KRAMER

USER MANUAL
MODEL:

KDS-EN4 & KDS-DEC4
HD Video Streamer Encoder & Decoder

Contents

Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment.

- Review the contents of this user manual.

(i) Go to www.kramerav.com/downloads/KDS-EN4 to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

Achieving the Best Performance

- Use only good quality connection cables (we recommend Kramer high-performance, high-resolution cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables).

- Do not secure the cables in tight bundles or roll the slack into tight coils.

- Avoid interference from neighboring electrical appliances that may adversely influence signal quality.

- Position your Kramer **KDS-EN4 & KDS-DEC4** away from moisture, excessive sunlight and dust.

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:**
- Use only the power cord that is supplied with the unit.

- To ensure continuous risk protection, replace fuses only according to the rating specified on the product label which located on the bottom of the unit.

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/support/recycling.

Overview

Congratulations on purchasing your Kramer **KDS-EN4 & KDS-DEC4 HD Video Streamer Encoder & Decoder**. **KDS-EN4 & KDS-DEC4** are an H.264 encoder/decoder pair for HDMI™ signals of up to 1920x1080p@60Hz. They provide high-quality and fully-featured end-to-end video and audio over IP. **KDS-EN4** and **KDS-DEC4** include AVC support for H.264/MPEG-4 and AAC codec, open encoding that enables decoding through VLC® player software and unicast or multicast streaming through RTSP.

Exceptional Quality

- High Resolution Video Encoding and Compression – supporting the following resolutions: 1080p@ (on the decoder only), 1080p@30Hz, 720p@60Hz, and 720p@30Hz.

- Maximum Compatibility – Fully standard and compliant H.264/MPEG-4 AVC (Advanced Video Codec) and AAC (Advanced Audio Code) codecs, enable compatibility with other software and hardware encoders. Open encoding enables software decoding through VLC® player software.

- Flexible Audio Support – Embedded HDMI and unbalanced analog stereo line in for both the encoder input and decoder output.

- Standard Ethernet Network Operation – 10/100/1000Mb.

- Selectable Streaming Mode – Unicast or multicast through RTSP (Real Time Streaming Protocol).

- Customizable Recording – Store streaming sessions on a computer or external USB storage appliance.

Advanced and User-friendly Operation

- Powerful, Versatile and User-friendly Device Management – Manage device operation and settings, using Kramer Network Enterprise Management Platform.

- Flexible Operation – Operate the unit by RS-232 remote control or through the embedded web pages. Control an external device via the RS-232 DATA port.

- Easy Installation – Compact DigiTOOLS® fan–less enclosure for dropped–ceiling mounting, or side-by-side mounting of 3 units in a 1U rack space with the optional RK-3T rack adapter.

Typical Applications

KDS-EN4 & KDS-DEC4 is ideal for the following typical applications:

- Education – e-learning applications with live streams broadcast on campus and over the internet.

- Boardroom Enhancements – Sharing content from boardrooms with remote participants.

- Digital Signage – Mass distribution of content to many screens with no limit on distance, for example, in hotels and places of worship

Defining KDS-EN4 & KDS-DEC4 HD Video Streamer Encoder & Decoder
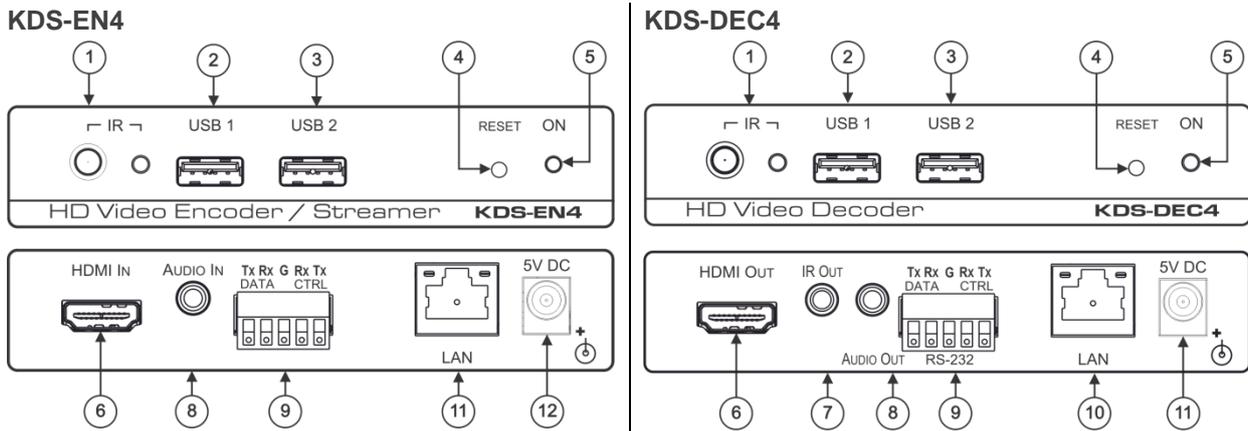
This section defines **KDS-EN4 & KDS-DEC4**.

KDS-EN4

KDS-DEC4

Figure 1: **KDS-EN4 & KDS-DEC4 HD Video Streamer Encoder & Decoder** Front Panel

#	Feature		Function	
1	IR Receiver		For future use.	
	LED			
2	USB 1 Port		For future use.	
3	USB 2 Port	Encoder	Connect to external storage device for saving recorded media (see Configuring Recording on page 17).	
		Decoder	For future use.	
4	RESET Button		Press to reboot a unit or to reset a unit to factory default settings (see Resetting the Unit on page 29).	
5	ON LED Indicator		Lights green when the unit is powered ON.	
6	HDMI IN/OUT Connector		Connect to HDMI source/acceptor.	
7	IR OUT		For future use.	
8	AUDIO IN/OUT 3.5mm mini jack		Connect to an unbalanced analog audio source/acceptor.	
9	RS-232 Terminal Block Connector	DATA	Connect to an external device to be controlled through RS-232. Connect an external device on the **KDS-DEC4** side to be controlled from **KDS-EN4** through data tunneling.	
		CTRL	Connect to an RS-232 controller to control **KDS-EN4** or **KDS-DEC4**.	
10	LAN RJ-45 Connector		Connect to a network.	
11	5V DC Power Connector		Connect to the power adapter and to the mains electricity.	

Principles of Operation

Kramer **KDS-EN4** Encoder and **KDS-DEC4** Decoder units work in conjunction to provide unicast (one-to-one) or multicast (one-to-many) streaming over an IP network. Using the embedded web pages, you can manage your entire **KDS-4** network from a single control unit.
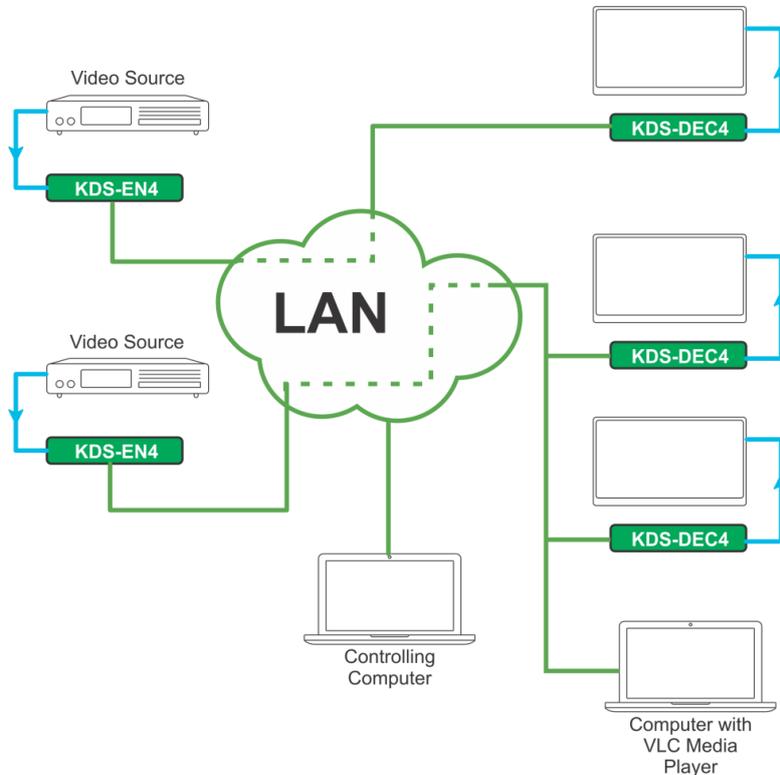

Figure 2: **KDS-EN4 & KDS-DEC4** Installation Setup

A Kramer **KDS-4** environment is made up of five types of components connected to a network:

- Source – A video source connected to an encoder, for example, a media player, computer, or camera.

- **KDS-EN4** Encoder – An encoder is needed for each source. An encoder captures compresses and packetizes the source video, so that it can be transmitted to a single decoder or to multiple decoders.

- Decoder – A decoder is needed for each acceptor. The decoder collects related IP packets from the network, de-compresses them and creates a solid video stream. The user can use **KDS-DEC4** or a computer system using VideoLAN® VLC Media Player software as a video player.

- Acceptor – A video acceptor connected to a decoder, for example, a computer, display or projector.

- Control unit – A unit connected to the network that manages video stream routing.

Mounting KDS-EN4 & KDS-DEC4

This section provides instructions for mounting **KDS-EN4 & KDS-DEC4**. 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:
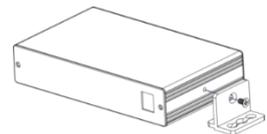- Mount **KDS-EN4 & KDS-DEC4** before connecting any cables or power.

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.

Mount KDS-EN4 & KDS-DEC4 in a rack:

- Use the recommended rack adapter
  (see www.kramerav.com/product/KDS-EN4).

Mount KDS-EN4 & KDS-DEC4 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. For more information go to www.kramerav.com/downloads/KDS-EN4.

Connecting KDS-EN4 & KDS-DEC4

(i) Always switch off the power to each device before connecting it to your **KDS-EN4 & KDS-DEC4**. After connecting your **KDS-EN4 & KDS-DEC4**, connect the power and then switch on the power to each connected device.
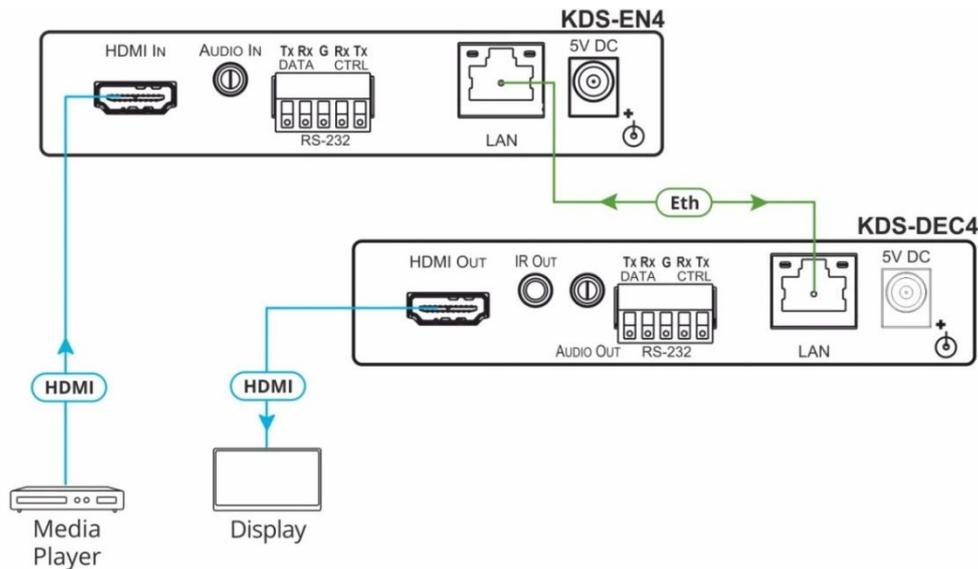
Figure 3: Connecting to the **KDS-EN4 & KDS-DEC4** Rear Panel

To connect KDS-EN4 & KDS-DEC4 as illustrated in Figure 3:

1. Connect the LAN RJ-45 connector ⑩ on each unit to a Local Area Network.

2. Connect the video:
   - An HDMI source (for example, a media player) to the HDMI IN connector ⑥ on **KDS-EN4.**
   - An HDMI acceptor (for example, a video display) to the HDMI OUT connector ⑥ on **KDS-DEC4.**

3. If required, connect the analog stereo:
   - Connect an analog stereo source to the AUDIO IN ⑧ connector on **KDS-EN4.**
   - Connect an analog stereo acceptor to the AUDIO OUT ⑧ connector on **KDS-DEC4.**

4. Connect the power adapter.
   We recommend that you use only the power adapter that is supplied with this machine

5. If required, connect:
   - The RS-232 CTRL connector ⑨ to a controller to control the **KDS-EN4** or **KDS-DEC4**. Connect pin 2 on the controller to the Tx port, pin 3 to the Rx port, and pin 5 to the G (ground) port.
   - The **KDS-DEC4** RS-232 DATA connector ⑨ to an external device (for example, a display) to be controlled by a controller (for example, a computer) connected to the **KDS-EN4** RS-232 DATA connector ⑨ via IP tunneling (see Viewing and Configuring Tunneling on page 22).

