USER MANUAL

MODEL:

KDS-100EN / KDS-100EN-U
KDS-100DEC / KDS-100DEC-U
4K AVoIP H.264 / H.265 Encoder / Decoder

KDS-100EN

KDS-100EN-U

KDS-100DEC

KDS-100DEC-U

1 Contents

2 Introduction

The **Kramer KDS-100** is a next-generation AV-over-IP solution designed for high-performance, low-latency video distribution in enterprise, education, government, and digital signage applications.

The system is available in two hardware models and multiple configurations to support different installation requirements.

2.1 Hardware Variants

The system is available in two hardware models that differ in USB functionality.

Variant	Functionality
Without USB	Standard video/audio distribution.
With USB	Adds KM/KVM functionality (keyboard/mouse control), with roaming support across multiple decoders. KVM functionality requires a one-time configuration, using Kramer's AVoIP Manager. For further details, refer to Appendix A: Kramer AVoIP Manager on page 40.

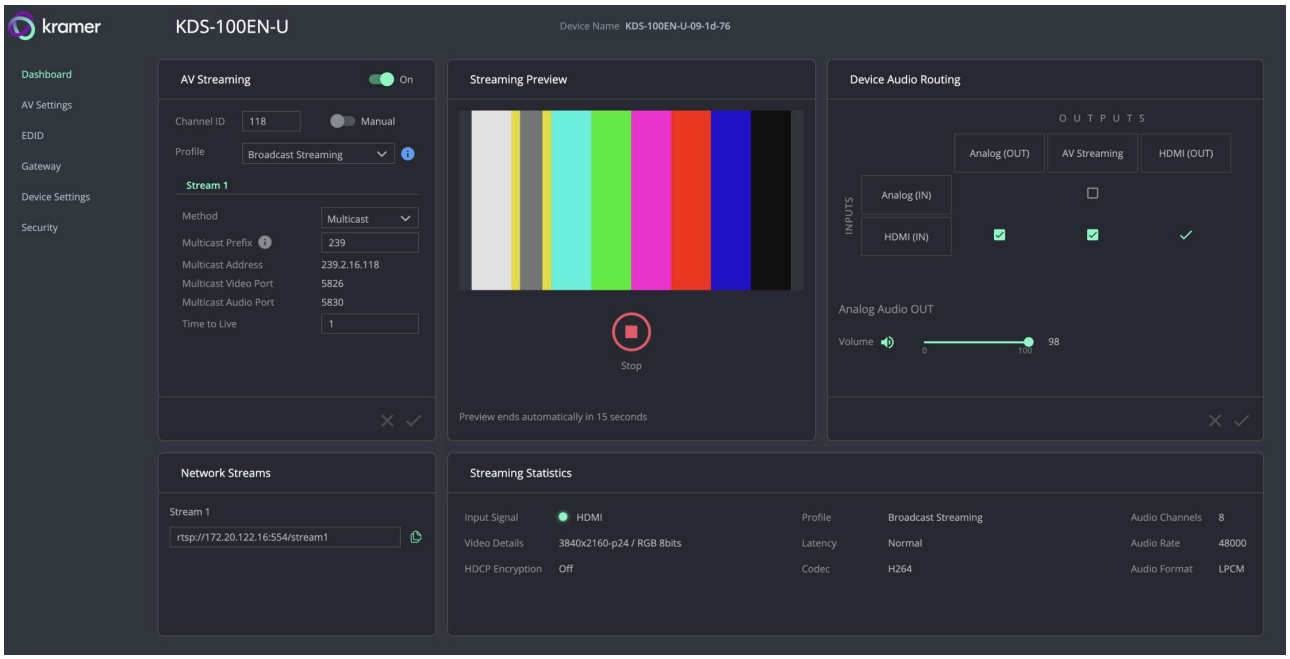
2.2 Device Roles

The system includes two device types, each serving a different function.

Device	Description
Encoder	Captures HDMI video/audio and streams it over IP.
Decoder	Receives network stream and outputs HDMI video/audio. Supports third-party IP sources (e.g., cameras).

3 Key Features

- Video Codecs: H.264 & H.265 (Baseline profile).
- Resolutions: Up to 4K60 4:2:2 (4:2:0 as default).
- Dual-Stream Support: Primary + Secondary streams for recording or parallel workflows.
- Network:
- 1 × Gigabit Ethernet (RJ-45).
- Full VLAN support (802.1Q).
- HTTPS-secured management.
- EDID Management: Automatic or manual EDID handling for optimal compatibility.
- Overlay Support: Custom text or graphics can be displayed on top of the video.
- Custom Splash Screens: Configurable per deployment.
- Flexible Configuration:
- Profiles Mode: Simplifies setup for common use cases.
- Custom Mode: Fine-grained control over streaming parameters (bitrate, GOP, latency, etc.).
- Third-Party IP Source Support: Decoder can subscribe to remote cameras/streamers



4 KDS-100 Encoder Application

A smart, web-based interface for configuring KDS-100 Encoders and Decoders, making streaming setup simple and intuitive.

All configuration is performed from a single Dashboard page — including network streaming setup, profile selection, and audio routing — simplifying deployment and reducing setup time.

4.1 Configuration & Profiles Overview

The KDS-100 Encoder includes a comprehensive set of pre-defined configuration profiles designed to simplify and accelerate deployment for common streaming, distribution, and recording use cases. Each profile represents a validated combination of codec, resolution, latency, transport protocol, and bandwidth parameters, ensuring optimal performance for specific applications.

4.1.1 Purpose

Configuration profiles provide the following benefits:

- Fast deployment with minimal configuration effort
- Reduced configuration errors using validated presets
- Automatic decoder configuration
- Optimized profiles for common ProAV and streaming workflows

4.1.2 Pre-Defined Profiles

Pre-defined profiles are optimized for specific use cases including live broadcast, ProAV low-latency distribution, IPTV, recording, and cloud streaming. Each profile is identified by a unique Profile ID and Profile Name for easy reference and selection.

4.1.3 Custom Profile

The Custom Profile (Profile ID 900) allows full manual configuration of all encoder parameters. This profile is intended for advanced users who require non-standard configurations. When using the Custom Profile, compatibility with the decoder or receiver must be verified by the user.

4.1.4 Activating the Profile

Profiles can be activated through two methods: the Web UI dashboard or the P3K API.

4.1.4.1 Web UI Activation

1. Open the KDS-100 Web UI
2. Navigate to Encoder Dashboard → Profiles
3. Select the desired profile
4. Apply the configuration

4.1.4.2 P3K API Activation

Use the following command format to activate a profile via the P3K API:

```
#KDS-MOD 1,<Profile ID>|KDS-APPLY *
```

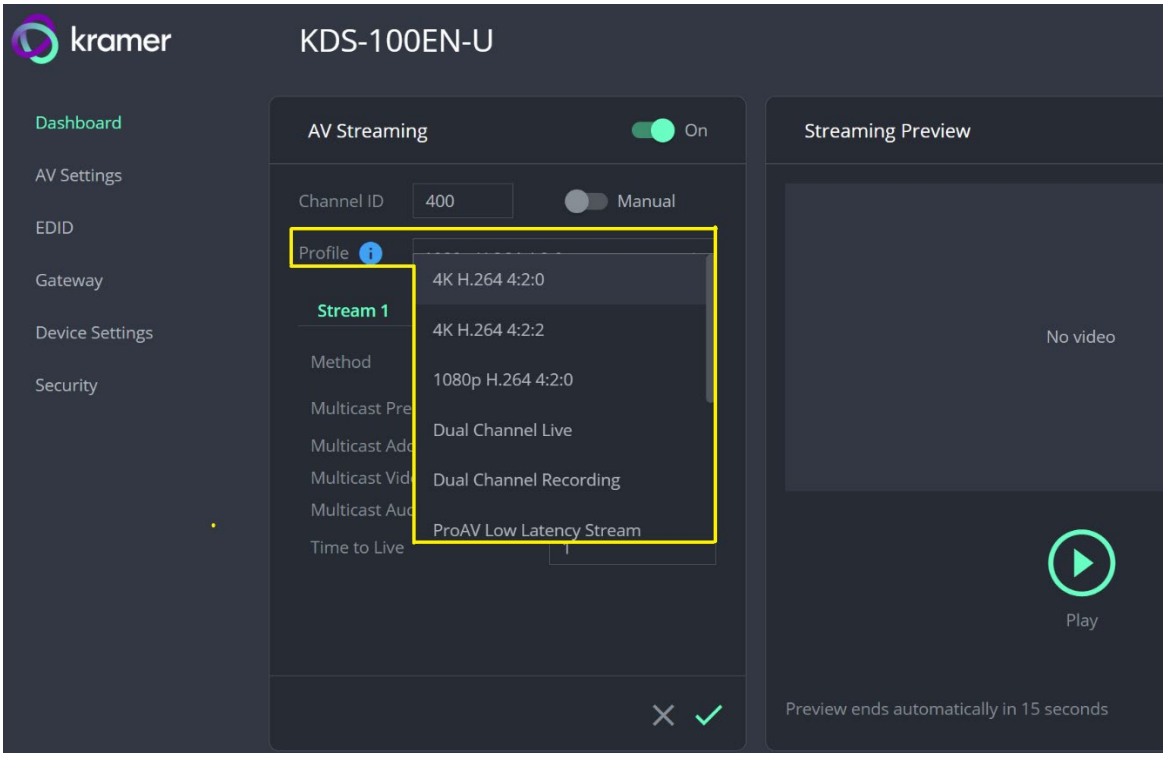
Example: `#KDS-MOD 1,19|KDS-APPLY *`

4.1.4.3 Decoder Auto-Configuration

Once a profile is activated on the encoder, the decoder automatically detects stream parameters and configures itself accordingly. No manual decoder setup is required, ensuring seamless operation and reducing setup time.

4.1.5 KDS-100 Profiles

Simplifies installation by pre-defining encoder configurations for common workflows (e.g., low-latency, high-quality, dual-stream).



Profile Options & Definitions

4.1.6 Profile Settings

The following table provides detailed specifications for each available profile:

P3K ID	Profile Names	Codec	Resolution	Color Space	Container	Protocol	Latency	Bandwidth
900	Custom Profile	User Defined Configuration						5-60 Mbps
19	4K 420 H.264 AVC-4K@60-420	H.264	3840×2160@60	4:2:0	MPEG-TS	RTSP (Multicast)	Normal	15 Mbps
20	4K 422 H.264 AVC-4K@60-422	H.264	3840×2160@60	4:2:2	MPEG-TS	RTSP (Multicast)	Normal	20 Mbps

P3K ID	Profile Names	Codec	Resolution	Color Space	Container	Protocol	Latency	Bandwidth
11	1080p H.264 4:2:0 AVC-1080@60-420	H.264	1920×1080@60	4:2:0	MPEG-TS	RTSP (Multicast)	Normal	15 Mbps
12	Dual-Channel Live HEVC-4K@30-422 AVC-1080p30-420	H.265	3840×2160@30	4:2:2	RTP	Multicast	Low	15 Mbps
		H.264	1920×1080@30	4:2:0	MPEG-TS	RTSP (Multicast)	Normal	8 Mbps
13	Dual-Channel Recording HEVC-4K@30-422 AVC-1080p30-420-VBR	H.265	3840×2160@30	4:2:2	RTP	Multicast	Low	15 Mbps
		H.264	1920×1080@30	4:2:0	RTP	RTSP (Multicast)	Normal	VBR
14	ProAV Low-Latency HEVC-4K@60-422	H.265	3840×2160@60	4:2:2	RTP	Multicast	Low	15 Mbps
17	1080p H.265 Low-Latency HEVC-1080p@60-422	H.265	1920×1080@30	4:2:2	RTP	RTP (Multicast)	Low	15 Mbps
15	SRT Streaming HEVC-4K@60-420-SRT	H.265	3840×2160@60	4:2:0	MPEG-TS	SRT (Unicast)	Normal	15 Mbps
16	RTMP Streaming HEVC-4K@60-420-RTMP	H.264	3840×2160@60	4:2:0	RTP	RTSP/RTMP (Unicast)	Normal	10 Mbps
18	IPTV Distribution AVC-1080@60-8Mbps	H.264	1920×1080@60	4:2:0	MPEG-TS	RTP (Multicast)	Normal	8 Mbps

4.1.7 Profile Use Cases

Each profile is optimized for specific deployment scenarios:

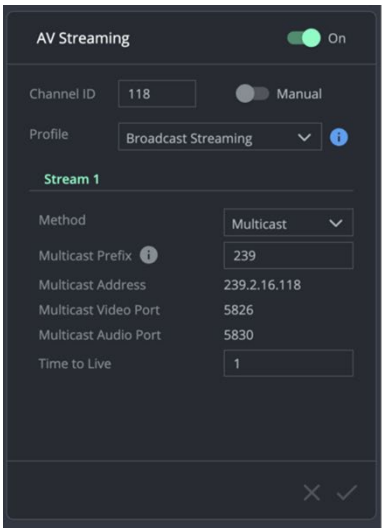
ID	Profile Name	Use Case Description
900	Custom Profile	User-defined configuration for advanced users requiring non-standard parameters or specialized deployment requirements.
19	4K 420 H.264	Optimized for standard 4K live broadcasting with H.264 codec. MPEG-TS container and normal latency ensure stability and broad compatibility with vendor-specific decoders.
20	4K 422 H.264	High-quality 4K broadcasting with enhanced color sampling (4:2:2). Designed for professional broadcast applications requiring superior color accuracy and broad decoder compatibility.
11	1080p H.264 4:2:0 AVC-1080@60-420	Optimized for HD (1080p) live broadcasting. H.264 codec with MPEG-TS and normal latency provide excellent stability and universal compatibility with broadcast equipment.
12	Dual-Channel Live	Dual-channel H.265 streaming with low latency over RTP. Second stream supports different resolutions or bitrates for adaptive use cases or storage applications.
13	Dual-Channel Recording	Recording-optimized configuration with dual streams. Second stream uses RTP, HD resolution, and variable bitrate (VBR) for efficient storage.

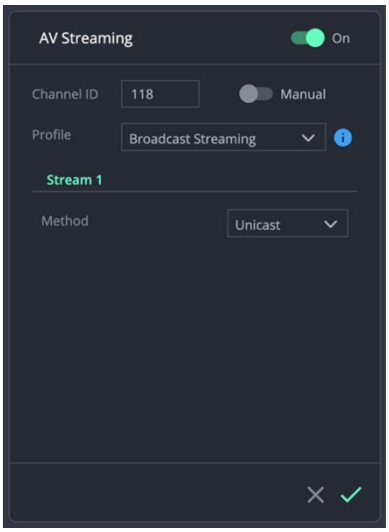
ID	Profile Name	Use Case Description
14	ProAV Low-Latency	High-quality 4K H.265 solution for real-time ProAV applications. RTP transport with low latency enables interactive presentations, live events, and time-sensitive video distribution.
17	1080p H.265 Low-Latency	H.265 solution for Full HD real-time streaming with fast switching capability over RTP. Low latency optimized for interactive applications.
15	SRT Streaming	Secure Reliable Transport (SRT) protocol support for 4K streaming over unpredictable networks. Ideal for contribution feeds, remote production, and internet-based distribution requiring error recovery.
16	RTMP Streaming	RTMP protocol support for cloud-based streaming platforms and CDN distribution. Compatible with popular streaming services and content delivery networks.
18	IPTV Distribution	Bandwidth-optimized HD distribution for IPTV systems. Compatible with standard set-top boxes and IPTV infrastructure (e.g., Kramer|ZeeVee STBi3).

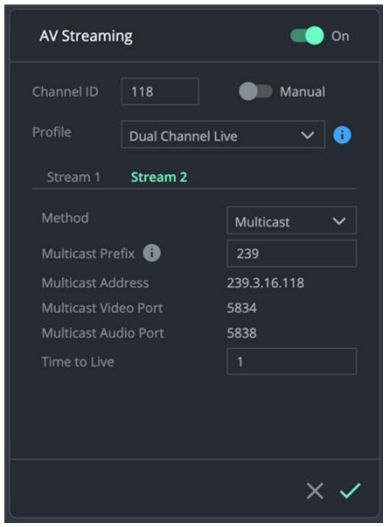
4.1.8 AV Streaming - Stream configuration

Selection of Multicast (default) to unicast.

In case of Dual channel support, Stream2 network setting should be configured.





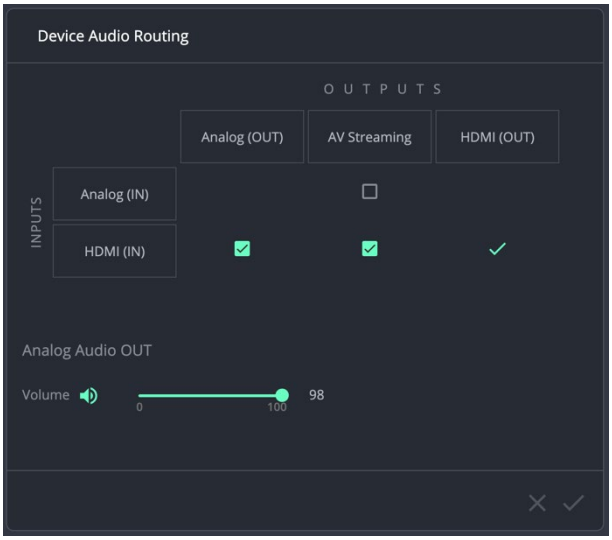


4.1.9 Audio Routing

The Audio Routing panel allows you to define how incoming audio signals are directed to the available outputs.

- Inputs: Choose between Analog (IN) and HDMI (IN) audio sources.
- Outputs: Route audio to any combination of Analog OUT, AV Streaming, or HDMI OUT.
- Volume Control: Adjust the output level for Analog OUT directly from this screen.

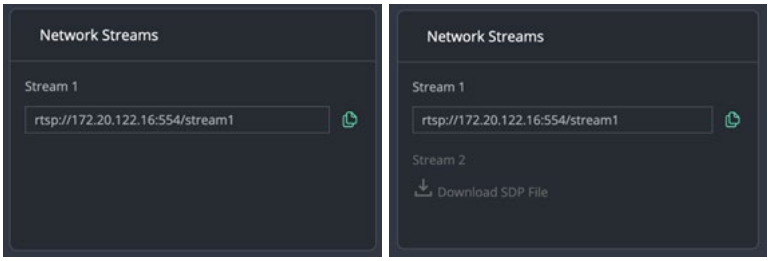
This intuitive matrix view provides a clear visual representation of your routing configuration, making it easy to set up or change audio paths.



4.1.10 Network Streams

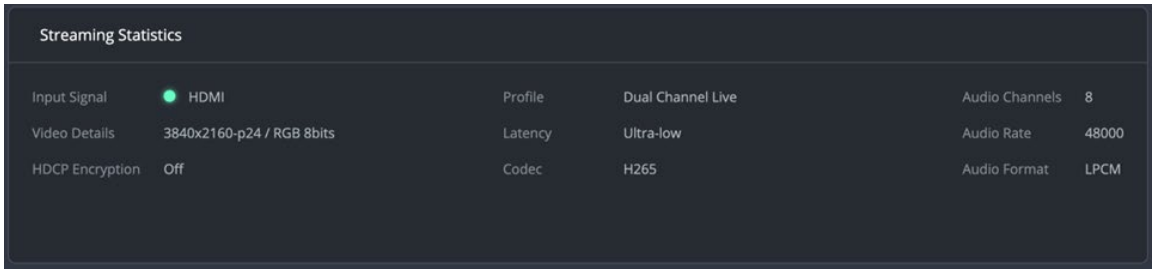
This section allows customers to copy & paste or download the encoder stream ‘address’ to be used in any 3rd party decoder if required.

