



NTI® NETWORK
TECHNOLOGIES
INCORPORATED

1275 Danner Dr Tel:330-562-7070
Aurora, OH 44202 Fax:330-562-1999
www.networktechinc.com

ENVIROMUX® Series

ENVIROMUX-ACLM-V ENVIROMUX-ACLM-P12/8 AC LINE MONITORS Installation and Operation Manual



**ENVIROMUX-ACLM-V
(Front and Rear View)**



**ENVIROMUX-ACLM-P12
(Front and Rear View)**

TRADEMARK

ENVIROMUX is a registered trademark of Network Technologies Inc in the U.S. and other countries.

COPYRIGHT

Copyright © 2007, 2009 by Network Technologies Inc. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written consent of Network Technologies Inc, 1275 Danner Drive, Aurora, Ohio 44202.

CHANGES

The material in this guide is for information only and is subject to change without notice. Network Technologies Inc reserves the right to make changes in the product design without reservation and without notification to its users.

ENVIROMUX-SEMS-16 FIRMWARE REQUIREMENT

In order to use the ENVIROMUX-ACLM-V or -P, the ENVIROMUX-SEMS-16 must be running firmware version 2.5 or later. For a firmware upgrade, go to <http://www.networktechinc.com/download/d-enviro-sems.html>.



CAUTION

- **To reduce the risk of electric shock- Disconnect power to the receptacle before installing or removing the unit.**
- **To Reduce the Risk of Electric Shock- Use only Indoors**
- **Do not plug into another relocatable power tap.**
- **Risk of electric shock, do not remove cover. No user serviceable parts inside. Refer servicing to qualified service personnel. For use in a controlled environment (see page 11).**

TABLE OF CONTENTS

MATERIALS	1
INTRODUCTION	2
ENVIROMUX-ACLM-V	2
ENVIROMUX-ACLM-P	3
MOUNTING	4
CONNECTIONS	5
ENVIROMUX-ACLM-V	5
Connect Voltage Source(s).....	5
ENVIROMUX-ACLM-P	6
Connect Voltage Source and Load.....	6
Connect Sensor to ENVIROMUX-SEMS-16	7
Sensor Cable	7
USE AND OPERATION	8
TECHNICAL SPECIFICATIONS	11
TROUBLESHOOTING	12
WARRANTY INFORMATION.....	12

TABLE OF FIGURES

Figure 1- Rotate the tabs for Zero-RU mounting.....	4
Figure 2- Connect ACLM-V to voltage source(s)	5
Figure 3- Connect ENVIROMUX-ACLM-P12 to voltage source and load	6
Figure 4- Connect sensor to ENVIROMUX-SEMS-16 Sensor Cable.....	7
Figure 5- CAT5 Cable pinout	7
Figure 6- Status windows for ENVIROMUX-ACLM sensors	8
Figure 7- First Configurations page for sensors.....	9
Figure 8- Second Configuration page for ACLM-V- Spike Thresholds.....	9
Figure 9- ACLM-P Spike Threshold and Relay Settings	10

MATERIALS

Materials supplied with this kit:

- NTI ENVIROMUX-ACLM-V or -P12/8
- 1-Line cord, country specific IEC 320 C13
- 2- Mounting tabs for Zero-RU mounting (pre-assembled to back of ENVIROMUX-ACLM-V or P12/8, see page 4)
- 2-#10-32 x 3/4" pan head screws and #10-32 cage nuts (server cabinet mounting hardware)
- This manual

Also supplied for ENVIROMUX-ACLM-P12/8:

- IEC 320 C14 to IEC 320 C13 Cord Set for connection to AC load

Materials *Not* supplied but **REQUIRED**:

- Cat5/5e/6 cable for connection to ENVIROMUX-SEMS-16

INTRODUCTION

ENVIROMUX-ACLM-V

The ENVIROMUX-SEMS-ACLM-V (ACLM-V) is a sensor for the ENVIROMUX-SEMS-16 capable of monitoring AC line input voltages between 50~250V AC and 47~63Hz from two separate AC lines. It will report the current RMS AC Voltage and AC Frequency (Hertz) to the ENVIROMUX-SEMS-16. The ACLM-V will also monitor the number of short term Swells¹ and Sags² as well as the number of Spikes³.

The ACLM-V utilizes two UL certified IEC 320 C14 inlets to connect to the AC lines being monitored. The ACLM-V connects to the ENVIROMUX-SEMS-16 through up to 1,000 ft of CAT5/5e/6 cable. Data is transmitted to and from the ENVIROMUX-SEMS-16 utilizing the RS485 protocol.

Features & Functions:

- 12 bit ADC resolution, 1% full scale ADC accuracy
- Measure AC Voltage (1% accuracy) and AC Frequency (1% accuracy)
- Monitors swells, sags, and spike events
- Auto-Configured upon connection with ENVIROMUX-SEMS-16
- RJ45 Status LED's for operating status
- User selectable data interpolation options

Measuring the AC Voltage, AC Frequency; Determining Swells, and Sags:

The ACLM-V provides constant monitoring of the AC line with an active sampling rate of 12,000 samples per second. The measurement data is transmitted to the ENVIROMUX-SEMS-16 once every second. Each time data is sent, the ACLM-V will report the current AC line voltage and frequency, as well as the number of sags, swells, and spikes that have occurred since the last data transmission.

