KRAMER ELECTRONICS LTD.

USER MANUAL

MODELS:

FC-21ETH, FC-22ETH and FC-24ETH

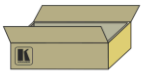
Ethernet Controller

P/N: 2900-300221 Rev 1

FC-21ETH FC-22ETH FC-24ETH Ethernet Controller 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-21ETH**, **FC-22ETH** or **FC -24ETH** Ethernet Controller
- 1 Power adapter (5V DC)
- 1 Quick Start Guide
- 4 Rubber feet

Save the original box and packaging in case your **FC-21ETH**, **FC-22ETH** or **FC-24ETH** needs to be returned to the factory for service.

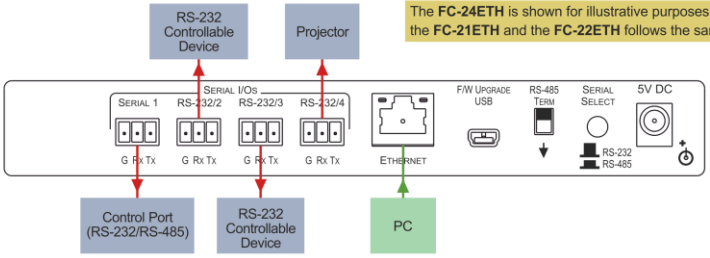
Step 2: Install the FC-21ETH, FC-22ETH and FC-24ETH

Mount the device in a rack (using a suitable rack adapter) 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-21ETH**, **FC-22ETH** or **FC-24ETH**.

The **FC-24ETH** is shown for illustrative purposes. Connecting the **FC-21ETH** and the **FC-22ETH** follows the same principles.



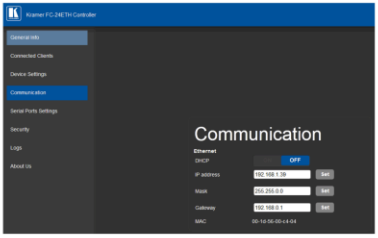
Always use Kramer high-performance cables for connecting equipment to the **FC-21ETH**, **FC-22ETH** or **FC-24ETH.**

Step 4: Connect the power

Connect the power adapter to the **FC-21ETH, FC-22ETH or FC-24ETH** and plug the power adapter it into the mains electricity.

Step 5: Configure and Operate the FC-21ETH, FC-22ETH and FC-24ETH

1. Using the embedded Web pages, 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.



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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 Products.

Congratulations on purchasing your Kramer **FC-21ETH**, **FC-22ETH** or **FC-24ETH** *Ethernet Controller*, which is ideal for the following typical applications:

- Use with Ethernet/RS-232 interfaces and/or Ethernet/RS-485 interfaces

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
- Use Kramer high performance high resolution cables

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 Kramer **FC-21ETH**, **FC-22ETH** and **FC-24ETH** 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 Kramer Electronics input power wall adapter that is provided with the unit.

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-21ETH**, **FC-22ETH** and **FC-24ETH** are a family of high-performance, easy-to-use, bidirectional hardware and software interface systems for controlling RS-232 and/or RS-485 controllable machines via an Ethernet LAN, as well as via the Internet.

These Ethernet to serial controllers bridge the gap between Ethernet infrastructures and serial communication devices by offering bidirectional Ethernet to serial conversion. All setup and maintenance of the devices is done from built-in Web pages which are accessible using any common Web browser. All devices offer one RS-232/RS-485 dual-use serial port.

In particular, the **FC-21ETH**, **FC-22ETH** and **FC-24ETH**:

- Offer network connectivity that lets you connect a Kramer (or other) device via its RS-232 or RS-485 port to an Ethernet LAN
- Let you control up to three RS-232 devices and one RS-485 device (model dependent) via Ethernet from a PC
- Let you control a device from multiple Ethernet points (PCs or remote controllers), via a LAN or the Internet
- Include Windows® based Virtual Port software for setting up virtual ports on a PC
- Support Internet-based, remote firmware upgrades
- Can be rack mounted in a 1U rack space with the optional rack adapters

More specifically, the **FC-21ETH**, **FC-22ETH** and **FC-24ETH** feature:

- One RS-232/RS-485 port (**FC-21ETH**), one RS-232 and one RS-232/RS-485 port (**FC-22ETH**), three RS-232 and one RS-232/RS-485 ports (**FC-24ETH**)
- An Ethernet LAN connection
- Static or dynamic (DHCP) IP addressing
- A USB port for upgrading the firmware

- A 5V DC power supply
- A compact Kramer TOOLS™ enclosure (**FC-21ETH**, **FC-22ETH**) or MegaTOOLS™ enclosure (**FC-24ETH**) which can be mounted side by side in a 19-inch rack using suitable rack adapters

The **FC-21ETH**, **FC-22ETH** and **FC-24ETH** include the Virtual Serial Port Manager (Kramer VSPM) for compatibility with applications based on COM-port communication. The virtual serial port:

- Makes the **FC-21ETH**, **FC-22ETH** and **FC-24ETH** compatible with all Windows®-based applications which require a physical COM port. This includes all versions of **K-Router** and other Kramer control applications. It lets you operate all RS-232 and RS-485 controllable devices via an Ethernet LAN using their existing PC software
- Operates like a physical COM port, that is, a logical COM port that behaves like a standard hardware COM port. In reality, it transparently reroutes the data using the TCP/IP network to the **FC-21ETH**, **FC-22ETH** or **FC-24ETH** interface via a virtual connection which you can emulate over the Ethernet or Internet
- Can be created in any quantity on your PC and does not occupy a physical serial port

4 Defining the FC-21ETH, FC-22ETH and FC-24ETH Ethernet Controllers

4.1 Defining the FC-21ETH Ethernet Controller

Figure 1 defines the front panel of the **FC-21ETH.**

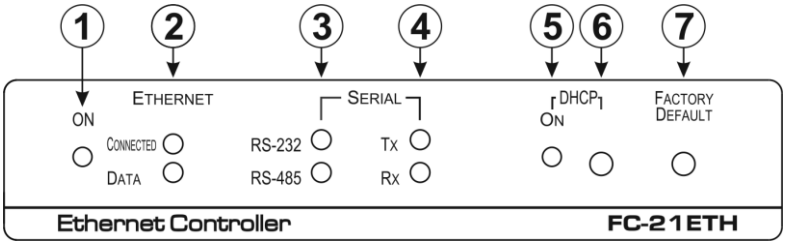

Figure 1: FC-21ETH Ethernet Controller Front Panel

#	Feature		Function
1	*ON* LED		Lights green when the unit is on
2	*ETHERNET* LEDs	*CONNECTED*	Lights yellow when the Ethernet port is connected
		DATA	Flashes green when data is transferred over the Ethernet link
3	*SERIAL* LEDs	*RS-232*	Lights green when RS-232 is selected
		RS-485	Lights green when RS-485 is selected
4		*Tx*	Flashes red when the serial port is transmitting data
		Rx	Flashes green when the serial port is receiving data
5	*DHCP*	*ON* LED	Lights green when DHCP is selected
6		Button	Press to toggle the selection between DHCP and static IP addressing, (see Section 8.3)
7	*FACTORY DEFAULT* Button		Press and hold while power-cycling the device to reset to factory default parameters, (see Section 10)