Consists of URL or SDP file if needed.



4.1.11 Streaming Statistics

This section displays the Streaming statistics from both Encoder/Decoder

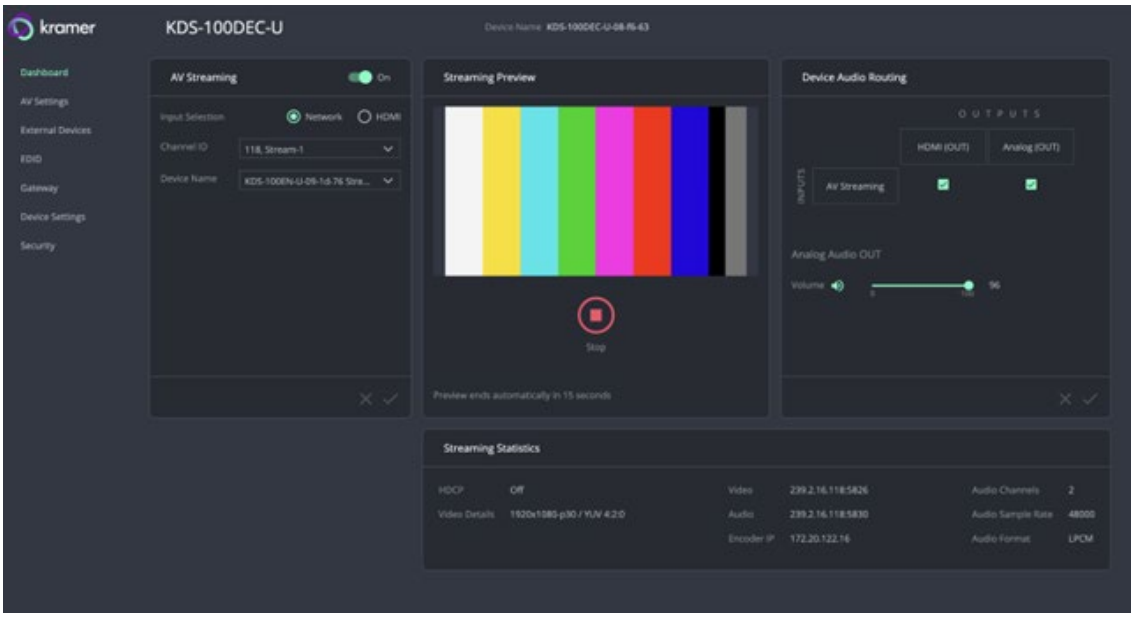


5 KDS-100 Decoder Application

A smart, web-based interface for configuring KDS-100 Encoders and Decoders, making streaming setup simple

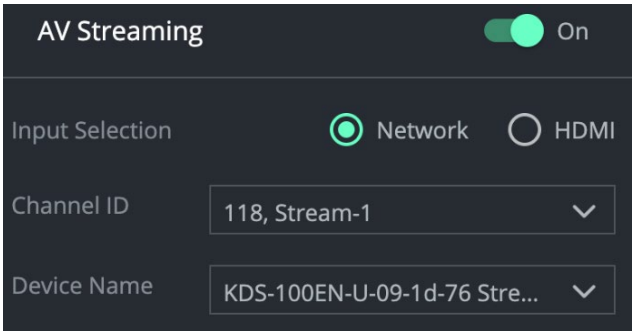
The Decoder is **fully automated** for stream detection — no additional setup is required to start receiving a stream.

It automatically detects any supported incoming stream and adjusts its configuration for seamless playback, ensuring a consistent and reliable viewing experience.



5.1 AV Streaming

The AV Streaming section manages the input source for the decoder.



Input Selection

- **Network** – Default mode; the decoder listens for AV streams over IP.
- **HDMI** – Allows the decoder to use a locally connected HDMI input as the source.

Channel ID

- Represents a **human-friendly mapping** of an IP/Port stream combination.
- Simplifies source selection by using readable identifiers instead of raw multicast or unicast addresses.

Example: *"118, Stream-1"* corresponds to a specific Encoder stream.

Device Name

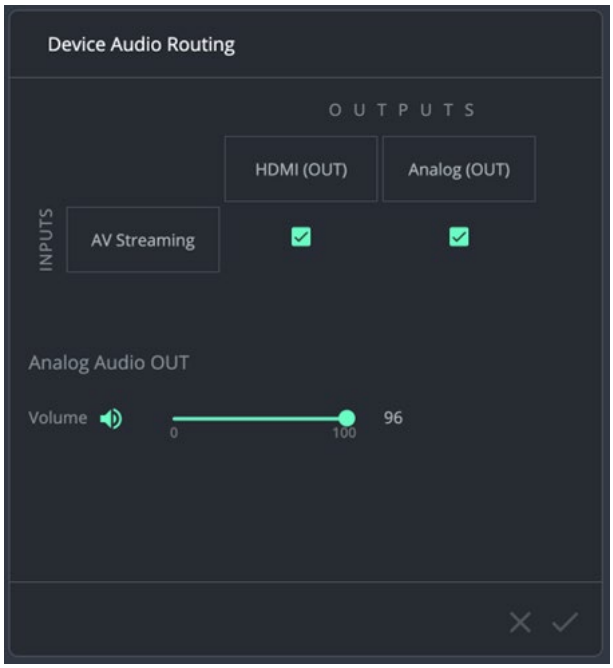
Shows the associated encoder or source device that is currently mapped to the selected channel.

Use Case

By selecting a **Channel ID**, installers and users can quickly route the decoder to the correct source without needing to manually enter IP addresses or port numbers.

5.2 Audio Routing

KDS-100 decoder audio routing allows to select 1-2 outputs to route the incoming audio stream.



6 Operating and Controlling KDS-100 Devices

This section describes the following actions:

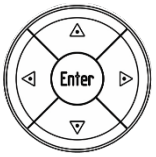
6.1 Controlling your KDS-100 device

Control your KDS-100 device via:

- **The Ethernet** using built-in user-friendly web pages: See Accessing the Embedded Web Pages on page 14.
- **Protocol 3000** (API) commands: See Protocol 3000 Commands on page 44.
- Use **the channel selection button** to set the broadcast channel: See Using the Channel Selection Buttons on page 13.

6.2 Using the Channel Selection Buttons

Each encoder requires a unique channel number. Decoders connected to the encoder must be tuned to the same channel as the encoder. By default, the channel selection is automatic on both the encoder and the decoder, but it can be set manually.



Setting the channel number with the channel selection button:

1. For the **KDS-100EN/U**:
   a) Use the UP/DOWN arrows to increment/decrement the channel number by 1 and the RIGHT/LEFT buttons to increment/decrement by 10. Channel selections that collide with an existing channel will not be accepted.
   b) Press **ENTER** (while the CHANNEL display flashes) to accept the changes.
      - Channel selections that collide with an existing channel will not be accepted.
      - The CHANNEL display flashes for 10 seconds and the new channel ID is displayed.
      - If ENTER is not pressed within the 10-second flashing period, or if an error occurs, the channel ID is not changed.
2. On each connected **KDS-100DEC/U:**
   - Set the same channel number defined on the **KDS-100EN/U**: Use the UP/DOWN arrows to scroll up or down through the list of automatically detected channels.
   - If **Dual Stream** mode is activated on **KDS-100EN/U**, both output streams have the same Channel ID.
   - The CHANNEL display flashes for 10 seconds, press Enter while it flashes to confirm the selection.

6.3 Accessing the Embedded Web Pages

Each KDS-100 device contains an embedded HTML menu which provides extensive device controls. The embedded web pages are accessed by entering the IP of the KDS-100 device in a browser within the same network or on a computer directly connected to the KDS-100 device.

To access the embedded web pages, perform the following:

1. Connect the LAN port of the KDS-100 device to a local area network.
2. By default, DHCP sets the IP of your KDS-100 device and you may need to ask your network administrator to identify its IP address.
   If no DHCP server is available, for example if the device is connected directly to a PC, it will use the default IP addresses (192.168.1.39 for the encoder and 192.168.1.40 for the decoder).
3. Connect your PC to the same network as the encoder / decoder.
4. Input the encoder or decoder's IP address in the browser and press Enter, if Security is enabled (default), the Login window pops up.

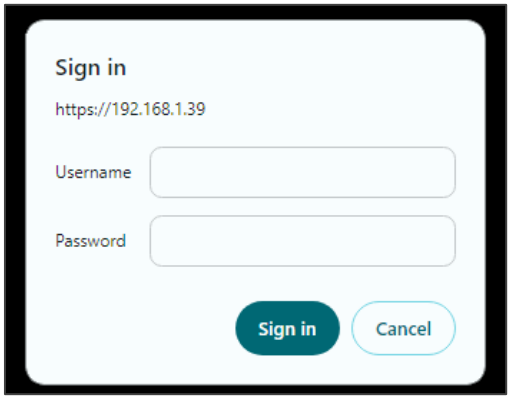


Figure 1: Login Window

4. Input the username and password (default username / password: Admin / Admin) and click **Sign In** to enter the main page of embedded web pages.

You have accessed the embedded web pages.

6.4 Configuring the Network Switch

KDS-100 supports the use of **Fiber modules**, either single mode or Multi mode, Max. range up to 10km. You must have a Network switch connected between the KDS-EN100 and KDS-DEC100, not a back-to –back connection.

Network switch configuration depends on your streaming method, which can be **Multicast** or **Unicast**. Multicast transmits data to multiple receivers and may be nonspecific, unicast is used for one-to-one communication.

For further details, refer to Appendix B: Configuring the Network Switch on page 41.

7 KDS-100 Compatibility

The KDS-100 Encoder uses the H.264 Baseline Profile to ensure broad compatibility with third-party devices and systems.

This applies only to H.264; when streaming in H.265 (HEVC), the encoder operates in High Profile.

Category	Device/Protocol	Notes / Workarounds
Video Output	4K60 / 4K30 / 1080p60	
Network (SFP)	1G SFP	
USB/KVM	Keyboard/Mouse	Wired & wireless supported
Encoding (EN)	H.264 Main Profile H.265 High Profile	
Decoding (DEC)	H.264/265	
Audio Decoding	Normal Latency – AAC Low Latency – Opus	48kHz 48 kHz — uses industry-standard AAC codec for audio decoding

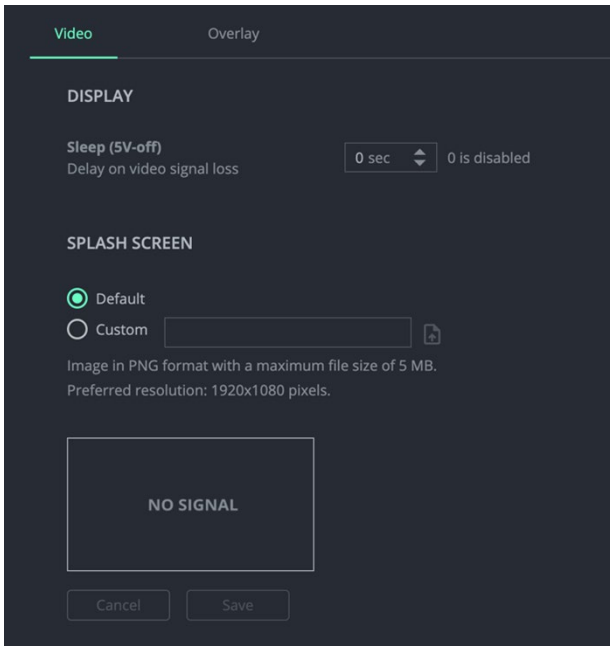
8 KDS-100 AV Settings

8.1 Decoder

8.1.1 Video

Sleep (5V-off): Defines the delay before powering down the HDMI output when video signal is lost. A value of 0 disables this function.

Splash Screen allows to change default image to display in cases of no streaming is available.



8.1.2 Overlay

KDS-100 supports on-screen overlay text, which can be configured and displayed as needed.

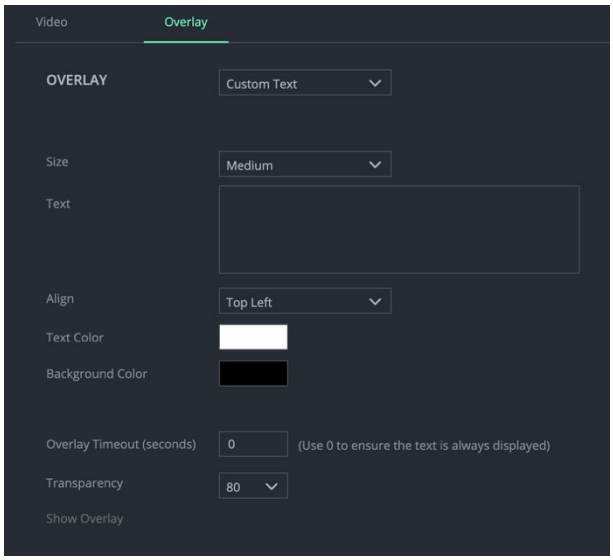
Available Overlay Options

- **Custom Text** – Enter a user-defined message.
- **Resolution Info** - Display the current video resolution.
- **Device Info** - Show system/device details.
- **None** – Overlay disabled (default).

Overlay Settings

- **Text size**: Small, Medium, Big
- **Alignment**: Top-Left, Top-Right, Center, Bottom-Left, Bottom-Right.
- **Appearance**: Customize text color, background color, and transparency.
- **Timeout**: Configure how long the overlay is displayed.
    - Set to 0 to display permanently.
    - Any other value will cause the overlay to fade after the specified time.

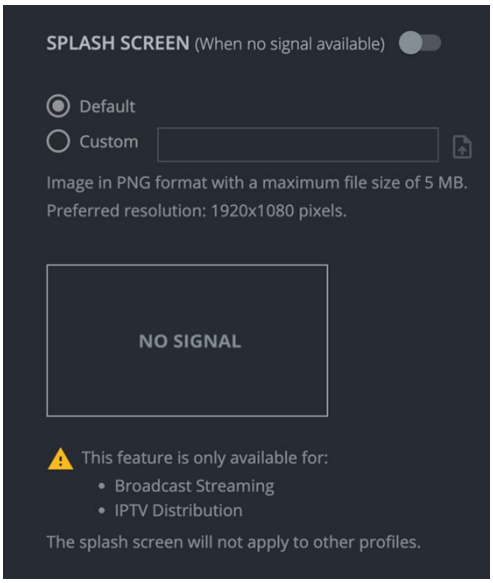
This feature is useful for monitoring, diagnostics, or displaying custom messages during operation.



8.2 Encoder

8.2.1 Splash Screen

The Splash Screen is an optional Encoder setting, used when a video source is not connected or when streaming is inactive. In this case, the Encoder sends a splash screen image to the Decoder instead of leaving the display blank.



Behavior

- When enabled, and no source is connected, the Encoder streams the selected splash screen to the Decoder.
- Useful in environments where Decoders do not support splash screens on their own.

Configuration Options

- When enabled, and no source is connected, the Encoder streams the selected splash screen to the Decoder.
- **Default**: Displays the standard “No Signal” screen.
- **Custom**: Allows uploading a user-defined image in PNG format.

- Maximum file size: 5 MB

Recommended resolution: 1920 × 1080 pixels

Available only for:

- Broadcast Streaming
- IPTV Distribution
- Splash screens are not applied to other streaming profiles.

9 KDS-100 External Devices (Decoder)

On the decoder side, the KDS-100 allows routing of **IP-based endpoints** directly to the decoder using supported streaming protocols. This is useful for integrating third-party cameras, encoders, or other RTSP-compliant sources into the system.

Device List

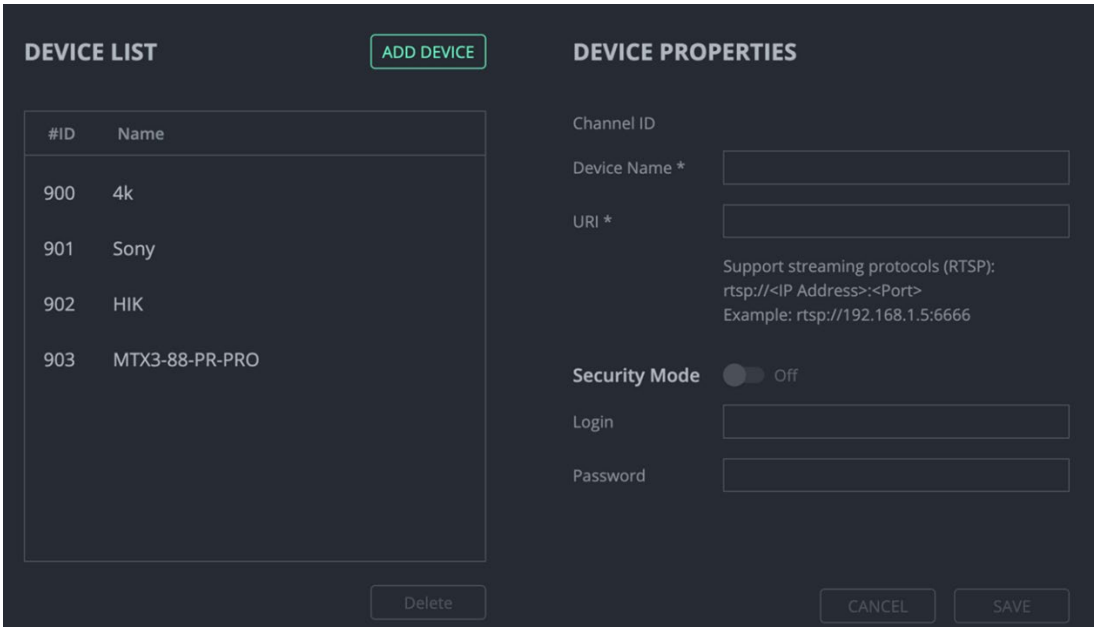
- Displays all configured external devices with assigned IDs and names.
- Devices can be added, modified, or deleted as required.

Device Properties

- **Channel ID** – Numeric identifier used for internal mapping.
- **Device Name*** – Friendly name for easy identification.
- **URI*** – Streaming address of the source.
  - Supports RTSP format: rtsp://<IP Address>:<Port>
  - Example: rtsp://192.168.1.5:6666
- **Security Mode** – Enable if the source requires login credentials.
  - **Login / Password** – Authentication details for the endpoint.

Use Case

This feature allows a decoder to display video streams not only from KDS-100 encoders, but also from external RTSP-enabled devices such as **IP cameras, NVRs, or third-party streamers**.



KDS-100 Decoder will auto allocate channel ID starting from 900-1000.