After the ACLM-V has transmitted data to the ENVIROMUX, any stored values in the ACLM-V will be erased as new data is acquired.

Measuring Spikes:

The ACLM-V is also capable of recording the number of Spike events with a peak greater than 50V, 250V, 500V, or 1KV as configured by the user. For example, if the spike threshold is set at 500V and the sensor records a voltage exceeding 500V, the ENVIROMUX-SEMS-16 will report a spike above 500V.

The User Interface:

From the Web Interface of the ENVIROMUX-SEMS-16, the ACLM-V sensor can be customized and monitored. The user can modify all of the typical sensor attributes (description, group, sampling, etc.), as well as define the maximum and minimum threshold values for AC voltage, and the threshold for spike measurement. The user may also configure the ENVIROMUX to send alerts based on the voltage level.

The sensor page for the ACLM-V will display the AC line voltage and frequency from the most recent data transmission, as well as running totals for the number of swells, sags, and spike events that have occurred. It will also display the date and time from which the ENVIROMUX began the running totals. A "Clear" button, when clicked, will erase the running totals and update the date and time. The data displayed by the ENVIROMUX can be refreshed, at most, once per second. (The display may be refreshed less frequently dependent upon the user settings.)

Note: As a result of the data transmission of the ACLM-V (once per second) and the browser refresh rate of the ENVIROMUX (up to once per second), the ACLM-V will report Sags or Swells on the AC line that may not be reflected in the numeric voltage display.

ENVIROMUX-ACLM-P

The ENVIROMUX-ACLM-P12 and –P8 (ACLM-P) are dual sensors for the ENVIROMUX-SEMS-16 capable of monitoring AC line input voltages between 50~250V AC, the Frequency (Hertz) between 47~63Hz, and the Power (Current) up to 12 amperes (for –P12) or 8 amperes (for –P8) from a single AC line. It will report the current RMS AC Voltage, AC Frequency and RMS AC Power to the ENVIROMUX-SEMS-16. The ACLM-P will also monitor the number of short term Swells¹ and Sags² as well as the number of Spikes³. The ACLM-P12 is rated for 12A of continuous load, 15A max. The ACLM-P8 is rated for 8A of continuous load, 10A max. The ACLM-P uses a UL certified IEC 320 C14 inlet to connect to the AC line and a UL certified IEC 320 C13 socket to connect the AC load.

The ACLM-P is connected to the ENVIROMUX-SEMS-16 through up to 1,000 ft of CAT5/5e/6 cable. Data is transmitted to and from the ENVIROMUX-SEMS-16 utilizing the RS485 protocol. ACLM-P is installed between the power source and the load device, able to sense a maximum surge current of 20A and will calculate and report the RMS AC Power. The device utilizes standard connection sockets for easy user installation. The ACLM-P is also equipped with a power interrupt feature, which allows power to be disconnected from the load device based on manual disconnect or configuration settings via the web interface.

The ACLM-P includes a resettable circuit breaker to protect the sensor from damage in the event the load device exceeds the rating of the ACLM-P12 circuits. In the event the circuit breaker should trip, remove the overload condition and reset the circuit breaker.

Note: The circuit breaker will not allow a reset until it has reached reset condition, which may take between 1 and 3 minutes from the time the breaker tripped.

Features & Functions:

- 12 bit ADC resolution, 1% full scale ADC accuracy
- Measure AC Voltage (1% accuracy) and AC Frequency (1% accuracy)
- Monitors swells, sags, and spike events
- Measures AC Current and Power (2% accuracy)
- Optional Power Disconnect and Reconnect
- Auto-Configured upon connection with ENVIROMUX-SEMS-16
- RJ45 Status LED's for operating status
- User selectable data interpolation options

Measuring the AC Voltage, AC Frequency, Power and Current Flow; Determining Swells, and Sags:

The ACLM-P provides constant monitoring of the AC line with an active sampling rate of 12,000 samples per second. The measurement data is transmitted to the ENVIROMUX-SEMS-16 once every second. Each time data is sent, the ACLM-P will report the present AC line voltage, frequency, current and calculated power, as well as the number of sags, swells, and spikes that have occurred since the last data transmission.

After the ACLM-P has transmitted data to the ENVIROMUX, any stored values in the ACLM-P will be erased as new data is acquired.

Measuring Spikes:

The ACLM-P is also capable of recording the number of Spike events with a peak greater than 50V, 250V, 500V, or 1KV as configured by the user. For example, if the spike threshold is set at 500V and the sensor records a spike exceeding 500V, the ENVIROMUX-SEMS-16 will report a spike above 500V.

The User Interface:

From the Web Interface of the ENVIROMUX-SEMS-16, the ACLM-P sensor can be customized and monitored. The user can define the maximum and minimum threshold values for AC power, and configure the ENVIROMUX to send alerts based on the power thresholds or disconnect power based on the voltage, current, or power thresholds. The user may also define the threshold for spike measurement.

