SolarVu® Installation Guide
for Sungrow SG30KU 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 inverter(s) to the remote SolarVu servers. This guide explains how to connect the K135 gateway to Sungrow SG30KU & SG36KU inverters. Several steps are required:
   1) Connect the K135 gateway to the inverter(s)
   2) Connect the K135 gateway to the building LAN for internet access
   3) Enter the communications settings into each inverter from the front panel
   4) Access SolarVu from a browser and configure the energy portal

Site Preparation

To access SolarVu from a browser, the inverters communicate serially with a Cachelan K135 gateway connected to the site network as shown in fig 1. The K135 connects to inverter(s) over RS485 using shielded twisted pair wire, 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 router or wall jack using a standard Cat5e patch cable of convenient length. A source of 120VAC power for the gateway is required.

K135 Installation

Mount the SolarVu enclosure with conduit to the inverter for the RS485 serial cable, ethernet cat5e cable and 120VAC control power. Normally this enclosure will be in the same electrical room as the inverters, however, the RS485 serial cable can run long distances, over 1000 feet, if necessary.

Power Supply: If DIN rail terminals are provided, wire 120VAC control power from a suitable 15A circuit to the L, N and G terminals. Otherwise, temporarily loosen the reusable tie wrap and remove the K135 power dongle from the AC receptacle. Wire 120VAC to the receptacle and replace the cover securing the dongle with the reusable cable tie supplied.

RS485 Serial: Locate the RS485 communication board as shown in fig 2. Route a twisted pair cable through the inverter cable entry holes away from power conductors to the terminals shown as RS485 A, B, G in fig 2. Shielded twisted pair wire is preferred for noise immunity but standard Cat5e, 8 wire, UTP, #24 cable may also work. Connect the other end of the twisted pair cable in the SolarVu enclosure to the K135 gateway terminals as shown in fig 3. Match wire orientation as inverter A to K135 1:D+, inverter B to K135 2:D- and inverter G to K135 3:COM. If a shield is used, connect it to the K135 terminal 4:GND. If more than one inverter is to be monitored, daisy chain from the first inverter to the second using the IN and OUT 485 terminals on each inverter. Do not connect inverters in star configuration. Set the 120 ohm terminator switch to OFF on each inverter except on the last inverter where this switch can be set ON for improved noise immunity. As an alternative to screw terminals, RJ45 jacks are also provided for the RS485 serial connections. Use one or the other method but not both. For further details on using the RJ45 jacks for connection, see the Sungrow SG30 manual section 6.6.

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 supplied 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 with the K135.

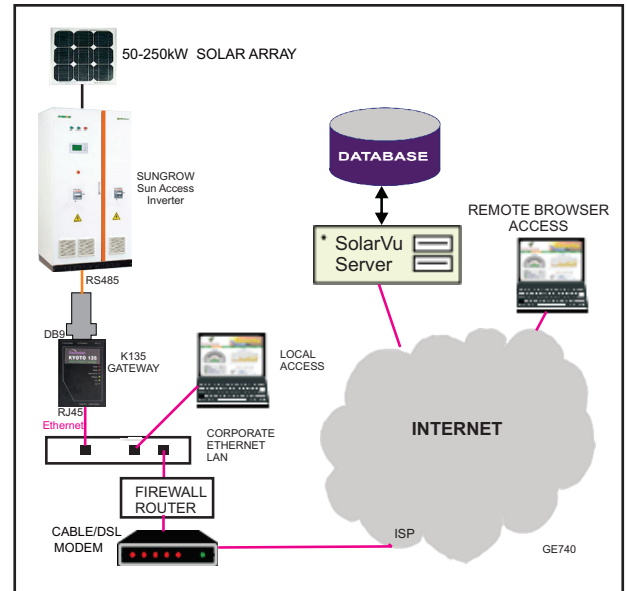*Fig 1 Internet Connection for single 10kW inverter*
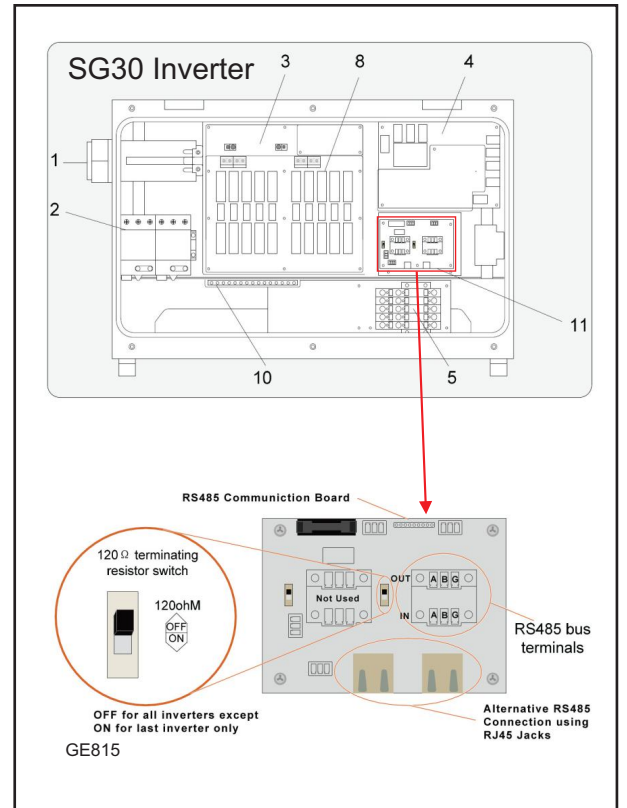