Figure 2 defines the rear panel of the **FC-21ETH.**

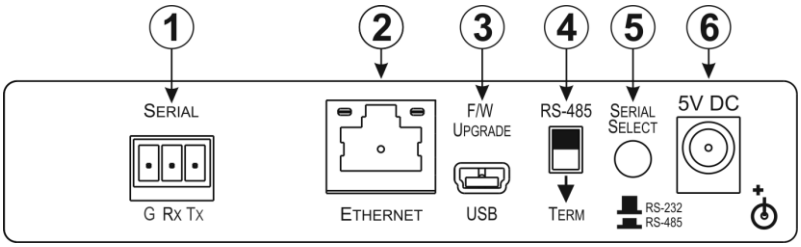

Figure 2: FC-21ETH Ethernet Controller Rear Panel

#	Feature	Function
1	*SERIAL* 3-pin Terminal Block	Connect to an RS-232 or RS-485 controlled device. When connecting as an RS-485 port, the connections are G, B, A in place of G, Rx, Tx
2	*ETHERNET* RJ-45 Connector	Connect to the PC or other controller directly or via a LAN (see Section 6.1)
3	*F/W UPGRADE USB* Connector	Connect to a PC to upgrade the firmware
4	*RS-485 TERM* Switch	Terminates the RS-485 bus, (see Section 8.3). Slide down when this is the last device on an RS-485 bus. Slide up when this device is not the last device on an RS-485 bus
5	*SERIAL SELECT* Button	Selects either RS-232 or RS-485 serial communication, (see Section 8.3). Depress for RS-485 serial communication. Release for RS-232 serial communication
6	*5V DC* Connector	Connect to the 5V DC power supply, center pin positive

4.2 Defining the FC-22ETH Ethernet Controller

Figure 3 defines the front panel of the **FC-22ETH.**

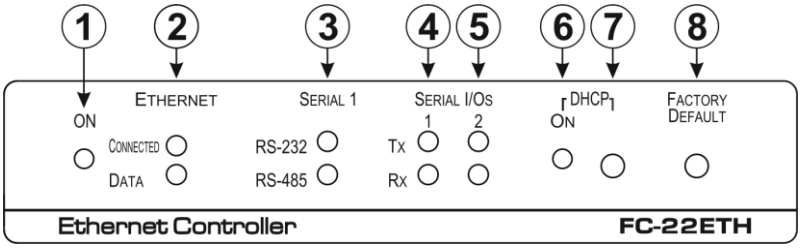

Figure 3: FC-22ETH Ethernet Controller Front Panel

#	Feature		Function
1	*ON* LED		Lights green when the unit is on
2	*ETHERNET* LEDs	*CONNECTED*	Lights yellow when the Ethernet port is connected
		DATA	Flashes green when data is transferred over the Ethernet link
3	*SERIAL 1* LEDs	*RS-232*	Lights green when RS-232 is selected
		RS-485	Lights green when RS-485 is selected
4	*SERIAL I/Os 1* LEDs	*Tx*	Flashes red when the device is transmitting data over serial port 1
		Rx	Flashes green when the device is receiving data on serial port 1
5	*SERIAL I/Os 2* LEDs	*Tx*	Flashes red when the device is transmitting data over serial port 2
		Rx	Flashes green when the device is receiving data on serial port 2
6	*DHCP*	*ON* LED	Lights green when DHCP is selected
7		Button	Selects either DHCP or static IP addressing, (see Section 8.3). Press to toggle the selection between DHCP and static IP addressing
8	*FACTORY DEFAULT* Button		Press and hold while power-cycling the device to reset to factory default parameters, (see Section 10)

Figure 4 defines the rear panel of the **FC-22ETH.**

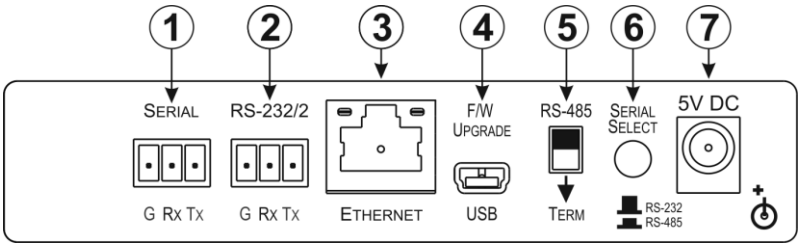

Figure 4: FC-22ETH Ethernet Controller Rear Panel

#	Feature	Function
1	*SERIAL* 3-pin Terminal Block	Connect to an RS-232 or RS-485 controlled device. When connecting as an RS-485 port, the connections are G, B, A in place of G, Rx, Tx
2	*RS-232/2* 3-pin Terminal Block	Connect to an RS-232 controlled device
3	*ETHERNET* RJ-45 Connector	Connect to the PC or other controller directly or via a LAN (see Section 6.1)
4	*F/W UPGRADE USB* Connector	Connect to a PC to upgrade the firmware
5	*RS-485 TERM* Switch	Terminates the RS-485 bus, (see Section 8.3). Slide down when this is the last device on an RS-485 bus. Slide up when this device is not the last device on an RS-485 bus
6	*SERIAL SELECT* Button	Selects either RS-232 or RS-485 serial communication for the SERIAL port, (see Section 8.3). Depress for RS-485 serial communication. Release for RS-232 serial communication
7	*5V DC* Connector	Connect to the 5V DC power supply, center pin positive

