KRAMER ELECTRONICS LTD.

USER MANUAL

MODEL:

FC-132ETH

33x9 Serial/Data Router

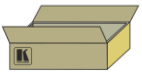
P/N: 2900-300229 Rev 2

FC-132ETH 33x9 Serial/Data Router Quick Start Guide

This guide helps you install and use your product for the first time. For more detailed information, go to http://www.kramerelectronics.com/support/product_downloads.asp to download the latest manual or scan the QR code on the left.

Step 1: Check what's in the box

- **FC-132ETH** 33x9 Serial/Data Router
- 1 Quick Start Guide
- 1 Set of rack "ears"
- 1 Power cord
- 4 Rubber feet



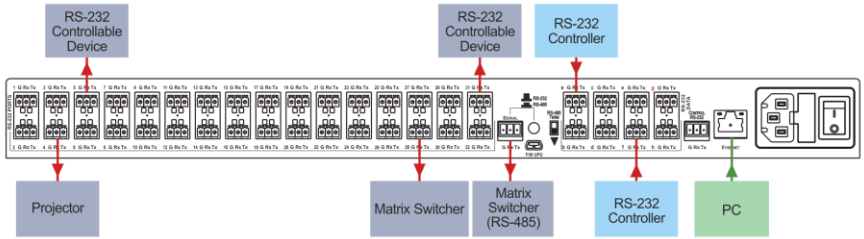
Save the original box and packaging in case your **FC-132ETH** needs to be returned to the factory for service.

Step 2: Install the FC-132ETH

Mount the device in a rack (using the included rack "ears") or attach the rubber feet and place the device on a shelf.

Step 3: Connect the inputs and outputs

Always switch off the power to all devices before connecting them to your **FC-132ETH**.



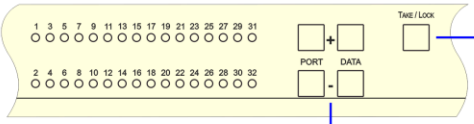
Always use Kramer high-performance cables for connecting equipment to the **FC-132ETH.**

Step 4: Connect the power

Connect the power cord to the **FC-132ETH** and plug it into the mains electricity.

Step 5: Configure and Operate the FC-132ETH

1. Configure the Ethernet controller
   - Set DHCP or assign a static IP address
   - Associate IP port(s) with serial port(s)
   - Configure the serial port parameters
2. Configure virtual port(s) on the PC
3. Configure Ethernet connection(s) on the PC
4. Switch port(s) on the Ethernet Controller



Lock and Unlock the Front Panel Buttons

To lock:

- Press and hold the Take/Lock button for 5 seconds. The display shows Locked

To unlock:

- Press and hold the Take/Lock button for 5 seconds. The display shows Unlocked

Switch a Data connection to a Port

- Select an output Port using the Port buttons
- Select a Data connection using the Data buttons
- Press the Take button

Contents

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1 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 video, audio, presentation, and broadcasting professionals on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 11 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters and GROUP 11: Sierra Video Products.

Congratulations on purchasing your Kramer **FC-132ETH** *33x9 Serial/Data Router*, which is ideal for the following typical applications:

- Conference room presentations
- Advertising applications
- Rental and staging

2 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

Go to http://www.kramerelectronics.com/support/product_downloads.asp to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

2.1 Achieving the Best Performance

To achieve 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 **FC-132ETH** away from moisture, excessive sunlight and dust

This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.

2.2 Safety Instructions

Caution: There are no operator serviceable parts inside the unit

Warning: Use only the power cord that is supplied with the unit

Warning: Do not open the unit. High voltages can cause electrical shock! Servicing by qualified personnel only

Warning: Disconnect the power and unplug the unit from the wall before installing

2.3 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 *http://www.kramerelectronics.com/support/recycling/*.

3 Overview

The **FC-132ETH** is an advanced serial communication matrix, and a bidirectional serial to Ethernet control-signals converter.

The unit acts as a gateway between Ethernet and massive numbers of RS-232 controlled devices. Also, it can be used to add a serial data routing layer to our modular matrices populated with DGKat or other cards with data-embedding features.

The **FC-132ETH** has 33 RS−232 ports, one of which can be used for RS-485 communication. Into one or more of these ports serial data can be switched from any of the eight RS-232 data ports or from a pre-configured, virtual Ethernet connection. Depending on the routing of the matrix, one-to-one bidirectional communication or one-to-many unidirectional communication is supported.

The **FC-132ETH** can be controlled using the front panel buttons, a serial controller, or by the intuitive, feature-loaded Web pages supported by all major Web browsers which makes it possible to access the **FC-132ETH** from mobile devices, PCs and MACs.

In particular, the **FC-132ETH** features:

- Eight RS-232, bidirectional input Data ports
- 32 RS-232, bidirectional/unidirectional output ports

  Note: A switched link acts bidirectionally only when there is one-to-one routing. When an input is switched to more than one output, that link operates unidirectionally
- One Ethernet control/data port
- One RS-232 local control port
- One dual-function RS-232/RS-485 port
- Selectable static or dynamic IP addressing (DHCP)
- Configurable serial data parameters, (for example, baud rate and parity)
- An easy to read LCD display
- A lock button to prevent unwanted tampering with the buttons on the front panel

- Support for Protocol 3000
- A virtual-port software application
- Web-page control with password authentication for making changes to settings
- An internal clock for accurate logs and time-stamping

The **FC-132ETH** includes the Virtual Serial Port Manager (Kramer VSPM) for compatibility with applications based on COM-port communication. The virtual serial port:

- Makes the **FC-132ETH** compatible with all Windows® based applications that work using a physical COM port. This includes all versions of **K-Router** and other Kramer control applications. It enables you to operate all RS-232 and RS-485 controllable devices over an Ethernet LAN using their existing PC software
- Operates like a physical hardware port, that is, a logical COM that behaves like a standard hardware port but in reality transparently reroutes the data using the TCP/IP network to the **FC-132ETH** interface via a virtual null-modem connection, which you can emulate over Ethernet or the Internet
- Can be created in any quantity on your PC and does not occupy an actual serial port

You can control the **FC-132ETH** using the front panel buttons, or remotely via:

- RS-232 serial commands transmitted by a PC, touch screen system or other serial controller
- A PC connected to the Ethernet port on the device via a LAN

4 Defining the FC-132ETH 33x9 Serial/Data Router

Figure 1 defines the front panel of the **FC-132ETH**.

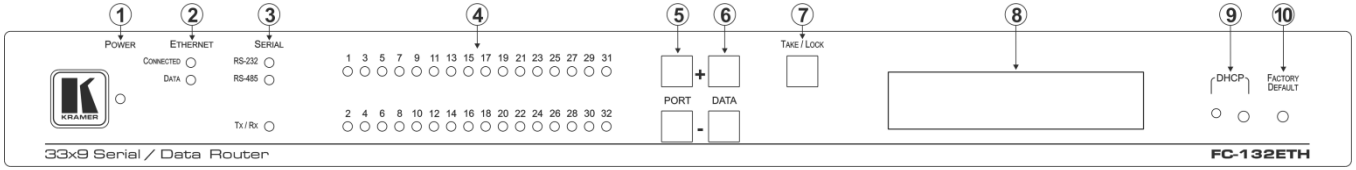


Figure 1: FC-132ETH 33x9 Serial/Data Router Front Panel

#	Feature		Function
1	*POWER* LED		Lights green when the device is powered on
2	*ETHERNET* LEDs	*CONNECTED*	Lights orange when the Ethernet port is connected to another device (see Section 7.2)
		DATA	Flashes green when data are being transferred on the Ethernet link
3	*SERIAL* LEDs	*RS-232*	Lights green when port number 33 is set to RS-232 mode (see RS-232 RS-485 Button)
		RS-485	Lights green when port number 33 is set to RS-485 mode
		Tx/Rx	Flashes green when data are being transferred over the RS-232/RS-485 link. Flashes red when serial data is being received. Flashes orange when serial data is being transmitted and received
4	RS-232 Ports LEDs *1~32*		Flashes green when serial data is being transmitted. Flashes red when serial data is being received. Flashes orange when serial data is being transmitted and received
5	*PORT* Buttons	+	Press to step up through the output data ports for selection (see Section 8.1)
		–	Press to step down through the output data ports for selection
6	*DATA* Buttons	+	Press to step up through the input data ports for selection (see Section 8.1)
		–	Press to step down through the input data ports for selection

#	Feature		Function
7	*TAKE/LOCK* Button		Press briefly to activate a switching selection (see Section 8.1). Press and hold for five seconds to lock/unlock the front panel buttons (see Section 8.2)
8	LCD Display 2 x 20		Displays the contextual messages. Automatically blanks after 30 seconds
9	*DHCP*	LED	Lights green to indicate DHCP is active
		Button	Press to activate DHCP. Press again to deactivate DHCP (see Section 10.4)
10	*FACTORY DEFAULT* Button		Press and hold while powering the device on to reset the device to the factory default values (see Section 10.4)

Figure 2 defines the rear panel of the **FC-132ETH**.

