Kramer Electronics, Ltd.

USER MANUAL

Model:

PL-50

Power Controller - Monitor

Contents

Figures

Tables

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 the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 1,000-plus different models now appear in 11 groups[1] that are clearly defined by function.

Congratulations on purchasing your Kramer **PL-50** *Power Controller Monitor*.

The **PL-50** is ideal for power monitoring and security systems.

The package includes the following items:

- **PL-50** *Power Controller Monitor*
- A power cord and an infrared remote control transmitter (including the required battery and a separate user manual[2])
- This user manual[2]
- P3K Wizard Software

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[3]

2.1 Quick Start

This quick start chart summarizes the basic setup and operation steps.

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1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; 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 Products

2 Download up-to-date Kramer user manuals from the Internet at http://www.kramerelectronics.com

3 The complete list of Kramer cables is on our Web site at http://www.kramerelectronics.com

Step 1: Mount the machine - see section 5

Mount the machine in a rack or stick the 4 rubber feet to the underside
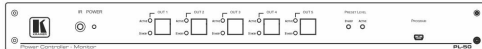
Step 2: Connect the inputs and outputs - see section 6

Connect to Alarms

Connect the outlets

Power

DVD Player

Power

LCD Display/
Plasma Display

Power

Power Amplifier
with Speakers

Power

Lighting System
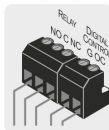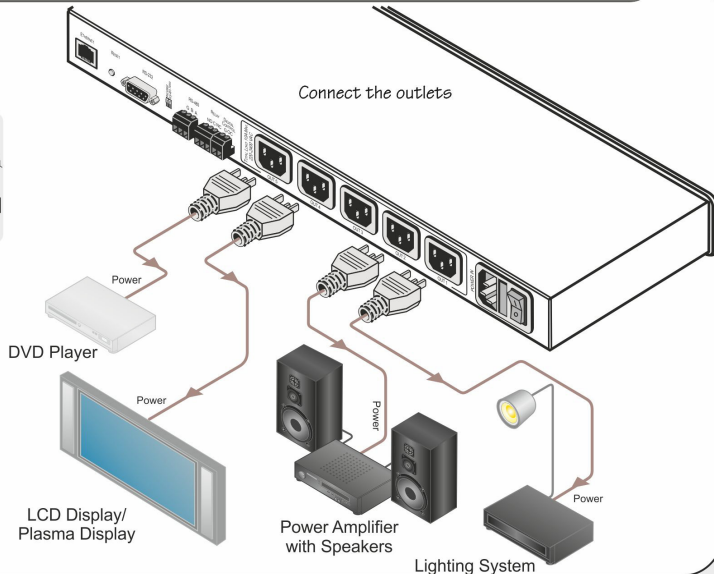
Step 3: Turn the power ON

Step 4: Calibrate the machine - see section 7

OUT 1   OUT 2   OUT 3   OUT 4   OUT 5   PRESET LEVEL

Select a button to calibrate to the Standby or Active modes
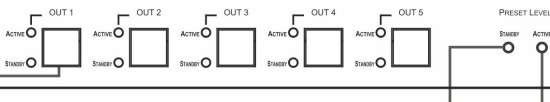
Press to calibrate the Standby mode

Press to calibrate the Active mode

Panel
Scheduler
Channel Settings
Alerts
Power Measurement
Power ON/OFF Order
Configurations

Use the embedded Web pages to control and operate the PL-50

Step 5: Calibrate the machine - see section 7

Operate and control via the front panel buttons, RS-232, RS-485, USB and the Ethernet

3 Overview

The **PL-50** *Power Controller Monitor* can control up to five power channels at a total load of 10A. The **PL-50**, by measuring and then monitoring the standby and active modes of the connected units, can detect whether a unit is in the standby mode, the active mode or is disconnected.

Two versions of the **PL-50** are available, a European version and a version for the USA.

The **PL-50** features include:

- PRESET LEVEL buttons, for measuring the STANDBY mode and the ACTIVE mode for reference
- A green ACTIVE LED and an orange STANDBY LED per channel, indicating the status of the outlet
- The ability to detect a change in the state of any of the channels and then trigger an alarm via the RELAY and Digital control terminal blocks that can be connected to an alarm or any other room activity
- Control via embedded Web pages, letting you schedule the activity of the outlet, set a response in case of an event, set the status of each channel separately, set the power ON/OFF order and delay, and so on
- An Ethernet port and a USB port for unit configuration and control

Control the **PL-50** using the front panel buttons, or remotely via:

- USB, RS-485 or RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller
- ETHERNET
- The Kramer Infrared Remote Control Transmitter

To achieve the best performance:

- Connect only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality and position your **PL-50** away from moisture, excessive sunlight and dust

3.1 Terminology Used in this User Manual

Table 1 defines some terms that are used in this user manual:

Table 1: Terminology Used in this User Manual

Term	Definition
802.3	The standard specification for ETHERNET that is maintained by the Institute of Electrical and Electronics Engineers (IEEE).
Dynamic Host Configuration Protocol (DHCP)	Allows the network administrator to distribute IP addresses from a central point and automatically send a new IP address when an Ethernet point is plugged into a different network location.
Gateway	A network position serving as an entry to another network. On the Internet, a node or stopping point can be either a gateway node or a host (end-point) node.
IP Address	A 32-binary digit number that identifies each sender or receiver (within a network via a particular server or workstation) of data (HTML pages or e-mails) that is sent in packets across the Internet. Every device connected to an IP network must have a unique IP address. This address is used to reference the specific unit.
Local Area Network (LAN)	Computers sharing a common communications line or wireless link, which often share a server within a defined geographic area.
Media Access Control (MAC) Address	A computer's unique hardware number (or address) in a LAN or other network. On an Ethernet LAN, the (MAC) address is identical to the Ethernet address.
Transmission Control Protocol/Internet Protocol (TCP/IP)	The basic communication language or protocol of the Internet that breaks the message into appropriately sized packets for the network, and can be used as a communications protocol in an intranet or an extranet.

4 Your PL-50 Power Controller - Monitor

Figure 1 and Table 2 define the **PL-50** *Power Controller - Monitor*:
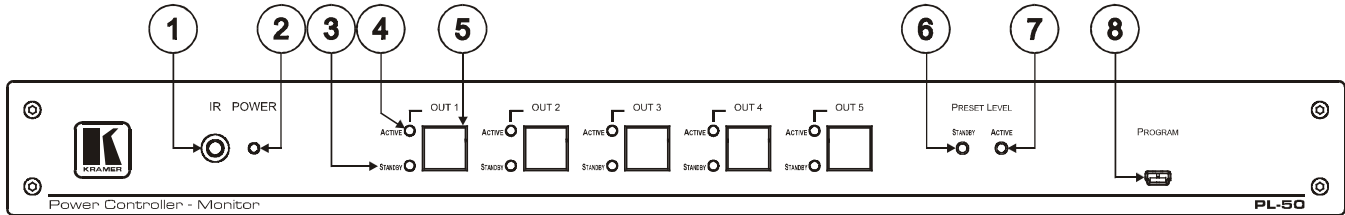
Figure 1: PL-50 Power Controller – Monitor Front Panel
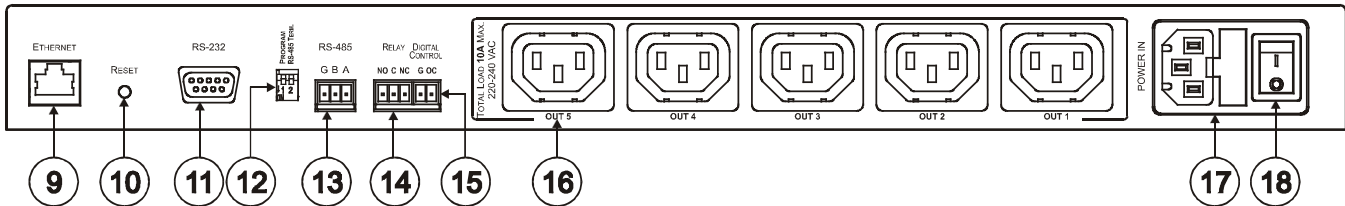
Figure 2: PL-50 Power Controller – Monitor (for Europe) Rear Panel
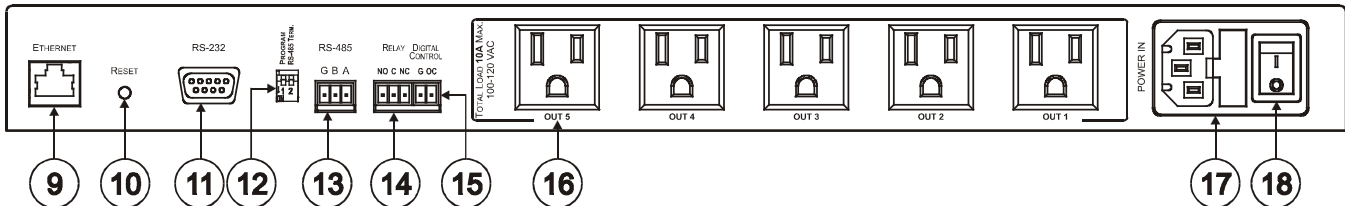
Figure 3: PL-50 Power Controller – Monitor (for USA) Rear Panel

Table 2: PL-50 Power Controller – Monitor Features

#	Feature		Function
1	IR Receiver Window		The red LED lights when receiving signals from the Kramer Infrared remote control transmitter
2	*POWER* LED		The red LED lights when the main power is ON
3	*OUT* Channel *(from 1 to 5)*	*STANDBY* LED	The orange LED lights when the channel outlet is in the standby mode, and blinks when reading the standby level
4		*ACTIVE* LED	The green LED lights when an outlet is connected to that power channel and active, and blinks when reading the preset active level
5		*OUT Button*	Press one or more buttons to select the power channel for calibrating
6	*PRESET LEVEL* Buttons	*STANDBY*	Press to read the standby mode
7		*ACTIVE*	Press to read the active mode
8	*PROGRAM USB connector*		For configuring and programming the unit
9	*ETHERNET* Connector		Connects to the PC or other Serial Controller through computer networking
10	*RESET*		Press to reset the standby and active values for all the channels, as well as the security passwords
11	*RS-232* 9-pin D-sub Port		Connect to the PC or other Serial Controller
12	*DIP-switches*		Program, for technical use only RS-485 TERM, for RS-485 termination
13	RS-485 Terminal Block Connector		Connect to the PC or other Serial Controller
14	RELAY terminal block connector		Connect to an alarm or other item (see section 6.1)
15	DIGITAL CONTROL (G, OC[1]) Terminal Block Connector		Connect to an alarm or other item
16	Power Outlets (from 1 to 5)		220-240V AC for European version (see Figure 2) 100-120V AC for USA version (see Figure 3)
17	POWER IN Connector with *FUSE*		AC connector enabling power supply to the unit
18	*POWER* Switch		Illuminated switch supplying power to the unit

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1 OC means Open Collector

5 Installing in a Rack

This section describes what to do before installing in a rack and how to rack mount.