4.3 Defining the FC-24ETH Ethernet Controller

Figure 5 defines the front panel of the **FC-24ETH.**

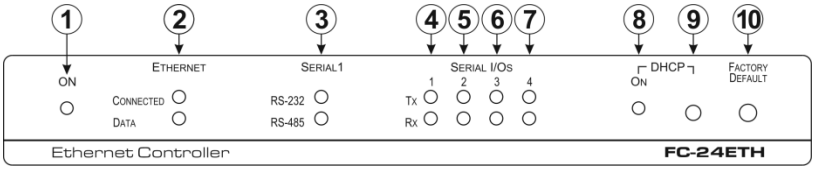

Figure 5: FC-24ETH Ethernet Controller Front Panel

#	Feature		Function
1	*ON* LED		Lights green when the unit is on
2	*ETHERNET* LEDs	*CONNECTED*	Lights yellow when the Ethernet port is connected
		DATA	Flashes green when data is transferred over the Ethernet link
3	*SERIAL 1* LEDs	*RS-232*	Lights green when RS-232 is selected
		RS-485	Lights green when RS-485 is selected
4	*SERIAL I/Os 1* LEDs	*Tx*	Flashes red when the device is transmitting data over serial port 1
		Rx	Flashes green when the device is receiving data on serial port 1
5	*SERIAL I/Os 2* LEDs	*Tx*	Flashes red when the device is transmitting data over serial port 2
		Rx	Flashes green when the device is receiving data on serial port 2
6	*SERIAL I/Os 3* LEDs	*Tx*	Flashes red when the device is transmitting data over serial port 3
		Rx	Flashes green when the device is receiving data on serial port 3
7	*SERIAL I/Os 4* LEDs	*Tx*	Flashes red when the device is transmitting data over serial port 4
		Rx	Flashes green when the device is receiving data on serial port 4
8	*DHCP*	*ON* LED	Lights green when DHCP is selected
9		Button	Selects either DHCP or static IP addressing, (see Section 8.3). Press to toggle the selection between DHCP and static IP addressing
10	*FACTORY DEFAULT* Button		Press and hold while power-cycling the device to reset to factory default parameters, (see Section 10)

Figure 6 defines the rear panel of the **FC-24ETH.**

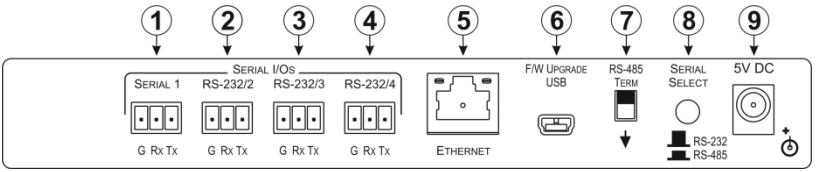

Figure 6: FC-24ETH Ethernet Controller Rear Panel

#	Feature		Function
1	SERIAL I/Os	*SERIAL* 3-pin Terminal Block	Connect to an RS-232 or RS-485 controlled device. When connecting as an RS-485 port, the connections are G, B, A in place of G, Rx, Tx
2		*RS-232/2* 3-pin Terminal Block	Connect to an RS-232 controlled device
3		*RS-232/2* 3-pin Terminal Block	Connect to an RS-232 controlled device
4		*RS-232/2* 3-pin Terminal Block	Connect to an RS-232 controlled device
5	*ETHERNET* RJ-45 Connector		Connect to the PC or other controller directly or via a LAN (see Section 6.1)
6	*F/W UPGRADE USB* Connector		Connect to a PC to upgrade the firmware
7	*RS-485 TERM* Switch		Terminates the RS-485 bus, (see Section 8.3). Slide down when this is the last device on an RS-485 bus. Slide up when this device is not the last device on an RS-485 bus
8	*SERIAL SELECT* Button		Selects either RS-232 or RS-485 serial communication for the SERIAL port, (see Section 8.3). Depress for RS-485 serial communication. Release for RS-232 serial communication
9	*5V DC* Connector		Connect to the 5V DC power supply, center pin positive

5 Initial Configuration and Use Overview

This chapter provides an overview of the initial configuration and basic operation of the **FC-21ETH**, **FC-22ETH** and **FC-24ETH.** The chapter comprises:

- Configuring the **FC-21ETH**, **FC-22ETH** and **FC-24ETH** (see Section 5.1)
- Configuring a virtual port on the PC (see Section 5.2)
- Configuring an Ethernet connection on the PC (see Section 5.3)

In the following description the **FC-24ETH** is used as an example. The same principles apply to the **FC-21ETH** and **FC-22ETH**.

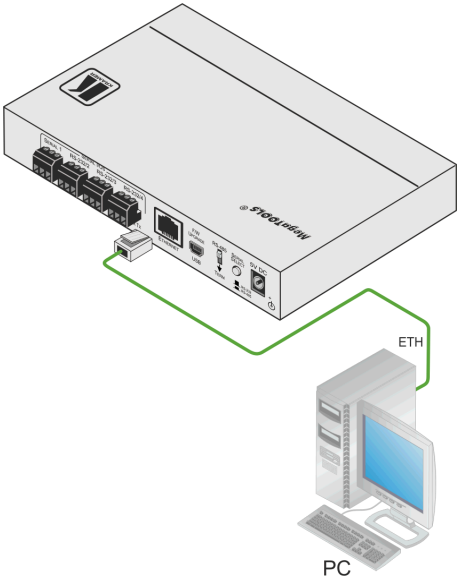

Figure 7: Connecting the FC-24ETH for Initial Configuration

5.1 Configuring the FC-21ETH, FC-22ETH and FC-24ETH

To configure the FC-21ETH, **FC-22ETH** and **FC-24ETH**:

1. Connect the Ethernet port on the rear panel of the **FC-21ETH**, **FC-22ETH** and **FC-24ETH** to a PC either directly or via a LAN, (see Section 6.1).

2. Using a Web browser, (see Section 6.1 and Section 7) browse to the General Info home page (see Figure 14).

3. Click on Device Settings to browse to the Device Settings page, (see Figure 16).

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 17).

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 18).

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.

5.2 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-21ETH**, **FC-22ETH** and **FC-24ETH**.

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.

5.3 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-21ETH**, **FC-22ETH** and **FC-24ETH** configuration, as illustrated in Figure 8.

