

SolarVu™ Installation Guide for SANTERNO Sunway TG NA 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 SANTERNO Sunway TG NA 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

If smart combiners are also monitored by the SolarVu energy portal, see separate instructions for setup.

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 120VAC outlet for the gateway power dongle 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 inverter, however, the RS485 serial cable can run long distances, over 1000 feet, if necessary.

Power Supply: Temporarily unplug the K135 power dongle. Wire 120VAC control power from a suitable 15A circuit to the the internal receptacle and replace the cover securing the dongle with the reusable cable tie supplied.

RS485 Serial: Consult the Santerno Sunway TG NA installation manual for the location of terminal block X4 for wiring the RS485 connection. Route twisted pair cable through the inverter cable entry holes away from power conductors to the terminals marked 1,2,3 as shown in fig 2. 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 #1 (A) to K135 D+, inverter #2 (B) to K135 D- and inverter #3 (com) to K135 com as shown in fig 4. Shielded twisted pair wire is preferred for noise immunity but standard Cat5e, 8 wire, UTP, #24 cable may also work. If more than one inverter is to be monitored, daisy chain from the first inverter to the second etc. Do not connect in star configuration.

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. Alternatively, for multiple K135 gateways when smart combiners are included, connect to the LAN switch provided in the SolarVu enclosure. 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

