



KRAMER ELECTRONICS LTD.

USER MANUAL

MODELS:

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

Ethernet Controller

P/N: 2900-300221 Rev 2

FC-21ETH FC-22ETH FC-24ETH Ethernet Controller Quick Start Guide

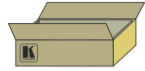


This guide helps you install and use your product for the first time. For more detailed information, go to http://www.kramerelectronics.com/support/product_downloads.asp to download the latest manual or scan the QR code on the left.

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



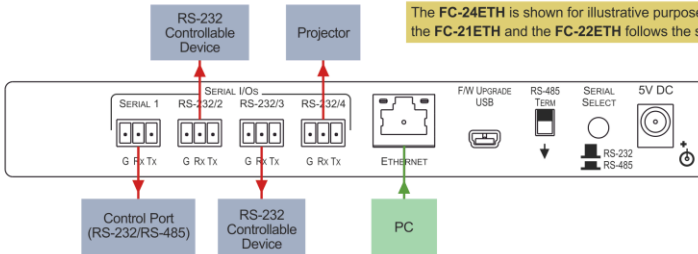
Save the original box and packaging in case your FC-21ETH, FC-22ETH or FC-24ETH needs to be returned to the factory for service.

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.

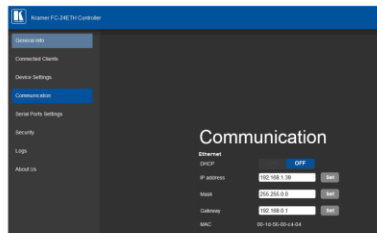
Step 4: Connect the power



Connect the power adapter to the FC-21ETH, FC-22ETH or FC-24ETH and plug the power adapter 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.



Contents

1	Introduction	1
2	Getting Started	2
2.1	Achieving the Best Performance	2
2.2	Safety Instructions	2
2.3	Recycling Kramer Products	3
3	Overview	4
4	Defining the FC-21ETH, FC-22ETH and FC-24ETH Ethernet Controllers	6
4.1	Defining the FC-21ETH Ethernet Controller	6
4.2	Defining the FC-22ETH Ethernet Controller	8
4.3	Defining the FC-24ETH Ethernet Controller	10
5	Initial Configuration and Use Overview	12
5.1	Configuring the FC-21ETH, FC-22ETH and FC-24ETH	13
5.2	Configuring a Virtual Port on the PC	14
5.3	Configuring an Ethernet Connection on the PC	14
6	Connecting the FC-21ETH, FC-22ETH and FC-24ETH	15
6.1	Connecting via Ethernet	17
6.2	Connecting to the Ethernet Controller via RS-232	21
6.3	Connecting to a Controlled Device via the RS-485 Port	21
7	Remote Operation via the Web Pages	23
7.1	Browsing the FC-24ETH Web Pages	23
7.2	Connected Clients Page	25
7.3	Device Settings Page	26
7.4	Communication Page	27
7.5	Serial Port Settings Page	28
7.6	Security Page	29
7.7	Logs Page	31
7.8	About Us Page	32
8	Configuring and Maintaining the FC-21ETH, FC-22ETH and FC-24ETH	33
8.1	Selecting the RS-232 or RS-485 Serial Port	33
8.2	Terminating the RS-485 Bus	33
8.3	Activating DHCP	34
8.4	Resetting to the Factory Default Settings	34
8.5	Upgrading the Firmware	34
9	Technical Specifications	35
9.1	Data Handling Performance	36
9.2	Example Bandwidth Calculation	36
10	Default Communication Parameters	37
11	Kramer Protocol 3000	38
11.1	Kramer Protocol 3000 – Syntax	38
11.2	Kramer Protocol 3000 – Command List	41
11.3	Kramer Protocol 3000 – Detailed Commands	42
11.4	Parameters	54

Figures

Figure 1: FC-21ETH Ethernet Controller Front Panel	6
Figure 2: FC-21ETH Ethernet Controller Rear Panel	7
Figure 3: FC-22ETH Ethernet Controller Front Panel	8
Figure 4: FC-22ETH Ethernet Controller Rear Panel	9
Figure 5: FC-24ETH Ethernet Controller Front Panel	10
Figure 6: FC-24ETH Ethernet Controller Rear Panel	11
Figure 7: Connecting the FC-24ETH for Initial Configuration	12
Figure 8: Configuring a Remote Connection	14
Figure 9: Connecting the FC-24ETH Ethernet Controller	16
Figure 10: Local Area Connection Properties Window	18
Figure 11: Internet Protocol Version 4 Properties Window	19
Figure 12: Internet Protocol Version 6 Properties Window	19
Figure 13: Internet Protocol Properties Window	20
Figure 14: General Info Page	24
Figure 15: Connected Clients Page	25
Figure 16: Device Settings Page	26
Figure 17: Communication Page	27
Figure 18: Serial Port Settings Page	28
Figure 19: Security Page	29
Figure 20: Security Confirmation Popup	29
Figure 21: Authentication Required Popup	30
Figure 22: Security Activated Page	30
Figure 23: Logs Page	31
Figure 24: About Us Page	32

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 13 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; GROUP 11: Sierra Video Products; GROUP 12: Digital Signage; and GROUP 13: Audio.

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.

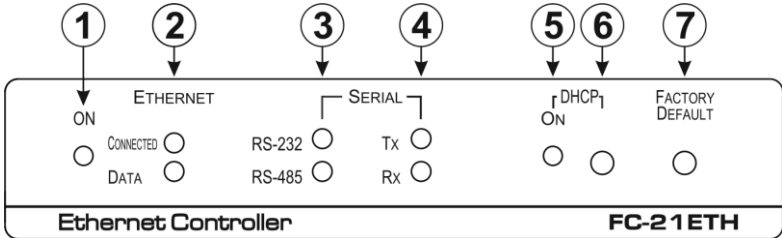


Figure 1: FC-21ETH Ethernet Controller Front Panel

#	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	SERIAL LEDs	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	DHCP 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.