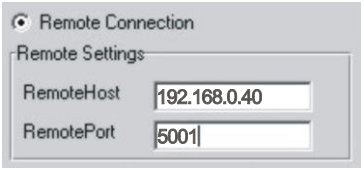

Figure 8: Configuring a Remote Connection

6 Connecting the FC-21ETH, FC-22ETH and FC-24ETH

This section describes:

- Connecting the **FC-21ETH**, **FC-22ETH** or **FC-24ETH** via Ethernet (see Section 6.1)
- Connecting the **FC-21ETH**, **FC-22ETH** or **FC-24ETH** via RS-232 (see Section 6.2)
- Connecting the **FC-21ETH**, **FC-22ETH** or **FC-24ETH** via RS-485 (see Section 6.3)

Always switch off the power to each device before connecting it to your **FC-21ETH**, **FC-22ETH** and **FC-24ETH**. After connecting your **FC-21ETH**, **FC-22ETH** and **FC-24ETH**, connect its power and then switch on the power to each device.

In the following description, the **FC-24ETH** is used as an example. The same principles apply to the **FC-21ETH** and **FC-22ETH**.

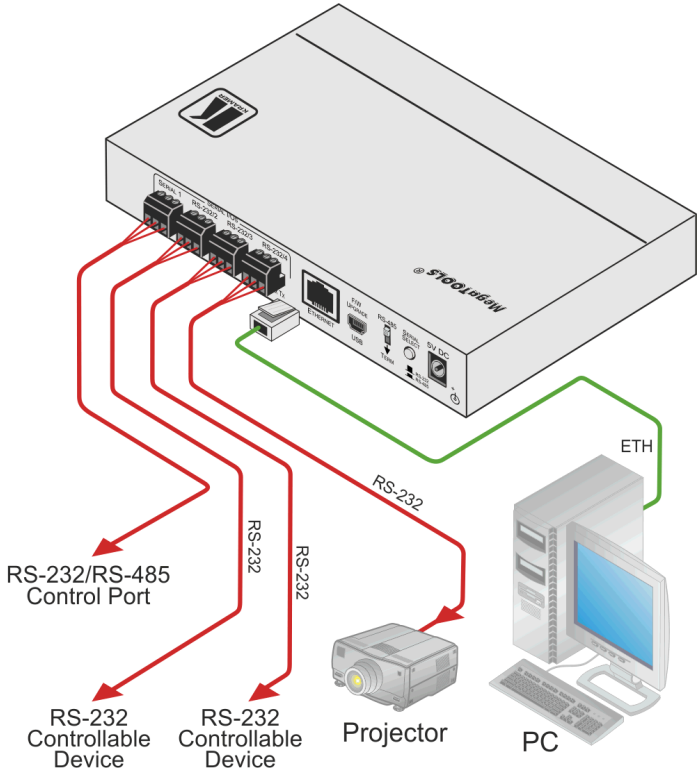

Figure 9: Connecting the FC-24ETH Ethernet Controller

To connect the **FC-24ETH** as illustrated in the example in Figure 9:

1. Connect the device to a LAN or PC via the RJ-45 Ethernet connector.
2. Connect up to 4 serially controlled devices, (for example, an RS-232/RS-485 controlled device, a projector and two other devices) to the 3-pin, RS-232 terminal blocks.
3. Connect the device to the power adapter and connect the power adapter to the mains electricity (not shown in Figure 9).

6.1 Connecting via Ethernet

You can connect to the **FC-24ETH** via Ethernet using either of the following methods:

- Directly to the PC using a crossover cable (see Section 6.1.1)
- Via a network hub, switch, or router, using a straight-through cable (see Section 6.1.2)

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.

6.1.1 Connecting the Ethernet Port Directly to a PC

You can connect the Ethernet port of the **FC-24ETH** 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 **FC-24ETH** with the factory configured default IP address.

After connecting the **FC-24ETH** 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 10.

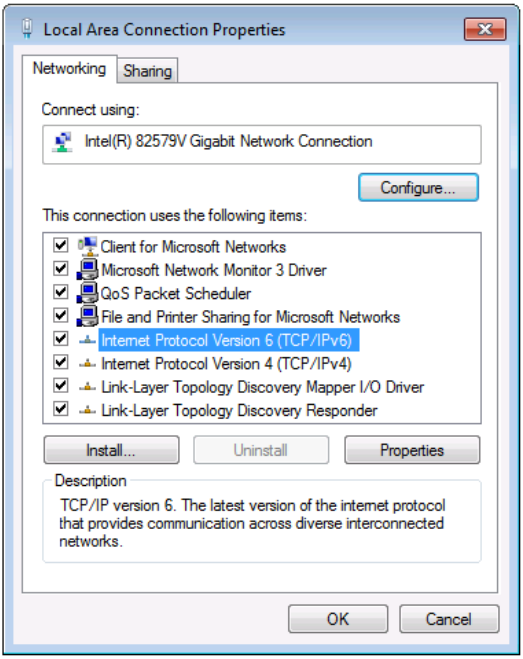

Figure 10: Local Area Connection Properties Window

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 11 or Figure 12.

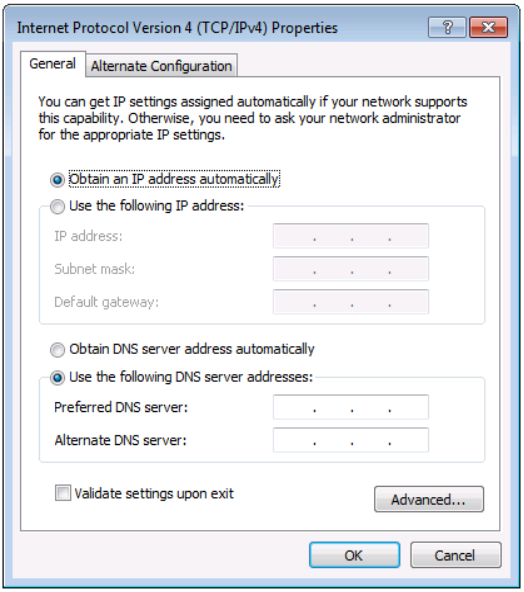

Figure 11: Internet Protocol Version 4 Properties Window

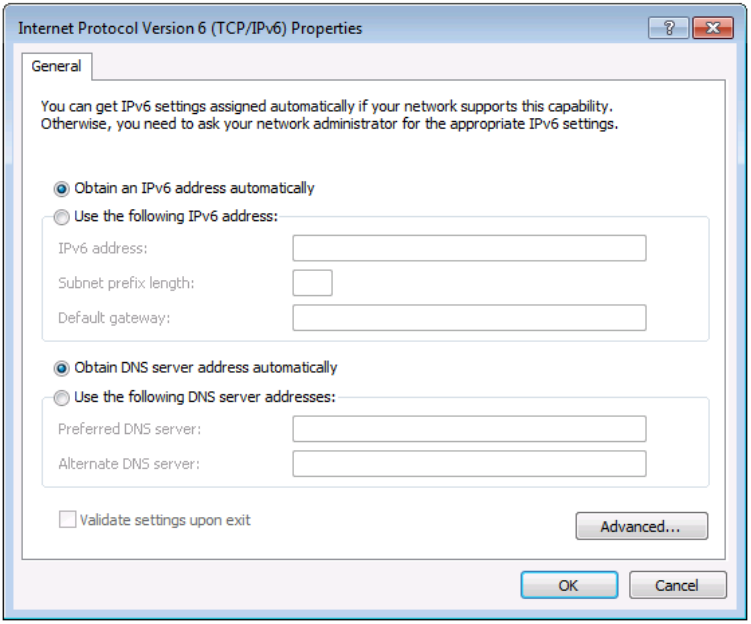

Figure 12: Internet Protocol Version 6 Properties Window

6. Select **Use the following IP Address** for static IP addressing and fill in the details as shown in Figure 13.
   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.