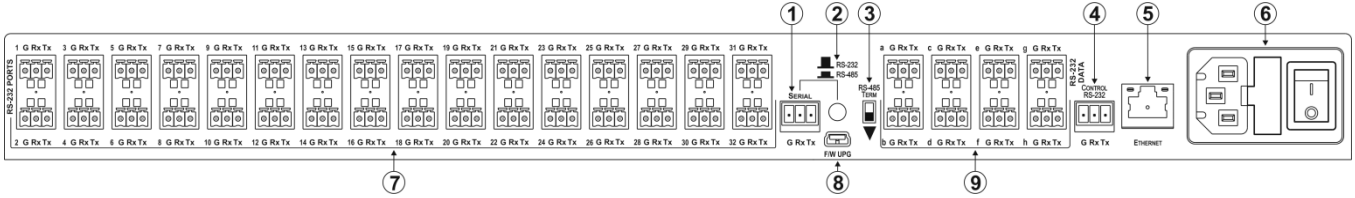


Figure 2: FC-132ETH 33x9 Serial/Data Router Rear Panel

#	Feature	Function
1	*SERIAL* RS-232/RS-485 3-pin Terminal Block	Connect to the device to be controlled serially, (for example, the VS-3232DN). When set to RS-232, (see RS-232 RS-485 Button), this port can be used as input port number 33
2	*RS-232 RS-485* Button	Release the button to set the port to RS-232 mode. Depress the button to set the port to RS-485 mode
3	*RS-485 TERM* Switch	Slide down to terminate the RS-485 bus. Slide up to leave the RS-485 bus unterminated (see Section 10.1)
4	*CONTROL RS-232* 3-pin Terminal Block	Connect to a serial controller (see Section 7.1)
5	*ETHERNET* RJ-45 Connector	Connect to a PC via a LAN (see Section 7.2)
6	Mains Power Connector, Fuse and Power Switch	Plug in the power cord and switch the device on and off
7	*RS-232 PORTS* Outputs *1~32* 3-pin Terminal Blocks	Connect to up to 32 serial destination devices, (see Section 6)
8	*F/W UPG* Mini USB Connector	For the use of Kramer service personnel only (see Section 10.5)
9	*RS-232 DATA* Serial Outputs *a~h* 3-pin Terminal Blocks	Connect to up to eight serial source devices

5 Installing in a Rack

This section provides instructions for rack mounting the unit.

Before installing in a rack, be sure that the environment is within the recommended range:

OPERATING TEMPERATURE:	0º to +40ºC (32º to 104ºF)
STORAGE TEMPERATURE:	-40º to +70ºC (-40º to 158ºF)
HUMIDITY:	10% to 90%, RHL non-condensing

CAUTION!

When installing on a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.

2. Once rack mounted, enough air will still flow around the machine.

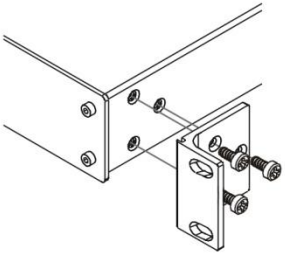
3. The machine is placed straight in the correct horizontal position.

4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.

5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note:

- In some models, the front panel may feature built-in rack ears
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions available from our Web site

6 Initial Configuration and Use Overview

This chapter provides an overview of the initial configuration and basic operation of the **FC-132ETH.** The chapter comprises:

- Configuring the **FC-132ETH** (see Section 6.1)
- Configuring a virtual port on the PC (see Section 6.2)
- Configuring an Ethernet connection on the PC (see Section 6.3)
- Switching ports on the **FC-132ETH** (see Section 6.4)

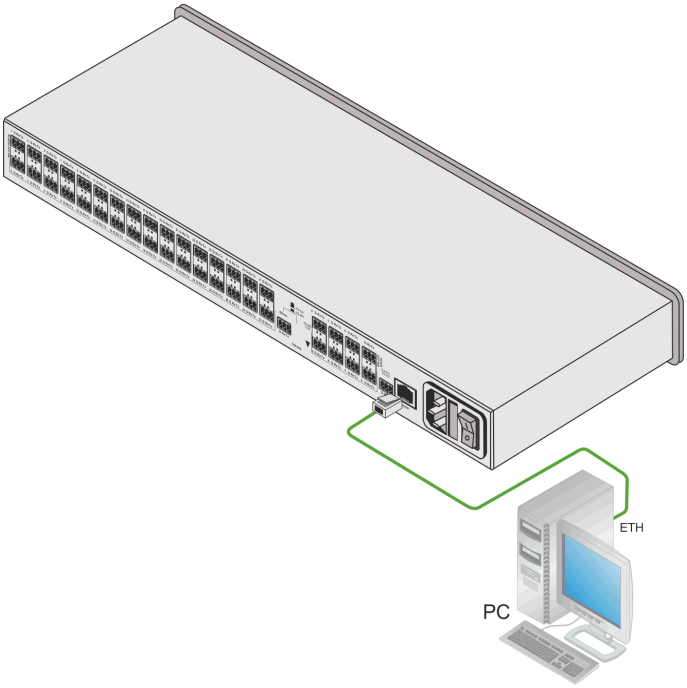


Figure 3: Connecting the FC-132ETH for Initial Configuration

6.1 Configuring the FC-132ETH

To configure the FC-132ETH:

1. Connect the Ethernet port on the rear panel of the **FC-132ETH** to a PC either directly (see Section 7.2) or via a LAN.

2. Using a Web browser, (see Section 9 and Section 11) browse to the General Info home page (see Figure 10).

3. Click on Device Settings to browse to the Device Settings page, (see Figure 13).

4. Enter the time and date manually, or enter the Time server address for automatic time and date synchronization.

5. Click Save Changes.

6. Click on Communication to browse to the Communication page, (see Figure 14).

7. Enter the IP address, mask and gateway for static IP addressing and Click Set.
   —Or—
   Click DHCP On for dynamic IP addressing.
   Note: If you have changed the IP from the default setting, you must reload the General Info home page again using the new IP address.

8. Click on Serial Ports Settings to browse to the Serial Port Settings page, (see Figure 15).

9. Associate the required serial ports with their corresponding TCP/UDP settings.

10. For each associated serial port, enter the serial port configuration parameters using the drop-down lists under Serial Configuration.

11. Click Save Changes.

12. If required, click on Security to browse to the Security page.

13. Click ON to activate security.
    The user name and password credentials popup appears.

14. Enter the required user name and password.

6.2 Configuring a Virtual Port on the PC

If the control application cannot work with an Ethernet driver, download the Kramer VSPM from our Web site to set a virtual port for each local port on your **FC-132ETH**.

The **Kramer VSPM** software lets you emulate virtual ports which normally would be present in the machine hardware. After setup, the virtual port lets you control Kramer machines via your PC.

6.3 Configuring an Ethernet Connection on the PC

If the control application can directly connect to the Ethernet driver, select the host IP and port number according to your **FC-132ETH** configuration, as illustrated in Figure 4.

