SolarVu™ Installation Guide for SolarEdge SE10000A-US Series Inverters

Introduction

SolarVu™ is an energy portal that enables remote monitoring of renewable energy generation sites over the internet. It requires the installation of a K135 gateway which continuously transfers data from the inverters to the remote SolarVu servers. This guide explains how to connect the K135 gateway to SolarEdge SE3000A-US to SE11400A-US inverters using RS485 serial connection with Sunspec protocol. Several steps are required:

1) Connect the K135 gateway to the inverters
2) Connect the K135 gateway to the building LAN for internet access
3) Enter the communications settings into each inverter
4) Access SolarVu from a browser and configure the energy portal

Consult the SolarEdge inverter installation guide and SolarEde Communications Options application guide for additional details.

Site Preparation

To access SolarVu from a browser, the inverters communicate serially over RS485 with a Cachelan K135 gateway connected to the site network as shown in fig 1. Each inverter comes with a RS485 serial interface as a standard feature. The K135 connects to inverters over RS485 using twisted pair wire, typically using Cat5e cables, daisy chained for multiple inverters. The LAN must have high speed internet service to an ISP to provide access to the internet. The K135 RJ45 ethernet jack plugs into an RJ45 LAN jack connected to the building router using a standard Cat5e patch cable. Alternatively, SolarVu can be ordered with a 3G cellular modem for wireless internet connection. A source of 120VAC for control power needs to be connected to the SolarVu enclosure.

K135 Installation

Mount the SolarVu enclosure containing the K135 gateway in a suitable location, typically in the electrical room near the inverters. The NEMA4 enclosure can also be mounted outdoors if preferred. The RS485 serial cable can run long distances, over 1000 feet, if necessary.

Power Supply: Source the 120VAC supply from a 15 amp breaker electrical circuit suitable for control power and connect to the internal junction box as shown in fig 2. Refasten the reusable dongle tie wrap after wiring to prevent it becoming loose over time.

RS485 Serial: Connect the RS485 serial cat5e cable to the K135 terminal board as shown in fig 3 being careful to match the correct wire colours to the terminals. Recommended cable type is Cat5e, 8 wire, UTP, #24 solid. Twisted pair must be used for the RS485 serial data wires. Use a tie wrap to provide strain relief for the cat5e cable. The ground wire is internally connected to terminal 4 to provide a path for transient protection. Connect the other end of the serial cable to the first inverter as shown in fig 4. Over 1000 feet of wire can be used for reliable serial communications.

Ethernet: Use a standard ethernet patch cable with RJ45 plug on each end of the appropriate length to connect from the RJ45 ethernet jack on the K135 gateway to the network ethernet at a RJ45 wall jack or router/switch. The network router must be configured to match the K135 IP settings. This is usually auto IP assignment using DHCP for small sites but a larger commercial organization may require static IP settings specified by the IT system administrator. This should be specified at time of order. Settings as shipped can be verified from the SolarVu configuration sheet included in the enclosure document pouch. Alternatively, SolarVu can be ordered with a 3G cellular modem/router installed for wireless connection. This requires installation of a customer supplied SIM card with an active telco account for service.

