SolarVu™ Installation Guide
for Fronius IG Plus V 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 Fronius IG Plus V 3.0 - 12.0 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. Each inverter requires an optional RS422 comms card, Fronius #4,240,001 that must be purchased from Fronius and plugged in to the inverter. Each comms card has RJ45 jacks for serial IN and serial OUT connection. The K135 connects to inverters over RS422 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 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 K135 gateway in an enclosure with conduit to the inverter for the RS422 serial cable as shown in fig 2 or directly on the wall where mechanical protection is not required. An indoor location is preferred. The RS422 serial cable can run long distances, over 1000 feet, if necessary.

Power Supply: Plug the K135 converter power supply dongle into a 120VAC receptacle. Plug the matching dongle DC connector into the K135. Alternatively, if the K135 is supplied pre-wired in an enclosure, connect the 120VAC supply to the receptacle plug in the outlet box inside the enclosure. Source the 120VAC from a 15 amp breaker electrical circuit suitable for control power.

RS422 Serial: As shown in fig 3, remove the PC card cover plate ❶ and install the Fronius RS422 communication card ❷ in an empty slot in each inverter. Replace the PC card cover. Connect the RS422 serial cable from the K135 supplied DB9-RJ45 adapter to the RJ45-OUT❸ jack (nearest the back) on the first inverter communication board. Recommended cable type is Cat5e, 8 wire, UTP, #24 solid. The inverter RJ45-IN jack is either connected to a link plug ❹ (supplied) if only one inverter or connected to the next inverter if more than one as shown in fig 4. For multiple inverters, daisy chain OUT - IN jacks. The final inverter must have the RJ45 link plug ❹ installed in its RJ45-IN jack to complete the serial path. All inverters must be connected and have both AC and DC power for communication to work.

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 with the K135.

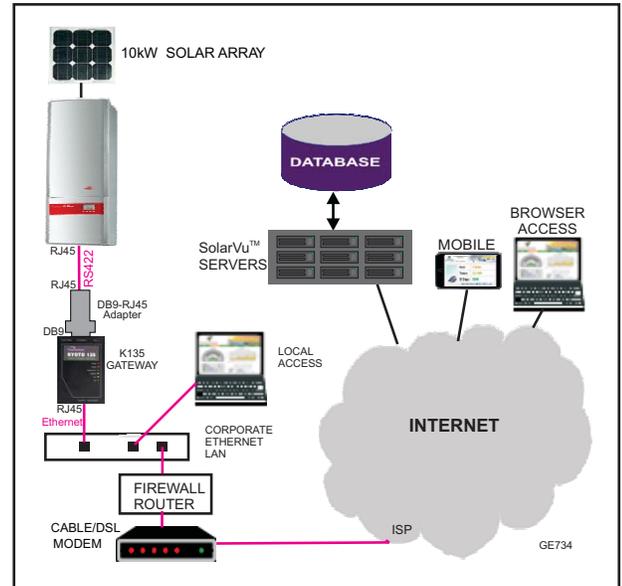*Fig 1 Internet Connection for single 10kW inverter*