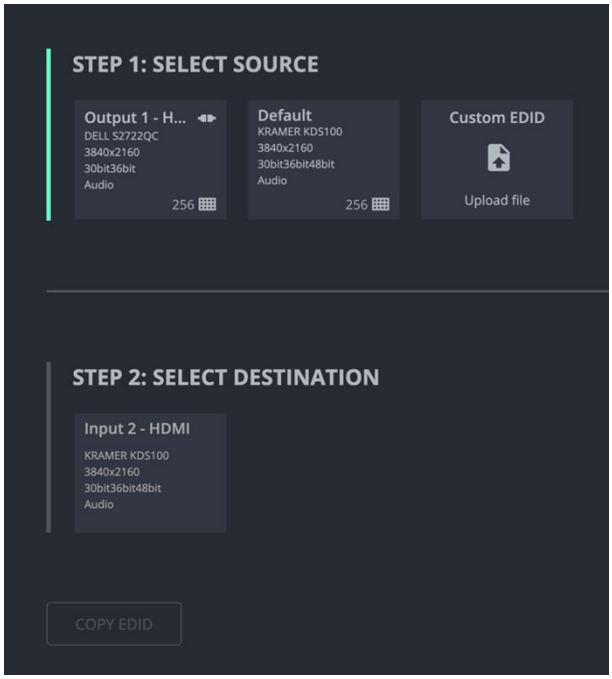
10KDS-100 EDID

The KDS-100 allows flexible EDID (Extended Display Identification Data) handling to ensure proper communication between sources and displays. This feature helps prevent resolution or compatibility issues.

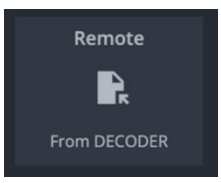
How to Use:

1. **Select Source** – Choose an EDID from:
   - A connected display (Output)
   - The KDS-100 default EDID
   - A custom EDID file (uploadable in .bin format)
2. **Select Destination** – Choose the input (e.g., HDMI IN) that should receive the selected EDID.
3. **Apply** – Copy the chosen EDID to the destination.

This process ensures the source device always receives the correct resolution, color, and audio capability information from the display system.

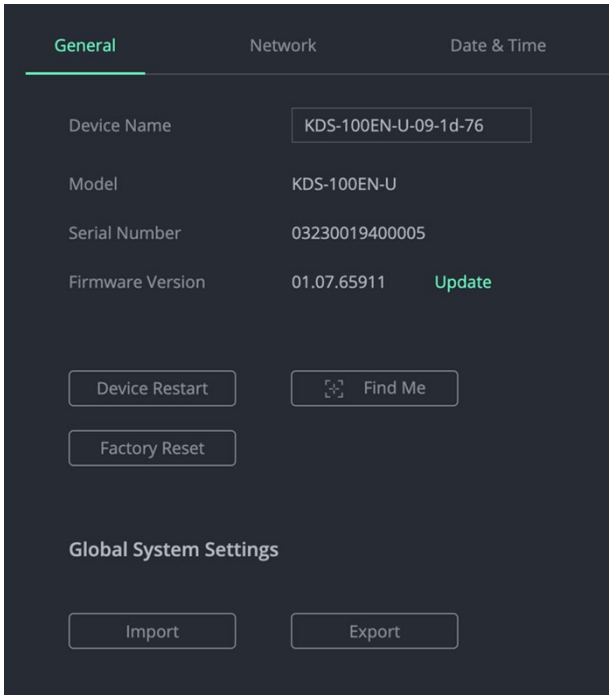


EDID Encoder allows to copy EDID from the Decoder.



11 KDS-100 Device Settings

The **General Setting**s page provides essential system information and control functions for the KDS-100 device.



Device Information

- **Device Name** – Editable identifier for easier recognition on the network.
- **Model** – Displays the exact hardware model (e.g., KDS-100EN-U).
- **Serial Number** – Unique identifier for service and support.
- **Firmware Version** – Shows the current software version with an option to check and perform updates.

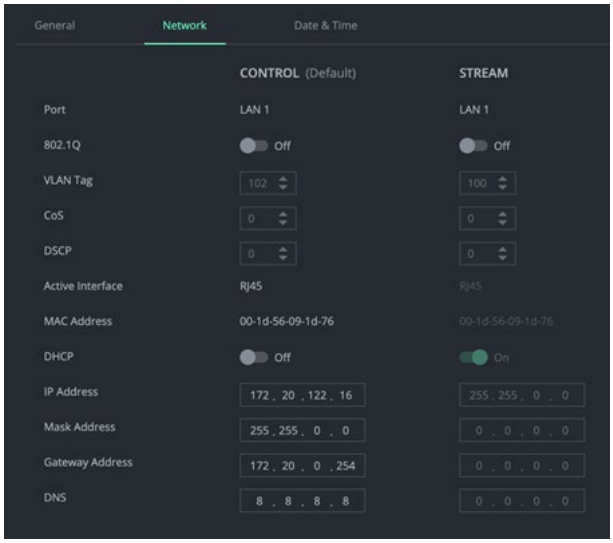
Device Controls

- **Device Restart** – Reboots the unit without affecting configuration.
- **Find Me** – Triggers a visual indicator (e.g., LED or on-screen message) to help locate the device in large installations.
- **Factory Reset** – Restores all settings to factory defaults (use with caution).

Global System Settings

- **Import** – Upload a saved configuration file to quickly apply predefined settings.
- **Export –** Save the current configuration for backup or replication across multiple units.

The **Network** tab provides configuration options for both Control (default management interface) and Stream (media transport) connections. Each interface can be customized independently to fit network policies.



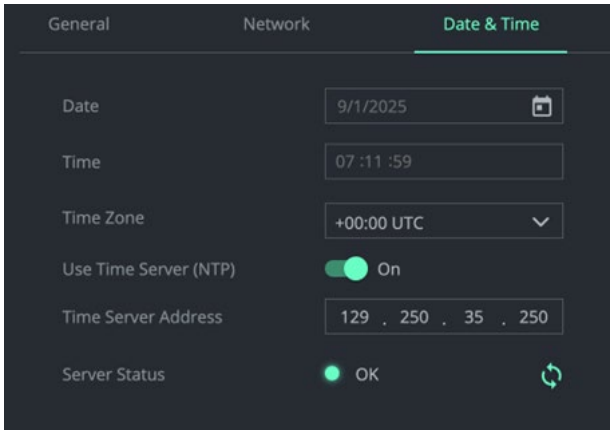
Available Settings

- **Port –** Defines the LAN port used for Control and Stream traffic.
- **802.1Q (VLAN) –** Enables VLAN tagging for segregated network traffic.
  - **VLAN Tag** – Specify VLAN ID (1–4094).
  - **CoS (Class of Service)** – Sets priority level within the VLAN.
  - **DSCP (Differentiated Services Code Point)** – Marks packets for QoS handling.
- **Active Interface –** Displays the selected physical interface (RJ45).
- **MAC Address –** Hardware address of the interface (read-only).
- **DHCP –** When enabled, the device automatically requests an IP address from the DHCP server.
- **Static IP Settings** (if DHCP is Off):
  - **IP Address** – Manually assign the device IP.
  - **Mask Address** – Define subnet mask.
  - **Gateway Address** – Set network gateway for external communication.
  - **DNS** – Define Domain Name Server for hostname resolution.

Typical Use Cases

- **Control Interface:** Often assigned to a management VLAN for device configuration and monitoring.
- **Stream Interface:** Optimized for AV streaming traffic, typically isolated on a dedicated VLAN with QoS enabled.

The **Date & Time** menu allows you to configure system time, which is critical for logging, scheduling, and synchronization with other devices.



Available Settings

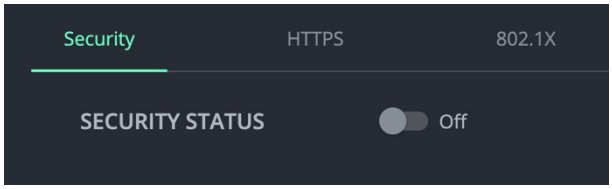
- **Date / Time** – Set manually if NTP is disabled.
- **Time Zone** – Select the appropriate offset to match your region.
- **Use Time Server (NTP)** – When enabled, the device automatically synchronizes time with a specified NTP server.
- **Time Server Address** – Define the NTP server's IP address or hostname.
- **Server Status** – Displays synchronization status (e.g., *OK* when time is successfully synced).

Best Practice

Enable **NTP** synchronization whenever possible to ensure consistent and accurate timestamps across devices in the network.

12KDS-100 Security

The **Security** tab allows to set password when user login.



The KDS-100 supports secure access to its web interface through HTTPS.

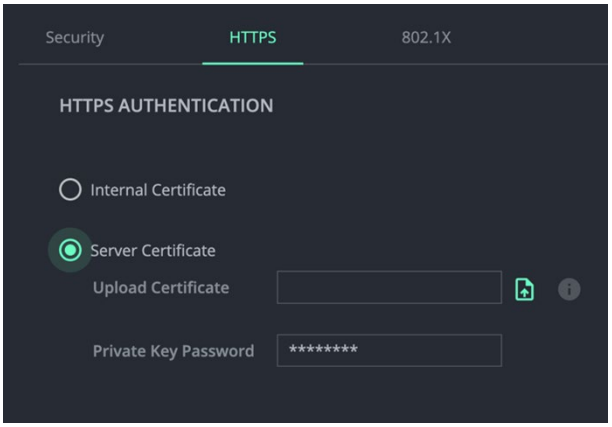
Authentication Options

- **Internal Certificate** – Uses the built-in self-signed certificate that comes preloaded with the device.
- **Server Certificate** – Allows administrators to upload and use their own certificate signed by a trusted Certificate Authority (CA). This option enhances security and ensures compliance with enterprise IT policies.

Configuration Fields

- **Upload Certificate** – Import a custom SSL/TLS certificate.
- **Private Key Password** – Enter the password associated with the uploaded certificate.

The KDS-100 is shipped with a **self-signed certificate** enabled by default. Customers may choose to issue and install their own **CA-signed certificate** to meet organizational security requirements.



The KDS-100 supports **IEEE 802.1X network authentication**, allowing secure integration into enterprise networks that require identity-based access control.

Available Authentication Methods

1. **EAP-MSCHAPv2**
    - Credentials are provided using a **username** and **password**.
    - Commonly used in environments with Microsoft-based authentication servers (e.g., Active Directory with RADIUS).

2. **EAP-TLS**

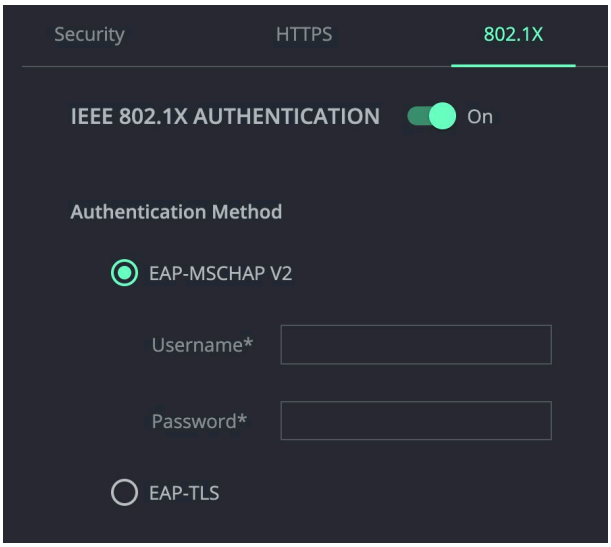
- Credentials are validated using **digital certificates**.
- Requires uploading a **Client Certificate**, **Private Key**, and **Private Key Password**.
- Provides a higher level of security through mutual certificate-based authentication.

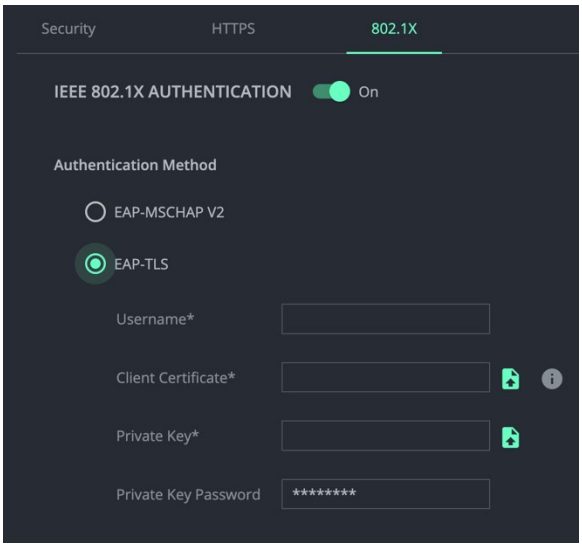
Configuration Fields

- **Username** – Identity string used for authentication (mandatory).
- **Password** – Required for EAP-MSCHAPv2 authentication.
- **Client Certificate** – Upload the certificate issued to the device (EAP-TLS only).
- **Private Key** – Upload the private key associated with the client certificate (EAP-TLS only).
- **Private Key Password** – Password protecting the private key (EAP-TLS only).

Best Practice

Use **EAP-TLS** wherever possible for stronger security. Ensure that the KDS-100 is enrolled with the organization's Certificate Authority (CA) and that certificates are managed according to IT security policy.





13 Hardware Overview

This section includes the following topics:

13.1 Defining KDS-100EN

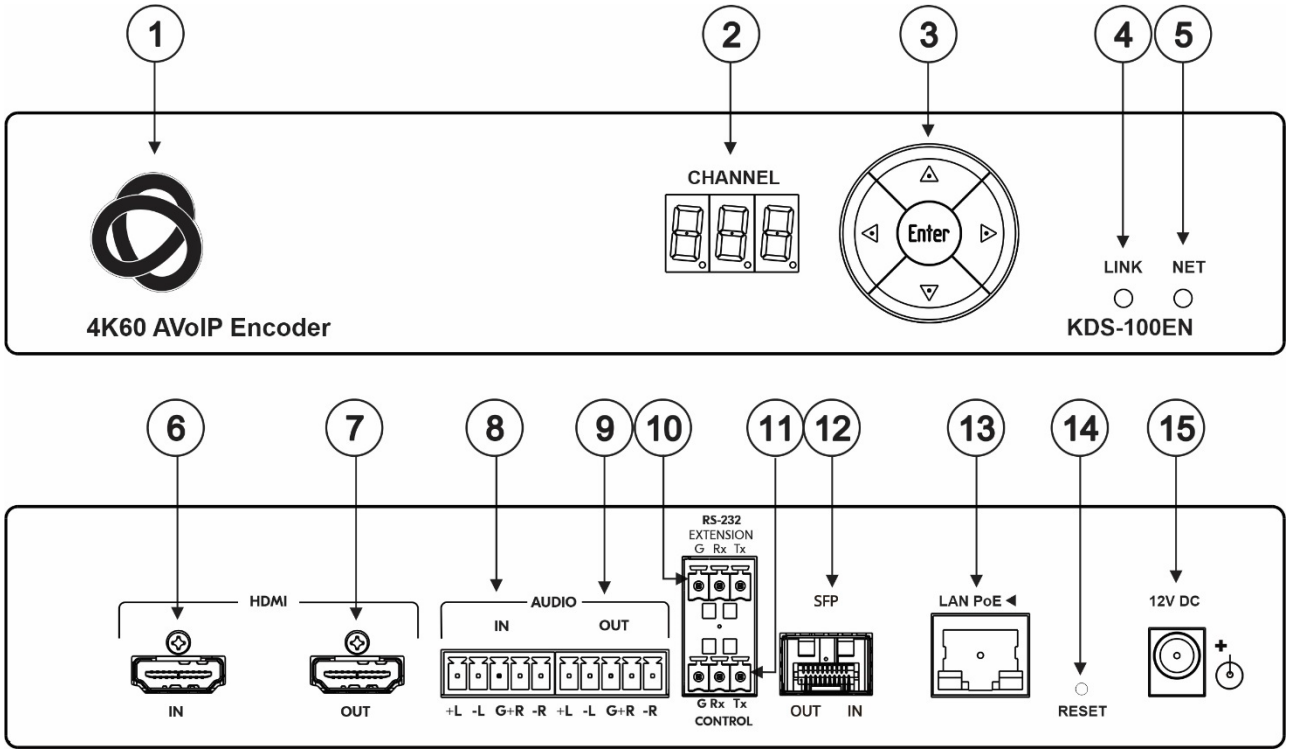


Figure 2: KDS-100EN

#	Feature		Function
1	ON LED (behind the logo)		On when power is supplied to the unit by PoE+ or by the (optional) power adapter.
2	CHANNEL 7-segment display		Use to set the stream's channel (channels must match on encoder and decoder).
3	Channel Selection Button	Up	Press to increment the channel ID number by 1.
		Down	Press to decrement the channel ID number by 1.
		Right	Press to increment the channel ID number by steps of 10.
		Left	Press to decrement the channel ID number by steps of 10.

#	Feature		Function
		Enter	Press to accept the new channel ID number (within 10 seconds).
4	LINK LED	Off	No HDMI input is detected, or AV streaming mode is OFF for **KDS-100EN**.
		Lights green	**KDS-100EN** is linked to a decoder and streaming is active.
		Lights blue	**KDS-100EN** is in Dual Streaming mode, but one of the streams is not active.
		Lights red	Streaming is not active (in Dual Streaming mode, both streams are inactive).
		Flashes green	A device identification command was sent (Flag me). Flashes for 60 seconds.
5	NET LED	Off	No network connection detected.
		Lights green	A network has been detected and **KDS-100EN** has a valid IP address
		Lights red	A network has been detected but the device was not assigned a valid IP address (configure with an RS-232 interface).
		Flashes green	A device identification command was sent (Flag me). Flashes for 60 seconds.
6	HDMI IN connector		Connect to an HDMI source.
7	HDMI OUT connector		Connect to an HDMI acceptor.
8	AUDIO IN 5-pin terminal block		Connect to a balanced, stereo audio source (for example, from the server).
9	AUDIO OUT 5-pin terminal block		Connect to a balanced, stereo audio acceptor (for example, active speakers).
10	RS-232 EXTENSION 3-pin terminal block connector		Connect to a serial data source or acceptor to extend RS-232 control from **KDS-100EN** to a **KDS-100DEC** (or vice versa)**.**
11	RS-232 CONTROL 3-pin terminal block connector		Connect to a serial controller or PC and use it to control **KDS-100EN** with **P3000** API commands.
12	SFP OUT IN transceiver connector		Insert an SFP transceiver (optical SM/MM or copper, supporting up to 1 GE) and plug in an optical / CAT-6e cable for Ethernet traffic over IP.
13	LAN PoE ◄ RJ-45 Port		Connect to the LAN (Ethernet traffic or PC controller). **KDS-100EN** is powered by PoE+ (power over ethernet) delivered through the LAN PoE port, unless the optional 12V DC power adapter is attached.
14	RESET recessed button		Press and hold for 10 seconds to restore factory default values. All LEDs flash.
15	12V DC connector		Connect to the optional power adapter (purchased separately).