Fig 1 Internet Connection for single 10kW inverter

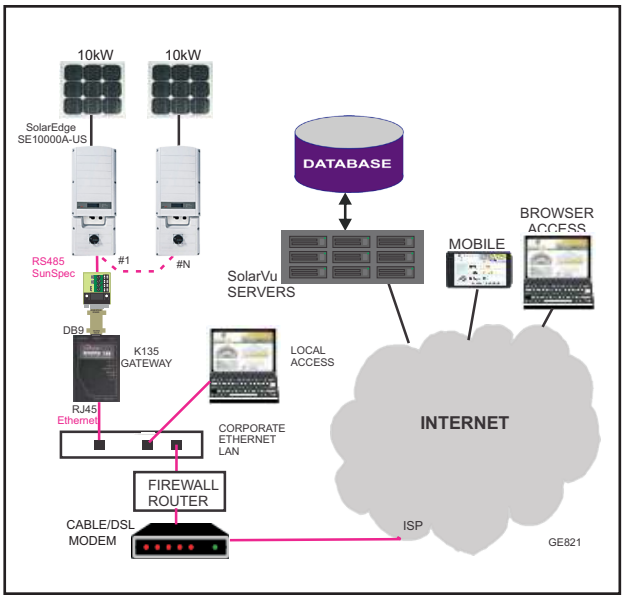


Fig 2 SolarVu enclosure wiring

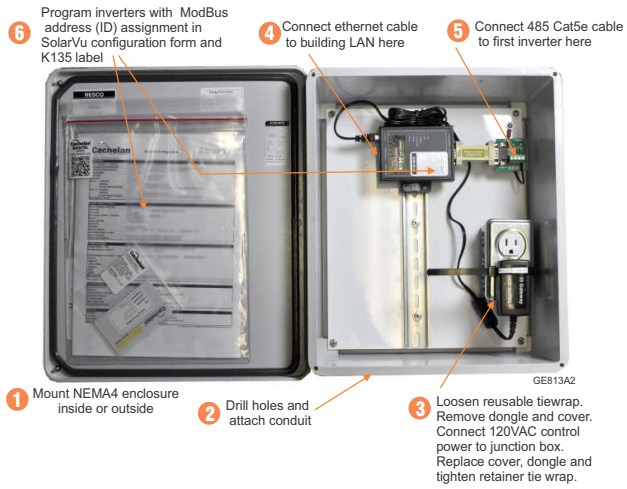
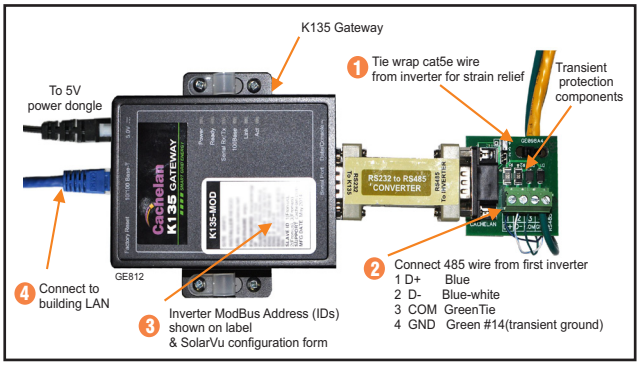