The ACLM-P has two sensor pages, each having a numeric display and status bar. One is for power, the other is for voltage. Both pages also display a table with the current and frequency from the most recent data transmission, as well as running totals for the number of swells, sags, and spike events that have occurred. It will also display the date and time from which the ENVIROMUX began the running totals. A "Clear" button, when clicked, will erase the running totals and update the date and time. The data displayed by the ENVIROMUX can be refreshed, at most, once per second. (The display may be refreshed less frequently dependent upon the user settings.) Additionally, the sensor page will display the status of the power interrupt relay.

Note: As a result of the data transmission rate of the ACLM-P (once per second) and the browser refresh rate of the ENVIROMUX (up to once per second), the ACLM-P will report Sags or Swells on the AC line that may not be reflected in the numeric voltage display.

MOUNTING

The ENVIROMUX-ACLM (-V or -P) can be placed on a solid surface, mounted to a wall, or mounted to an accessible surface within a rack (Zero-RU). To mount to a wall or other surface, first remove the screws holding the mounting tabs to the rear of the box. Rotate the tabs such that they extend from the back of the box, and attach the tabs with the screws removed. Now the ENVIROMUX-ACLM can be secured to any convenient surface. Two #10-32 x 3/4" machine screws and cage nuts have been provided to assist mounting within a server cabinet. Use appropriate hardware (not supplied) when mounting to a wall.

CAUTION: To reduce the risk of electric shock- Disconnect power to the receptacle before installing or removing the unit.

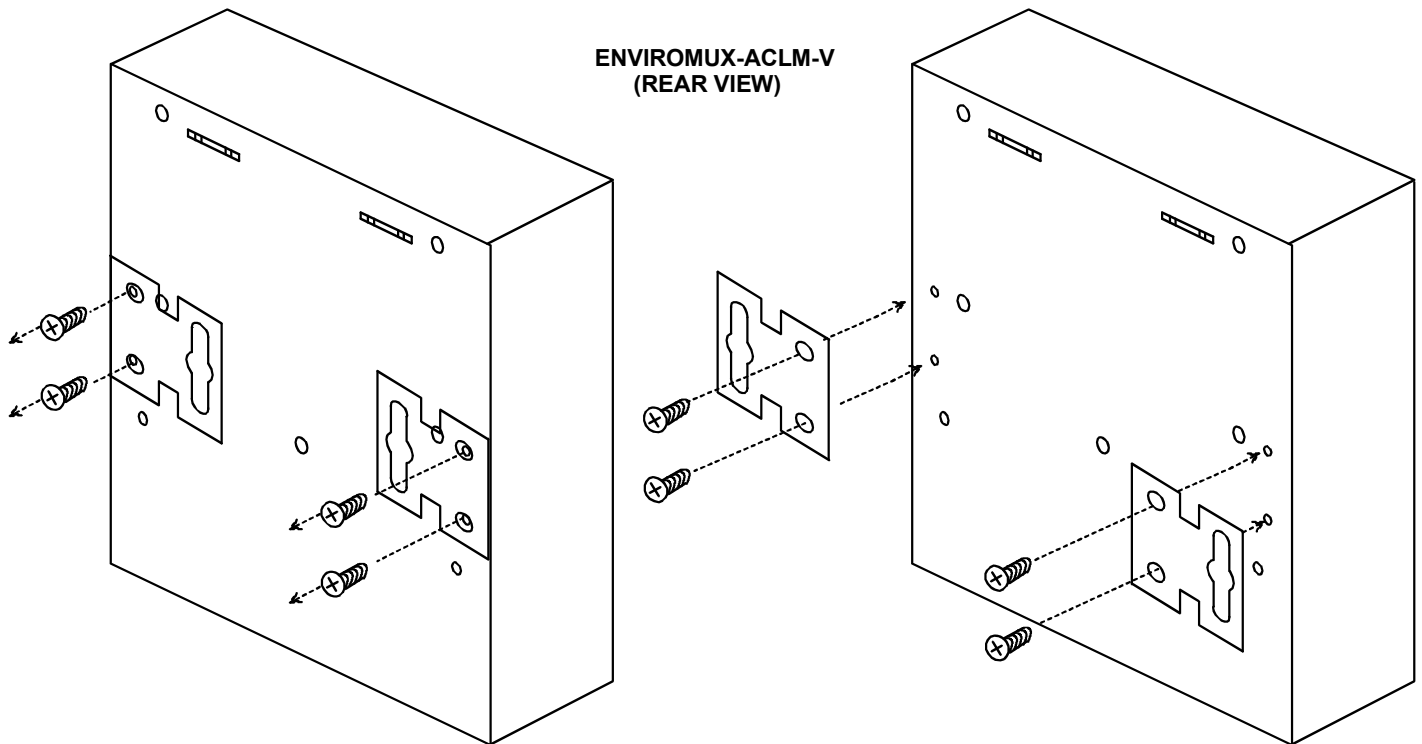


Figure 1- Rotate the tabs for Zero-RU mounting

CONNECTIONS

ENVIROMUX-ACLM-V

Connect Voltage Source(s)

1. Connect a voltage source (50-250VAC, 47-63Hz) to the ACLM-V at "AC IN 1".
2. Connect a second voltage source (50-250VAC, 47-63Hz) to the ACLM-V at "AC IN 2".