Operating KDS-EN4 & KDS-DEC4

Control and manage your **KDS-EN4 & KDS-DEC4** using any of the following methods:

- Via the Ethernet using built-in, user-friendly web pages (see Using Web Pages on page 9).

- Protocol 3000 commands (see Protocol 3000 Commands on page 33)

- RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller (see Connecting KDS-EN4 & KDS-DEC4 on page 7).

- Kramer Network Enterprise Management Platform (go to www.kramerav.com/product/KDS-EN4 for more information).

- Remotely, by infrared remote control transmitter (for future use).

Using Web Pages

The embedded web pages enable you to control **KDS-EN4 & KDS-DEC4** via the Ethernet. The encoder and decoder each have their own web pages that are accessed using a web browser and an Ethernet connection.

The **KDS-EN4 & KDS-DEC4** Web pages enable performing the following:

- Configuring Streaming/Encoding Settings on page 10
- Configuring Decoding Settings on page 13
- Configuring Network Settings on page 15
- Setting the Device Time and Date on page 16
- Starting or Stopping Operation of the Device on page 16
- Recording a Streaming Session on page 17
- Viewing and Configuring Tunneling on page 22
- Changing the Device Name on page 24
- Upgrading Firmware on page 25
- Changing Password and Security Settings on page 26
- Viewing Manufacturer Information on page 26

To browse the KDS-EN4 & KDS-DEC4 Web pages:

1. Type the IP address of the device in the address bar of your internet browser (default encoder address = 192.168.1.39, default decoder address = 192.168.1.40).

The Streaming Settings page appears.
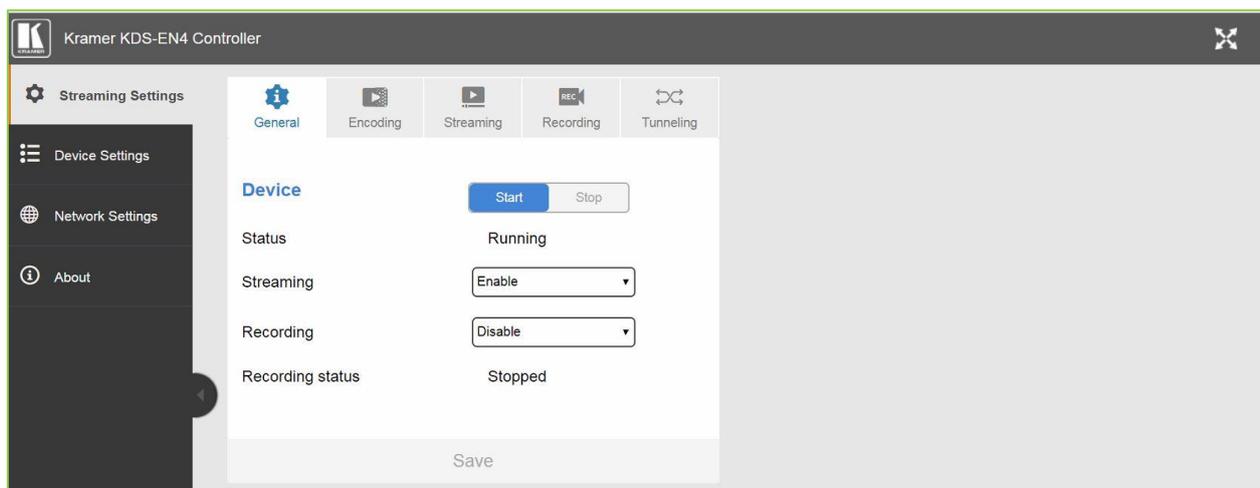
Figure 4: **KDS-EN4** Steaming Settings Page with Navigation List on Left

2. Click the desired web page on the navigation list or click the arrow to hide the navigation list.

Configuring Streaming/Encoding Settings

The **KDS-EN4** web pages enable you to configure streaming/encoding settings.

ⓘ   This section applies only to the encoder web pages.

To configure streaming/encoding settings:

1. On the **KDS-EN4** web pages, click **Streaming Settings** on the navigation list.
   The Streaming Settings page appears with the General tab open.
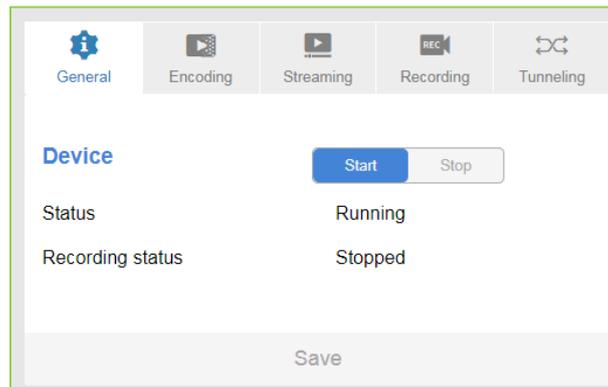
Figure 5: Steaming Settings – General Tab

2. From the Streaming drop-down box select Enable.

3. Click **Encoding**.

   The Encoding tab appears.
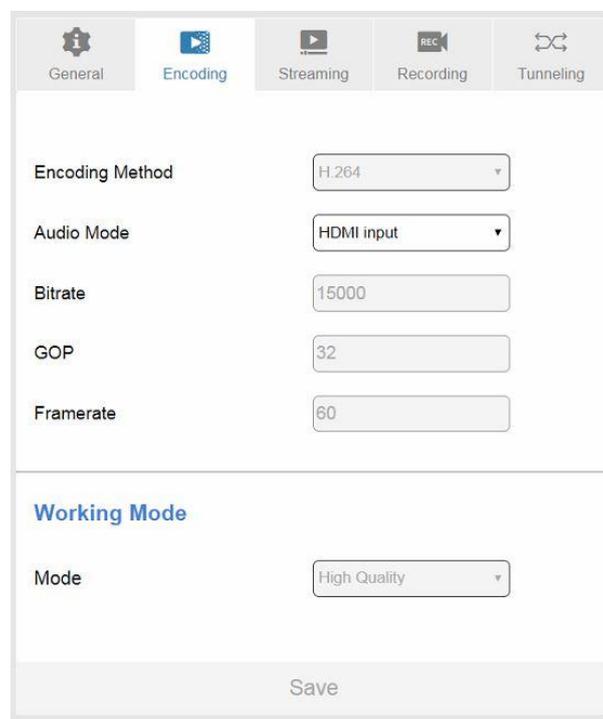
Figure 6: Streaming Settings – Encoding Tab

4. Select one of the following from the Audio Mode drop-down box:

   ▪ HDMI input – streams the embedded HDMI audio from the source connected to the

HDMI IN connector ⑥ on the encoder.

- Analog input – streams audio from an analog source connected to the AUDIO IN connector ⑧ on the encoder.

- None – does not stream any audio.

ⓘ The following parameters are displayed for information purposes only and cannot be changed:

Encoding Method – Video compression standard

Bitrate – Maximum usable bandwidth

GOP – Group Of Pictures within a coded video stream

Framerate – Maximum frames per second

Working Mode – Encoder priority

5. Click **Streaming**.

The Streaming tab appears.

Figure 7: Streaming Settings – Streaming Tab

6. Define the Port number and define whether the Streaming Method is Unicast or Multicast.

ⓘ When configuring Multicast, define the Group Address.

7. Click **Save**.

To validate E2E encoding using VLC® decoding

1. Launch VLC media player.

2. Select **Media** > **Open network stream**

3. Select **Network** tab

4. Enter Encoder streaming information in the VLC open media network protocol settings in the following format:
    RTSP://<Encoder IP Address>:554/Stream
    For example: rtsp://192.168.0.90:554/ Stream

Refer to VLC documentation for more information.

Configuring Decoding Settings

The **KDS-DEC4** web pages enable you to configure decoding settings.

ⓘ This section applies only to the decoder web pages.

To configure decoding settings:

1. On the decoder web pages, click **Streaming Settings** on the navigation list.

   The Streaming Settings page appears with the General tab open.
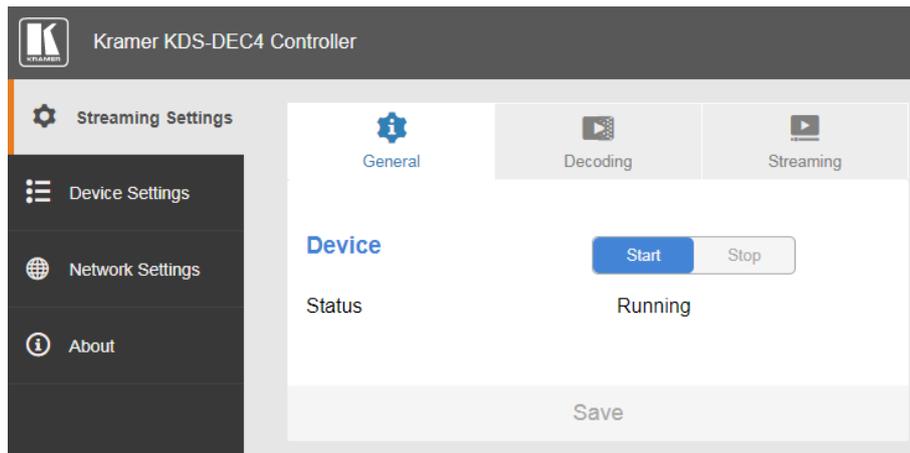
Figure 8: **KDS-DEC4** Steaming Settings Page – General Tab

2. Click **Decoding**.
   The Decoding tab appears.
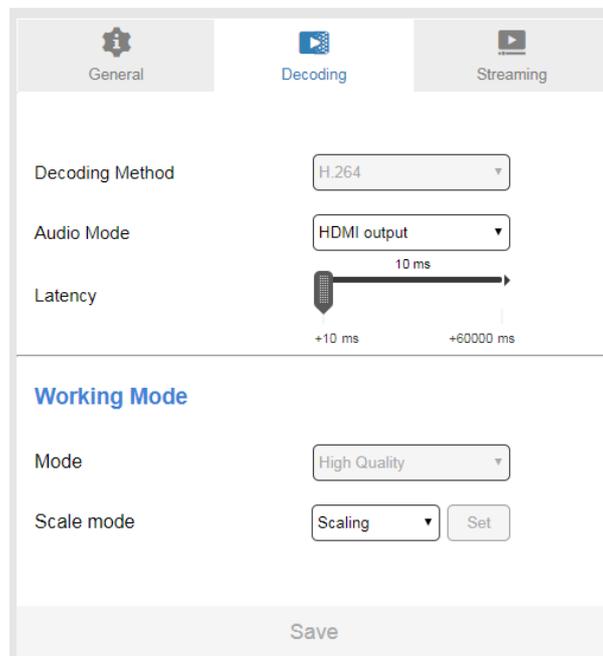
Figure 9: **KDS-DEC4** Steaming Settings Page – Decoding Tab

3. From the Audio Mode drop-down box, select the audio destination:

- HDMI output – outputs streamed audio to the acceptor connected to the HDMI OUT connector ⑥ on the decoder.

- Analog output – outputs streamed audio to the acceptor connected to the AUDIO OUT connector ⑧ on the decoder.

- Both – outputs streamed audio to both the acceptor connected the HDMI OUT connector ⑥ and to the AUDIO OUT connector ⑧ on the decoder.

- None – does not output any audio.

4. When the video is rendered with artifacts, increase the Latency value to allow sufficient time for re-ordering the packets, thereby increasing the video quality.

ⓘ The latency parameter defines the network latency expected by the decoder, and not the video latency. However, increasing this value does increase the video latency already inherent in the hardware.

5. Under Working Mode, select one of the following for Scale mode:

- Pass-through – the video is streamed at the source resolution.

- Scaling – the video is scaled up to 1920x1080p@60Hz.

6. Click **Streaming**.
The Streaming tab appears.

Figure 10   **KDS-DEC4** Steaming Settings Page – Streaming Tab

7. Enter the IP address and Port number of the decoder.

8. Click **Save**.

Configuring Network Settings

To configure network settings:

1. Click **Network Settings** on the navigation list.
   The Network Settings page appears.

Figure 11: Network Settings Page

2. Change the network settings as required and click **Save**.

   –OR, if you want the device to obtain a DHCP IP, do the following:

   Under DHCP, click **ON**.
   The DHCP confirmation message appears.