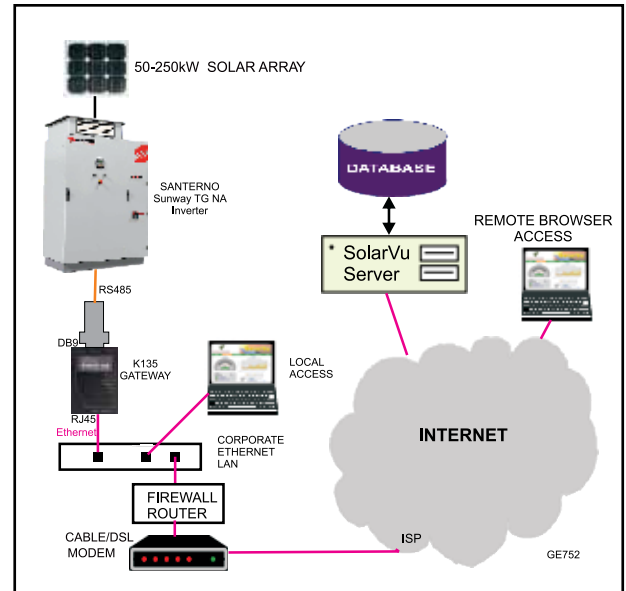


Fig 2 Santerno Sunway TG NA RS485 Connection

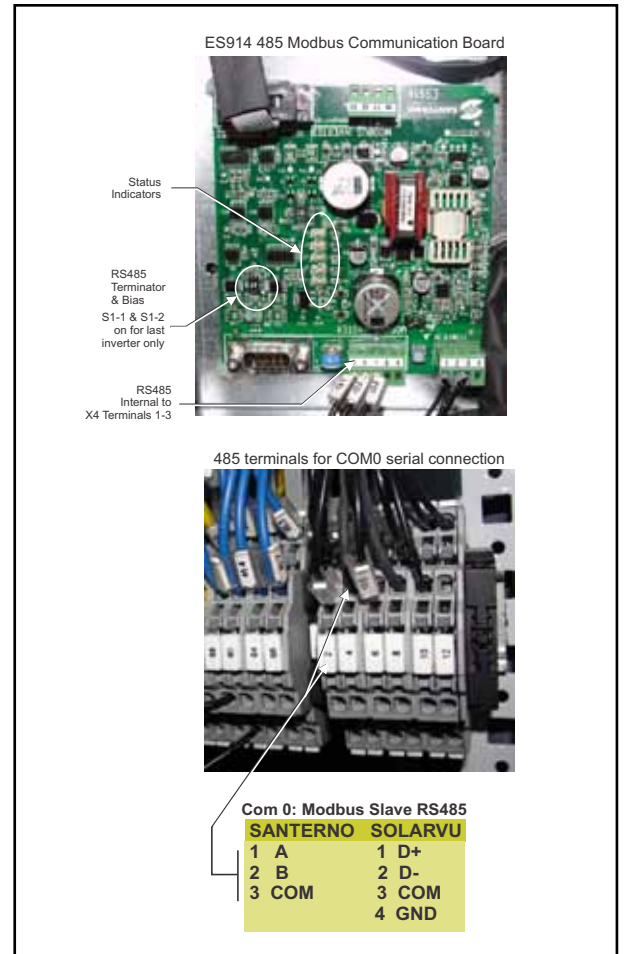
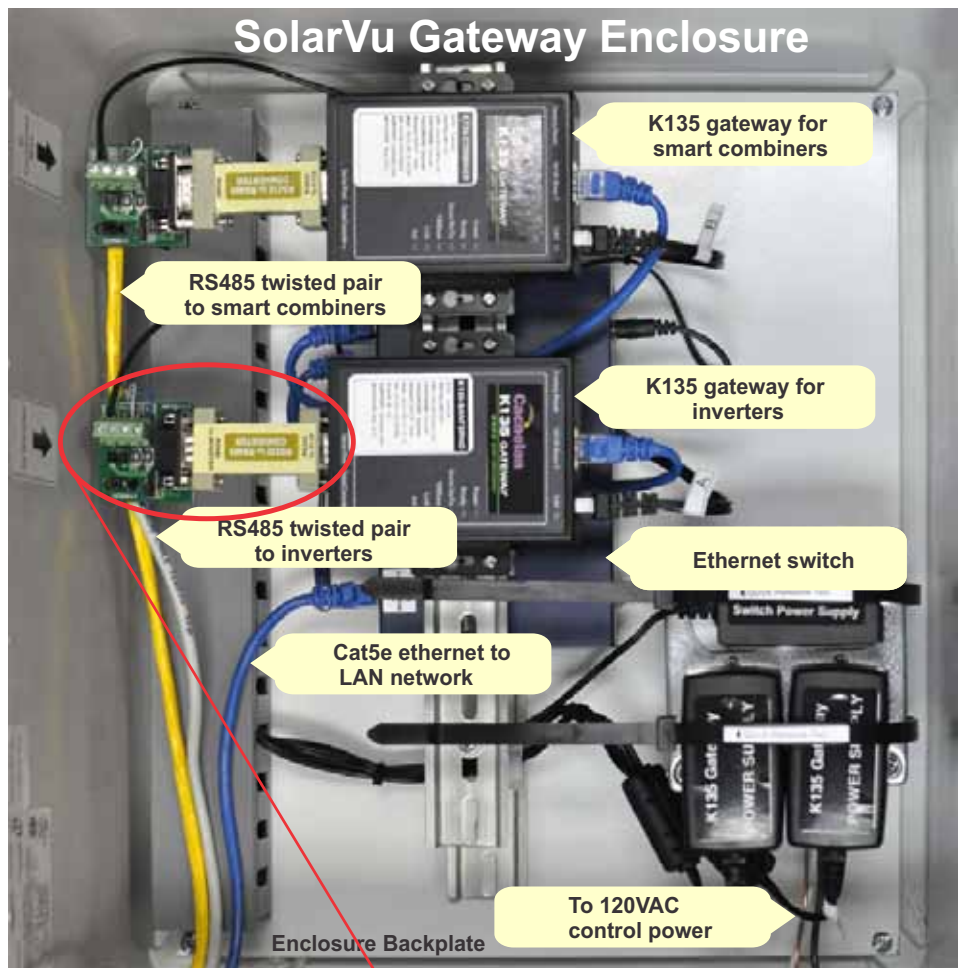