13.2 Defining KDS-100DEC

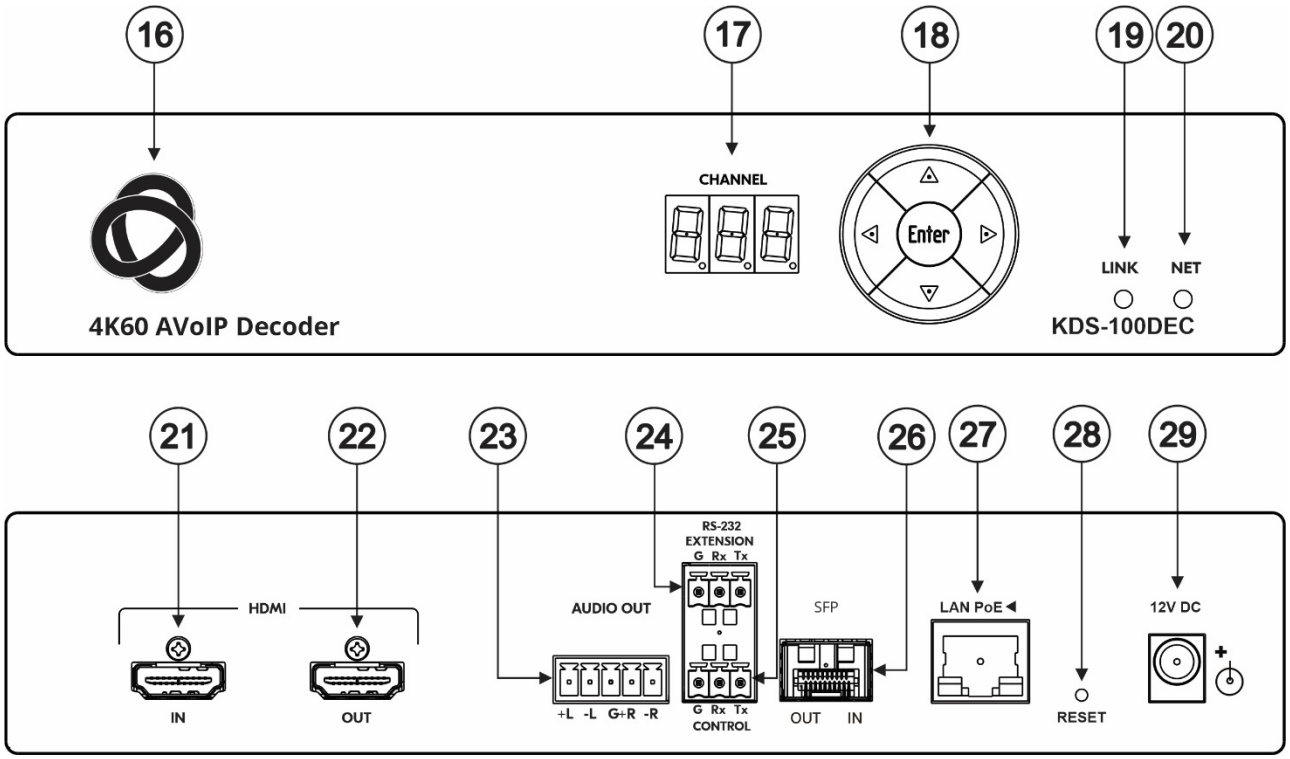


Figure 3: **KDS-100DEC** 4K60 AVoIP Decoder

#	Feature		Function
16	ON LED (behind the logo)		On when power is supplied to the unit by PoE+ or by the (optional) power adapter.
17	CHANNEL 7-segment display		Use to set the stream's channel (channels must match on encoder and decoder).
18	Channel Selection Button	Up	Scroll up through the list of automatically discovered channels.
		Down	Scroll down through the list of automatically discovered channels.
		Right	No action.
		Left	No action.
		Enter	Press to accept the new channel ID number (within 10 seconds).
19	LINK LED	Off	No network streaming detected, or AV streaming mode is OFF for **KDS-100DEC**
		Lights green	**KDS-100DEC** is receiving an input stream and decoding is successful.
		Lights red	**KDS-100DEC** is receiving an input stream but decoding has failed.
		Flashes green	A device identification command was sent (Flag me). Flashes for 60 seconds.
20	NET LED	Off	No network connection detected.
		Lights green	Network detected and the device has been assigned a valid IP address
		Lights red	A network has been detected but the device was not assigned a valid IP address (configure with an RS-232 interface).
		Flashes green	A device identification command was sent (Flag me). Flashes for 60 seconds.
21	HDMI IN connector		Connect to an HDMI source.
22	HDMI OUT connector		Connect to an HDMI acceptor.
23	AUDIO OUT 5-pin terminal block		Connect to a balanced stereo audio acceptor (for example, active speakers).
24	RS-232 EXTENSION 3-pin terminal block connector		Connect to a serial data source or acceptor to extend RS-232 control from **KDS-100DEC** to **KDS-100-EN** (or vice versa)**.**

#	Feature	Function
25	RS-232 CONTROL 3-pin terminal block connector	Connect to a serial controller or PC to control **KDS-100DEC**.
26	SFP OUT IN transceiver connector	Insert an SFP transceiver (optical SM/MM or copper, supporting up to 1 GE) and plug in an optical / CAT-5e cable for Ethernet traffic over IP.
27	LAN PoE ◄ RJ-45 Port	Connect to the LAN (Ethernet traffic or PC controller). **KDS-100DEC** is powered by PoE+ (power over ethernet) delivered through the LAN PoE+ port, unless the optional 12V DC power adapter is attached.
28	RESET recessed button	Press and hold for 10 seconds to restore factory default values. All LEDs flash.
29	12V DC connector	Connect to the power adapter (purchased separately).

13.3 Defining KDS-100EN-U

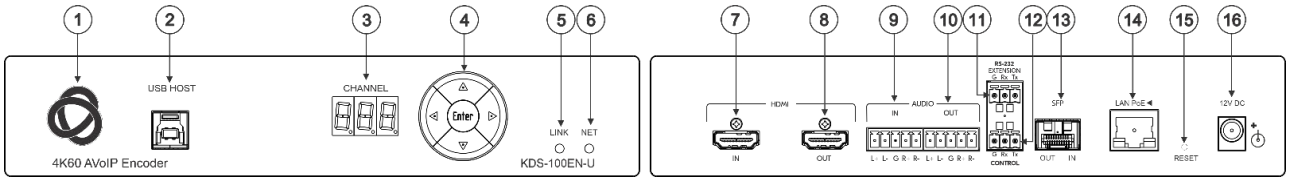


Figure 4: KDS-100EN-U

KDS-100EN/DEC-U adds KM/KVM functionality (keyboard/mouse control), with roaming support across multiple decoders.

KVM functionality requires a one-time configuration, using Kramer's On Premises Site Agent. For further details, refer to Appendix A: Kramer AVoIP Manager on page 40.

#	Feature		Function
1	ON LED (behind the Logo)		On when power is supplied to the unit by PoE+ or by the (optional) power adapter.
2	USB HOST 3.0 Port		Connect to a USB host.
3	CHANNEL 7-segment Display		Use to set the stream's channel (channel must match on the encoder and decoder).
4	Channel Selection Button	▲	Press to increment the channel ID number by 1.
		▼	Press to decrement the channel ID number by 1.
		►	Press to increment the channel ID number by steps of 10.
		◄	Press to decrement the channel ID number by steps of 10.
		Enter	Press to accept the new channel ID number (within 10 seconds).
5	LINK LED	Off	No AV input is detected or AV streaming mode is OFF for **KDS-100EN-U.**
		Lights green	**KDS-100EN-U** is linked to a decoder and streaming is active.
		Lights blue	**KDS-100EN-U** is in dual streaming mode, but one of the streams is not active.
		Lights red	Streaming is not active (in Dual Streaming mode **both** streams are inactive).
		Flashes green (60 seconds)	A device identification command was sent (Flag me).
6	NET LED	Off	No network connection detected.
		Lights green	A network has been detected and **KDS-100EN-U** has a valid IP address.
		Lights Red	A network has been detected but the device was not assigned a valid IP address (configure with an RS-232 interface).
		Flashes green (60 seconds)	A device identification command was sent (Flag me).

#	Feature	Function
7	HDMI IN connector	Connect to an HDMI source.
8	HDMI OUT connector	Connect to an HDMI acceptor.
9	AUDIO IN 5-pin terminal block	Connect to a balanced, stereo audio source (for example, from the server).
10	AUDIO OUT 5-pin terminal block	Connect to a balanced, stereo audio acceptor (for example, active speakers).
11	RS-232 EXTENSION 3-pin terminal block connector	Connect to a serial data source or acceptor to extend RS-232 control from **KDS-100EN-U** to **KDS-100DEC-U**.
12	RS-232 CONTROL 3-pin terminal block connector	Connect to a serial controller or PC and use it to control **KDS-100EN-U**.
13	SFP OUT IN Connector	Connect a fiber optic cable to the plugged-in SFP optical module connectors (SM/MM) for Ethernet traffic over IP.
14	LAN PoE ◄ RJ-45 Port	Connect to the LAN (Ethernet traffic or PC controller). **KDS-100EN-U** is powered by PoE+ (power over ethernet) delivered through the LAN PoE+ port, unless the optional 12V DC power adapter is attached.
15	RESET recessed Button	Press and hold for 10 seconds to restore factory default values. All LEDs flash.
16	12V DC Connector	Connect to the optional power adapter (purchased separately).

13.4 Defining KDS-100DEC-U

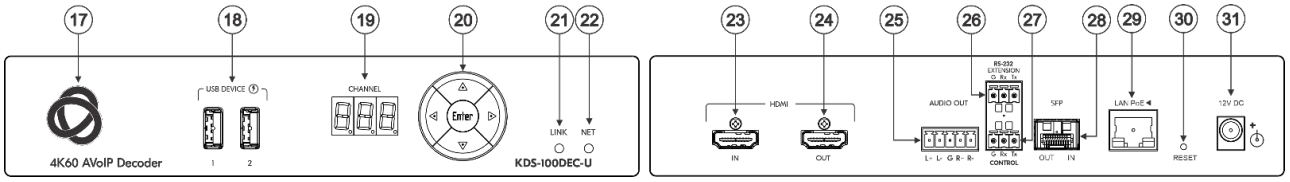


Figure 5: KDS-100DEC-U

#	Feature		Function
17	On LED (behind the Logo)		On when power is supplied to the unit by PoE+ or the (optional) power adapter.
18	USB DEVICE USB 3.0 Type A Ports (2)		Connect to USB devices.
19	CHANNEL 7-segment Display		Use to set the stream's channel (channel must match on encoder and decoder).
20	Channel Selection Button	▲	Scroll up through the list of automatically discovered channels.
		▼	Scroll down through the list of automatically discovered channels.
		►	No action.
		◄	No action.
		Enter	Press to accept the new channel ID number (within 10 seconds).
21	LINK LED	Off	No network connection detected.
		Lights green	**KDS-100DEC-U** is receiving an input stream and decoding is successful.
		Lights red	**KDS-100DEC-U** is receiving an input stream but decoding has failed.
		Flashes green (60 seconds)	A device identification command was sent (Flag me).
22	NET LED	Off	No network connection.
		Lights green	Network detected and the device has been assigned a valid IP address.

#	Feature		Function
		Lights red	A network has been detected but the device was not assigned a valid IP address (configure with an RS-232 interface).
		Flashed green (60 seconds)	A device identification command was sent (Flag me).
23	HDMI IN connector		Connect to an HDMI source.
24	HDMI OUT connector		Connect to an HDMI acceptor.
25	AUDIO OUT 5-pin terminal block		Connect to a balanced, stereo audio acceptor (for example, active speakers).
26	RS-232 EXTENSION 3-pin terminal block connector		Connect to a serial data source or acceptor to extend RS-232 between **KDS-100DEC-U** and **KDS-100EN-U**.
27	RS-232 CONTROL 3-pin terminal block connector		Connect to a serial controller or PC and use it to control **KDS-100DEC-U**.
28	OUT IN SFP transceiver connector		Insert an SFP transceiver (optical SM/MM or copper) and plug in an optical / RS-232 cable for Ethernet traffic over IP.
29	LAN PoE ◄ RJ-45 Port		Connect to the LAN (Ethernet traffic or PC controller). **KDS-100DEC-U** is powered by PoE+ (power over ethernet) delivered through the LAN PoE+ port, unless the optional 12V DC power adapter is attached.
30	RESET recessed Button		Press and hold for 10 seconds to restore factory default values. All LEDs flash.
31	12V DC Connector		Connect to the optional power adapter (purchased separately).

13.5 Connecting Inputs and Outputs

Always switch off the power to a device before connecting it to your **KDS-100EN-U** device.

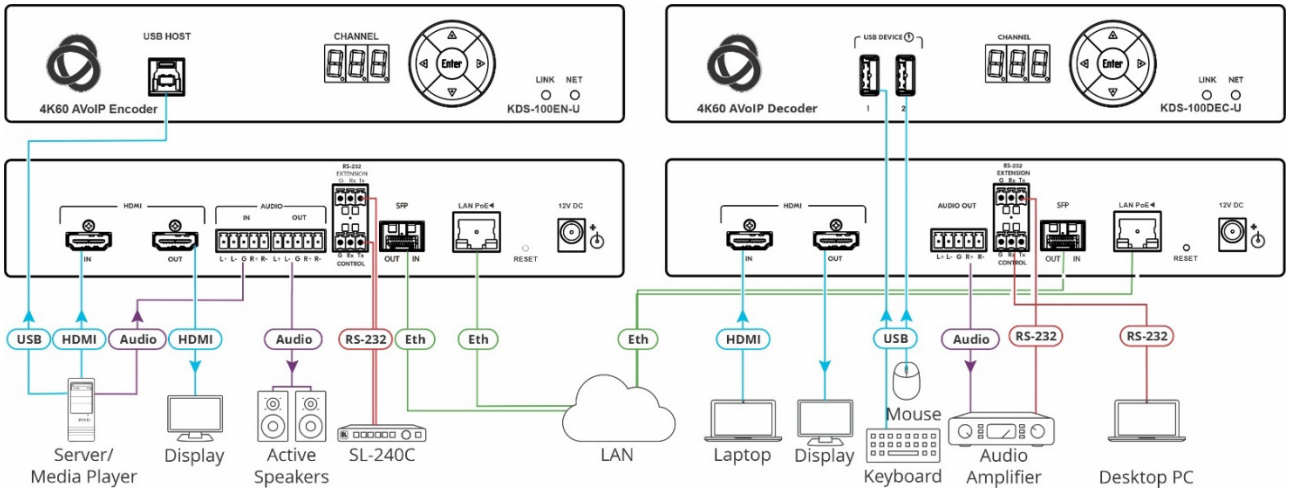


Figure 6: Connecting **KDS-100EN-U** to **KDS-100DEC-U**

KDS-100EN-U and **KDS-100DEC-U** can stream 4K video, requiring a gigabit Ethernet switch for high quality performance, while the maximum momentary transfer rate can reach 60Mbps. We recommend using AVoIP Ethernet switches that support: PoE+, multicast forwarding or filtering, IGMP Snooping, IGMP Querier and IGMP snooping fast leave.

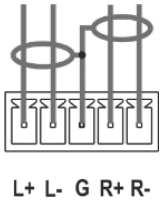
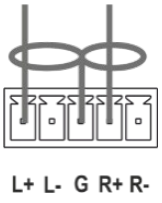
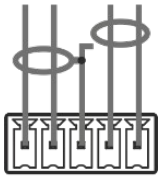
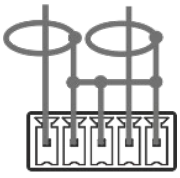
13.6 Connecting Power

By-default, KDS-100EN-U and KDS-100DEC-U use PoE+ for power.

Optionally, you can separately purchase a power adapter to connect to each device and plug into the mains electricity.

13.7 Connecting the Audio/Input Output

The following are the pinouts for connecting the input/output to a balanced or unbalanced stereo audio acceptor:

Connecting the audio output		Connecting to the audio input	
To a balanced stereo audio acceptor:	To an unbalanced stereo audio acceptor:	From a balanced stereo audio source:	From an unbalanced stereo audio source:
			
L+ L- G R+ R-	L+ L- G R+ R-	L+ L- G R+ R-	L+ L- G R+ R-

13.8 Mounting KDS-100

This section provides instructions for mounting the devices. Before installing, verify that the environment is within the recommended range:

- Operation temperature – 0° to 40°C (32 to 104°F).
- Storage temperature – -40° to +70°C (-40 to +158°F).
- Humidity – 10% to 90%, RHL non-condensing.

Caution:

- Mount the devices before connecting any cables or power.

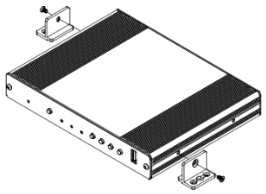
Warning:

- Ensure that the environment (e.g., maximum ambient temperature & air flow) is compatible for the device.
- Avoid uneven mechanical loading.
- Appropriate consideration of equipment nameplate ratings should be used for avoiding overloading of the circuits.
- Reliable earthing of rack-mounted equipment should be maintained.
- Maximum mounting height for the device is 2 meters.

Mounting KDS-100 devices in a rack:

- Use the recommended rack adapter

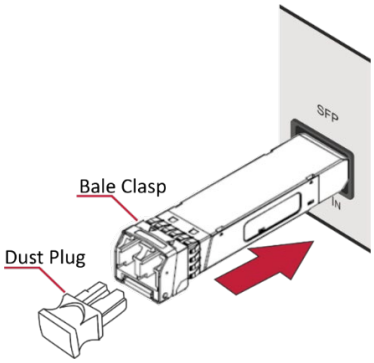
Mount KDS-100 devices on a surface using one of the following methods:



- Attach the rubber feet and place the unit on a flat surface.
- Fasten a bracket (included) on each side of the unit and attach it to a flat surface.

13.9 Installing the SFP MM/SFP SM

To install the SFP MM/SFP SM Kramer recommended transceiver:



1. Remove the currently installed transceiver: Pull down the bale clasp, insert the dust plug and pull out. Store in a safe place.
2. Make sure the bale clasp of the new transceiver is pushed up, in the closed position.
3. Insert the new transceiver into the SFP port and push it in until it clicks.
4. Remove the dust plug and store it in a safe place for future use.

Warning: Connecting the SFP connector to an LC(APC) fiber connector may cause poor performance and damage the connector!

Warning: Class 1 Laser Product

- Invisible laser radiation present.
- Avoid long-term viewing of laser.
- Avoid the use of magnifying viewing aids or instruments (such as binoculars, telescopes, microscopes and magnifying lenses, but not spectacles or contact lenses).
- Avoid placing optical devices in the emitted beam that could cause the concentration of the laser radiation to be increased.

14 Safety and Environmental Information

14.1 Safety Instructions

Caution:

- This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.
- For products with relay terminals and GPI\O ports, please refer to the permitted rating for an external connection, located next to the terminal or in the User Manual.
- There are no operator serviceable parts inside the unit.

Warning:

- If not using PoE, use only the optional power cord supplied for the unit.

14.2 Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at www.kramerav.com/quality/environment.

15 Upgrading Firmware

Upgrade the firmware, view the date of the last upgrade, or rollback to the previous firmware revision in case of a problem.

