary for country-specific layouts.
Note the key position of keys when changing the keyboard layout, e.g., from QWERTZ to AZERTY with the French keyboard layout.

8.1 Starting and Exiting the Command Mode

Keyboard command	Function
2x Left Shift	Starts the command mode (Hot Key, factory setting).
Esc	Exits the command mode.

8.2 Changing and Resetting the Hot Key

Hot Key

Keyboard command	Function
Current Hot Key, c, new Hot Key code, Enter	Changes the Hot Key according to the predefined Hot Key Code table.
Hot Key, c, 0, new Hot Key, Enter	Defines a freely selectable Hot Key.
Right Shift + Del within 5 s after switching on the CON Unit or plugging in a keyboard	Resets the Hot Key back to default settings.

Hot Key Code

Hot Key Code	Hot Key
0	Freely selectable, except Esc, Del, Backspace and Enter
2	2x Scroll
3	2x Left Shift (default)
4	2x Left Ctrl
5	2x Left Alt
6	2x Right Shift
7	2x Right Ctrl
8	2x Right Alt

8.3 EDID Management

Keyboard command	Function
Hot Key, a	Downloads the EDID of a monitor connected to the CON Unit into the CPU Unit.

9 Draco CON App

The Draco CON App is a client software program for access to the Draco tera enterprise and flex series over IP. It requires Java 11 or newer and is available for download on our website www.ihse.com/downloads.

The Draco CON App replaces an IP CON unit. Running it on your computer, you can access another computer via matrix and a CPU unit.

9.1 Installation

NOTICE
It is essential that you allow access by the Windows Defender Firewall when prompted to do so.

1. Download the Draco CON App setup file from our website www.ihse.com.
2. Double-click the *exe file DracoCONApp_Setup_2_0_0 (current version).
   The setup wizard opens.

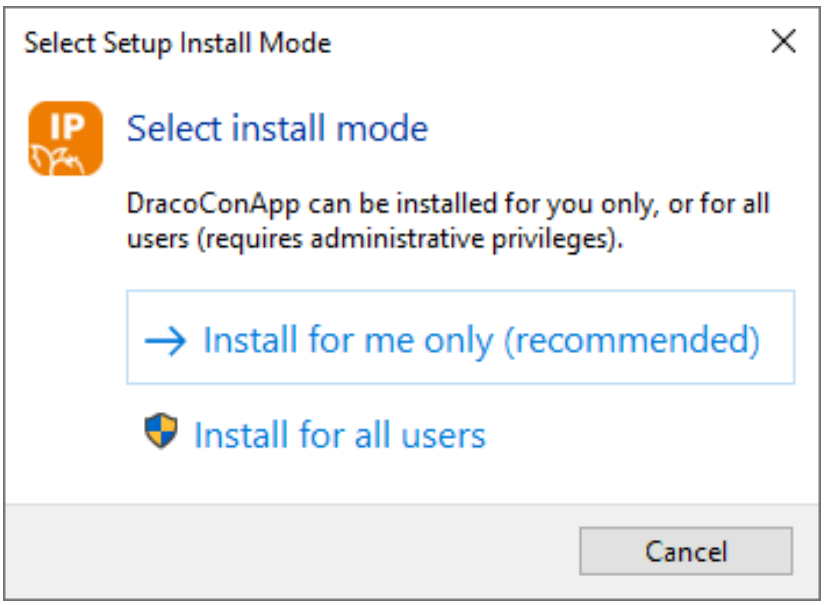


*Fig. 47 Draco CON App - **Setup wizard - Select Setup Install Mode***

3. Select the desired install mode.

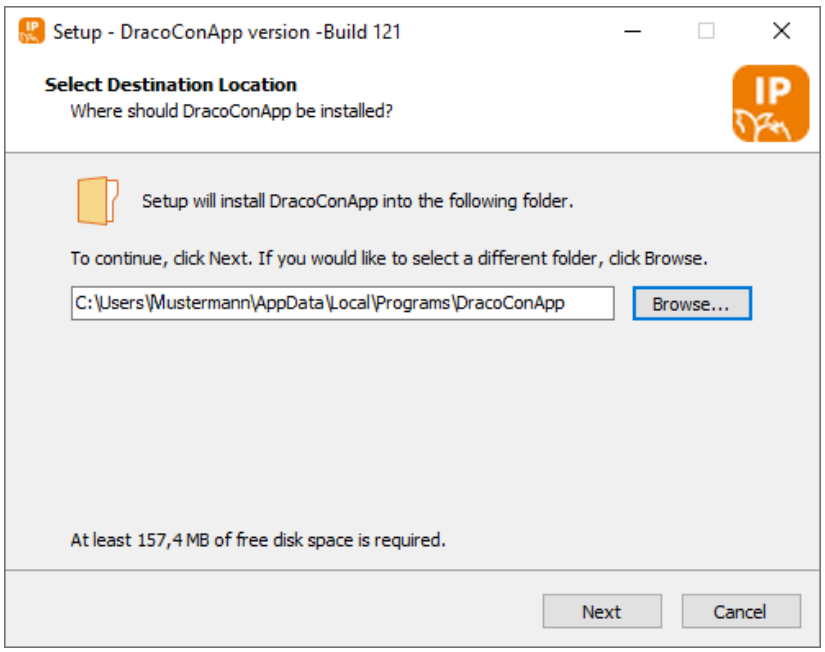


*Fig. 48 Draco CON App - **Setup wizard** - Select folder*

4. If you want to use another folder, click **Browse** and select the desired folder.
5. Click **Next**.

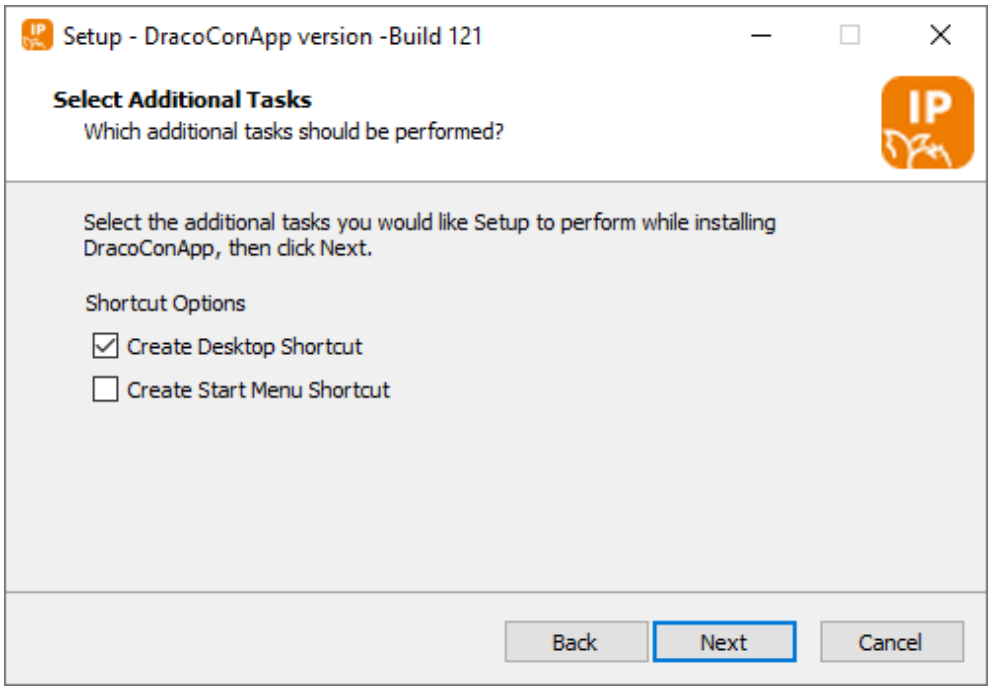


*Fig. 49 Draco CON App - **Setup wizard** - Select additional tasks*

6. Select an option if you wish, then click **Next**.

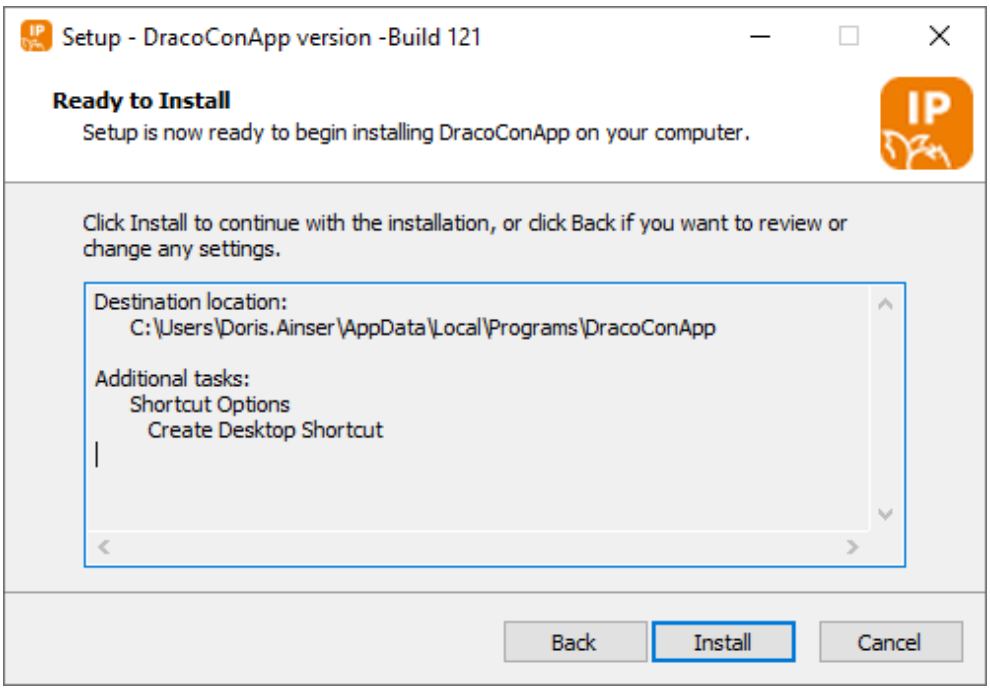


*Fig. 50 Draco CON App - **Setup wizard** - Start installation*

7. Click **Install** to start the installation or **Back** if you want to review or change any settings.
   After clicking **Install**, the Draco CON App is being installed which is illustrated by a green bar. When the installation is finished, the following window appears:

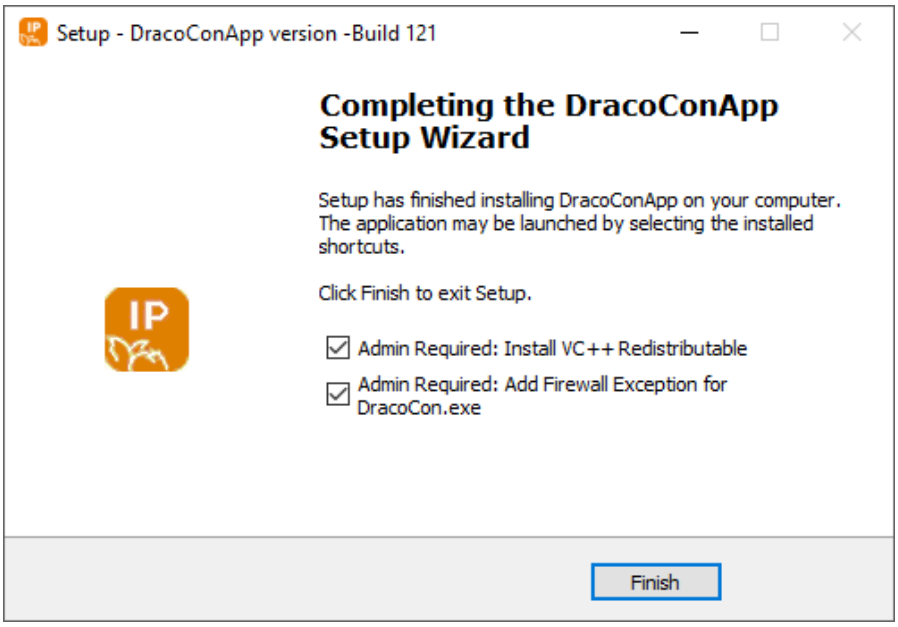


*Fig. 51 Draco CON App - **Setup wizard** - Installation procedure completed*

8. Click **Finish** to complete the installation of the Draco Con App and close the wizard.

9.2 Description

1. Start the Draco CON App by double clicking the icon or the file in the folder.
   The following window appears.

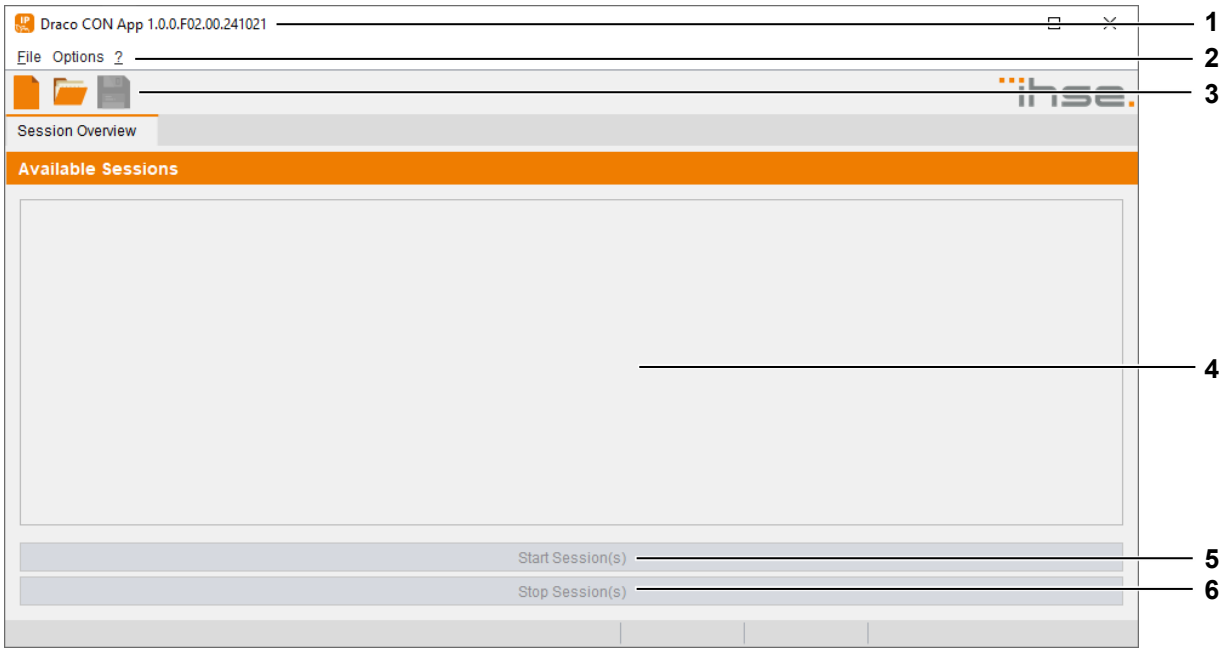


*Fig. 52 Draco CON App - **Draco CON App window***

1 Version number of Draco CON App
2 Menu line
3 Toolbar
4 Area where sessions are displayed
5 Start button, only active after selecting a session
6 Stop button, only active when a session is running

The symbols of the toolbar mean the following:

Symbol	Description
	Creates a new session.
	Opens a session.
	Saves a session.