Note: The voltage source connected to "AC IN 1" does not need to be the same voltage or frequency as the voltage source connected to "AC IN 2".

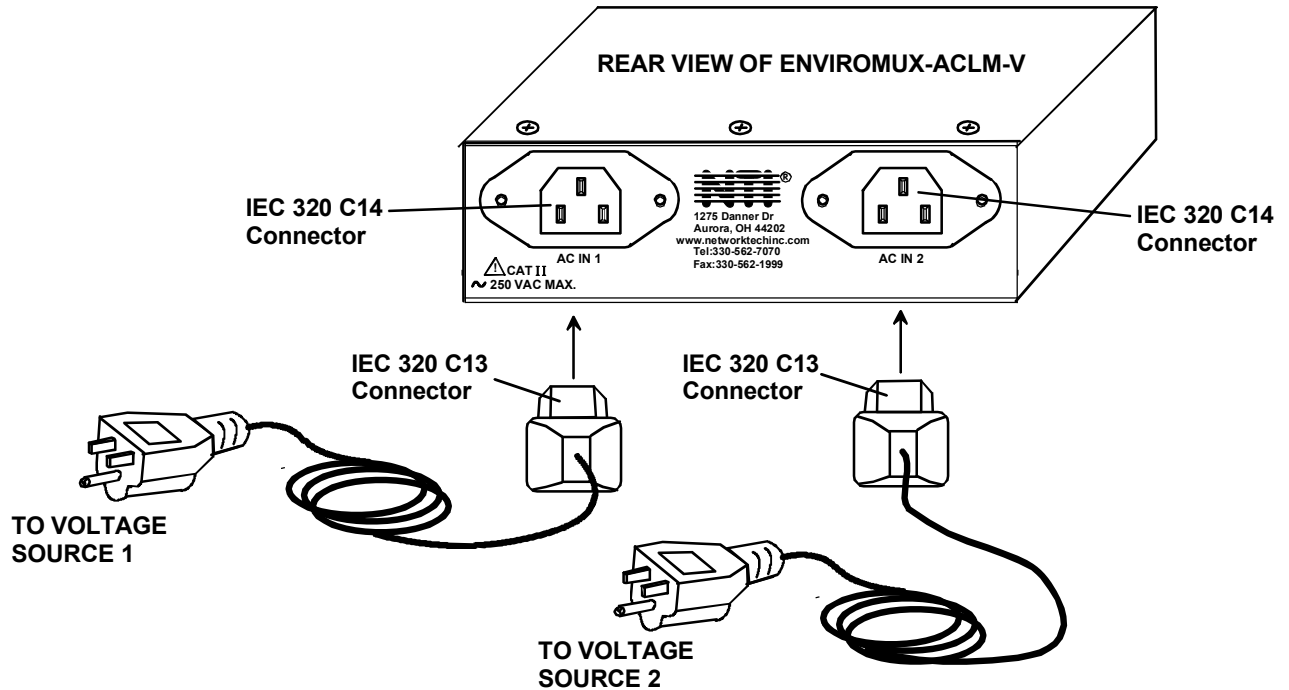


Figure 2- Connect ACLM-V to voltage source(s)

ENVIROMUX-ACLM-P

Connect Voltage Source and Load

1. Connect a voltage source (50-250VAC, 47-63Hz) to the ACLM-P12 at “AC IN”.
2. Connect an AC load device to the “AC OUT” that is compatible with the voltage source connected to “AC IN”. The device connected to “AC OUT” must be rated at 12A or less for model –P12, **8A or less for –P8**.