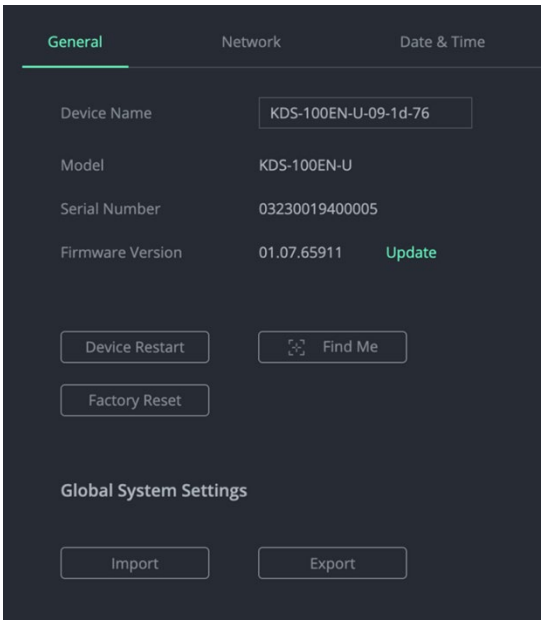
For support, contact the Kramer tech support team at support@kramerav.com.

15.1 To upgrade the firmware

Firmware can also be updated using the AV Updater from the AVoIP Manager.

1. Download the latest firmware from the Kramer website at:
   - **KDS-100EN** - https://www.kramerav.com/downloads/kds-100en
   - **KDS-100DEC** - https://www.kramerav.com/downloads/kds-100dec
   - **KDS-100EN-U** - https://www.kramerav.com/downloads/kds-100en-u
   - **KDS-100DEC-U** - https://www.kramerav.com/downloads/kds-100dec-u

2. In the embedded web pages, select the **Device Settings** page. It will open on the **General** tab. This page is the same in both KDS100EN/DEC & KDS100EN/DEC-U.



3. Next to **Firmware Version**, click **Update**.
4. Select the Firmware file and click **Open**. The Firmware upgrade pop-up opens. Wait for upgrade completion.
5. Once completed, refresh the web page and log-in.

Firmware upgrade is complete.

16 Technical Specifications

16.1 KDS-100EN Specifications

Inputs	1 HDMI	On a female HDMI connector
	1 Balanced Audio	On a 5-pin terminal block connector
Outputs	1 HDMI	On a female HDMI connector
	1 Balanced Audio	On a 5-pin terminal block connector
Ports	1 Media/Control LAN PoE	On an RJ-45 female connector
	1 RS-232	On a 3-pin terminal block connector for control
	1 RS-232	On a 3-pin terminal block connector for extension
	1 Fiber on an LC Connector	Standard: 1000BASE-SX, 1000BASE-LX
Network	1 GE	
	IPv4	
	Multicast	IGMPv2
	RTP/RTCP	Over UDP
	MPEG-TS	
	RTSP	
Video	Max In/Out Resolution	3840x21604K@60Hz 4:4:4
Video Streaming	Compression	H.264 / HEVC (H.265)
	Max Streaming Resolution	3840x21604K@60Hz 4:2:2
	Bit Rate Range	1-60Mbps
	Latency	Low latency: About 40msec
	Dual streaming support	Primary: Up to 3840x2160@30Hz 4:2:2 Secondary: Up to 1920x 1080@60Hz 4:2:2
Security	HTTPS, 802.1x, OWASP-10	
User Interface	Indicators	LINK, NET and ON LEDs, front panel channel number display
	Rear Panel	Factory reset button
	Controls	Embedded web pages, P3K API commands via Ethernet, front panel channel selection buttons
Power	PoE+	IEEE 802.3at
	Optional Power Supply	12V DC, 5A. Unit must be supplied by a power supply specified as a Limited Power Source (LPS) or PS2 source of supply.
	Consumption	13.6W
Environmental Conditions	Operating Temperature	0° to +40°C (32° to 104°F)
	Storage Temperature	–40° to +70°C (–40° to 158°F)
	Humidity	10% to 90%, RHL non-condensing
Regulatory Compliance	Safety	CE, FCC
	Environmental	RoHs, WEEE
Dimensions	Net Dimensions (W, D, H)	21.5cm x 16.3cm x 4.4cm (8.5" x 6.4" x 1.72")
	Shipping Dimensions (W, D, H)	34.5cm x 16.5cm x 5.2cm (13.6" x 6.5" x 2.05")
Weight	Net Weight	0.9kg (2lbs) approx.
	Shipping Weight	1.4kg (3.1lbs) approx.
Specifications are subject to change without notice at www.kramerav.com		

16.2 KDS-100DEC Specifications

Inputs	1 HDMI	On a female HDMI connector
Outputs	1 HDMI	On a female HDMI connector
	1 Balanced Audio	On a 5-pin terminal block connector
Ports	1 Ethernet	On an RJ-45 female connector
	1 RS-232	On a 3-pin terminal block connector for control
	1 RS-232	On a 3-pin terminal block connector for data
	1 Fiber on an LC Connector	Standard: 1000BASE-SX, 1000BASE-LX
Network	1 GE	
	IPv4	
	Multicast	IGMPv2
	RTP/RTCP	Over UDP
	MPEG-TS	
	RTSP	
Video	Max In/Out Resolution	3840x21604K@60Hz 4:4:4
Video Streaming	Compression	H.264 / H.265
	Streaming Resolution	3840x21604K@60Hz 4:2:2
	Bit Rate Range	1-60Mbps
	Latency	Low latency About 40msec
	Scaler	Yes
Security	HTTPS, 802.1x, OWASP-10	
User Interface	Indicators	LINK, NET and ON LEDs, front panel channel number display
	Rear Panel	Factory reset button
	Controls	Embedded web pages, P3K API commands via Ethernet, front panel channel selection buttons
Power	PoE+	IEEE 802.3at
	Optional Power Adapter	12V DC, 5A. Unit must be supplied by a power supply specified as a Limited Power Source (LPS) or PS2 source of supply.
	Consumption	13.6W
Environmental Conditions	Operating Temperature	0° to +40°C (32° to 104°F)
	Storage Temperature	–40° to +70°C (–40° to 158°F)
	Humidity	10% to 90%, RHL non-condensing
Regulatory Compliance	Safety	CE, FCC
	Environmental	RoHs, WEEE
Dimensions	Net Dimensions (W, D, H)	21.5cm x 16.3cm x 4.4cm (8.5" x 6.4" x 1.72")
	Shipping Dimensions (W, D, H)	34.5cm x 16.5cm x 5.2cm (13.6" x 6.5" x 2.05")
Weight	Net Weight	0.9kg (2lbs) approx.
	Shipping Weight	1.4kg (3.1lbs) approx.
Specifications are subject to change without notice at www.kramerav.com		

16.3 KDS-100EN-U Specifications

Inputs	1 HDMI	On a female HDMI connector
	1 Balanced Audio	On a 5-pin terminal block connector
Outputs	1 HDMI	On a female HDMI connector
	1 Balanced Audio	On a 5-pin terminal block connector
Ports	1 USB-B Host	On a female USB-B connector

	1 Media/Control LAN PoE	On an RJ-45 female connector
	1 RS-232	On a 3-pin terminal block connector for control
	1 RS-232	On a 3-pin terminal block connector for extension
	1 Fiber on an LC Connector	Standard: 1000BASE-SX, 1000BASE-LX
Network	1 GE	
	IPv4	
	Multicast	IGMPv2
	RTP/RTCP	Over UDP
	MPEG-TS	
	RTSP	
Video	Max In/Out Resolution	3840x21604K@60Hz 4:4:4
Video Streaming	Compression	H.264 / HEVC (H.265)
	Max Streaming Resolution	3840x21604K@60Hz 4:2:2
	Bit Rate Range	1-60Mbps
	Latency	Low latency: About 40msec
	Dual streaming support	Primary: Up to 3840x2160@30Hz 4:2:2 Secondary: Up to 1920x 1080@60Hz 4:2:2
Security	HTTPS, 802.1x, OWASP-10	
User Interface	Indicators	LINK, NET and ON LEDs, front panel channel number display
	Rear Panel	Factory reset button
	Controls	Embedded web pages, P3K API commands via Ethernet, front panel channel selection buttons
Power	PoE+	IEEE 802.3at
	Optional Power Supply	12V DC, 5A. Unit must be supplied by a power supply specified as a Limited Power Source (LPS) or PS2 source of supply.
	Consumption	13.6W
Environmental Conditions	Operating Temperature	0° to +40°C (32° to 104°F)
	Storage Temperature	–40° to +70°C (–40° to 158°F)
	Humidity	10% to 90%, RHL non-condensing
Regulatory Compliance	Safety	CE, FCC
	Environmental	RoHs, WEEE
Dimensions	Net Dimensions (W, D, H)	21.5cm x 16.3cm x 4.4cm (8.5" x 6.4" x 1.72")
	Shipping Dimensions (W, D, H)	34.5cm x 16.5cm x 5.2cm (13.6" x 6.5" x 2.05")
Weight	Net Weight	0.53kg (1.2lbs) approx.
	Shipping Weight	1.29kg (2.8lbs) approx.
Specifications are subject to change without notice at www.kramerav.com		

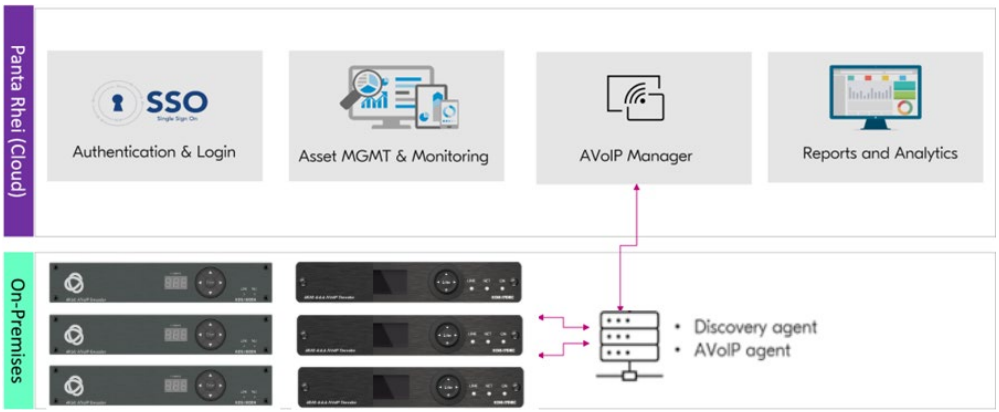
16.4 KDS-100DEC-U Specifications

Inputs	1 HDMI	On a female HDMI connector
Outputs	1 HDMI	On a female HDMI connector
	1 Balanced Audio	On a 5-pin terminal block connector
Ports	2 USB 3.0 Type A	On a female USB 3.0 connector
	1 Ethernet	On an RJ-45 female connector
	1 RS-232	On a 3-pin terminal block connector for control
	1 RS-232	On a 3-pin terminal block connector for data
	1 Fiber on an LC Connector	Standard: 1000BASE-SX, 1000BASE-LX
Network	1 GE	
	IPv4	
	Multicast	IGMPv2
	RTP/RTCP	Over UDP
	MPEG-TS	
	RTSP	
Video	Max In/Out Resolution	3840x21604K@60Hz 4:4:4
Video Streaming	Compression	H.264 / H.265
	Streaming Resolution	3840x21604K@60Hz 4:2:2
	Bit Rate Range	1-60Mbps
	Latency	Low latency About 40msec
	Scaler	Yes
Security	HTTPS, 802.1x, OWASP-10	
User Interface	Indicators	LINK, NET and ON LEDs, front panel channel number display
	Rear Panel	Factory reset button
	Controls	Embedded web pages, P3K API commands via Ethernet, front panel channel selection buttons
Power	PoE+	IEEE 802.3at
	Optional Power Adapter	12V DC, 5A. Unit must be supplied by a power supply specified as a Limited Power Source (LPS) or PS2 source of supply.
	Consumption	13.6W
Environmental Conditions	Operating Temperature	0° to +40°C (32° to 104°F)
	Storage Temperature	–40° to +70°C (–40° to 158°F)
	Humidity	10% to 90%, RHL non-condensing
Regulatory Compliance	Safety	CE, FCC
	Environmental	RoHs, WEEE
Dimensions	Net Dimensions (W, D, H)	21.5cm x 16.3cm x 4.4cm (8.5" x 6.4" x 1.72")
	Shipping Dimensions (W, D, H)	34.5cm x 16.5cm x 5.2cm (13.6" x 6.5" x 2.05")
Weight	Net Weight	0.53kg (1.2lbs) approx.
	Shipping Weight	1.29kg (2.8lbs) approx.
Specifications are subject to change without notice at www.kramerav.com		

Appendix A: Kramer AVoIP Manager

AVoIP Manager Overview

AVoIP Manager is a hybrid cloud-on-premises service within the Panta Rhei platform that provides centralized management of AV-over-IP devices across distributed environments. It enables users to configure, route, monitor, and manage Kramer devices remotely.



AVoIP Manager Requirements & Components

AVoIP Manager has two deployment options: On Cloud and On Premises:

1. Cloud (Panta Rhei Portal)
    - Configure device settings and routing logic.
    - Push configuration and routing rules to remote sites.
    - Monitor device status and receive real-time feedback.
    - Accessible via the Panta Rhei web portal.
2. On-Premises Site Agent
    - Installed on a local server or workstation.
    - Communicates with all Kramer devices on the local network.
    - Applies configurations received from the cloud.
    - Discovers AV devices in near real-time.
    - Reports status and results (success/failure) back to the cloud.

User Documentation

Click here to view the relevant AVoIP Manager User Documentation:

Appendix B: Configuring the Network Switch

Configuring the Network Switch

In unicast streaming the switch directs packets to the MAC address of the destination device and there is no need for special network configuration.

Make sure that your AV over IP network switch meets the following requirements:

1. Activate **IGMP Snooping -** This causes the network switch to “listen” for multicast traffic requests.

2. Activate **IGMP Immediate/Fast Leave -** This saves bandwidth by enabling decoders to notify the network switch that they are leaving the multicast group and to stop sending them the multicast group’s traffic.

3. Activate **Unregistered Multicast Filtering** – This saves bandwidth by telling the network switch to discard multicast traffic that is not requested by any devices on the network (devices must request to receive the stream).

4. Activate **PoE+** - Both KDS-100EN and KDS-100DEC are powered by PoE+ (power supplied by the switch), unless the optional power supply unit has been purchased and attached.

VLAN Configuration

Networks can be divided into VLAN (virtual local area network) segments, so that network traffic can be filtered and the network streams can be limited to certain segments.

KDS-100 devices support the use of VLANs and can be configured to attach VLAN tags to stream packets, along with VLAN CoS (local network class of service) priorities and DSCP (WAN differentiated services code point) priorities.

Appendix C: Third-Party and Open-Source Software Notice

This product includes third-party software components, including open-source libraries. Information about these components and their respective licenses is available upon written request and/or on Kramer's website at www.kramerav.com.

Appendix D: Protocol 3000

Kramer devices can be operated using Kramer Protocol 3000 commands sent via serial or Ethernet ports.

Understanding Protocol 3000

Protocol 3000 commands are a sequence of ASCII letters, structured according to the following.

- **Command format**:

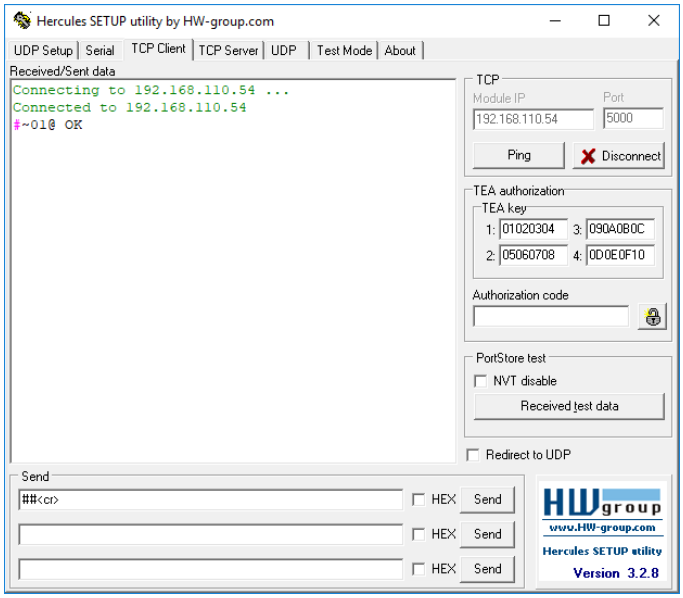
Prefix	Command Name	Constant (Space)	Parameter(s)	Suffix
#	Command	␣	Parameter	<CR>

- **Feedback format**:

Prefix	Device ID	Constant	Command Name	Parameter(s)	Suffix
~	nn	@	Command	Parameter	<CR><LF>

- **Command parameters** – Multiple parameters must be separated by a comma (,). In addition, multiple parameters can be grouped as a single parameter using brackets ([and]).
- **Parameters attributes** – Parameters may contain multiple attributes. Attributes are indicated with pointy brackets (<…>) and must be separated by a period (.).