Before Installing in a Rack

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

OPERATING TEMPERATURE:	0º to +55ºC (32º to 131ºF)
STORAGE TEMPERATURE:	-45º to +72ºC (-49º to 162ºF)
HUMIDITY:	10% to 90%, RHL non-condensing

CAUTION!

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

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

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

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

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

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

How to Rack Mount

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.
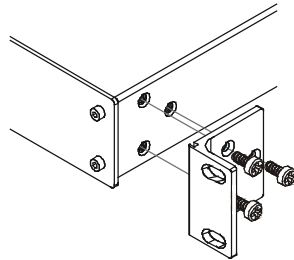
2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note:

• In some models, the front panel may feature built-in rack ears

• Detachable rack ears can be removed for desktop use

• Always mount the machine in the rack before you attach any cables or connect the machine to the power

• If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions available from: http://www.kramerelectronics.com)

6 Connecting the PL-50 Power Controller - Monitor

To connect the **PL-50**, as illustrated in the example in Figure 4, do the following[1]:

1. Connect up to five[2] outlets (from 1 to 5). For example, connect:
   - OUT 1 to a DVD player
   - OUT 2 to an LCD display
   - OUT 4 to a power amplifier with speakers
   - OUT 5 to a lighting system

2. Set the DIP-switches (see Table 2).

3. Connect an item (for example, an alarm) via the RELAY and/or DIGITAL CONTROL terminal block connectors (not shown in Figure 4).

4. As an option you can connect a PC and/or controller to the RS-232 port, RS-485 port and/or the ETHERNET connector (see section 6.2.1)

5. Connect the power cord[3] (not shown in Figure 4).
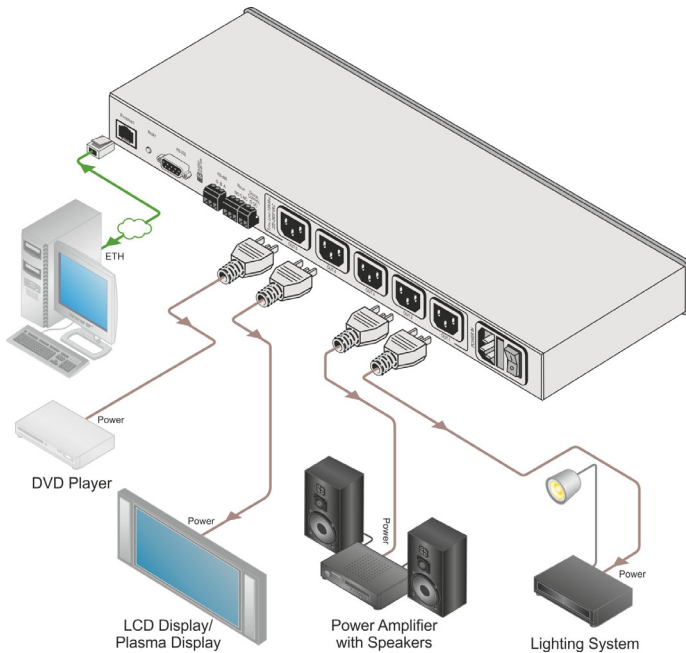
Figure 4: Connecting the PL-50

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1 Be sure that the power is switched OFF on each device before connecting it to your PL-50. After connecting all the devices to your PL-50, switch on the power of the PL-50, and then switch on the power of each device

2 You do not have to connect all the outlets. In this example OUT 3 is not connected

3 We recommend that you use only the power cord that is supplied with this machine

6.1 Connecting the Relays

Figure 5 shows how to connect the relay.
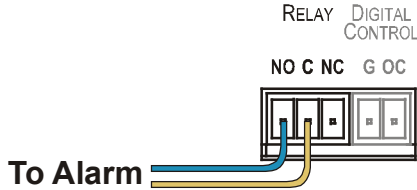
Figure 5: Relay Wiring

On each 3-pole terminal block connector, connect either: **C** to **NC,** or **C** to **NO**. Table 3 defines the Relay PINOUT:

Table 3: Relay PINOUT

RELAY PINOUT	
C	Common
NO	Normally Open (relay is open by default and closes for activation)
NC	Normally Closed (relay is closed by default and opens for activation)

6.2 Controlling the PL-50 via the Ethernet Port

You can connect the **PL-50** via the ETHERNET in the following ways:

- For direct connection to the PC, use a crossover cable (see section 6.2.1)
- For connection via a network hub or network router, use a straight-through cable (see section 6.2.2)

6.2.1 Connecting the ETHERNET Port Directly to a PC (Crossover Cable)

You can connect the Ethernet port of the **PL-50** to the Ethernet port on your PC, via a crossover cable with RJ-45 connectors.

> This type of connection is recommended for identifying the **PL-50** with the factory configured default IP address

After connecting the Ethernet port, configure your PC as follows:

1. Right-click the My Network Places icon on your desktop.
2. Select **Properties**.
3. Right-click Local Area Connection Properties.
4. Select **Properties**.
   The Local Area Connection Properties window appears.

5. Select the Internet Protocol (TCP/IP) and click the **Properties** button (see Figure 6).
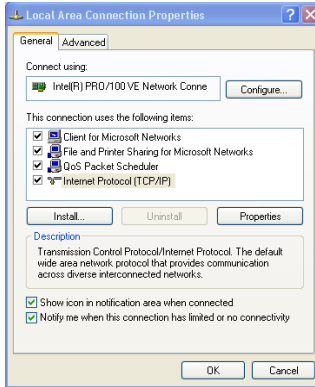
Figure 6: Local Area Connection Properties Window

6. Select Use the following IP address, and fill in the details as shown in Figure 7.
7. Click **OK**.
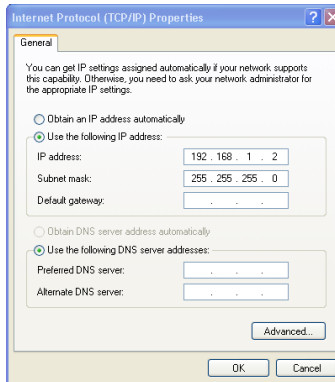
Figure 7: Internet Protocol (TCP/IP) Properties Window

6.2.2   Connecting via a Straight-Through Cable

You can connect the ETHERNET of the **PL-50** to the Ethernet port on a network hub or network router, via a straight-through cable with RJ-45 connectors.

6.2.3   Configuring the Ethernet Port Initially

To initially configure the Ethernet port, download the *K-UPLOAD* Ethernet configuration software[1]. Extract the file to a folder and create a shortcut on your desktop to the file.

Follow these steps to configure the port:

1. Double click the desktop icon
    the K-UPLOAD screen appears:
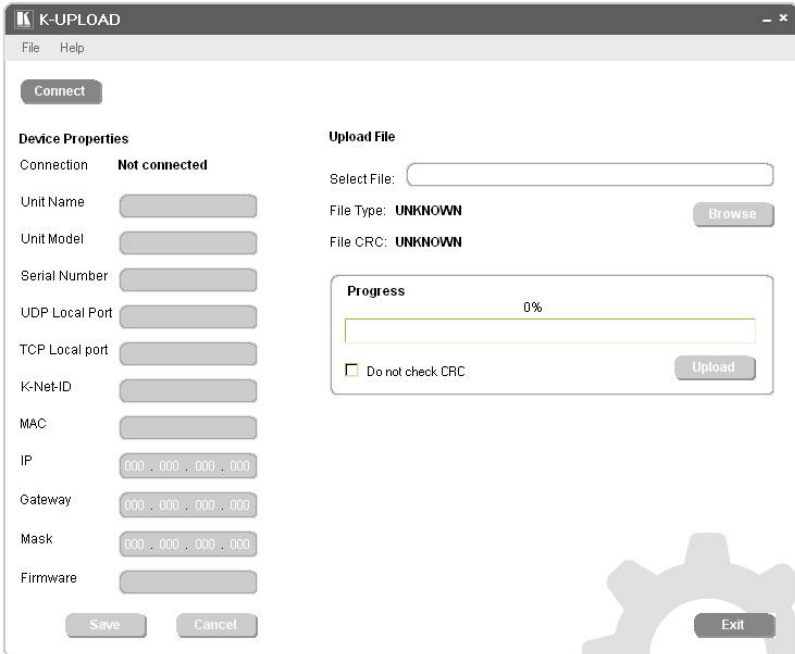
Figure 8: K-UPLOAD Main Screen

2. Click the Connect button.
    The Connect screen appears as follows:

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1 From the Kramer Web site at http://www.kramerelectronics.com
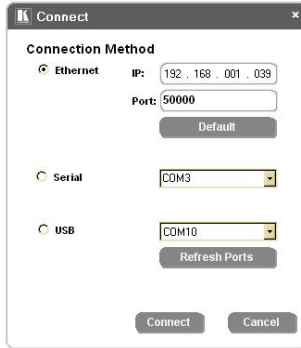
Figure 9: Connect Screen

3. Connect a USB cable from a USB port on the PC to the USB port on the **PL-50** (you can also connect to the PC via the Ethernet or a serial connector).

