Site Preparation

SolarVu® is an energy portal that enables remote monitoring of renewable energy generation sites over the web. It requires the installation of a K135 gateway which continuously transfers data from the inverter. This guide explains how to connect the K135 gateway to an AE 500NX inverter.

The AE 500NX has a Moxa communication module with multiple RJ45 jacks of which only Port P3 is used for serial RS485. Be careful to plug into the correct jack as shown in fig 2 as they all look similar but are for different purposes. To access SolarVu from a browser, the inverter is connected to the internet through a Cachelan K135 gateway using twisted pair wire, typically cat5e. An RJ45 ethernet jack, connected to the LAN network and 120VAC outlet for the gateway power dongle are required. The LAN must have high speed internet service to an ISP to provide a gateway to the internet as shown in figure 1.

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 internal receptacle and replace the cover securing the dongle with the reusable cable tie supped.

RS485 Serial: Consult the AE 500NX installation manual and fig 2 for location, wiring and default ModBus RTU RS485 serial communications of slave address 22, 9600 baud. An adapter is provided for connecting RJ45 port 3 to terminals to allow using twisted pair wire between the inverter and the K135 gateway. Connect the other end of the twisted pair cable in the SolarVu enclosure to the K135 gateway terminals as shown in fig 2. Shielded twisted pair wire is preferred for noise immunity but standard Cat5e, 8 wire, UTP, #24 cable may also work. Use a standard ethernet patch cable with RJ45 connectors of the appropriate length to connect from the K135 to the network ethernet at a RJ45 wall jack or the router/switch.
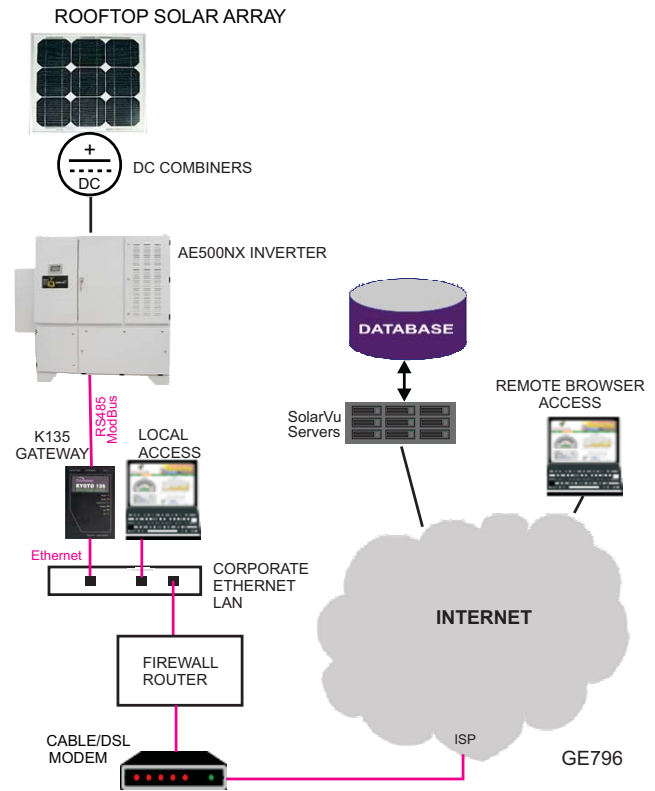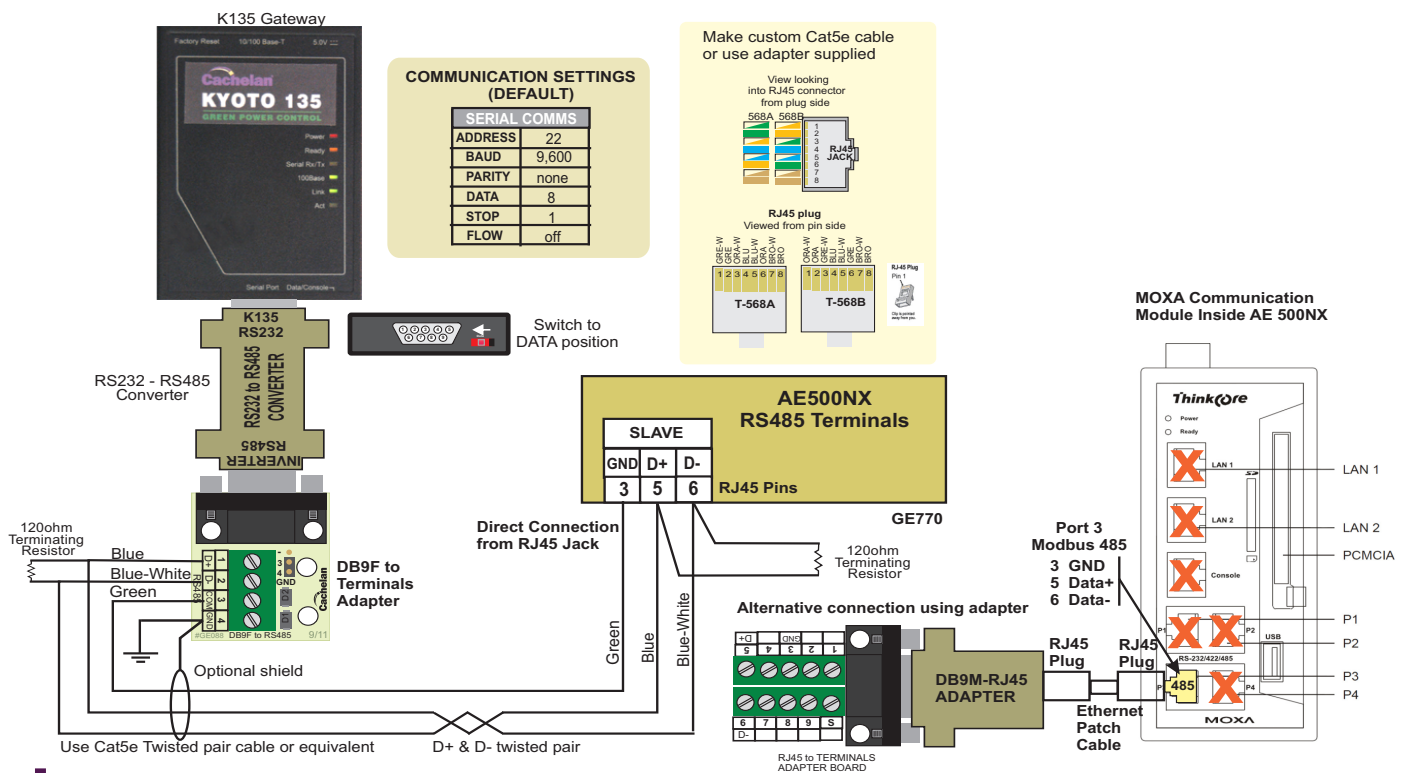
Fig 1 Internet Connection