Figure 12: DHCP Confirmation Message

3. Click **Yes**.
   The current web page session is disconnected. To access the web pages, reload with the new URL.

Setting the Device Time and Date

1. Click **Device Settings** on the navigation list.
   The Device Settings page appears with the General tab open ([Figure 22](#)).

2. Click **Time and Date**.
   The Time and Date tab appears.

Figure 13: Device Settings Page – Time and Date Tab

3. Click **NO** under Use time server (NTP) and define the date, time, and time zone.

   –OR, if you want to obtain the time from the NTP server, do the following:

   Click **YES** and enter the time server address in the Time Server Address field.

4. Click **Save**.

Starting or Stopping Operation of the Device

To start operation of the encoder or decoder:

- On the General tab of the Streaming Settings page ([Figure 5](#)), click **Start**.

To stop operation of the encoder or decoder:

- On the General tab of the Streaming Settings page, click **Stop**.

Recording a Streaming Session

KDS-EN4 web pages enable you to configure recording settings, schedule a recording session to run automatically and to manually start and stop a recording session.

(i) This section applies only to the encoder web pages.

Configuring Recording

To configure recording settings:

1. Click **Streaming Settings** on the navigation list.
   The Streaming Settings page appears (Figure 5) with the General tab open.

2. From the Recording drop-down box, select Enable.

3. Click **Recording**.
   The Recording tab appears.

Figure 14: Streaming Settings – Recording Tab

4. Under Storage configuration, define the URI (storage location) address:

   ▪ When saving the recording files to an external USB storage device connected to the USB 2 port ③ on the **KDS-EN4** encoder front panel:

   In the URI text box, enter: USB://

   ⓘ The recordings are saved to the main directory of the USB storage device. They cannot be saved to a subfolder.

   ▪ When saving recording files on a connected computer, do the following:

   a. Designate a folder or create a new folder on your computer for saving recordings.
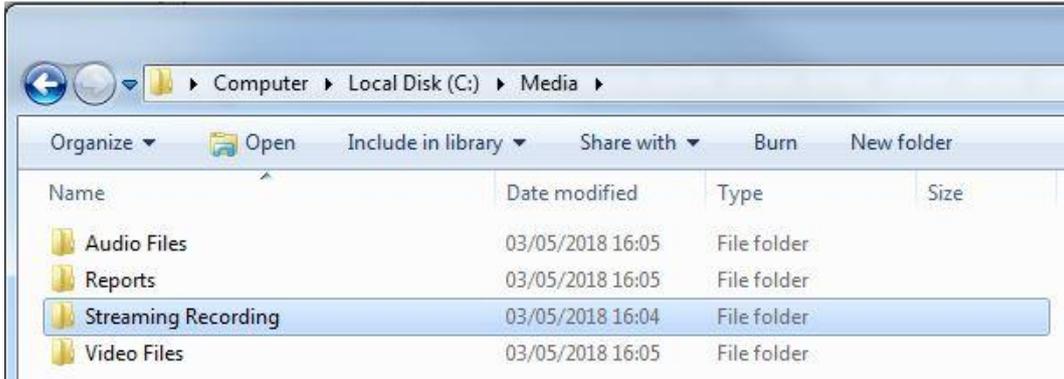
Figure 15: Streaming Settings – Recording Tab

   b. Right-click the new folder
      The context menu appears.
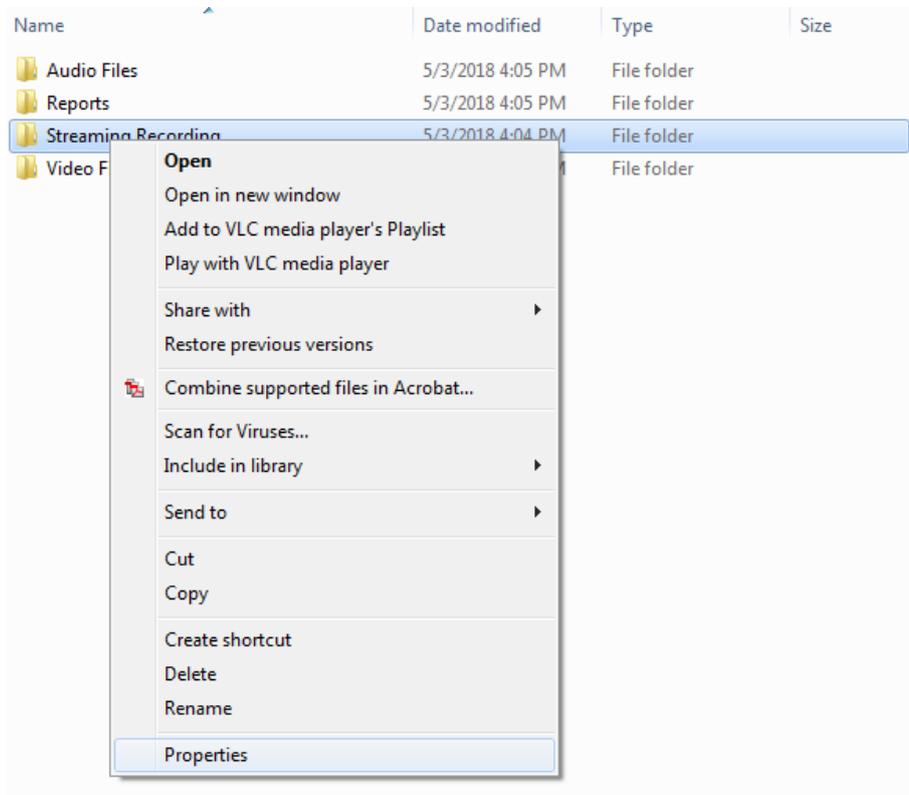
Figure 16: Folder Context Menu – Select Properties

c. Select Properties from the context menu.

The Streaming Recording Properties window appears.
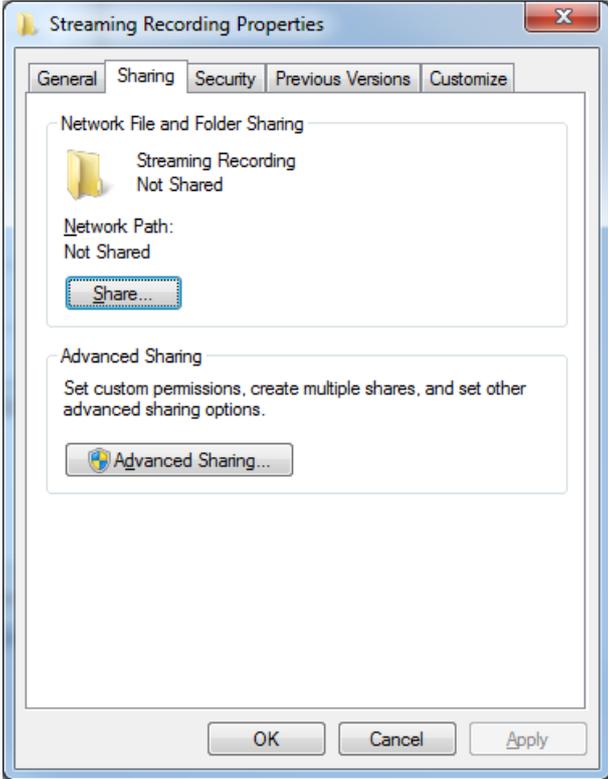
Figure 17:Folder Properties Sharing Tab

d. Select the Sharing tab.

e. Click **Share**.
The File Sharing window appears.
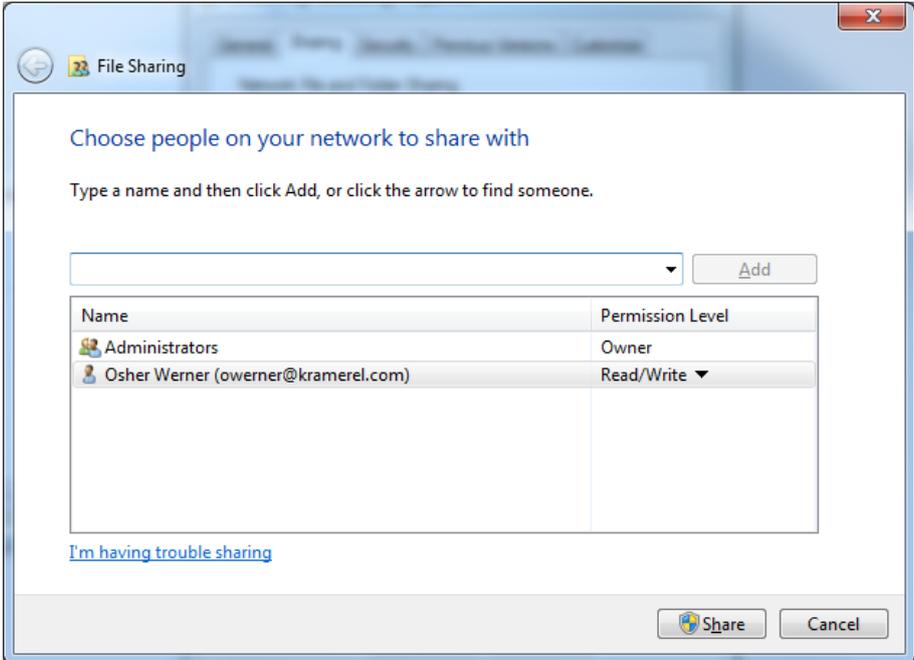
Figure 18   [Figure Caption]

f. Click the relevant name from the list and select Read/Write from the context menu.

g. Click **Share**.

h. In the URI text box, enter the location of the recordings folder in the following format: smb://[IP Address of the computer]/[folder name]/[sub folder name], for example: smb://192.168.1.39/Media/Streaming Recordings

i. Enter the computer login Username and Password for the computer account where the storage folder is located.

ⓘ If the network requires a domain name as well as a Username, enter the Username in the following format: domain name/username, for example: company network/John.

5. Enter a File prefix. Each recording file is automatically named with this prefix, followed by the date and time, an index number, and mp4 file extension.

6. Enter a Storage file time limit. When the recording reaches the defined time limit, the recording stops on the current file and continues on a new file.

7. Enter a number for the Storage maximum files. When the number of saved files reaches the maximum, the recording continues and overwrites the already saved files, starting with the first one that was saved.
OR
Select the Unlimited checkbox to continue creating new recording files indefinitely.

8. Click **Save**.

Scheduling an Automatic Recording Session

The **KDS-EN4** web pages enable you to schedule a recording session to run automatically. Only one session can be scheduled at a time. Once a recording session has been scheduled, it can be edited and, even while the session is in progress, the end time can be changed.

To schedule an automatic recording session:

1. Click **Streaming Settings** on the navigation list.
   The Streaming Settings page appears (<u>Figure 5</u>) with the General tab open.

2. Click **Recording**.
   The Recording tab appears (<u>Figure 14</u>).

3. Under Schedule recording, click **Schedule**.
   The Schedule recording dialogue box opens.
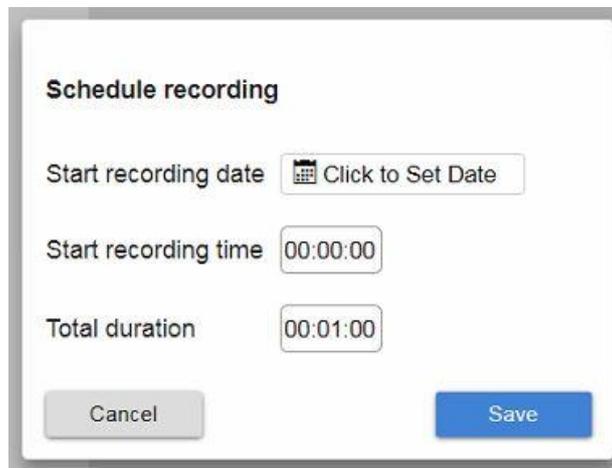
Figure 19: Schedule Recording Window

4. Define Start recording date, Start recording time, and Total duration for the recording.

5. Click **Save**.
   The recording is scheduled, and the date and time of the recording appear under Schedule recording on the Recording tab.

6. To edit the recording, click **Edit** (previously appeared as Schedule) under Schedule recording.
   The Schedule recording dialogue box opens.

7. Edit the recording settings and click **Save**.

ⓘ After a recording session has started, the Total duration can be shortened or lengthened, as long as the new end time has not passed.