Fig 3 SolarVu enclosure typical connections



GE754

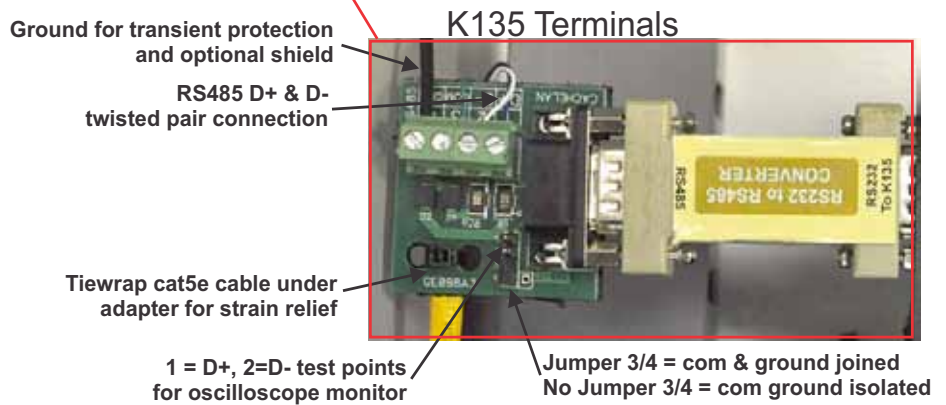
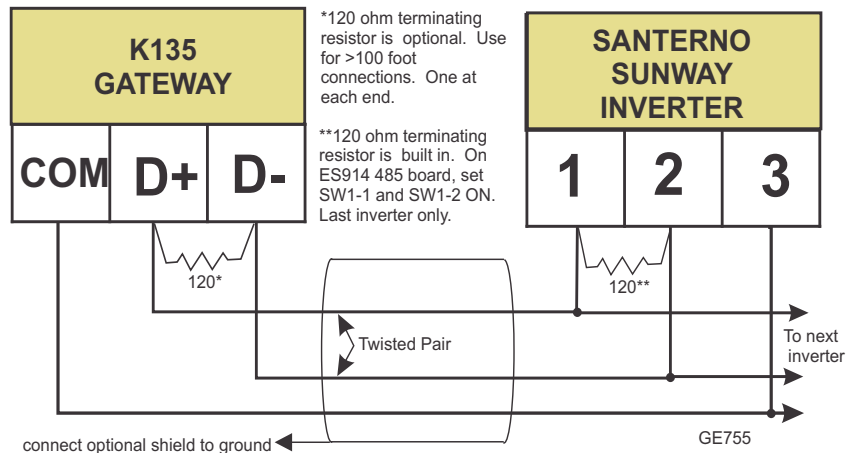


Fig 4 RS485 Serial connection from K135 gateway to inverter



GE755

Inverter Serial Communications Settings

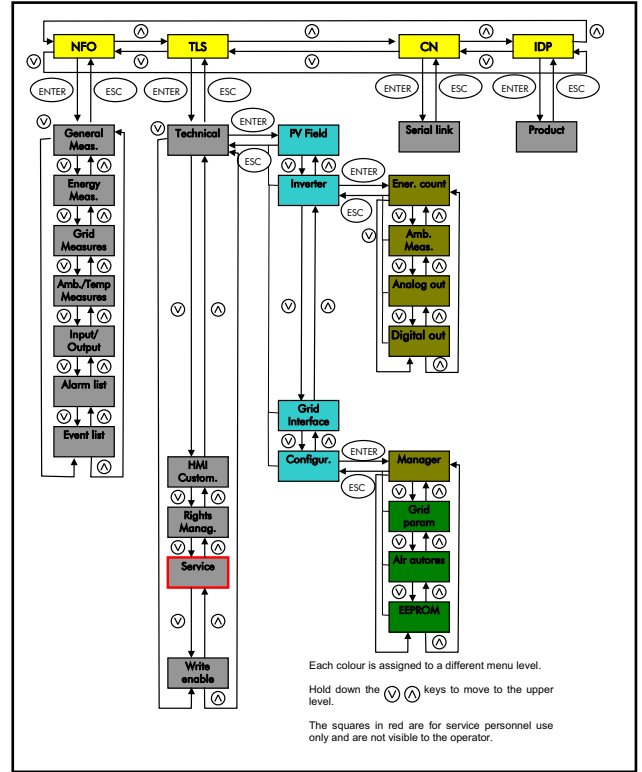
Each inverter must be configured with a unique RS485 address using the front panel keys and display for successful communications. The K135 gateway is pre-set with serial settings. The inverter(s) must be programmed to match these settings in order to communicate with the gateway. Settings for Modbus Com 0 slave interface link 0 should be set to:

- Interface Protocol:** ModBus
- Baud Rate:** 9,600 for link 0
- Parity:** None Data Bits: 8 Stop Bits: 1 for link 0
- Slave Address:** 1 (additional inverters 2, 3...) for link 0

Once the wiring is complete with the inverter powered on, consult the Santerno Sunway TG NA manual section 5. First enable parameter changes by selecting menu TLS parameter write enable P000 = 0001. Then change serial values with menu CN R001 = 1 (address) and CN R003 =9600 (baud rate). Menu navigation is 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 be assigned slave addresses of 1,2,3. Enter these settings using the front panel keys navigating the menus

Fig 5 Entering inverter communications settings



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.

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.



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

To access the inverter status screen, enter the SolarVu URL in your browser
Click ANALYZER

SITE	LIVE	ANALYZER	SETUP	SUPPORT	HOME		
Inverter Status HELP							
Time → Tuesday, December 20, 2011 1:57:43 PM (GMT -5:00)							
#1 (Device ID : 1) ← Inverter identification							
Lifetime Energy 31.0 kWh	DC Input	Power	17.2 kW	Voltage	314 V	Current	55 A
	AC Output	L1-L2 Voltage	341 V	L2-L3 Voltage	344 V	L3-L1 Voltage	340 V
Current Power 16.8 kW	Now	L1 Current	18 A	L2 Current	19 A	L3 Current	18 A
		Power	16.8 kW	VAR	0 W	Efficiency	96.3 %
Inverter	State	Power Factor	0.895	Frequency	60.0 Hz		
		Daily Energy	32.5 kWh	Operation	9 Hrs	Temperature	30 °C
		Model	SG100KC	Rated Power	100 kW	Type	3 Phase
		Run					
Listen <input type="checkbox"/>		Last Data Updated:		Dec 16, 2011, Fri 11:35 AM (GMT -5:00)			
Listen <input type="checkbox"/>		No Communication Since:		Dec 16, 2011, Fri 11:35 AM (GMT -5:00)			

Alarms and status reported by inverter

Light is green if K135 is reading valid data from the inverter over RS485. K135 must be connected to the internet.

Light goes green if K135 is connected to the internet

Time of last communication from gateway. K135 sends an update every 15 minutes.

Last update from inverter

Network Setup

If 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



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 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

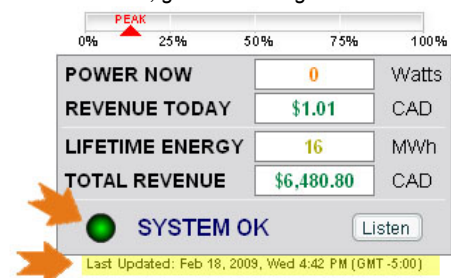
K135 front panel label with web address and login

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



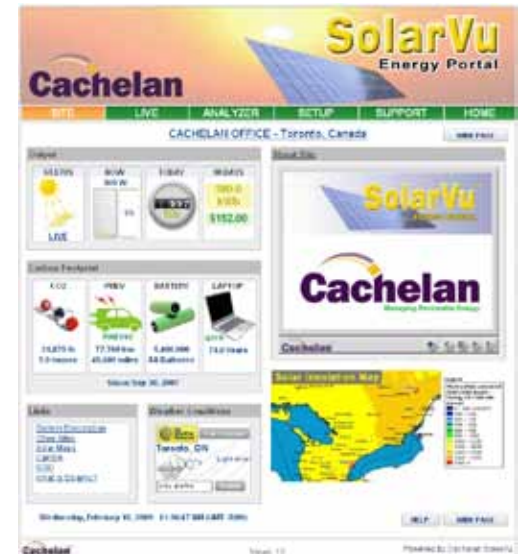
Site Screen

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.