The command framing varies according to how you interface with **KDS-100EN**. The following figure displays how the # command is framed using terminal communication software (such as Hercules):



Protocol 3000 Commands

Function	Description	Syntax	Response	Parameters/Attributes	Example
#	Protocol handshaking. Validates the Protocol 3000 connection and gets the machine number. Step-in master products use this command to identify the availability of a device.	#<CR>	~nn@ok<CR><LF>		#<CR>
AUTH-802-1X-ENABLE	Set Authentication 802.1X feature for the device per specific interface.	#AUTH-802-1X-ENABLE Interface ID,state<CR>	~nn@AUTH-802-1X-ENABLE Interface ID,state<CR><LF>	**Interface ID:** – 0 **State**: 0,1 – Enable/Disable	Enable 802 Security of interface 0 #AUTH-802-1X-ENABLE 0,1<CR>
AUTH-802-1X-ENABLE?	Get Authentication 802.1X feature for the device per specific interface.	#AUTH-802-1X-ENABLE? Interface ID<CR>	~nn@AUTH-802-1X-ENABLE Interface ID,state<CR><LF>	**Interface ID:** – 0 **State**: 0,1 – Enable/Disable	Get 802 security status of interface 0 #AUTH-802-1X-ENABLE? 0<CR>
AUTH-802-1X-OP-STAT?	Get Authentication 802.1X operational status	#AUTH-802-1X-OP-STAT? Interface ID<CR>	~nn@AUTH-802-1X-OP-STAT Interface ID ,state<CR><LF>	**Interface ID:** – 0 **State**: 0 - 3 – Enable/Disable	802 authentication is running #AUTH-802-1X-OP-STAT? 0<CR>
AV-SW-TIMEOUT	Set auto switching timeout.	#AV-SW-TIMEOUT action,time_out<CR>	~nn@AV-SW-TIMEOUT action,time_out<CR><LF>	action – video / audio switching actions 0 – Video signal lost 1 – New video signal detected 2 – Audio signal lost 3 – Audio signal detected 4 – Disable 5V on video output if no input signal detected 5 – Video cable unplugged 6 – Audio cable unplugged 7 – Video signal lost for signal routed as a result of a manual override action time_out - timeout in seconds, for different action it has different valid range: Action Range Default 0 5 - 90 5 1 0 - 90 0 2 5 - 90 5 3 0 - 90 0 4 0 - 90 0 5 0 - 90 0 6 0 - 90 0 7 0 - 90 5	Set auto switching "Disable 5V on video output if no input signal detected" to 5 seconds: #AV-SW-TIMEOUT 4,5<CR>
AV-SW-TIMEOUT?	Get auto switching timeout.	#AV-SW-TIMEOUT? action<CR>	~nn@AV-SW-TIMEOUT action,time_out<CR><LF>	action – video / audio switching actions 0 – Video signal lost 1 – New video signal detected 2 – Audio signal lost 3 – Audio signal detected 4 – Disable 5V on video output if no input signal detected 5 – Video cable unplugged 6 – Audio cable unplugged 7 – Video signal lost for signal routed as a result of a manual override action time_out - timeout in seconds, for different action it has different valid range: Action Range Default 0 5 - 90 5 1 0 - 90 0 2 5 - 90 5 3 0 - 90 0 4 0 - 90 0 5 0 - 90 0 6 0 - 90 0 7 0 - 90 5	Get auto switching "Disable 5V on video output if no input signal detected" value: #AV-SW-TIMEOUT? 4<CR>
BUILD-DATE?	Get device build date.	#BUILD-DATE?<CR>	~nn@BUILD-DATE date,time<CR><LF>	**date** – Format: YYYY/MM/DD **time** – Format: hh:mm:ss	Get the device build date: #BUILD-DATE?<CR>
CHANNEL-ID	Set channel or channel mode.	#CHANNEL-ID channel_mode, channel_id<CR>	~nn@CHANNEL-ID channel_mode, channel_id<CR><LF>	**channel_mode** – auto=0, man=1 **channel_id** - <channel number>	Set the channel to 18 #CHANNEL-ID 1,18<CR>
CHANNEL-ID?	Get channel or channel mode.	#CHANNEL-ID?<CR>	~nn@CHANNEL-ID? channel_mode, channel_id<CR><LF>	**channel_mode – auto=0, man=1** **channel_id** - <channel number>	Get the channel mode and number. #CHANNEL-ID?<CR>
COM-ROUTE	This command sets tunneling port routing. Every com port can send or receive data from the ETH port.	#COM-ROUTE com_id,port_type,port_id,eth_rep_en,ping_val<CR>	~nn@COM-ROUTE com_id,port_type,port_id,eth_rep_en,ping_val<CR><LF>	**com_id** – Machine dependent **port_type** – TCP/UDP 2 – TCP 1 – UDP **port_id** – TCP/UDP port number **eth_rep_en** – Ethernet Reply 0 – COM port does not send replies to new clients 1 – COM port sends replies to new clients. **Ping_val** – every x seconds the device sends an empty string to TCP client ("/0") (0 to 3600)	Set tunneling for TCP port 5000; where the COM port sends replies to new clients and the keep alive time is 1: #COM-ROUTE 1,tcp,5000,1,1<CR>
COM-ROUTE?	Get tunneling port routing.	#COM-ROUTE?,com_id<CR>	~nn@COM-ROUTE com_id,port_type,port_id,eth_rep_en,ping_val<CR><LF>	**com_id** – Machine dependent port_type – TCP/UDP 2 – TCP 1 – UDP **port_id** – TCP/UDP port number **eth_rep_en** – Ethernet Reply 0 – COM port does not send replies to new clients 1 – COM port sends replies to new clients. **Ping_val** – Every x seconds the device sends an empty string to TCP client ("/0") (0 to 3600)	Get tunneling port routing for all route tunnels: #COM-ROUTE?,*<CR>

Function	Description	Syntax	Response	Parameters/Attributes	Example
COM-ROUTE-ENABLE	Enable/Disable RS-232 Gateway	#COM-ROUTE-ENABLE Connector ID,Mode<CR>	~nn@COM-ROUTE-ENABLE Connector ID,Mode<CR><LF>	**Connector ID** 1 **Mode** ON/OFF 0-1	Get RS-232 gateway status #COM-ROUTE-ENABLE 1,1<CR>
COM-ROUTE-ENABLE?	Get RS-232 gateway status	#COM-ROUTE-ENABLE? Connector ID<CR>	~nn@COM-ROUTE-ENABLE Connector ID,Mode<CR><LF>	**Connector ID** 1 **Mode** ON/OFF 0-1	Enable RS-232 Gateway #COM-ROUTE-ENABLE 1,1<CR>
CPEDID	Copy EDID data from the output to the input EEPROM	#CPEDID edid_io, src_id, dest_bitmap<CR>	~nn@CPEDID edid_io,src_id,dest_bitmap,safe_mode<CR><LF>	**edid_io**: EDID source type (usually output) 0 – Input / 1 – Output / 2 – Default EDID / 3 – Custom EDID **src_id:** Number of chosen source stage 0..N **dest_bitmap:** Bitmap representing destination IDs. Format: XXXX…X, where X is hex digit. The binary form of every hex digit represents corresponding destinations 0 – EDID data is not copied to this destination / 1 – EDID data is copied to this destination. **safe_mode:** Safe mode 0 – device accepts the EDID as is without trying to adjust 1 – device tries to adjust the EDID (default value if no parameter is sent).	Copy the EDID data from Output 1 (EDID source) to the Input: #CPEDID 1,1,0<CR>
CPEDID-REMOTE	Load EDID from remote device.	#CPEDID-REMOTE Decoder output number,Decoder ID,Encoder Input,Destination ID,Decoder IP Address<CR>	~nn@CPEDID-REMOTE Decoder output number,Decoder ID,Encoder Input,Destination ID,Decoder IP Address<CR><LF>	**Decoder output number** - 1 **Decoder ID** -1 **Encoder Input number** - 2 **Destination ID** - 2 **Decoder IP Address** - Valid IP Address	Copy EDID from Decoder output to Encoder input #CPEDID-REMOTE 1,1,2,2,192.168.58.3<CR>
DISPLAY?	Get the output's HPD (hot plug display) status	#DISPLAY? out_index<CR>	~nn@DISPLAY out_index,status<CR><LF>	**out_index:** Number that indicates the specific output. 1-N (N= the total number of outputs) **status:** HPD status according to signal validation. 0 – Signal or sink is not valid 1 – Signal or sink is valid 2 – Sink and EDID is valid.	Get the output HPD status of Output 1: #DISPLAY? 1<CR>
ETH-ACTIVE-PHY?	Get the status of the currently active connector – SFP/RJ-45	#ETH-ACTIVE-PHY? 1,mod,1<CR>	~nn@ETH-ACTIVE-PHY <CR><LF>	1,mod,1- parameters that indicates which interface is connected 1-2.	The SFP connector is active #ETH-ACTIVE-PHY? 1,2,1<CR>
ETH-PORT	Set Ethernet port protocol. If the port number you enter is already in use, an error is returned. The port number must be within the following range: 0-(2^16-1).	#ETH-PORT port_type,port_id<CR>	~nn@ETH-PORT port_type,port_id<CR><LF>	**port_type** – TCP/UDP **port_id** – when port_type = TCP: 5000~5099 when port_type = UDP: 50000~50999	Set the Ethernet port protocol for TCP to port 12457: #ETH-PORT TCP,5000<CR>
ETH-PORT?	Get Ethernet port protocol.	#ETH-PORT? port_type<CR>	~nn@ETH-PORT port_type,port_id<CR><LF>	**port_type** – TCP/UDP **port_id** – when port_type = TCP: 5000~5099 when port_type = UDP: 50000~50999	
ETH-TUNNEL?	Get open tunnels parameters.	#ETH-TUNNEL? tunnel_id<CR>	~nn@ETH-TUNNEL tunnel_id,cmd_name,port_type,port_id,eth_ip,remote_port_id,eth_rep_en,connection_type <CR><LF>	**tunnel_id:** Tunnel ID number * (get all open tunnels) **cmd_name:** UART number **port_type:** TCP/UDP 0 – TCP 1 – UDP **port_id:** TCP/UDP port number **eth_ip:** Client IP address **remote_port_id:** Remote port number **eth_rep_en:** Ethernet Reply 0 – COM port does not send replies to new clients 1 – COM port sends replies to new clients **Connection_type** 0 – not wired connection 1 – wired connection	Get Tunnel id 1 details #ETH-TUNNEL? 1<CR>
FACTORY	Reset device to factory default configuration. This command deletes all user data from the device. The deletion can take some time. Your device may require powering off and powering on for the changes to take effect.	#FACTORY<CR>	~nn@FACTORY ok<CR><LF>		Reset the device to factory default configuration: #FACTORY<CR>
GEDID	Get EDID data on certain input/output.	#GEDID io_mode,in_index<CR>	~nn@GEDID io_mode,in_index,size,Binary DATA<CR><LF>	**io_mode:** Input/Output 0 – Input, 1 – Output, 2 – Default EDID, 3 – Custom EDID **in_index:** Number that indicates the specific input 1-N (N= the total number of inputs) size: Size of data to be sent from device 0 means no EDID support **Binary DATA:** EDID Binary data in binary format.	Get EDID data for input #1: #GEDID? 0,1<CR>

Function	Description	Syntax	Response	Parameters/Attributes	Example
HDCP-MOD	Set HDCP mode. NOTE: Set HDCP working mode on the device input.	#**HDCP-MOD** in_index,mode<CR>	~nn@**HDCP-MOD** in_index,mode<CR><LF>	in_index – Number that indicates the specific input: 1-N (N= the total number of inputs) mode – HDCP mode: 0 – HDCP Off 1 – HDCP On	Set the input HDCP-MODE of IN 1 to Off: #HDCP-MOD 1,0<CR>
HDCP-MOD?	Get HDCP mode. **NOTE:** Set HDCP working mode on the device input.	#**HDCP-MOD?** in_index<CR>	~nn@**HDCP-MOD** in_index,mode<CR><LF>	in_index – Number that indicates the specific input: 1-N (N= the total number of inputs) mode – HDCP mode: 0 – HDCP Off 1 – HDCP On	Get the input HDCP-MODE of IN 1 HDMI: #HDCP-MOD <CR>
HDCP-STAT?	Get HDCP signal status. **NOTE:** io_mode =1 – get the HDCP signal status of the sink device connected to the specified output. io_mode =0 – get the HDCP signal status of the source device connected to the specified input.	#**HDCP-STAT?** io_mode,in_index<CR>	~nn@**HDCP-STAT** io_mode,in_index,status<CR><LF>	io_mode – Input/Output 0 – Input 1 – Output io_index – Number that indicates the specific number of inputs or outputs (based on io_mode): 1-N (N=total number of inputs or outputs) status – Signal encryption status - valid values On/Off 0 – HDCP Off 1 – HDCP On (1.4) 2 – HDCP On (2.3)	Get the output HDCP-STATUS of IN 1: #HDCP-STAT? 0,1<CR>
HELP	Get command list or help for specific command.	#HELP<CR> #HELP cmd_name<CR>	1. Multi-line: ~nn@Device cmd_name, cmd_name<CR><LF> To get help for command use: HELP (COMMAND_NAME)<CR><LF> ~nn@HELP cmd_name:<CR><LF> description<CR><LF> USAGE:usage<CR><LF>	**cmd_name** – Name of a specific command	Get the command list: #HELP<CR> To get help for AV-SW-TIMEOUT: HELP av-sw-timeout<CR>
IDV	Set visual indication from device. Using this command, some devices can light a sequence of buttons or LEDs to allow identification of a specific device from similar devices.	#IDV<CR>	~nn@IDV ok<CR><LF>		#IDV<CR>
KDS-ACTION	Set action to perform by encoder/decoder.	#KDS-ACTION kds_mode<CR>	~nn@KDS-ACTION kds_mode<CR><LF>	**kds_mode** – Action (state) for encoder/decoder 0 – Stop 1 – Play 2 – Save config	Stop the encoder/decoder: #KDS-ACTION 0<CR>
KDS-ACTION?	Get last action (state) performed by encoder/decoder.	#KDS-ACTION?<CR>	~nn@KDS-ACTION kds_mode<CR><LF>	**kds_mode** – Action (state) for encoder/decoder 0 – Stop 1 – Play 2 – Save config	Get the last action performed by the encoder/decoder: #KDS-ACTION?<CR>
KDS-APPLY	Save configuration for all inputs	#KDS-APPLY * <CR>	~nn@KDS-APPLY all<CR><LF>	**all:** Save all inputs configuration *	Save configuration for all inputs #KDS-APPLY *<CR>
KDS-B-FRAMES	Set current streaming b-frames	#KDS-B-FRAMES input,B-Frames<CR>	~nn@KDS-B-FRAMES input,B-Frames<CR><LF>	**input:** 1-2 (stream 1 or stream 2). **B-Frames:** Value 0-4.	Set B-Frames of input 1 to 0 #KDS-B-FRAMESV1,0<CR>
KDS-B-FRAMES?	Get current streaming b-frames	#KDS-B-FRAMES? input<CR>	~nn@KDS-B-FRAMES input,B-Frames<CR><LF>	**input:** 1-2 (stream 1 or stream 2). **B-Frames:** Value 0-4.	Get B-Frames of input 1 #KDS-B-FRAMES? 1<CR>
KDS-BR	Set bitrate.	#KDS-BR bitrate <CR>	~nn@KDS-BR bitrate<CR><LF>	**Bitrate** – 1-60 in Mbps	set bit rate to 15 mbps: #KDS-BR? 15<CR>
KDS-BR?	Get bitrate.	#KDS-BR? <CR>	~nn@KDS-BR bitrate<CR><LF>	Bitrate in Mbps	Get bit rate: #KDS-BR?<CR>
KDS-CS?	Get color space of the source	#KDS-CS? Input<CR>	~nn@KDS-CS Input,Color Space<CR><LF>	**Input:** Input ID 1	Get Input 1 color space information #KDS-CS? 1<CR>
KDS-EN	Set encoding method to encoder/decoder.	#KDS-EN method<CR>	~nn@KDS-EN method<CR><LF>	**Method** 0-encoder, 1-decoder	Set encoding method to decoder: #KDS-EN 1<CR>
KDS-EN?	Get encoding method.	#KDS-EN?<CR>	~nn@KDS-EN method<CR><LF>	**Method** 0-encoder, 1-decoder	Get encoding method: #KDS-EN 1<CR>
KDS-FR?	Get frame rate.	#KDS-FR?<CR>	~nn@KDS-FR value<CR><LF>	**value:** Frame rate in frames per second.	Get frame rate: #KDS-FR?<CR>
KDS-GOP	Set GOP (group of pictures) size.	#KDS-GOP? Input, gop_value<CR>	~nn@KDS-GOP input,gop_value<CR><LF>	**Input:** **Value:** GOP size (1 – 1000). Number of frames between every keyframe.	
KDS-GOP?	Get GOP (group of pictures) size.	#KDS-GOP?<CR>	~nn@KDS-GOP value<CR><LF>	**Input:** 1,2 (stream 1 or stream 2). **Value:** GOP size. Number of frames between every keyframe.	Get GOP size: #KDS-GOP?<CR>
KDS-IDR	Set Encoder IDR (Instantaneous Decoder Refresh) Frequency.	#KDS-IDR Input,IDR Frequency<CR>	~nn@KDS-IDR Input,IDR Frequency<CR><LF>	**Input:** Input 1-2 (stream 1 or stream 2). **IDR Frequency:** -1 – infinite.	Set Input 1 IDR frequency of 60 #KDS-IDR 1,60<CR>
KDS-IDR?	Get Encoder IDR Frequency.	#KDS-IDR? Input<CR>	~nn@KDS-IDR Input,IDR Frequency<CR><LF>	**Input:** Input 1-2 (stream 1 or stream 2). **IDR Frequency:** -1 – infinite.	Get IDR Frequency of input 1 #KDS-IDR? 1<CR>
KDS-LATENCY	Set Encoder IDR (Instantaneous Decoder Refresh) Frequency.	#KDS-IDR Input,IDR Frequency<CR>	~nn@KDS-IDR Input,IDR Frequency<CR><LF>	Input: Input 1-2 (stream 1 or stream 2). IDR Frequency: -1 – infinite.	Set Input 1 IDR frequency of 60 #KDS-IDR 1,60<CR>