Fig 2 K135-AE inverter connections

SERIAL COMMS	
ADDRESS	22
BAUD	9,600
PARITY	none
DATA	8
STOP	1
FLOW	off

COMMUNICATION SETTINGS (DEFAULT)

SolarVu® Installation Guide for AE 500NX Inverter

1

Configure Inverter with ModBus Settings

After installing the communication wiring, the inverter must be configured with ModBus communication settings to match the K135 gateway for successful communication to occur. If the inverter ships with its default settings as shown in fig 3, which have been programmed into the K135 gateway, it should begin communicating with SolarVu once a connection is made with no changes required. To check, consult the AE500 manual section 5 for login using the internal web browser which requires a user name and password provided with the inverter.

Fig 3 Configure inverter with default ModBus RS485 settings

Inverter Status

Once the inverter is connected to the SolarVu K135 gateway, powered on and set up for communications with an internet connection, data will be sent to the SolarVu server. From a browser, log in to the SolarVu energy portal (URL shown on the K135 gateway label and configuration sheet) and select ANALYZER --> Inverters. The lower indicator goes green when there is a valid internet connection. Once the internet connection is made, the upper light will go green if the K135 is able to communicate with the inverter. Ensure the internet is working first. Check network settings if the No Communications Since internet indicator does not come on within a few minutes. With the internet connection working, if the inverter Last Data Updated indicator does not go green, consult the inverter manual section 5 and verify the communications settings are correct.