The drop-down menu **File** contains the following entries:

Entry	Description
New Session	Creates a new session.
Open Session	Opens a session.
Save Session	Saves the opened session.
Save Session As	Saves the session under a new name.
Exit	Quits the Draco CON App.

The drop-down menu **Options** contains the following entries:

Entry	Description
Language	To select the language; for the time being, only English is available.
Theme	To select the color theme, you can choose between Dark Gray (Default), Light Gray and Dark.
Monitoring	Displays log messages.

Getting Information about the App

1. Click **?** in the menu line and then **About**.
   A window opens with information about the app and the manufacturer.

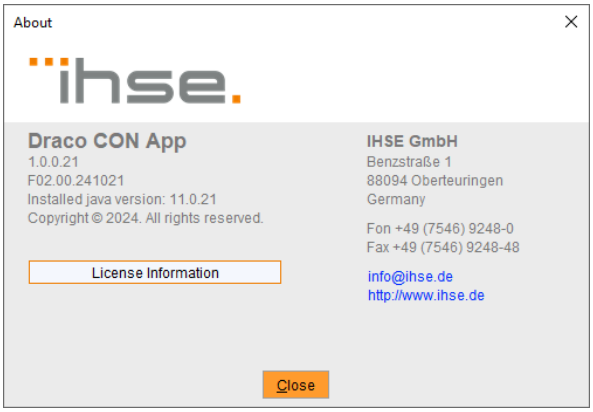


*Fig. 53 Draco CON App - **About***

9.3 Configuration

9.3.1 Creating Sessions for Connecting to IP Gateway Boards

1. Create a new session by clicking the symbol in the toolbar or by clicking **New Session** in the drop-down menu **File**.

   The following tab appears.

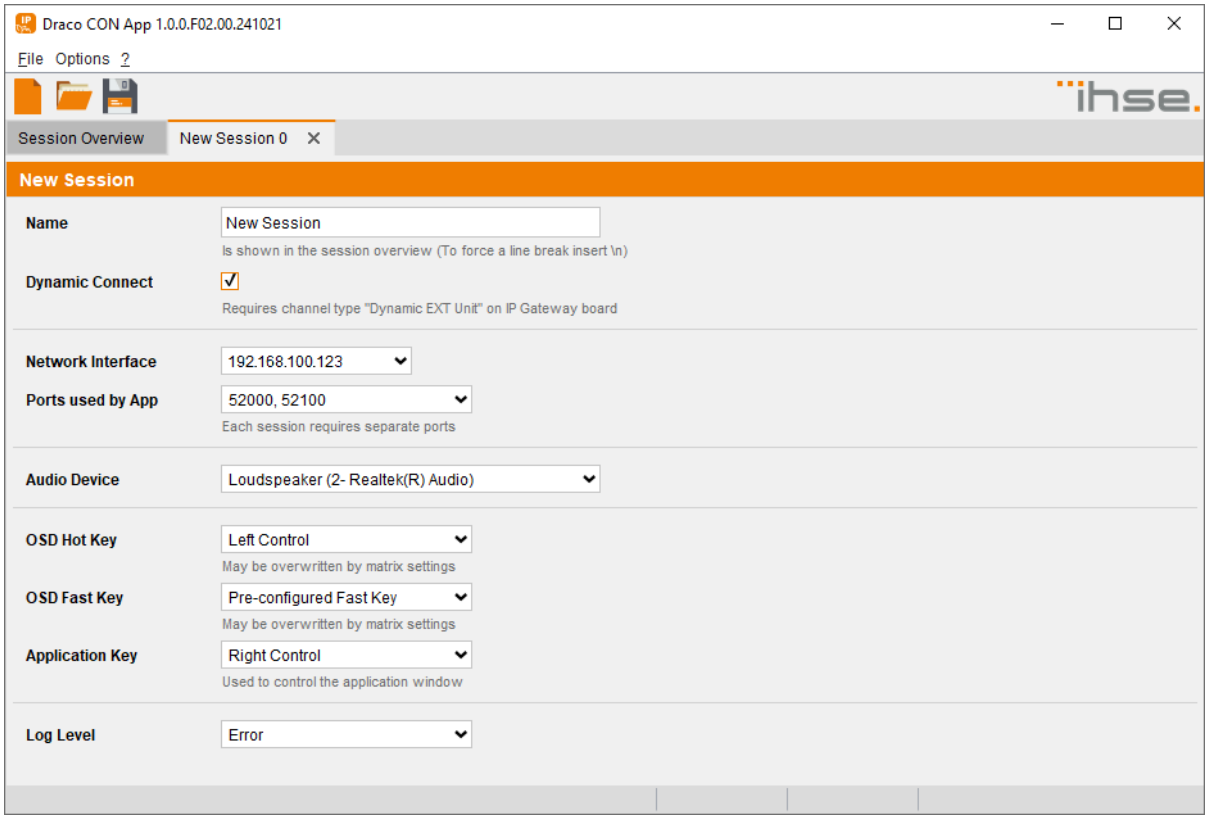


*Fig. 54 Draco CON App - **Configuring a new session***

Entry	Description
Name	The name of the session that is shown in the session overview.
Dynamic Connect	Requires channel type “Dynamic EXT Unit” on the IP Gateway board, is necessary to connect to several matrix configurations. When this option is not ticked, the IP Gateway board needs a channel of the type “EXT Unit”.
Network Interface	IP address of the computer on which the Draco CON App is running. The computer must be in the same subnet as the matrix/matrices you want to connect to.
Ports used by App	Port of the computer/laptop, each session requires a separate port.
Audio Device	To choose loudspeakers.
OSD Hot Key	Hot key to open the OSD for connecting to a CPU Device, may be overwritten by matrix settings.
OSD Fast Key	Fast key to open the OSD, may be overwritten by matrix settings.
Application Key	Hot key to toggle/set display parameters of the Draco CON window, e.g fullscreen or not, mouse coordinates relative or absolute.
Log Level	To choose which messages should be displayed under Options/Monitoring

2. Type in a **name** for the session.

☑ There are two possibilities to connect the Draco CON App to an IP Gateway board. Using a “Dynamic EXT Unit” channel and using an “EXT Unit” channel.

3. Tick the box **Dynamic Connect** when you wish to use this session to connect to different matrix configurations. The IP gateway board of each matrix needs at least one channel of the type “Dynamic EXT Unit”. When you do not tick this box, the IP gateway board needs a channel of the type “EXT Unit”. A fixed connection is created between this session and the matrix.
4. For **Network Interface** select or type in the IP address of your computer.
5. Select a port at your computer/laptop to be used for this session. Every session needs a different port.
6. You can select another hot key for opening the OSD under **OSD Hot Key**.
7. You can select another fast key under **OSD Fast Key**.
8. Select an **Application Key** for changing display parameters for the Draco CON App window.
9. Under **Log Level** select which messages should be listed when Monitoring is switched on.
10. Save the configured session by clicking the symbol in the toolbar or by clicking **Save Session** in the drop-down menu **File.**

    The Save dialog box appears.

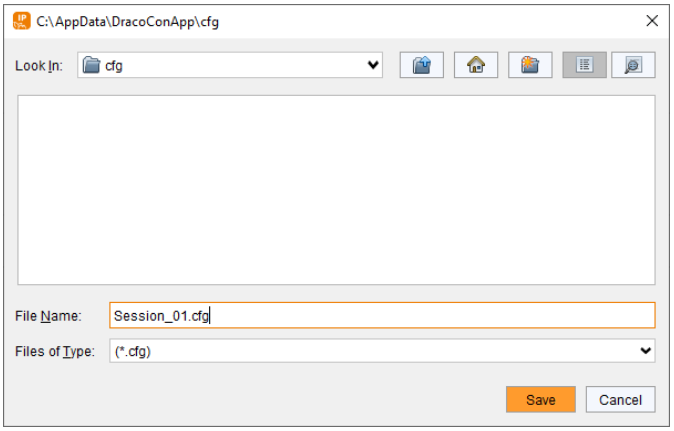


*Fig. 55 Draco CON App - **Saving a session***

11. By default, the session files are stored in the folder displayed in the figure above. You can select another folder.
12. Type in a file name for the session.
13. Click the button **Save**.

9.3.2 Modifying a Session

1. Click the symbol in the toolbar or click the entry **Open Session** in the menu **File**.

   A selection window opens.
2. Select the session you want to modify and click the button **Open**.
   The dialog box for configuring a session opens.
3. Make the desired modifications.
4. To overwrite the existing session with the changed one click the symbol in the toolbar or the entry **Save Session** in the menu **File**.
5. Click **Save Session As…** in the menu **File** to create a new session. In this case, change the port since every session needs a different port.

9.3.3 Creating and Configuring a CON Device for a Session

Each session needs an EXT Unit, a CON Device for switching and access rights to computers that are connected to the matrix.

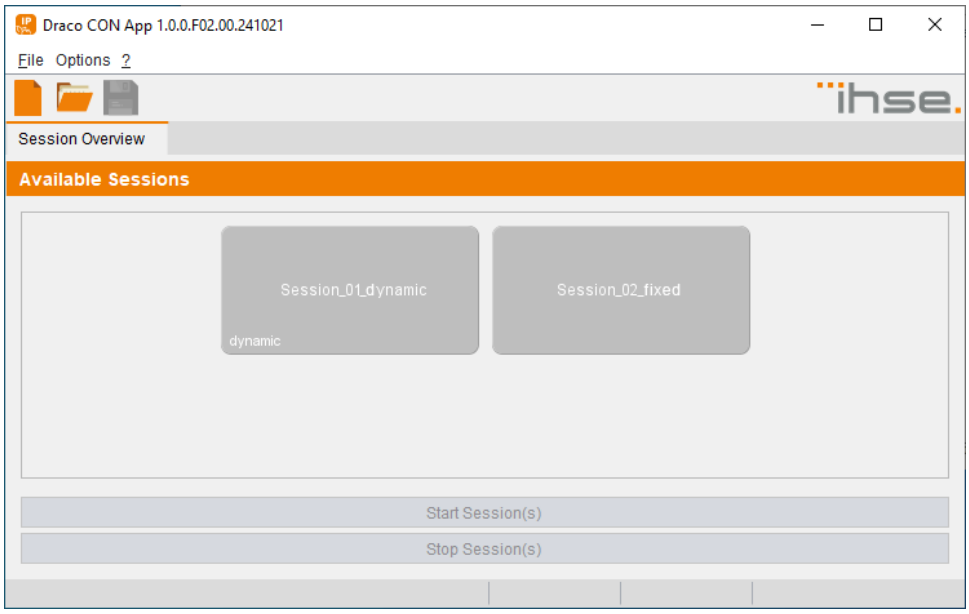


*Fig. 56 Draco CON App - **Session Overview with available sessions***

1. In the **Session Overview**, click on a session which is then displayed in orange. The button **Start Session(s)** is activated.
2. Click the button **Start Session(s)**. A window opens with information about initializing the session.

   After initializing is finished, the DracoCon window appears.

*Fig. 57 Draco CON App - **Black DracoCON window** (signifies a successful connection to the IP Gateway board of the matrix)*

With the successful connection to the IP Gateway board, an EXT unit for the session was automatically created. When the function **Auto Config** is active (default setting), a CON Device is also automatically created. We recommend renaming the EXT Unit and the CON Device. The session also needs access rights to one or several CPU Devices of CPU Units that are connected to the matrix.

Proceed as follows:

Renaming the EXT Unit

1. Connect the computer to the matrix and start Tera Tool.
2. Click **System Settings > Extender & Devices > EXT Units**.
3. Click the button **Activate Edit Mode** in the toolbar.