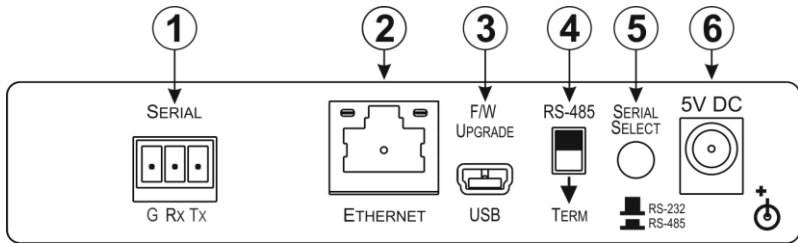


Figure 2: FC-21ETH Ethernet Controller Rear Panel

#	Feature	Function
1	<i>SERIAL</i> 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	<i>ETHERNET</i> RJ-45 Connector	Connect to the PC or other controller directly or via a LAN (see Section 6.1)
3	<i>F/W UPGRADE</i> USB Connector	Connect to a PC to upgrade the firmware
4	<i>RS-485 TERM</i> 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	<i>SERIAL SELECT</i> 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	<i>5V DC</i> 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.

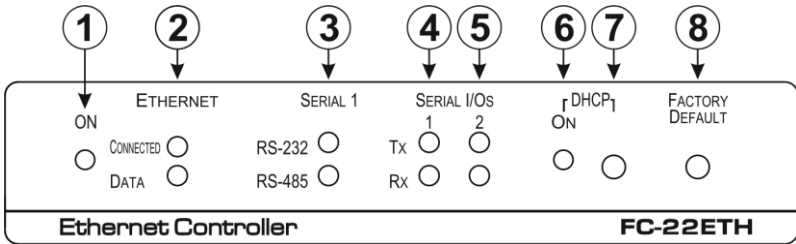


Figure 3: FC-22ETH Ethernet Controller Front Panel

#	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.

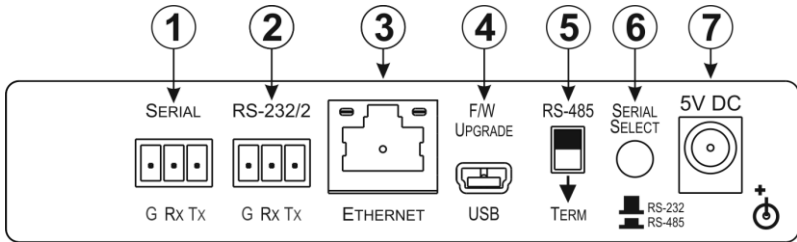


Figure 4: FC-22ETH Ethernet Controller Rear Panel

#	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.

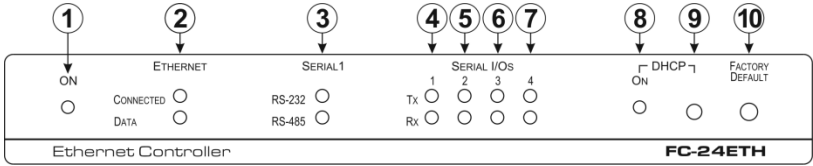


Figure 5: FC-24ETH Ethernet Controller Front Panel

#	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.

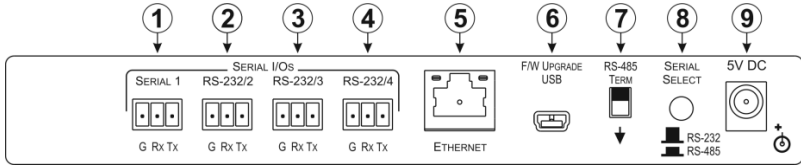


Figure 6: FC-24ETH Ethernet Controller Rear Panel

#	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-232/3 3-pin Terminal Block Connect to an RS-232 controlled device
4		RS-232/4 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**.

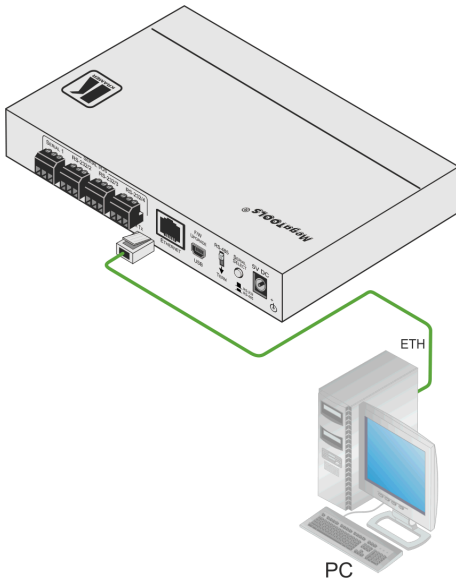


Figure 7: Connecting the FC-24ETH for Initial Configuration

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](#).

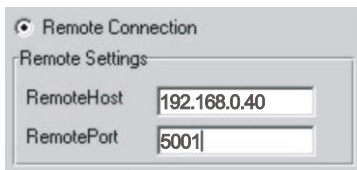


Figure 8: Configuring a Remote Connection

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**.