Manually Starting a Recording Session

To manually start a recording session:

1. Click **Streaming Settings** on the navigation list.
   The Streaming Settings page appears ([Figure 5](#)) with the General tab open.

2. Click **Recording**.
   The Recording tab appears ([Figure 14](#)).

3. Select Continuous from the Recording drop-down box and click **Save**.
   Recording starts.

4. To stop recording, select Disable from the Recording drop-down box and click **Save**.

Viewing and Configuring Tunneling

RS-232 communication can be tunneled through the network from the encoder to the decoder. For example, you can use the encoder to control an external device connected to the RS-232 DATA connector ⑨ on the decoder. The **KDS-EN4** web pages enable you to view the tunneling connection parameters and to configure some of them.

ⓘ   This section applies only to the encoder web pages.

To view and configure tunneling:

1. Click **Streaming Settings** on the navigation list.
   The Streaming Settings page appears ([Figure 5](#)) with the General tab open.

2. Click **Tunneling**.
   The Tunneling tab appears. If there is an active connection, it appears in the table.

Figure 20   Encoder System Settings > Tunneling > Active Clients tab

3. Click **Port 1**.
   The Port 1 parameters appear.

Figure 21: Encoder System Settings > Tunneling > Port 1 tab

4. View Ethernet Settings and Serial Configuration for Port 1 and, if necessary, change the following parameters: IP Port, TC Keep Alive, Parity, Data Bits, Baud Rate, Stop Bits, and Send Replies to new client by default.

5. Click **Save.**

6. Restart the device to apply any changes in parameters.

Changing the Device Name

To change the device name:

1. Click **Device Settings** on the navigation list.
   The Device Settings page appears with the General tab open.
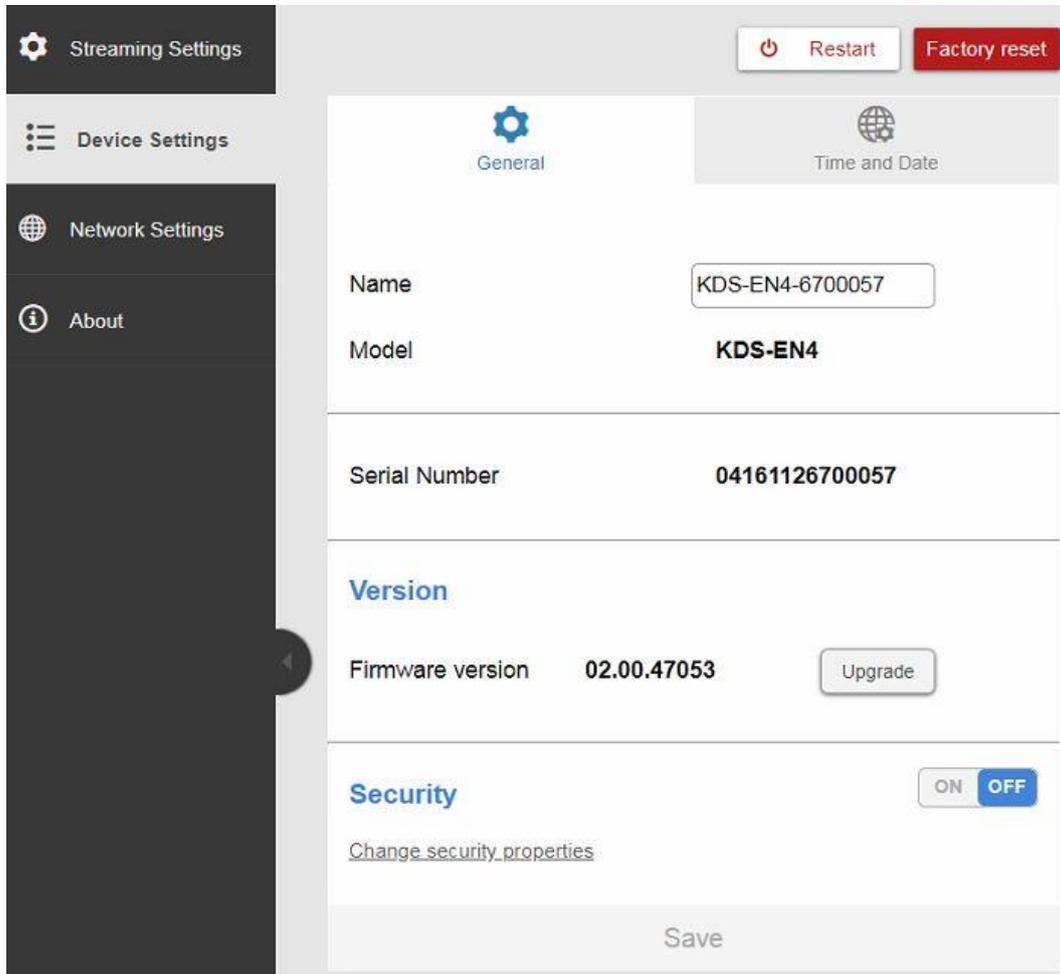
Figure 22: Device Settings Page– General Tab

2. Enter the new name of the device in the Name text box.
   The device name cannot include any spaces, can be up to 63 characters and can include only letters, numbers, hyphens and underscores.

3. Click **Save**.

Upgrading Firmware

To upgrade the KDS-EN4 & KDS-DEC4 via Webpage:

1. Download the latest firmware from the Kramer website.

2. Confirm that IP is set and reachable, i.e., establish Decoder to Encoder video streaming.

3. Click **Streaming Settings** on the navigation list.
    The Streaming Settings page appears with the General tab open ([Figure 5](#)).

4. Slide Device Switch to **Stop**.
    The device Status should read "Not Running".

5. Click **Device Settings** on the navigation list.
    The Device Settings page appears with the General tab open ([Figure 22](#)).

6. Click **Upgrade**.
    A file browser appears.

7. Open the required upgrade file.

8. Follow the upgrade procedure.

⚠️ **Caution:** We recommend not operating the device during firmware upgrade.

ⓘ When upgrading the Encoder wait about 6 minutes until the device restart itself.

You can monitor the restart by attaching a serial console to the Encoder and monitor reboot message from u-boot like this
```
U-Boot SPL 2013.10-rc4-g7e499c5-dirty (Nov 29 2017 - 11:07:15)
~01@ OK
```

To upgrade the KDS-EN4 & KDS-DEC4 via K-Upload:

1. Download the latest firmware from the Kramer website.

2. Run K-Upload and follow the directions.

Changing Password and Security Settings

ⓘ By default, **KDS-EN4 & KDS-DEC4** security settings are OFF.

To change the password and security settings:

1. Click **Device Settings** on the navigation list.
   The Device Settings page appears with the General tab open (Figure 22).

2. In the Security area, click **ON** to enable security.
   A confirmation message appears.

Would you like to enable security?

⚠ This action will enable the authentication.

Cancel   OK
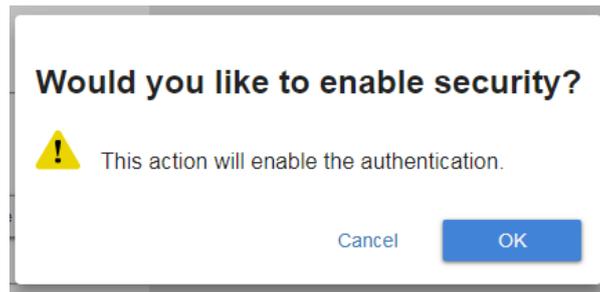
Figure 23: Enable Security Confirmation Message

3. Click **OK** to confirm.

4. Type the current password, the new password and the new password confirmation and click **Save**.
   The new password is saved.

Viewing Manufacturer Information

To view information about Kramer Electronics:

• Click **About** on the left side of the web page (Figure 4).
  The About page appears.

WEB VERSION 3.0.1

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Web: http://www.kramerelectronics.com

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Figure 24: About Page Example

Technical Specifications

Inputs (**KDS-EN4**)	1 HDMI	On a female HDMI connector
	1 Stereo Analog Unbalanced Audio	On a 3.5mm mini jack
Outputs (**KDS-DEC4**)	1 HDMI	On a female HDMI connector
	1 Stereo Analog Unbalanced Audio	On a 3.5mm mini jack
Ports	1 Ethernet	On an RJ–45 connector
	2 USB	On female USB type-A connectors
	2 RS-232	On five pin terminal block connectors
Video	Supported Resolutions	720p@30Hz, 720p@60Hz, 1080p@30Hz, 1080p@60Hz
	Encoding Method/Compression Standard	H.264/MPEG-4 Part 10 (AVC)
	Levels	Up to 4.2
	Bitrate	Up to 15,000kbps
	Rate Control	CBR
Audio	Compression Standard	MPEG-4 AAC–LC
	Channels	2 channel (stereo), HDMI with digital L–PCM audio
	Sample Frequency	44.1, and 48kHz
	Bitrates	128Kbps
Streaming	Maximum Unicast Connections (**KDS-EN4**)	8
Supported Web Browsers	Windows 7	Internet Explorer, Firefox, Chrome
	Windows 10	Internet Explorer, Edge, Firefox, Chrome
	MAC 10.11	Safari
	iOS 10.3.2	Safari
	Android	N/A
Power	Consumption	5V DC
	Source	800mA
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
Enclosure	Size	Mount the unit in a rack using the recommended rack adapter (see www.kramerav.com/product/KDS-EN4)
	Type	Aluminum
	Cooling	Convection Ventilation
General	Product Dimensions (W, D, H)	12.00cm x 7.15cm x 2.44cm (5.47" x 5.08" x 1.22")
	Product Weight	0.5kg (1.1lbs) approx.
	Shipping Dimensions (W, D, H)	15.70cm x 12.00cm x 8.70cm (6.18" x 4.72" x 3.43")
	Shipping Weight	1.0kg (2.3lbs) approx.
Accessories	Included	Power supply, bracket set
	Optional	For optimum range and performance use recommended Kramer cables.
Specifications are subject to change without notice at www.kramerav.com		

Default Communication Parameters

RS-232 Control / Protocol 3000 Parameters	
Baud Rate:	115,200
Data Bits:	8
Stop Bits:	1
Parity:	None
Command Format:	ASCII
Example (start device operation):	#KDS-ACTION 1<CR>

Ethernet Default Parameters	KDS-EN4	KDS-DEC4
IP Address:	192.168.1.39	192.168.1.40
Subnet mask:	255.255.0.0	255.255.0.0
Default gateway:	192.165.0.1	192.165.0.1
TCP Port #:	5000	5000

Firewall Recommendations

The following list of ports must be configured as open / not blocked for the relevant device functions to work properly:

Port #	Function	Notes
445	Recording	
Default = 554	RTSP	Can be changed, see Configuring Streaming/Encoding Settings on page 10.
Open all UDP ports.	RTP/UDP	The port number is selected by the protocol.
Default = 5001	Tunneling	Can be changed, Viewing and Configuring Tunneling on page 22.
Default = 5000	TCP	Can be changed, Configuring Network Settings on page 15.

Resetting the Unit

Two types of reset can be performed:

- Reboot – Reboots your unit and keeps all your unit settings, including the IP address and password.

- Factory reset – Reboots your unit and restores all factory settings, including the IP address and password.

Resetting the decoder or encoder can be accomplished by using:

- The Front Panel Reset button.

- Protocol 3000 commands (see System Commands on page 33).

- Web pages – Device Settings Page > General tab (Figure 22)

- Kramer Network

To reset a decoder or encoder unit using the front panel:

- *P*ress and hold the *RESET Button* ④ with the tip of a paper clip:

    - For reboot, hold for 2 seconds.

    - For factory reset, hold for more than 5 seconds.

ⓘ The device must be powered on when performing a reset.

Protocol 3000

The **KDS-EN4 & KDS-DEC4 HD Video Streamer Encoder & Decoder** can be operated using the Kramer Protocol 3000 serial commands.

The command framing varies according to how you interface with a device. For example, a basic video input switching command that routes a layer 1 video signal to HDMI out 1 from HDMI input 2 (ROUTE 1,1,2), is entered as follows:

- Terminal communication software, such as Hercules:
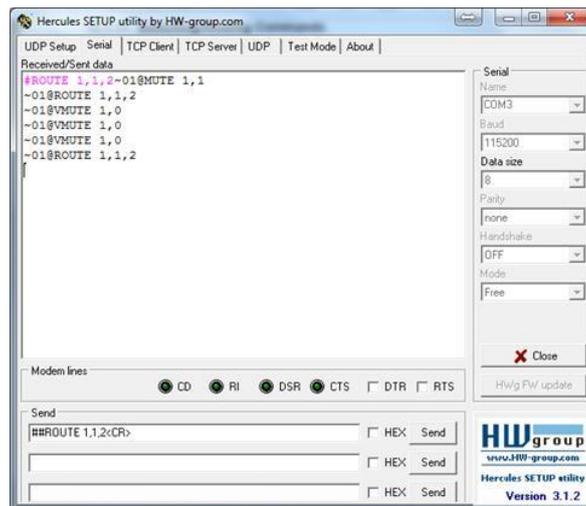
ⓘ The above image is for illustration purposes only.