Fig 2 K135 gateway connection

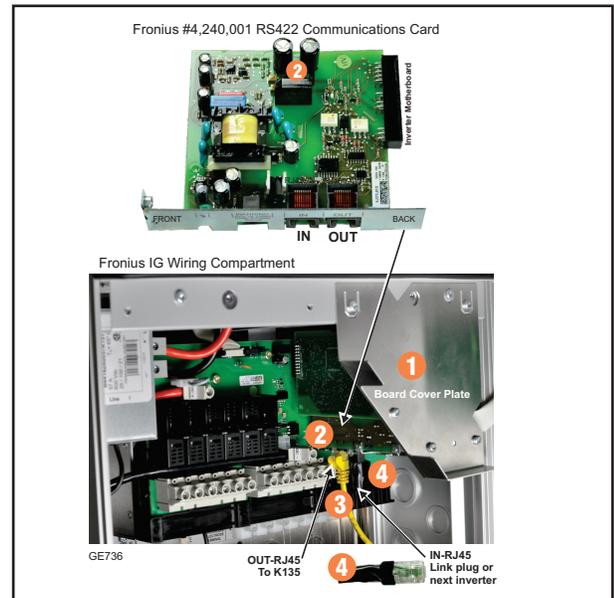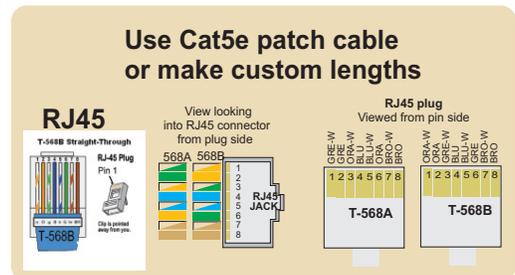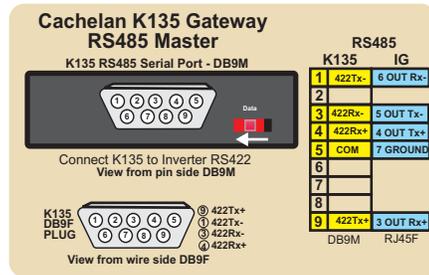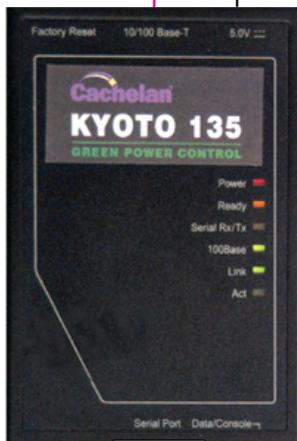
Fig 3 Fronius communication card installation

Fig 4 RS422 serial connections

Cachelan K135 Gateway RS485 Master

K135 RS485 Serial Port - DB9M

Connect K135 to Inverter RS422
View from pin side DB9M

K135 DB9F PLUG
⑨ 422Tx+
① 422Tx-
③ 422Rx-
④ 422Rx+

View from wire side DB9F

RS485			
K135		IG	
1	422Tx-	6 OUT Rx-	
2			
3	422Rx-	5 OUT Tx-	
4	422Rx+	4 OUT Tx+	
5	COM	7 GROUND	
6			
7			
8			
9	422Tx+	3 OUT Rx+	
DB9M		RJ45F	

Use Cat5e patch cable or make custom lengths

RJ45

T-568B Straight-Through
RJ-45 Plug
Pin 1
Clip is pointed away from you.
T-568B

View looking into RJ45 connector from plug side
568A 568B

RJ45 JACK

RJ45 plug
Viewed from pin side

GRE-W GRE ORA-W BLU BLU-W ORA BRO-W BRO
1 2 3 4 5 6 7 8
T-568A

ORA-W ORA GRE-W BLU BLU-W GRE BRO-W BRO
1 2 3 4 5 6 7 8
T-568B

Single Inverter Connection

Fronius IG Inverter
OUT   IN

LINK PLUG
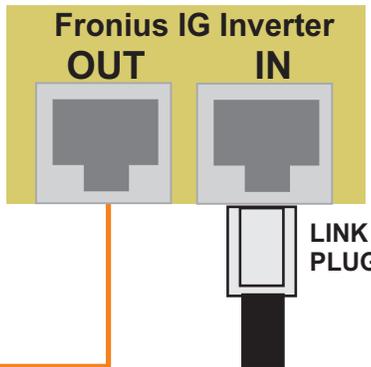
Internal RS422 Connections

IG Plus Slave Comm Card
RS422 DRIVER

K135 Master RS422
RS422 DRIVER

*IN RJ45 must be connected
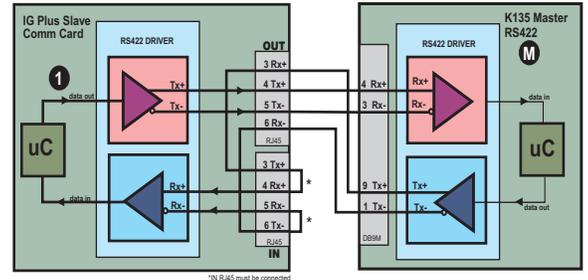
Serial Communications for Multiple Inverters