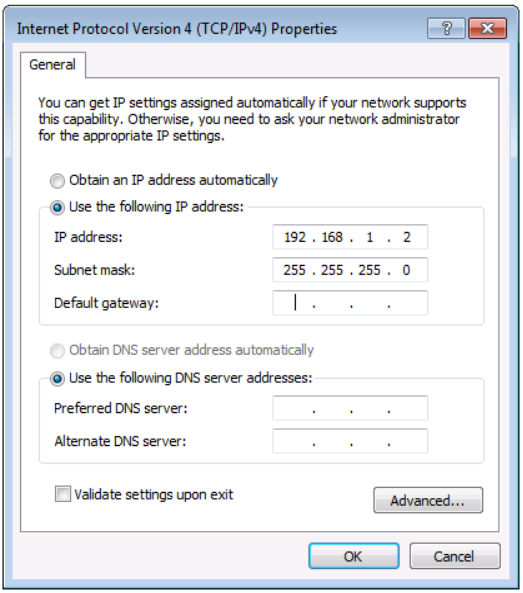

Figure 13: Internet Protocol Properties Window

7. Click **OK**.

8. Click **Close**.

6.1.2 Connecting the Ethernet Port via a Network Hub or Switch

You can connect the Ethernet port of the **FC-24ETH to** the Ethernet port on a network hub or using a straight-through cable with RJ-45 connectors.

6.2 Connecting to the Ethernet Controller via RS-232

To connect to the FC-21ETH, **FC-22ETH and FC-24ETH via RS-232**:

- Connect the RS-232, 3-pin, terminal block connectors on the rear panel of the **FC-21ETH**, **FC-22ETH** and **FC-24ETH** unit via 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 the devices to be controlled

6.3 Connecting to a Controlled Device via the RS-485 Port

You can control a device up to 1200m (3900ft) away by using the RS-232/RS-485 port on the **FC-21ETH**, **FC-22ETH** and **FC-24ETH** and setting it to RS-485 operation. To connect via RS-485, you must switch the Serial 1 port on the rear panel of the **FC-21ETH**, **FC-22ETH** and **FC-24ETH** to RS-485 operation and set the RS-485 bus termination.

Note: On the dual-use Serial port, the connections are G, B, A in place of G, Rx, Tx.

To connect a device with an RS-485 port to the FC-21ETH, FC-22ETH and FC-24ETH:

1. Depress the Serial Select switch on the rear panel of the **FC-21ETH**, **FC-22ETH** and **FC-24ETH**.

2. Connect the devices as follows:

    - Connect the B (–) pin on the RS-485 port of the PC to the Tx (A) pin on the RS-485 port on the rear panel of the **FC-21ETH**, **FC-22ETH** and **FC-24ETH**

    - Connect the A (+) pin on the RS-485 port of the PC to the Rx (B) pin on the RS-485 port on the rear panel of the **FC-21ETH**, **FC-22ETH** and **FC-24ETH**

    - Connect the G pin on the RS-485 port of the PC to the G pin on the RS-485 port on the rear panel of the **FC-21ETH**, **FC-22ETH** and **FC-24ETH**

3. Terminate the RS-485 bus at the **FC-21ETH**/**FC-22ETH**/**FC-24ETH** by sliding the RS-485 Term switch on the rear panel of the **FC-21ETH**, **FC-22ETH** and **FC-24ETH** down.

7 Operating the FC-21ETH, FC-22ETH and FC-24ETH Remotely via the Web Pages

The embedded Web pages can be used to remotely operate the **FC-21ETH**, **FC-22ETH** and **FC-24ETH** using a Web browser and an Ethernet connection.

Before attempting to connect:

- Perform the procedures in Section 6.1.
- Ensure that your browser is supported (see Section 9)

Note: The **FC-24ETH** is used throughout this chapter as an example. The same principles apply to the **FC-21ETH** and the **FC-22ETH**.

7.1 Browsing the FC-24ETH Web Pages

To browse the FC-24ETH Web pages:

1. Open your Internet browser.
2. Type the device's IP number (see Section 10) in the Address bar of your browser.

The Loading page appears followed shortly by the General Info page shown in Figure 14.

The General Info page displays the following:

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

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.

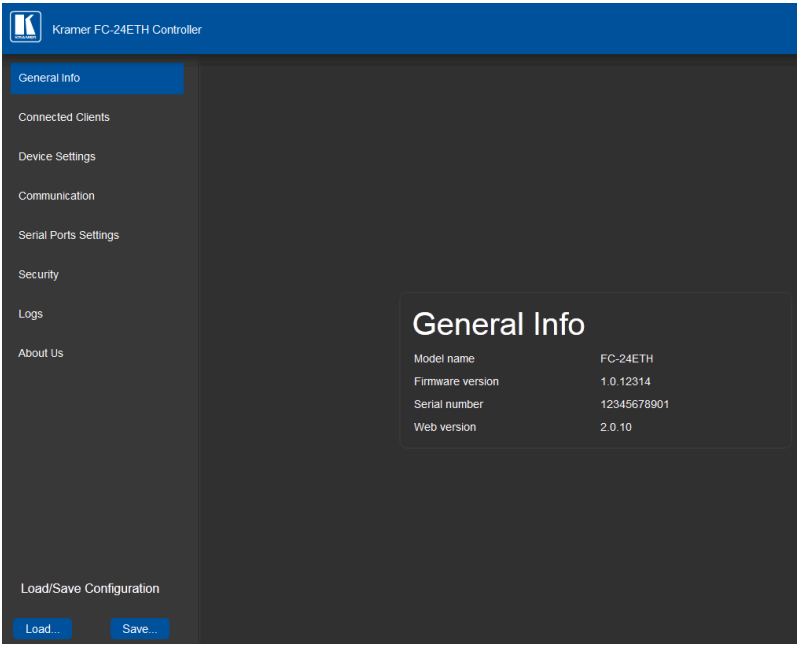

Figure 14: General Info Page

7.2 Connected Clients Page

The Connected Clients page is informational and allows you to view the following details of any client devices connected via Ethernet to the **FC-24ETH**:

- IP address
- The port it is connected to
- Method of connection
- Whether or not Send Replies is enabled for the port

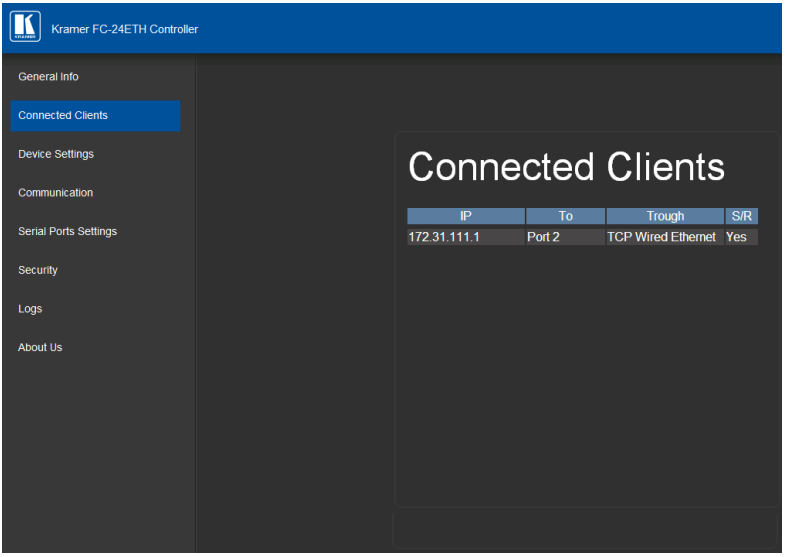

Figure 15: Connected Clients Page

7.3 Device Settings Page

The Device Settings page allows you to view the model name and time server status, and 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

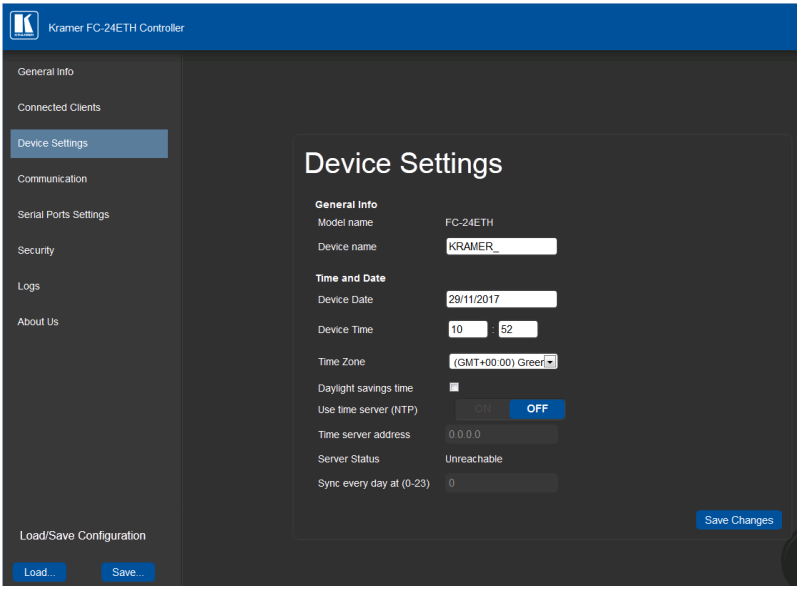

Figure 16: Device Settings Page

The **FC-24ETH** 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 16.

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-24ETH** should synchronize with the Time Server.

5. Click Save Changes.

7.4 Communication Page

The communication page allows you to:

- Turn DHCP for the device on and off
- Edit the IP settings for static IP

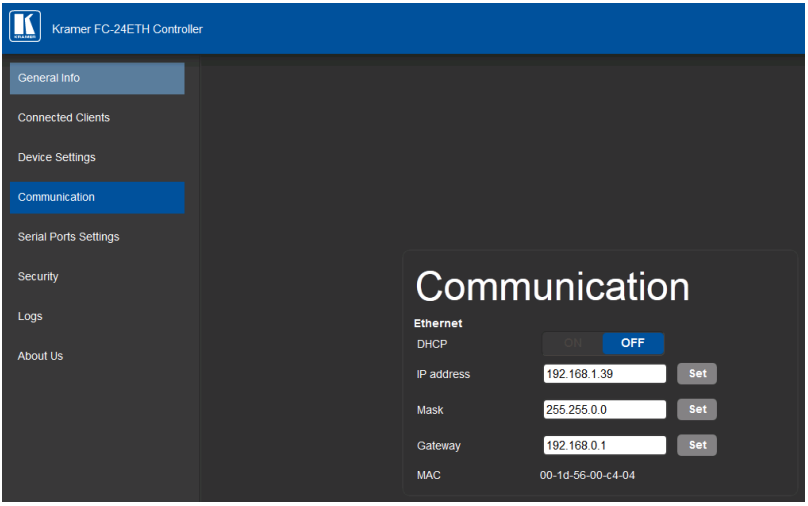

Figure 17: Communication Page

After modifying any of the IP settings, click Set to save the changes.