Function	Description	Syntax	Response	Parameters/Attributes	Example
KDS-LATENCY?	Get Encoder IDR Frequency.	#KDS-IDR? Input<CR>	~nn@KDS-IDR Input,IDR Frequency<CR><LF>	**Input:** Input 1-2 (stream 1 or stream 2). **IDR Frequency:** -1 – infinite.	Get IDR Frequency of input 1 #KDS-IDR? 1<CR>
KDS-LATENCY-MODE	Set current streaming latency mode	#KDS-LATENCY-MODE input,l_mode<CR><LR>	~nn@KDS-LATENCY-MODE input,l_mode<CR><LR>	**Input:** Input 1-2 (stream 1 or stream 2). **L_mode:** 0=Default,1=Normal,2=LowLatency	Set Input 1 to low latency #KDS-LATENCY-MODE 1,2<CR>
KDS-LATENCY-MODE?	Get current streaming latency mode	#KDS-LATENCY-MODE? input<CR><LR>	~nn@KDS-LATENCY-MODE input,l_mode<CR><LR>	**Input:** Input 1-2 (stream 1 or stream 2). **L_mode:** 0=Default,1=Normal,2=LowLatency	Get the latency level of Input 1: #-KDS-LATENCY-MODE 1,2<CR>
KDS-METHOD	Set unicast / multicast streaming method. Available only when RTP Streaming Protocol is configured (see KDS-PROT command).	#KDS-METHOD input,method<CR>	~nn@KDS-METHOD input,method<CR><LF>	**Input -** Input 1-2 (stream 1 or stream 2). **method** – Streaming method 1 – Unicast 2 – Multicast	Get current streaming method of encoder/decoder: #KDS-METHOD<CR>
KDS-METHOD?	Get unicast / multicast streaming method. Available only when RTP Streaming Protocol is configured (see KDS-PROT command).	#KDS-METHOD? input<CR>	~nn@KDS-METHOD input,method<CR><LF>	**input –** Input 1 – 2 (stream 1 or stream 2). **method** – Streaming method 1 – Unicast 2 – Multicast	Set the current streaming method of input 1 to Unicast on the encoder/decoder : #KDS-METHOD 1,1 <CR>
KDS-MOD	Set device profile mode.	#KDS-MOD <stream_id>,<mode_id> <CR>	~nn@KDS-MOD mode<CR><LF>	**<Stream_id>** Identifies the target stream **<mode_id>** Defines the streaming mode **Profile 11** – Broadcast Streaming **Profile 12** – Dual Channel Live **Profile 13** – Dual Channel Recording **Profile 14** – ProAV Low Latency Stream **Profile 15** – SRT Streaming **Profile 16** – RTMP Streaming **Profile 18** – IPTV Distribution	Set IPTV Distribution Profile: #KDS-MOD 1,18<CR> **NOTE:** After selecting a streaming profile with #KDS-MOD, you must apply the configuration to activate it #KDS-APPLY *\r * → Apply the configuration to all streams. The command must be terminated with a carriage return (\r).
KDS-MOD?	Get device current working mode.	#KDS-MOD?<CR>	~nn@KDS-MOD mode<CR><LF>	**mode:** Device working mode 3 – HIGH_QUALITY.	Get device current working mode: #KDS-MOD?<CR>
KDS-MULTICAST	Set multicast group address and TTL value (encoder mode only). Multicast groups are identified by special IP addresses between the range of 224.0.0.0 and 239.255.255.255. Addresses within the 224.0.0.0 range are commonly reserved for local subnet communications. TTL is the time to live of the datagram to avoid it being looped forever due to routing errors.	#KDS-MULTICAST group_ip,ttl<CR>	~nn@KDS-MULTICAST group_ip,ttl<CR><LF>	**group-ip** - Multicast group IP used for streaming packets in Multicast Streaming Method. **ttl** - Time to Live of the streamed packets.	Set multicast group address and TTL value #KDS-MULTICAST 225.225.0.10,1<CR>
KDS-MULTICAST?	Get multicast group address and TTL value.	#KDS-MULTICAST?<CR>	~nn@KDS-MULTICAST group_ip,ttl<CR><LF>	**group-ip** - Multicast group IP used for streaming packets in multicast streaming method. **ttl** - Time to Live of the streamed packets.	Set multicast group address and TTL value #KDS-MULTICAST 225.225.0.10,1<CR>
KDS-MULTICAST-PREFIX	Set multicast group address value.	#KDS-MULTICAST-PREFIX Input,Octet 1,Octet 2,Octet 3,Octet 4<CR>	~nn@KDS-MULTICAST-PREFIX Input,Octet 1,Octet 2,Octet 3,Octet 4<CR><LF>	**Input:** 1-2 (stream 1 or stream 2). **Octet 1:** 224-239 **Octet 2:** 0-255 **Octet 3:** 0 **Octet 4:** 0	Set Multicast Prefix of input 2 to 230.3.0.0 #KDS-MULTICAST-PREFIX 2,230,3,0,0<CR>
KDS-MULTICAST-PREFIX?	Get multicast group address value.	#KDS-MULTICAST-PREFIX Input<CR>	~nn@KDS-MULTICAST-PREFIX Input,Octet 1,Octet 2,Octet 3,Octet 4<CR><LF>	**Input:** 1-2 **Octet 1:** 224-239 **Octet 2**: 0-255 **Octet 3:** 0 **Octet 4:** 0	Set Multicast Prefix of input 2 to 230.3.0.0 #KDS-MULTICAST-PREFIX 2,230,3,0,0<CR>
KDS-NUM-SLICES	Set current streaming number of slices produced for each frame.	#KDS-NUM-SLICES Input,Slices<CR>	~nn@KDS-NUM-SLICES Input,Slices<CR><LF>	**Input:** Input 1-2 (stream 1 or stream 2). **Slices:** Slice Value 4-32	Set 8 slices per frame to input 1. #KDS-NUM-SLICES 1,8 <CR>
KDS-NUM-SLICES?	Get current streaming number of slices produced for each frame.	#KDS-NUM-SLICES? Input<CR>	~nn@KDS-NUM-SLICES Input,Slices<CR><LF>	**Input:** Input 1-2 (stream 1 or stream 2). **Slices:** Slice Value 4-32	Get Slice value of input 1 #KDS-NUM-SLICES? 1<CR>
KDS-OP-STAT?	Get streaming operational status.	#KDS-OP-STAT?<CR>	~nn@KDS-OP-STAT value<CR><LF>	**value:** Streaming operational status 0 – running 1 – Not_running/stop 2 – error.	Get streaming operational status: #KDS-OP-STAT?<CR>
KDS-PROT?	Get current streaming protocol of encoder/decoder.	#KDS-PROT? stream<CR>	~nn@KDS-PROT protocol<CR><LF>	**Stream:** 1 encoder, 2 decoder. **protocol:** Encoder/decoder streaming protocol 0 – RTP, 1 - RTSP	Get current streaming protocol of encoder/decoder: #KDS-PROT? 1/2<CR>

Function	Description	Syntax	Response	Parameters/Attributes	Example
KDS-RESOL?	Get actual AV stream resolution.	#KDS-RESOL? io_mode,io_index,is_native<CR>	~nn@KDS-RESOL? io_mode,io_index,is_native,resolution<CR><LF>	**io_mode:** Input/Output 0 – Input 1 – Output **io_index:** Number that indicates the specific input or output port. 1-N (N= the total number of input or output ports) **is_native:** Native resolution flag 0 – Off 1 – On **resolution:** Resolution index 0=No Signal (for input) / Native – EDID (for output) 31=1920x1080p@50Hz 34=1920x1080p@29.97Hz/30Hz 74=3840x2160p@30Hz 76=3840x2160p@60Hz	
KDS-SCALE	Set scaling mode. Encoder only, requires a reboot to activate. Scaling is only supported from resolutions: up-scaled 720p to 1080p, and down-scaled 1080p to 720p.	#KDS-SCALE value<CR>	~nn@KDS-SCALE value,res_type<CR><LF>	**value** – Streamer Decoder Scaling Mode 0 – Pass Thru 1 – Scaling **res_type** – The resolution mode on the display, for example "S:1920x1080p-60"	Set scaling mode: #KDS-SCALE 1<CR>
KDS-SCALE?	Get scaling mode.	#KDS-SCALE? <CR>	~nn@KDS-SCALE value,res_type<CR><LF>	**value** – Streamer Decoder Scaling Mode 0 – Pass Thru 1 – Scaling **res_type** – The resolution mode on the display, for example "S:1920x1080p-60"	Get scaling mode #KDS-SCALE?<CR>
KDS-SCALE-CS	Set KDS Scale Color Space.	#KDS-SCALE-CS stream_id,scaling_color_space<CR>	~nn@KDS-SCALE-CS<CR><LF>	**stream id** number 1 – 2 (stream 1 or stream 2). **scaling_color_space**: 0 - ScalingColorSpace_NV12_4_2_0, 1 - ScalingColorSpace_NV16_4_2_2, (0 – 1)	Set Scaling Color Space Stream 1 to NV12_4_2_0 #KDS-SCALE-CS 1,0<CR>
KDS-SCALE-CS?	Get KDS Scale Color Space.	#KDS-SCALE-CS? stream_id <CR>	~nn@KDS-SCALE-CS<CR><LF>	**stream_id:** 1 – 2 (stream 1 or stream 2).	Get Scaling Color Space Stream 1 #KDS-SCALE-CS? 1<CR>
KDS-SCALE-LIST?	Return list of supported video resolutions.	#KDS-SCALE-LIST? stream_id <CR>	~nn@KDS-SCALE-LIST<CR><LF>	**stream_id:** 1 – 2 (stream 1 or stream 2).	Get decoder scaling list from stream_id 1 #KDS-SCALE-LIST? 1<CR>
KDS-START-OVERLAY	Set KVM Master Name.	#KVM-MASTER Name<CR>	~nn@KVM-MASTER Name<CR><LF>	**Name:** IP address boundary to ip address	Set KVM ip address of 192.168.30.3 #KVM-MASTER 192.168.30.3<CR>
KVM-MASTER?	Get KVM Master Name.	#KVM-MASTER?<CR>	~nn@KVM-MASTER Name<CR><LF>	**Name:** IP address boundary to ip address	Get KVM ip address #KVM-MASTER?<CR>
KVM-MODE?	Get KVM Mode.	#KVM-MODE?<CR>	~nn@KVM-MODE Mode<CR><LF>	**Mode:** Mode ON/OFF	Get KVM status #KVM-MODE?<CR>
LDEDID	Write EDID data from external application to device. When the unit receives the LDEDID command it replies with READY and enters the special EDID packet wait mode. In this mode the unit can receive only packets and not regular protocol commands. If the unit does not receive correct packets for 30 seconds or is interrupted for more than 30 seconds before receiving all packets, it sends a timeout error ~nn@LDEDID err01<CR><LF> and returns to the regular protocol mode. If the unit received data that is not a correct packet, it sends the corresponding error and returns to the regular protocol mode.	#LDEDID edid_io,dest_bitmask,edid_size, safe_mode<CR>	~nn@LDEDID edid_io,dest_bitmask,edid_size, safe_mode,ready<CR><LF>	**edid_io:** EDID destination type (usually input) 0 – Input,1 – Output, 2 – Default EDID 3 – Custom EDID **dest_bitmask:** Bitmap representing destination IDs. Format: 0x********, where * is ASCII presentation of hex digit. The binary presentation of this number is a bit mask for destinations. Setting '1' means EDID data has to be copied to this destination. **edid_size:** EDID data size. **safe_mode:** Safe mode. 0 – Device accepts the EDID as is without trying to adjust, 1 – Device tries to adjust the EDID. ready: Data in protocol packets Using the Packet Protocol Send a command: LDRV, LOAD, IROUT, LDEDID Receive Ready or ERR### If **ready:** a. Send a packet, b. Receive OK on the last packet, c. Receive OK for the command packet structure: Packet ID (1, 2, 3…) (2 bytes in length) Length (data length + 2 for CRC) – (2 bytes in length) Data (data length -2 bytes) CRC – 2 bytes 01 02 03 04 05 Packet ID Length Data CRC 5. In response: ~nnnn ok (Where NNNN is the received packet ID in ASCII hex digits).	
MANAGER-ID?	Get Manager ID	#MANAGER-ID token<CR>	~nn@MANAGER-ID token	token - the encrypted token	Set the device be provisioned with one AVoIP Manager #MANAGER-ID VALIDTOKEN<CR>
MODEL?	Get device model.	#MODEL?<CR>	~nn@MODEL model_name<CR><LF>	**model_name:** String of up to 19 printable ASCII chars.	Get the device model: #MODEL? <CR>
NAME	Set the device's DNS name. Requires DNS feature is on. Sets a DNS identifier, not the model name.	#NAME machine_name<CR>	~nn@NAME machine_name<CR><LF>	**machine_name:** String of up to 15 alpha-numeric chars (can include hyphen, not at the beginning or end).	Set the DNS name of the device to room-442: #NAME room-442<CR>
NAME?	Get the device's DNS name.	#NAME?<CR>	~nn@NAME machine_name<CR><LF>	**machine_name:** String of up to 15 alpha-numeric chars (can include hyphen, not at the beginning or end).	Get the DNS name of the device: #NAME?<CR>

Function	Description	Syntax	Response	Parameters/Attributes	Example
NAME-RST	Reset device's DNS name to factory default. Factory default DNS name is "KRAMER_" + 4 last digits of device serial number.	#NAME-RST<CR>	~nn@NAME-RST ok<CR><LF>		Reset the machine name (S/N last digits are 0102): #NAME-RST kramer_0102<CR>
NET-DHCP	Set DHCP mode. Only 1 is relevant for the mode value. To disable DHCP, the user must configure a static IP address for the device. Connecting Ethernet to devices with DHCP may take time in some networks. To connect with a randomly assigned DHCP IP, specify the device DNS name (if available) using the NAME command. You can also get an assigned IP by direct connection to USB or RS-232 protocol port, if available. For proper settings consult your network administrator. For Backward compatibility, the id parameter can be omitted. In this case, the Network ID, by default, is 0, which is the Ethernet control port.	#NET-DHCP netw_id,dhcp_state<CR>	~nn@NET-DHCP netw_id,dhcp_state<CR><LF>	**netw_id** – Network ID–the device network interface (if there are more than one). Counting is 0 based, meaning the control port is '0', additional ports are 1,2,3…. **dhcp_state** – 1 – Try to use DHCP. (If unavailable, use the IP address set by the factory or the net-ip command).	Enable DHCP mode for port 1, if available: #NET-DHCP 1,1<CR>
NET-DHCP?	Get DHCP mode. For Backward compatibility, the network ID can be omitted (it will be assigned the default value of 0, which is the Ethernet control port).	#NET-DHCP? netw_id<CR>	~nn@NET-DHCP netw_id,dhcp_state<CR><LF>	**netw_id** – Network ID–the device network interface (if there are more than one). Counting is 0 based, meaning the control port is '0', additional ports are 1,2,3…. **dhcp_state** – 1 – Try to use DHCP. (If unavailable, use the IP address set by the factory or the net-ip command).	Get DHCP mode for port 1, if available: #NET-DHCP? 1<CR>
NET-DNS	Set the ID and IP of the DNS name server. If dns_id is out of the defined DNS range, Error Code #3 (ERR_PARAMETER_OUT_OF_RANGE) is returned.	#NET-DNS dns_id,dns_ip<CR>	~nn@NET-DNS dns_id,dns_ip<CR><LF>	**dns_id:** ID of the DNS name server to retrieve, indexing starts at "0" **dns_ip:** IP address of the DNS server.	Set the DNS name server's ID and IP. #NET-DNS DNS,192.168.34.23 <CR>
NET-DNS?	Get the ID and IP pf the DNS name server. If dns_id is out of the defined DNS range, Error Code #3 (ERR_PARAMETER_OUT_OF_RANGE) is returned.	#NET-DNS? dns_id<CR>	~nn@NET-DNS dns_id,dns_ip<CR><LF>	**dns_id:** ID of the DNS name server to retrieve, indexing starts at "0" **dns_ip:** IP address of the DNS server.	Get DNS name server: #NET-DNS? <CR>
NET-MAC?	Get MAC address. For backward compatibility, the id parameter can be omitted. In this case, the Network ID, by default, is 0, which is the Ethernet control port.	#NET-MAC? id<CR>	~nn@NET-MAC id,mac_address<CR><LF>	**id** – Network ID–the device network interface (if there are more than one). Counting is 0 based, meaning the control port is '0', additional ports are 1,2,3…. **mac_address** – Unique MAC address. Format: XX-XX-XX-XX-XX-XX where X is a hex digit	#NET-MAC? id<CR>
NET-SERVICE	Maps applicational service to specific network interface	#NET-SERVICE service_id,netw_id<CR>	~nn@NET-SERVICE service_id,port<CR><LF>	service_id – ID of the service: 0 – Control 1 – Stream 2 – Dante port – 0,1…. physical interface	Set Dante service to LAN-2(eth1) #NET-SERVICE 2,1<CR>
NET-SERVICE?	Get applicational service to specific network interface mapping	#NET-SERVICE? service_id<CR>	~nn@NET-SERVICE service_id,port<CR><LF>	service_id – ID of the service: 0 – Control 1 – Stream 2 – Dante port – 0,1…. physical interface	Get Dante service LAN port #NET-SERVICE? 2<CR>
NET-SRV-802-1Q	Set a network service 802.1Q configuration.	#NET-SRV-802-1Q service_id,mode,vlan_id,cos<CR>	~nn@NET-SRV-802-1Q service_id,mode,vlan_id,cos<CR><LF>	service_id – ID of the service: 0 – Control 1 – Stream 2 – Dante mode – enable 802.1Q 0 – off (When mode is Off, vlan_id and cos will be ignored) 1 – on vlan_id – 2~4000 (Optional, when mode is 1, must be provided) cos – 0~7 (Optional, when mode is 1, must be provided)	Set Control service 802.1Q enable with VLAN ID 10, Cos 6 #NET-SRV-802-1Q 0,1,10,6 <CR> Set Stream service 802.1Q Off #NET-SRV-802-1Q 0,0 <CR>
NET-SRV-802-1Q?	Get a network service 802.1Q configuration.	#NET-SRV-802-1Q? service_id<CR>	~nn@NET-SRV-802-1Q service_id,mode,vlan_id,cos<CR><LF>	service_id – ID of the service: 0 – Control 1 – Stream 2 – Dante mode – enable 802.1Q 0 – Off 1 – On vlan_id – 2~4000 cos – 0~7	Get Control service 802.1Q #NET-SRV-802-1Q? 0 <CR>
NET-SRV-APPLY	Apply the vlan configuration defined in NET-SRV-CONFIG..	#NET-SRV-APPLY <CR>	~nn@NET-SRV-APPLY <CR><LF>		Apply the VLAN configuration #NET-SRV-APPLY<CR>

Function	Description	Syntax	Response	Parameters/Attributes	Example
NET-SRV-CONFIG	Set a network configuration for application services. NOTE: If the gateway address is not compliant to the subnet mask used for the host IP, the command will return an error. Subnet and gateway compliancy specified by RFC950. NOTE: This set the device to DHCP OFF automatically.	#NET-SRV-CONFIG service_id,net_ip,net_mask,gateway,dns<CR>	~nn@NET-SRV-CONFIG service_id,net_ip,net_mask,gateway,dns<CR><LF>	service_id – ID of the service: 0 – Control 1 – Stream 2 – Dante net_ip – Network IP net_mask – Network mask gateway – Network gateway dns - DNS address	Set the device control service network to IP address 192.168.113.10, net mask 255.255.0.0, and gateway 192.168.0.1: #NET-SRV-CONFIG 0,192.168.113.10,255.255.0.0, 192.168.0.1<CR>
NET-SRV-CONFIG?	Get a network configuration for application services.	#NET-SRV-CONFIG? service_id<CR>	~nn@NET-SRV-CONFIG service_id,net_ip,net_mask,gateway,dns<CR><LF>	service_id – ID of the service: 0 – Control 1 – Stream 2 – Dante net_ip – Network IP net_mask – Network mask gateway – Network gateway dns - DNS address	Get network configuration for control service: #NET-SRV-CONFIG? 0<CR>
NET-SRV-DHCP	Set DHCP mode on application services. NOTE: To disable DHCP, the user must configure a static IP address for the device. Connecting Ethernet to devices with DHCP may take more time in some networks.	#NET-SRV-DHCP service_id,dhcp_state<CR>	~nn@NET-SRV-DHCP service_id,dhcp_state<CR><LF>	service_id – ID of the service: 0 – Control 1 – Stream 2 – Dante dhcp_state – 1 – Try to use DHCP. (If unavailable, use the IP address set by the factory or the net-ip command).	Enable DHCP mode for port 0, if available: #NET-SRV-DHCP 0,1<CR>
NET-SRV-DHCP?	Get DHCP mode on application services.	#NET-SRV-DHCP? service_id<CR>	~nn@NET-SRV-DHCP service_id,dhcp_state<CR><LF>	service_id – ID of the service: 0 – Control 1 – Stream 2 – Dante dhcp_state – 1 – Try to use DHCP. (If unavailable, use the IP address set by the factory or the net-ip command).	Get DHCP mode for control service: #NET-SRV-DHCP? 0<CR>
NET-SRV-DSCP	Set a network service DSCP configuration.	#NET-SRV-DSCP service_id,dscp<CR>	~nn@NET-SRV-DSCP service_id,dscp<CR><LF>	service_id – ID of the service: 0 – Control 1 – Stream 2 - Dante (Can't be changed) dscp – 0~63	Set Control service DSCP as 63 #NET-SRV-DSCP 0,63<CR>
NET-SRV-DSCP?	Get a network service DSCP configuration.	#NET-SRV-DSCP? service_id<CR>	~nn@NET-SRV-DSCP service_id,dscp<CR><LF>	service_id – ID of the service: 0 – Control 1 – Stream 2 - Dante dscp – 0~63	Get Control service DSCP #NET-SRV-DSCP? 0<CR>
PORTS-LIST?	Get the port list of this machine. The response is returned in one line and terminates with<CR><LF>. The response format lists port IDs separated by commas.	#NET-SRV-DSCP service_id,dscp<CR>	~nn@NET-SRV-DSCP service_id,dscp<CR><LF>	service_id – ID of the service: 0 – Control 1 – Stream 2 - Dante (Can't be changed) dscp – 0~63	Set Control service DSCP as 63 #NET-SRV-DSCP 0,63<CR>
PROT-VER?	Get device protocol version.	#PROT-VER? <CR>	~nn@PROT-VER 3000:,version<CR><LF>	**3000::** Prefix **version:** XX.XX where X is a decimal digit	Get the device protocol version: #PROT-VER? <CR>
RESET	Reset device. To avoid locking the port due to a USB bug in Windows, disconnect USB connections immediately after running this command. If the port was locked, disconnect and reconnect the cable to reopen the port.	#RESET<CR>	~nn@RESET ok<CR><LF>		Reset the device: #RESET<CR>
SIGNAL?	Get input signal status.	#SIGNAL? in_index<CR>	~nn@SIGNAL in_index,status<CR><LF>	**in_index**: Number that indicates the specific input 1-N (N= the total number of inputs) **status**: Signal status according to signal validation 0 – Off 1 – On	Get the input signal lock status of IN 1: #SIGNAL? 1<CR>