4. Check USB as the connection method and select the com port from the USB drop down list.

5. Click Connect.
   The K-UPLOAD screen appears.
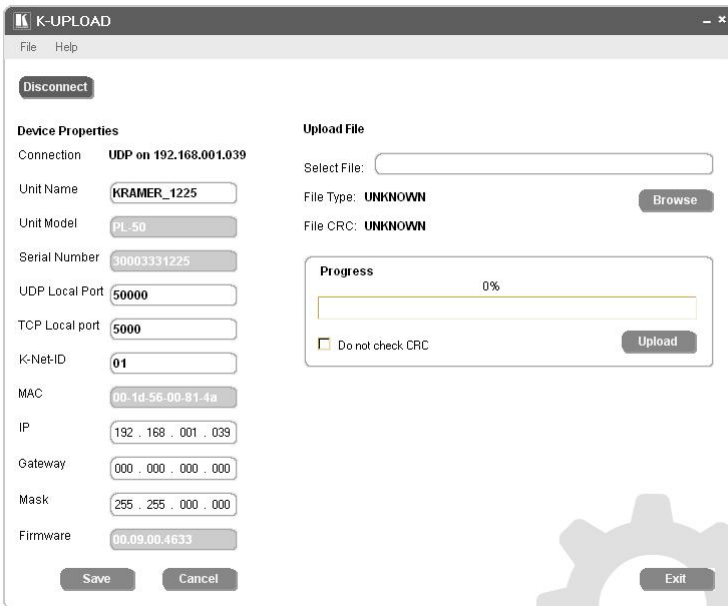
Figure 10: Device Properties Screen

6. If required, make changes and click Save. If not, click Exit.

6.3 Controlling via the Embedded Web Pages

The embedded Web page can be used to remotely operate the **PL-50** via the Ethernet (see section 6.2).

6.3.1   Setting the Embedded Web Page

Before you use the embedded Web pages to control the **PL-50** via the Ethernet, check that the Java™ software is installed on your computer. If not, download it from: www.java.com.

A description of each Web page appears if you hover with your mouse over the question mark that appears on the left side of the screen.

To control the **PL-50** via the embedded Web page, make sure that it is connected to the Ethernet port of your computer and do the following:

1. Open your Internet browser.

2. Type the unit's IP number[1] in the address bar of your browser (or the name, if using DHCP):

Figure 11: Typing the IP Number

The following window appears:
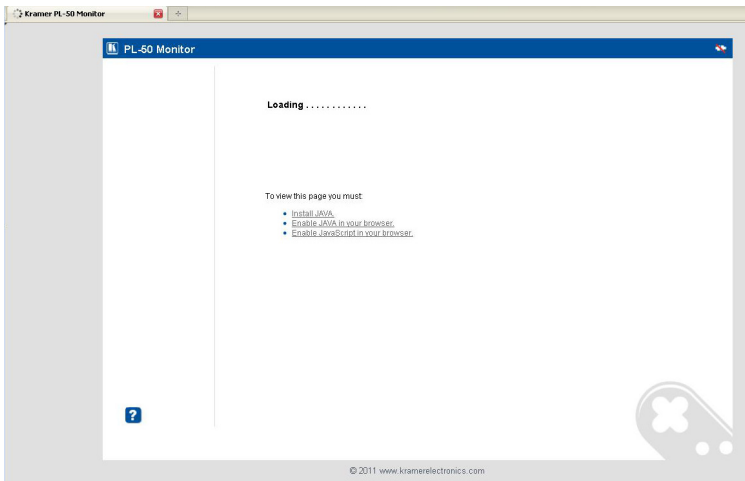
Figure 12: Loading the Embedded Web Pages

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1 The default IP number is 192.168.1.39, and may be changed by the system integrator

Check that Java and JavaScript is enabled in your browser. The following window appears:

Figure 13: Running the Application

3. Click Run.
    The **PL-50** front panel is displayed on your screen (see Figure 14).

The Web embedded screens let you control the **PL-50** via the Ethernet. The menu appears on the left side of the screen.

The web embedded pages include a security system (see Section 6.3.8.1). If the security system is disabled (for example, when you use the embedded Web pages for the first time), the embedded Web pages can be accessed, and the parameters changed by anyone.

6.3.2 The Panel Screen

The Panel screen lets you select one or more channels in order to read the Standby or Active values and turn the power outlet ON/OFF:
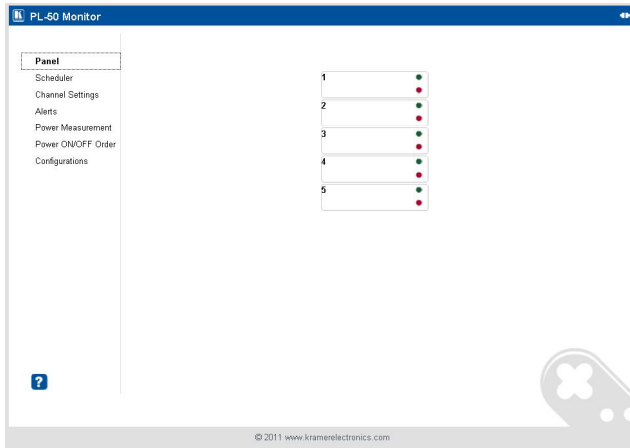
Figure 14: HOME Embedded Web Page

The connection icon on the top right screen indicates whether the machine is connected to your PC ▮▮ or not ✖.

Click the on-screen channel buttons:
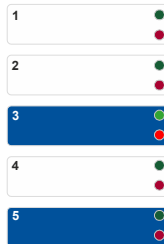
Figure 15: Selecting a Channel

Each channel button includes red and green indicators. If the indicators appear bright, the Standby or Active values are measured (channel 3 in the example in Figure 15). Otherwise, these values were not measured.

The Help Box ❓

This is the main panel window. In this window you can control the channels.

6.3.3 The Scheduler Screen

The Scheduler screen lets you schedule the operation of the outlets on a weekly basis. Figure 16 and Table 4 define the Scheduler screen:
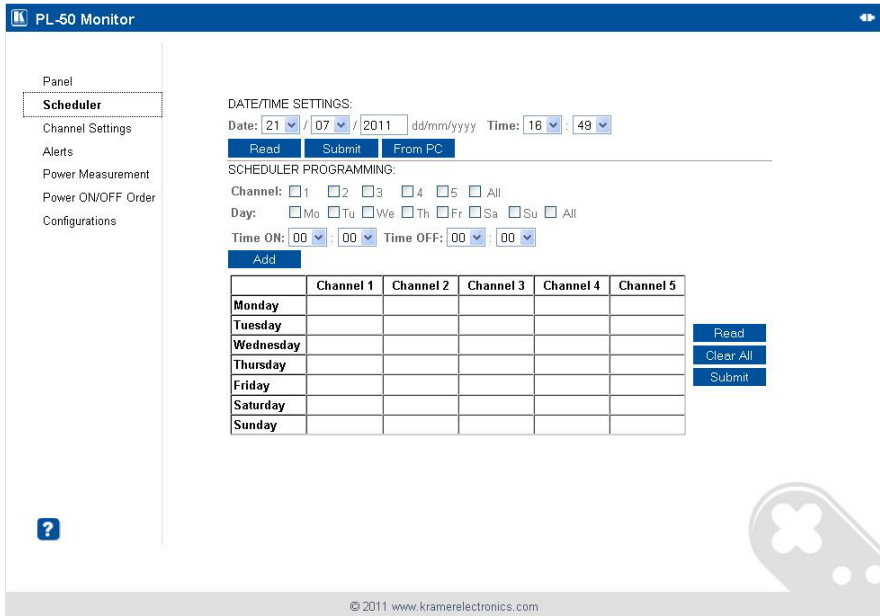
Figure 16: The Scheduler Screen

Table 4: The Scheduler Screen Features

Feature	Function
DATE/TIME SETTINGS	Set the current date and time Click Read to read the machine settings Click Submit to accept the date and time settings Click From PC to acquire the date and time from your PC (and then press submit to accept settings)
SCHEDULER PROGRAMMING	Select a channel for scheduling[1] Select the day or days of the week for scheduling Select the time schedule for the selected channel(s): the Time ON and the Time OFF You can select more than one active period per channel, per day Click Add to add the schedule for the selected channel(s) Click Read to read[2] the current schedule stored in the machine Click Clear All to clear the scheduling table[3] Click Submit to save the current scheduling table to the machine

---

1 Or several channels, or all the channels

2 The schedule stored in the machine overwrites the data displayed on the scheduler

3 This clears the schedule on the screen only, not in the machine

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After scheduling the outlets, the Scheduler screen appears as follows:
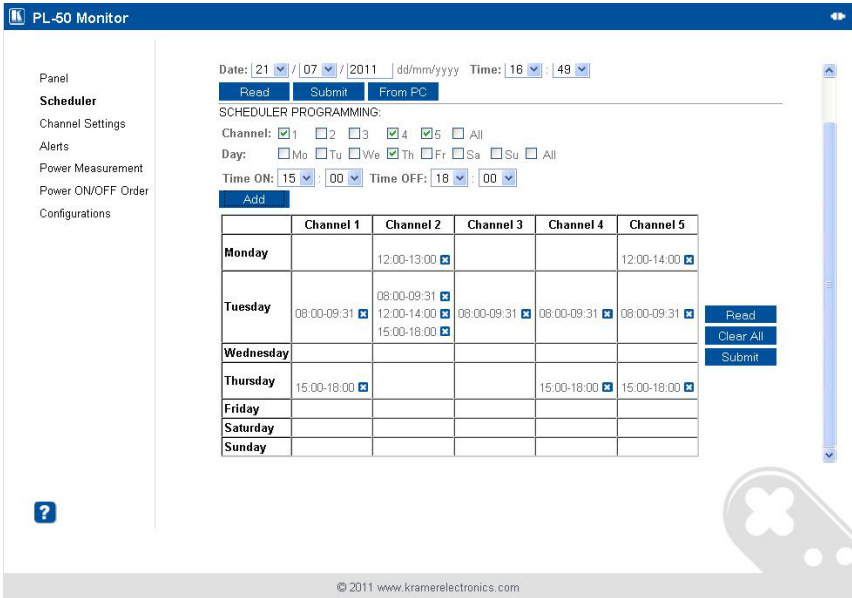
Figure 17: Scheduling the Outlets

In Figure 17, the channels are scheduled at different times. For example:

- On Monday, Channel 2 will be ON from 12:00 to 13:00 and Channel 5 will be ON from 12:00 to 14:00
- On Tuesday, Channel 2 will be ON from 08:00 to 09:31, from 12:00 to 14:00 and from 15:00 to 18:00.
- On Tuesday all the channels are scheduled to be ON from 08:00 to 09:31 and on Thursday Channels 1, 4 and 5 are scheduled to be ON from 15:00 to 18:00 (see section 6.3.7 for setting the power ON/OFF order)

You can clear a checkbox next to a time period setup in the scheduler table to delete a scheduled time period. Click Submit to save the schedule to the **PL-50**.