Select wide screen view for public display on an HDTV

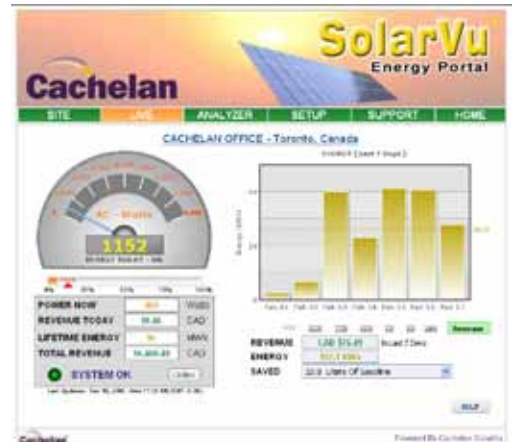
Site Summary Screen



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.

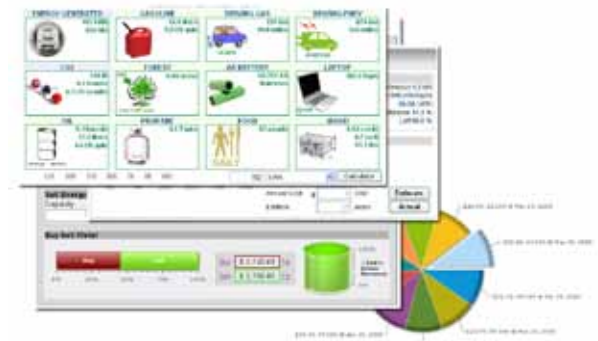


Trends are shown for the lifetime of the system using the graphs on the right. Select either an Energy or Revenue view using the button. Click the desired time period under the graph. Scroll over a data point with the mouse for more detailed information about that day. The carbon footprint pulldown gives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

ANALYSER - select performance views from pulldown

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.



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.



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.



Support

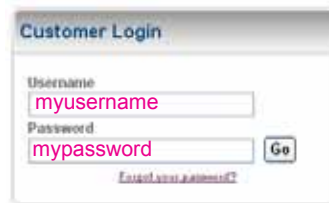
See the What is SolarVu? video at www.solarvu.net for a feature overview. Each screen has a HELP button with details for the items on that view. A printable HELP guide can be downloaded in SETUP > DOWNLOAD.

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

Click ANALYZER > INVERTER STATUS for troubleshooting

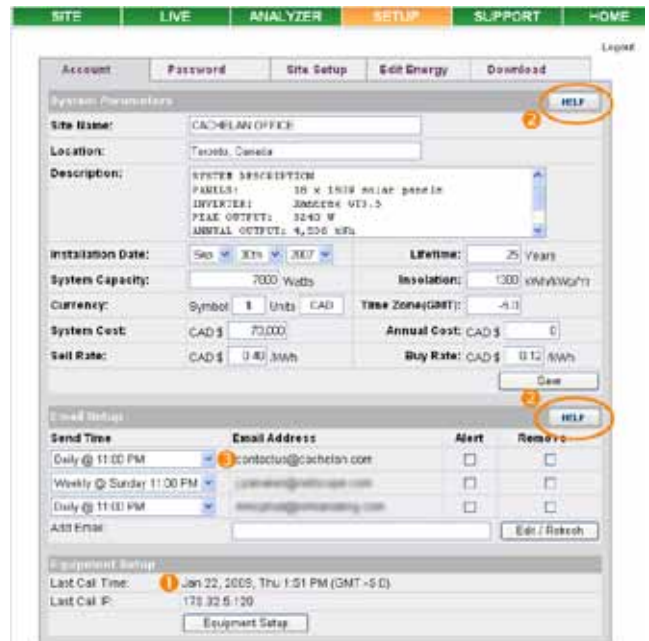


See K135 label for SETUP login



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



Cachelan Technical Support

contactus@cachelan.com

905.470.8400 x228