ⓘ The framing of the command varies according to the terminal communication software.

You can enter commands directly using terminal communication software (e.g., Hercules) by connecting a PC to the serial or Ethernet port on **KDS-EN4 & KDS-DEC4**. To enter CR press the Enter key (LF is also sent but is ignored by the command parser).

Commands sent from various non-Kramer controllers (e.g., Crestron) may require special coding for some characters (such as, /X##). For more information, refer to your controller's documentation.

For more information about:

- Using Protocol 3000 commands, see <u>Understanding Protocol 3000 on page 31</u>

- General syntax used for Protocol 3000 commands, see <u>Kramer Protocol 3000 Syntax</u> on page <u>31</u>

- Protocol 3000 commands available for **KDS-EN4 & KDS-DEC4**, see <u>Protocol 3000 Commands</u> on page <u>33.</u>

Understanding Protocol 3000

Protocol 3000 commands are structured according to the following:

- **Command –** A sequence of ASCII letters (A–Z, a–z and -). A command and its parameters must be separated by at least one space.

- **Parameters –** A sequence of alphanumeric ASCII characters (0–9, A–Z, a–z and some special characters for specific commands). Parameters are separated by commas.

- **Message string –** Every command entered as part of a message string begins with a message starting character and ends with a message closing character.

ⓘ A string can contain more than one command. Commands are separated by a pipe (|) character.

- **Message starting character:**
  - ▪ # – For host command/query
  - ▪ ~ – For device response

- **Device address** – K-NET Device ID followed by @ (optional, K-NET only)

- **Query sign** – ? follows some commands to define a query request

- **Message closing character:**
  - ▪ CR – Carriage return for host messages (ASCII 13)
  - ▪ CR LF – Carriage return for device messages (ASCII 13) and line-feed (ASCII 10)

- **Command chain separator character –** Multiple commands can be chained in the same string. Each command is delimited by a pipe character (|). When chaining commands, enter the message starting character and the message closing character only at the beginning and end of the string.

ⓘ Spaces between parameters or command terms are ignored. Commands in the string do not execute until the closing character is entered. A separate response is sent for every command in the chain.

Kramer Protocol 3000 Syntax

The Kramer Protocol 3000 syntax uses the following delimiters:

- CR = Carriage return (ASCII 13 = 0x0D)
- LF = Line feed (ASCII 10 = 0x0A)
- SP = Space (ASCII 32 = 0x20)

Some commands have short name syntax in addition to long name syntax to enable faster typing. The response is always in long syntax.

The Protocol 3000 syntax is in the following format:

- Host Message Format:

Start	Address (optional)	Body	Delimiter
#	*Device_id@*	**Message**	CR

- **Simple Command** – Command string with only one command without addressing:

Start	Body	Delimiter
#	**Command** SP *Parameter_1,Parameter_2,…*	CR

- **Command String** – Formal syntax with command concatenation and addressing:

Start	Address	Body	Delimiter
#	*Device_id@*	**Command_1** *Parameter1_1,Parameter1_2,…*| **Command_2** *Parameter2_1,Parameter2_2,…*| **Command_3** *Parameter3_1,Parameter3_2,…*|…	CR

- **Device Message Format**:

Start	Address (optional)	Body	Delimiter
~	*Device_id@*	**Message**	CR LF

- **Device Long Response** – Echoing command:

Start	Address (optional)	Body	Delimiter
~	*Device_id@*	**Command** SP **[***Param1,Param2 …***]** **result**	CR LF

Protocol 3000 Commands

This section includes the following commands:

System Commands

Command	Description
#	Protocol handshaking (system mandatory)
BUILD-DATE	Get device build date (system mandatory)
FACTORY	Reset to factory default configuration
HELP	Get command list (system mandatory)
MODEL	Get device model (system mandatory)
NAME	Set/get machine (DNS) name
NAME-RST	Reset machine (DNS) name to factory default
PROT-VER	Get device protocol version (system mandatory)
RESET	Reset device (system mandatory)
SN	Get device serial number (system mandatory)
TIME	Set/get device time and date
TIMEZONE	Set/get device time zone.
TIMEZONE-LIST	Get a list of time zones.
VERSION	Get device firmware version (system mandatory)

#

Functions		Permission	Transparency
Set:	**#**	End User	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Protocol handshaking	**#** `CR`	
Get:	-	-	
Response			
~`nn`@`SP`**OK**`CR LF`			
Notes			
Validates the Protocol 3000 connection and gets the machine number. Used to identify the availability of the device.			
Example			
#<CR>			

BUILD-DATE

Functions		Permission	Transparency
Set:	-	-	-
Get:	**BUILD-DATE?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device build date	#**BUILD-DATE?**[CR]	

Response

~[nn]@**BUILD-DATE**[SP]*date*[SP]*time*[CR LF]

Parameters

date – Format: *YYYY/MM/DD* where *YYYY* = Year, *MM* = Month, *DD* = Day
time – Format: *hh:mm:ss* where *hh* = hours, *mm* = minutes, *ss* = seconds

Response Triggers

Notes

Example

#BUILD-DATE?<CR>

FACTORY

Functions		Permission	Transparency
Set:	**FACTORY**	End User	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Reset device to factory default configuration	#**FACTORY**[CR]	
Get:	-	-	

Response

~[nn]@**FACTORY**[SP]OK[CR LF]

Parameters

Response Triggers

Notes

This command deletes all user data from the device. The deletion can take some time.
You must power cycle the device for the changes to take effect.

Example

#FACTORY<CR>

HELP

Functions		Permission	Transparency
Set:	–	–	–
Get:	**HELP**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get command list or help for specific command	1. #**HELP**[CR] 2. #**HELP**[SP]*COMMAND_NAME*[CR]	

Response

1. Multi-line: ~[nn]@Device available protocol 3000 commands:[CR LF]

command,[SP]*command...* [CR LF]

2. Multi-line: ~[nn]@HELP[SP]*command:*[CR LF]*description*[CR LF]USAGE:*usage*[CR LF]

Parameters

COMMAND_NAME – name of a specific command

Response Triggers

Notes

Example

1. Get a list of all **KDS-EN4 & KDS-DEC4** commands:
#HELP<CR>
2. Get help for the ETH-PORT command:
#HELP ETH-PORT<CR>

MODEL

Functions		Permission	Transparency
Set:	–	–	–
Get:	**MODEL?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device model	#**MODEL?**[CR]	

Response

~[nn]@**MODEL**[SP]*model_name*[CR LF]

Parameters

model_name – String of up to 19 printable ASCII chars

Response Triggers

Notes

This command identifies equipment connected to **KDS-EN4 & KDS-DEC4** and notifies of identity changes to the connected equipment.

Example

#MODEL?<CR>

NAME

Functions		Permission	Transparency
Set:	**NAME**	Administrator	Public
Get:	**NAME?**	End User	Public
Description		**Syntax**	
Set:	Set machine (DNS) name	#**NAME** `SP` *machine_name* `CR`
Get:	Get machine (DNS) name	#**NAME?** `CR`

Response

Set: ~`nn`@**NAME** `SP` *machine_name* `CR LF`

Get: ~`nn`@**NAME?** `SP` *machine_name* `CR LF`

Parameters

machine_name – string of up to 63 alpha-numeric chars (can include hyphen, not at the beginning or end)

Response Triggers

Notes

The machine name is not the same as the model name. The machine name is used to identify a specific machine or a network in use (with DNS feature on).

Example

Set the machine name to Alpha:

`#NAME Alpha<CR>`

NAME-RST

Functions		Permission	Transparency
Set:	**NAME-RST**	Administrator	Public
Get:	–	-	-
Description		**Syntax**	
Set:	Reset machine (DNS) name to factory default	#**NAME-RST** `CR`
Get:	-	-

Response

~`nn`@**NAME-RST** `SP` OK `CR LF`

Parameters

Response Triggers

Notes

Factory default of machine (DNS) name is "model_name-" + 5 last digits of device serial number

Example

`#NAME-RST<CR>`

PROT-VER

Functions		Permission	Transparency
Set:	–	-	-
Get:	**PROT-VER?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device protocol version	#**PROT-VER?**[CR]	
Response			
~[nn]@**PROT-VER**[SP]3000:*version*[CR LF]			
Parameters			
version – XX.XX where X is a decimal digit			
Response Triggers			
Notes			
Example			
#PROT-VER?<CR>			

RESET

Functions		Permission	Transparency
Set:	**RESET**	Administrator	Public
Get:	–	-	-
Description		**Syntax**	
Set:	Reset device	#**RESET**[CR]	
Get:	-	-	
Response			
~[nn]@**RESET**[SP]**OK**[CR LF]			
Parameters			
Response Triggers			
Notes			
Example			
#RESET<CR><CR>			

SN

Functions		Permission	Transparency
Set:	–	-	-
Get:	**SN?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device serial number	#**SN?**⌷CR	

Response
~⌷nn⌷@**SN**⌷SP⌷*serial_number*⌷CR LF

Parameters
serial_number – 11 decimal digits, factory assigned

Response Triggers

Notes
This device has a 14 digit serial number, only the last 11 digits are displayed

Example
#SN?<CR>

TIME

Functions		Permission	Transparency
Set:	**TIME**	Administrator	Public
Get:	**TIME?**	End User	Public
Description		**Syntax**	
Set:	Set device time and date	#**TIME**⌷SP⌷*day_of_week,date,time*⌷CR
Get:	Get device time and date	#**TIME?**⌷CR

Response
~⌷nn⌷@**TIME**⌷SP⌷*day_of_week, date, time*⌷CR LF

Parameters
day_of_week – one of {SUN,MON,TUE,WED,THU,FRI,SAT}
date – format: DD-MM-YYYY.
time – format: hh:mm:ss

Response Triggers

Notes
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

Example
Set device time and date to December 5, 2018 at 2:30pm:
#TIME MON,05-12-2018,14:30:00<CR>

TIMEZONE

Functions		Permission	Transparency
Set:	**TIME-ZONE**	End User	Public
Get:	**TIME-ZONE?**	End User	Public
Description		**Syntax**	
Set:	Set device time zone.	**#TIME-ZONE** SP *timezone_str* CR
Get:	Get device time zone.	**#TIME-ZONE?** CR

Response

~nn@**TIME-ZONE** SP *timezone_str* CR LF

Parameters

timezone_str – the relevant time zone in the following format: [*region*]/[*city*]. See notes.

Response Triggers

Notes

Available time zones can be listed using the **#TIME-ZONE-LIST?** command.

Example

Set time zone to London, England:
#TIME-ZONE EUROPE/LONDON<CR>

TIMEZONE-LIST

Functions		Permission	Transparency
Set:			
Get:	**TIME-ZONE-LIST?**	End User	Public
Description		**Syntax**	
Set:			
Get:	Get a list of time zones.	**#TIME-ZONE-LIST?** CR

Response

~nn@**TIME-ZONE-LIST** SP *list* CR LF

Parameters

List – List of available time zones, one per line.

Response Triggers

Notes

Entries from the list can be set as the device time zone with the **#TIME-ZONE** command.