Fig 4 SolarVu Analyzer - Inverter status screen

Inverter ModBus slave address Default = 22

Green = K135 Gateway communicating with inverter

Green = K135 Gateway internet connection successful

Data appears here when available

Last communication time from K135 Gateway to SolarVu over internet

Download instructions

SolarVu® Installation Guide for AE 500NX Inverter

Network Setup

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

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	OFF No DHCP or static IP address. Check IP settings, ethernet connection
SERIAL	FLASHING	OFF Check RS232 to inverter connection. Inverter may be off.
100Base	ON	ON- 100Base, OFF- 10Base or no ethernet connection
Link	ON	OFF No ethernet connection
Activity	FLASHING	FLASH - data traffic activity

TROUBLESHOOTING CHECKLIST	
IP	Obtain IP by DHCP or set static IP. Network configured to recognize K135
Serial	RS232 serial cable connected between inverter and K135
Inverter	Inverter is powered 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. 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 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 after the URL.

Once the website 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.

If the K135 gateway is successfully collecting data from the inverter, 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 serial connection to the inverter and that it is operating. When both lights are green the gages on the SITE screen will display live data and graphs will begin recording site energy output.

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: Xantrex GT

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

Xantrex GT (North Array)

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 27m
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)

SolarVu® Installation Guide for AE 500NX Inverter

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
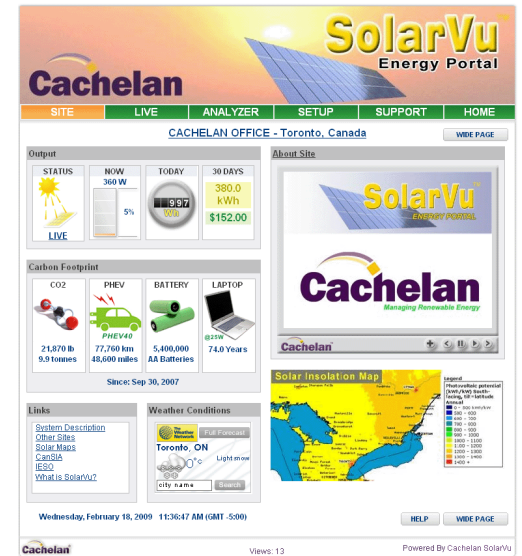
Live Data

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
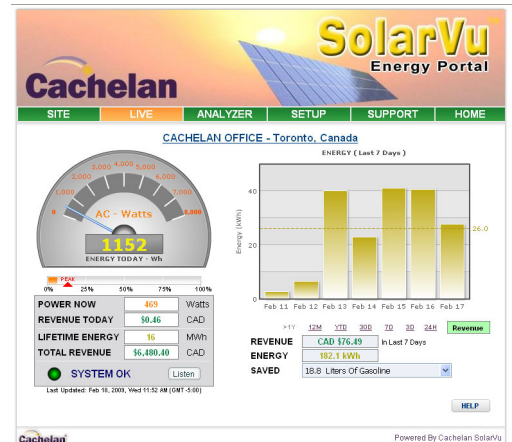
Analyzer - Performance

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
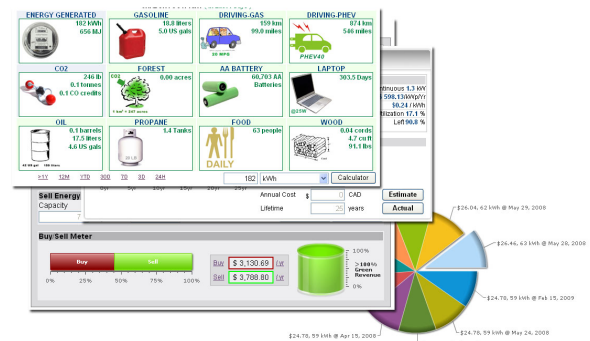
Analyzer - Troubleshooting

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.

