User Manual

AC²Sensor

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Introduction

Features

The AC^{2}Sensor, Racktivity's newest addition to its data center power monitoring and management solution can be installed at the AC power distribution board or in distributed remote locations such as PoPs, base stations, and head ends. The unit features a DIN rail mountable design and Ethernet connectivity and supports 8 inputs for current measurements.

Main Features:

- Measure AC voltage
  - On 3 phases: L1, L2, L3
  - Input range: 100-240 VAC
  - Accuracy: +/- 2%
- Measure AC current
  - On 8 inputs: each input can be manually assigned to the corresponding phase
  - Input range: up to 1500A (depends on the current transducer used)
  - Accuracy: +/- 2%
- Calculates power (W) and power consumption (kWh) per input
- Power supply via L1 (phase 1)
- Input grouping (3 phases) and neutral current calculation

Applicable Models

Unless specified otherwise, all information in this document is applicable to the following Racktivity AC^{2}Sensor model(s):

- **ACS08-03**

Specifications

Electrical Ratings

Input:

Voltage	100-240 VAC

Operating Environment

Operating temperature	0°C to 50°C	32°F to 122°F
Storage temperature	-10°C to 60°C	14°F to 140°F
Humidity	5% to 85% RH	non-condensing

Dimensions

Dimensions cm (WxHxD)	7.1 x 9 x 5.3
Dimensions inch (WxHxD)	2.8 x 3.54 x 2.1

User Account Overview

The AC²Sensor has 3 types (levels) of user accounts: ***admin***, ***restricted*** and ***guest***. The following table shows an overview of the functionalities of each type:

	admin	restricted	guest
Open website	Yes	Yes	Yes
Open CLI session	Yes	Yes	Yes
View current status (states, data & values)	Yes	Yes	Yes
Edit thresholds	Yes	No	No
Edit port names	Yes	No	No
Change SNMP notification settings	Yes	No	No
Edit device settings	Yes	No	No
View & download logs	Yes	No	No
Default user name	admin	restricted	guest
Default password	1234	1234	1234

The same features and options apply to both the website and the Command Line Interface (CLI). To change the login credentials for the users please refer to the Device Settings chapter.

Safety

Save these instructions!

This Safety Information contains important instructions that should be followed during installation and maintenance of the AC^{2}Sensor. It is intended for Racktivity customers who set up, install, relocate or maintain Racktivity equipment. Changes and modifications to this unit not specifically approved by Racktivity could void the warranty.

Electrical Hazard!

Read the following information before installing or operating your AC^{2}Sensor:

- Do not work alone under hazardous conditions.
- High current through conductive materials could cause severe burns.
- Follow all local and national codes when installing the AC^{2}Sensor.
- To avoid possible electrical shock and equipment damage, use only the supplied hardware.
- The power connector serves as connection switch for the AC^{2}Sensor.
- Do not operate your AC^{2}Sensor with any covers removed or when damaged.
- There are no user serviceable parts inside the AC^{2}Sensor. All repairs and service should be performed by authorized service personnel only.
- The AC^{2}Sensor is designed for indoor use only in a controlled environment away from excess moisture, temperature extremes, conductive contaminants, dust, direct sunlight or magnetic sources.
- Do not attempt to mount the AC^{2}Sensor to an insecure or unstable surface.
- Never attempt to install electrical equipment during a thunderstorm.
- Use of this equipment in life support applications or any medical applications is strictly prohibited since failure of this equipment can reasonably be expected to cause the failure of the life support equipment or to significantly affect its safety.

- **CAUTION:**
  The AC^{2}Sensor contains a lithium battery and should not be disposed of with general refuge. Dispose of the lithium battery in accordance with all local codes and regulations for products containing lithium batteries. Contact your local environmental control or disposal agency for further details. The battery is not intended to be user replaceable.

Certifications

Not all certifications are applicable to every model. Please check the label on your device.

- **CE / FCC**

This device is designed in compliance with the requirements of the 4 following regulations:

EN 55022: Class B
EN 61000-3-2
EN 6100-3-3
EN 55024

This device is certified to comply with Part 15 of the FCC rules.