Example

Get a list of time zones:
#TIME-ZONE-LIST?<CR>

VERSION

Functions		Permission	Transparency
Set:	–	-	-
Get:	**VERSION?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get firmware version number	#**VERSION?**CR	
Response			
~nn@**VERSION**SP *firmware_version*CR LF			
Parameters			
firmware_version – XX.XX.XXXX where the digit groups are: major.minor.build version			
Response Triggers			
Notes			
Example			
#VERSION?<CR>			

Authentication Commands

Command	Description
LOGIN	Set/get protocol permission
LOGOUT	Cancel current permission level
PASS	Set/get password for login level
SECUR	Set/get current security state

LOGIN

Functions		Permission	Transparency
Set:	**LOGIN**	Not Secure	Public
Get:	**LOGIN?**	Not Secure	Public
Description		**Syntax**	
Set:	Set protocol permission	#**LOGIN**[SP]*login_level,password*[CR]	
Get:	Get current protocol permission level	#**LOGIN?**[CR]	

Response

Set: ~[nn] @**LOGIN**[SP]*login_level,password*[SP]**OK**[CR LF]

    or

    ~[nn]@**LOGIN**[SP]ERR[SP]004[CR LF] (if bad password entered)

Get: ~[nn]@**LOGIN**[SP]*login_level*[CR LF]

Parameters

login_level – level of permissions required: User, Admin
password – predefined password (by PASS command). Default password is an empty string

Response Triggers

Notes

When the permission system is enabled, LOGIN enables running commands with the User or Administrator permission level
When set, login must be performed upon each connection
The permission system works only if security is enabled with the SECUR command. It is not mandatory to enable the permission system in order to use the device

Example

Set the protocol permission level to Admin (when the password defined in the PASS command is 33333):
#LOGIN Admin,33333<CR>

LOGOUT

Functions		Permission	Transparency
Set:	**LOGOUT**	Not Secure	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Cancel current permission level	#**LOGOUT**[CR]	
Get:	-	-	
Response			
~[nn]@**LOGOUT**[SP]**OK**[CR LF]			
Parameters			
Response Triggers			
Notes			
Logs out from User or Administrator permission levels			
Example			
#LOGOUT<CR>			

PASS

Functions		Permission	Transparency
Set:	**PASS**	Administrator	Public
Get:	**PASS?**	Administrator	Public
Description		**Syntax**	
Set:	Set password for login level	#**PASS**[SP]*login_level,password*[CR]	
Get:	Get password for login level	#**PASS?**[SP]*login_level*[CR]	
Response			
~[nn]@**PASS**[SP]*login_level,password*[CR LF]			
Parameters			
login_level – level of login to set: User, Admin *password* – password for the *login_level*. Up to 15 printable ASCII chars.			
Response Triggers			
Notes			
The default password is an empty string			
Example			
Set the password for the Admin protocol permission level to 33333: #PASS Admin,33333<CR>			

SECUR

Functions		Permission	Transparency
Set:	**SECUR**	Administrator	Public
Get:	**SECUR?**	Not Secure	Public
Description		**Syntax**	
Set:	Start/stop security	#**SECUR**`SP`*security_mode*`CR`	
Get:	Get current security state	#**SECUR?**`CR`	
Response			
~`nn`@**SECUR**`SP`*security_mode*`CR LF`			
Parameters			
security_mode – 1 (On / enable security), 0 (Off / disable security)			
Response Triggers			
Notes			
The permission system works only if security is enabled with the SECUR command			
Example			
Enable the permission system: #SECUR 0<CR>			

Communication Commands

Command	Description
ETH-PORT	Set/get Ethernet port protocol
NET-CONFIG	Set/get a network configuration.
NET-DHCP	Set/get DHCP mode
NET-MAC	Get MAC address
NET-DNS	Set/get DNS name server
TIME-SRV	Set/get time server settings
UART	Set/get SERIAL port configuration

ETH-PORT

Functions		Permission	Transparency
Set:	**ETH-PORT**	Administrator	Public
Get:	**ETH-PORT?**	End User	Public
Description		**Syntax**	
Set:	Set Ethernet port protocol	#**ETH-PORT**[SP]*portType,ETHPort*[CR]	
Get:	Get Ethernet port protocol	#**ETH-PORT?**[SP]*portType*[CR]	
Response			
~[nn]@**ETH-PORT**[SP]*portType,ETHPort*[CR LF]			
Parameters			
portType – string of 3 letters indicating the port type: TCP, UDP *ETHPort* – TCP / UDP port number: 0-65565			
Response Triggers			
Notes			
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).			
Example			
Set the Ethernet port protocol for TCP to port 12457: #ETH-PORT TCP,12457<CR>			

NET-CONFIG

Functions		Permission	Transparency
Set:	**NET-CONFIG**	End User	Public
Get:	**NET-CONFIG?**	End User	Public
Description		**Syntax**	
Set:	Set a network configuration.	#**NET-CONFIG** `SP` *id,ip,net_mask,gateway* `CR LF`
Get:	Get a network configuration.	#**NET-CONFIG?** `SP` *id* `CR LF`
Response			
Get: ~`nn`@**NET-CONFIG** `SP SP` *id,ip,net_mask,gateway* `CR LF`			
Parameters			
id – Ethernet connection ID number: 0 *ip* – network IP address, in the following format: `xxx.xxx.xxx.xxx` *net_mask* – network mask, in the following format: `xxx.xxx.xxx.xxx` *gateway* – network gateway, in the following format: `xxx.xxx.xxx.xxx`			
Response Triggers			
Notes			
Example			
Set the device network parameters to IP address 192.168.113.10, net mask 255.255.0.0, and gateway 192.168.0.1: `#NET-CONFIG 0,192.168.113.10,255.255.0.0,192.168.0.1<CR>`			

NET-DHCP

Functions		Permission	Transparency
Set:	**NET-DHCP**	Administrator	Public
Get:	**NET-DHCP?**	End User	Public
Description		**Syntax**	
Set:	Set DHCP mode	#**NET-DHCP** `SP` *mode* `CR`
Get:	Get DHCP mode	#**NET-DHCP?** `CR`
Response			
~`nn`@**NET-DHCP** `SP` *mode* `CR LF`			
Parameters			
mode – 0 (do not use DHCP. Use the IP address set by the factory or the `NET-IP` command), 1 (try to use DHCP. If unavailable, use the IP address set by the factory or the `NET-IP` command)			
Response Triggers			
Notes			
Connecting Ethernet to devices with DHCP may take more time in some networks. To connect with a randomly assigned IP by DHCP, specify the device DNS name (if available) using the `NAME` command. You can also get an assigned IP by direct connection to RS-232 protocol port, if available. Consult your network administrator for correct settings.			
Example			
Enable DHCP mode, if available: `#NET-DHCP 1<CR>`			

NET-MAC

Functions		Permission	Transparency
Set:	–	-	-
Get:	**NET-MAC?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get MAC address	#**NET-MAC?**[CR]	

Response

~[nn]@**NET-MAC**[SP]*mac_address*[CR LF]

Parameters

mac_address – unique MAC address. Format: XX-XX-XX-XX-XX-XX where X is hex digit

Response Triggers

Notes

Example

#NET-MAC?<CR>

NET-DNS

Functions		Permission	Transparency
Set:	**NET-DNS**	End User	Public
Get:	**NET-DNS?**	End User	Public
Description		**Syntax**	
Set:	Set DNS name server	#**NET-DNS**[SP]*dns_id_ip*[CR]	
Get:	Get DNS name server	#**NET-DNS?**[SP]*dns_id*[CR]	

Response

~[nn]@**NET-DNS**[SP]*dns_id,ip*[CR LF]

Parameters

dns_id – ID of the relevant DNS name server: 1 (server 1), 2 (server 2)
ip – IP address of the DNS server in the following format: xxx.xxx.xxx.xx

Response Triggers

After execution, response is sent to the com port that sent the command.
After set, response notification sent to all connected Protocol 3000 ports.

Notes

Use NET-CONFIG to set up the network, including the DNS name servers.
If *dns_id* is out of the defined DNS range, Error Code #3 (ERR_PARAMETER_OUT_OF_RANGE) is returned.
If no *dns_id* is defined, Error Code #3 is returned for any *dns_id*.

Example

Set DNS name server for server 2 to 192.168.000.002:
#NET-DNS 2,192.168.000.002<CR>

TIME-SRV

Functions		Permission	Transparency
Set:	**TIME-SRV**	Administrator	Public
Get:	**TIME-SRV?**	End User	Public
Description		**Syntax**	
Set:	Set time server	#**TIME-SRV** `SP` *mode,time_server,time_server_sync_hour* `CR`
Get:	Get time server	#**TIME-SRV?** `CR`

Response

~`nn`@**TIME-SRV** `SP` *mode,time_server,time_server_sync_hour,server_status* `CR LF`

Parameters

mode – 0 (OFF), 1 (ON)

time_server – time server IP address or hostname. IP must be, in the following format:
xxx.xxx.xxx.xxx

time_server_sync_hour – not in use: 0

server_status – ON/OFF

Response Triggers

Notes

This command sets up the NTP server.

Example

Set time server with IP address of 128.138.140.44 to ON:
#TIME-SRV *1,128.138.140.44,0*<CR>

UART

Functions		Permission	Transparency
Set:	**UART**	Administrator	Public
Get:	**UART?**	End User	Public
Description		**Syntax**	
Set:	Set *SERIAL* port configuration	#**UART** `SP` *COM_Num,baud_rate,data_bits,parity,stop_bits* `CR`
Get:	Get *SERIAL* port configuration	#**UART?** `SP` *COM_Num* `CR`

Response

Set: ~`nn`@**UART** `SP` *COM_Num,baud_rate,data_bits,parity,stop_bits* `CR LF`

Get: ~`nn`@**UART?** `SP` *COM_Num,baud_rate,data_bits,parity,stop_bits* `CR LF`

Parameters

COM_Num – The number of the relevant *SERIAL* port:1–8

baud_rate – 4800, 9600, 14400, 19200, 38400, 56000, 57600, 115200 (default: 115,200)

data_bits – 7, 8

parity – 0 (no parity), 1 (Odd), 2 (Even)

stop_bits – 1, 2

Response Triggers

Notes

Stop_bits = 1.5 only when *data_bits* = 5.

Example

Set *SERIAL* port number 1 configuration to baud rate 9600, data bits 8, parity 'None', stop bits 1:
#UART *1,9600,8,0,1*<CR>

I/O Gateway Commands

Command	Description
COM-ROUTE	Set/get tunneling port routing
ETH-TUNNEL	Get opened tunnel parameters

COM-ROUTE

Functions		Permission	Transparency
Set:	**COM-ROUTE**	End User	Administrator
Get:	**COM-ROUTE?**	End User	Internal

Description		Syntax
Set:	Set tunneling port routing	#COM-ROUTE `SP` *COM_Num,portType,ETHPort,ETH_rep_en,TCP_keep_alive_timing*`CR`
Get:	Get tunneling port routing	#**COM-ROUTE?** `SP` *COM_Num*`CR`

Response
s

Parameters
COM_Num – *SERIAL* port number: 1 *portType* – 2 (TCP) *ETHPort* – TCP port number: default = 5001 *ETH_rep_en* – 1 (see notes) *TCP_keep_alive_timing* – every x seconds the device sends an empty string to TCP client ("/0"):   0–3600 seconds

Response Triggers

Notes
This command gets tunneling port routing. The serial port on the encoder sends data from the ETH port to the decoder. The *ETH_rep_en* parameter is not in use in KDS-4. Always use 1 as the value.

Example
Set tunneling port routing to port number 5025, where the COM port sends replies to new clients and the TCP keep alive timing is 10 minutes: #COM-ROUTE *1,2,5025,1,600*<CR>

ETH-TUNNEL

Functions		Permission	Transparency
Set:	-	-	-
Get:	**ETH-TUNNEL?**	Administrator	Internal
Description		**Syntax**	
Set:			
Get:	Get parameters for open tunnels	#**ETH-TUNNEL?**`SP`*TunnelId*`CR`	

Response

~`nn`@**ETH-TUNNEL**`SP`*TunnelId,ComNum,PortType,EthPort,EthIp,RemotPort,*

ETH_rep_en,Wired`CR LF`

Parameters

TunnelId – tunnel ID number :* (get all open tunnels), or type a number corresponding to one of the existing tunnels
ComNum – *SERIAL* port number: 1
PortType – 2 (TCP)
ETHPort – TCP/UDP port number: default = 5001
EthIp – client IP address in the following format: xxx.xxx.xxx.xxx
RemotPort – remote port number
ETH_rep_en – 1 (see notes)
Wired – 1 (wired connection)

Response Triggers

Notes

The *ETH_rep_en* parameter is not in use in KDS-4. Always use 1 as the value.

Example

Get parameters for all open tunnels:
#ETH-TUNNEL? *<CR>
Get parameters for tunnel 1:
#ETH-TUNNEL? 1<CR>

Streamer Commands

Command	Description
KDS-ACTION	Set/get Streamer action.
KDS-EN	Set/get Streamer encoding method.
KDS-PROT	Get Streaming protocol.
KDS-METHOD	Set/get Streaming method.
KDS-CONN	Set/get Streaming connection parameters.
KDS-MOD	Get Streamer working mode.
KDS-GOP	Get GOP Size.
KDS-BR	Get Bitrate.
KDS-FR	Get Framerate.
KDS-OP-STAT	Get Device operational status.
KDS-AUD	Set/get audio source/destination.
KDS-LATENCY	Set/get network latency estimated in rtpjitter.
KDS-SCALE	Set/get scaling mode in decoder.
KDS-MULTICAST	Set/get current multicast group address and TTL value.
KDS-FEATURE	Set/get KDS features in order to Enable/Disable them.
KDS-STORAGE-MOUNT	Set/get Recording Storage configuration parameters.
KDS-STORAGE-FILE-PREFIX	Set/get Recording Storage file name prefix.
KDS-STORAGE-FILE-LIMIT	Set/get maximum length of a Recording Storage file.
KDS-STORAGE-MAX-FILE	Set/get maximum number of files that can be created in a recording session.
KDS-RECORD-SCHEDULE	Set/get Recording Scheduling parameters.
KDS-RECORD-DURATION	Set/get the scheduled recording duration.
KDS-RECORD-OP-STAT	Get Recording operational status.