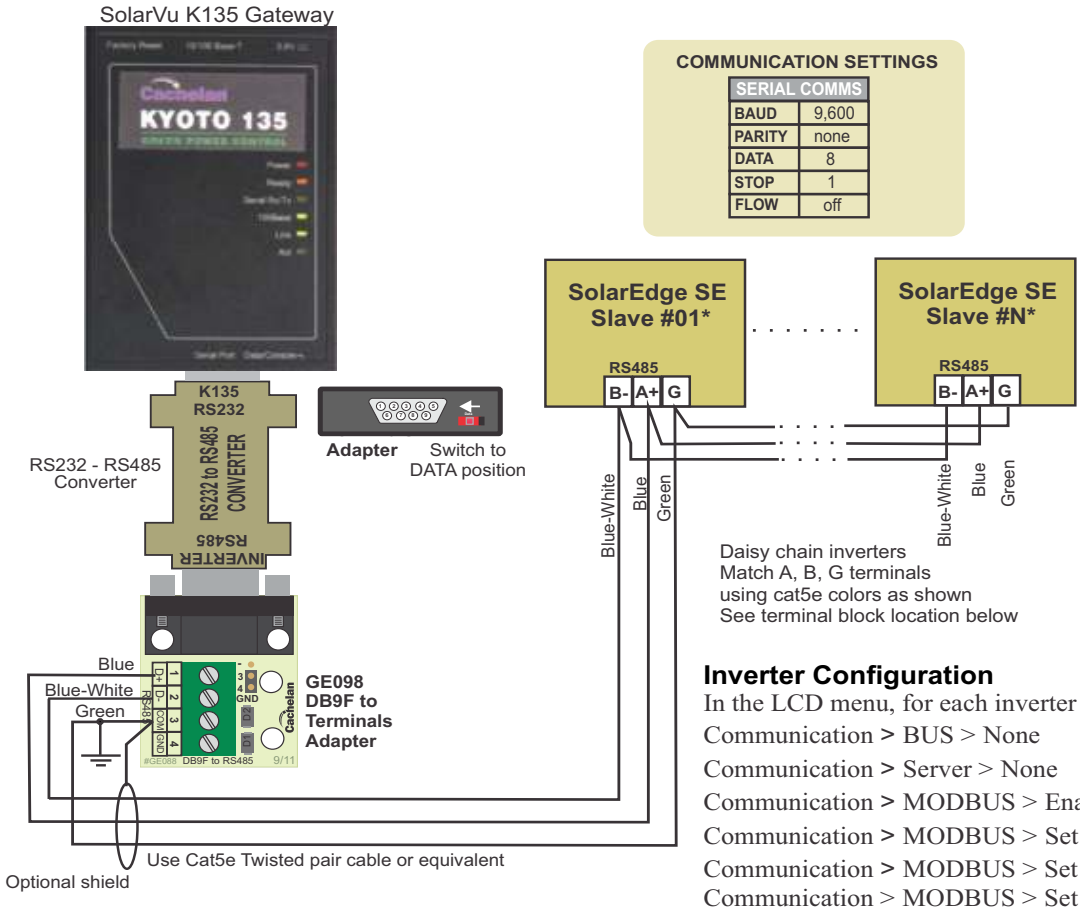
Fig 3 K135 Gateway connection



Inverter Connection

Consult the SolarEdge inverter installation manual for more details on serial communication connection. Ensure AC and DC power to the inverter are off before installing the communication wiring. Router the Cat5e serial communcation cable wire through the communication gland in the inverter base. Daisy chain the inverter B- (data D-), A+ (data D+) and G (ground) together using cat5e cable as shown in fig 4. Carefully match the colours shown at each terminal. Set the termination resistor switch off (left switch down in fig 4) for all inverters except the last one which can optionally be set on. After all inverters are wired together, enter a unique slave address into each inverter starting at 1 to match the SolarVu configuration assignment in the document pouch configuration form. For 3 inverters the slave addresses would typically be 1,2,3 for example. Follow the menu settings sequence shown in fig 4.

Fig 4 SolarEdge SE inverter communication connection and settings



Inverter Configuration

In the LCD menu, for each inverter program serial settings:

Communication > BUS > None

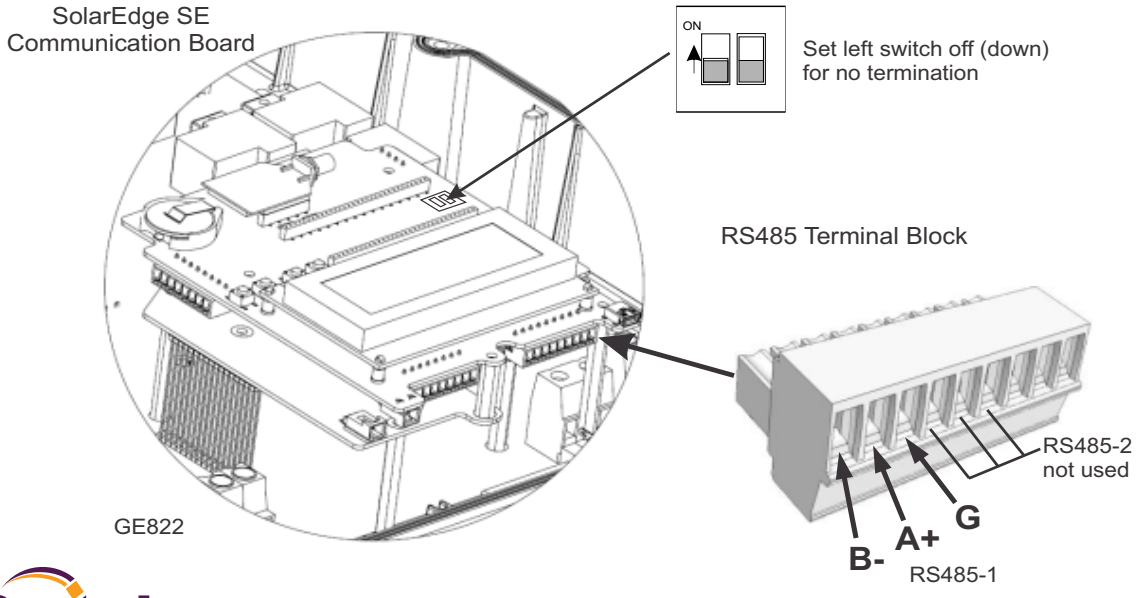
Communication > Server > None

Communication > MODBUS > Enable

Communication > MODBUS > Set Device ID > *address1, 2, ...