Compliance

- **WEEE**

Waste Electrical and Electronic Equipment

- **RoHS**

Restriction of Hazardous Substances

Recycling

The materials used for shipping the AC^{2}Sensor are recyclable, please save them for later use or dispose of them appropriately.

Servicing & Repair

There are no user serviceable parts inside the AC^{2}Sensor. All repairs and service should be performed by authorized service personnel only.
Please refer to the Service manual for RMA procedure.

Additional Documentation

Additional documentation and support regarding the following subjects is available on the Racktivity website http://www.racktivity.com/support/.

- API
    - Manual
    - GUID Overview
    - (python) Examples
- E^{2}Sensor User Manual
- Servicing (RMA)

Getting Started

Receiving Inspection

Inspect the package (see INVENTORY section) and contents for shipping damage and make sure that all parts were received. Report any damage immediately to the shipping agent and report missing contents, damage, or other problems immediately to your reseller.

Inventory

Please verify the contents of the box:

Standard Package

Item	Quantity
AC^{2}Sensor	1
Connector	1

Installation

Mounting the AC²Sensor

Mount the AC²Sensor to a horizontal DIN rail using the slots at the back of the unit. Hold the unit with the top (white) slider over the DIN rail and while slightly pulling the unit down, place the bottom (black) slider over the bottom of the DIN rail.
To remove the AC²Sensor use a flathead screwdriver to slightly pull the bottom (black) slider down. This will enable you to pull the bottom of the unit forward and release it from the DIN rail.

Connecting the AC²Sensor

1. The AC²Sensor is powered from the L1 connector.

2. Attach the supplied connector to an existing 100-240 VAC power cable by using the screws.

3. The POWER LED (blue) adjacent to the connected connector will become active.

Installing Transducers

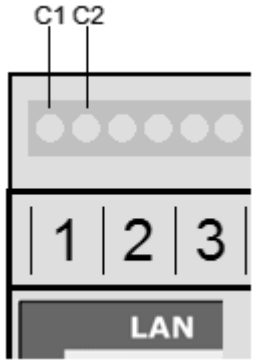
Specifications

The AC²Sensor has been designed to communicate with a wide range of transducers as long as they meet the following criteria:

- Output voltage: -4V/+4V

Note: The AC²Sensor features fixed list of predefined transducer models with wide variety of current ranges. If you are uncertain that your preferred transducer is compatible with the AC²Sensor, please contact Support prior to purchase.

The pin layout of the transducer connectors on the AC²Sensor is as follows:



Connect the transducer for input 1 into C1 and C2 holes. For other inputs, use corresponding pairs of holes.

Installation

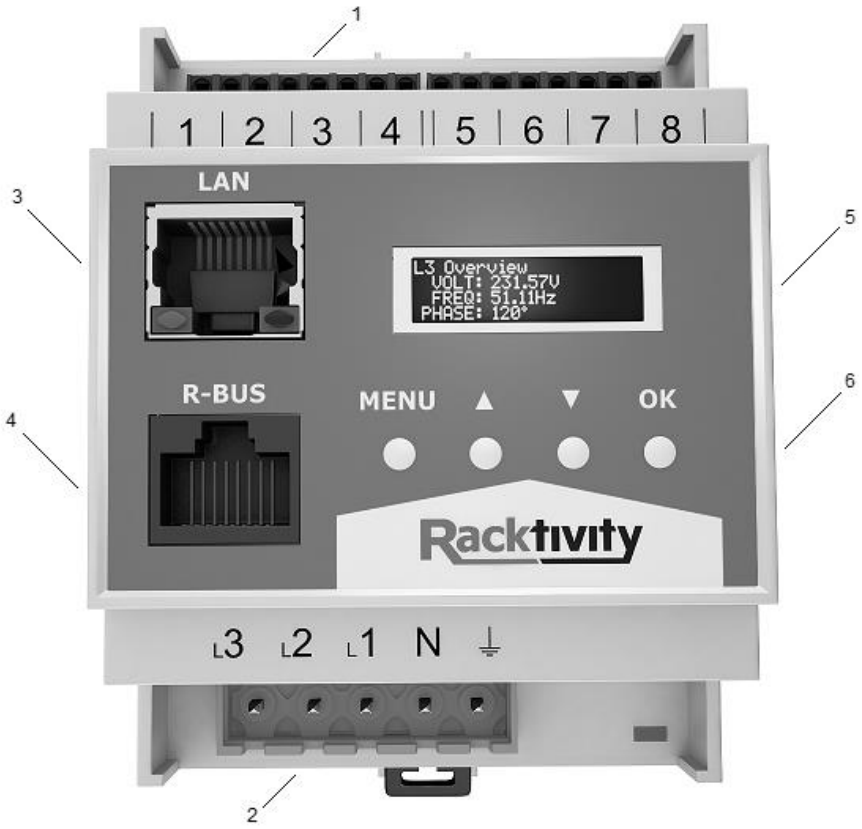
The AC²Sensor can be installed and operated by connecting only 1 of the available phases (it has to be L1) in the connector. If certain metrics are missing for a specific transducer, please verify that there is an active phase for that transducer.