Fig 2 RS485 Comms board location in SC30 inverter

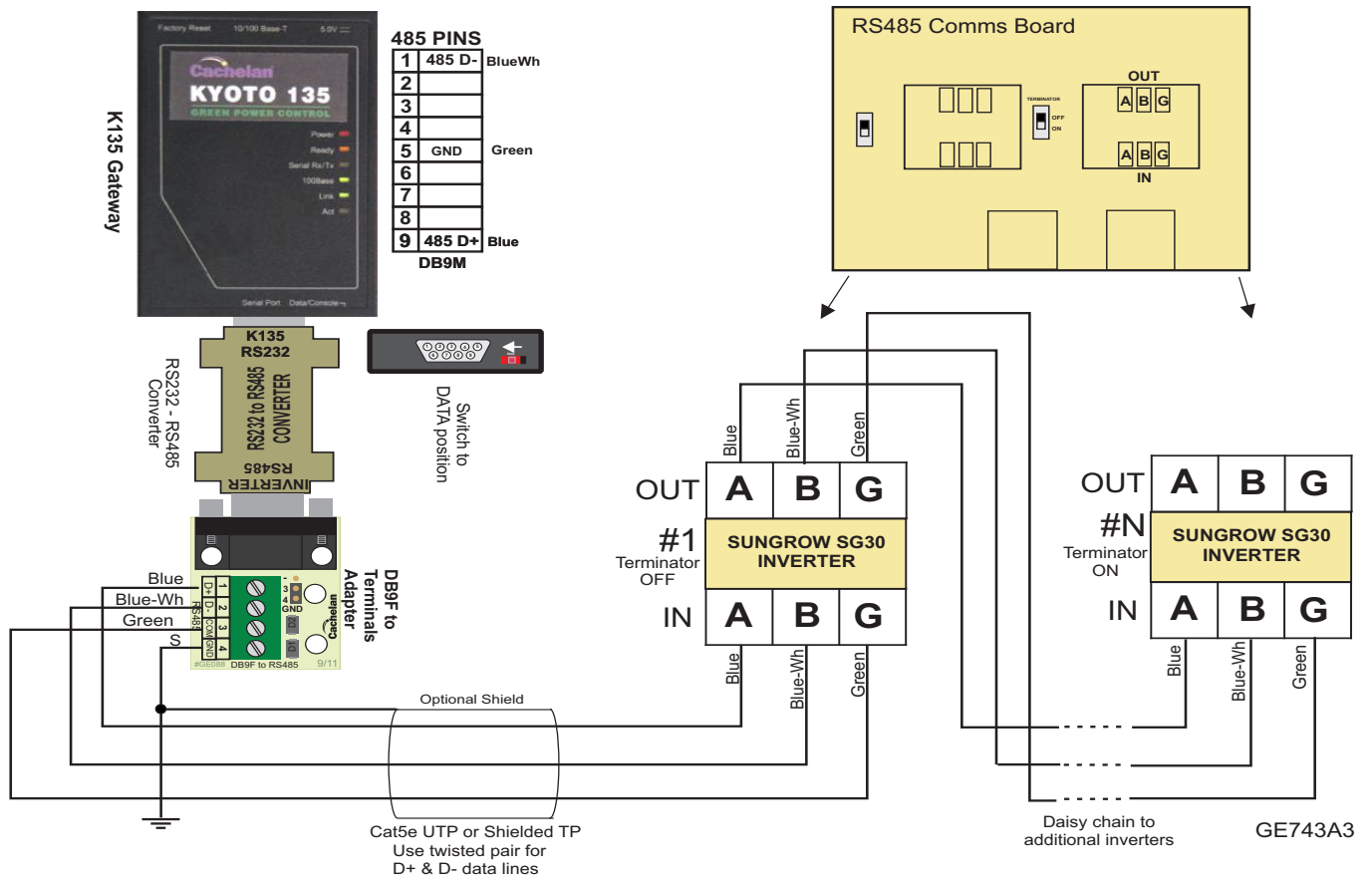## Fig 3 RS485 Serial connection from K135 gateway to SG30 inverter