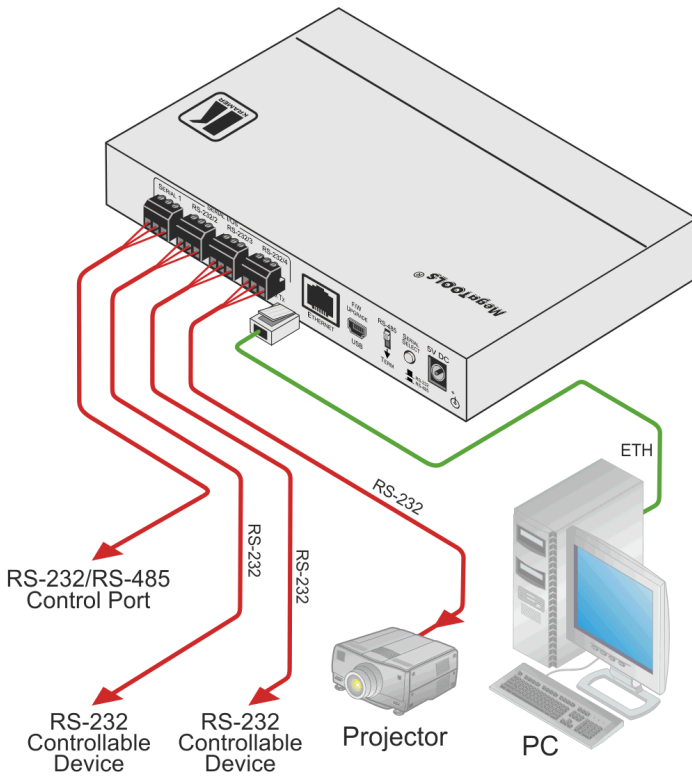


Figure 9: Connecting the FC-24ETH Ethernet Controller

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](#).

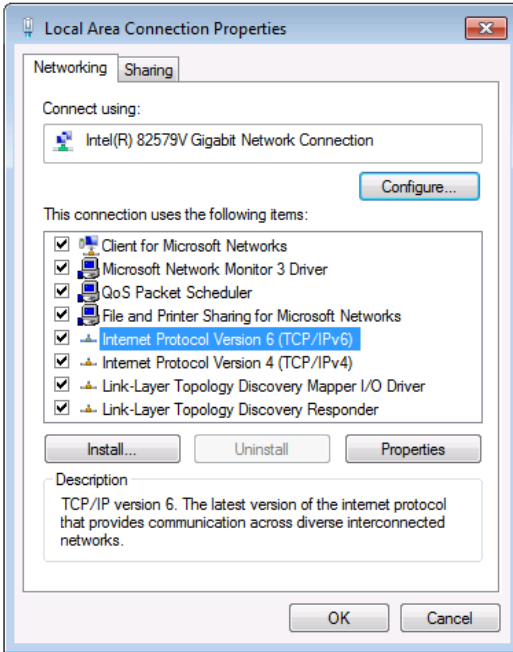


Figure 10: Local Area Connection Properties Window

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](#).

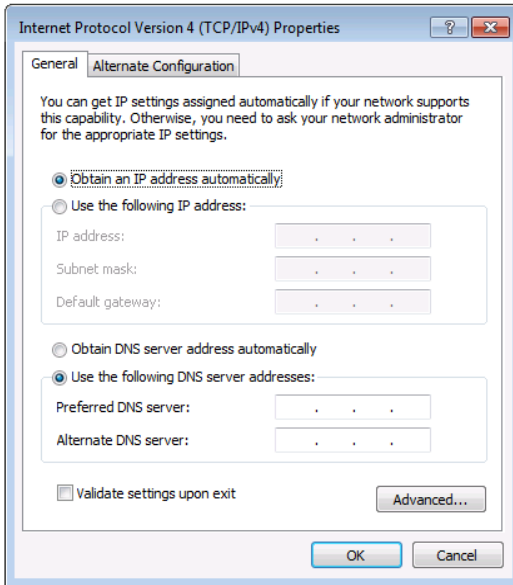


Figure 11: Internet Protocol Version 4 Properties Window

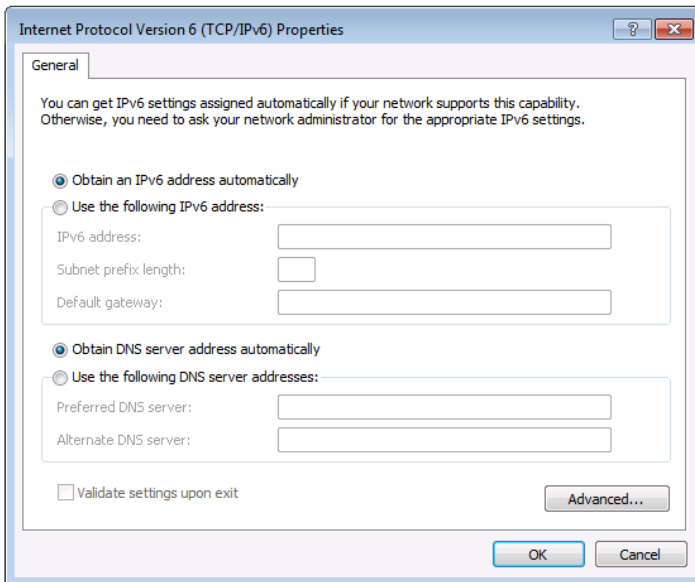


Figure 12: Internet Protocol Version 6 Properties Window

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.

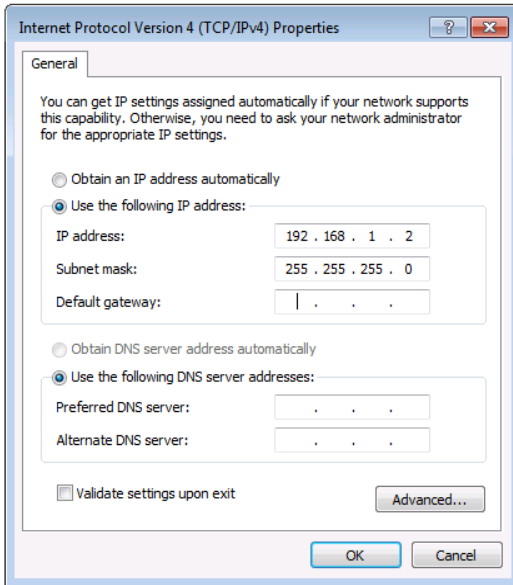


Figure 13: Internet Protocol Properties Window

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 Remote Operation 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 preserved configurations.