7.5 Serial Port Settings Page

The Serial Port Settings page allows you to:

- Set the following Ethernet parameters for each Ethernet port:
  - Select TCP or UDP
  - IP port label
  - TCP keep alive time
- Set the following serial parameters for each serial port:
  - Parity
  - Data bits
  - Baud rates
  - Stop bits
- Select whether or not to send replies on the port to the new client

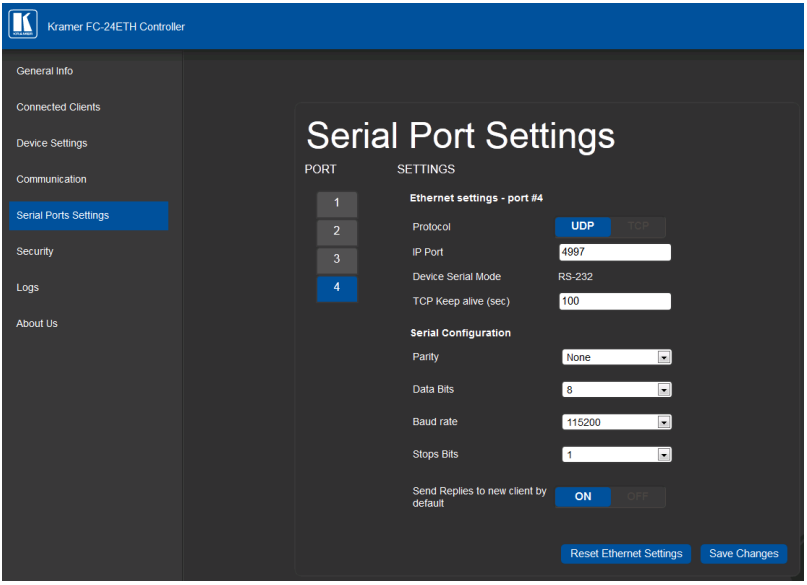

Figure 18: Serial Port Settings Page

7.6 Security Page

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

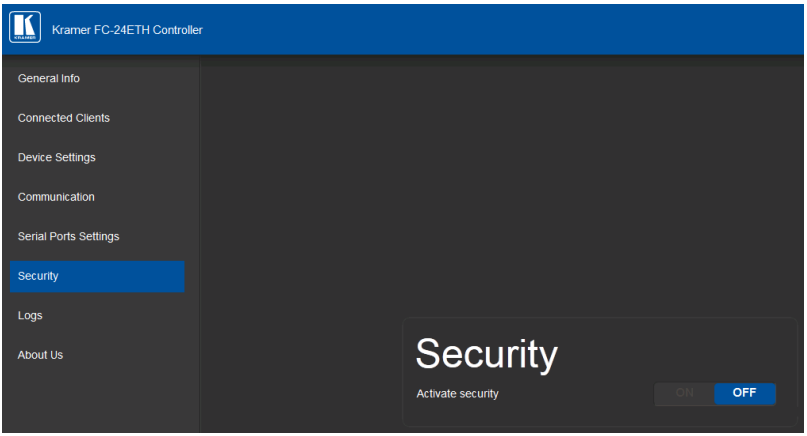

Figure 19: Security Page

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 20.

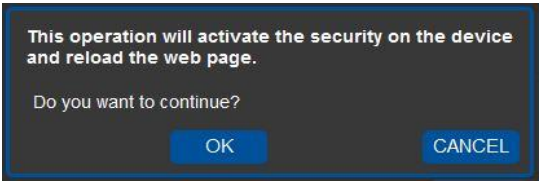

Figure 20: Security Confirmation Popup

2. Click OK.
   The Authentication Required popup is displayed as shown in Figure 21.

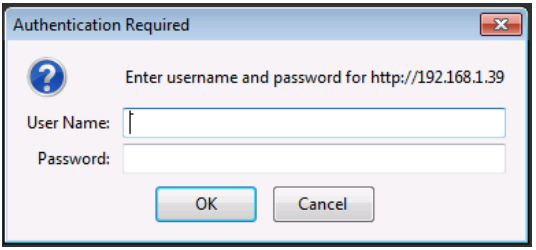

Figure 21: Authentication Required Popup

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 22 is displayed.

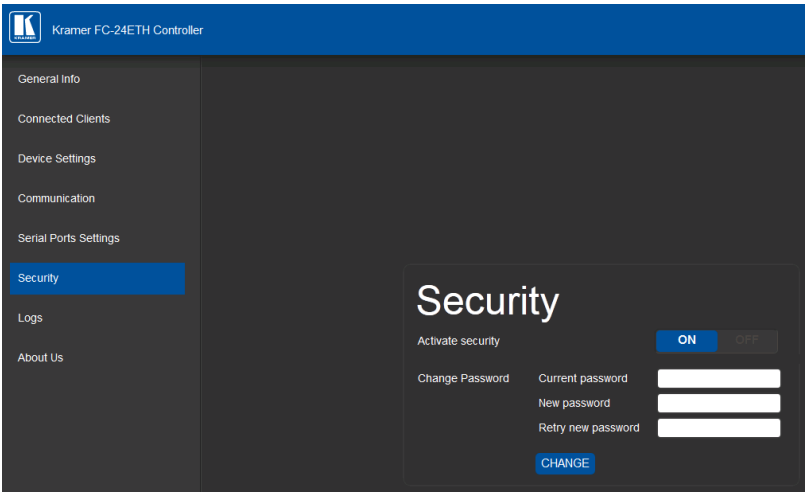

Figure 22: Security Activated Page

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

7.7 Logs Page

The Logs page allows you to:

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

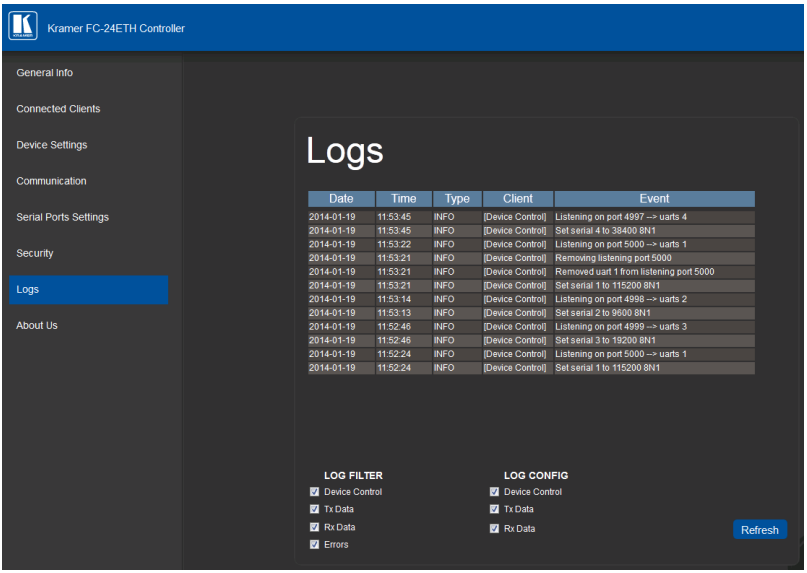

Figure 23: Logs Page

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.