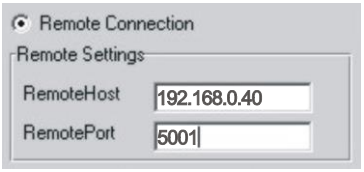


Figure 4: The Port Window – Selecting a Remote Connection

6.4 Switching Ports on the FC-132ETH

You can switch ports either locally using the front panel buttons or remotely using the Web pages, (see Section 9.3).

To switch ports locally on the FC-132ETH:

1. Select the required output Port using the **+** and **–** Port buttons.
   The Data buttons flash and the selected output is displayed on the readout.

2. Select the required input Data connection using the **+** and **–** Data buttons. The selected Data connection is displayed on the readout and the Take button flashes.

3. Press Take/Lock to save the selection.

7 Connecting the FC-132ETH 33x9 Serial/Data Router

Switch off the power to all devices before connecting them to your **FC-132ETH**. After connecting your **FC-132ETH**, connect its power and then switch on the power to each device.

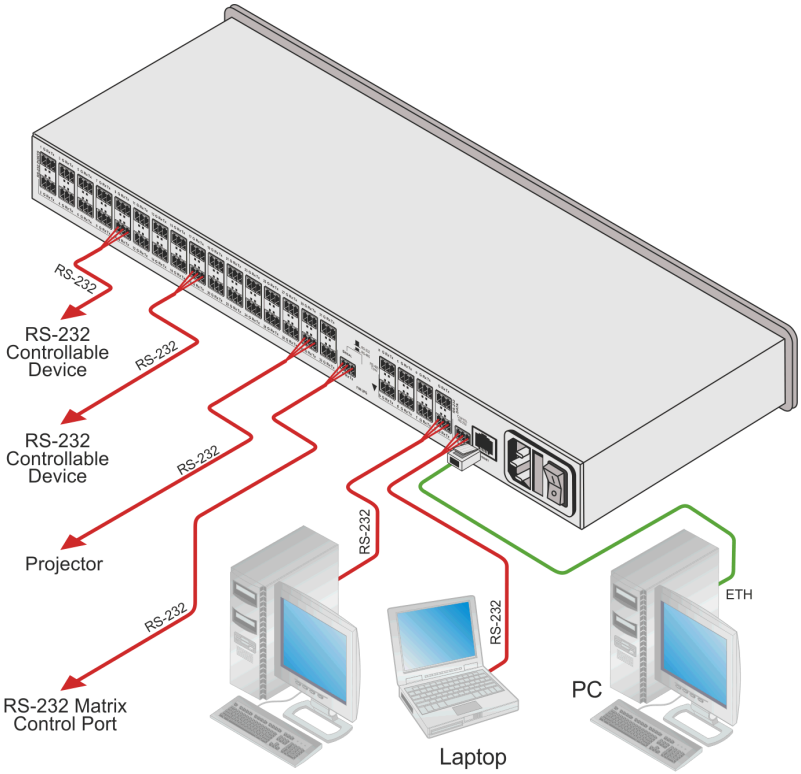


Figure 5: Connecting the FC-132ETH 33x9 Serial/Data Router

To connect the FC-132ETH as illustrated in the example in Figure 5:

1. Connect up to eight serial controllers/serial data sources, (for example, Personal Computers) to the 3-pin, terminal block, RS-232 Data connectors.

2. Connect a serial controller, (for example, a laptop) to the Control RS-232 port.

3. Connect the device to a LAN using the RJ-45 Ethernet connector.

4. Connect up to 32 serial data destination devices, (for example, projectors or matrix switchers) to the 3-pin, terminal block, RS-232 Ports connectors.

5. Connect a device to be controlled using RS-232 serial data, (for example, a matrix switcher) to the 3-pin, terminal block, Serial port.

6. Connect the device to the mains electricity (not shown in Figure 5) and power the device on.

7.1 Connecting to the FC-132ETH 33x9 Serial/Data Router via RS-232

You can connect to the **FC-132ETH** via an RS-232 connection using, for example, a PC.

To connect to the FC-132ETH via RS-232:

- Connect the Control RS-232 3-pin, terminal block connector on the rear panel of the **FC-132ETH** unit via a 3-wire cable (pin TX to pin 2, RX to pin 3, and G to pin 5) to the RS-232 9-pin D-sub port on your PC

7.2 Connecting to the FC-132ETH 33x9 Serial/Data Router via Ethernet

You can connect to the **FC-132ETH** via Ethernet using either of the following methods:

- Directly to the PC using a crossover cable (see Section 7.2.1)
- Via a network hub, switch, or router, using a straight-through cable (see Section 7.2.2)

Note: If you want to connect via a router and your IT system is based on IPv6, speak to your IT department for specific installation instructions.

7.2.1 Connecting the Ethernet Port Directly to a PC

You can connect the Ethernet port of the **FC-132ETH** directly to the Ethernet port on your PC using a crossover cable with RJ-45 connectors.

This type of connection is recommended for identifying the with the factory configured default IP address.

After connecting the **FC-132ETH** to the Ethernet port, configure your PC as follows:

1. Click **Start** > **Control Panel** > **Network and Sharing Center**.
2. Click **Change Adapter Settings**.
3. Highlight the network adapter you want to use to connect to the device and click **Change settings of this connection**.
   The Local Area Connection Properties window for the selected network adapter appears as shown in Figure 6.

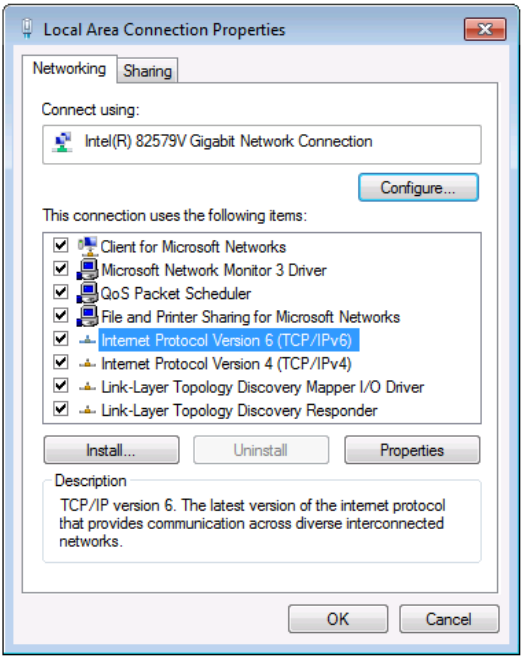


Figure 6: Local Area Connection Properties Window

4. Highlight either **Internet Protocol Version 6 (TCP/IPv6)** or **Internet Protocol Version 4 (TCP/IPv4)** depending on the requirements of your IT system.

5. Click **Properties**.
   The Internet Protocol Properties window relevant to your IT system appears as shown in Figure 7 or Figure 8.