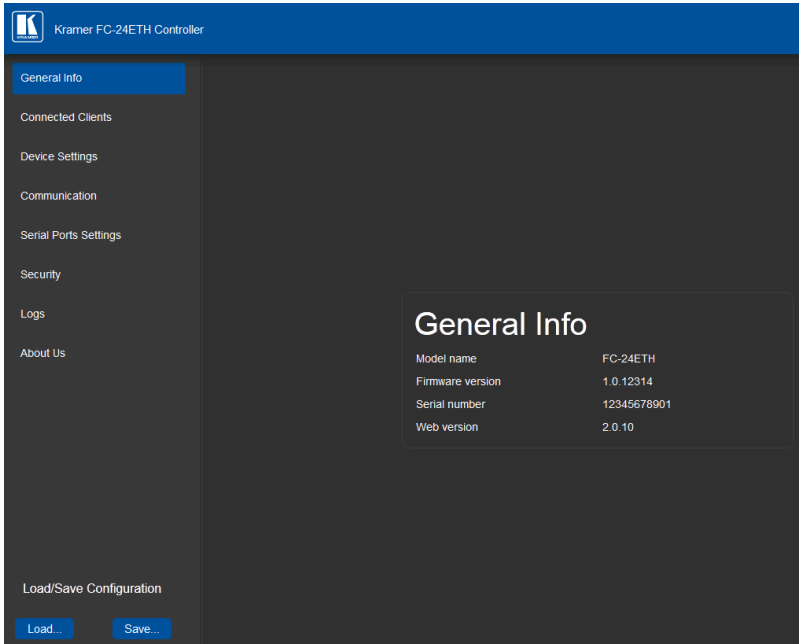
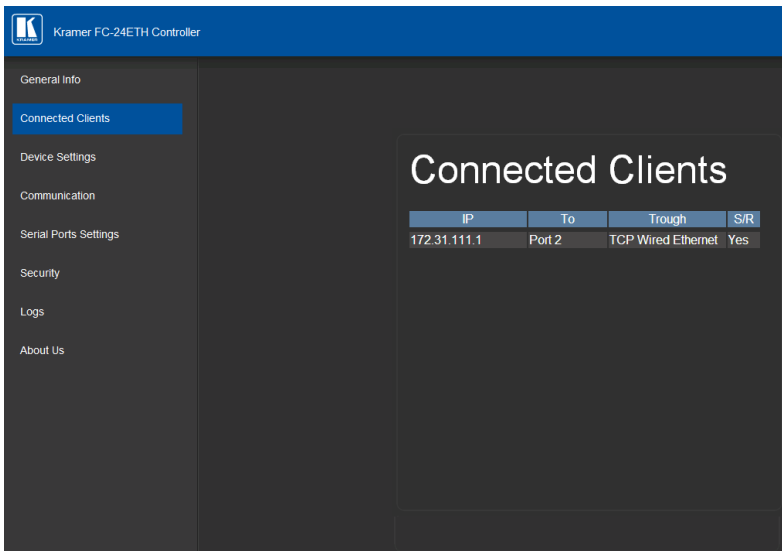


Figure 14: General Info Page

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



The screenshot shows the Kramer FC-24ETH Controller web interface. The left sidebar contains a navigation menu with the following items: General Info, Connected Clients (highlighted), Device Settings, Communication, Serial Ports Settings, Security, Logs, and About Us. The main content area is titled "Connected Clients" and displays a table with the following data:

IP	To	Trough	S/R
172.31.111.1	Port 2	TCP Wired Ethernet	Yes

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

The screenshot displays the 'Device Settings' page for a Kramer FC-24ETH Controller. The interface is dark-themed with a blue header. On the left, a navigation menu includes 'General Info', 'Connected Clients', 'Device Settings' (highlighted), 'Communication', 'Serial Ports Settings', 'Security', 'Logs', and 'About Us'. At the bottom left, there are 'Load...' and 'Save...' buttons. The main content area is titled 'Device Settings' and contains the following fields:

- General Info**
 - Model name: FC-24ETH
 - Device name: KRAMER
- Time and Date**
 - Device Date: 29/11/2017
 - Device Time: 10 : 52
 - Time Zone: (GMT+00:00) Greenl...
 - Daylight savings time:
 - Use time server (NTP): ON OFF
 - Time server address: 0.0.0.0
 - Server Status: Unreachable
 - Sync every day at (0-23): 0

A 'Save Changes' button is located at the bottom right of the settings area.