HELP BOX ❓

This page lets you view and set the ON/OFF scheduling of the channel. Note, that the device will store the new scheduling only after you click "Submit".
You can also view and set the current time.

6.3.4   The Channel Settings Screen

Figure 18 and Table 5 define the Channel Settings screen:
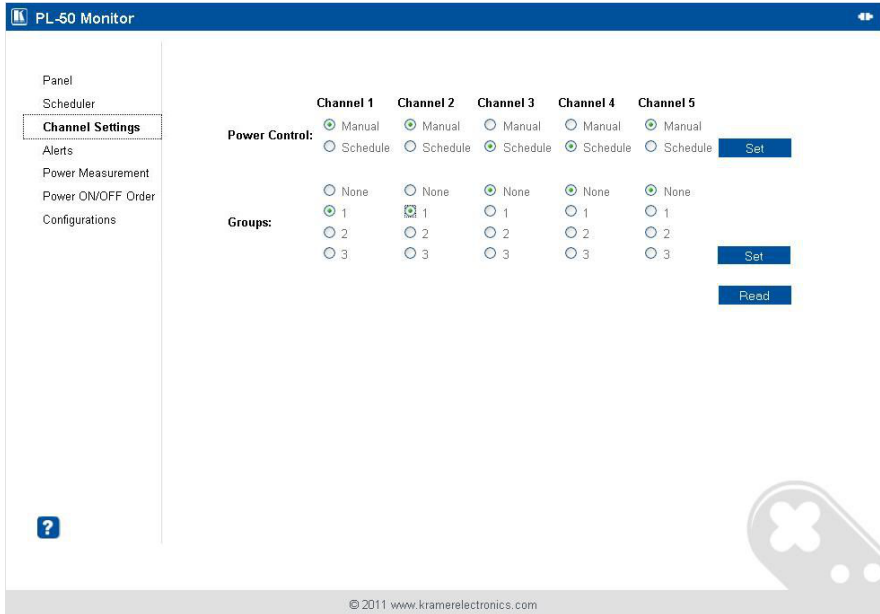
Figure 18: The Channel Settings Screen

Table 5: The Channel Settings Screen Features

Feature	Function
Power Control:	Set, for each channel whether it will be controlled manually (by the Panel screen or the front panel buttons) or by the scheduler In this example, channels 1, 2 and 5 are manually controlled, while channels 3 and 4 are controlled by the scheduler
Groups:	Assign the channel to one of three groups only in the manual mode[1]. For example, in Figure 18 Channel 1 and Channel 2 are assigned to group 1 and will operate concurrently in the manual setting In this example, channels 1 and 2 are assigned to group 1, so pressing one of them will also activate the other

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HELP BOX [?]

In this page you can view and set the channels Power Control (Manual or Schedule) you can also view and set Groups of channels to act together.

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[1] A channel that is scheduled overrides the group manual setting

6.3.5   The Alerts Screen

Figure 19 and Table 6 define the Alerts screen:
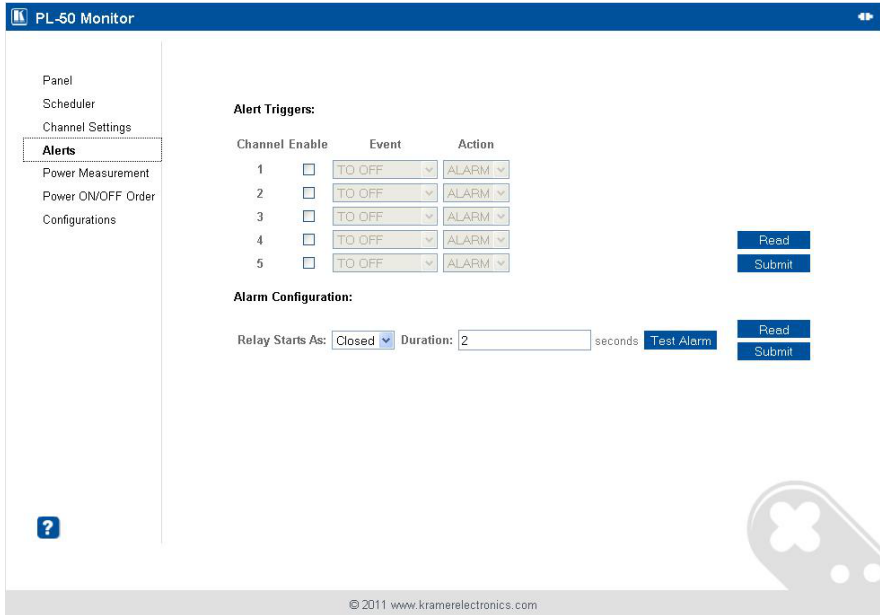
Figure 19: The Alerts Screen

Table 6: The Alerts Screen Features

Feature	Function
Alert Triggers:	Select the event that will trigger an alarm: Check the Enable box to enable the event and action taken or clear to disable **The events**: TO OFF – the outlet turns OFF (the channel button is off) TO ON – the outlet turns ON (the channel button is on) TO ACTIVE – the green LED is ON TO STANDBY – the orange LED is ON TO NONE – the outlet is disconnected ANY CHANGE – any change in the current status Read: click to read the data stored in the machine Submit: click to submit changes
Alarm configuration:	Relay Starts As: set the relay status to closed or open according to the relay installation. For example, if the alarm is installed so that in the closed state the alarm is off set it to Closed Duration: set the duration of the alarm in seconds Test Alarm: click this button to test the alarm, click again to silence it An alarm icon appears on the top right side of the screen. Stop the alarm by clicking the Alarm icon (see Figure 20) Read: click to read the data stored in the machine Submit: click to submit changes

After setting the alarms, the Alerts screen appears as follows:
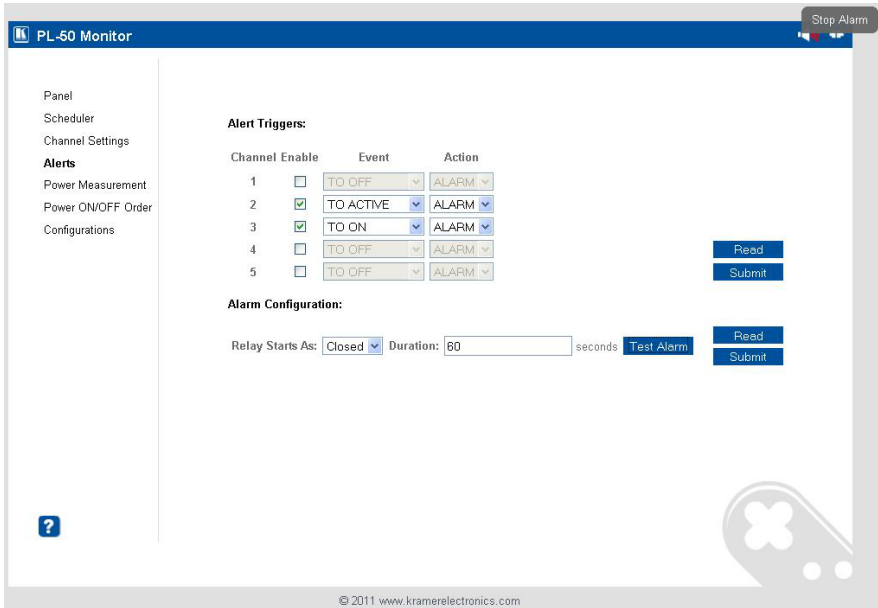
Figure 20: Setting the Alarms

In this example, Channel 2 and Channel 3 are enabled, and the events (TO ACTIVE and TO ON, respectively) trigger the ALARM

The duration of the alarm is 60 seconds and it will activate both the relay alarm and the digital control alarm. Click Test Alarm to test the alarm.

HELP BOX ❓

This page lets you view and set all the Alerts the device will trigger. You can also view and set the alarm configuration.

6.3.6 The Power Measurement Screen

Figure 21 and Table 7 define the Power Measurement screen:
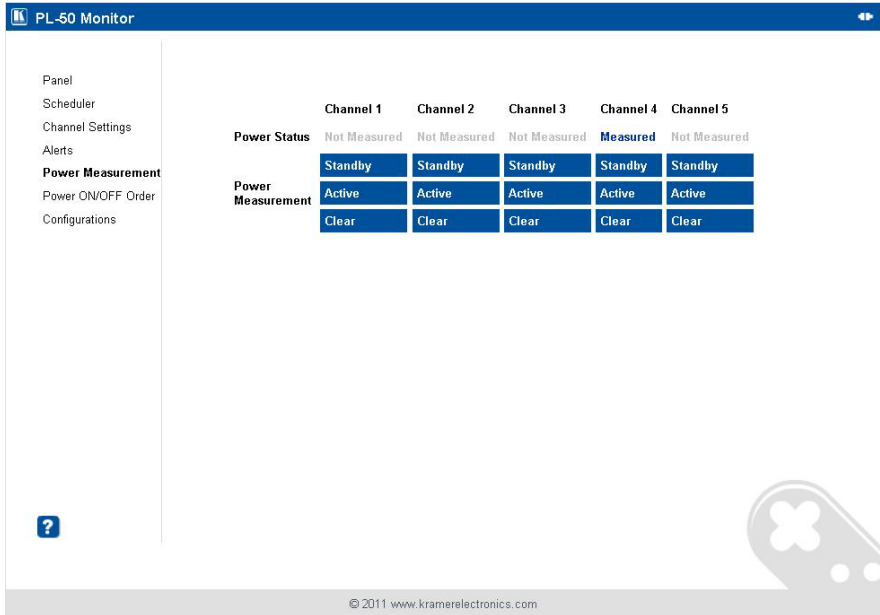
Figure 21: The Power Measurement Screen

Table 7: The Power Measurement Screen Features

Feature	Function
Power Status	Status indicator per channel: Measured – if the standby and active values are available (Channel 4 in this example) Not Measured – if one or both of the values were not measured (for example, Channel 1)
Power Measurement	Click Standby or active to measure the standby and/or Active values for an outlet connected to a channel (once measured, the status changes from "Not Measured" to "Measured") Click clear to clear the Standby and Active data for that channel[1]

HELP BOX

This page lets you start the "Standby" and "Active" mode measurement process. You can also clear the current "Standby" and "Active" thresholds.