To install a current transducer:

- Connect the current transducer cable to an available 2 pins in the connector on the AC²Sensor.
- Connect the current transducer to the power cable that needs to be monitored.
- Using web interface, in “Settings” > “Sensor Settings” set the correct transducer type and phase (you can use the suggested detected phase setup)
- The AC²Sensor display and web portal will now show the correct current values (and power values if the phase connector for that phase is attached and powered).

Overview

Front



1	**CONN**	Transducer connectors 1 to 8
2	**POWER**	Input voltage connector with power LED
3	**LAN**	Ethernet connector (with connectivity indicator LEDs)
4	**R BUS**	RS485 peripheral bus connector (for external modules)
5	**OLED**	Measurements and settings OLED
6	**NAV BUTTONS**	Menu, Up, Down and OK navigation buttons

Status LEDs

Power LEDs (1)

ON	The device is powered
OFF	No power is provided to the device

Quick Configuration

Using the OLED Display

Activating the Display

When the Power LED is lit and the screen is black, push any of the 4 navigation buttons next to the display to activate it. The OLED standby delay can be set at the Settings page on the Web Interface (the default value is 10 minutes).

Controlling the Display

The display is controlled using the **MENU, UP, DOWN** and **OK** buttons below the screen.
Use the **UP** and **DOWN** buttons to navigate through the reporting screens or through a selection list in the menu. Press **OK** to select the highlighted item and **MENU** to go back.

Network Settings

There are two methods for setting up the IP address: Dynamic IP address assignment and Manual Assignment. If you are uncertain which method to use, contact your network administrator for assistance before continuing the installation process.

Note: The AC^{2}Sensor has secure HTTP (**HTTPS**) enabled by default. Use 'https://' instead of 'http://' in your browser to access the web portal.

Dynamic IP Address Assignment (DEFAULT)

1. Press the **MENU** button until the MENU appears, select **Network Settings** using the **DOWN** button and press **OK**.

2. Within the **Network Settings** menu, select **DHCP** and press **OK**. When the value DHCP: ON is displayed, the device already has dynamic IP assignment enabled (skip to step 4). If not, use the **UP** or **DOWN** buttons to change the value to 'DHCP: OFF' and afterwards press **MENU** or **OK** to confirm.

3. Use the **UP** button to select **Apply Settings** and press **OK.** Press the **MENU** button to cancel or the **OK** button to apply the settings.

4. Press **DOWN** to select **IP Address** and press **OK** to display the current IP address.

5. On a computer in the same network, use a browser to open the assigned IP address, for example https://192.168.14.250

6. When surfing to the web portal, a login screen appears. The default user name is **admin** and the default password is **1234**.

Manual IP Address Assignment

1. Obtain the correct IP address, standard gateway, DNS Server IP and subnet mask from your network administrator.

2. Press the **MENU** button until the MENU appears, select **Network Settings** using the **DOWN** button and press **OK**.

3. Within the **Network Settings** menu, select **DHCP** and press **OK**. When the value 'DHCP: OFF' is displayed, the device already has manual IP assignment enabled. If not, use the **UP** or **DOWN** buttons to change the value to 'DHCP: OFF' and press **MENU** or **OK** to confirm.