Fronius IG Inverter
OUT   IN

Fronius IG Inverter
OUT   IN

Fronius IG Inverter
OUT   IN

LINK PLUG

RS422   RS422   RS422
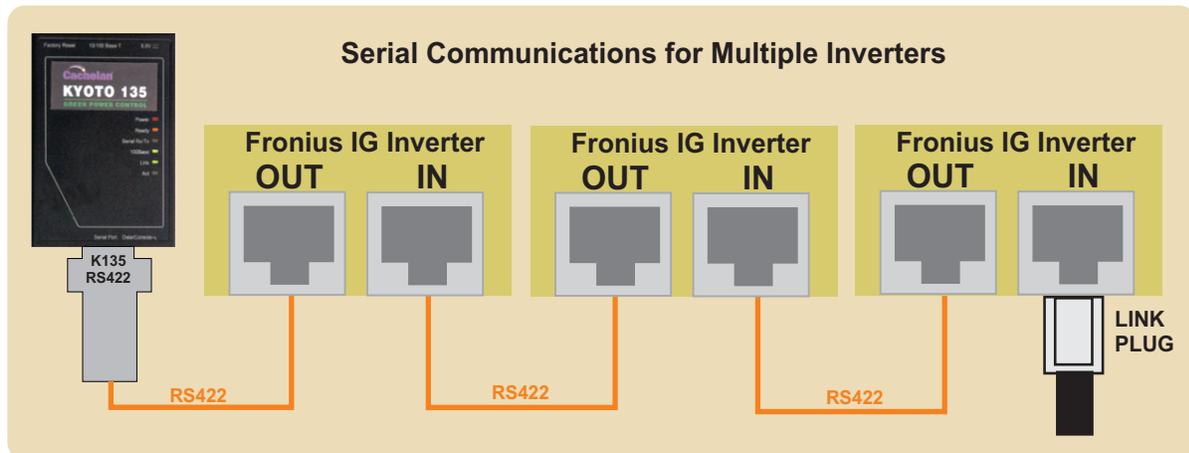
Inverter Serial Communications Settings

Each inverter must be configured with a unique RS422 address using the front panel keys and display for successful communications. The K135 gateway is preset to match the inverter factory default serial parameters which can be accessed from Setup --> Menu

Access Code: 22742
Interface Protocol: IFP
Baud Rate: 2,400
Parity: None   **Data Bits:** 8   **Stop Bits:** 1

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 as described in the Fronius IG Plus manual shown in fig 5.

With multiple inverters, for easy identification, record which address was assigned by serial number and identify its physical array such as

Address: 1 Serial No: 185674 Location: west roof
Address: 2 Serial No: 184890 Location: east roof

When viewing inverter values in SolarVu this will make it easier to identify which part of the system is being displayed as shown in the Analyzer > Inverter Status screen fig 6a and 6b.

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 6 are useful for determining the status of the system.

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

Fig 5 See Fronius IG Inverter manual for communications settings programming instructions

Program serial settings in Fronius IG inverter.
Click button to play video.

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

Time of last update received from the K135 gateway

Inverter Identification

Measured values from the inverter

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. K135 sends an update every 15 minutes