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1 You can also reset the data for all the channels by pressing the reset button located on the rear panel of the machine (see Figure 2 and Figure 3) and plugging the power ON while pressing

6.3.7 The Power ON/OFF Order Screen

The Power ON/OFF Order screen lets you determine the power ON and OFF order for channels that are scheduled to switch ON/OFF simultaneously. This is very convenient for systems that require a specific power up or shut down sequence. Figure 22 and Table 8 define Switch Order screen:
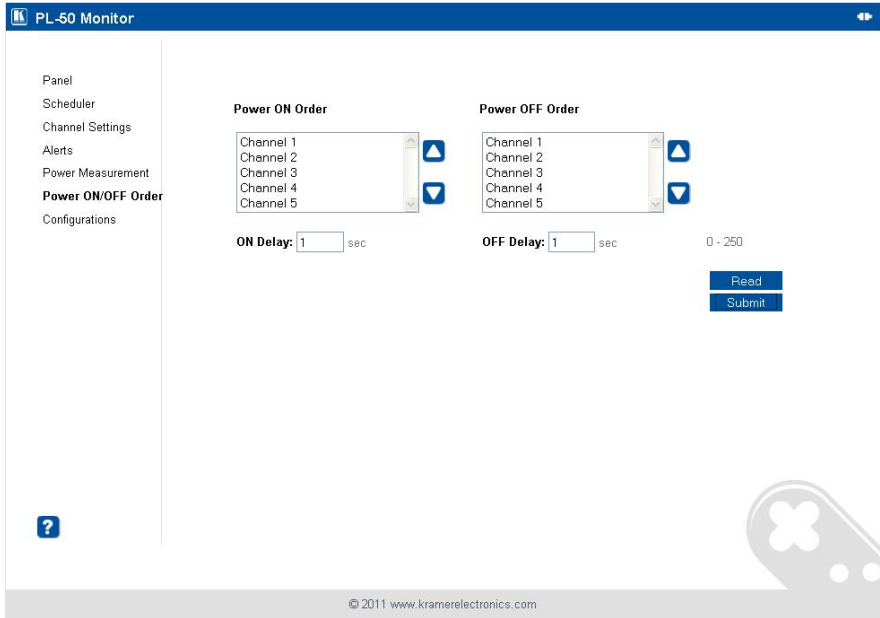
Figure 22: The Power ON/OFF Order Screen

Table 8: The Power ON/OFF Order Screen Features

Feature	Function
Power ON /OFF Order	By default, the channels are set to switch ON/OFF in sequence (from 1 to 5). Use the up and down arrows to set to the desired order
ON/OFF Delay	Set the switching ON/OFF delay time for each channel in the switching sequence
Read	Click to read the switching order stored in the machine
Submit	Click to submit changes

In the example illustrated in [Figure 23](#), the Power OFF Order is set from 5 to 1 with a 10 second delay time before each channel in the sequence is switched OFF:

Figure 23: Power ON Order Example

The system switches ON according to the Power ON Order, with a 1 second delay before powering ON each channel:
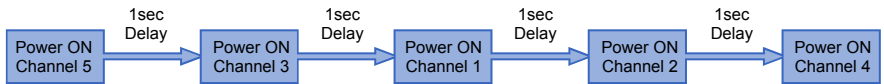
Figure 24: Switching ON Sequence Example

If an outlet is not connected, the sequence skips over that channel (and its switching delay time as well) and continues to the next channel in the sequence.

HELP BOX ❓

This page lets you set the power ON and OFF order and delay.

6.3.8   The Configurations Screen

The Configurations page lets you view and change some Ethernet settings[1] (see Figure 25) and also set the security level.

To change Configuration definitions:

1.   Click Configurations. The Configurations Web page appears.

2.   Change the definitions as required.

3.   Click the Submit button to apply changes[2]. A window appears asking if you are sure you want to change the network settings.

4.   Click Yes.
      A window appears announcing that the configuration has been successfully changed.

5.   Click OK

6.   If the IP number had been changed, close the browser and reload the Web page.
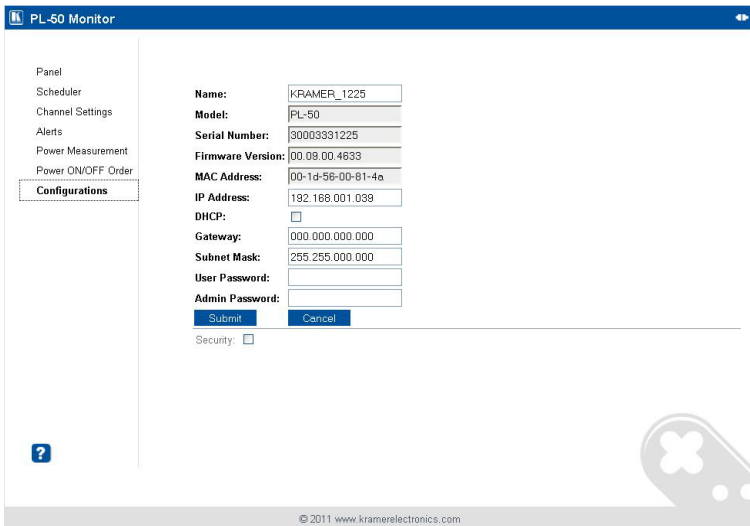
Figure 25: Configurations Embedded Web Page

HELP BOX

This page lets you view and set the device configuration.

---

1 The model name, serial number, firmware version and MAC address

2 Or Cancel to cancel changes

If the security system is disabled, the embedded Web pages can be accessed, and the parameters changed by anyone.

Check the Security box to enable the security system. The following window appears:

Figure 26: Enable Security System

Click OK to enable the security system:
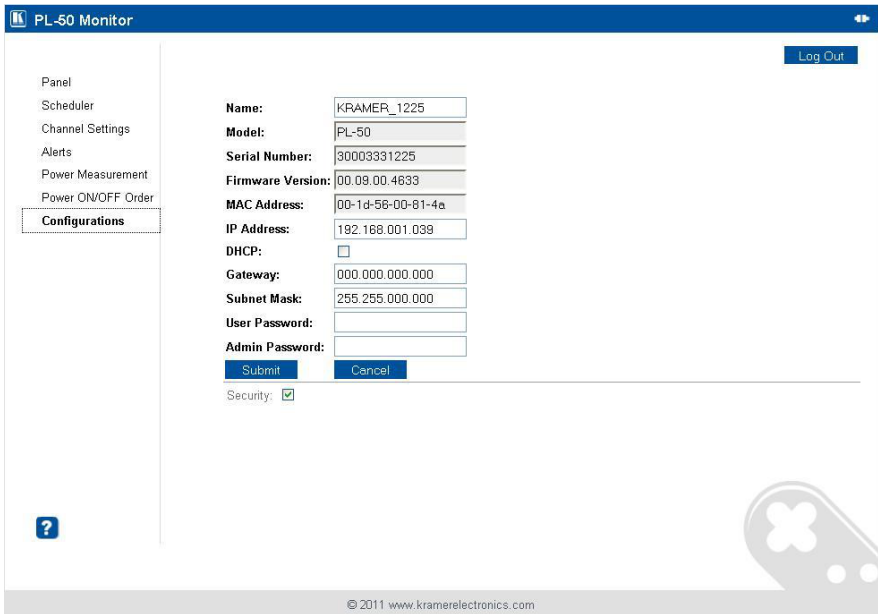
Figure 27: Security System Enabled

6.3.8.1 The Security System

Set the user password and Admin password[1] (by default, the passwords for both User and Admin are empty fields).

The security system includes three levels of security:

- Pre-authorized mode (the security box is checked) – the Web pages are disabled and you have to enter either the User or Admin password to access the system (see Figure 28)
- User mode – monitor the system and switch outlets ON or OFF
- Admin mode – control the system and change any of the parameters
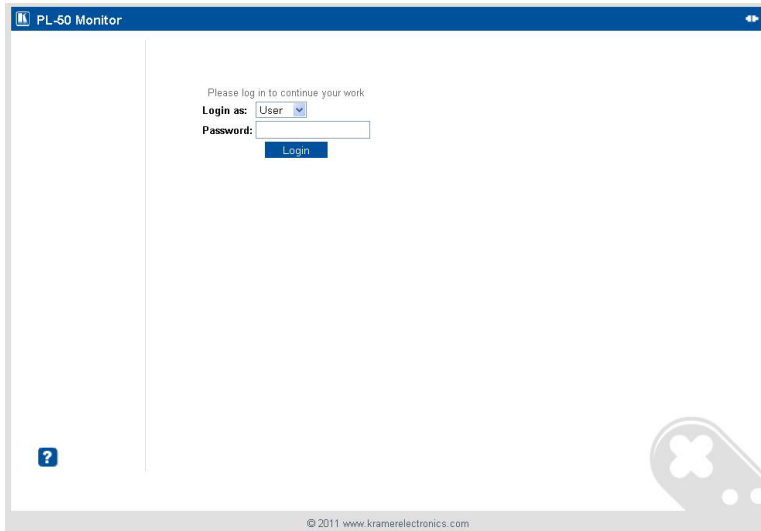
Figure 28: User Login

At any time you can log out by clicking the Log Out button on the top right side of the Web page (see Figure 27).

HELP BOX ❓

Please log in as USER or ADMIN.