KDS-ACTION

Functions		Permission	Transparency
Set:	KDS-ACTION	End User	Public
Get:	KDS-ACTION?	End User	Public
Description		**Syntax**	
Set:	Set encoder/decoder action to perform.	#KDS-ACTION␣$action$␣CR	
Get:	Get last action (state) performed by encoder/decoder	#KDS-ACTION?␣CR	

Response

~nn@KDS-ACTION␣$action$␣CR LF

Parameters

$action$ – action code: 0 (stop operation), 1 (start operation), 2 (apply parameter changes)

Response Triggers

Notes

Use this command with the $action$ value of 2 to apply changes made in all other KDS commands.
You can send several KDS commands and run this command to apply all of the changes at once.
After using the set command, reboot the decoder to apply any changes made with other commands.

Example

Start device operation:
#KDS-ACTION 1<CR>

KDS-EN

Functions		Permission	Transparency
Set:	–	-	-
Get:	**KDS-EN?**	End User	Public
Description		**Syntax**	
Set:			
Get:	Get current encoding method of encoder/decoder	#KDS-EN?`CR`	
Response			
~`nn`@**KDS-EN**`SP`*method*`CR LF`			
Parameters			
method – encoding method: 0 (H.264)			
Response Triggers			
Notes			
There is no set for this command because H.264 is the only encoding method.			
Example			
Set encoding method to H.264:			
#KDS-EN 0<CR>			

KDS-PROT

Functions		Permission	Transparency
Set:			
Get:	**KDS-PROT?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get current streaming protocol of encoder/decoder	#KDS-PROT?`CR`	
Response			
~`nn`@**KDS-METHOD**`SP`*protocol*`CR LF`			
Parameters			
protocol – streaming protocol: 1 (RTSP)			
Response Triggers			
Notes			
There is no set for this command because RTSP is the only valid protocol.			
Example			
Get current streaming protocol of encoder/decoder:			
#KDS-PROT?<CR>			

KDS-METHOD

Functions		Permission	Transparency
Set:	**KDS- METHOD**	End User	Public
Get:	**KDS- METHOD?**	End User	Public
Description		**Syntax**	
Set:	Set current streaming method of encoder/decoder	**#KDS-METHOD** $\boxed{\text{SP}}$ *method* $\boxed{\text{CR}}$	
Get:	Get current streaming method of encoder/decoder	**#KDS-METHOD?** $\boxed{\text{CR}}$	
Response			
~$\boxed{\text{nn}}$@**KDS-METHOD** $\boxed{\text{SP}}$ *method* $\boxed{\text{CR LF}}$			
Parameters			
method – streaming method: 1 (unicast), 2 (multicast)			
Response Triggers			
Notes			
The Set command is available only for the encoder. After setting multicast as the streaming method, use the **KDS-MULTICAST** command to complete the multicast configuration. To apply changes made with this command, you must send the **KDS-ACTION** command with the *action* value as 2 (see KDS-ACTION on page 50).			
Example			
Set the streaming method to multicast: #KDS-METHOD *2*<CR>			

KDS-CONN

Functions		Permission	Transparency
Set:	**KDS-CONN**	End User	Public
Get:	**KDS-CONN?**	End User	Public
Description		**Syntax**	
Set:	Set streaming connection parameters	**#KDS-CONN** $\boxed{\text{SP}}$ *P1,P2,P3* $\boxed{\text{CR}}$	
Get:	Get current streaming connection parameters	**#KDS-CONN?** $\boxed{\text{CR}}$	
Response			
~$\boxed{\text{nn}}$@**KDS-CONN** $\boxed{\text{SP}}$ *P1,P2,P3* $\boxed{\text{CR LF}}$			
Parameters			
For encoder: *P1* (stream port), *P2* (folder name) For decoder *P1* (IP address), *P2* (stream port), *P3* (folder name)			
Response Triggers			
Notes			
To apply changes made with this command, you must send the **KDS-ACTION** command with the *action* value as 2 (see KDS-ACTION on page 50). Parameter *P3* is not used for the encoder.			
Example			
Set the streaming parameters for the decoder to IP address: 192.168.1.45, stream port: 1024, and folder name: Alpha: #KDS-CONN 192.168.1.45,1024,Alpha <CR>			

KDS-MOD

Functions		Permission	Transparency
Set:	–	-	-
Get:	`KDS-MOD?`	End User	Public
Description		**Syntax**	
Set:			
Get:	Get device current working mode	`#KDS-MOD?`⟨CR⟩	

Response

~[nn]@**KDS-MOD**[SP]*mode*[CR LF]

Parameters

mode – device working mode: 3 (high-quality)

Response Triggers

Notes

Example

Get device current working mode:
#KDS-MOD?<CR>

KDS-GOP

Functions		Permission	Transparency
Set:	–	-	-
Get:	`KDS-GOP?`	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get GOP size	`#KDS-GOP?`⟨CR⟩	

Response

~[nn]@**KDS-GOP**[SP]*value*[CR LF]

Parameters

value – GOP size: 32

Response Triggers

Notes

This command is relevant only for the encoder.

Example

Get GOP size for the encoder:
#KDS-GOP?<CR>

KDS-BR

Functions		Permission	Transparency
Set:	–	-	-
Get:	**KDS-BR?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get bitrate	**#KDS-BR?** CR	

Response

~nn@**KDS-BR** SP *value* CR LF

Parameters

value – bitrate in kbps

Response Triggers

Notes

This command is relevant only for the encoder.

Example

Get encoder bitrate:
#KDS-BR?<CR>

KDS-FR

Functions		Permission	Transparency
Set:	–	-	-
Get:	**KDS-FR?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get framerate	**#KDS-FR?** CR	

Response

~nn@**KDS-FR** SP *value* CR LF

Parameters

value – framerate in FPS

Response Triggers

Notes

Example

Get the framerate :
#KDS-FR?<CR>

KDS-OP-STAT

Functions		Permission	Transparency
Set:	–	-	-
Get:	**KDS-OP-STAT?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get device operational status	#KDS-OP-STAT? CR	
Response			
~nn@**KDS-OP-STAT** SP *value* CR LF			
Parameters			
value – device operational status: 0 (running), 1 (stopped), 2 (error), 3 (waiting – relevant for decoder only)			
Response Triggers			
Notes			
Example			
Get the device operational status : #KDS-OP-STAT?<CR>			

KDS-AUD

Functions		Permission	Transparency
Set:	**KDS-AUD**	End User	Public
Get:	**KDS-AUD?**	End User	Public
Description		**Syntax**	
Set:	Set audio source/destination	#KDS-AUD SP *mode* CR	
Get:	Get audio source/destination	#KDS-AUD? CR	
Response			
~nn@**KDS-AUD** SP *mode* CR LF			
Parameters			
mode – audio mode for encoder: 0 (HDMI input), 1 (analog input), 2 (none); audio mode for decoder: 0 (HDMI output), 1 (analog output), 2 (both), 3 (none)			
Response Triggers			
Notes			
When using this command for the decoder, to apply changes made with this command, you must send the **KDS-ACTION** command with the *action* value as 2 (see KDS-ACTION on page 50). When using this command for the encoder, changes are applied without running another command.			
Example			
Set the audio mode for the encoder to HDMI input: #KDS-AUD 0<CR>			

KDS-LATENCY

Functions		Permission	Transparency
Set:	**KDS-LATENCY**	End User	Public
Get:	**KDS-LATENCY?**	End User	Public

Description		Syntax
Set:	Set RTP jitter latency in ms	**#KDS-LATENCY**⎵*value*⟨CR⟩
Get:	Get RTP jitter latency	**#KDS-LATENCY?**⟨CR⟩

Response
~⟦nn⟧@**KDS-LATENCY**⎵*value*⟨CR LF⟩

Parameters
value – RTP jitter latency in ms: 10 (default value)–60000 (=one minute)

Response Triggers

Notes
Relevant only for the decoder.
When the video is rendered with artifacts, use this command to add latency to the RTP jitter buffer to allow sufficient time for re-ordering the packet, thereby increasing the video quality.
This command sets the network latency expected by the decoder, and not the video latency. However, increasing this value does increase the video latency already inherent in the hardware.
To apply changes made with this command, you must send the **KDS-ACTION** command with the *action* value as 2 (see KDS-ACTION on page 50).

Example
Set the RTP jitter latency to 30000ms:
#KDS-LATENCY 30000<CR>

KDS-SCALE

Functions		Permission	Transparency
Set:	**KDS-SCALE**	End User	Public
Get:	**KDS-SCALE?**	End User	Public

Description		Syntax
Set:	Set scaling mode	**#KDS-SCALE**⎵*value*⟨CR⟩
Get:	Get scaling mode	**#KDS-SCALE?**⟨CR⟩

Response
~⟦nn⟧@**KDS-SCALE**⎵*value,mode*⟨CR LF⟩

Parameters
value – scaling mode: 0 (pass-through), 1 (upscale)
mode – the display resolution after upscaling: 1920x1080p-60

Response Triggers

Notes
This command is relevant only for the decoder.
Upscaling display resolution is always 1920x1080p@60Hz. However, if the maximum resolution of the sink is 720p60, the output video will be scaled to that resolution.
To apply changes made with this command, you must send the **KDS-ACTION** command with the *action* value as 2 (see KDS-ACTION on page 50) and reboot the device.

Example
Set the scaling mode of the decoder to pass-through:
#KDS-SCALE 0<CR>

KDS-MULTICAST

Functions		Permission	Transparency
Set:	`KDS-MULTICAST`	End User	Public
Get:	`KDS-MULTICAST?`	End User	Public

Description		Syntax
Set:	Set current multicast group address and TTL value	`#KDS-MULTICAST`␣*group_ip,TTL*[CR]
Get:	Get current multicast group address and TTL value	`#KDS-MULTICAST?`[CR]

Response

~nn@**KDS-MULTICAST**␣*group_ip,TTL*[CR LF]

Parameters

group_ip – Multicast group IP used for streaming packets in Multicast Streaming Method, in the following format: `xxx.xxx.xxx.xxx`.

TTL - Time to Live of the streamed packets: `1` (restricted to the same subnet, won't be forwarded by a router), `2`–`31` (restricted to the same site, organization or department), `32`–`63` (restricted to the same region), `64`–`127` (restricted to the same continent), `128`–`254` (unrestricted in scope)

Response Triggers

Notes

This command is relevant only for the encoder.

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 (Time To Live) controls the lifetime of the datagram to avoid it being looped forever, due to routing errors.

To apply changes made with this command, you must send the `KDS-ACTION` command with the *action* value as 2 (see KDS-ACTION on page 50).

Example

Set the group address to 224.0.0.0 and the TTL to 1:
`#KDS-MULTICAST 224.0.0.0,`*1*`<CR>`

KDS-FEATURE

Functions		Permission	Transparency
Set:	`KDS-FEATURE`	End User	Public
Get:	`KDS-FEATURE?`	End User	Public
Description		**Syntax**	
Set:	Set KDS features operation status.	`#KDS-FEATURE`␣`feature_id,status`CR	
Get:	Get KDS features operation status.	`#KDS-FEATURE?`␣`feature_id`CR	
Response			
~nn@`KDS-FEATURE`␣`feature_id,status`CR LF			
Parameters			
`feature_id` – KDS feature code: `0` (streaming), `1` (recording) `status`– operation status for streaming feature: `0` (disabled), `1` (enabled); operation status for recording: `0` (disabled), `1` (continuous), `2` (scheduled)			
Response Triggers			
Notes			
This command is available only for encoders. To apply changes made with this command, you must send the **KDS-ACTION** command with the *action* value as 2 (see KDS-ACTION on page 50).			
Example			
Set the recording feature to scheduled: `#KDS-FEATURE 1,2<CR>`			

KDS-STORAGE-MOUNT

Functions		Permission	Transparency
Set:	**KDS-STORAGE-MOUNT**	End User	Public
Get:	**KDS-STORAGE-MOUNT?**	End User	Public

Description		Syntax
Set:	Set recording storage location.	**#KDS-STORAGE-MOUNT**`SP`*uri,username*`CR`
Get:	Get recording storage location.	**#KDS-STORAGE-MOUNT?**`CR`

Response

~`nn`@**KDS-STORAGE-MOUNT**`SP`*uri,username*`CR LF`

Parameters

uri – recording storage location:

   when storing on a connected computer – smb*://[IP Address of the computer]/[folder name]/[sub folder name]*

   when storing on an external USB storage device connected to the USB 2 port: USB://

username – the username of the computer account when storing on a connected computer (see notes below).