4. Use the **UP** button to select **IP Address** and press **OK**.

5. Use the **UP** and **DOWN** buttons to change the currently selected value and press **OK** to select the next value. When holding the **UP** and **DOWN** buttons, you can speed up the changing of the values. When ready press **MENU** to confirm and return to the **Network Settings** menu.

6. Repeat the last two steps for the **Subnet Mask**, **Standard Gateway** and **DNS Server** settings.

7. Use the **UP** button to select **Apply Settings** and press **OK.** Press the **MENU** button to cancel or the **OK** button to apply the settings.

8. On a computer in the same network, use a browser to open the chosen IP address, for example https://192.168.14.250

9. When surfing to the web portal, a popup appears requesting a username and password. The default username is **admin** and the default password is **1234**

Web Interface

Getting Started

Supported Web Browsers

The following browsers have been tested and certified to work with the AC²Sensor Web Interface (on all platforms):

- Internet Explorer 8 or higher
- Firefox 3.6.16 or higher
- Chrome 11.0.696.71 or higher
- Opera 11.11 or higher
- Safari 5.0.5

Other available web browsers may work with the AC²Sensor but have not been fully tested by Racktivity.

Logging in

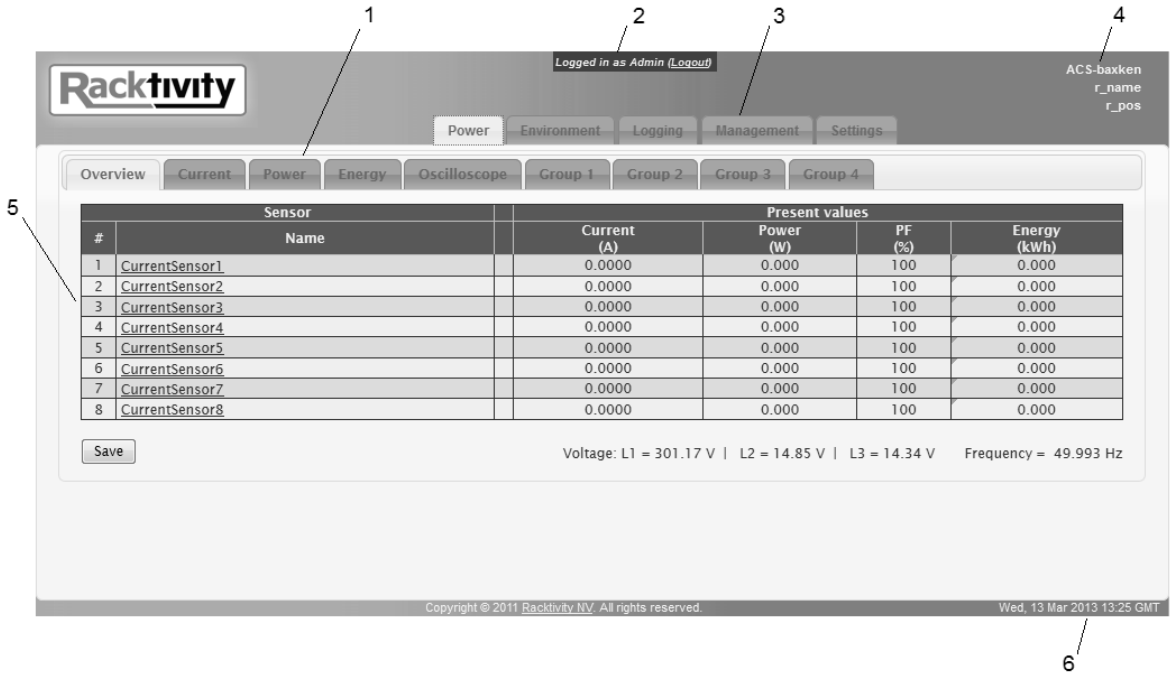
For instructions on how to set up the TCP/IP settings to connect to the Web Interface, please see the Network Settings chapter.
To recover from a lost password, please refer to the Troubleshooting chapter.