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

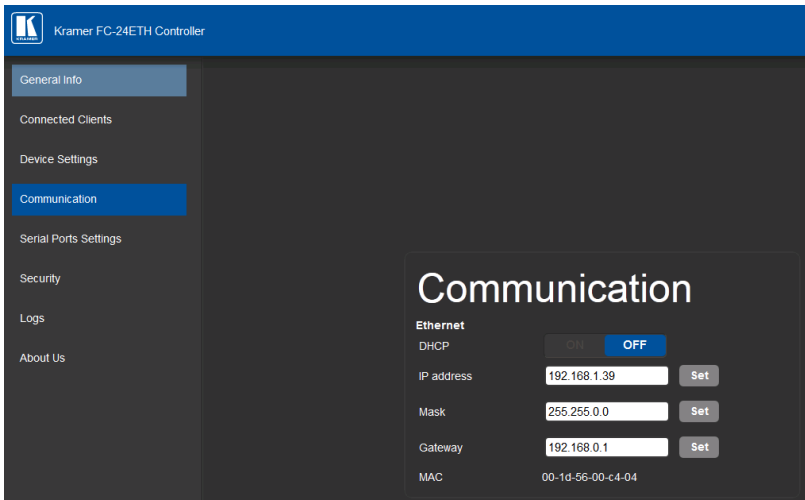


Figure 17: Communication Page

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

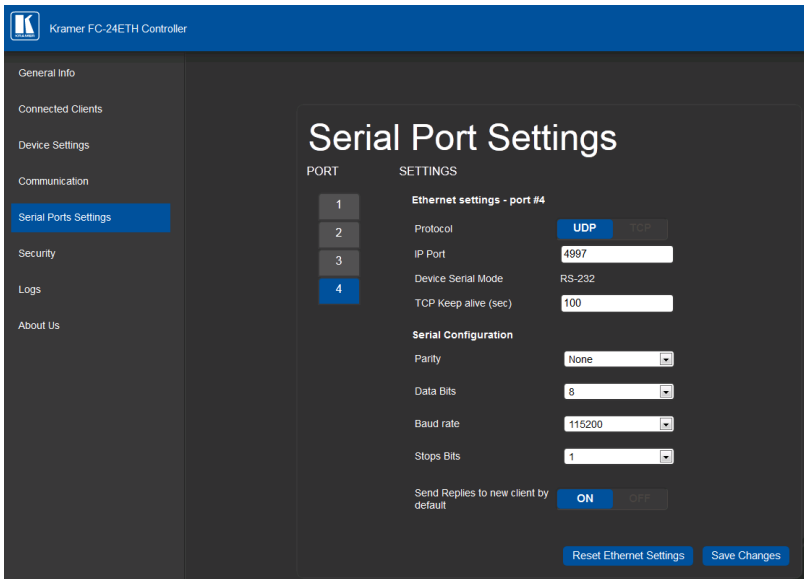


Figure 18: Serial Port Settings Page

7.6 Security Page

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

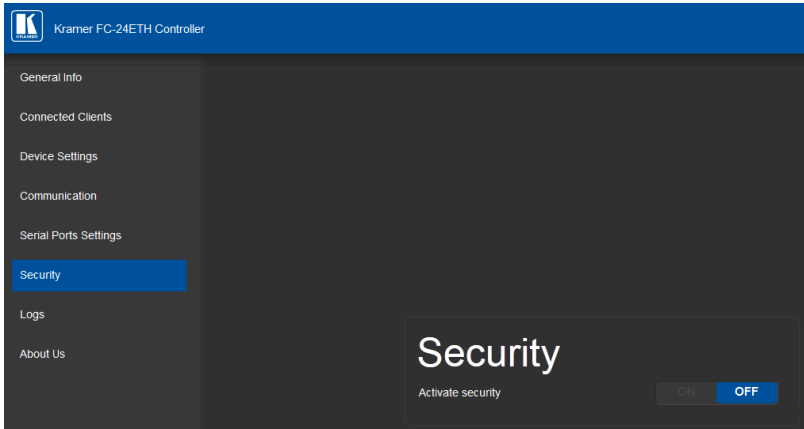


Figure 19: Security Page

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](#).

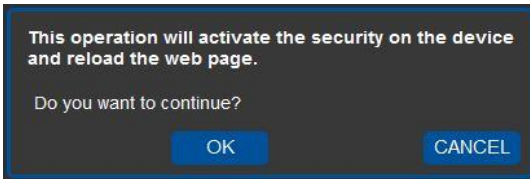


Figure 20: Security Confirmation Popup

2. Click OK.

The Authentication Required popup is displayed as shown in [Figure 21](#).

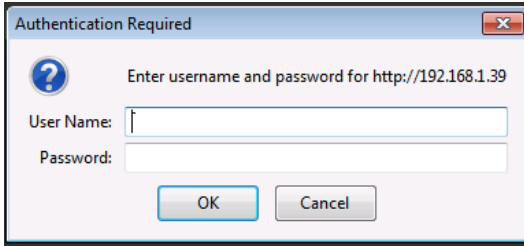


Figure 21: Authentication Required Popup

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.