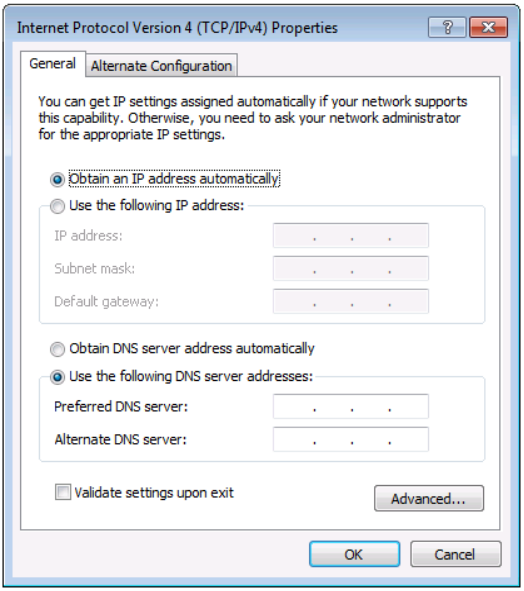


Figure 7: Internet Protocol Version 4 Properties Window

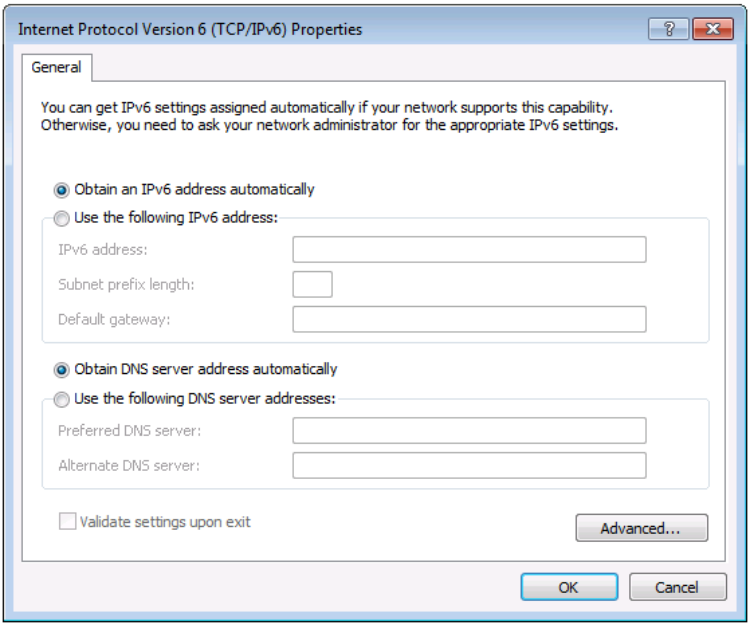


Figure 8: Internet Protocol Version 6 Properties Window

6. Select **Use the following IP Address** for static IP addressing and fill in the details as shown in Figure 9.
   For TCP/IPv4 you can use any IP address in the range 192.168.1.1 to 192.168.1.255 (excluding 192.168.1.39) that is provided by your IT department.

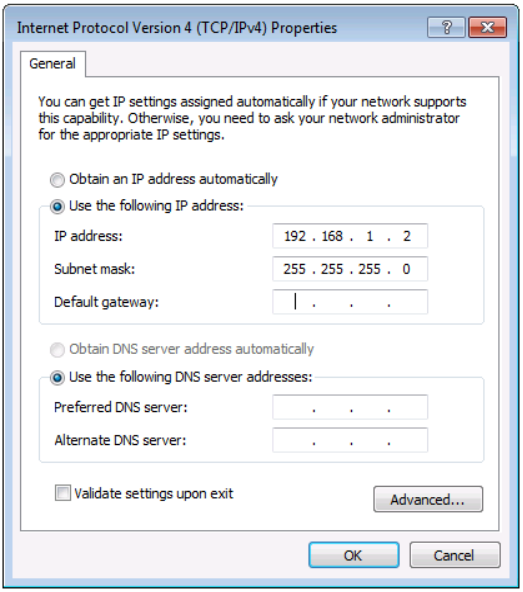


Figure 9: Internet Protocol Properties Window

7. Click **OK**.

8. Click **Close**.

7.2.2 Connecting the Ethernet Port via a Network Hub or Switch

You can connect the Ethernet port of the **to** the Ethernet port on a network hub or using a straight-through cable with RJ-45 connectors.

8 Operating the FC-132ETH Locally

This section describes:

- Switching a Data connection to an output Port (see Section 8.1)
- Locking the front panel buttons (see Section 8.2)

8.1 Switching a Data Connection to an Output Port

To switch a Data connection to an output Port:

1. Select the required output Port using the **+** and **–** Port buttons.
   The Data buttons flash and the selected output is displayed on the readout.

2. Select the required input Data connection using the **+** and **–** Data buttons.
   The selected Data connection is displayed on the readout and the Take button flashes.

3. Press Take/Lock to save the selection.
   If you do not press the Take/Lock button within 30 seconds the selection is not saved and the display reverts to the standby blank display.

8.2 Locking and Unlocking the Front Panel Buttons

To lock and unlock the front panel buttons:

1. Press and hold the unlit Take/Lock button for five seconds.
   The front panel buttons are locked. Pressing any of the front panel buttons causes the Lock button to flash a few times.

2. Press and hold the lit Take/Lock button for five seconds.
   The front panel buttons are unlocked.

9 Operating the FC-132ETH Remotely via the Web Pages

The embedded Web pages can be used to remotely operate the **FC-132ETH** using a Web browser and an Ethernet connection.

Before attempting to connect:

- Perform the procedures in Section 7.2.
- Ensure that your browser is supported (see Section 11)

9.1 Browsing the FC-132ETH Web Pages

Note: In the event that a Web page does not update correctly, clear your Web browser's cache (by pressing CTRL-F5).

To browse the FC-132ETH Web pages:

1. Open your Internet browser.
2. Type the device's IP number (see Section 12) in the Address bar of your browser.

The Loading page appears followed shortly by the General Info page shown in Figure 10.

The General info page displays the following:

- Model Name
- Firmware version
- Device serial number
- Web page version

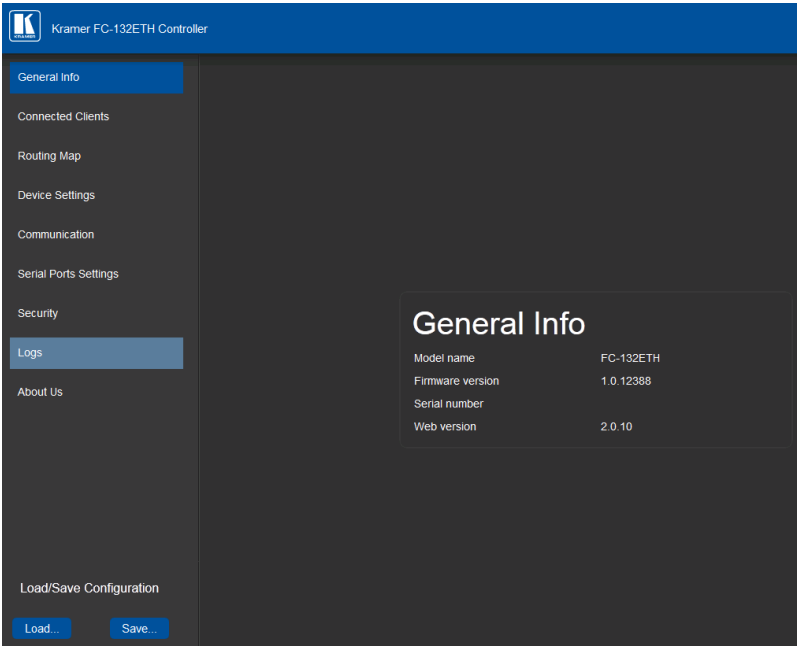


Figure 10: General Info Page

At the bottom left hand side of all pages there are Load/Save Configuration buttons. These allow you to save the current configuration and load any presaved configurations.

9.2 Connected Clients Page

The Connected Clients page allows you to view the following details of any client devices connected via Ethernet to the **FC-132ETH**:

- IP address
- The port it is connected to
- Method of connection
- Whether or not Send Replies is enabled for the port, (see Section 9.6)

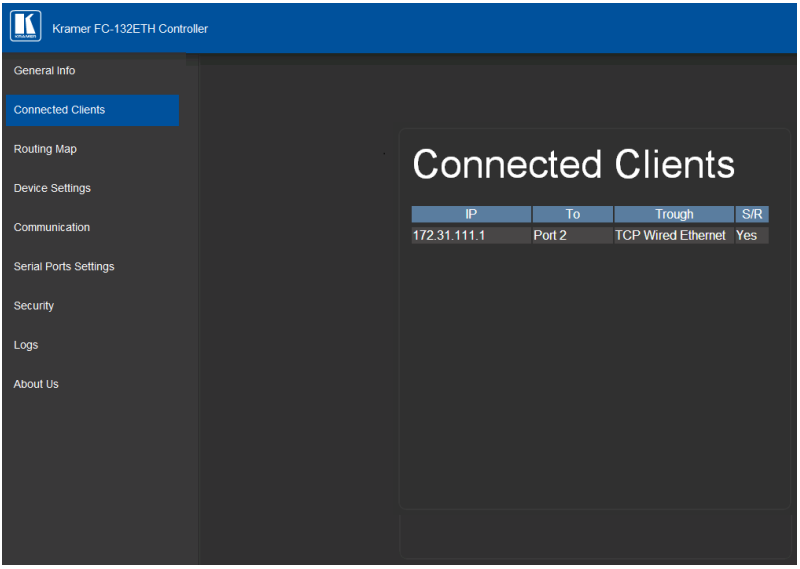


Figure 11: Connected Clients Page

9.3 Routing Map Page

The Routing Map page shows the current switching state and allows you to switch input and output ports, either graphically by clicking on the table, or by selection using the drop-down lists.