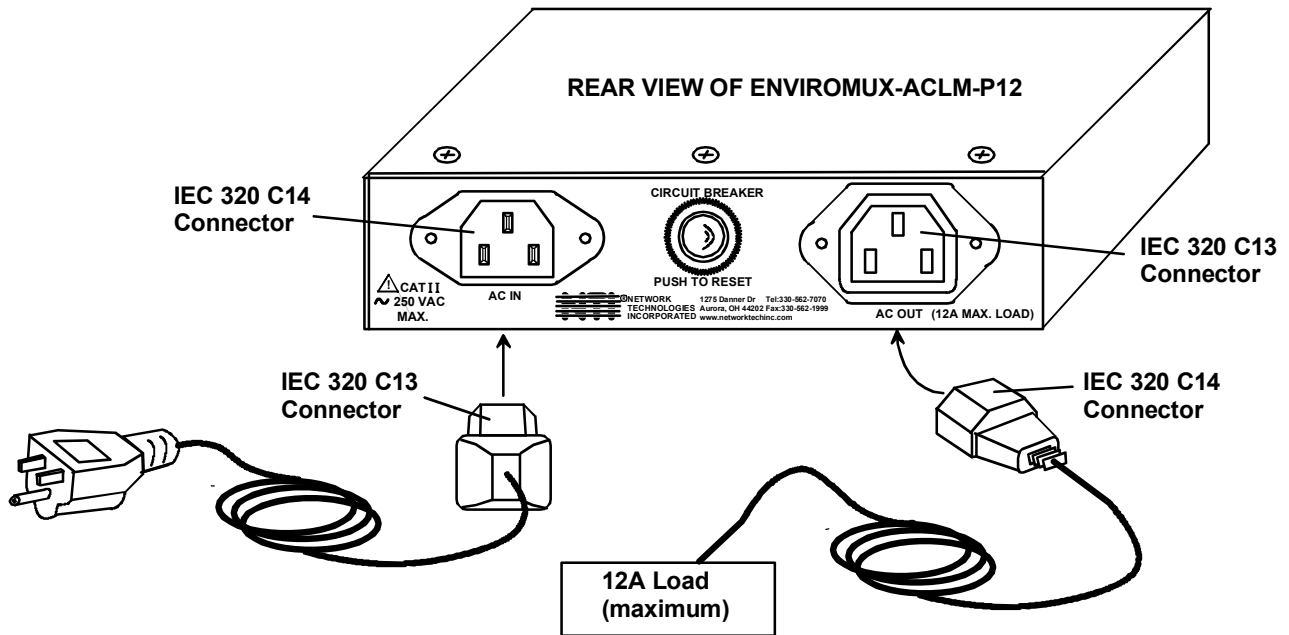


Figure 3- Connect ENVIROMUX-ACLM-P12 to voltage source and load

Connect Sensor to ENVIROMUX-SEMS-16

With the voltage source(s) and load connected to the sensor (as applicable), connect a CAT5/5e/6 cable, up to 1,000 feet in length, between the “Cat5” connector on the sensor and one of the “RJ45” sensor ports on the ENVIROMUX-SEMS-16. The pinout for this cable can be found below.

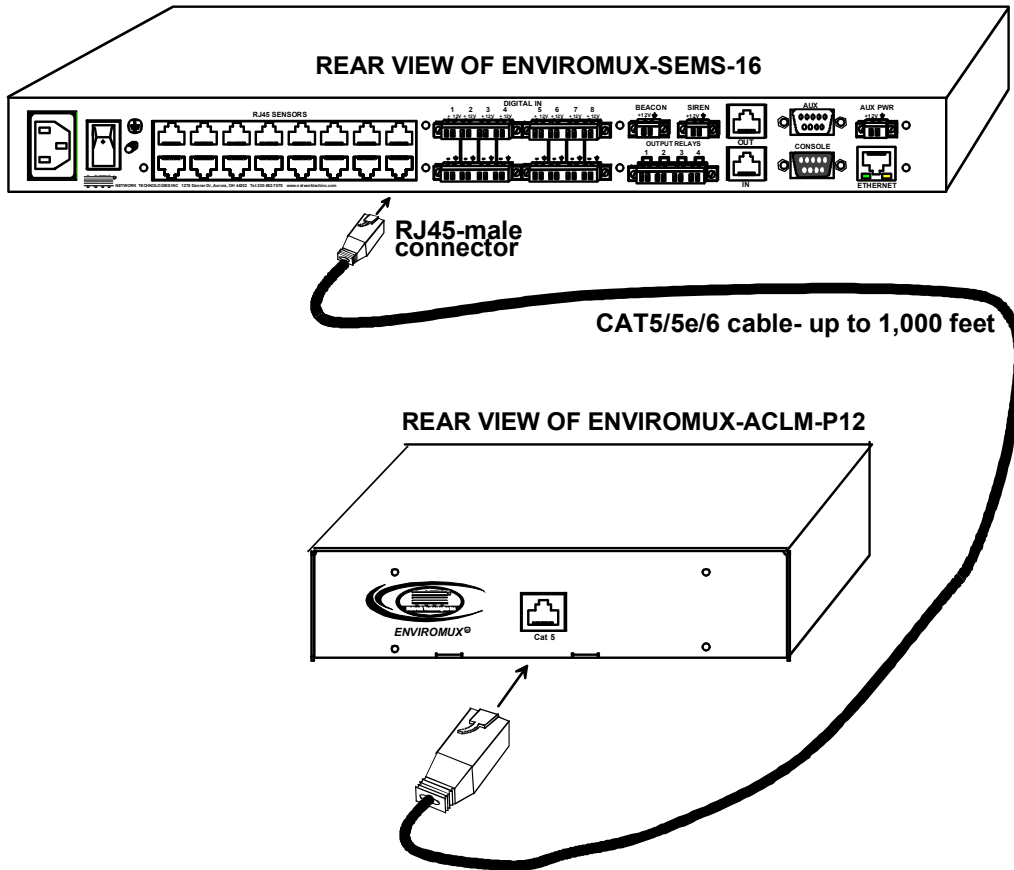
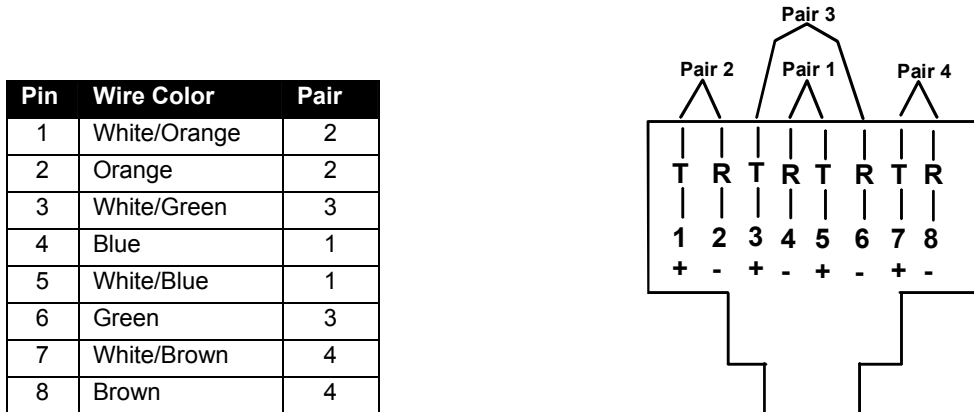