---
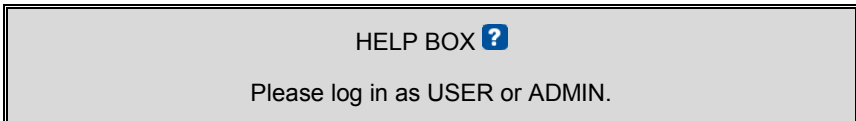
1 Both the Admin and the User passwords are reset to their default values when pressing the reset button located on the rear panel of the machine (see Figure 2 and Figure 3) and plugging the power ON while pressing

6.4 DIP-switch Settings

Figure 29 and Table 9 define the DIP-switches:

PROGRAM
RS-485 TERM.

Table 9: DIP-switch Definitions

DIP	Function:
1	PROGRAM, for factory use only
2	ON for RS-485 Line Termination with 120Ω; OFF for no RS-485 Line Termination

↓ 1 2
ON

Figure 29: SETUP DIP-switches

7 Operating Your PL-50 Power Controller – Monitor

You can operate your **PL-50** via:

- The front panel buttons
- Remotely, by USB, RS-485 or RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller
- The Ethernet
- Remotely, from the Kramer Infrared Remote Control Transmitter or the infrared remote extension cable transmitter

Powering up **PL-50** unit, recalls the previous settings (that is, the state of the unit when it was powered down) from the non-volatile memory.

7.1 Calibrating via the Front Panel Buttons

Prior to monitoring the **PL-50** outlets, each outlet needs to be measured for its standby and Active modes.

To set the Active mode, do the following:

1. Press one or more OUT buttons to select the channels for which you want to measure the standby or active modes.
   The selected buttons illuminate.

2. Set the connected units to the Active mode.

3. Press the PRESET LEVEL ACTIVE button.
   The selected orange OUT buttons, and their related ACTIVE green LEDs blink.

4. Press each of the selected orange blinking buttons to initialize the measurement.
   The ACTIVE green LED blinks until measurement is complete.

To set the Standby mode[1], do the following:

1. Press one or more OUT buttons to select the channels for which you want to measure the standby or active modes.
    The selected buttons illuminate.

2. Set the connected units to the Standby mode

3. Press the PRESET LEVEL STANDBY button.
    The selected orange OUT buttons, and their related STANDBY orange LEDs blink.

4. Press each of the selected orange blinking buttons to initialize the measurement.
    The STANDBY orange LED blinks until measurement is complete.

To reset the active and standby values on all channels, press the RESET button on the rear panel while turning the power ON.

You can measure the Active and Standby values as well as reset individual channels via the embedded Web pages (see section 6.3.2).

---

1 The unit should be powered up and running under typical conditions when the measurements are made

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8 Flash Memory Upgrade

The **PL-50** uses a microcontroller that runs firmware located in FLASH memory. The latest version of firmware can be downloaded from the Kramer Web site at www.kramerelectronics.com and updated in minutes using the K-UPLOAD and the following procedures.

> **Before firmware upgrade**:
> Close the embedded Web pages
> Do not press the front panel buttons

8.1 Upgrading the Firmware

To upgrade the **PL-50** firmware:

1. Download the firmware file from the Internet (see section 8.1.1)
2. Connect a PC to the **PL-50** (see section 8.1.2)
3. Update the firmware using the K-UPLOAD (see section 8.1.3)

8.1.1 Download the Firmware

To download the latest firmware file[1] from the Internet:

1. Go to the Kramer Web site at www.kramerelectronics.com.
2. Navigate to SUPPORT / Software Firmware Updates.
3. Click on the link of the firmware that applies to your product. Download it and save it to disk.
4. Extract the file to a folder (for example, C:\Program Files\Kramer Flash).

8.1.2 Connect a PC to the PL-50

To connect a PC to the **PL-50**, make any one of the following connections:

- Connect a serial cable from an RS-232 9-pin D-sub rear panel port on the PC to the **PL-50**.
- Connect a USB cable from a USB port on the PC to the USB port on the **PL-50**
- Connect an RJ-45 Ethernet cable from the Ethernet port on the PC to the Ethernet port on the **PL-50** as explained in section 6.2

---

1 The files indicated in this section are given as an example only. File names are liable to change from time to time

8.1.3 Update the Firmware

To update the firmware, perform the following steps:

1. Open the K-UPLOAD software[1] by double-clicking the desktop icon **K-UPLOAD**. The *K-UPLOAD* screen appears[2]:
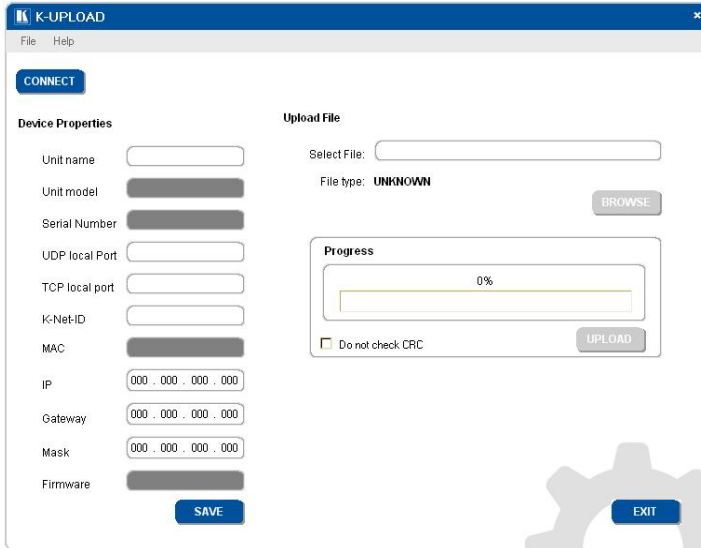
Figure 30: K-UPLOAD Screen

2. Click the **Connect** button.
    The *Connect Window* appears (see Figure 31).
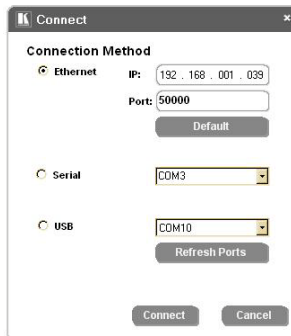
Figure 31: Connect Ethernet by IP Number

---

1 You can download and install the latest version of K-UPLOAD from http://www.kramerelectronics.com.

2 The screens appearing in this manual are examples of the process. The actual screens may differ in their content.

3. If you are upgrading using an Ethernet connection, check **Ethernet**.
   To reset the device address to the factory default address, click Default and the address 192.168.1.39 appears.

If you are upgrading using:
- RS-232 check **Serial**, and select the COM port to connect
- USB, check USB and select the USB device to connect

4. Click **Connect**.

Note: If you try to connect to a device and the time out message appears[1] (see [Figure 32](#)), click **CLOSE** and verify that the device is powered on, the cable connection is good, the switch on the device is set to "Program", and that you are trying to connect by the correct method and then click **Connect** again.
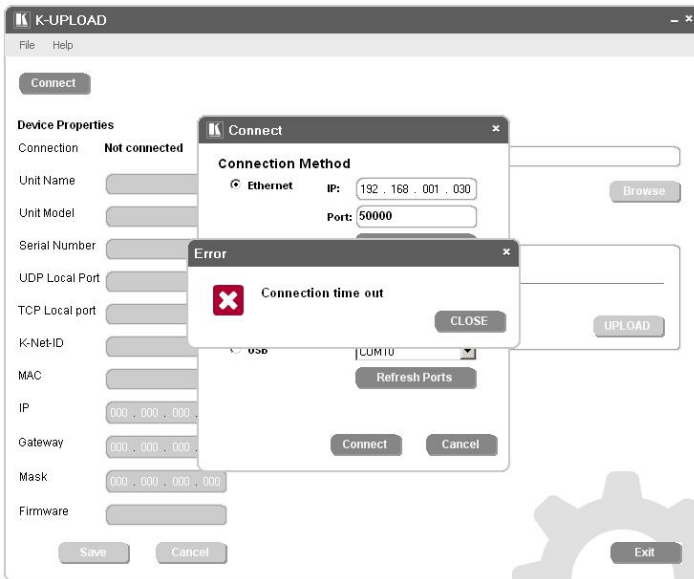
Figure 32: Connection Time Out Message

The machine is now connected:

---

1 Other Error messages may appear, such as "No USB devices were found" or "This driver is not a valid driver for this unit" and so on
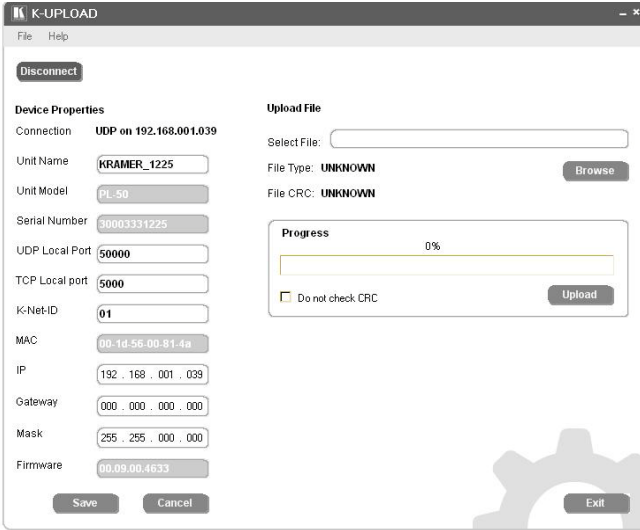
Figure 33: K-UPLOAD Connected

Note: In the Device Properties section, you can update any of the active fields that have a white background. After making any changes, click **Save**.