Communication > MODBUS > Set Channel > RS485

Communication > MODBUS > Set Protocol Type > Serial

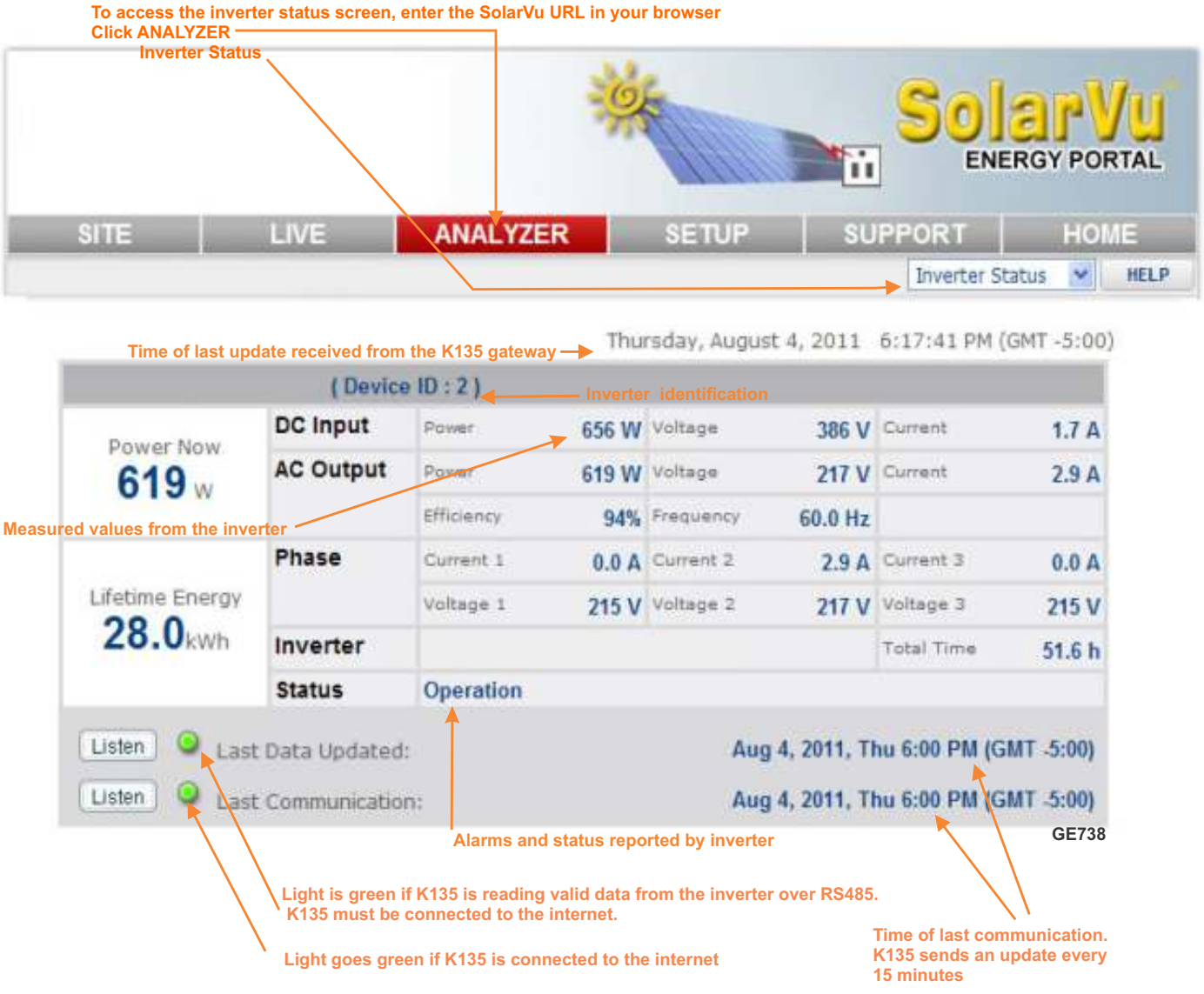


Testing the System

At this point the installation should be complete ready for testing. It is helpful to have access to a PC that is connected to the internet for viewing SolarVu screens. Using the URL supplied for the system. The K135 is preconfigured to automatically send inverter data to the SolarVu servers. To do this it must first establish an internet connection. Then it will collect data from the inverters and periodically transmit it.

Verifying correct operation is described in the sections that follow. Indicator lights and actual values accessible from the SolarVu Analyzer > Inverter Status screen figure 7 are useful for determining the status of the system.

Fig 7 Use the ANALYZER > Inverter Status screen to check system status (Note: screen is different for each inverter type)



Network Setup

It automatic IP assignment is used, on power up, the K135 looks for a DHCP server to provide it a dynamic IP address. If a PC connected to the network can automatically connect to the internet through a browser then the network is already configured to accept the K135. Otherwise consult the IT systems administrator for assistance. If a dedicated IP address, subnet mask and DNS server address are required, this needs to be entered into the K135 before shipment. Once the K135 receives its IP address it acts as a client. It will automatically try to connect to the SolarVu™ server and begin transferring data from the inverter to the server.

K135 indicators and connections

Testing

Ensure the inverters and K135 are powered on, the ethernet cable is plugged into a network jack and the RS485 cable is connected between the K135 and the inverter(s). The Power and Ready lights should be on if the power supply is plugged in. The Link light on indicates the ethernet connection is working. 100Base will only be on for high speed connections; for 10Base it is off. The Act light will periodically flash showing network activity. The Serial Rx/Tx flashes when the inverter is polled by the K135 but most of the time the light is off.

Internet Connection

Power on the K135 and allow at least 2 minutes for communication to be established. From any internet connected computer, open the browser and type in the SolarVu site address assigned for your account. This will be found on the account label shipped with the K135 and on the front panel of the K135. It is in the format *www.mysitename.solarvu.net*

Once the SolarVu energy portal is reached, the opening screen is the SITE view. Click ANALYZER > INVERTER STATUS. If there is a connection from the site, the Last Communication light will be green. The K135 gateway does not need to be connected to the inverter for this light to be green. If this indicator is red, it indicates no internet connection has been established. Check internet connections at the site by trying to browse the internet at the site with a PC connected to the network.

On a new system, the K135 gateway will search for the address of each connected inverter. When found, the Last Data Updated indicator will be green and inverter data will appear. If this indicator is red but the Last Communication indicator is green, check the RS485 serial connection to the inverter and that unique slave IDs have been entered. When both lights are green the gages on the SITE screen will display live data and graphs will begin recording site energy output. Contact Cachelan Technical Support for assistance if you cannot get a connection.