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

Connect to RJ45 LAN (see IP settings) **RJ45 ETHERNET**

Connect to 120VAC power supply **5Vdc POWER**

Factory Reset 10/100 Base-T 5.0V

Cachelan®
KYOTO 135
GREEN POWER CONTROL

Power
Ready
Serial Rx/Tx
100Base
Link
Act
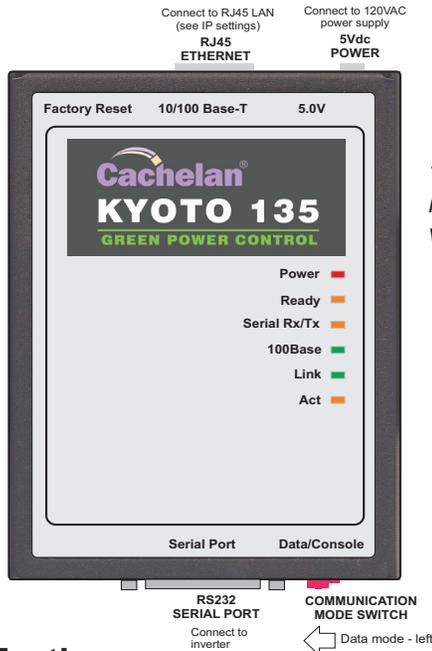
Troubleshooting with K135 indicators. Click button to play video.

Serial Port   Data/Console

RS232 SERIAL PORT
Connect to inverter

COMMUNICATION MODE SWITCH
Data mode - left

K135 Status Indicator Interpretation

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

INDICATOR STATUS

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 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 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
PERFORMANCE	Efficiency	88.6 %	Frequency	60.0 Hz	Heat Sink	36 C
TODAY	Energy	5,325 Whr	Max Power	3.35 kW	Online	06h 17m
LIFETIME	Energy	8,150 kWh	Revenue	$ 3,423.00	Run Time	607 Days

Inverter AC Watts
898

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 .
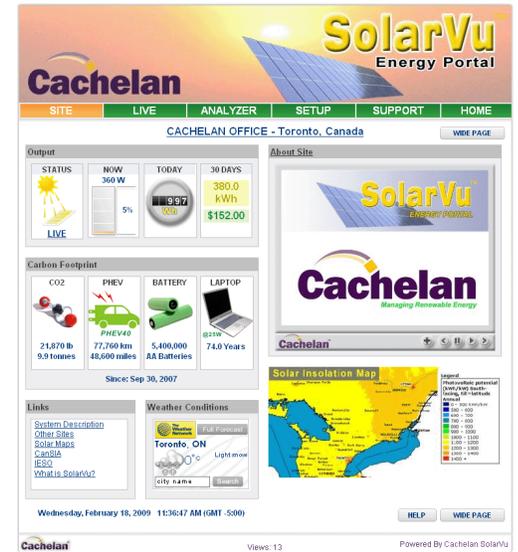
Help guide

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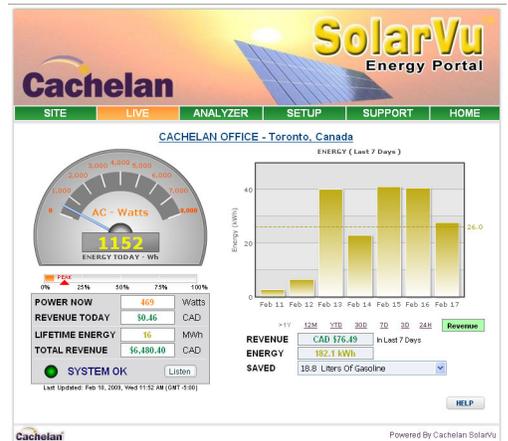
Trends are shown for the lifetime of the system using the graphs on the right. Select either an Energy or Revenue view using the button. Click the desired time period under the graph. Scroll over a data point with the mouse for more detailed information about that day. The carbon footprint pulldown gives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

LIVE view shows current conditions

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
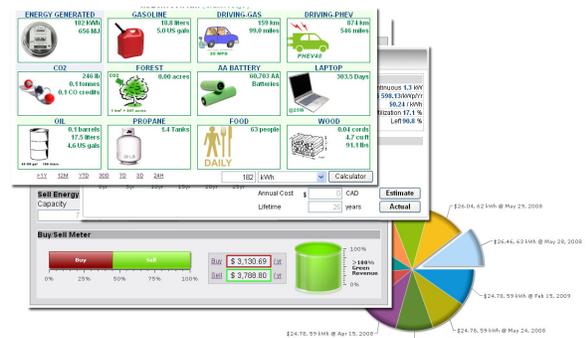
Analyzer - Troubleshooting

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