485 PINS

1	485 D-	BlueWh
2		
3		
4		
5	GND	Green
6		
7		
8		
9	485 D+	Blue

DB9M

K135 Gateway

RS232 - RS485 Converter

K135 RS232
RS232 to RS485 CONVERTER
INVERTER RS485

Switch to DATA position

DB9F to Terminals Adapter

RS485 Comms Board

OUT A B G
TERMINATOR OFF ON
A B G IN

OUT **A B G**
#1 Terminator OFF
SUNGROW SG30 INVERTER
IN **A B G**

OUT **A B G**
#N Terminator ON
SUNGROW SG30 INVERTER
IN **A B G**

Blue / Blue-Wh / Green

Optional Shield

Cat5e UTP or Shielded TP
Use twisted pair for
D+ & D- data lines

Daisy chain to additional inverters

GE743A3

Fig 4 SolarVu enclosure connections

Enclosure Backplate

Cat5 ethernet to building network

K135 gateway

232 to 485 converter

Alternate Connection RS485 here if no terminals on DIN rail

RS485 twisted pair to inverters

Power for WeatherTrak option

K135 power supply

120VAC control power

SolarVu
GATEWAY INSTALLATION
TYPICAL WIRING
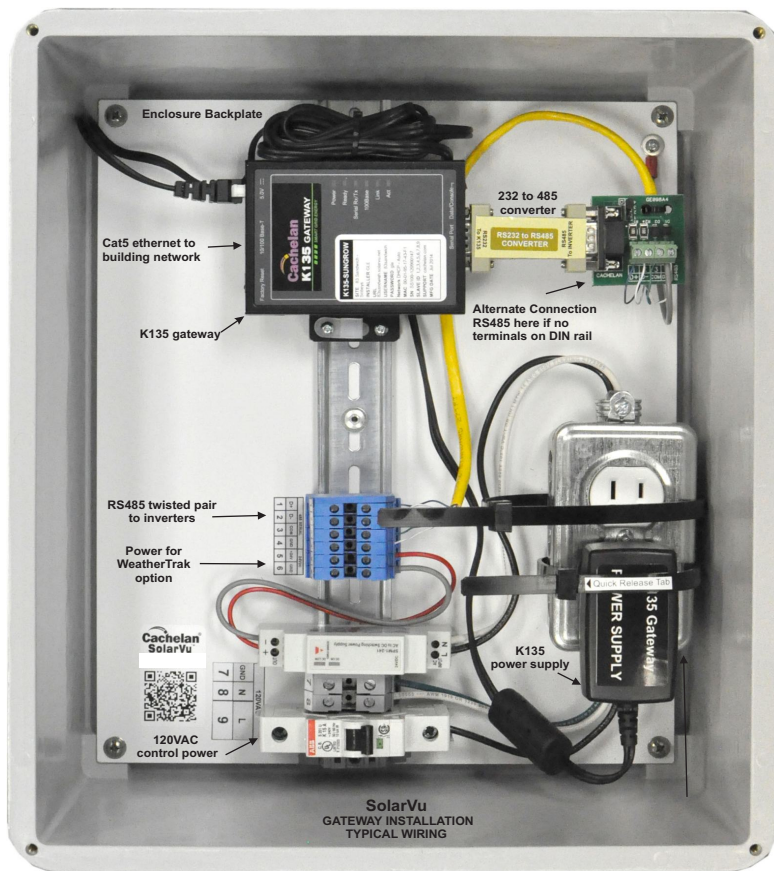
Inverter Serial Communications Settings