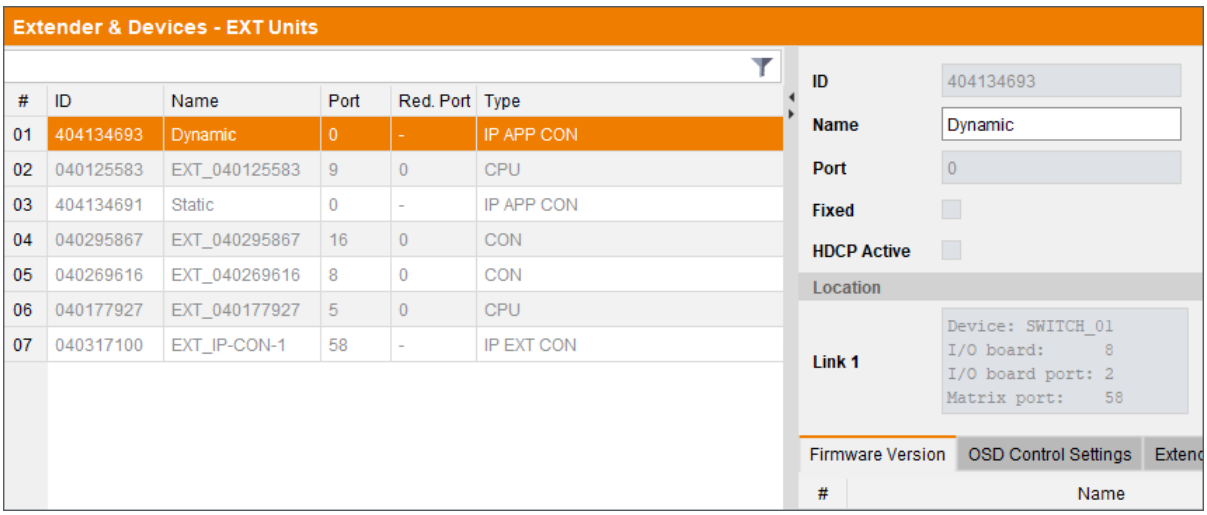


*Fig. 58 Tera Tool - **EXT Units list** with two IP App CON entries and changed name*

4. Select the EXT unit (type: IP APP CON) and type in another name (here: Dynamic) in the field **Name**.
5. Click **Apply**.

Configuring a CON Device

1. Click **System Settings > Extender & Devices > CON Devices**.
   The CON Device menu opens.

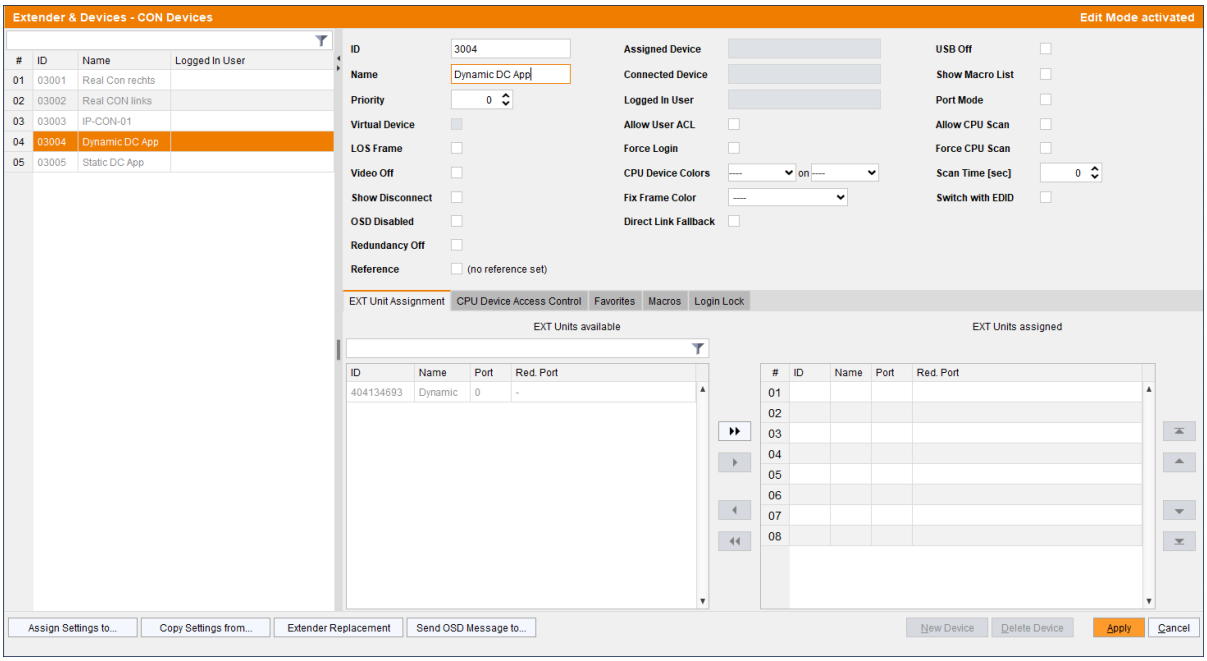


*Fig. 59 Tera Tool - **Menu CON Devices** with changed name*

Function **AutoConfig** is active:

2. Select the CON Device that has the EXT unit named “Dynamic” assigned to.

Function **Auto Config** is not active:

2.1. Click the button **New Device**.

2.2. In the selection menu that opens, select **Create a Real CON Device** and click on the button **Ok**.
A new Real CON Device is created.

2.3. Enter a suitable name for the CON Device. For all other parameters refer to the Tera Tool manual.

2.4. On the **EXT Unit Assignment** tab, select the EXT unit of the Draco App session in the **EXT Units available** list.

2.5. Click ▶ to move the highlighted EXT unit to the **EXT Units assigned** list.

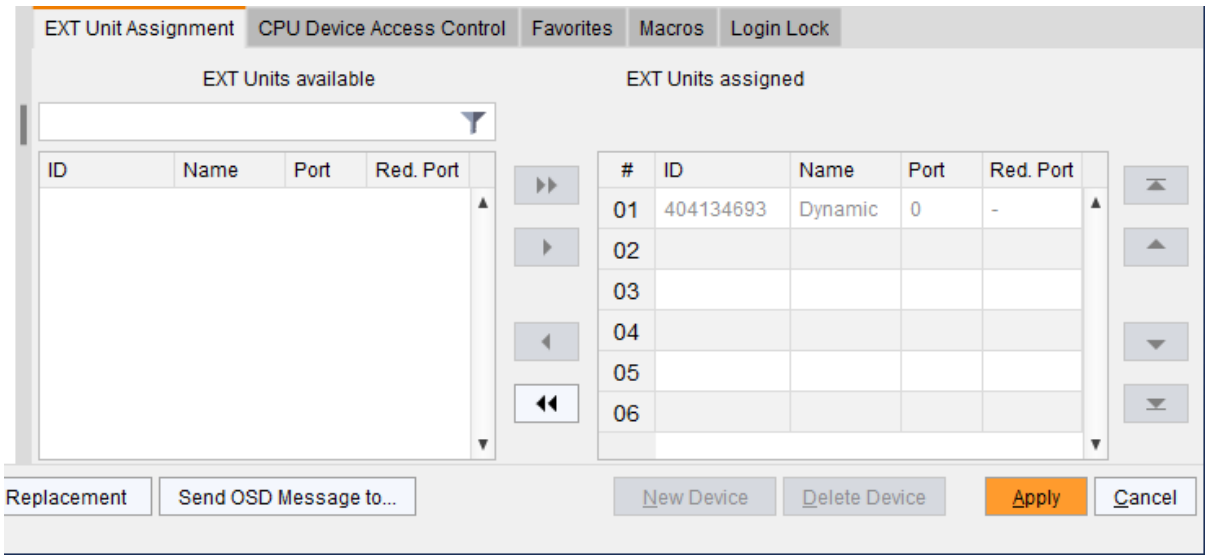


*Fig. 60 Tera Tool - **EXT Unit Assignment***

3. Click the tab **CPU Device Access Control**.

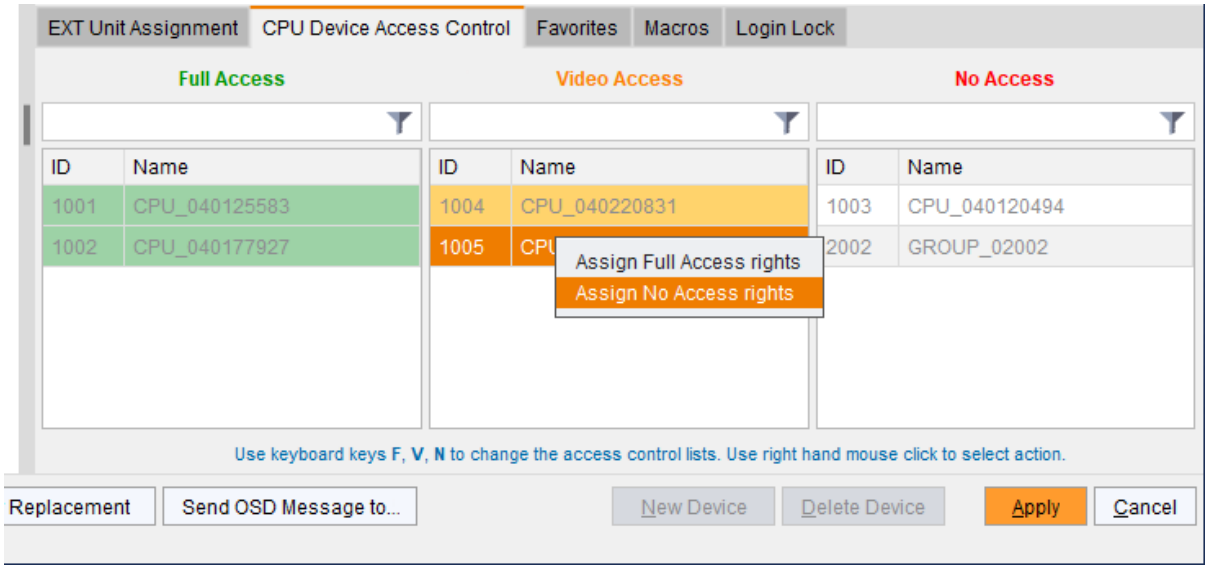


*Fig. 61 Tera Tool - **CPU Device Access Control***

4. By right-clicking once on a CPU Device in one of the respective lists (**Full Access**, **Video Access**, **No Access**), a context menu for selection appears for changing the access rights of the respective CPU Device. Alternatively, press f, v or n to set the respective access rights.
5. Click **Apply** to confirm all settings.

These are the minimum settings that need to be done to use the Draco CON app with this session to connect to a CPU Device/computer.

On the tab **Favorites**, CPU Devices/computers can be selected as favorites. The user can switch to favorites with a simple keyboard command.

On the tab **Macros**, macros can be created that the user can execute with a keyboard command.

A detailed description of these functions is contained in the Tera Tool manual.

9.4 Using the Draco CON App

The Draco CON App replaces an IP CON unit. Using it on your computer, you can access and work with another computer via matrix and a CPU unit. The computer with the Draco CON App must be in the same subnet as the matrix/matrices.

1. Start the Draco CON app on your computer.

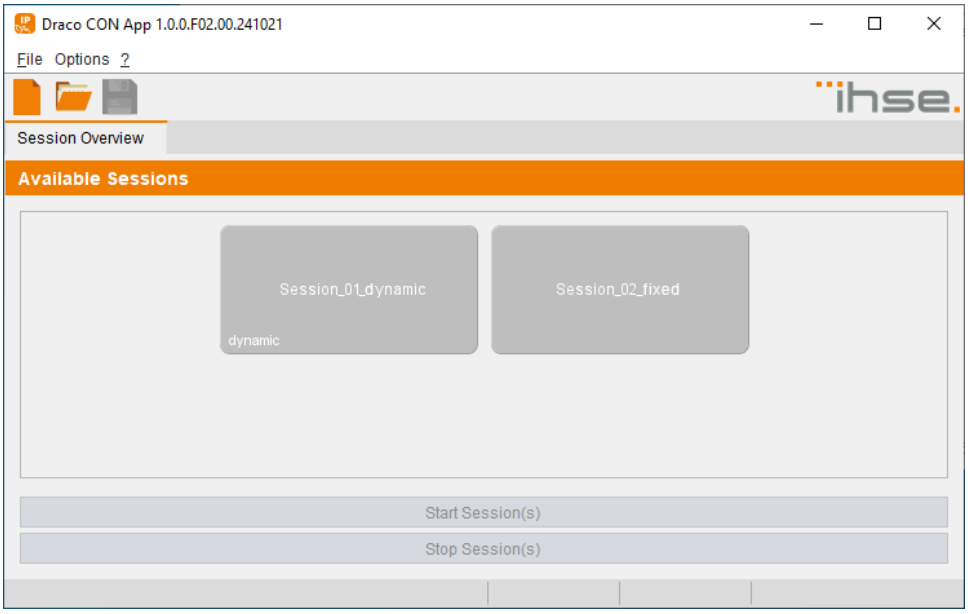


*Fig. 62 Draco CON App - **Session Overview with available sessions***

2. When you move the mouse pointer over a session button without clicking, an information box appears containing the general settings and application control possibilities.