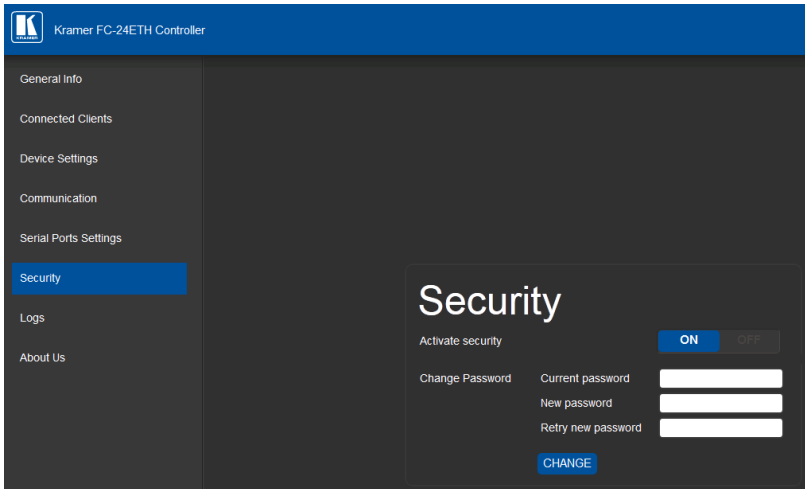


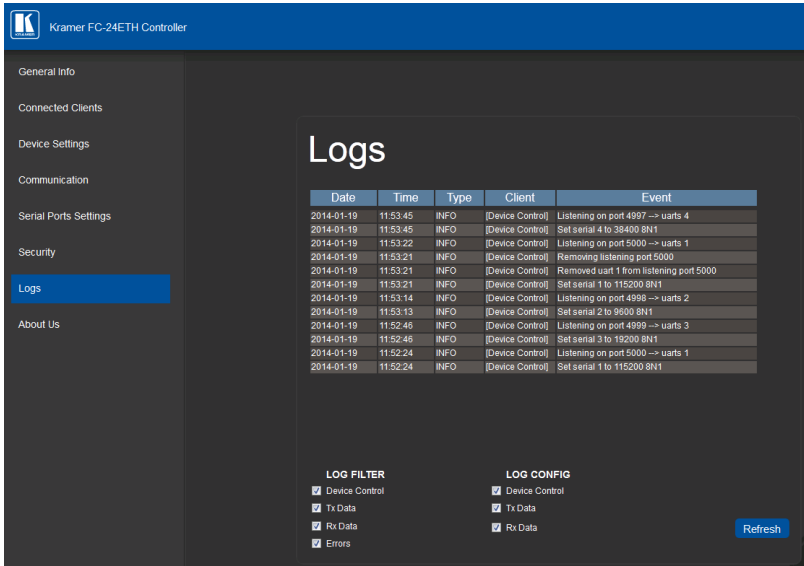
Figure 22: Security Activated Page

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



Kramer FC-24ETH Controller

General info

Connected Clients

Device Settings

Communication

Serial Ports Settings

Security

Logs

About Us

Logs

Date	Time	Type	Client	Event
2014-01-19	11:53:45	INFO	[Device Control]	Listening on port 4997 → uarts 4
2014-01-19	11:53:45	INFO	[Device Control]	Set serial 4 to 38400 8N1
2014-01-19	11:53:22	INFO	[Device Control]	Listening on port 5000 → uarts 1
2014-01-19	11:53:21	INFO	[Device Control]	Removing listening port 5000
2014-01-19	11:53:21	INFO	[Device Control]	Removed user 1 from listening port 5000
2014-01-19	11:53:21	INFO	[Device Control]	Set serial 1 to 115200 8N1
2014-01-19	11:53:14	INFO	[Device Control]	Listening on port 4998 → uarts 2
2014-01-19	11:53:13	INFO	[Device Control]	Set serial 2 to 9600 8N1
2014-01-19	11:52:46	INFO	[Device Control]	Listening on port 4999 → uarts 3
2014-01-19	11:52:46	INFO	[Device Control]	Set serial 3 to 19200 8N1
2014-01-19	11:52:24	INFO	[Device Control]	Listening on port 5000 → uarts 1
2014-01-19	11:52:24	INFO	[Device Control]	Set serial 1 to 115200 8N1

LOG FILTER

Device Control

Tx Data

Rx Data

Errors

LOG CONFIG

Device Control

Tx Data

Rx Data

Refresh

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.

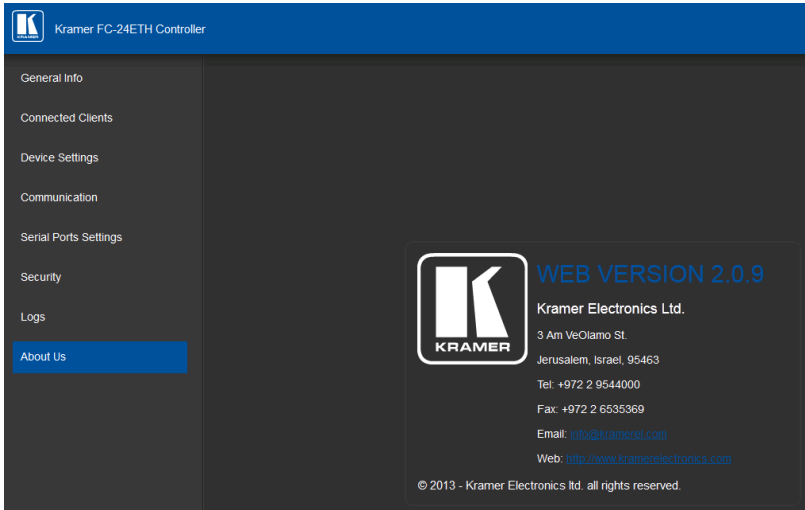


Figure 24: About Us Page

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:	5V DC, 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.
INCLUDED 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:

- $140\text{kbps} / 2 = 70\text{kbps}$

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 ($(140\text{kbps} * 1024) / 800\text{bits} / 2 = 89.2$). 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
#	<i>Destination_id@</i>	Message	CR

11.1.1.1 Simple Command

Command string with only one command without addressing:

Start	Body	Delimiter
#	Command SP <i>Parameter_1,Parameter_2,...</i>	CR

11.1.1.2 Command String

Formal syntax with commands concatenation and addressing:

Start	Address	Body	Delimiter
#	<i>Destination_id@</i>	Command_1 <i>Parameter1_1,Parameter1_2,... </i> Command_2 <i>Parameter2_1,Parameter2_2,... </i> Command_3 <i>Parameter3_1,Parameter3_2,... ...</i>	CR

11.1.2 Device Message Format

Start	Address (optional)	Body	delimiter
~	<i>Sender_id@</i>	Message	CR LF

11.1.2.1 Device Long Response

Echoing command:

Start	Address (optional)	Body	Delimiter
~	<i>Sender_id@</i>	Command SP [<i>Param1 ,Param2 ...</i>] 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 – Command List