Response Triggers

Notes

This command is relevant only when the recording feature is enabled (see the #KDS-FEATURE command).

This command is available only for encoders.

If there is a password on the account, you must use the embedded web pages to set the recording storage location for security reasons. The embedded web pages encrypt the password, this Protocol 3000 command does not.

If the network requires a domain name as well as a username, enter the username in the following format: [domain name]/[username].

The uri is limited to a maximum of 1024 characters.

To apply changes made with this command, you must send the **KDS-ACTION** command with the *action* value as 2 (see KDS-ACTION on page 50).

Example

Set the recordings to be saved and stored in the Media > Streaming Recordings folder of the connected computer where the computer domain=company network and the username=John:

#KDS-STORAGE-MOUNT smb://192.168.1.39/Media/Streaming Recordings,company network/John <CR>

KDS-STORAGE-FILE-PREFIX

Functions		Permission	Transparency
Set:	**KDS-STORAGE-FILE-PREFIX**	End User	Public
Get:	**KDS-STORAGE-FILE-PREFIX?**	End User	Public
Description		**Syntax**	
Set:	Define the prefix for recording storage file names.	**#KDS-FILE-PREFIX**_{SP} *file_prefix*_{CR}
Get:	Get the prefix for recording storage file names.	**#KDS-FILE-PREFIX?**_{CR}

Response
~nn@**KDS-FILE-PREFIX**_{SP} *file_prefix*_{CR LF}

Parameters
file_prefix – recording storage file prefix: default = video-

Response Triggers

Notes
This command is available only for encoders.
This command is relevant only when the recording feature is enabled (see the #KDS-FEATURE command).
Each recording file is automatically named with this prefix, followed by the date and time.
The file prefix must follow the standard rules for file naming.
To apply changes made with this command, you must send the **KDS-ACTION** command with the *action* value as 2 (see KDS-ACTION on page 50).

Example
Define the recording storage file prefix as My Audio:
#KDS-FILE-PREFIX My Audio<CR>

KDS-STORAGE-FILE-LIMIT

Functions		Permission	Transparency
Set:	**KDS-STORAGE-FILE-LIMIT**	End User	Public
Get:	**KDS-STORAGE-FILE-LIMIT?**	End User	Public
Description		**Syntax**	
Set:	Set the maximum length of recording storage files.	**#KDS-STORAGE-FILE-LIMIT**␣*file_limit*␍	
Get:	Get the maximum length of recording storage files.	**#KDS-STORAGE-FILE-LIMIT?**␍	
Response			
~nn@**KDS-STORAGE-FILE-LIMIT**␣*file_limit*␍␊			
Parameters			
file_limit – The maximum length of a recording storage file in the following format *hh:mm:ss*.			
Response Triggers			
Notes			
This command is available only for encoders. This command is relevant only when the recording feature is enabled (see the #KDS-FEATURE command). When a recording reaches the defined maximum length, the recording stops on the current file and continues on a new file. To apply changes made with this command, you must send the **KDS-ACTION** command with the *action* value as 2 (see KDS-ACTION on page 50).			
Example			
Set the maximum length of recording storage files to 1 hour and 30 minutes: #KDS-STORAGE-FILE-LIMIT 01:30:00<CR>			

KDS-STORAGE-MAX-FILE

Functions		Permission	Transparency
Set:	**KDS-STORAGE-MAX-FILE**	End User	Public
Get:	**KDS-STORAGE-MAX-FILE?**	End User	Public
Description		**Syntax**	
Set:	Set the maximum number of files that can be created in a recording session.	**#KDS-STORAGE-MAX-FILE** `SP` *value* `CR`	
Get:	Get maximum number of files that can be created in a recording session.	**#KDS-STORAGE-MAX-FILE?** `CR`	
Response			
~`nn`@**KDS-STORAGE-MAX-FILE** `SP` *value* `CR LF`			
Parameters			
value – a number (`1` or greater) that defines the maximum number of files that can be created in a recording session or `0` (no limit on the number of files).			
Response Triggers			
Notes			
This command is available only for encoders. This command is relevant only when the recording feature is enabled (see the `#KDS-FEATURE` command). When the number of saved files reaches the maximum, the recording continues and overwrites the already saved files, starting with the first one that was saved. To apply changes made with this command, you must send the **KDS-ACTION** command with the *action* value as 2 (see [KDS-ACTION](#) on page [50](#)).			
Example			
Set the maximum number of files that can be created in a recording session to 15: `#KDS-STORAGE-MAX-FILE 15<CR>`			

KDS-RECORD-SCHEDULE

Functions		Permission	Transparency
Set:	**KDS-RECORD-SCHEDULE**	End User	Public
Get:	**KDS-RECORD-SCHEDULE?**	End User	Public
Description		**Syntax**	
Set:	Set scheduled recording date and time.	**#KDS-RECORD-SCHEDULE**`SP`*date,time*`CR`
Get:	Get scheduled recording date and time.	**#KDS-RECORD-SCHEDULE?**`CR`

Response
~`nn`@**KDS-RECORD-SCHEDULE**`SP`*date,time*`CR LF`

Parameters
date – date of scheduled recording in following format: `dd-mm-yyyy`.
time – time of scheduled recording in following format: `hh:mm:ss`.

Response Triggers

Notes
This command is available only for encoders.
This command is relevant only when the scheduled recording feature is enabled (see the `#KDS-FEATURE` command).
Scheduling time must be a valid date and time in the future.
The unit only saves one scheduled recording at a time.
Sending this command when there is an existing scheduled recording will replace the existing date and time with the new one.
You do not need to send the **KDS-ACTION** command to apply changes using this command.

Example
Set scheduled recording for May 24, 2019 at 3:30pm:
`#KDS-RECORD-SCHEDULE` *24-05-2019,15:30:00*<CR>

KDS-RECORD-DURATION

Functions		Permission	Transparency
Set:	**KDS-RECORD-DURATION**	End User	Public
Get:	**KDS-RECORD-DURATION?**	End User	Public
Description		**Syntax**	
Set:	Set the scheduled recording duration.	**#KDS-RECORD-DURATION**sp *time*cr
Get:	Get the scheduled recording duration.	**#KDS-RECORD-DURATION?**cr
Response			
~nn@**KDS-RECORD-DURATION**sp *time*cr lf			
Parameters			
time – duration of the scheduled recording in the following format: hh:mm:ss.			
Response Triggers			
Notes			
This command is available only for encoders. This command is relevant only when the scheduled recording feature is enabled (see the #KDS-FEATURE command). Duration can be extended or reduced as long as the new end time has not passed. Seconds are rounded up so that the recording is not cut short. To apply changes made with this command, you must send the **KDS-ACTION** command with the *action* value as 2 (see KDS-ACTION on page 50).			
Example			
Set the scheduled recording duration to 45 minutes: #KDS-RECORD-DURATION *00:45:00*<CR>			

KDS-RECORD-OP-STAT

Functions		Permission	Transparency
Set:	–	-	-
Get:	**KDS-RECORD-OP-STAT?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get recording operational status.	**#KDS-RECORD-OP-STAT?** `CR`	

Response
~`nn`@**KDS-RECORD-OP-STAT** `SP` *status* `CR LF`

Parameters
status – number that represents the recording operational status:
0 (Running)
1 (Stopped)
2 (Read only file system error)
3 (Credentials error)
4 (Invalid method error)
5 (File system is full error)
6 (File system is almost full warning)
7 (Read/write error)
8 (File system mount error)
9 (File system unmount error)
10 (Waiting for new schedule)
11 (Waiting for scheduled recording to begin)
12 (Error – Bandwidth for storage is too low, contact your system administrator.)

Response Triggers

Notes
This command is available only for encoders.

Example
Get recording operational status:
#KDS-RECORD-OP-STAT?<CR>

The warranty obligations of Kramer Electronics Inc. ("Kramer Electronics") for this product are limited to the terms set forth below:

What is Covered
This limited warranty covers defects in materials and workmanship in this product.

What is Not Covered
This limited warranty does not cover any damage, deterioration or malfunction resulting from any alteration, modification, improper or unreasonable use or maintenance, misuse, abuse, accident, neglect, exposure to excess moisture, fire, improper packing and shipping (such claims must be presented to the carrier), lightning, power surges, or other acts of nature. This limited warranty does not cover any damage, deterioration or malfunction resulting from the installation or removal of this product from any installation, any unauthorized tampering with this product, any repairs attempted by anyone unauthorized by Kramer Electronics to make such repairs, or any other cause which does not relate directly to a defect in materials and/or workmanship of this product. This limited warranty does not cover cartons, equipment enclosures, cables or accessories used in conjunction with this product.

Without limiting any other exclusion herein, Kramer Electronics does not warrant that the product covered hereby, including, without limitation, the technology and/or integrated circuit(s) included in the product, will not become obsolete or that such items are or will remain compatible with any other product or technology with which the product may be used.

How Long this Coverage Lasts
The standard limited warranty for Kramer products is seven (7) years from the date of original purchase, with the following exceptions:
1. All Kramer VIA hardware products are covered by a standard three (3) year warranty for the VIA hardware and a standard three (3) year warranty for firmware and software updates; all Kramer VIA accessories, adapters, tags, and dongles are covered by a standard one (1) year warranty.
2. Kramer fiber optic cables, adapter-size fiber optic extenders, pluggable optical modules, active cables, cable retractors, ring mounted adapters, portable power chargers, Kramer speakers, and Kramer touch panels are all covered by a standard one (1) year warranty.
3. All Kramer Cobra products, all Kramer Calibre products, all Kramer Minicom digital signage products, all HighSecLabs products, all streaming, and all wireless products are covered by a standard three (3) year warranty.
4. All Sierra Video MultiViewers are covered by a standard five (5) year warranty.
5. Sierra switchers & control panels are covered by a standard seven (7) year warranty (excluding power supplies and fans that are covered for three (3) years).
6. K-Touch software is covered by a standard one (1) year warranty for software updates.
7. All Kramer passive cables are covered by a ten (10) year warranty.

Who is Covered
Only the original purchaser of this product is covered under this limited warranty. This limited warranty is not transferable to subsequent purchasers or owners of this product.

What Kramer Electronics Will Do
Kramer Electronics will, at its sole option, provide one of the following three remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:
1. Elect to repair or facilitate the repair of any defective parts within a reasonable period of time, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition. Kramer Electronics will also pay the shipping costs necessary to return this product once the repair is complete.
2. Replace this product with a direct replacement or with a similar product deemed by Kramer Electronics to perform substantially the same function as the original product. If a direct or similar replacement product is supplied, the original product's end warranty date remains unchanged and is transferred to the replacement product.
3. Issue a refund of the original purchase price less depreciation to be determined based on the age of the product at the time remedy is sought under this limited warranty.

What Kramer Electronics Will Not Do Under This Limited Warranty
If this product is returned to Kramer Electronics or the authorized dealer from which it was purchased or any other party authorized to repair Kramer Electronics products, this product must be insured during shipment, with the insurance and shipping charges prepaid by you. If this product is returned uninsured, you assume all risks of loss or damage during shipment. Kramer Electronics will not be responsible for any costs related to the removal or re-installation of this product from or into any installation. Kramer Electronics will not be responsible for any costs related to any setting up this product, any adjustment of user controls or any programming required for a specific installation of this product.

How to Obtain a Remedy Under This Limited Warranty
To obtain a remedy under this limited warranty, you must contact either the authorized Kramer Electronics reseller from whom you purchased this product or the Kramer Electronics office nearest you. For a list of authorized Kramer Electronics resellers and/or Kramer Electronics authorized service providers, visit our web site at www.kramerav.com or contact the Kramer Electronics office nearest you.

In order to pursue any remedy under this limited warranty, you must possess an original, dated receipt as proof of purchase from an authorized Kramer Electronics reseller. If this product is returned under this limited warranty, a return authorization number, obtained from Kramer Electronics, will be required (RMA number). You may also be directed to an authorized reseller or a person authorized by Kramer Electronics to repair the product.

If it is decided that this product should be returned directly to Kramer Electronics, this product should be properly packed, preferably in the original carton, for shipping. Cartons not bearing a return authorization number will be refused.

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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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