Use an internet browser to open the AC²Sensor IP address. You will be asked for login credentials, the default values for the **administrator** account are:

User name	Admin
Password	1234

To find out everything about the different types of user accounts see the User Account Overview chapter.
It is possible that you get a warning about the connection being untrusted (self-signed certificate. If so, please ignore.

Layout



1	**Sub tabs**	Displays the different sections of the selected main tab
2	**User account**	Displays which type of User Account is currently logged in
3	**Main tabs**	Displays the different functions of the AC^{2}Sensor
4	**Device info**	Displays the device name, cabinet name & cabinet location Can be changed at the settings tab
5	**Transducers**	Displays the available info for each transducer of 8 inputs
6	**Device time**	The time set on the Settings tab (either manual or through an NTP server)

Tabs

Power

Use the Power Tab for the following:

- See the load and general status of both the AC^{2}Sensor's individual transducers and the totals:
  - Amps
  - Wattage (only when the corresponding phase connector is powered)
  - Real and Apparent Energy (kWh)
  - Voltage for each phase
- Monitor transducers
- Configure thresholds for transducers and groups (as applicable)
- Resetting measurements
- Change SNMP notifications state

Environment

Use the Environment Tab to monitor and manage:

- Internal sensors (as applicable)
- Voltage: status, history and management of each phase

Logging

The logging tab provides access to the **Event** logging. After selecting the desired module and time-range the log can be downloaded or viewed inside the browser.
For more information regarding this subject, please refer to the Logging chapter.

Modules

Use this tab to control connected E^{2}Sensors.
For more information regarding the Modules tab, please see the E^{2}Sensor documentation.
Note: This tab is only displayed with a connected and managed E^{2}Sensor.

Management

The management tab is used to manage the modules in an AC^{2}Sensor setup, including E^{2}Sensors.
For more information regarding the managing of E^{2}Sensors, please see the E^2 Sensor documentation.

Settings

Use this tab to configure the following settings:

- Network
- SNMP
- Telnet
- Device and User Accounts
- NTP (Network Time Protocol)
- Sensor settings and group assignment

Network Configuration

Path: Settings > Network Settings

The Network Settings contains both the Network and the SNMP related settings. The SNMP related settings can be found in the SNMP Configuration chapter. The following Network settings are editable:

- **Device IP Address**
  - The IP address of the AC^{2}Sensor*****
- **Subnet Mask**
  - The subnet mask of the AC^{2}Sensor
- **Standard Gateway**
  - The IP address of the default node on the network
- **DNS Server**
  - The IP address of the Domain Name System (DNS) server
- **Enable DHCP**
  - Check to enable DHCP
- **Force secure web access (HTTPS)**
  - Check to force secure HTTP web access
- **Force secure telnet access (SSL)**
  - Check to force SSL telnet access

*** Note:** When DHCP is enabled, the Network Settings are not necessarily the ones shown here, since they are provided by the DHCP server. Disabling DHCP will force the AC^{2}Sensor to use the provided network settings.

SNMP Configuration

The AC²Sensor offers SNMPv2 communication (GETs, SETs and traps). Notifications (traps) can be enabled or disabled for many of the device's functions:

- Transducer thresholds (current, power, …)
- Totals thresholds (current, power, …)
- Temperature thresholds
- Voltage thresholds
- …

To toggle SNMP for a specific parameter or function, (un)check that parameter's checkbox and press the Save button. The SNMP checkboxes can be found next to most measurements.

SNMP Settings

path: Settings > Network Settings

The Network Settings contains both the Network and the SNMP related settings. The network related settings can be found in the Network Configuration chapter. The following SNMP settings are editable:

- **SNMP Community read**
  The community read string for GET requests
- **SNMP Community write**
  The community write string for SET requests
- **SNMP Trap Community string**
  Community string used when sending SNMP traps
- **SNMP Trap Receiver IP**
  IP address of the trap receiver. Up to 3 trap receivers (and ports) can be configured
- **SNMP Trap Receiver port**
  The port (1 - 65535) on which traps will be sent
- **Enable SNMP write protection**
  Check this box to disable SNMP write (SET) access to the AC²Sensor completely
- **Enable SNMP Traps for device**
  The AC²Sensor will not send any traps when unchecked, regardless of individual settings
- **Use ECS authentication**
  Toggles the use of an external authentication server
- **ECS Authentication server IP**
  The IP address of the authentication server
- **ECS Authentication server port**
  The port (1 - 65535) of the authentication server on which the connection will be made