Command	Description
#	Protocol handshaking
BUILD-DATE?	Read device build date
FACTORY	Restart the machine with the default
HELP	List of commands
LOGIN	Set/get protocol permission
LOGOUT	Demotes the terminal security level to minimum
MODEL?	Read device model
NAME	Set/get device (DNS) name
NET-DHCP	Set/get DHCP mode
NET-GATE	Set/get gateway IP
NET-IP	Set/get device IP address
NET-MAC?	Get the MAC address
NET-MASK	Set/get the device subnet mask
PASS	Set/get the password for login level
PROT-VER?	Get protocol version
RESET	Reset device
SECUR	Set/get current security state
SN?	Get device serial number
TIME	Set/get the time
TIME-LOC	Set/get local time offset from UTC/GMT
TIME-SRV	Set/get time synchronization from server
UART	Set/get a port serial parameters
VERSION?	Get firmware version number

11.3 Kramer Protocol 3000 – Detailed Commands

This section lists the detailed commands applicable to the FC-21ETH, FC-22ETH, FC-24ETH.

Command - #		Command Type - System-mandatory	
Command Name		Permission	Transparency
Set:	#	End User	Public
Get:	-	-	-
Description		Syntax	
Set:	Protocol handshaking	#	CR
Get:	-	-	-
Response			
~nn@SPOKCR 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:	Read device build date	#BUILD-DATE	CR
Get:	-	-	-
Response			
~nn@BUILD-DATE _{SP} date _{SP} time _{CR LF}			
Parameters			
<i>date</i> - Format: YYYY/MM/DD where YYYY = Year, MM = Month, DD = Day <i>time</i> - Format: hh:mm:ss where hh = hours, mm = minutes, ss = seconds			
Response triggers			
Notes			

Command - FACTORY		Command Type - System-mandatory	
Command Name		Permission	Transparency
Set:	FACTORY	End User	Public
Get:	-	-	-
Description		Syntax	
Set:	Reset device to factory defaults configuration	# FACTORY _{CR}	
Get:	-	-	
Response			
~ hn @ BUILD-DATE _{SP} <i>date</i> _{SP} <i>time</i> _{CR LF}			
Parameters			
Response triggers			
Notes			
This command deletes all user data from the device. The deletion can take some time.			

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} <i>command_name</i> _{CR}	
Response			
1. Multi-line: ~ hn @ Device available protocol 3000 commands : _{CR LF} <i>command</i> _{SP} <i>command...</i> _{CR LF} To get help for command use: HELP (COMMAND_NAME) _{CR LF}			
2. Multi-line: ~ hn @ HELP _{SP} <i>command</i> : _{CR LF} <i>description</i> _{CR LF} USAGE : <i>usage</i> _{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] <i>login_level, password</i> _[CR]	
Get:	Get current protocol permission level	# LOGIN? _[CR]	
Response			
Set:	~ _[nn] @ LOGIN _[SP] <i>login_level,password</i> _[SP] OK _[CR LF]		
	or		
	~ _[nn] @ LOGIN _[SP] ERR _[SP] 004 _[CR LF] (if bad password entered)		
Get:	~ _[nn] @ LOGIN _[SP] <i>login_level</i> _[CR LF]		
Parameters			
<i>login_level</i> - level of permissions required (End User or Admin)			
<i>password</i> - 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 <input type="checkbox"/>	
Get:	-	-	
Response			
~ <input type="checkbox"/> @ LOGOUT <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>			
Parameters			
Response triggers			
Notes			
Logs out from End User or Administrator permission levels to Not Secure			

Command - MODEL?		Command Type - System-mandatory	
Command Name		Permission	Transparency
Set:	-	-	-
Get:	MODEL?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get device model	# MODEL? <input type="checkbox"/>	
Response			
~ <input type="checkbox"/> @ MODEL <input type="checkbox"/> <i>model_name</i> <input type="checkbox"/>			
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			
<i>machine_name</i> - 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 - 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			
<i>mode</i> - 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	#NET-GATE _[SP] ip_address _[CR]	
Get:	Get Gateway IP	#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			
<i>ip_address</i> - 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			
<i>ip_address</i> - 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			
<i>login_level</i> - level of login to set (End User or Administrator).			
<i>password</i> - password for the <i>login_level</i> . 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 _{SP} 3000:version _{CR LF}			
Parameters			
<i>Version</i> - 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 <input type="checkbox"/>	
Get:	-	-	
Response			
~ <input type="checkbox"/> @ RESET <input type="checkbox"/> OK <input type="checkbox"/> 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 - SECUR		Command Type - Authentication	
Command Name		Permission	Transparency
Set:	SECUR	Administrator	Public
Get:	SECUR?	Not Secure	Public
Description		Syntax	
Set:	Set security	# SECUR <input type="checkbox"/> security_mode <input type="checkbox"/>	
Get:	Get current security state	# SECUR? <input type="checkbox"/>	
Response			
Set: ~ <input type="checkbox"/> @ SECUR <input type="checkbox"/> security_mode <input type="checkbox"/> OK <input type="checkbox"/> CR LF			
Get: ~ <input type="checkbox"/> @ SECUR <input type="checkbox"/> security_mode <input type="checkbox"/> 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			
~ _{hh} @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			
~ _{hh} @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 - UART		Command Type - Communication	
Command Name		Permission	Transparency
Set:	UART	Administrator	Public
Get:	UART?	End User	Public
Description		Syntax	
Set:	Set com port configuration	# UART _{SP} COM_Num , <i>baud_rate</i> , <i>data_bit</i> , <i>parity</i> , <i>stop_bit</i> _{CR}	
Get:	Get com port configuration	# UART? _{SP} COM_Num _{CR}	
Response			
Set:	~ nn @ UART _{SP} COM_Num , <i>baud_rate</i> , <i>data_bit</i> , <i>parity</i> , <i>stop_bit</i> _{CR LF}		
Get:	~ nn @ UART _{SP} COM_Num , <i>baud_rate</i> , <i>data_bit</i> , <i>parity</i> , <i>stop_bit</i> , <i>serial1_type</i> , <i>485_term</i> _{CR LF}		
Parameters			
<i>COM_Num</i> - 1-4			
<i>baud_rate</i> - 9600 - 115200			
<i>data_bit</i> - 7-8			
<i>parity</i> - See Section 11.4.1 Parity Types			
<i>stop_bit</i> - 1-2			
<i>serial1_type</i> - 232/485 (see Section 11.4.2 Serial Types)			
<i>485_term</i> - 1/0 (optional - this exists exist only when serial1_type = 485)			
Response triggers			
Notes			
In the FC-2x the serial port is selectable to RS-232 or RS-485 (usually serial port 1). If Serial1 is configured when RS-485 is selected, the RS-485 UART port is automatically changed			