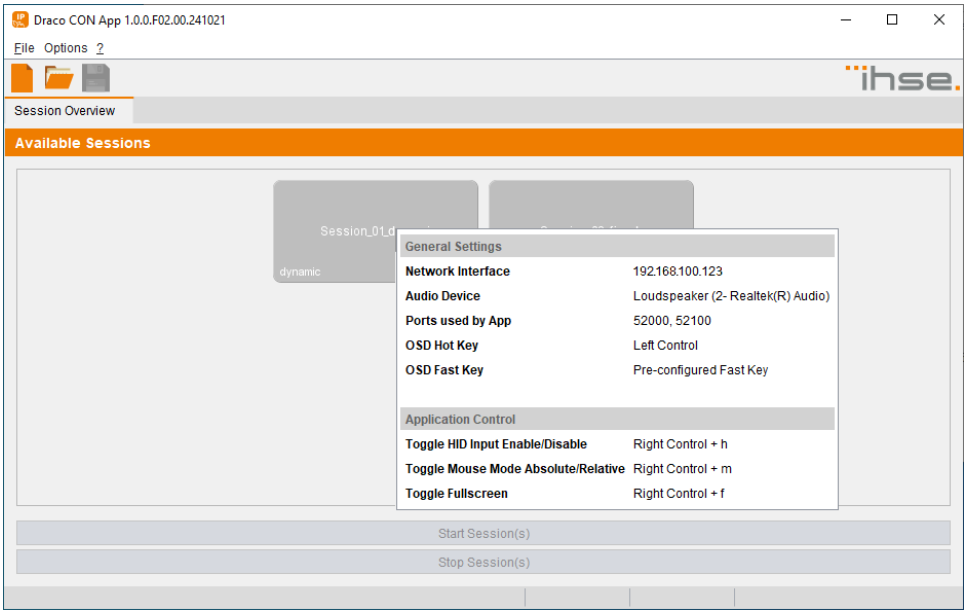


*Fig. 63 Draco CON App - **Information box of a session***

9.4.1 Description of Command Mode

After a connection is established (see following sections), use the command mode to switch to a CPU Device/ computer.

1. Enter the Hot Key (2xLeft Control according to the General Settings displayed in Fig. 63) to start the command mode.

NOTICE
While in command mode, ➡ the Caps Lock and Scroll Lock LEDs on the keyboard are flashing, ➡ the USB-HID devices are not operable, mouse and keyboard functions are deactivated, ➡ only selected keyboard commands are available.

If there is no keyboard command entered within 10 seconds after activating the command mode, it will be deactivated automatically.

After a short while, the Command Mode menu appears.

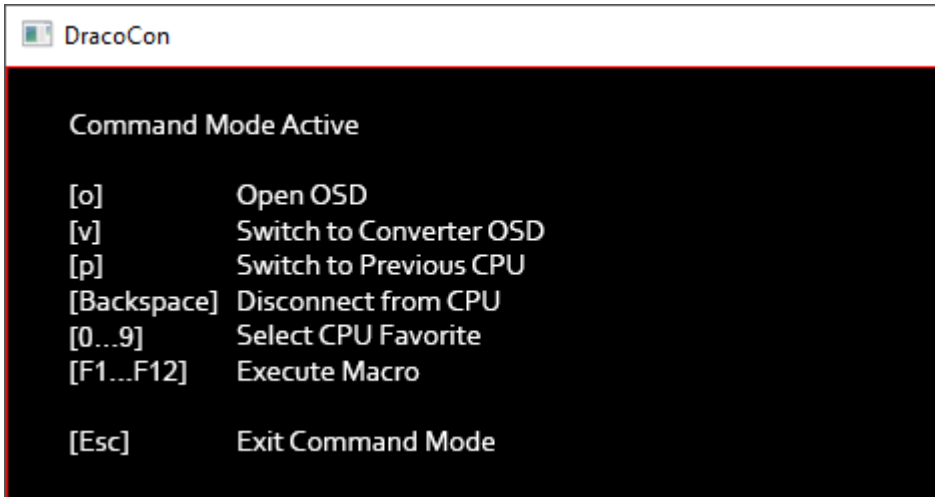


*Fig. 64 Draco CON App - **DracoCon window with Command Mode menu***

Command	Description
o	Opens the OSD. The small OSD with a selection list of accessible CPU Devices appears.
v	Only relevant for DVI-I extender units, opens the OSD of the converter.
p	Switches to the previous CPU Device.
Backspace	Cuts the connection to the currently connected CPU Device.
0…9	To select and switch to CPU Devices that were selected by the administrator of the matrix as favorites for the CON Device of this session.
F1…F12	To select and execute macros that were created by the administrator of the matrix for the CON Device of this session.
Esc	Exits Command Mode.

9.4.2 Connecting to Computers with Fixed Sessions

1. To start a session, click the desired one. It appears in orange. It is possible to start more than one session.
2. Click the button **Start Session(s)**.

   A window opens with information about initializing the session.

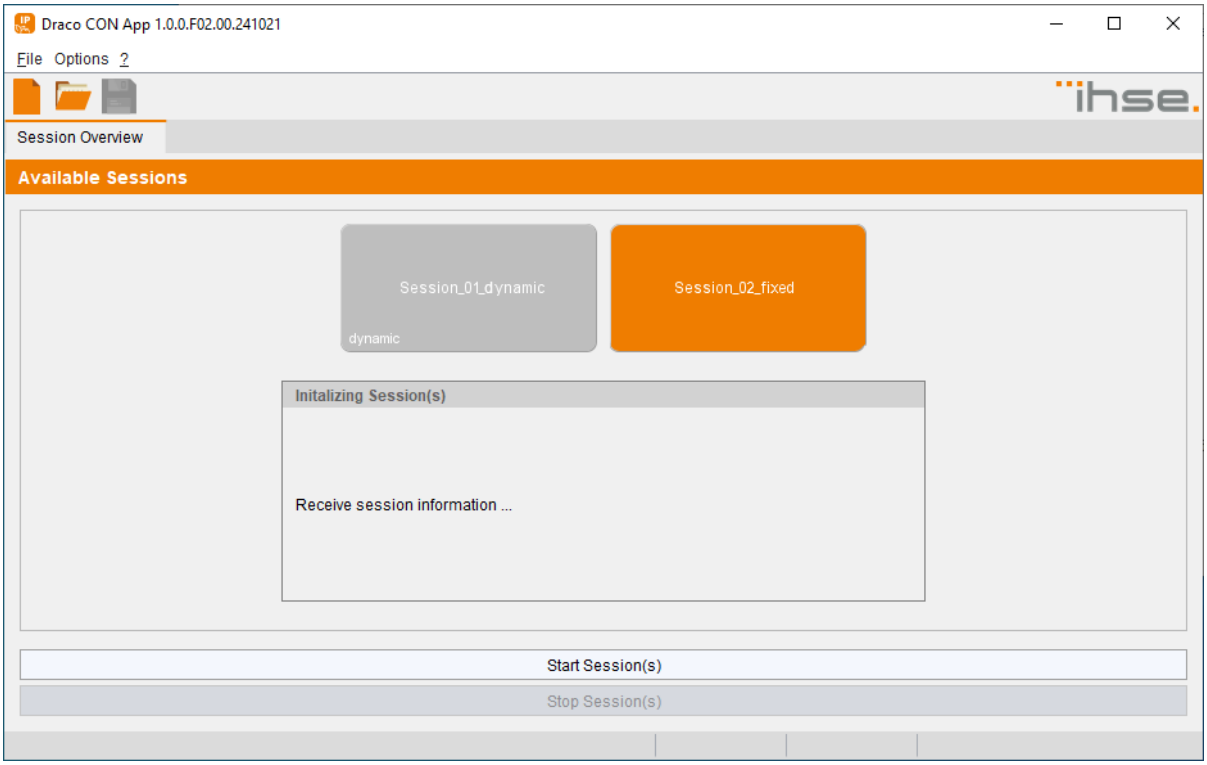


*Fig. 65 Draco CON App - **Initializing session***

After initializing is finished, the DracoCon window appears all in black.

3. Start the command mode with the Hot Key (default: 2xLeft Shift) and press o to open the OSD.
   The CPU selection menu appears in a translucent window.

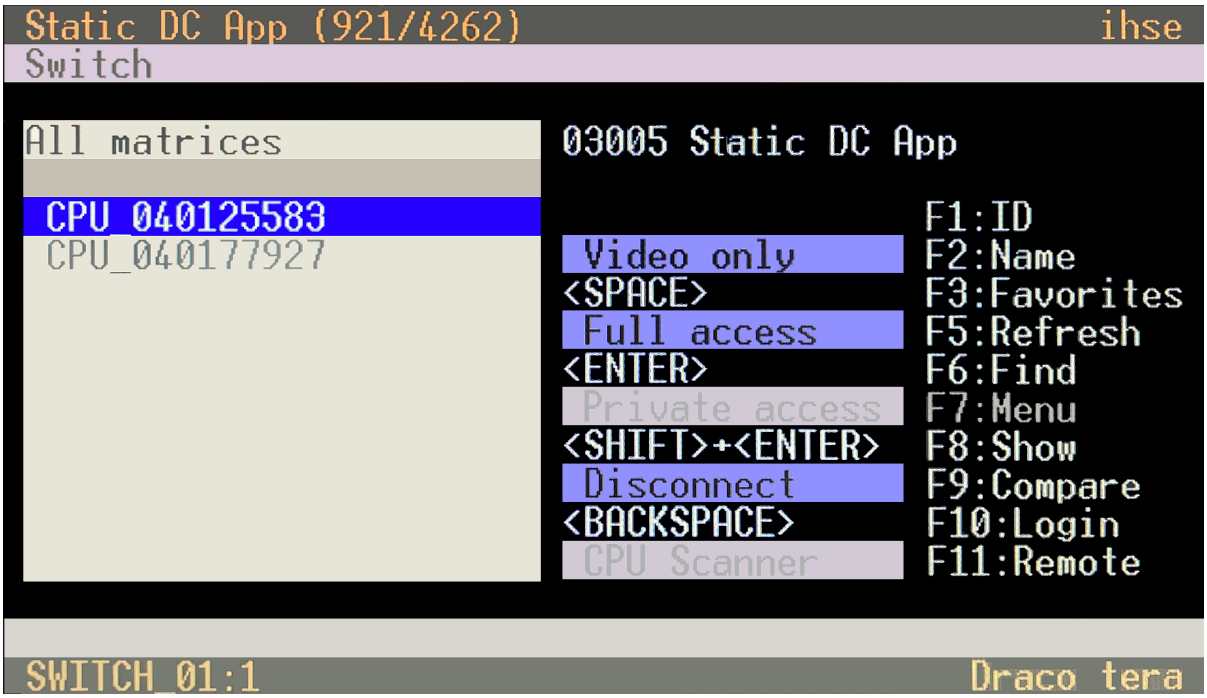


*Fig. 66 OSD - **Translucent OSD with CPU Device selection list***

4. Select a CPU Device from the list and press Enter for **Full access** (video signal and USB-HID control) or Space for **Video only**.

   The OSD window is closed, and the Draco CON window shows the video signal of the connected computer.

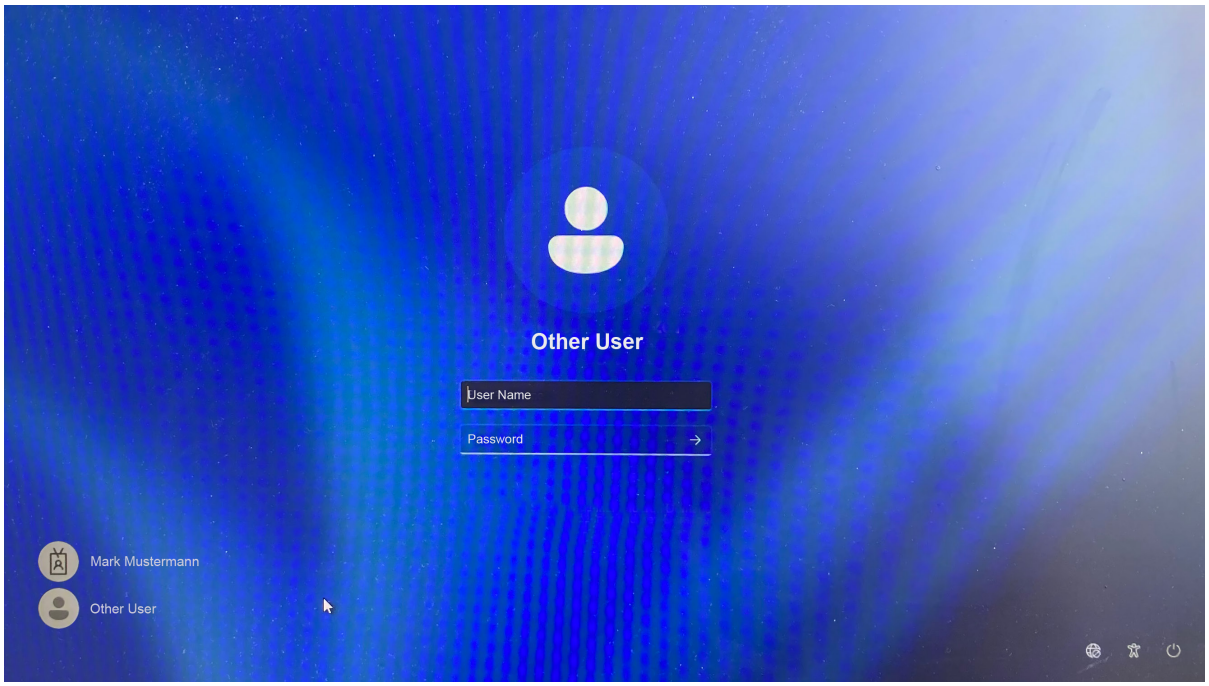


*Fig. 67 Draco CON App - **Video signal of connected computer***

9.4.3 Connecting to Computers with Dynamic Sessions

1. To start a session, click the desired one. It appears in orange. It is possible to start more than one session.
2. Click the button **Start Session(s)**.

The app searches for free dynamic channels. When such channels are found on more than one matrix/matrix grid configuration, a selection window appears.