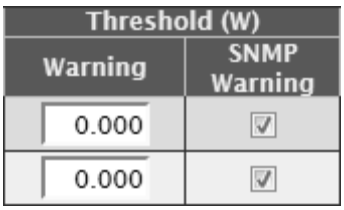
Device Settings

The Device Settings give access to

- AC²Sensor identification
  - **Device name**: the name of the AC²Sensor
  - **Rack name**: the name of the rack or cabinet where the AC²Sensor is located
  - **Rack position**: the identifier of the position in the rack or cabinet
- User account settings (see the User Account Overview chapter)
  - **Admin**
  - **Restricted user**
  - **Guest**
- TFT settings
  - **TFT timeout**: the idle time in minutes after which the TFT goes into standby
  - **TFT display lock**: when checked the TFT (and buttons) cannot be used to change settings. All changes must be made through the website.
- Temperature
  - **Temperature unit**: degrees Celsius (°C) or Fahrenheit (°F)
- Date & Time Settings (see the Network Time Protocol (NTP) chapter)
  - **Date & Time Settings**: The real-time clock dialog features several options. Uncheck the *Use NTP* checkbox to be able to set a custom date & time. Uncheck the *Use default NTP* checkbox to not use an NTP server from pool.ntp.org and enter the custom IP address into the *NTP address* field.
    Note: Making changes to the date/time settings might clear all logged data!

Thresholds

Thresholds can be configured and used so that you are notified through SNMP at certain events. Many of the AC²Sensor's parameters have settable thresholds. To configure a specific threshold, open the tab where the appropriate parameter is shown.



At least the following parameters have one or more settable thresholds:

- **Amperage**
  - Path: Power > Current
- **Wattage**
  - Path: Power > Power
- **Voltage**
  - Path: Environment > Voltage
- **Ambient**
  - Path: Environment > Ambient

- **External modules**
    - Path: Environment > External Modules
- **Group totals**
    - Path: Power > Group X

Depending on the parameter one or more of the following types of thresholds will be available:

- **Warning**: When the measurement crosses this value an SNMP notification is sent
- **Low**: When the measurement goes below this value an SNMP notification is sent
- **High**: When the measurement goes above this value an SNMP notification is sent

To change a threshold enter the desired value into the appropriate input area and press the Save button. If the background of the input area turns red an incorrect value has been entered.

Note: Most thresholds have corresponding SNMP checkboxes that enable/disable the notification. Please ensure that both the threshold **and** the appropriate SNMP notifications are set correctly.

Resetting Measurements

For many parameters the minimum, maximum and/or total is saved to give an easy overview of load activity. These values van be easily reset by pressing the Reset link for that value.

Outlet		Current (A)			
#	Name	Min	Now	Max	Min/max Reset
1	CurrentSensor1	0.0000	0.0000	0.0000	Reset
2	CurrentSensor2	0.0000	0.0000	0.0000	Reset

The following parameters have resettable values:

- **Individual amperage**
  - Path: Power > Current
- **Individual wattage**
  - Path: Power > Power
- **Individual active (kWh) and apparent energy (kVAh)**
  - **Note:** The **Accumulated kWh** counter is not resettable!
  - Path: Power > Energy
- **Temperature**
  - Path: Environment > Ambient
- **Voltage**
  - Path: Environment > Electrical
- **Group totals**
  - Path: Power > Group X

Note: Clicking a Reset link in the column header will reset all values in that column.

Network Time Protocol (NTP)

path: Settings > Device Settings

The Network Time Protocol (NTP) is a protocol for synchronizing the clocks of computer systems over networks. The AC^{2}Sensor is equipped with an onboard clock that can be setup to sync with:

- pool.ntp.org (default)
- a custom NTP server
- date & time picker

For more information regarding the configuration of the onboard clock please refer to the Device Settings chapter.