*Download printable HELP guide
or actual readings for any time period*

Xantrex GT (North Array)

DC INPUT	POWER	903.0 W	Volts	294.1 V	Amps	3.07 A
AC OUTPUT	POWER	793.0 W	Volts	212.4 V	Amps	3.90 A
PERFORMANCE	Efficiency	87.8 %	Frequency	60.0 Hz	Heat Sink	37 C
TODAY	Energy	7,132 Whr	Max Power	3.35 kW	Online	08h 20m
LIFETIME	Energy	8,151 kWh	Revenue	$ 3,423.42	Run Time	607 Days

Inverter AC Watts **793**

Listen ● Last Data Updated: Feb 26, 2009, Thu 3:42 PM (GMT -5:00)
Listen ● Last Communication: Feb 26, 2009, Thu 3:42 PM (GMT -5:00)

Xantrex GT (South Array)

DC INPUT	POWER	727.0 W	Volts	300.4 V	Amps	2.42 A
AC OUTPUT	POWER	640.0 W	Volts	211.8 V	Amps	3.13 A
PERFORMANCE	Efficiency	88.0 %	Frequency	60.0 Hz	Heat Sink	36 C
TODAY	Energy	5,609 Whr	Max Power	2.36 kW	Online	08h 18m
LIFETIME	Energy	8,175 kWh	Revenue	$ 3,433.50	Run Time	607 Days

Inverter AC Watts **640**

Listen ● Last Data Updated: Feb 26, 2009, Thu 3:42 PM (GMT -5:00)
Listen ● Last Communication: Feb 26, 2009, Thu 3:42 PM (GMT -5:00)

Account	Password	Site Setup	Edit Energy	Download

Energy Records (.csv) HELP

Last 7 days (in hrs)	Download
Last 7 days	Download
Last 30 days	Download
Last 12 months	Download

Document

SolarVu Brochure	Download
Printed Help	Download

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

Customer Login

Username
myusername
Password
mypassword [Go]
Forgot your password?

```
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: Outback Mate
DATE: Feb 2009
SUPPORT: cachelan.com
```

Configure site settings in SETUP

SITE	LIVE	ANALYZER	SETUP	SUPPORT	HOME

Logout

Account	Password	Site Setup	Edit Energy	Download

System Parameters HELP ❷

Site Name:	CACHELAN OFFICE
Location:	Toronto, Canada
Description:	SYSTEM DESCRIPTION PANELS: 18 x 180W solar panels INVERTER: Xantrex GT3.5 PEAK OUTPUT: 3240 W ANNUAL OUTPUT: 4,536 kWh

Installation Date:	Sep 30th 2007	Lifetime:	25 Years
System Capacity:	7800 Watts	Insolation:	1300 kWh/kWp/Yr
Currency:	Symbol $ Units CAD	Time Zone(GMT):	-5.0
System Cost:	CAD $ 70,000	Annual Cost: CAD $	0
Sell Rate:	CAD $ 0.40 /kWh	Buy Rate: CAD $	0.12 /kWh

Save

Email Setup ❷ HELP

Send Time	Email Address	Alert	Remove
Daily @ 11:00 PM	❸ contactus@cachelan.com	☐	☐
Weekly @ Sunday 11:00 PM	j.panase@ebcape.com	☐	☐
Daily @ 11:00 PM	tom.jma@xmaxeng.com	☐	☐
Add Email:		Edit / Refresh	

Equipment Setup
Last Call Time: ❶ Jan 22, 2009, Thu 1:51 PM (GMT -5.0)
Last Call IP: 173.32.5.120
Equipment Setup

Account	Password	Site Setup	Edit Energy	Download

Password Setup HELP

Enter your current password and then choose your new password. Click **Save** when you're done.

Current Password:	
New Password:	(Use 4 to 16 characters, no spaces)
Confirm New Password:	

Cancel   Save

Password Reminder
➡ Reminder Email: contactus@cachelan.com Save Email

Visitor Access Control
☐ Enable Passphrase: Save Passphrase

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

SolarVu® Installation Guide for AE 500NX Inverter