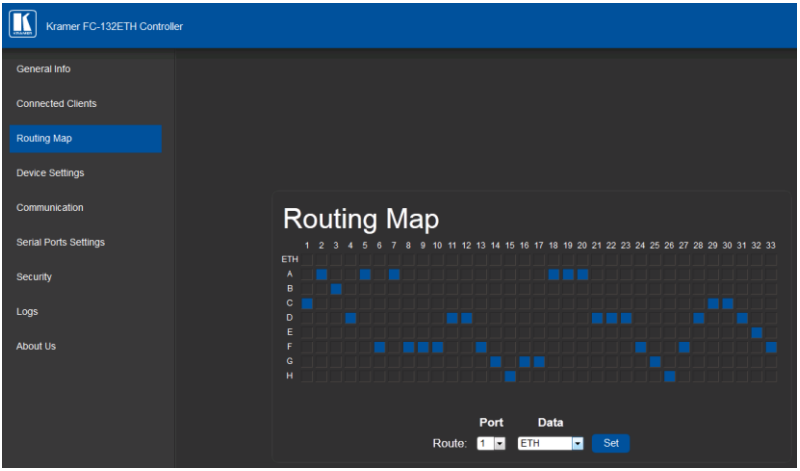


Figure 12: Serial Port Settings Page

9.4 Device Settings Page

The Device Settings page allows you to view the Model name and Time server status, and to modify the following fields:

- Device name
- Time and date automatically using a Time Server (if the device is connected to the Internet), including the Time Zone and daylight savings time
- Time and date manually

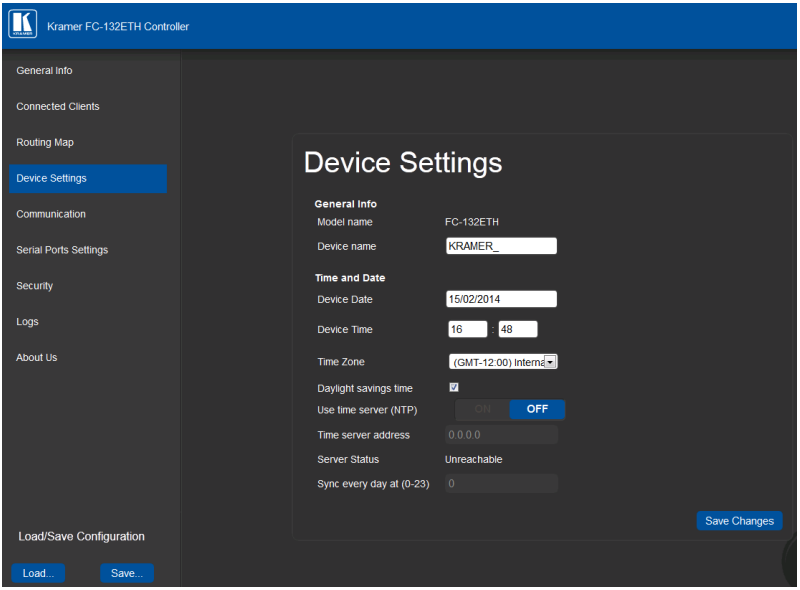


Figure 13: Device Settings Page

The **FC-132ETH** has a built-in clock that can synchronize with a Time Server if required.

To enable Time Server synchronization:

1. Browse to the Device Settings page by clicking Device Settings.
   The Device Settings page is displayed as shown in Figure 13.
2. Click the Use Time Server ON button.
3. Enter the IP address of the Time Server.
4. Enter the time of day at which the **FC-132ETH** should synchronize with the Time Server.
5. Click Save Changes.

9.5 Communication Page

The communication page allows you to:

- Set the RS-232 baud rate (for the control port)
- Turn DHCP on and off
- Edit the IP settings for static IP

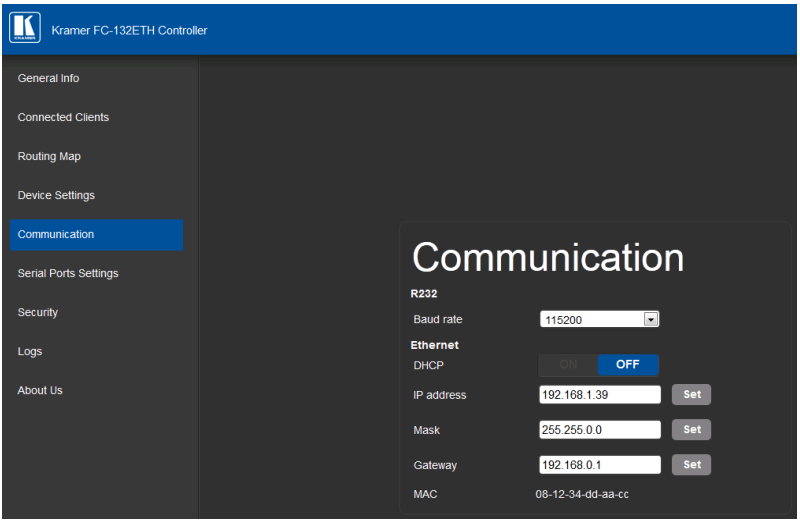


Figure 14: Communication Page

9.6 Serial Port Settings Page

The Serial Port Settings page allows you to set the parameters that will be used when the port is switched to an Ethernet port and also allows you to:

- Set the following Ethernet parameters for each of the 33 serial ports. These parameters must be used to address the serial port form and Ethernet host:
  - Select TCP or UDP
  - IP port label
  - TCP keep alive time
- Set the following serial parameters for each serial port. These parameters must be used when data arrives at the port from an Ethernet connection using the above-mentioned Ethernet settings:
  - Parity
  - Data bits
  - Baud rates
  - Stop bits

Note: When switched to one of the local 1-8 serial inputs, these settings are not used).

- Select whether or not to send replies on the port to the new client

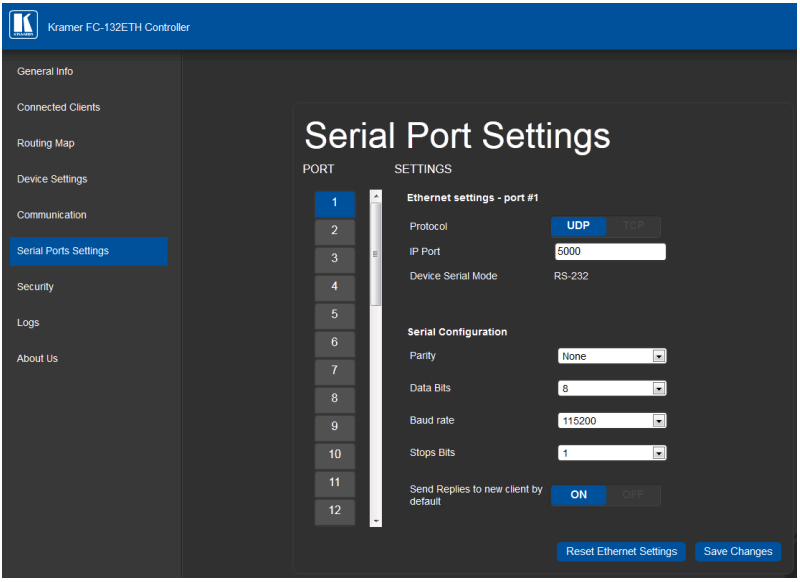


Figure 15: Serial Port Settings Page

9.7 Security Page

The Security page allows you to turn the security for the device on or off.