7.8 About Us Page

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

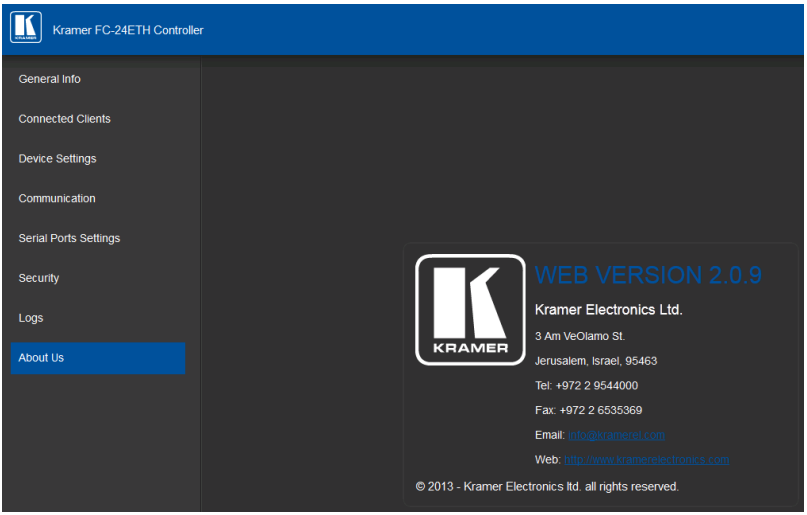

Figure 24: About Us Page

8 Configuring and Maintaining the FC-21ETH, FC-22ETH and FC-24ETH

This section describes:

- Selecting the RS-232 or RS-485 Port (see Section 8.1)
- Terminating the RS-485 bus (see Section 8.2)
- Activating DHCP (see Section 8.3)
- Resetting to the factory default settings (see Section 8.4)
- Upgrading the firmware (see Section 8.5)

8.1 Selecting the RS-232 or RS-485 Serial 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

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

8.2 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

8.3 Activating DHCP

The IP address of the **FC-21ETH**, **FC-22ETH** and **FC-24ETH** 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.

2. Press the DHCP button again.
   DHCP is deactivated and the DHCP LED no longer lights.

8.4 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.

8.5 Upgrading the Firmware

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

9 Technical Specifications

	FC-21ETH	FC-22ETH	FC-24ETH
PORTS:	1 Ethernet on an RJ-45 connector		
	1 USB on a mini USB connector for programming		
	1 RS-232/RS-485 serial port on a 3-pin terminal block	1 RS-232/RS-485 serial port on a 3-pin terminal block 1 RS-232 serial port on 3-pin terminal blocks	1 RS-232/RS-485 serial port on a 3-pin terminal block 3 RS-232 serial ports on 3-pin terminal blocks
MAXIMUM SERIAL PORT BAUD RATE:	115200bps		
RS-232 COMMUNICATION:	Transparent up to 115200bps		
OVERALL DEVICE BAUDRATE SUPPORT:	150kbps	140kbps	180kbps
SUPPORTED WEB BROWSERS:	Microsoft IE V9.0 and higher Google Chrome Firefox V3.0 and higher		
POWER CONSUMPTION:	200mA		
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:	12.1cm x 6.97cm x 2.48cm (4.76" x 2.74" x 0.98") W, D, H		18.8cm x 11.3cm x 2.5cm (7.4" x 4.5" x 1") W, D, H
WEIGHT:	0.48kg (1.1lbs) approx.		0.72kg (1.59lbs) approx.
ACCESSORIES:	Power adapter		
OPTIONS:	19" Rack adapter RK-3T		19" Rack adapter RK-T2B
Specifications are subject to change without notice at http://www.kramerelectronics.com			

9.1 Data Handling Performance

The **FC-21ETH**, **FC-22ETH** and **FC-24ETH** are designed to support mainly AV-relevant RS-232 communication.

These devices have overall data bandwidth limits 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 limitations.

The total sustained data bandwidth that each device can handle for all ports simultaneously is as follows:

- **FC-21ETH**—150kbps
- **FC-22ETH**—140kbps
- **FC-24ETH**—180kbps

9.2 Example Bandwidth Calculation

The **FC-22ETH** has two serial ports. Each serial port can support up to:

- 140kbps / 2 = 70kbps

If each of your protocol commands is 100 bytes, (that is, 800bits), you can safely send and/or receive a minimum of 85 of these commands per second on each serial port ((140kbps * 1024) / 800bits / 2 = 89.2). The same calculation applies to all devices. 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).

10 Default Communication Parameters

RS-232 Protocol 3000	
Baud Rate:	115200
Data Bits:	8
Stop Bits:	1
Parity:	None
Ethernet	
IP Address:	192.168.1.39
TCP Port Number:	5000
Network Mask:	255.255.0.0
Default Gateway:	192.168.0.1

11 Kramer Protocol 3000

The **FC-21ETH** 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 11.1)
- Kramer Protocol 3000 commands (see Section 11.2)

11.1 Kramer Protocol 3000 Syntax

11.1.1 Host Message Format

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

11.1.1.1 Simple Command

Command string with only one command without addressing:

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

11.1.1.2 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

11.1.2 Device Message Format

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

11.1.2.1 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)

11.1.3 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.

11.1.4 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.

11.1.5 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.

11.1.6 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.

11.1.7 Maximum String Length

64 characters

11.2 Kramer Protocol 3000 Commands

Command	Description
#	Protocol handshaking
BUILD-DATE?	Read device build date
FACTORY	Restart the machine with the default
HELP	List of commands
LOGIN	Elevates terminal security level
LOGIN?	Displays current terminal security level
LOGOUT	Demotes the terminal security level to minimum
MODEL?	Read device model

Command	Description
NAME?	Get device name
NET-DHCP	Sets DHCP on or off
NET-DHCP?	Checks if DHCP on or off
NET-GATE	Sets the network gateway
NET-GATE?	Gets the network gateway
NET-IP	Sets the IP
NET-IP?	Get the IP
NET-MAC?	Gets the MAC address
NET-MASK	Sets the subnet mask
NET-MASK?	Gets the subnet mask
PASS	Sets the password
PASS?	Gets the password
PROT-VER?	Read device protocol version
RESET	Reset device
SECUR	Sets security on or off
SECUR?	Indicates whether security is on or off
SN?	Read device serial number
TIME	Sets the time
TIME?	Gets the time
TIME-LOC	Sets the time zone and DST
TIME-LOC?	Gets the timezone and DST
TIME-SRV	Sets the NTP server parameters
TIME-SRV?	Gets the NTP server parameters
UART	Sets a port serial parameters
UART?	Gets a port serial parameters
VERSION?	Read device firmware version

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SAFETY WARNING
Disconnect the unit from the power supply before opening and servicing

P/N: 2900-300221 Rev: 1