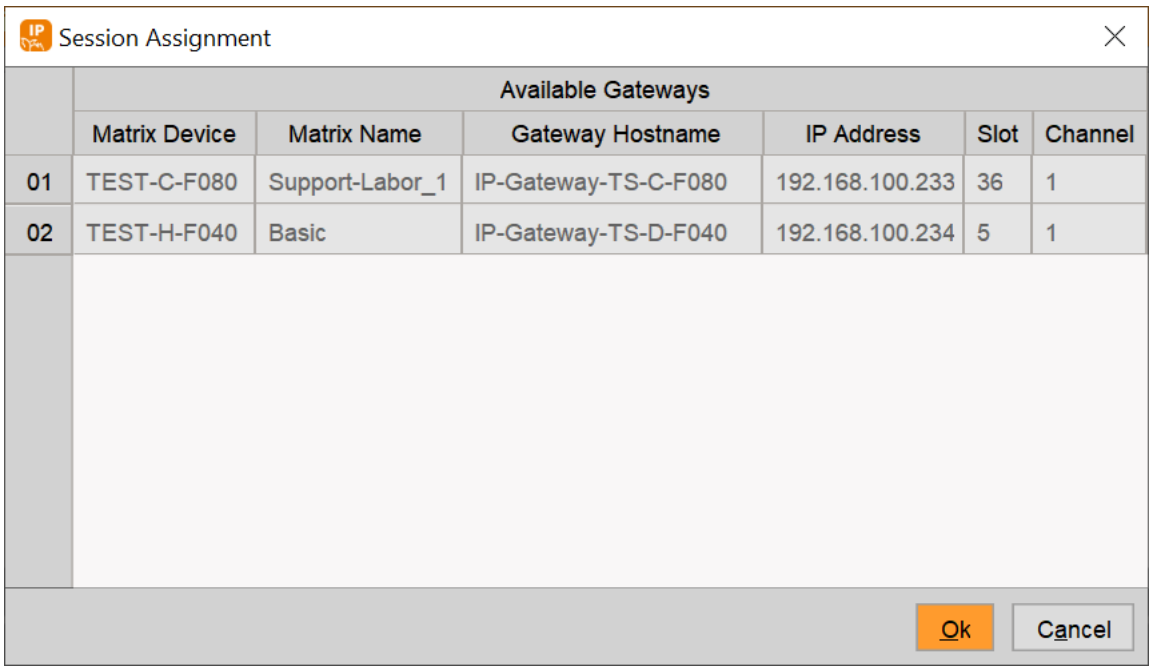


*Fig. 68 Draco CON App - **Matrix selection window***

3. Select the desired matrix and click **Ok**.
   The app now searches for free dynamic channels on this matrix/matrix grid and uses a random dynamic channel to establish a connection.

   After initializing is finished, the DracoCon window appears all in black.
4. Start the command mode with the Hot Key (default: 2xLeft Shift) and press o to open the OSD.
   The CPU selection menu appears in a translucent window.

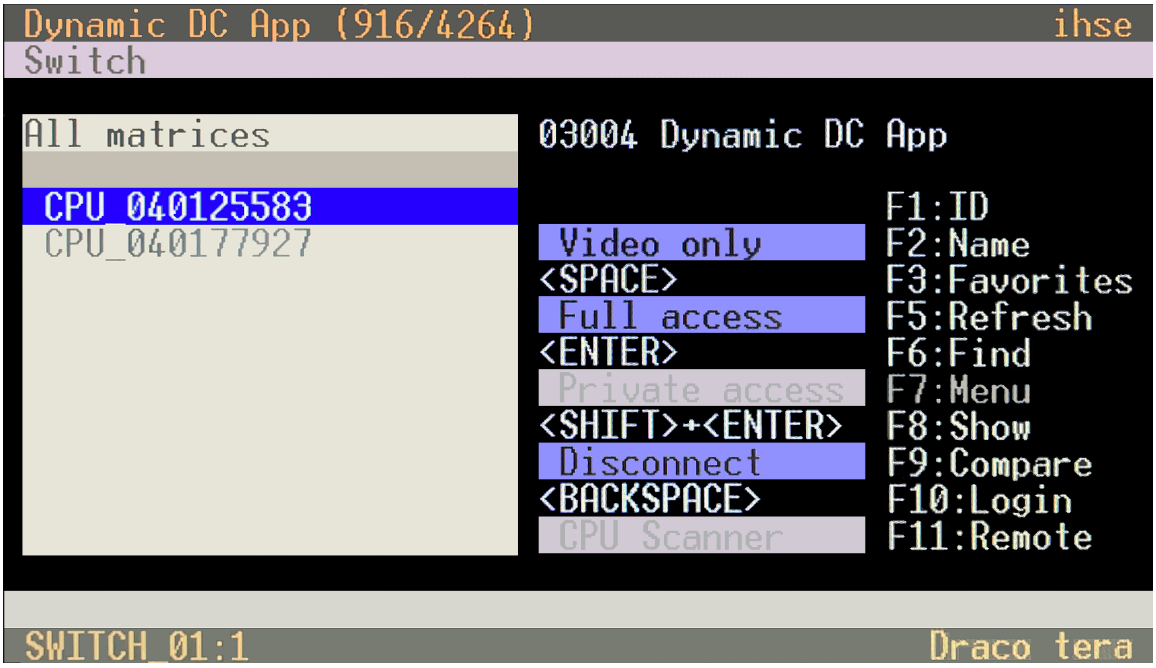


*Fig. 69 OSD - **Translucent OSD with CPU Device selection list***

5. Select a CPU Device from the list and press Enter for **Full access** (video signal and USB-HID control) or Space for **Video only**.

   The OSD window is closed, and the Draco CON window shows the video signal of the connected computer.

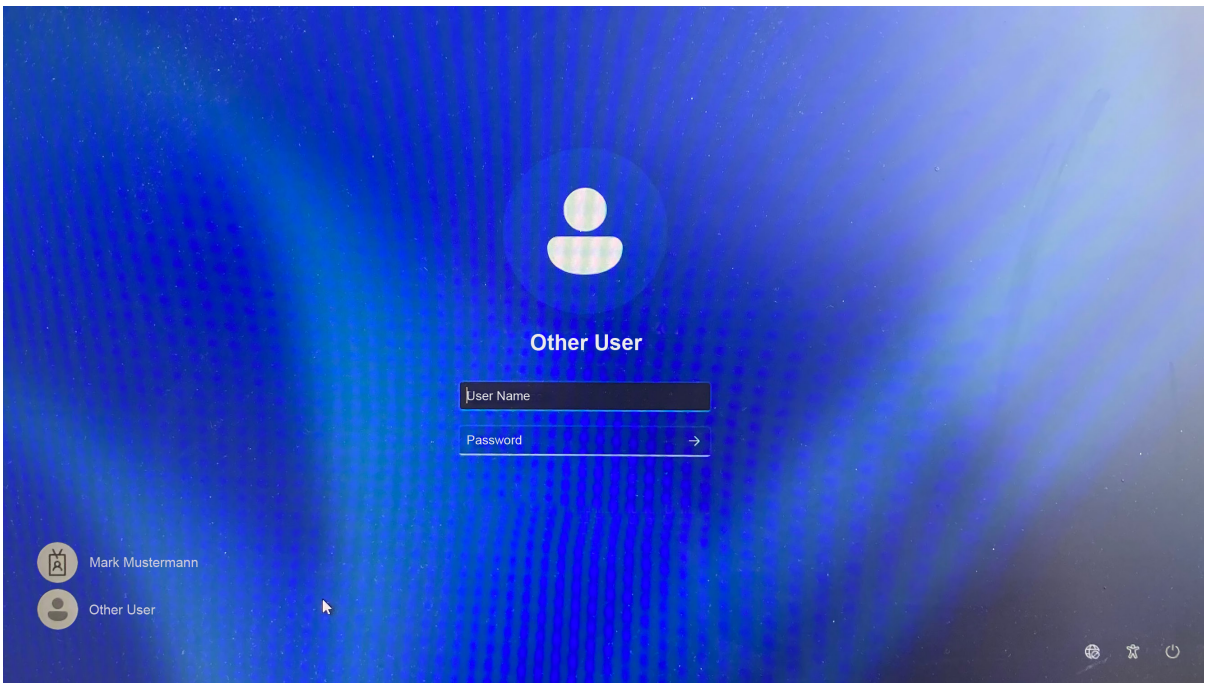


*Fig. 70 Draco CON App - **Video signal of connected computer***

10 Maintenance of IP Gateway Extender

10.1 Cleaning of IP Gateway CON Modules

NOTICE

Possible damage to the mechanical and electronic components

The modules 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 void.

➥ Remove dust deposits from the device with a dry, antistatic cloth or dehumidified air spray.

10.2 Replacing or Mounting additional Modules in Chassis

For information on the replacement or retrofitting of additional extender modules, please refer to 474-BODY manual. The safety instruction and conditions described in the chassis manual are to be observed to avoid personal injury and damage of components.

10.3 Updating the IP Gateway CON Firmware via Matrix

To update connected IP Gateway CONs via matrix, please refer to the Draco tera or Tera Tool user manuals. The only firmware that cannot be updated via the matrix is the type xxxMSD. This must be done via the Mini-USB service port.

10.4 Updating the IP Gateway CON Firmware via Mini-USB Interface

10.4.1 Updating the IP Gateway CON Firmware via Tera Tool Software

A parallel flash update of several IP Gateway CONs will be available with further firmware.

1. Run the Tera Tool Software und connect to the matrix.
2. Click **Flash Update** in the toolbar.

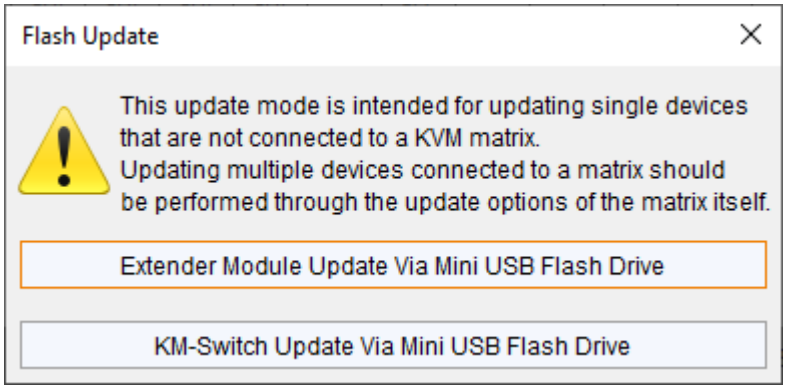


*Fig. 71 Tera Tool - **Flash Update***

3. Click **Extender Module Via Mini-USB Flash Drive**.

The update dialog appears.

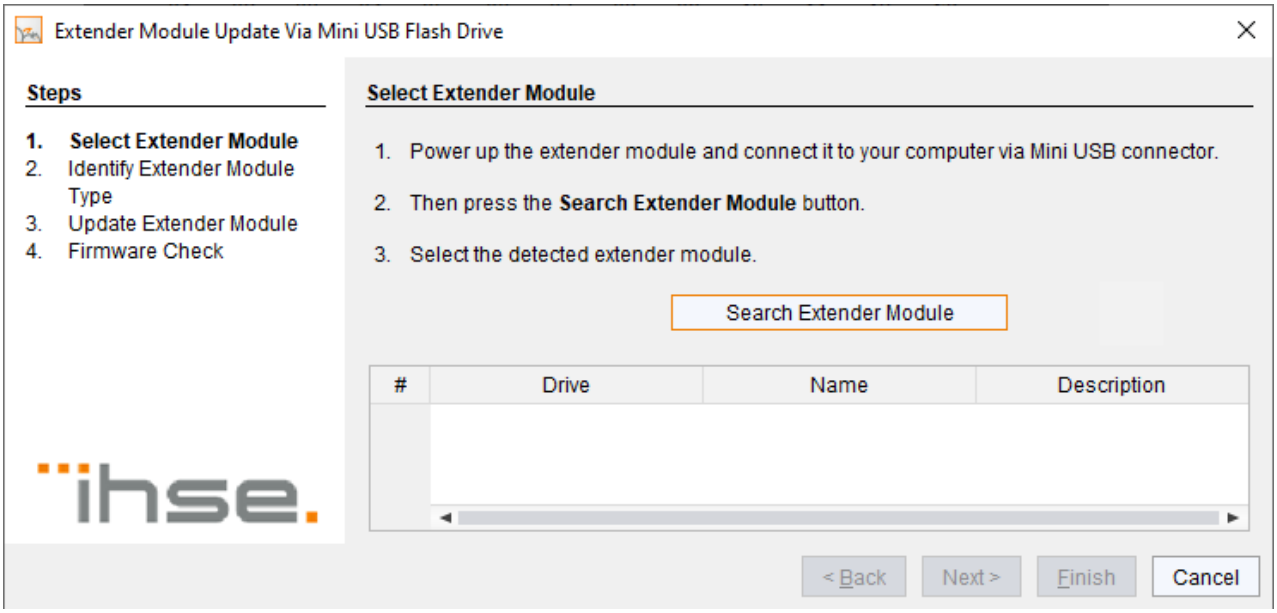


*Fig. 72 Tera Tool - **Flash Update - Search Extender Module***

4. Power down the extender module by disconnecting the power cord from the chassis.
5. Power up the extender module, wait 5 seconds, then connect the extender module to your computer running the Tera Tool software using a Mini-USB cable.
6. Click **Search Extender Module**.

   The flash drive of the connected extender module is displayed in the drive overview.