Figure 4- Connect sensor to ENVIROMUX-SEMS-16 Sensor Cable

Sensor Cable

The CAT5 connection cable between the ENVIROMUX-SEMS-16 and the “Cat5” port on the ACLM-V/P sensor is terminated with RJ45 connectors and must be wired according to the EIA/TIA 568 B industry standard. Wiring is as per the table and drawing below.



(View Looking into RJ45 Socket)

Figure 5- CAT5 Cable pinout

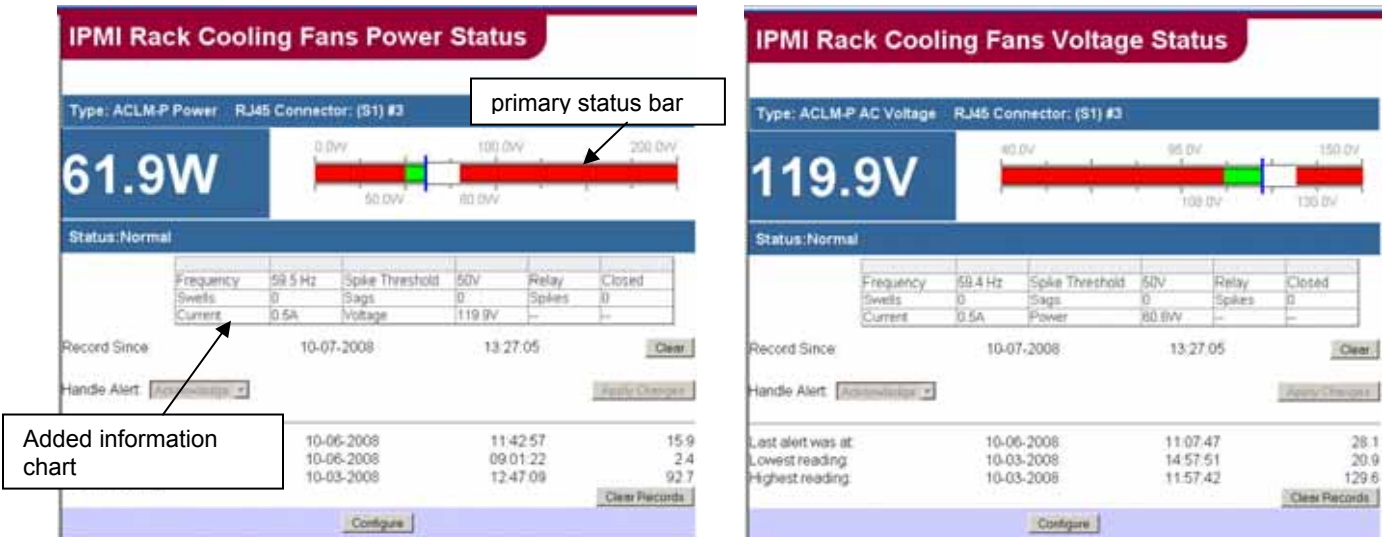
USE AND OPERATION

For instruction on how to monitor and use the data provided by the ENVIROMUX-ACLM-V / -P Line Monitors, see the ENVIROMUX-SEMS-16 manual. Most of the features configurable on the ENVIROMUX-ACLM-V and -P Line Monitors are common to all sensors and are described in the manual for the ENVIROMUX-SEMS-16. This manual will introduce features that are new and not described in that manual.

The sensor status page for the ENVIROMUX-ACLM-V and -P includes a chart detailing information not found in the primary status bar. The chart includes:

- the last reading taken for the line frequency
- number of swells, sags, and spikes that have occurred
- the current setting of the spike threshold.
- the current status of the outlet relay (ACLM-P only)

The ENVIROMUX-ACLM-P additionally displays the present current draw and either the input voltage or the power consumption depending on whether the sensor status being viewed is the "Power Status" or the "Voltage Status" respectively, as seen in the images below.



ACLM-V Voltage Sensor 1 Status Page

Figure 6- Status windows for ENVIROMUX-ACLM sensors

A **Configure** button at the bottom of the page allows the user to configure parameters of the sensor.

Note: Configuration options on this page are similar to those of other ENVIROMUX-SEMS-16 sensors and are covered at length in the ENVIROMUX-SEMS-16 manual.