CLI

Introduction

The AC²Sensor has a built in Command Line Interface that can be accessed through Telnet. Commands are typically sent to the separate modules. An AC²Sensor consists of exactly 1 Master module, 1 Power module, and 1 optional E²Sensor module. Each module is of a specific type: 'M' for master module, 'P' for power module and 'A' for sensor module. The Master will always have address M1, Power - P1, sensor modules can have addresses A1, A2, A3…

Connecting

Connect to the device IP on port 23. Please note that only Telnet over SSL is enabled by default and requires an SSL capable Telnet client. This can be changed at the Settings tab.

Once connected, you will be presented with a log-in screen. Use the admin credentials to gain full access. From here it is possible to access the majority of the AC²Sensor's functions.
Enter "HELP" for more information.

Logging

The AC²Sensor features an Event logging memory that can be downloaded from the Web Interface or through the API for your convenience.

Event

path: Logging > Event

The Event log is used to keep a history of all important events. Fill in the available fields and view the log in your browser or download it for offline use.

- **Module**
  The module for which to request the Event log.
- **Start time**
  The starting date & time for the log.
- **End time**
  The ending date & time for the log.
- **Download**
  Download the log as a text file.
- **Show**
  View the log in your browser.

The Log is displayed as a table with the following columns (from left to right):

- **Timestamp**
  The timestamp of the event.
- **Event type**
  The type of event: outlet toggle, threshold violation, etc.
- **GUID**
  The GUID of the control. For more info regarding GUIDs please refer to the *API Manual*.
- **Value**
  The value that was returned by the event (voltage, temperature, etc.)

Management Information Base (MIB)

A **Management Information Base (MIB)** is a virtual database used for managing the entities in a communications network and is most often associated with the Simple Network Management Protocol (SNMP). The AC^{2}Sensor features a built-in mib file which can be found at the following locations:

- By browsing to https://[DEVICE_IP]/ES-RACKTIVITY-MIB.txt (where [DEVICE_IP] is the IP of your AC^{2}Sensor).
- By clicking the "Download MIB file" link on the Settings > Network Settings tab on the web portal.

Use this file to translate the OIDs (Object IDentifiers) to a more human-readable state. For more information on how to use the MIB file, please refer to the documentation of your network monitoring software.

Upgrade Firmware

Racktivity is always working on improving and fine-tuning its products. It is possible that a new firmware is available for your device. During a firmware update the device continues working as normal.

Note: Make sure all active connections to the AC^{2}Sensor - such as the website and telnet - **are closed before updating**. Open connections might result in a failed update!

Obtaining Files

If you are unsure whether a firmware update is available for your device, have a look at http://www.racktivity.com/support or contact Racktivity Support (see Support chapter).
If applicable the necessary files and instructions will be provided.

Troubleshooting

Resetting Login Credentials

In case of lost login credentials, resetting them can be done on the device itself:

- Press and hold the **UP** and **DOWN** buttons simultaneously for 3 seconds until a notification is shown on the display.
  The credentials will now be reset to their default settings:

	Default login credentials
User name	admin
Password	1234

Connecting to the Web Interface

If you are unable to connect to the Web Interface please try one or more of the following options:

- Ping the device on its IP address. When unsuccessful, the AC^{2}Sensor is most likely not on the same network as your PC, or communication is blocked by a network device.
- Connect the AC^{2}Sensor directly to your computer (please note that for this both devices need to have a valid fixed IP).
- Try opening the Web Interface with another browser.
- Connect to the AC^{2}Sensor using a different computer.
- If possible, power cycle the AC^{2}Sensor.

Knowing your AC^{2}Sensor's IP address

If you want to easily find out the IP address of your AC^{2}Sensor, use the navigation buttons next to the TFT on the front.

- If the TFT is black, press any button once to activate it.
- Press MENU to enter the Menu.
- Select Network Settings and press OK.
- Press the DOWN button, select IP Address and press OK.
- The IP of your AC^{2}Sensor is displayed.

Support

Feel free to contact us if you need any support or have any other questions or remarks:

Online	www.racktivity.com/support
E-mail	support@racktivity.com
Phone	003293242095 (GMT+1)