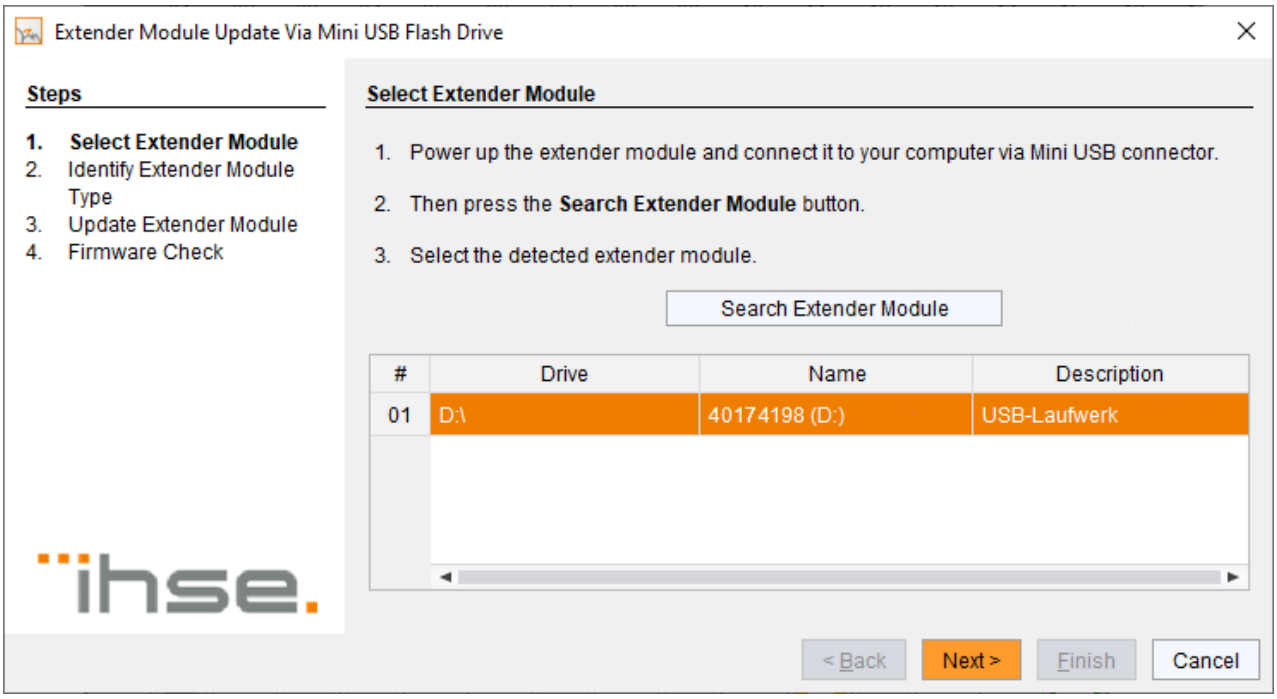


*Fig. 73 Tera Tool - **Flash Update - Select Extender Module***

7. Select the flash drive of the extender module to be updated.
8. Click **Next >**.

   The identification of the extender module type starts automatically.

   After successful identification, the extender module specific firmware is displayed in the **Status Log** area.

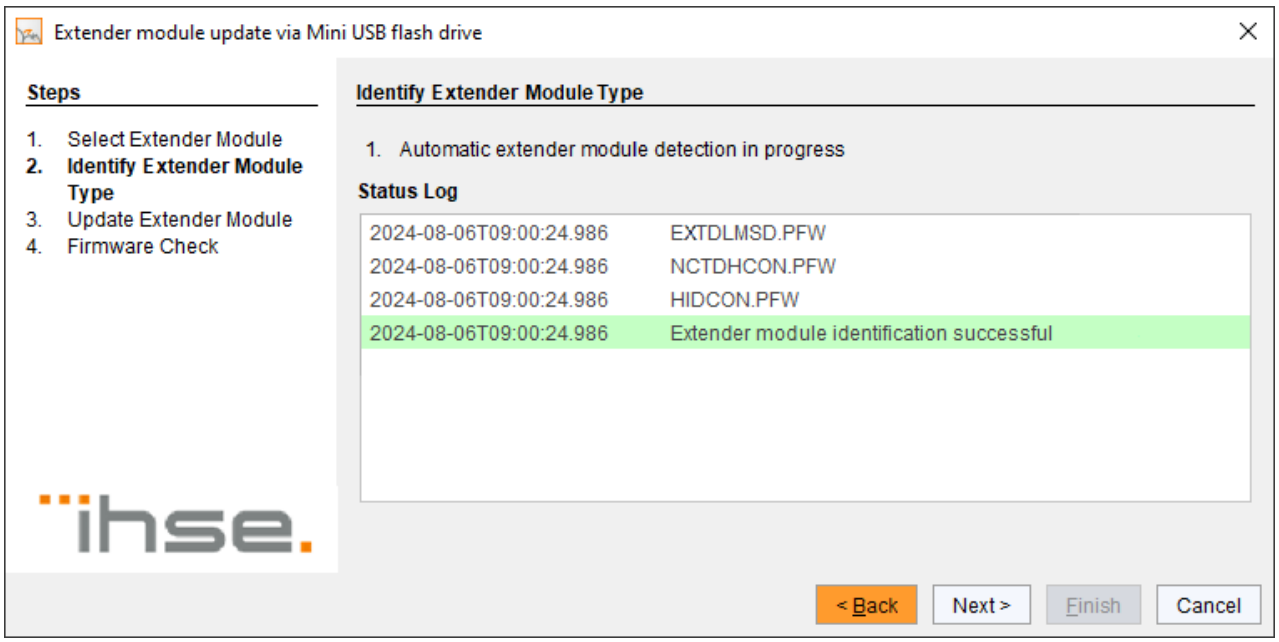


*Fig. 74 Tera Tool - **Flash Update - Identify Extender Module Type***

9. Click **Next >** after successful identification.

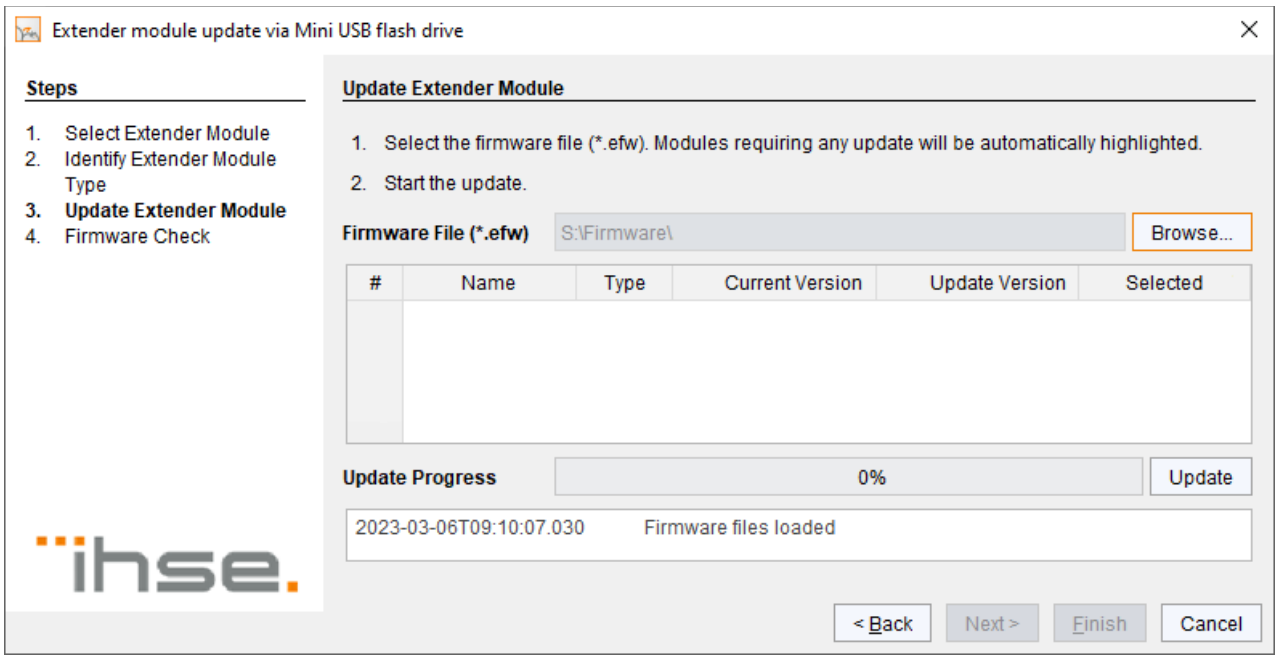


*Fig. 75 Tera Tool - **Flash Update - Update Extender Module - Select files***

10. Click **Browse…** to go to the location where the update files are saved.
11. Select the update files and click **Select** in the selection dialog.

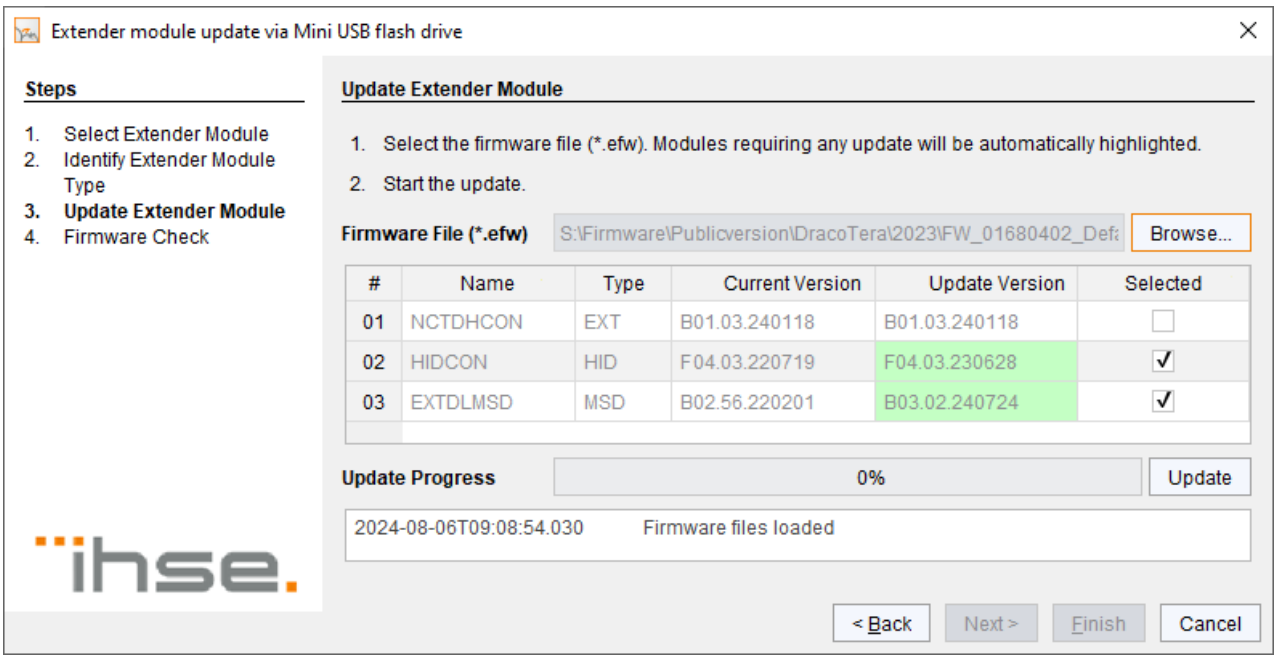


*Fig. 76 Tera Tool - **Flash Update - Update Extender Module - Firmware files found***

The firmware available for the extender module is displayed in the update dialog.

Firmware requiring any update will be highlighted automatically.

12. Click **Update** to start the update process.

    A green highlighted message appears when the firmware update has been completed.

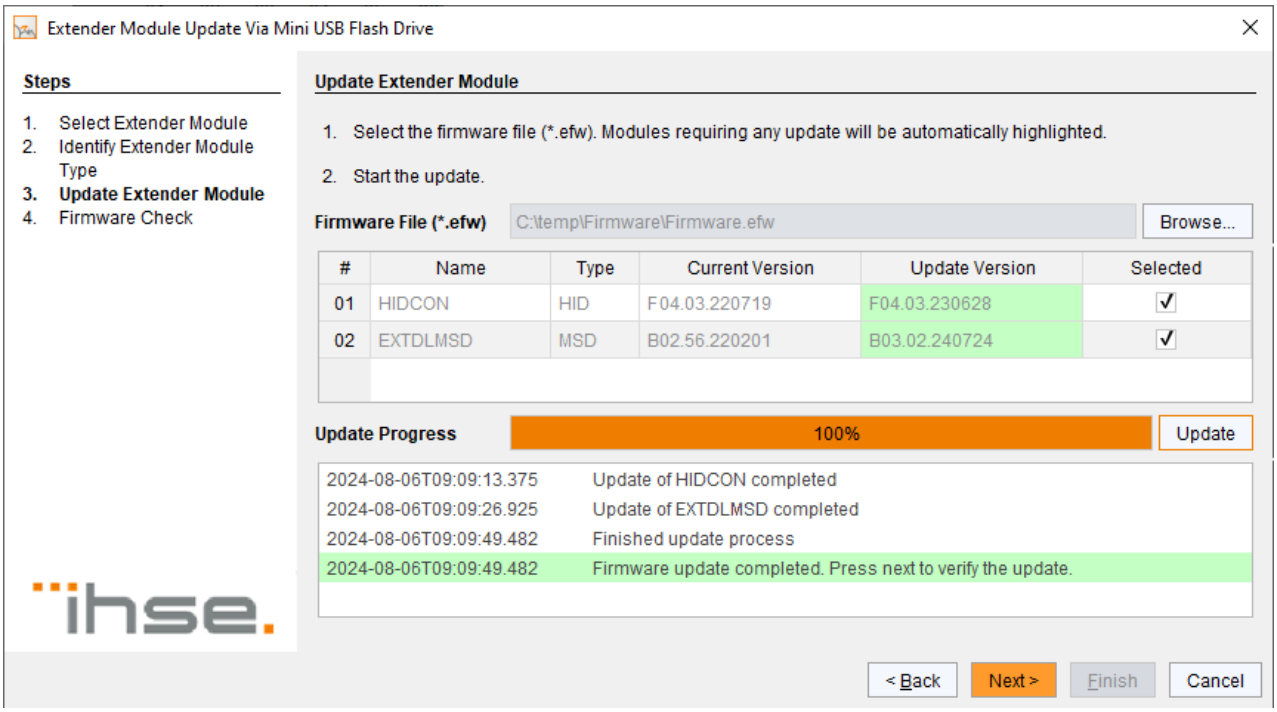


*Fig. 77 Tera Tool - **Flash Update - Update Extender Module - Firmware update completed***

13. Click **Next >** to verify the update.
14. Manually power off the extender module.
15. Power on the extender module.

    The extender module restarts, and validation begins automatically. The completion of the validation is displayed in the **Status Log** area.