K135 Status Indicator Interpretation

INDICATOR STATUS		
LED	NORMAL	STATUS
POWER	ON	OFF- no power ON-power OK
READY	ON	ON IP address valid OFF No DHCP or static IP address.
SERIAL	RED FLASH GREEN FLASH	OFF Check K135 to inverter connection, inverter address & baud rate. No AC/DC to Inverter. RED flash=K135 Transmit data, Green flash=Receive data
100Base	ON	ON- 100Base OFF- 10Base or no ethernet
Link	ON	ON - ethernet network connection OK OFF No ethernet connection
Activity	SHORT FLASH	FLASH - data traffic activity

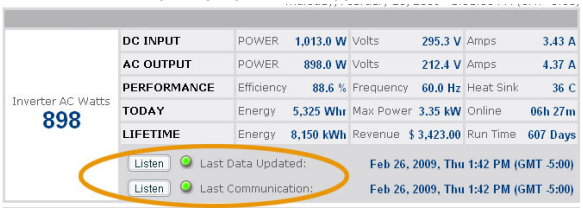
TROUBLESHOOTING CHECKLIST	
IP	Obtain IP by DHCP or set static IP. Network configured to recognize K135
Serial	Check serial cable between inverter & K135 Correct inverter communications settings.
Inverter	Inverter has AC and DC power on.
Internet	Internet connection from ISP to LAN is operating normally
K135	K135 in data mode (red switch set to left viewed from top)
Support	Technical support: contactus@cachelan.com

K135 front panel label with web address and login

K135 GATEWAY

URL: *mysite.solarvu.net*
USER: myusername
PASSWORD: mypassword
IP: DHCP
MAC: 00-01-95-06-E8-33
ID: SS100 070300075 v1.4.1
TYPE:

Check ANALYSER > INVERTER STATUS for communication
Screen shots may vary by inverter type



LIVE - for valid data, green status light and time received

Video Tour

For an overview of available features, visit www.solarvu.net and play the What is SolarVu video. Each screen has a HELP button that explains how all the features work. An online help guide is available for printing under SETUP > DOWNLOADS > PRINTED HELP .

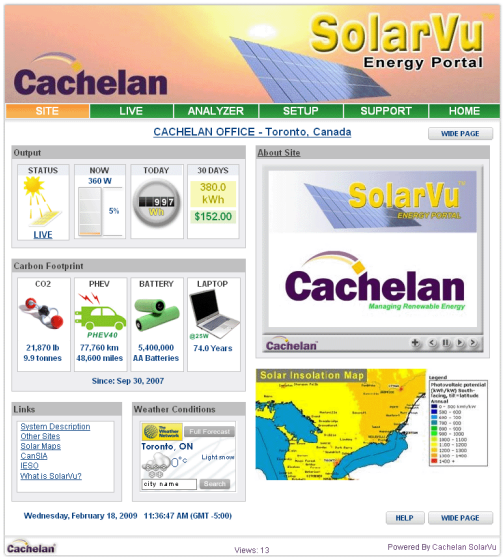
Visit www.solarvu.net for a features video

Help guide

Site Screen

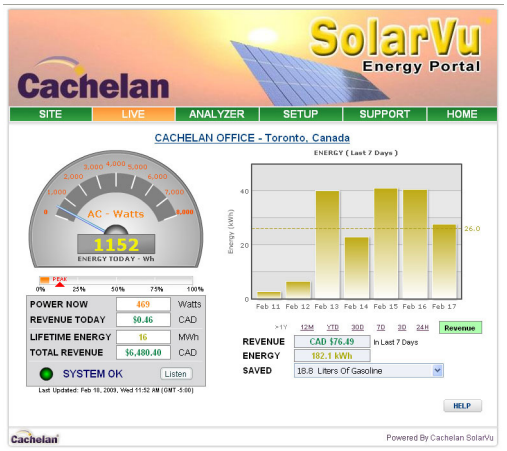
For a summary of information about the site, click the SITE menu button. On the upper left, the current charging status of the solar panels, total power being generated now and in the last 30 days is displayed. Underneath, the carbon footprint of energy equivalents is displayed since startup. Links to other websites can be left as defaults or changed in SETUP to personal preferences. The local weather is preset. Email contactus@cachelan.com to have it changed. For viewing on a widescreen TV suitable for display in a public place, click the WIDE PAGE button. On the right is a slideshow for public viewing. Content can be personalized using uploaded graphics in SETUP.