Each inverter must be configured with a unique RS485 address using the front panel keys and display for successful communications. The K135 gateway is preset with serial settings. The inverter(s) must be programmed to match these settings found in the configuration sheet in the SolarVu document pouch in order to communicate with the gateway. Default settings are:

Access Passcode: 1 1 1 1 1 1
Interface Protocol: ModBus
Baud Rate: 9,600
Parity: None   Data Bits: 8   Stop Bits: 1
Slave Address: 1 (additional inverters 2, 3...)

Once the wiring is complete with the inverter powered on, refer to Sungrow SG30 manual section 10 and follow the menu screens shown in fig 5.

Slave Address: Set first inverter to address 1. For additional inverters, each must have a unique slave address (also called a slave ID) consecutively numbered. For example, 3 inverters would normally be assigned slave addresses of 1,2,3. Enter these settings using the front panel keys navigating the menus as described in the Sungrow manual. Use factory default access code 1 1 1 1 1 1 to enter the settings screen.
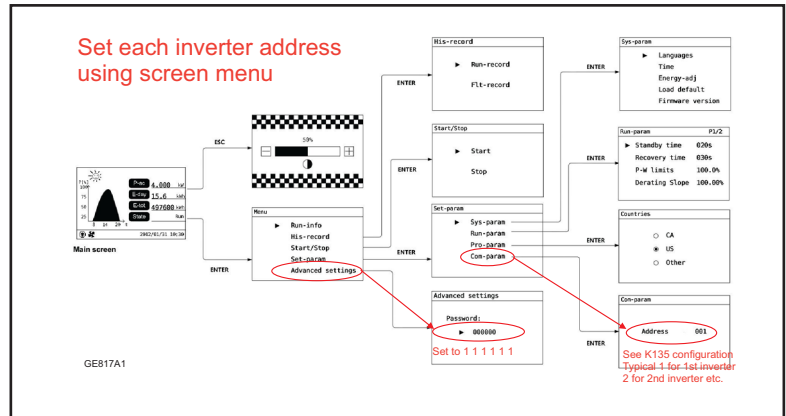
Fig 5 Entering inverter communications settings

Set each inverter address using screen menu

Fig 7 Access the ANALYZER screen from a browser as mysite.solarvu.net or scan the QR code on the enclosure from a mobile device.

Cachelan Sola
Sungrow Power
sungrow.solarvu.net

Testing the System

At this point the installation should be complete ready for testing. It is helpful to have access to a PC or mobile device that is connected to the internet for viewing SolarVu screens. 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 6 are useful for determining the status of the system.

Fig 6 Use the ANALYZER > Inverter Status screen to check system status

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

Click the PLAY button to watch a video explaining K135 indicator functions

Connect to RJ45 LAN (see IP settings)
RJ45 ETHERNET

Connect to 120VAC power supply
5Vdc POWER

Factory Reset   10/100 Base-T   5.0V

Power
Ready
Serial Rx/Tx
100Base
Link
Act

Serial Port   Data/Console

RS232 SERIAL PORT
Connect to inverter

COMMUNICATION MODE SWITCH
Data mode - left

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

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 light should be on if the power supply is plugged in. When the K135 receives an IP address the READY light comes on. 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 briefly when the inverter is polled by the K135; red for K135 transmit, green for K135 receive (inverter transmit).

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.
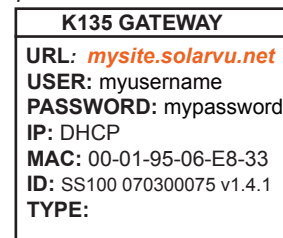
K135 front panel label with web address and login

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

	DC INPUT	POWER	1,013.0 W	Volts	295.3 V	Amps	3.43 A
	AC OUTPUT	POWER	898.0 W	Volts	212.4 V	Amps	4.37 A
Inverter AC Watts	PERFORMANCE	Efficiency	88.6 %	Frequency	60.0 Hz	Heat Sink	36 C
898	TODAY	Energy	5,325 Whr	Max Power	3.35 kW	Online	06h 27m
	LIFETIME	Energy	8,150 kWh	Revenue	$ 3,423.00	Run Time	607 Days