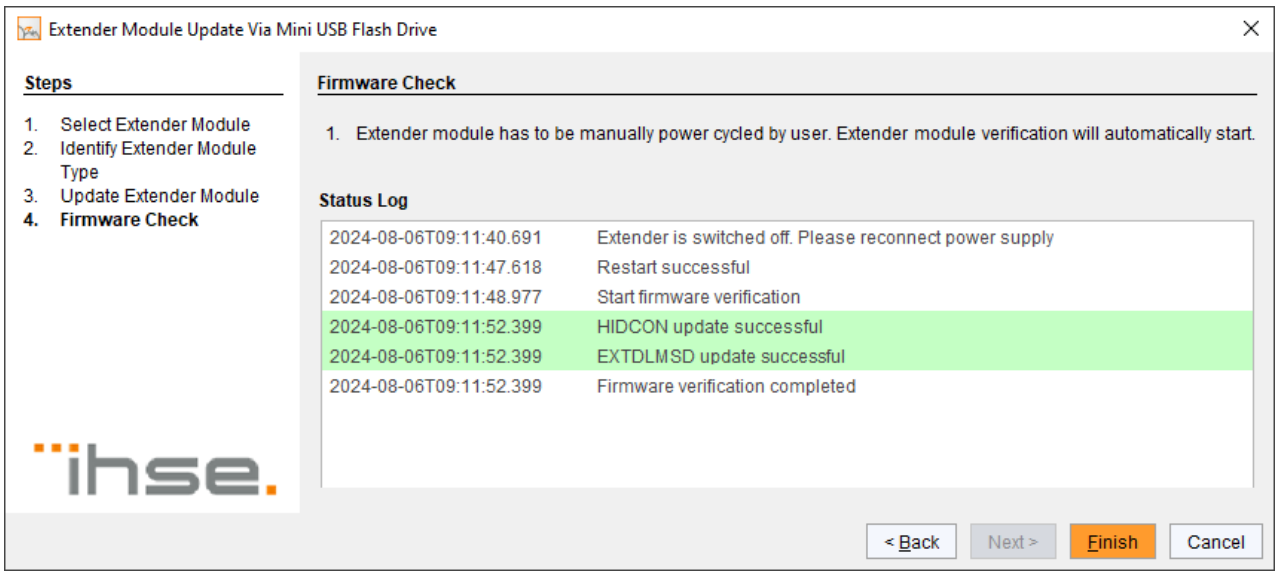


*Fig. 78 Tera Tool - **Flash Update - Firmware Check - Firmware verification completed***

16. Click **Finish**.

    The firmware update of the extender module is completed.

    A dialog appears offering to update another extender module.

17. Click **Yes** to update another extender module or click **No** and **Finish** to quit the Update dialog.

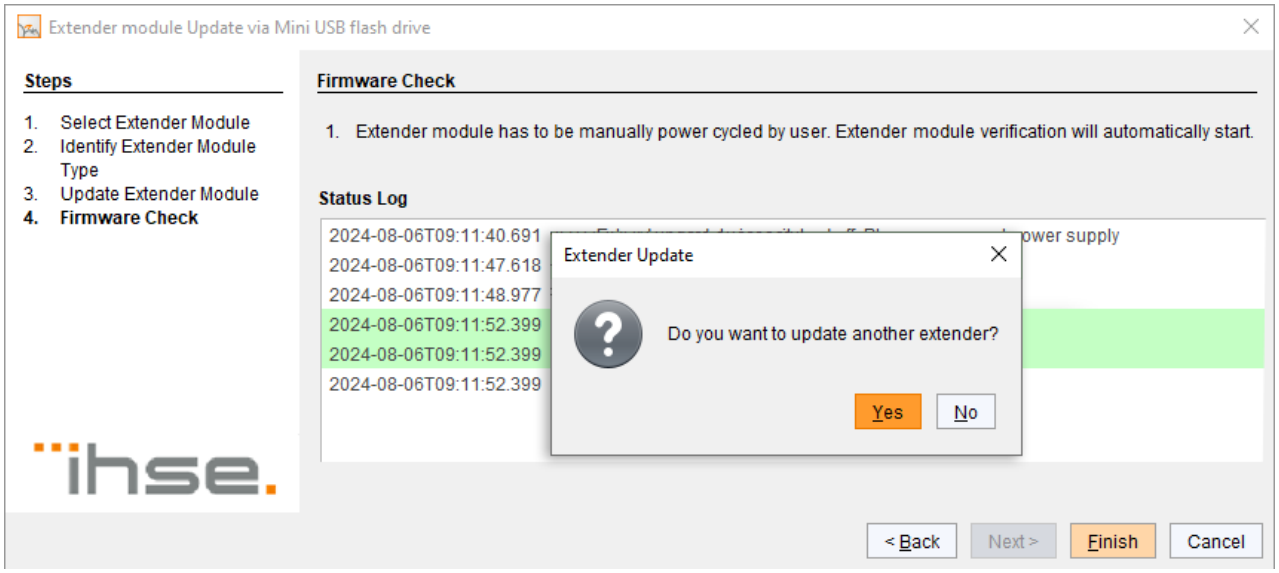


*Fig. 79 Tera Tool - **Flash Update - Firmware Check - Query about further update***

10.4.2 Updating the Firmware via Update File

The extender modules can be updated via copy & paste using the Mini-USB service port of the extender modules. The firmware type is part of the file name, e.g., for the MSD firmware `EXTDZMSD.pfw` with the file extension *.`pfw`

Updating the firmware manually via copy & paste is usually not necessary. We recommend using the efficient flash update via Tera Tool software and to manually copy & paste only if a single firmware file should be updated. In rare cases, e.g., for the xxxMSD firmware, an update may be necessary to expand the functionality of certain extender modules for specific requirements. In this case, please contact the technical support of the manufacturer in advance.

NOTICE

To process successful firmware updates and avoid failures:

- ➡ For firmware update of the extender module, use only stand-alone computers that are not integrated into the extender module setup.
- ➡ Ensure that the computer used for the firmware update is not set into standby mode or sleep mode during the update.
- ➡ Always update the firmware with firmware of the same name.

If required, the update files can be requested from the manufacturer's technical support.

Preparation

We recommend using a central location for firmware files, e.g., by using the Tera Tool software's option menu under **Extras > Options > Default Settings > Firmware Directory**.

NOTICE

Possible failures when updating the extender firmware

In case the xxxMSD firmware part of an extender module requires an update, there may be dependencies between the new contents of xxxMSD firmware files and other extender firmware files. In this case, installing other firmware files before updating xxxMSD firmware files could lead to failed updates.

To perform successful firmware updates:

- ➡ Please check the release notes of the firmware package for dependencies between the extender firmware files.
- ➡ If you got information from the manufacturer's technical support that an update of xxxMSD firmware files of a certain extender module is required, please follow the instructions in this section.

By updating an xxxMSD firmware via copy & paste, the `Config.txt` file will be overwritten. If there are parameters set in the `Config.txt` file, they are lost and have to be set again. To avoid resetting the parameters:

- ➡ Store the `Config.txt` file locally before updating an xxxMSD firmware.
- ➡ Copy the stored `Config.txt` file after updating MSD firmware back to the flash drive of the extender module.

To achieve a successful firmware update, proceed as follows.

- ➡ Always update the firmware with firmware of the same name.
- ➡ Update all firmware files sequentially.
- ➡ First update the required xxxMSD firmware part.
- ➡ Update all other firmware files one by one, file by file.
- ➡ Wait between each copy process until the respective copy process has been completed.
- ➡ Restart the extender module after all copying operations of the other firmware files are completed.

However, if you are manually updating a single firmware part via Mini-USB service port on an extender module, we recommend updating all firmware on this extender module.

Preserving the Parameters of the Config.txt File

To store the `Config.txt` file before updating MSD firmware, if parameters have been set, proceed as follows:

1. Connect the extender module to any source using a Mini-USB cable.
   The extender module opens a flash drive containing the `Config.txt` file.
2. Copy the `Config.txt` file from the flash drive and paste it to a local directory of the connected computer.

Performing Firmware Updates via Copy & Paste

1. Connect the extender module to your computer via Mini-USB cable.
   The flash drive of the extender module opens.
2. Go to the location of the firmware update files.
3. If you got instructions from the manufacturer's technical support to update xxxMSD firmware part:
   3.1. Copy the first `xxxMSD.pfw` firmware file and paste it to the flash drive of the extender module.
   3.2. Wait until the copying process is complete.
   3.3. The extender module will be restarted after the copy process of the `xxxMSD.pfw` firmware file is completed.
   3.4. If several xxxMSD firmware parts have to be updated, copy, and paste them individually. In each case, wait until the copying process has been completed and the extender module has been restarted.
4. Afterwards update the other firmware files changed if required, regarding the following steps:
   4.1. Copy additional firmware files one by one and paste it to the extender module flash drive.
   4.2. After copying each firmware file, wait until the copying process is complete.
5. Optionally: copy the stored `Config.txt` file from the local directory and paste it to the flash drive of the extender module.
6. Manually power off the extender module after copying all required firmware files.
7. Remove the Mini-USB cable from the extender module.
8. Power on the extender module.
   The extender module starts automatically with the new firmware.

10.5 Resetting an Extender Module to the Factory Settings

NOTICE
If a firmware update has been carried out since the delivery, the latest installed firmware version is retained.

To reset extender modules back to default, there is the following possibility:

1. Connect the extender module to any source using a Mini-USB cable.
   The extender module opens a flash drive containing the `Config.txt` file.
2. Delete the `Config.txt` file.
3. Manually power off the extender module.
4. Power on the extender module.
   The extender module restarts and the extender module's parameters, such as serial number, the manufacturing p/n, and the video signal details, are written in the `Config.txt` file.

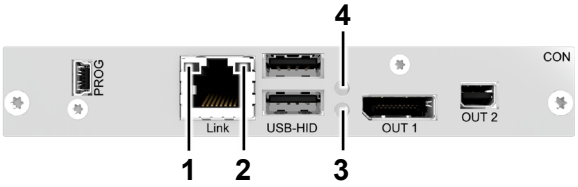
11 Troubleshooting

11.1 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.

11.2 Blank Screen

Sink side (483 CON module)



Sink side (481 CON module)

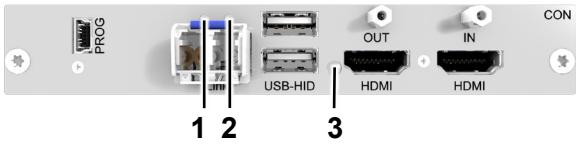


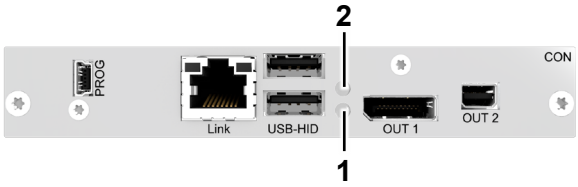
Fig. 80 Interface side extender failure indication - Failure indication

See also status indication of the extender modules in section 3.8, from page 21.

Diagnosis	Possible reason	Measure
All LEDs are off.	Power supply voltage is not available.	➡ Check the power supply units. ➡ Check the connection to the power network.
LED **1** or **2** are flashing.	No link connection between CON Unit and CPU Unit available.	➡ Check the interconnection cables. ➡ Check the connectors.
483: LED **3 and 4** are flashing red/violet. 481: LED **3** lights up red.	No link connection between CON Unit and CPU Unit available.	➡ Check the interconnection cables. ➡ Check the connectors.
	CON Unit not switched to the CPU Unit.	➡ Switch the CON Unit to the CPU Unit.
	No video signal detected.	➡ Check the video cable to the source. ➡ Check the connectors. ➡ Download the EDID from the console monitor (see section 7.1, page 53). Reboot the source if necessary.
483: LED **3** flashes green/light blue and LED **4** flashes red/violet. 481: LED **3** lights up red.	CON Unit is not switched to the CPU Unit.	➡ Switch the CON Unit to the CPU Unit.
483: LED **3 and 4** light up violet. 481: LED **3** lights up violet.	No video signal detected.	➡ Check the video cable to the source. ➡ Check the connectors. ➡ Download the EDID from the console monitor (see section 7.1, page 53). Reboot the source if necessary.