Site Summary Screen



Select wide screen view for public display on an HDTV

LIVE view shows current conditions



Live Data

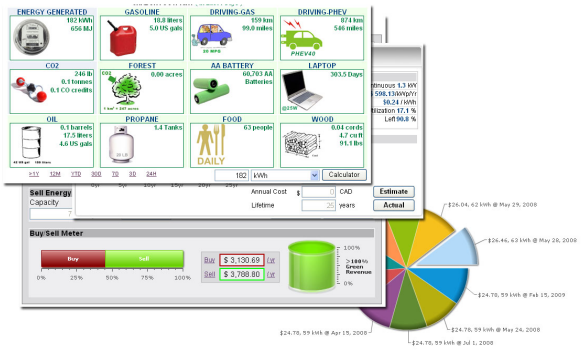
Click the LIVE menu button to display current power being generated in the array. Actual power and energy generated today are shown on the meter dial. For a normally operating system, the status indicator should be green with the last update time less than 15 minutes ago. Lifetime energy and revenue are shown digitally. For correct revenue display, the sell price per kWh must be entered in SETUP. If connection to the site is lost, or if an alarm is detected, the status indicator will be red. Click the Listen button with sound on for more information.

Trends are shown for the lifetime of the system using the graphs on the right. Select either an Energy or Revenue view using the button. Click the desired time period under the graph. Scroll over a data point with the mouse for more detailed information about that day. The carbon footprint pulldown gives energy equivalents for the solar power generated for the selected time period.

Analyzer - Performance

Click the ANALYZER menu button and select a category in the pulldown menu and a time period under the graph. The carbon footprint will compute the energy equivalents to the solar energy generated over the selected time period. This helps visitors get a practical feel for the benefits available. To find the carbon equivalent for an arbitrary value, override the actual solar amount by entering a kWh value and selecting a category, then click the Calculator button. Other views including buy/sell energy use, performance and payback can be selected with in the pulldown menu. The screen will return to the last value selected on return.

ANALYSER - select performance views from pulldown

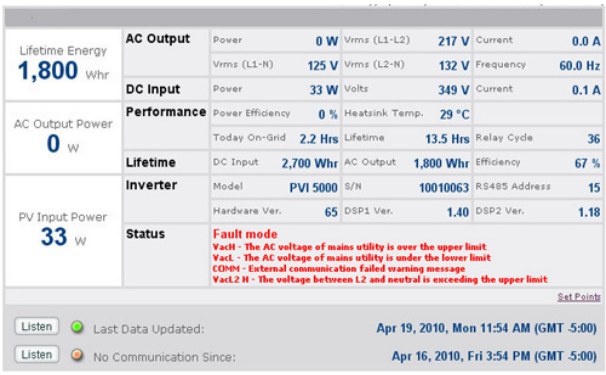


Analyzer - Troubleshooting

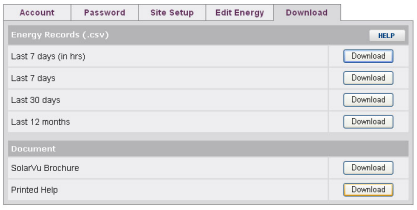
When problems occur with the system or to check inverter operation, click ANALYZER > INVERTER STATUS. Each inverter connected to the system with a K135 gateway will have its own display panel showing actual values sent. Remotely located technical personnel can assist in interpreting what the values are conveying. If no communication has been received from the device for more than 2 hours a No Data Available message will be shown.

For detailed analysis, it may be helpful to download all readings for the time period of interest into a spreadsheet for further analysis using SETUP > DOWNLOAD.