5. Click the Browse button, select the file from the Open window and then click Open.
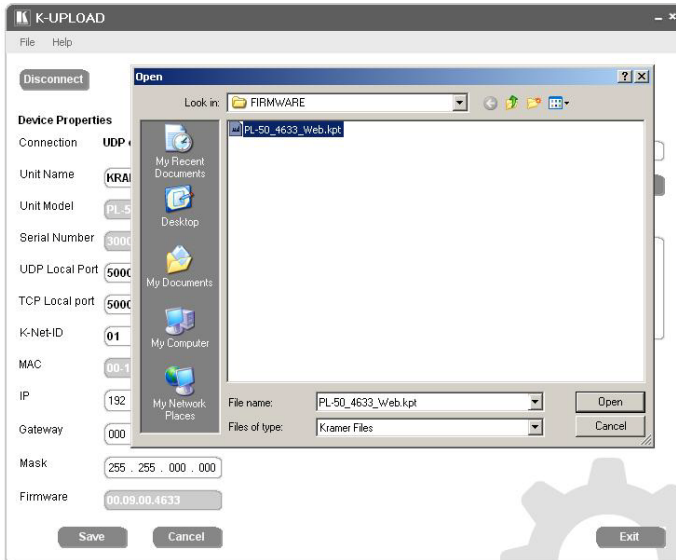
Figure 34: Open the Firmware File

6. Click the **UPLOAD** button to begin the file transfer.
The Warning window appears:
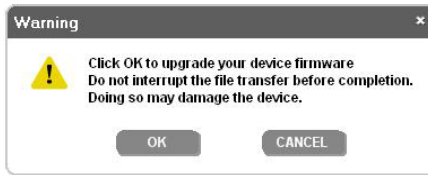
Figure 35: Warning Window

7. Click **OK** to continue.
The upload progress appears in the Progress box:

Figure 36: Upload Progress

After loading the firmware file, wait for completion of the firmware upgrade:
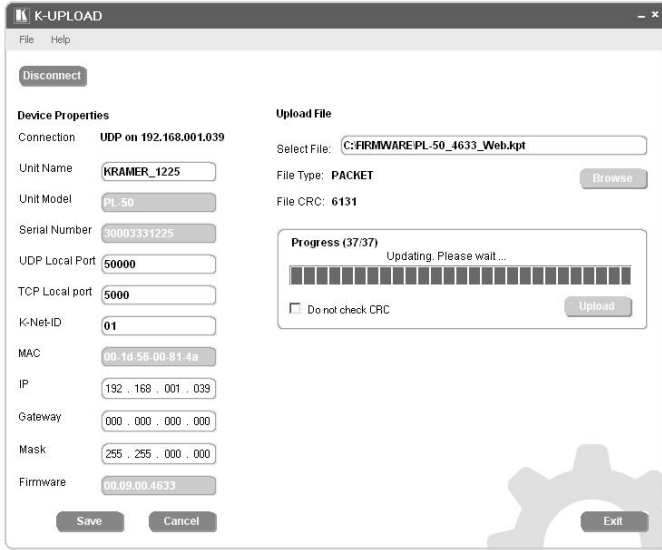
8. When the update is finished, the restart message appears:

Figure 37: Restart Message

9. Click **Restart now** to close K-UPLOAD and remove the cable that connects the **PL-50** to the PC.

8.2 Changing the Device Parameters

To change the device parameters do the following:

1. Connect a PC to the **PL-50** (see section 8.1.2).

2. Open K-UPLOAD (see Figure 30).

3. Click the **Connect** button to open the *Connect* window (see Figure 31).

4. Choose the appropriate type of connection: Ethernet, Serial or USB, and click **Connect**.
    The Connect window disappears and the Device Properties become visible.

5. Change the parameters as required and then click **Save**.

9 Technical Specifications

Table 10 includes the technical specifications:

Table 10: Technical Specifications[1] of the PL-50

INPUT POWER SOURCE:	For Europe: 230V AC, 50/60Hz, 10VA, internal For the USA 130V AC, 130V AC, 50/60Hz, 10VA, internal
OUTPUTS:	For Europe: 5 x 220-240V AC outputs, total load of 10A Max. For the USA: 5 x 100-120V AC outputs, total load of 10A Max.
DIMENSIONS:	19-inch (W), 7-inch (D) 1U (H) rack-mountable
WEIGHT:	2.7kg (6lbs) approx.
ACCESSORIES:	Power cord, Windows®-based Kramer control software, Infrared remote control transmitter

---

1 Specifications are subject to change without notice

10 Kramer Protocol 3000

The Ethernet/USB/RS-232/RS-485[1] communication protocol[2] lets you control the machine from any standard terminal software (for example, Windows® HyperTerminal Application).

10.1 Protocol 3000 Syntax

Host message format:

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

Simple command (commands string with only one command without addressing):

start	body	delimiter
#	Command SP Parameter_1,Parameter_2,…	CR

Commands 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

Device message format:

Start	Address (optional)	Body	Delimiter
~	*Sender_id@*	message	CR LF

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)

---

1 RS-232/RS-485 use a data rate of 115200 baud, with no parity, 8 data bits, and 1 stop bit

2 Not available at the time of printing. Refer to our Web site at http://www.kramerelectronics.com for details

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10.2   Command Terms

Command:
Sequence of ASCII letters ('A'-'Z', 'a'-'z' and '-').
Command will separate from parameters with at least single space.

Parameters:
Sequence of Alfa-Numeric ASCII chars ('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 char:
 '#' for host command/query.
'~' for machine response.

Device address (Optional when directly connected to the device)
K-NET Device ID or MACHINE NUMBER followed by '@'
(ex. #02@ CRLF)
Query sign
'?' follows some commands to define a query request.
All outputs sign
'*' defines all outputs.
Message closing character
CR – For host messages; carriage return (ASCII 13)

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

Commands chain separator char:
When a **message string** contains more than one command, a pipe ('|') character separates each command.
Spaces between parameters or command terms are ignored.

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, Ethernet, or USB 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.

Command forms:
Some commands have short name syntax beside the full name to allow faster typing, response is always in long syntax.

Command chaining:
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.

maximum string length:
64 characters.

10.3   Common Commands

#

Cmd Short	Description	Command Type	Permission
	Protocol handshaking	Common-mandatory	End User
Usage:			

Syntax	Response
#CR	~OKCRLF

BUILD-DATE?

Cmd Short	Description	Command Type	Permission
	Read device build date	Common-mandatory	End User
Usage:			

Syntax	Response

MODEL?

Cmd Short	Description	Command Type	Permission
	Read device model	Common-mandatory	End User
Usage:			

Syntax	Response
MODEL?	MODEL MACHINE_MODEL

PROT-VER?

Cmd Short	Description	Command Type	Permission
	Read device protocol version	Common-mandatory	End User
Usage:			

Syntax	Response

RESET

Cmd Short	Description	Command Type	Permission
	Reset device	Common-mandatory	Administrator
Usage:			

Syntax	Response
RESET	RESET OK

SN?

Cmd Short	Description	Command Type	Permission
	Read device serial number	Common-mandatory	End User
Usage:			

Syntax	Response
SN?	SN SERIAL_NUMBER

VERSION?

Cmd Short	Description	Command Type	Permission
	Read device firmware version	Common-mandatory	End User
Usage:			

Syntax	Response
VERSION?	VERSION MAJOR .MINOR .BUILD .REVISION

FACTORY

Cmd Short	Description	Command Type	Permission
	Reset to factory default config	Common	Administrator

Usage:

Syntax	Response

NAME

Cmd Short	Description	Command Type	Permission
	Set machine (DNS) name	Common	Administrator

Usage:

Syntax	Response
NAME MACHINE_NAME	NAME MACHINE_NAME RESULT

NAME?

Cmd Short	Description	Command Type	Permission
	Get machine (DNS) name	Common	End User

Usage:

Syntax	Response
NAME?	NAME MACHINE_NAME

***Note**: 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).
MACHINE_NAME = Up to 14 alphameric chars.
* **Machine factory name =** Model name + last 4 digits from serial number.

NAME-RST

Cmd Short	Description	Command Type	Permission
	Reset machine name to factory default (DNS)	Common	Administrator

Usage:

Syntax	Response
NAME-RST	NAME-RST MACHINE_FACTORY_NAME RESULT

TIME

Cmd Short	Description	Command Type	Permission
	Set device time and date	Common	Administrator

Usage:

Syntax	Response
TIME DATE_TIME	TIME DATE_TIME RESULT

Note: Time setting commands require administrator authorization.

TIME?

Cmd Short	Description	Command Type	Permission
	Get device time and date	Common	End User

Usage:

Syntax	Response
TIME?	TIME? DATE_TIME

UPGRADE

Cmd Short	Description	Command Type	Permission
	Execute firmware upgrade	Common	Administrator

Usage:

Syntax	Response
UPGRADE	UPGRADE OK

Firmware usually uploads to a device via a command like LDFW. The device may need to be reset to complete the process.

10.4 Result and Error Codes

	Syntax
Command ran successfully, no error.	COMMAND PARAMETERS OK

Protocol Errors:

Syntax error	ERR001
Command not available for this device	ERR002
Parameter is out of range	ERR003
Unauthorized access (command run without the matching login).	ERR004

10.5 Security Commands

LOGIN

Cmd Short	Description	Command Type	Permission
	Login	Security	No Security

Usage:

Syntax	Response
LOGIN ID , PASS ID = User/Admin PASS = 0-15 length ASCII characters without #, ~, @, ?	LOGIN ID , PASS RESULT

LOGIN?

Cmd Short	Description	Command Type	Permission
	Query Login	Security	No Security

Usage:

Syntax	Response
LOGIN?	LOGIN ID

LOGOUT

Cmd Short	Description	Command Type	Permission
	Logout	Security	No Security

Usage:

Syntax	Response
LOGOUT	LOGOUT RESULT

PASS

Cmd Short	Description	Command Type	Permission
	Set password	Security	Administrator

Usage:

Syntax	Response
PASS ID , PASS	PASS ID , PASS RESULT

PASS?

Cmd Short	Description	Command Type	Permission
	Query password	Security	Administrator

Usage:

Syntax	Response
PASS? ID	PASS ID , PASS RESULT

SECUR

Cmd Short	Description	Command Type	Permission
	Start/Stop Security	Security	Administrator

Usage:

Syntax	Response
SECUR ON/OFF ON/OFF = 0 or OFF, 1 or ON	SECUR ON/OFF RESULT

SECUR?

Cmd Short	Description	Command Type	Permission
	Query Start/Stop Security	Security	No Security

Usage:

Syntax	Response
SECUR?	SECUR ON/OFF

10.6   Network Setting Commands

These commands are used by network devices running Protocol 3000.