11.3 USB-HID

Sink side (483 CON module)



Sink side (481 CON module)

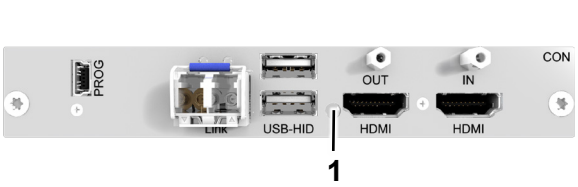


Fig. 81 Interface side extender module USB-HID - Failure indication

In the following, diagnoses, causes and measures are described for the case that a video signal is present.

See also status indication of the extender modules in section 3.8, from page 21.

Diagnosis	Possible reason	Measure
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.
USB device without function.	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.
483: LED **1** is flashing green/light blue and LED **2** is flashing red/violet or vice versa or both are flashing green/light blue. 481: LED **1** lights up green.	The keyboard is in command mode.	➡ Press Esc to leave the command mode. ➡ Or press Left Shift + Esc to leave the command mode.
	CON-Unit in V**ideo only** mode.	➡ Start OSD. ➡ Change Access Mode from **Video only** to **Full Access**.

11.4 IP Gateway Connection Failure

Diagnosis	Possible reason	Measure
No connection with IP Gateway CON or Draco CON App	The channel type is set to Grid.	➡ Set the channel type to EXT Unit or Dynamic EXT Unit.
	The destination data is wrong.	➡ Check the destination IP address of the devices used.
		➡ Check the destination port of the devices used.
	The IP Gateway assignment is only set in one of two devices.	➡ Set the IP Gateway assignment in both devices.
No grid connection	The channel type is set to EXT Unit or Dynamic EXT Unit.	➡ Set the channel type to Grid.
	The destination data is wrong.	➡ Check the IP address of the IP Gateway boards in both matrices.
		➡ Check the port of the IP Gateway boards in both matrices.
	The IP Gateway connection is only set in one of the two matrices.	➡ Set IP Gateway connection data in both matrices.

12 Technical Data

12.1 Interfaces

12.1.1 DisplayPort 1.1

Video

The video interface supports the DisplayPort 1.1 standard. Depending on the control of the monitor (blanking type), different transmission rates result for single head operation or dual head operation.

Operating mode	Resolution with frame rate	Effective data rate	Color depth/color component	Trans-mission rate
Single head operation (primary channel)	1920 x 1080 @ 120 Hz (reduced blanking)	5.97 Gbit/s	8 bit (4:4:4)	HBR (High Bit Rate)
	1920 x 1200 @ 60 Hz (normal blanking)	3.32 Gbit/s		
	1920 x 1200 @ 120 Hz (reduced blanking)	6.64 Gbit/s		
	2560 x 1440 @ 60 Hz (normal blanking)	5.31 Gbit/s		
	3840 x 2160 @ 30 Hz - UHD (reduced blanking)	5.97 Gbit/s		
	4096 x 2160 @ 30 Hz - 4K DCI (reduced blanking)	6.37 Gbit/s		
Single head or dual head operation (primary channel)	1920 x 1080 @ 60 Hz (reduced blanking)	2.96 Gbit/s	8 bit (4:4:4)	RBR (Reduced Bit Rate)
	1920 x 1200 @ 60 Hz (reduced blanking)	3.32 Gbit/s		

NOTICE

Dual head operation depending on the transmission rate

Dual head operation is only possible with the transmission rate RBR. If the primary channel (DisplayPort) is controlled in dual head operation with the transmission rate HBR, no picture is displayed on the secondary channel (Mini DisplayPort).

Audio

Various audio formats can be transmitted through the interface.

Parameter	Value
Standards	Stereo Linear Pulse Code Modulation (LPCM), DTS, DTS-HD (5.1), Dolby Digital, Dolby Digital Plus (5.1)
Bit depth	16 to 24 bit
Sample rate	32 to 192 kHz

12.1.2 Mini DisplayPort 1.1

Video

The video interface supports the DisplayPort 1.1 standard. Depending on the control of the monitor (blanking type), different transmission rates for single head operation or dual head operation are available.

Operating mode	Resolution with frame rate	Effective data rate	Color depth/color component	Trans-mission rate
Single head operation (secondary channel)	1920 x 1080 @ 60 Hz (reduced blanking)	2.96 Gbit/s	8 bit (4:4:4)	RBR (Reduced Bit Rate)
	1920 x 1200 @ 60 Hz (reduced blanking)	3.32 Gbit/s		
Dual head operation (secondary channel)	1920 x 1080 @ 60 Hz (reduced blanking)	2.96 Gbit/s	8 bit (4:4:4)	RBR
	1920 x 1200 @ 60 Hz (reduced blanking)	3.32 Gbit/s		

NOTICE

Dual head operation depending on the transmission rate

Dual head operation is only possible with the transmission rate RBR. If the primary channel (DisplayPort) is controlled in dual head operation with the transmission rate HBR, no picture is displayed on the secondary channel (Mini DisplayPort).

Audio

The Mini DisplayPort does not support audio transmission.

12.1.3 HDMI

The audio / video interface can transmit monitor resolutions such as 3840x2160@30Hz, Full HD (1920x1080p) or 2K HD (up to 2560x1600@60Hz). Data rate is limited to 8.16 Gbit/s and 8 bit.

Audio

Various audio formats can be transmitted through the interface.

Standards	Stereo Linear Pulse Code Modulation (LPCM), DTS, DTS-HD (5.1), Dolby Digital, Dolby Digital Plus (5.1), TrueHD
Bit Depth	16 to 24 bit
Sample Rate	32 to 192 kHz

12.1.4 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.

12.1.5 Mini-USB

The Mini-USB interface enables a customer specified communication with extender modules. The firmware can also be updated using this interface.

12.1.6 RJ45

Cat X devices offer a 1000BASE-T interface to establish a 1G interconnection via IP. All four wire pairs are used in both directions. The cabling is suitable for a full duplex operation.

12.1.7 Fiber SFP Type LC

The communication of fiber devices is performed via Gigabit SFPs that are connected to suitable fibers fitted with connectors type LC (see section 12.2.2, page 85).

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

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

12.2 Interconnection Cables

12.2.1 Cat X

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 Interconnection Cable

The extender modules require interconnection 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)

12.2.2 Fiber

Type of Interconnection 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

12.3 Video Cables

NOTICE

For 4K transmission via DisplayPort, the maximum length of the DisplayPort cable between CON module and monitor is 2 m according to the specification. We also recommend a maximum length of 2 m for other resolutions for which error-free transmission has been verified in our company.

If you use longer cables, interference may occur.

➡ Use only video cables with a maximum length of 2 m.

12.4 Connector Pinouts

Downstream/Upstream

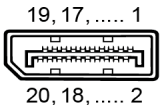
The pins of the DisplayPort sockets are assigned differently.

Downstream: data is received (e.g., sink, monitor, video input of a device)

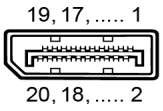
Upstream: data is sent (e.g., source, graphics card, video output of a device)

12.4.1 DisplayPort

Upstream

Connector	Pin	Signal	Pin	Signal
	1	ML_Lane 0 (p)	11	GND
	2	GND	12	ML_Lane 3 (n)
	3	ML_Lane 0 (n)	13	CONFIG1
	4	ML_Lane 1 (p)	14	CONFIG 2
	5	GND	15	AUX CH (p)
	6	ML_Lane 1 (n)	16	GND
	7	ML_Lane 2 (p)	17	AUX CH (n)
	8	GND	18	Hot Plug Detect
	9	ML_Lane 2 (n)	19	Power Out Return
	10	ML_Lane 3 (p)	20	Power Out: +3.3 V/0.5 A

Downstream

Connector	Pin	Signal	Pin	Signal
	1	ML_Lane 3 (n)	11	GND
	2	GND	12	ML-LANE 0 (p)
	3	ML_Lane 3 (p)	13	Config1/GND
	4	ML_Lane 2 (n)	14	Config2/GND
	5	GND	15	AUX CH (p)
	6	ML_Lane 2 (p)	16	GND
	7	ML_Lane 1 (n)	17	AUX CH (n)
	8	GND	18	Hot Plug Detect
	9	ML_Lane 1 (p)	19	Power Out Return
	10	ML_Lane 0 (n)	20	Not connected

12.4.2 Mini-DisplayPort

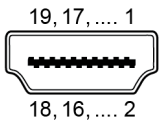
Upstream

Connector	Pin	Signal	Pin	Signal
	1	GND	11	ML_Lane 1 (n)
	2	Hot Plug Detect	12	ML_Lane 3 (n)
	3	ML_Lane 0 (p)	13	GND
	4	CONFIG1	14	GND
	5	ML_Lane 0 (n)	15	ML_Lane 2 (p)
	6	CONFIG2	16	AUX_CH (p)
	7	GND	17	ML_Lane 2 (n)
	8	GND	18	AUX_CH (n)
	9	ML_Lane 1 (p)	19	Power Out Return
	10	ML_Lane 3 (p)	20	Not connected

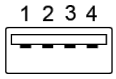
Downstream

Connector	Pin	Signal	Pin	Signal
	1	GND	11	ML_Lane 1 (n)
	2	Hot Plug Detect	12	ML_Lane 0 (p)
	3	ML_Lane 3 (n)	13	GND
	4	CONFIG1	14	GND
	5	ML_Lane 3 (p)	15	ML_Lane 2 (p)
	6	CONFIG2	16	AUX_CH (p)
	7	GND	17	ML_Lane 2 (n)
	8	GND	18	AUX_CH (n)
	9	ML_Lane 1 (p)	19	Power Out Return
	10	ML_Lane 0 (n)	20	Power out (+3.3 V/0.5 A)

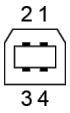
12.4.3 HDMI 1.4

Connector	Pin	Signal	Pin	Signal
	1	TMDS data 2 +	11	TMDS clock GND
	2	TMDS data 2 GND	12	TMDS clock -
	3	TMDS data 2 -	13	CEC
	4	TMDS data 1+	14	HEC data+
	5	TMDS data 1 GND	15	DDC Input (SCL)
	6	TMDS 1 -	16	DDC Ouput (SDA)
	7	TMDS 0 +	17	DDC / CEC / HEC GND
	8	TMDS 0 GND	18	+5 V (DC) high impedance
	9	TMDS 0 -	19	Hot Plug recognition
	10	TMDS clock +		

12.4.4 USB, Type A

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

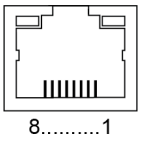
12.4.5 USB, Type B

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

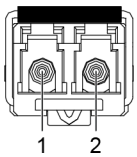
12.4.6 Mini-USB, Type B

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

12.4.7 RJ45 (Interconnection)

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

12.4.8 Fiber SFP Type LC (Interconnection)

Connector	Diode	Signal
	1	Data OUT
	2	Data IN

12.5 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)

12.6 Current Draw and Power Consumption

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).

Product type	Max. current draw	Max. power consumption
IP-R481-BUHCL	1,250 mA	6.3 W
IP-R481-BUHSL	1,250 mA	6.3 W
IP-R483-B2HC	1,170 mA	5.9 W
IP-R483-B2HS	1,170 mA	5.9 W

12.7 Dimensions

Product type	Dimensions (WxHxD)
IP Gateway CON extender module (board) in 474-BODY2	145 x 44 x 147 mm (5.7” x 1.7” x 5.8”)
IP Gateway CON extender module (board) in 474-BODY2N	221 x 44 x 147 mm (8.7” x 1.7” x 5.8”)
K480-xxxxxx	442 x 44 x 449 mm (17.4” x 3.5” x 17.7”)
480-IPG	205 x 20 x 170 mm (8.1” x 0.8” x 6.7”)

12.8 Weight

Product type	Max. weight
IP-R481-BUHCL	120 g
IP-R481-BUHSL	120 g
IP-R483-B2HC	120 g
IP-R483-B2HS	120 g
474-BODY2	0.8 kg (1.7 lb) fully equipped
474-BODY2N	1.4 kg (3.1 lb) fully equipped
K480-xxxxxx	7.7 kg (17 lb)
480-IPG	220 g

12.9 MTBF

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

13 Technical Support

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

13.1 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
- Date and number of sales receipt and 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, interconnection cable) including manufacturer and model number
- Results from any testing you have done

13.2 Shipping Checklist

1. To return your device, you need an RMA number (Return-Material-Authorization). Therefore, please contact your dealer.
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.

14 Glossary

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

Term	Description
Cat X	Any Cat 5e (Cat 6, Cat 7) cable.
CON Device	Logical object that can summarize 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.
DisplayPort	A VESA standardized interface for 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 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).
ESD	Electrostatic discharge (ESD) describes a sudden flow of electricity between two electrically charged objects. This can be caused by an electrical short circuit or a dielectric breakdown. This must be considered when unpacking the extender modules, during assembly and first usage.
Fiber	Single-mode or multi-mode fiber cables.
IP Gateway	Draco tera IP Gateway, a Draco tera matrix containing an IP Gateway board either built-in (Draco tera flex) or as slide-in module (Draco tera enterprise)
IP Gateway CON	Draco vario IP Gateway CON, a Draco vario extender module (decoder) containing the IP Gateway technology
KVM	Keyboard, video, and mouse.
LPCM	LPCM (Linear Pulse Code Modulation) is a pulse modulation procedure which is often understood as an uncompressed data format. An analog signal is transformed into a digital one with equally sized value ranges.
Mini-DisplayPort	A VESA standardized interface for 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.
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.
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.
Single-Mode	9 µm single-mode fiber cable.
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.

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17 Change Log

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

Edition	Date	Firmware version	Software version (Tera Tool)	Chapter/section	New functions/changes
Rev 0	2025-08-07	Latest version	V 6.0.2.0, 2025-05-28	-	Initial user manual.