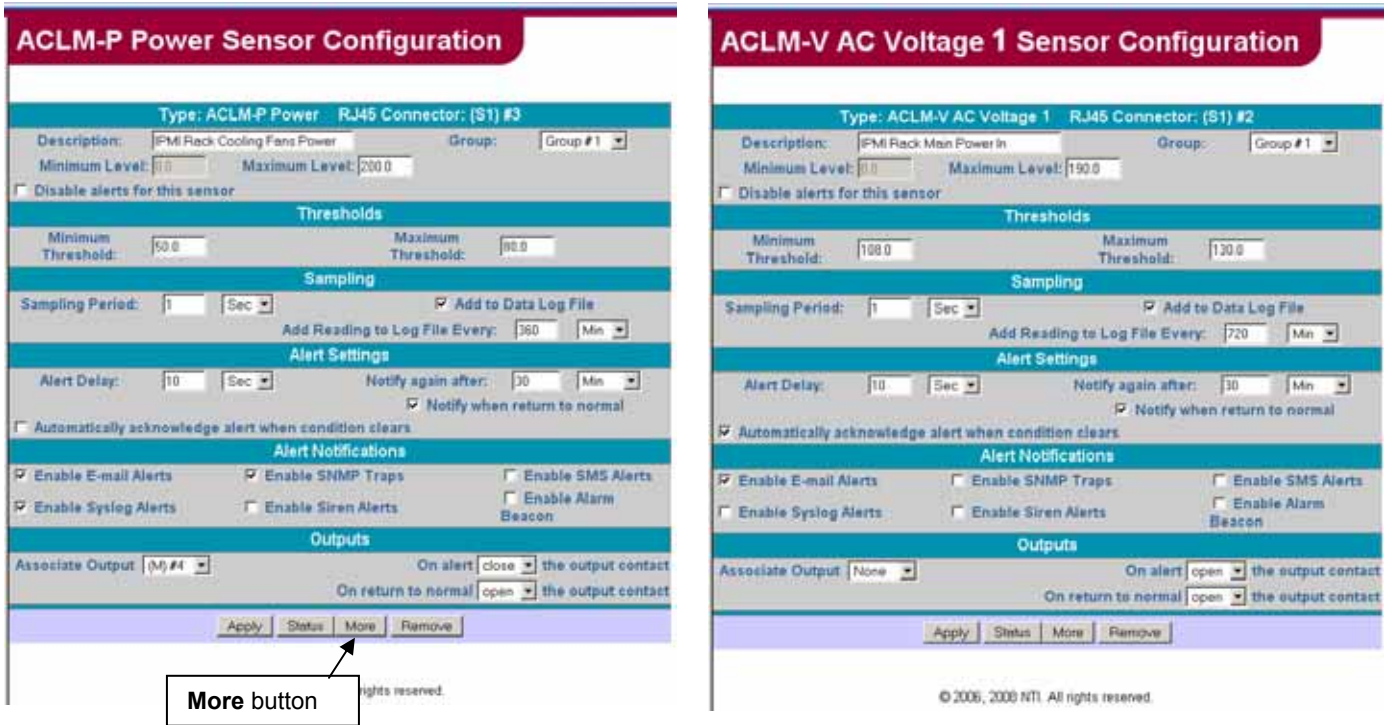


Figure 7- First Configurations page for sensors

To configure the spike threshold , a **More** button is available at the bottom of the configuration page.

Note: The “More” button is only present on the configuration page for the Power Sensor on the ENVIROMUX-ACLM-P, and on the configuration page for Voltage 1 Sensor on the ENVIROMUX-ACLM-V. Spikes will be monitored on both the Voltage 1 and Voltage 2 inputs using the threshold value set on the Voltage 1 “More” page.



Figure 8- Second Configuration page for ACLM-V- Spike Thresholds

The configuration page that appears when the **More** button is pressed provides a block to configure the voltage spike threshold setting for the ENVIROMUX-ACLM. This threshold can be set to 50, 250, 500, or 1K (1000) V.

The ENVIROMUX-ACLM-P provides additional configuration to control an internal relay that toggles power ON/OFF to the AC outlet. The relay can be configured to disconnect power using one of four types of readings:

- Manually- the user can select/deselect the “Disconnect” box to power the outlet ON/OFF
- Threshold Voltage- control power to the outlet based on minimum and or maximum configurable threshold voltage readings
- Threshold Current- control power to the outlet based on maximum configurable threshold current readings
- Threshold Power- control power to the outlet based on maximum configurable threshold power readings