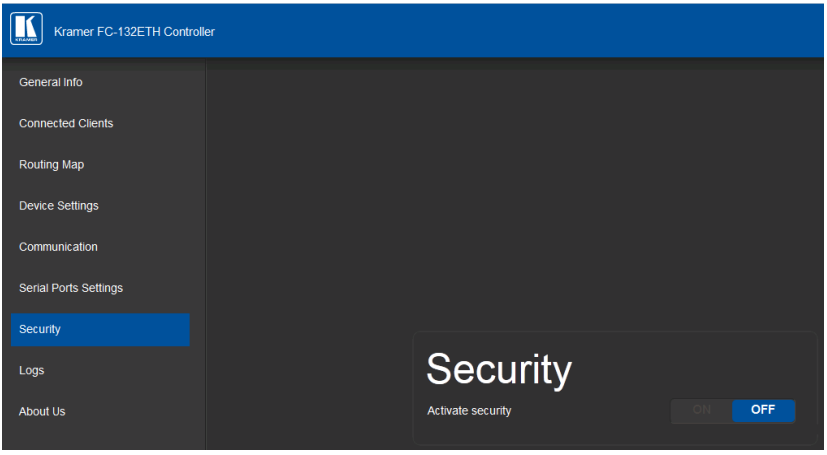


Figure 16: Security Page

When security is on, access to the Web pages is only granted on submission of a valid user and password. The default credentials are “admin” and no password.

To activate Web page security:

1. On the Security page, click ON.
   The confirmation popup is displayed as shown in Figure 17.

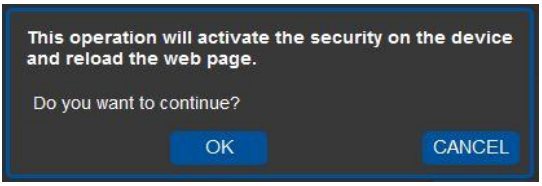


Figure 17: Security Confirmation Popup

2. Click OK.
   The Authentication Required popup is displayed as shown in Figure 18.

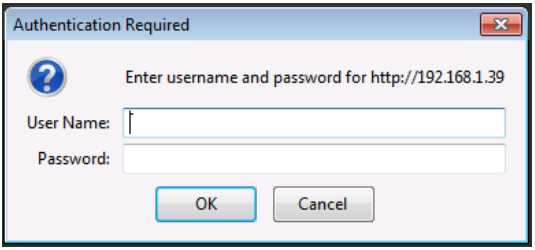


Figure 18: Authentication Required Popup

3. Enter the default User Name and Password.

4. Click OK.

5. Wait until the Web pages have reloaded and click to browse to the Security page.
   The page show in Figure 19 is displayed.

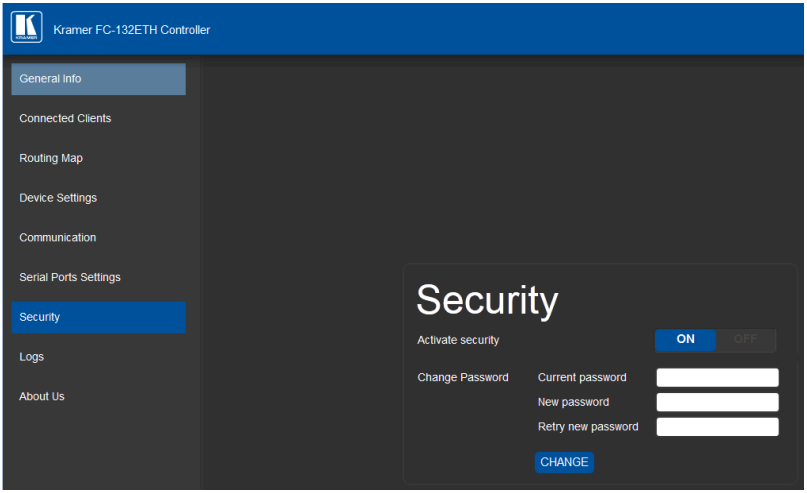


Figure 19: Security Activated Page

6. If required, turn security off by clicking OFF or change the password and click Change.

9.8 Logs Page

The Logs page allows you to:

- View current logs
- Configure the logs
- Filter the logs

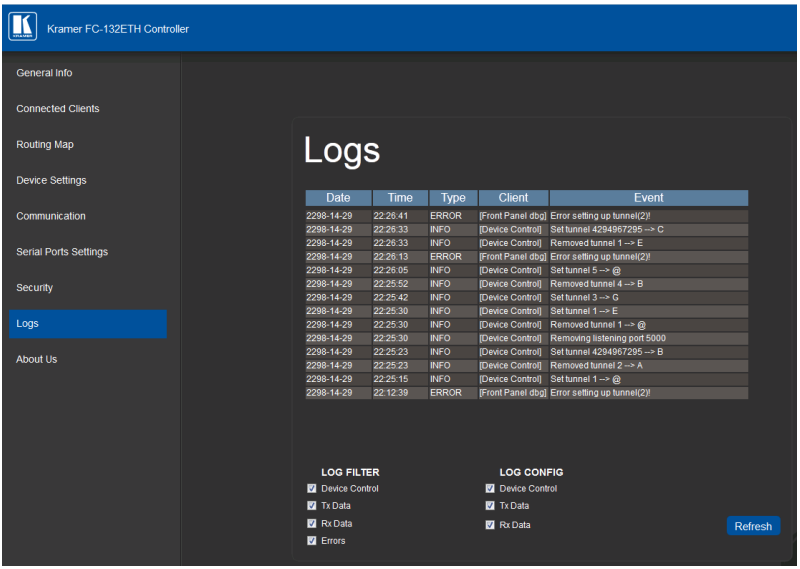


Figure 20: Logs Page

The display is not updated automatically. Click Refresh to update the display.

Use the Log Config check-boxes to select which events are recorded. Use the Log Filter check-boxes to select which events to display from the log.

9.9 About Us Page

The About Us page displays the Web page version and the Kramer company details.

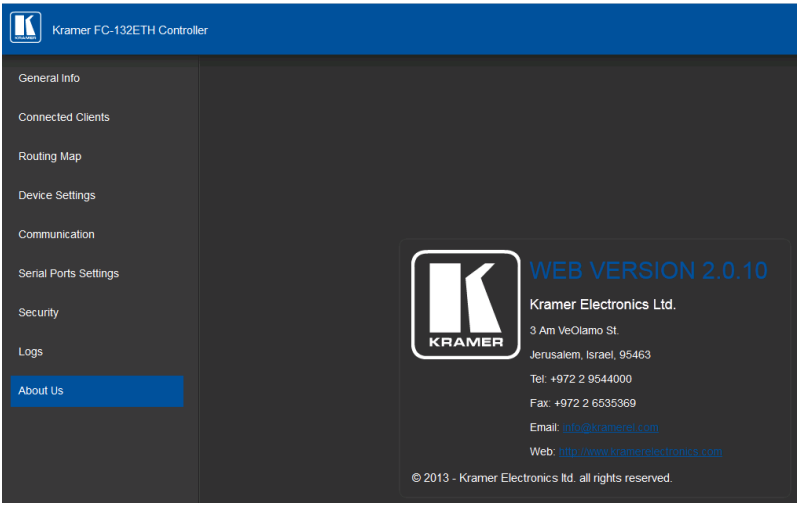


Figure 21: About Us Page

10 Configuring and Maintaining the FC-132ETH

This section describes:

- Terminating the RS-485 bus (see Section 10.1)
- Selecting the RS-232/RS-485 Port (see Section 10.2)
- Activating and deactivating DHCP (see Section 10.3)
- Resetting to the factory default settings (see Section 10.4)
- Upgrading the firmware (see Section 10.5)

10.1 Terminating the RS-485 Bus

The devices at both ends of the RS-485 chain must be terminated; all other devices in the chain must be left unterminated.

To terminate the RS-485 bus:

- Slide the RS-485 Term switch down

10.2 Selecting the RS-232 or RS-485 Port

The 3-pin Serial terminal block can be used as either an RS-232 or as an RS-485 port.