Click ANALYZER > INVERTER STATUS for troubleshooting



Download printable HELP guide or actual readings for any time period

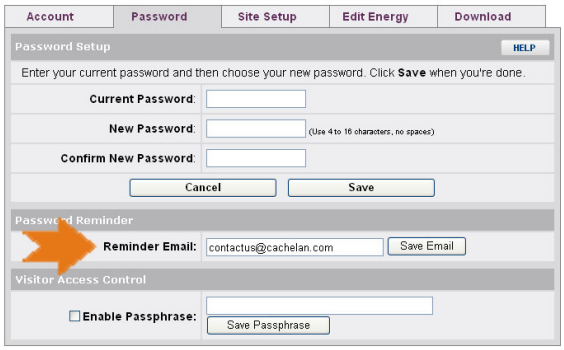


Setup

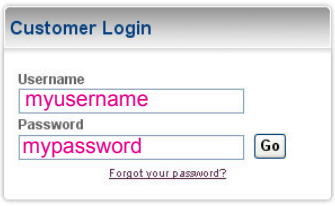
For entering settings to configure your site, click the SETUP menu button. Enter your unique username and password from the account label. The setup screen appears showing communication status and current preference settings. Check the last communication time ❶. It should show a time within the last 15 minutes if communication between the site and SolarVu™ server is working normally.

For the payback and revenue calculators to work properly, correct parameters for energy sell rate, capacity, average insolation etc should be entered. Account > Equipment Setup is for factory use. All changes take immediate effect. The Site Setup tab is used to customize the banner, links, slideshow and system description. Click the Help ❷ button for each section for a description of the effect for each entry. For further analysis, individual energy readings for any time period can be downloaded into a spreadsheet from the DOWNLOAD section.

Enter the email address ❸ for each individual that wants a regular status report sent to them and select the frequency. This report will include energy and revenues for different time periods and indicate if there are any alarms. In the Password tab, include an email address to receive the Setup login password if this is forgotten.



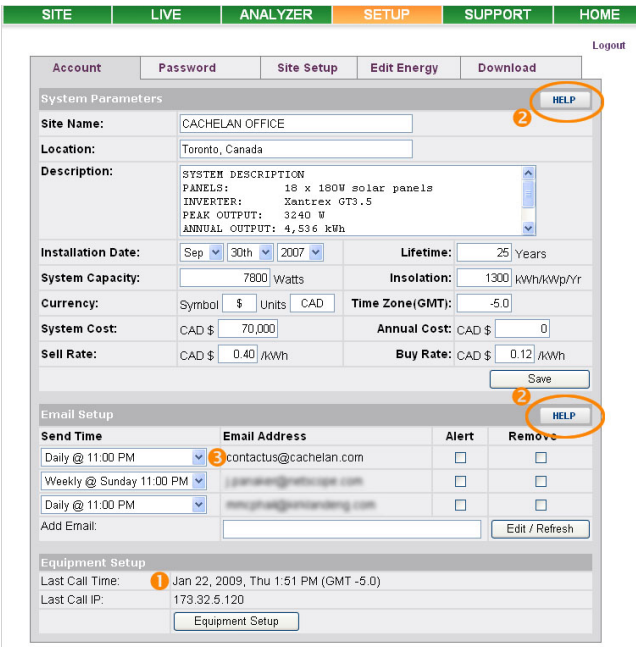
See K135 label for SETUP login



K135 GATEWAY

URL: *mysite.solarvu.net*
USER: myusername
PASSWORD: mypassword
IP: DHCP
MAC: 00-01-95-06-E8-33
ID: SS100 070300075 v1.4.1
TYPE:
DATE: Feb 2009
SUPPORT: cachelan.com

Configure site settings in SETUP



Support

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For additional technical support, send an email to contactus@cachelan.com or dial our support line in Toronto, Canada at 905.470.8400

Cachelan Technical Support
contactus@cachelan.com
905.470.8400 x228