Listen ● Last Data Updated: Feb 26, 2009, Thu 1:42 PM (GMT -5:00)
Listen ● Last Communication: Feb 26, 2009, Thu 1:42 PM (GMT -5:00)

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

PEAK
0%   25%   50%   75%   100%

POWER NOW	0	Watts
REVENUE TODAY	$1.01	CAD
LIFETIME ENERGY	16	MWh
TOTAL REVENUE	$6,480.80	CAD

● SYSTEM OK   Listen

Last Updated: Feb 18, 2009, Wed 4:42 PM (GMT -5:00)

Cachelan
SMART GRID ENERGY

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 .


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
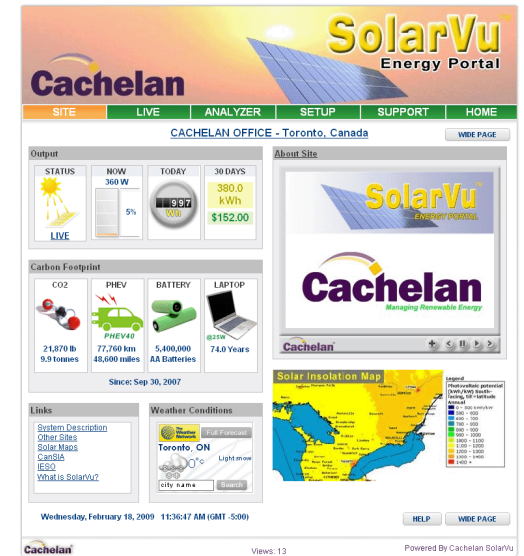
Select wide screen view for public display on an HDTV

LIVE view shows current conditions
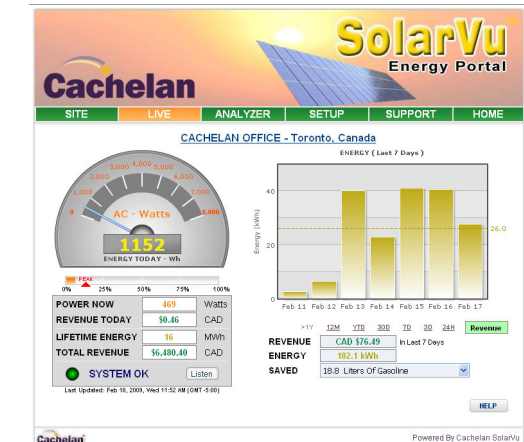
Live Data

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
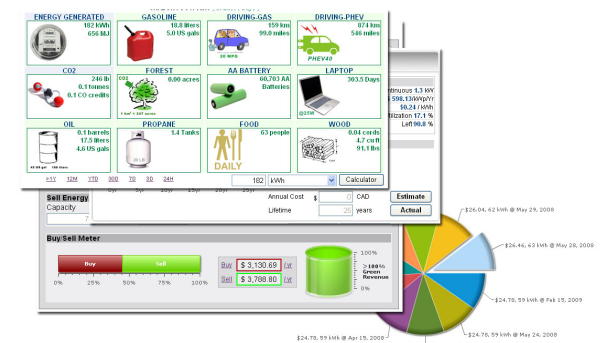
Analyzer - Troubleshooting

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
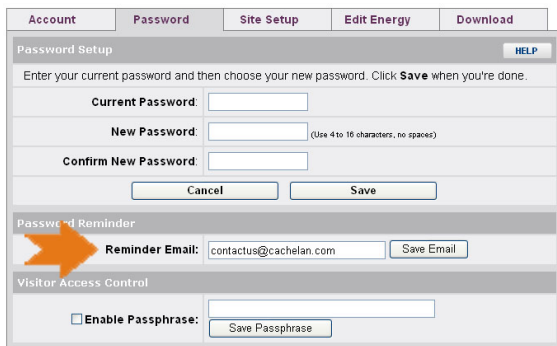
Support

See the What is SolarVu? video at www.solarvu.net for a feature overview. Each screen has a HELP button with details for the items on that view. A printable HELP guide can be downloaded in SETUP > DOWNLOAD.

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