To set the Serial port as an RS-232 port:

- Release the RS-232/RS-485 button on the rear panel.
  The Serial RS-232 LED lights and selection is shown on the display

To set the Serial port as an RS-485 port:

- Depress the RS-232/RS-485 button on the rear panel.
  The Serial RS-485 LED lights and the selection is shown on the display

10.3 Activating and Deactivating DHCP

The IP address of the **FC-132ETH** can be set either statically or dynamically where it is issued by a DHCP server.

To activate and deactivate DHCP:

1. Press the DHCP button on the front panel.
   DHCP is activated, the DHCP LED lights green and the selection is shown on the display.

2. Press the DHCP button again.
   DHCP is deactivated, the DHCP LED no longer lights and the selection is shown on the display.

10.4 Resetting to the Factory Default Settings

To reset the device to its factory default settings:

1. Turn off the power to the device.

2. Press and hold the Reset button on the front panel.

3. Turn on the power to the device while holding down the Reset button for a few seconds.

4. Release the button.
   The device is reset to the factory default settings.

10.5 Upgrading the Firmware

For instructions on upgrading the firmware see the "*Kramer K-Upload User Manual*".

11 Technical Specifications

PORTS:	“Ports” 8 RS-232 Serial Data connections on 3-pin terminal blocks 1 Ethernet on an RJ-45 connector 1 RS-232 Control port on a 3-pin terminal block “Data” 32 RS-323 Serial Ports on 3-pin terminal blocks 1 RS-232/RS-485 Dual-use port on a 3-pin terminal block
RS-232 COMMUNICATION:	Transparent up to 115200bps
SUPPORTED WEB BROWSERS:	Microsoft IE V9.0 and higher Google Chrome Firefox V3.0 and higher
OVERALL DEVICE BAUDRATE SUPPORT:	310kbps
POWER CONSUMPTION:	100–240V AC, 50/60Hz, 17VA
CONTROLS:	Front panel buttons, RS-232, RS-485, Ethernet
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
DIMENSIONS:	19” x 7.24” x 1U (W, D, H)
WEIGHT:	1.48kg (3.26lbs) approx.
ACCESSORIES:	Power cord, rack ”ears”
Specifications are subject to change without notice at http://www.kramerelectronics.com	

11.1 Data Handling Performance

The **FC-132ETH** is designed to support mainly AV-relevant RS-232 communication.

The device has an overall data bandwidth limit which should be high enough in most AV installations to support the required communication bandwidth.

In extremely demanding cases, we recommend that you take into account the bandwidth limitation.

The total sustained data bandwidth that the device can handle for all ports simultaneously is 310kbps

11.2 Example Bandwidth Calculation

The **FC-132ETH** has 33 serial ports. When used at the same time, each serial port can support up to:

- 310kbps / 33 = 9.3kbps

If each of your protocol commands is 100 bytes, (that is, 800bits), you can safely send and/or receive a minimum of 12 of these commands per second on each serial port ((310kbps * 1024) / 800bits / 33 = 12). A similar calculation applies when fewer ports are used at the same time; in this case higher bandwidth per port can be achieved.

In critical applications requiring a lossless data transfer, we recommend that communication on all the other ports is stopped when making a long file transfer (for example, when performing a firmware upgrade via one of the serial ports).

12 Default Communication Parameters

RS-232	
Protocol 3000 (Default)	
Baud Rate:	115,200
Data Bits:	8
Stop Bits:	1
Parity:	None
Command Format:	ASCII
Example (Output 1 to Input 1):	#AV 1>1<CR>

Ethernet	
IP Address:	192.168.1.39
TCP Port #:	5000
UDP Port #:	50000

13 Protocol 3000

The **FC-132ETH** can be operated using serial commands from a PC, remote controller or touch screen using the Kramer Protocol 3000. This section describes:

- Kramer Protocol 3000 syntax (see Section 13.1)
- Kramer Protocol 3000 commands (see Section 13.2)
- Kramer Protocol 3000 detailed commands (see Section 13.3)

13.1 Kramer Protocol 3000 Syntax

13.1.1 Host Message Format

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

13.1.1.1 Simple Command

Command string with only one command without addressing:

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

13.1.1.2 Command String

Formal syntax with commands concatenation and addressing:

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

13.1.2 Device Message Format

Start	Address (optional)	Body	delimiter
~	*Sender_id@*	**Message**	CR LF

13.1.2.1 Device Long Response

Echoing command:

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

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

13.1.3 Command Terms

Command

A sequence of ASCII letters ('A'-'Z', 'a'-'z' and '-').

Command and 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**.

Note: 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 (Optional, for K-NET)

K-NET Device ID followed by '@'

Query sign

'?' follows some commands to define a query request.

Message closing character

CR – For host messages; carriage return (ASCII 13)

CRLF – For device messages; carriage return (ASCII 13) + line-feed (ASCII 10)

Command chain separator character

When a message string contains more than one command, a pipe ('|') character separates each command.

Spaces between parameters or command terms are ignored.

13.1.4 Entering Commands

You can directly enter all commands using a terminal with ASCII communications software, such as HyperTerminal, Hercules, etc. Connect the terminal to the serial or Ethernet port on the Kramer device. To enter **CR** press the Enter key.
(**LF** is also sent but is ignored by command parser).

For commands sent from some non-Kramer controllers like Crestron, some characters require special coding (such as, /X##). Refer to the controller manual.

13.1.5 Command Forms

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

13.1.6 Chaining Commands

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 once, at the beginning of the string and at the end.

Commands in the string do not execute until the closing character is entered.

A separate response is sent for every command in the chain.

13.1.7 Maximum String Length

64 characters

13.2 Kramer Protocol 3000 Commands

Command	Description
#	Protocol handshaking
BUILD-DATE?	Get device build date
HELP	Get command list or help for specific command
LOGIN?	Set/get protocol permission
LOGOUT	Cancel current permission level
MACH-NUM	Set the machine number
MODEL?	Get device model
NAME	Set/get machine (DNS) name
NAME-RST	Reset machine (DNS) name to factory default
NET-DHCP	Set/get DHCP mode
NET-GATE	Set/get gateway IP address
NET-IP	Set/get device IP address
NET-MAC?	Get the MAC address
NET-MASK	Set/get the subnet mask
PASS	Set/get password for login level
PROT-VER?	Get device protocol version
RESET	Reset device
ROUTE	Set/get layer routing
SECUR	Set/get security state
SN?	Get device serial number
TIME	Set/get the time and date
TIME-LOC	Set/get local time offset from UTC/GMT
TIME-SRV	Set/get time synchronization from server
VERSION?	Get device firmware version

13.3 Kramer Protocol 3000 – Detailed Commands

This section lists the detailed commands applicable to the **FC-132ETH**.

Command - #		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	#	End User	Public
Get:	-	-	-
Description		**Syntax**	
Set:	Protocol handshaking	#CR	
Get:	-	-	
Response			
~nn@SP**OK**CR LF			
Parameters			
Response triggers			
Notes			
Use to validate the Protocol 3000 connection and get the machine number			

Command - BUILD-DATE?		Command Type - System-mandatory	
Command Name		**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			

Command - **HELP**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**HELP**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get command list or help for specific command	2 options: 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 **To get help for command use: HELP (COMMAND_NAME)** CR LF 2. Multi-line: ~nn@**HELP**SP *command* **:** CR LF *description* CR LF **USAGE :** *usage* CR LF			
Parameters			
Response triggers			
Notes			

Command - **LOGIN**		Command Type - Authentication	
Command Name		**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 protocol permission level	#**LOGIN?**CR	

Response

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

or

~nn**@LOGIN**SP ERRSP004CR LF (if bad password entered)

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

Parameters

login_level - level of permissions required (End User or Admin)
password - predefined password (by PASS command). Default password is an empty string

Response triggers

Notes

For devices that support security, LOGIN allows to the user to run commands with an End User or Administrator permission level
In each device, some connections can be logged in to different levels and some do not work with security at all
Connection may logout after timeout
The permission system works only if security is enabled with the “SECUR” command

Command - **LOGOUT**		Command Type - Authentication	
Command Name		**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 End User or Administrator permission levels to Not Secure			