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} <i>firmware_version</i> _{CR LF}			
Parameters			
<i>firmware_version</i> - XX.XX.XXXX where the digit groups are: major.minor.build version			
Response triggers			
Notes			

11.4 Parameters

11.4.1 Parity Types

Number	Value
0	No
1	Odd
2	Even
3	Mark
4	Space

11.4.2 Serial Types

Number	Value
0	232
1	485

LIMITED WARRANTY

The warranty obligations of Kramer Electronics for this product are limited to the terms set forth below:

What is Covered

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

What is Not Covered

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

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

How Long Does this Coverage Last

Seven years as of this printing; please check our Web site for the most current and accurate warranty information.

Who is Covered

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

What Kramer Electronics will do

Kramer Electronics will, at its sole option, provide one of the following three remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:

1. Elect to repair or facilitate the repair of any defective parts within a reasonable period of time, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition. Kramer Electronics will also pay the shipping costs necessary to return this product once the repair is complete.
2. Replace this product with a direct replacement or with a similar product deemed by Kramer Electronics to perform substantially the same function as the original product.
3. Issue a refund of the original purchase price less depreciation to be determined based on the age of the product at the time remedy is sought under this limited warranty.

What Kramer Electronics will not do Under This Limited Warranty

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

How to Obtain a Remedy under this Limited Warranty

To obtain a remedy under this limited warranty, you must contact either the authorized Kramer Electronics reseller from whom you purchased this product or the Kramer Electronics office nearest you. For a list of authorized Kramer Electronics resellers and/or Kramer Electronics authorized service providers, please visit our web site at www.kramerelectronics.com or contact the Kramer Electronics office nearest you.

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

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

Limitation on Liability

THE MAXIMUM LIABILITY OF KRAMER ELECTRONICS UNDER THIS LIMITED WARRANTY SHALL NOT EXCEED THE ACTUAL PURCHASE PRICE PAID FOR THE PRODUCT. TO THE MAXIMUM EXTENT PERMITTED BY LAW, KRAMER ELECTRONICS IS NOT RESPONSIBLE FOR DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY BREACH OF WARRANTY OR CONDITION, OR UNDER ANY OTHER LEGAL THEORY. Some countries, districts or states do not allow the exclusion or limitation of relief, special, incidental, consequential or indirect damages, or the limitation of liability to specified amounts, so the above limitations or exclusions may not apply to you.

Exclusive Remedy

TO THE MAXIMUM EXTENT PERMITTED BY LAW, THIS LIMITED WARRANTY AND THE REMEDIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, REMEDIES AND CONDITIONS, WHETHER ORAL OR WRITTEN, EXPRESS OR IMPLIED. TO THE MAXIMUM EXTENT PERMITTED BY LAW, KRAMER ELECTRONICS SPECIFICALLY DISCLAIMS ANY AND ALL IMPLIED WARRANTIES, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IF KRAMER ELECTRONICS CANNOT LAWFULLY DISCLAIM OR EXCLUDE IMPLIED WARRANTIES UNDER APPLICABLE LAW, THEN ALL IMPLIED WARRANTIES COVERING THIS PRODUCT, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL APPLY TO THIS PRODUCT AS PROVIDED UNDER APPLICABLE LAW.

IF ANY PRODUCT TO WHICH THIS LIMITED WARRANTY APPLIES IS A "CONSUMER PRODUCT" UNDER THE MAGNUSON-MOSS WARRANTY ACT (15 U.S.C.A. §2301, ET SEQ.) OR OTHER APPLICABLE LAW, THE FOREGOING DISCLAIMER OF IMPLIED WARRANTIES SHALL NOT APPLY TO YOU, AND ALL IMPLIED WARRANTIES ON THIS PRODUCT, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR THE PARTICULAR PURPOSE, SHALL APPLY AS PROVIDED UNDER APPLICABLE LAW.

Other Conditions

This limited warranty gives you specific legal rights, and you may have other rights which vary from country to country or state to state.

This limited warranty is void if (i) the label bearing the serial number of this product has been removed or defaced, (ii) the product is not distributed by Kramer Electronics or (iii) this product is not purchased from an authorized Kramer Electronics reseller. If you are unsure whether a reseller is an authorized Kramer Electronics reseller, please visit our Web site at www.kramerelectronics.com or contact a Kramer Electronics office from the list at the end of this document.

Your rights under this limited warranty are not diminished if you do not complete and return the product registration form or complete and submit the online product registration form. Kramer Electronics thanks you for purchasing a Kramer Electronics product. We hope it will give you years of satisfaction.



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

We welcome your questions, comments, and feedback.

Web site: www.kramerelectronics.com

E-mail: info@kramerel.com



SAFETY WARNING

Disconnect the unit from the power supply before opening and servicing

P/N: 2900-300221



Rev: 2