ETH-PORT

Cmd Short	Description	Command Type	Permission
ETHP	Change protocol Ethernet port	Ethernet	Administrator

Usage:

Syntax	Response
ETH-PORT PROTOCOL , PORT	ETH-PORT PROTOCOL PORT RESULT

ETH-PORT?

Cmd Short	Description	Command Type	Permission
ETHP?	Get protocol Ethernet port	Ethernet	End User

Usage:

Syntax	Response
ETH-PORT? PROTOCOL	ETH-PORT PROTOCOL , PORT
PROTOCOL = TCP/UDP (transport layer protocol) PORT = Ethernet port that accepts Protocol 3000 commands 1-65535 = User defined port	

NET-DHCP

Cmd Short	Description	Command Type	Permission
NTDH	Set DHCP mode	Ethernet	Administrator

Usage:

Syntax	Response
NET-DHCP DHCP_MODE	NET-DHCP DHCP_MODE RESULT

DHCP_MODE =
'0' – Don't use DHCP (Use IP set by factory or IP set command).
'1' – Try to use DHCP, if unavailable use IP as above.

NET-DHCP?

Cmd Short	Description	Command Type	Permission
NTDH?	Get DHCP mode	Ethernet	End User

Usage:

Syntax	Response
NET-DHCP?	NET-DHCP DHCP_MODE

NET-GATE

Cmd Short	Description	Command Type	Permission
NTGT	Set Gateway	Ethernet	Administrator

Usage:

Syntax	Response
NET-GATE GATEWAY_ADDRESS GATEWAY ADDRESS = gateway IP address (ex: 192.168.001.001)	NET-GATE GATEWAY_ADDRESS RESULT

NET-GATE?

Cmd Short	Description	Command Type	Permission
NTGT?	Get Gateway	Ethernet	End User

Usage:

Syntax	Response
NET-GATE?	NET-GATE GATEWAY_ADDRESS

NET-IP

Cmd Short	Description	Command Type	Permission
NTIP	Set IP address	Ethernet	Administrator

Usage:

Syntax	Response
NET-IP IP_ADDRESS, (ex: 192.168.001.001)	NET-IP IP_ADDRESS RESULT

NET-IP?

Cmd Short	Description	Command Type	Permission
NTIP?	Get IP address	Ethernet	End User

Usage:

Syntax	Response
NET-IP?	NET-IP IP_ADDRESS

NET-MAC?

Cmd Short	Description	Command Type	Permission
NTMC?	Read MAC address	Ethernet	End User
Usage:			

Syntax	Response
NET-MAC?	NET-MAC MAC_ADDRESS

NET-MASK

Cmd Short	Description	Command Type	Permission
NTMSK	Set subnet mask	Ethernet	Administrator
Usage:			

Syntax	Response
NET-MASK SUBNET_MASK Ex: 255.255.000.000	NET-MASK SUBNET_MASK RESULT

NET-MASK?

Cmd Short	Description	Command Type	Permission
NTMSK?	Get subnet mask	Ethernet	End User
Usage:			

Syntax	Response
NET-MASK?	NET-MASK SUBNET_MASK

10.7   Instruction Codes

ALARM

Cmd Short	Description	Command Type	Permission
	Device notification	PL-50	No security
Usage:			

Syntax	Response
ALARM 1/0	
1/0 = On OR Off	

ALARM-DURATION

Cmd Short	Description	Command Type	Permission
	Set alarm duration	PL-50	Administrator
Usage:			

Syntax	Response
ALARM-DURATION SECONDS SECONDS = 0–255	ALARM-DURATION SECONDS RESULT

ALARM-DURATION?

Cmd Short	Description	Command Type	Permission
	Query alarm duration	PL-50	User
Usage:			

Syntax	Response
ALARM-DURATION?	ALARM-DURATION SECONDS

ALARM-OFF

Cmd Short	Description	Command Type	Permission
	Set alarm OFF	PL-50	User

Usage:

Syntax	Response
ALARM-OFF	**ALARM-OFF** RESULT

ALARM-ON

Cmd Short	Description	Command Type	Permission
	Set alarm ON	PL-50	User

Usage:

Syntax	Response
ALARM-ON	**ALARM-ON** RESULT

ALARM-ON?

Cmd Short	Description	Command Type	Permission
	Query alarm status	PL-50	User

Usage:

Syntax	Response
ALARM-ON?	**ALARM-ON** 1/0

1/0 = On OR Off

ALARM-START-AS

Cmd Short	Description	Command Type	Permission
	Set alarm Relay mode start	PL-50	Administrator

Usage:

Syntax	Response
ALARM-START-AS 1/0	**ALARM-START-AS** 1/0 RESULT

1/0 = Open/Close

ALARM-START-AS?

Cmd Short	Description	Command Type	Permission
	Query alarm Relay mode start.	PL-50	User

Usage:

Syntax	Response
ALARM-START-AS?	**ALARM-START-AS** 1/0

1/0 = Open/Close

ALERT-REG

Cmd Short	Description	Command Type	Permission
	Alert Registration	PL-50	Administrator

Usage:

Syntax	Response
ALERT-REG? CHNL	**ALERT-REG?** CHNL , EVENT , ACTION

CHNL = (1-5)
EVENT = (TO_OFF,TO_ON,TO_FULL,TO_STBY,TO_NONE,ANY_CHANGE)
ACTION = (NO_ALERT,ALARM, ALL_ALERTS)

ALERT-REG?

Cmd Short	Description	Command Type	Permission
	Query Alert Registration	PL-50	User

Usage:

Syntax	Response
ALERT-REG? CHNL	**ALERT-REG?** CHNL , EVENT , ACTION

CHNL = (1-5)
EVENT = (TO_OFF,TO_ON,TO_FULL,TO_STBY,TO_NONE,ANY_CHANGE)
ACTION = (NO_ALERT,ALARM, ALL_ALERTS)

MEASURE

Cmd Short	Description	Command Type	Permission
	Device notification	PL-50	

Usage:

Syntax	Response
MEASURE CHNL , MES-MODE	

Query the "full" and "standby" LED status. (device will report to all protocol ports on any change)
LVL = (0 = no LEDs, 1 = standby LED on, 2 = full LED on)
CHNL = (1-5)
MES-MODE = (0=MEASURE_START, 1 = MEASURE_DONE, 2 = MEASURE_TIMEOUT)

PWR-LVL?

Cmd Short	Description	Command Type	Permission
	Query Power level	PL-50	User

Usage:

Syntax	Response
PWR-LVL?	**PWR-LVL** LVL

Query the "full" and "standby" LED status. (Device reports to all protocol ports on any change)
LVL = (0 = no LED, 1 = standby LED on, 2 = full LED on)

SCHED?

Cmd Short	Description	Command Type	Permission
	Query saved scheduling	PL-50	User

Usage:

Syntax	Response
SCHED? CHNL , DAY	**SCHED?** CHNL , DAY , SCHEDULINGS

CHNL = (1-5)
DAY = (1-7) OR (SUN,MON,TUE,WED,THU,FRI,SAT)
SCHEDULINGS = (start-end) example: 8:29-8:32

SWITCH

Cmd Short	Description	Command Type	Permission
	Channel switch	PL-50	User

Usage:

Syntax	Response
SWITCH CHNL , STATUS	**SWITCH** CHNL , STATUS RESULT

CHNL = (1-5)
STATUS = (0=OFF,1=ON,2=ON-SCHEDULER,3=OFF-SCHEDULER ,4=ACTIVE-MEASURE,5=STANDBY-MEASURE)

SWITCH?

Cmd Short	Description	Command Type	Permission
	Query channel switch	PL-50	User

Usage:

Syntax	Response
SWITCH? CHNL	**SWITCH?** CHNL ,STATUS

CHNL = (1-5)

STATUS = (0=OFF,1=ON,2=ON-SCHEDULER,3=OFF-SCHEDULER ,4=ACTIVE-MEASURE,5=STANDBY-MEASURE)

SWITCH-ORDER

Cmd Short	Description	Command Type	Permission
	Set the switch order	PL-50	Administrator

Usage:

Syntax	Response
SWITCH-ORDER ON/OFF, **C**, **C**, **C**, **C**, **C**	**SWITCH-ORDER ON/OFF**, **C**, **C**, **C**, **C**, **C** RESULT

CHNL = C = (1-5)   ON/OFF = ON or OFF

SWITCH-ORDER?

Cmd Short	Description	Command Type	Permission
	Query the switch order	PL-50	User

Usage:

Syntax	Response
SWITCH-ORDER? ON/OFF	**SWITCH-ORDER ON/OFF**, **C**, **C**, **C**, **C**, **C**

CHNL = C = (1-5)   ON/OFF = ON or OFF

SWITCH-ORDER-DELAY

Cmd Short	Description	Command Type	Permission
	Set the switch order delay	PL-50	Administrator

Usage:

Syntax	Response
SWITCH-ORDER-DELAY ON/OFF, **0-255 sec**	**SWITCH-ORDER-DELAY ON/OFF**, **0-255 sec** RESULT

ON/OFF = ON or OFF

SWITCH-ORDER-DELAY?

Cmd Short	Description	Command Type	Permission
	Query the switch order delay	PL-50	User

Usage:

Syntax	Response
SWITCH-ORDER-DELAY? ON/OFF	**SWITCH-ORDER-DELAY ON/OFF**, **0-255 sec**

ON/OFF = ON or OFF

LIMITED WARRANTY

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for seven years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
   i)   Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
   ii) Product modification, or failure to follow instructions supplied with the product
   iii) Repair or attempted repair by anyone not authorized by Kramer
   iv) Any shipment of the product (claims must be presented to the carrier)
   v)   Removal or installation of the product
   vi) Any other cause, which does not relate to a product defect
   vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

EN-50081:	"Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"	
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".	
CFR-47:	FCC* Rules and Regulations: Part 15: "Radio frequency devices Subpart B Unintentional radiators"	

CAUTION!

⊠   Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.

⊠   Use the supplied DC power supply to feed power to the machine.

⊠   Please use recommended interconnection cables to connect the machine to other components.
    * FCC and CE approved using STP cable (for twisted pair products)

**For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com, where updates to this user manual may be found.
We welcome your questions, comments and feedback.**

Safety Warning:
Disconnect the unit from the power supply before opening/servicing.