Command - **MACH-NUM**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**MACH-NUM**	End User	Public
Get:	**-**	-	-
Description		**Syntax**	
Set:	Set machine number	#**MACH-NUM**SP*machine_number*CR	
Get:	-	-	
Response			
~nn@**MACH-NUM**SP*machine_#* **OK**CR LF			
Parameters			
machine_number - New machine number to device			
Response triggers			
Notes			
Some devices do not set the new machine number until the device is restarted Some devices can change the machine number only from DIP-switches			

Command - **MODEL?**		Command Type - System-mandatory	
Command Name		**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			

Command - **NAME**		Command Type - System (Ethernet)	
Command Name		**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*SP**OK**CR LF Get: ~nn@**NAME?**SP*machine_name*CR LF			
Parameters			
machine_name - String of up to 14 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)			

Command - NAME-RST		Command Type - System (Ethernet)	
Command Name		**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 “KRAMER_” + 4 last digits of device serial number			

Command - NET-DHCP		Command Type - Communication	
Command Name		**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			
Set: ~nn@ **NET-DHCP**SP*mode*SP**OK**CR LF Get: ~nn@ **NET-DHCP**SP*mode*CR LF			
Parameters			
mode - 0 - Do not use DHCP. Use the IP set by the factory or using the IP set command 1 - Try to use DHCP. If unavailable, use IP as above			
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 command “NAME”. 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			

Command - NET-GATE		Command Type - Communication	
Command Name		**Permission**	**Transparency**
Set:	**NET-GATE**	Administrator	Public
Get:	**NET-GATE?**	End User	Public
Description		**Syntax**	
Set:	Set gateway IP address	#**NET-GATE**SP *ip_address* CR	
Get:	Get gateway IP address	#**NET-GATE?**CR	
Response			
Set: ~nn@ **NET-GATE**SP*ip_address*SP**OK**CR LF Get: ~nn@ **NET-GATE**SP*ip_address*CR LF			
Parameters			
ip_address - format: xxx.xxx.xxx.xxx			
Response triggers			
Notes			
A network gateway connects the device via another network and maybe over the Internet. Be careful of security problems. For proper settings consult your network administrator			

Command - NET-IP		Command Type - Communication	
Command Name		**Permission**	**Transparency**
Set:	**NET-IP**	Administrator	Public
Get:	**NET-IP?**	End User	Public
Description		**Syntax**	
Set:	Set device IP address	#**NET-IP**SP ip_address CR	
Get:	Get device IP address	#**NET-IP?**CR	
Response			
Set: ~nn@ **NET-IP**SP*ip_address*SP**OK**CR LF Get: ~nn@ **NET-IP**SP*ip_address*CR LF			
Parameters			
ip_address - format: xxx.xxx.xxx.xxx			
Response triggers			
Notes			
For proper settings consult your network administrator			

Command - **NET-MAC?**		Command Type - Communication	
Command Name		**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			

Command - **NET-MASK**		Command Type - Communication	
Command Name		**Permission**	**Transparency**
Set:	**NET-MASK**	Administrator	Public
Get:	**NET-MASK?**	End User	Public
Description		**Syntax**	
Set:	Set device subnet mask	#**NET-MASK**SP*net_mask*CR	
Get:	Get device subnet mask	#**NET-MASK?**CR	
Response			
Set: ~nn@**NET-MASK**SP*net_mask*SP**OK**CR LF Get: ~nn@**NET-MASK**SP*net_mask*CR LF			
Parameters			
net_mask - format: xxx.xxx.xxx.xxx			
Response triggers			
The subnet mask limits the Ethernet connection within the local network For proper settings consult your network administrator			
Notes			

Command - **PASS**		Command Type - Authentication	
Command Name		**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*SP**OK**CR LF			
Parameters			
login_level - level of login to set (End User or Administrator). *password* - password for the *login_level*. Up to 15 printable ASCII chars			
Response triggers			
Notes			
The default password is an empty string			

Command - **PROT-VER?**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**PROT-VER?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get protocol version	#**PROT-VER?**CR	
Response			
~nn@**PROT-VER**SP3000:*version*CR LF			
Parameters			
Version - XX.XX where X is a decimal digit			
Response triggers			
Notes			

Command - **RESET**		Command Type - System-mandatory	
Command Name		**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			
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.			

Command - **ROUTE**		Command Type - Routing	
Command Name		**Permission**	**Transparency**
Set:	**ROUTE**	End User	Public
Get:	**ROUTE?**	End User	Public
Description		**Syntax**	
Set:	Set layer routing	#**ROUTE**[SP]*layer, dest, src*[CR]	
Get:	Get layer routing	#**ROUTE?**[SP]*layer, dest*[CR]	
Response			
~ [nn]@ **ROUTE**[SP] *layer, dest, src* [CR LF]			
Parameters			
layer - only layer 3 (data) is available *dest* - limits are 1-33 *src* - valid values are 0-8 where 0 is Ethernet and 1-8 are A-H accordingly			
Response triggers			
Notes			
This command replaces all other routing commands.			

Command - **SECUR**		Command Type - Authentication	
Command Name		**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			
Set: ~nn@**SECUR**SP*security_mode*SP**OK**CR LF Get: ~nn@**SECUR**SP*security_mode*CR LF			
Parameters			
security_mode – 1/ON - enables security, 0/OFF - disables security			
Response triggers			
Notes			
The permission system works only if security is enabled with the “SECUR” command			

Command - **SN?**		Command Type - System-mandatory	
Command Name		**Permission**	**Transparency**
Set:	**-**	-	-
Get:	**SN?**	End User	Public
Description		**Syntax**	
Set:	-	-	
Get:	Get serial number	#**SN?**CR	
Response			
~nn@**SN**SP*serial_number*CR LF			
Parameters			
serial_number - 11 decimal digits, factory assigned			
Response triggers			
Notes			
For new products with 14 digit serial numbers, use only the last 11 digits			

Command - **TIME**		Command Type - System	
Command Name		**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*SP**OK**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			

Command - **TIME-LOC**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**TIME-LOC**	End User	Public
Get:	**TIME-LOC?**	End User	Public
Description		**Syntax**	
Set:	Set local time offset from UTC/GMT	#**TIME-LOC**SP*UTC_off,DayLight*CR	
Get:	Get local time offset from UTC/GMT	#**TIME-LOC?**CR	
Response			
~nn@ **TIME-LOC**SP*UTC_off,DayLight* CR LF			
Parameters			
UTC_off - Offset of device time from UTC/GMT (without daylight time correction) *DayLight* - 0 - no daylight saving time, 1 - daylight saving time			
Response triggers			
Notes			
If the time server is configured, device time calculates by adding UTC_off to UTC time (that it got from the time server) + 1 hour if daylight savings time is in effect TIME command sets the device time without considering these settings			

Command - **TIME-SRV**		Command Type - System	
Command Name		**Permission**	**Transparency**
Set:	**TIME-SRV**	End User	Public
Get:	**TIME-SRV?**	End User	Public
Description		**Syntax**	
Set:	Set time synchronization from server	#**TIME-SRV**SP*mode, srv_ip, sync_hour*CR	
Get:	Get time synchronization settings	#**TIME-SRV?**CR	
Response			
For Set: ~nn@**TIME-SRV**SP*mode,srv_ip,sync_hour*CR LF			
For Get: ~nn@**TIME-SRV**SP*mode,srv_ip,server_status,sync_hour*CR LF			
Parameters			
Mode - 0 - disabled, 1 - enabled *srv_ip* - time server IP address *sync_hour* - hour in day for time sync *server_status* - *ON/OFF*			
Response triggers			
Notes			
Device must have a valid gateway (NTGT command) and DNS server (NTDNS command)			

Command - **VERSION?**		Command Type - System-mandatory	
Command Name		**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			

13.4 Parameters

13.4.1 Layer Enumeration

Number	Value
1	Video
2	Audio
3	Data

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SAFETY WARNING

Disconnect the unit from the power supply before opening and servicing

P/N: 2900-300229 Rev: 2