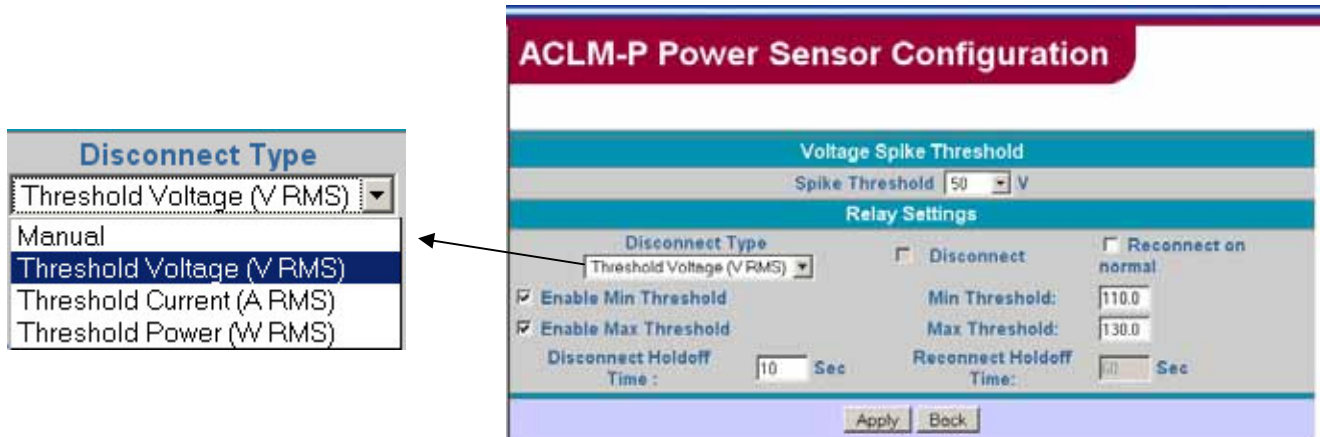


Figure 9- ACLM-P Spike Threshold and Relay Settings

Additional options include:

Feature	Description
Enable Min. Threshold	Select if the outlet should power OFF when the minimum threshold setting is reached
Enable Max Threshold	Select if the outlet should power OFF when the maximum threshold setting is reached
Disconnect Holdoff Time	Number of seconds to delay power OFF when the minimum or maximum threshold setting is reached
Reconnect on normal	Select if the outlet should be powered ON when the reading has returned to the normal operating range (only applicable if “Disconnect Type” is set to “Threshold Voltage”)
Reconnect Holdoff Time	Number of seconds to delay powering ON when the reading has returned to normal operating range (only applicable if Reconnect on Normal is selected)

Once settings are changed, press the **Apply** button to save them. Press the **Back** button to return to the previous configuration menu.

TECHNICAL SPECIFICATIONS

Sensor Performance Specifications

AC Inlet (ACLM-V).....	IEC 320 C14
AC Inlet (ACLM-P12/-P8).....	IEC 320 C14
AC Outlet (ACLM-P12/-P8).....	IEC 320 C13
Maximum Spike Threshold	1kVAC
Voltage Range	50 to 250VAC
Voltage Frequency Range	47 to 63Hz
Voltage Accuracy	+/- 1%
Frequency Accuracy	+/- 1%
Measurable Current range.....	300mA to 20A
Continuous Current (ACLM-P12).....	12A
Continuous Current (ACLM-P8).....	8A
Maximum Current (ACLM-P12)	15A
Maximum Current (ACLM-P8)	10A
Current Accuracy	+/- 2%
Voltage Supply.....	12VDC from ENVIROMUX-SEMS-16
Max Current Consumption	250mA
Max. Cable Length (from Sensor to ENVIROMUX-SEMS-16).....	1000 ft
Communication Type	RS485
Data rate	96kbps max

General Specifications

Temperature Range.....	32° to 104° F (0° to 40° C)
Humidity Range	20% to 80% RH
Enclosure Size.....	2.5" x 3.25 x 1.03"

Compliance Specifications

CE Mark.....	BS EN55022: 2006+A1:2007
ESD Protection	BS EN61000-4-2: 2009
RoHS	All parts comply with RoHS

TROUBLESHOOTING

Each and every piece of every product produced by Network Technologies Inc is 100% tested to exacting specifications. We make every effort to insure trouble-free installation and operation of our products. If problems are experienced while installing this product, please look over the troubleshooting chart below to see if perhaps we can answer any questions that arise. If the answer is not found in the chart, please check the FAQs (Frequently Asked Questions) at our website at <http://www.networktechinc.com> or contact us directly for help at 1-800-742-8324 (800-RGB-TECH) in US & Canada or 1-330-562-7070 worldwide. We will be happy to assist in any way we can.

Problem	Cause	Solution
Sensor is not identified by the ENVIROMUX-SEMS-16	The ENVIROMUX-SEMS-16 has not been upgraded to the latest code	Upgrade the ENVIROMUX-SEMS-16 to version 2.5 or later. Upgrade code can be found at www.networktechinc.com
Sensor data is not updating	Communication has been lost between the sensor and the ENVIROMUX-SEMS-16	Check CAT5 cable connections at both ends. Make sure they are fully snapped in.
ACLM-P is not reading power	Breaker on ACLM-P is tripped	Reset circuit breaker
ACLM-P repeatedly trips breaker	Excessive current draw from connected load device	Check connected load device- must be rated at 12A or less for ACLM-P12, and 8A or less for ACLM-P8.

WARRANTY INFORMATION

The warranty period on this product (parts and labor) is two (2) years from the date of purchase. Please contact Network Technologies Inc at **(800) 742-8324** (800-RGB-TECH) or **(330) 562-7070** or visit our website at <http://www.networktechinc.com> for information regarding repairs and/or returns. A return authorization number is required for all repairs/returns.

PRODUCT

MODEL: ENVIROMUX-ACLM-_____

SERIAL NO.: _____

DATE: _____ INSPECTED BY: _____

MAN021 Rev. 10/27/09

¹ Swells are defined as an AC voltage exceeding the user specified maximum threshold for a duration of 5 cycles to 1 minute's time.

² Sags are defined as an AC voltage exceeding the user specified minimum threshold for a duration of 5 cycles to 1 minute's time.

³ Spikes are defined as a sudden high peak event that raises the voltage in either a positive or negative direction.