Function	Description	Syntax	Response	Parameters/Attributes	Example
SIGNALS-LIST?	Get signal ID list of this device. The response format lists signal IDs separated by commas. This is an Extended Protocol 3000 command.	#SIGNALS-LIST? <CR><LF>	~nn@SIGNALS-LIST [direction_type.port_format.port_label.signal_type.index,]<CR><LF>	The following attributes comprise the signal ID: **direction_type** – Direction of the port: IN – Input OUT – Output BOTH – Bi-directional (e.g. for RS-232) **port_format** – Type of signal on the port: HDMI HDBT ANALOG_AUDIO AMPLIFIED_AUDIO TOS SPDIF MIC RS-232 IR USB_A USB_B **port_label** – The port number as printed on the front or rear panel VIDEO AUDIO ARC RS232 IR USB **signal_type** – Signal ID attribute. **index** – Indicates a specific channel number when there are multiple channels of the same type	Get signal ID list: #SIGNALS-LIST?<CR>
SN?	Get device serial number.	#SN? <CR>	~nn@SN serial_num<CR><LF>	**serial_num** – 14 decimal digits, factory assigned	Get the device serial number: #SN? <CR>
TIME	Set device time and date. The year must be 4 digits. The device does not validate the day of week from the date. Time format - 24 hours. Date format - Day, Month, Year.	#TIME day_of_week,date,data<CR>	~nn@TIME day_of_week,date,data<CR><LF>	**day_of_week** – One of {SUN,MON,TUE,WED,THU,FRI,SAT} **date** – Format: DD-MM-YYYY. **data** – Format: hh:mm:ss	Set device time and date to December 5, 2018 at 2:30pm: #TIME mon,05-12-2018,14:30:00<CR>
TIME?	Get device time and date. The year must be 4 digits. Time format - 24 hours. Date format - Day, Month, Year.	#TIME? <CR>	~nn@TIME day_of_week,date,data<CR><LF>	**day_of_week** – One of {SUN,MON,TUE,WED,THU,FRI,SAT} **date** – Format: DD-MM-YYYY. **data** – Format: hh:mm:ss	Get device time and date: #TIME? <CR>
TIME-SRV	Set (NTP) time server. This command is needed for setting the UDP timeout for the current client list.	#TIME-SRV mode,time_server_ip,sync_hour <CR>	~nn@TIME-SRV mode,time_server_ip,sync_hour, server_status<CR><LF>	**mode** – On/Off 0 – Off 1 – On **time_server_ip** – Time server IP address **sync_hour** – Hour in day for time server sync **server_status** – On/Off	Set time server with IP address of 128.138.140.44 to ON: #TIME-SRV 1,128.138.140.44,0,1<CR>
TIME-SRV?	Get time server. This command is needed for setting UDP timeout for the current client list.	#TIME-SRV?<CR>	~nn@TIME-SRV mode,time_server_ip,sync_hour, server_status<CR><LF>	**mode** – On/Off 0 – Off 1 – On **time_server_ip** – Time server IP address **sync_hour** – Hour in day for time server sync **server_status** – On/Off	Get time server: #TIME-SRV? <CR>
TIME-ZONE	Set the device's time zone.	#TIME-ZONE timezone_str<CR>	~nn@TIME-ZONE timezone_str <CR><LF>	**timezone_str:** A string that identifies the relevant time zone. Available time zone strings can be listed using the TIME-ZONE-LIST? command.	Set time zone to London, England: #TIME-ZONE europe/london<CR>
TIME-ZONE?	Get the device's time zone.	#TIME-ZONE? <CR>	~nn@TIME-ZONE timezone_str<CR><LF>	**timezone_str:** A string that identifies the relevant time zone. Available time zone strings can be listed using the TIME-ZONE-LIST? command.	Get the device time zone: #TIME-ZONE? <CR>
TIME-ZONE-LIST?	Get a list of time zones. Entries from the list can be set as the device time zone with the TIME-ZONE command.	#TIME-ZONE-LIST? <CR>	~nn@TIME-ZONE-LIST list<CR><LF>	**list:** List of available time zones, one per line	Get a list of available time zones: #TIME-ZONE-LIST? <CR>
TUNNELING-MODE	Set decoder tunneling mode enable / disable.	#TUNNELING-MODE enable/disable<CR>	~nn@TUNNELING-MODE <CR><LF>	**enable/disable:** decoder enable tunneling mode 1-0	set decoder tunneling mode enable #TUNNELING-MODE 1<CR>
TUNNELING-MODE?	Get decoder tunneling mode status.	#TUNNELING-MODE? <CR>	~nn@TUNNELING-MODE <CR><LF>	**enable/disable:** decoder enable tunneling mode 1-0	Get decoder tunneling mode #TUNNELING-MODE? <CR>
UART	Set com port configuration.	#UART com_id,baudrate,databits,parity, stopbits<CR>	~nn@UART com_id,baudrate,databits,parity, stopbits <CR><LF>	com_id – 1 to n (machine dependent) baudrate – 1200 - 115200 databits – 5-8 parity – Parity Type 0 – No 1 – Odd 2 – Even stopbits – 1/2	Set baudrate to 9600, 8 databits, parity to none and stopbit to 1: #UART 1,9600,8,0,1<CR>

Function	Description	Syntax	Response	Parameters/Attributes	Example
UART?	Get com port configuration. The command is backward compatible, meaning that if the extra parameters do not exist, FW goes to RS-232. Stop_bits 1.5 is only relevant for 5 data_bits.	#UART? com_id<CR>	~nn@UART com_id,baud_rate,data_bits,parity,stop_bits_mode,serial_type,485_term<CR><LF>	**com_id** – 1 to n (machine dependent) **baud_rate** – 9600 - 115200 **data_bits** – 5-8 **parity** – Parity Type 0 – No 1 – Odd 2 – Even 3 – Mark 4 - Space **stop_bits_mode** – 1/1.5/2 **serial_type** – 232/485 0 – 232 1 – 485 **485_term** – 485 termination state 0 – disable 1 – enable (optional - this exists only when serial_type is 485)	Set baud rate to 9600, 8 data bits, parity to none and stop bit to 1: #UART 1,9600,8,node,1<CR>
VERSION?	Get firmware version number.	#VERSION? <CR>	~nn@VERSION firmware_version<CR><LF>	firmware_version – XX.XX.XXXX where the digit groups are: major.minor.build version	Get the device firmware version number: #VERSION?<CR>
X-AUD-DESC?	Get audio signal info. This is an Extended Protocol 3000 command.	#X-AUD-DESC? <direction_type>.<port_format>.<port_index><CR>	~nn@X-AUD-DESC? <direction_type>.<port_format>.<port_label>.<signal_type>.<index>,ch_tot,samp_rate,aud_format<CR><LF>	The following attributes comprise the signal ID: **direction_type** – Direction of the port: IN – Input OUT – Output BOTH – Bi-directional (e.g. for RS-232) **port_format** – Type of signal on the port: HDMI HDBT ANALOG_AUDIO AMPLIFIED_AUDIO TOS SPDIF MIC RS-232 IR USB_A USB_B **port_index** – The port number as printed on the front or rear panel. **Port_label** **Signal_type -** Signal ID attribute: VIDEO AUDIO ARC RS232 IR USB **Index** - Indicates a specific channel number when there are multiple channels of the same type. **ch_tot** – Total number of channels **samp_rate** – Sample rate **aud_format** – audio format.	Get the audio signal info: #X-AUD-DESC? out.hdmi.1<CR>
X-AUD-LVL	Set audio level of a specific signal. This is an Extended Protocol 3000 command.	#X-AUD-LVL <direction_type>.<port_format>.<port_index>.<signal_type>.<index>,audio_level<CR>	~nn@X-AUD-LVL <direction_type>.<port_format>.<port_index>.<signal_type>.<index>,audio_level<CR><LF>	The following attributes comprise the signal ID: <**direction_type**> – Direction of the port: IN – Input OUT – Output BOTH – Bi-directional (e.g. for RS-232) <**port_format**> – Type of signal on the port: HDMI HDBT ANALOG_AUDIO AMPLIFIED_AUDIO TOS SPDIF MIC RS-232 IR USB_A USB_B <**port_index**> – The port number as printed on the front or rear panel <**signal_type**> – Signal ID attribute: VIDEO AUDIO ARC RS232 IR USB <**index**> – Indicates a specific channel number when there are multiple channels of the same type **audio_level** – Audio level in dB (range between -60 to +30) depending of the ability of the product	Set the audio level of a specific signal to 10: #X-AUD-LVL in.analog_audio.5.audio.1,10<CR>

Function	Description	Syntax	Response	Parameters/Attributes	Example
X-AUD-LVL?	Get the audio level of a specific signal.	#X-AUD-LVL? <direction_type>.<port_format>.<port_index>.<signal_type>.<index><CR>	~nn@X-AUD-LVL <direction_type>.<port_format>.<port_index>.<signal_type>.<index>,audio_level<CR><LF>	The following attributes comprise the signal ID: **<direction_type>** – Direction of the port: IN – Input OUT – Output BOTH – Bi-directional (e.g. for RS-232) **<port_format>** – Type of signal on the port: HDMI HDBT ANALOG_AUDIO AMPLIFIED_AUDIO TOS SPDIF MIC RS-232 IR USB_A USB_B **<port_index>** – The port number as printed on the front or rear panel **<signal_type>** – Signal ID attribute: VIDEO AUDIO ARC RS232 IR USB **<index>** – Indicates a specific channel number when there are multiple channels of the same type **audio_level** – Audio level in dB (range between -60 to +30) depending of the ability of the product	Get the audio level of a specific signal: #X-AUD-LVL? out.analog_audio.1.audio.1<CR>
X-MUTE	Set mute ON/OFF on a specific signal. This command is designed to Mute a Signal. This means that it could be applicable on any type of signal. Could be audio, video and maybe IR, USB or data if this capability is supported by the product.	#X-MUTE <direction_type>.<port_format>.<port_index>.<signal_type>.<index>,state<CR>	~nn@ X-MUTE <direction_type>.<port_format>.<port_index>.<signal_type>.<index>,state<CR><LF>	<direction_type> – Direction of the port: { IN – Input ; OUT – Output; BOTH – Bi-directional } <port_format> – Type of signal on the port: { HDMI,USB_C,ANALOG_AUDIO } <port_index> – The port number as printed on the front or rear panel <signal_type> – Signal ID attribute: { VIDEO, AUDIO} <index> – Indicates a specific channel number when there are multiple channels of the same type state – OFF/ON (not case sensitive)	Mute the video on HDMI OUT 1: #X-MUTE_out.hdmi.1.video.1,on<CR>
X-MUTE?	Get mute ON/OFF on a specific signal.	#X-MUTE? <direction_type>.<port_format>.<port_index>.<signal_type>.<index><CR>	~nn@ X-MUTE <direction_type>.<port_format>.<port_index>.<signal_type>.<index>,state<CR><LF>	<direction_type> – Direction of the port: { IN – Input ; OUT – Output; BOTH – Bi-directional } <port_format> – Type of signal on the port: { HDMI,USB_C,ANALOG_AUDIO } <port_index> – The port number as printed on the front or rear panel <signal_type> – Signal ID attribute: { VIDEO, AUDIO} <index> – Indicates a specific channel number when there are multiple channels of the same type state – OFF/ON (not case sensitive)	Get the mute the video on HDMI OUT 1: #X-MUTE?_out.hdmi.1.video.1<CR>
X-ROUTE	Send routing command. It is recommended to use the command #SIGNALS-LIST to get the list of all the signal IDs which can be used in this command. Video 1 is the default port in this command and is implied even if not written: #X-ROUTE out.sdi.5,in.sdi.1<CR> is interpreted as: #X-ROUTE out.sdi.5.video.1,in.sdi.1.video.1<CR> This is an Extended Protocol 3000 command. Brackets '[' and ']' are reserved Protocol 3000 characters that define a list of parameters as in [a,b,c,d].	#X-ROUTE [<direction_type1>.<port_type1>.<port_index1>.<signal_type1>.<index1>,...],<direction_type2>.<port_type2>.<port_index2>.<signal_type2>.<index2><CR>	~nn@X-ROUTE [<direction_type1>.<port_type1>.<port_index1>.<signal_type1>.<index1>,…],<direction_type2>.<port_type2>.<port_index2>.<signal_type2>.<index2><CR><LF>	The following attributes comprise the signal ID: **<direction_type>** – Direction of the port: IN – Input OUT – Output BOTH – Bi-directional (e.g. for RS-232) **<port_type>** – Type of signal on the port: HDMI HDBT ANALOG_AUDIO AMPLIFIED_AUDIO TOS SPDIF MIC RS-232 IR USB_A USB_B STREAM DANTE **<port_index>** – The port number as printed on the front or rear panel **<signal_type>** – Signal ID attribute: VIDEO AUDIO ARC RS232 IR USB **<index>** – Indicates a specific channel number when there are multiple channels of the same type.	Route HDMI IN 2 to HDMI OUT 3: #X-ROUTE out.hdmi.3.video.1,in.hdmi.2.video.1<CR> Route an ARC audio signal to HDBT input #1 from HDMI output #1: #X-ROUTE in.hdbt.1.arc.1,out.hdmi.1.arc.1<CR> Route audio of hdmi.1.audio.1 signal to hdmi output, analog,and dante: #X-ROUTE [out.hdmi.1.audio.1,out.analog_audio.1.audio.1,out.dante.1.audio.1],in.hdmi.1.audio.1<CR>

Function	Description	Syntax	Response	Parameters/Attributes	Example
X-ROUTE?	Get routing status. It is recommended to use the command #SIGNALS-LIST to get the list of all signal IDs available in the system and which can be used in this command. VIDEO.1 are the default <signal_type> and <index> in this command and are implied even if not written: #X-ROUTE out.sdi.5,in.sdi.1<CR> is interpreted as: #X-ROUTE out.sdi.5.video.1,in.sdi.1.video.1<CR> This is an Extended Protocol 3000 command.	#X-ROUTE? <direction_type1>.<port_type1>.<port_index1>.<signal_type1>.<index1><CR>	~nn@X-ROUTE <direction_type1>.<port_type1>.<port_index1>.<signal_type1>.<index1>,<direction_type2>.<port_type2>.<port_index2>.<signal_type2>.<index2><CR><LF>	The following attributes comprise the signal ID: **<direction_type>** – Direction of the port: IN – Input OUT – Output BOTH – Bi-directional (e.g. for RS-232) **<port_format>** – Type of signal on the port: HDMI HDBT ANALOG_AUDIO AMPLIFIED_AUDIO TOS SPDIF MIC RS-232 IR USB_A USB_B USB_C **<port_index>** – The port number as printed on the front or rear panel **<signal_type>** – Signal ID attribute: VIDEO AUDIO ARC RS232 IR USB AV_TEST_PATTERN **<index>** – Indicates a specific channel number when there are multiple channels of the same type.	Get the routing status: #X-ROUTE? out.hdmi.5.video.1<CR>

Result and Error Codes

Syntax

In case of an error, the device responds with an error message. The error message syntax:

- **~NN@ERR XXX<CR><LF>** – when general error, no specific command
- **~NN@CMD ERR XXX<CR><LF>** – for specific command
- **NN** – machine number of device, default = 01
- **XXX** – error code

Error Codes

Error Name	Error Code	Description
P3K_NO_ERROR	0	No error
ERR_PROTOCOL_SYNTAX	1	Protocol syntax
ERR_COMMAND_NOT_AVAILABLE	2	Command not available
ERR_PARAMETER_OUT_OF_RANGE	3	Parameter out of range
ERR_UNAUTHORIZED_ACCESS	4	Unauthorized access
ERR_INTERNAL_FW_ERROR	5	Internal FW error
ERR_BUSY	6	Protocol busy
ERR_WRONG_CRC	7	Wrong CRC
ERR_TIMEDOUT	8	Timeout
ERR_RESERVED	9	(Reserved)
ERR_FW_NOT_ENOUGH_SPACE	10	Not enough space for data (firmware, FPGA…)
ERR_FS_NOT_ENOUGH_SPACE	11	Not enough space – file system
ERR_FS_FILE_NOT_EXISTS	12	File does not exist
ERR_FS_FILE_CANT_CREATED	13	File can’t be created
ERR_FS_FILE_CANT_OPEN	14	File can’t open
ERR_FEATURE_NOT_SUPPORTED	15	Feature is not supported
ERR_RESERVED_2	16	(Reserved)
ERR_RESERVED_3	17	(Reserved)
ERR_RESERVED_4	18	(Reserved)
ERR_RESERVED_5	19	(Reserved)
ERR_RESERVED_6	20	(Reserved)
ERR_PACKET_CRC	21	Packet CRC error
ERR_PACKET_MISSED	22	Packet number isn't expected (missing packet)
ERR_PACKET_SIZE	23	Packet size is wrong
ERR_RESERVED_7	24	(Reserved)
ERR_RESERVED_8	25	(Reserved)
ERR_RESERVED_9	26	(Reserved)
ERR_RESERVED_10	27	(Reserved)
ERR_RESERVED_11	28	(Reserved)
ERR_RESERVED_12	29	(Reserved)
ERR_EDID_CORRUPTED	30	EDID corrupted
ERR_NON_LISTED	31	Device specific errors
ERR_SAME_CRC	32	File has the same CRC – not changed
ERR_WRONG_MODE	33	Wrong operation mode
ERR_NOT_CONFIGURED	34	Device/chip was not initialized

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SAFETY WARNING

Disconnect the unit from the power supply before opening and servicing

For the latest information on our products and a list of Kramer distributors, visit our website where updates to this user manual may be found.

We welcome your questions, comments, and feedback.

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