Pro Control User Manual

Version 1.2 2010.08

Contents

1. Operating Pro Control

1.1. Document History

Version	*Date*	*Description*	*Author*
1.0	16-Dec-2009	The First official release of this document.	Scott Lin
1.1	26-Jan-2010	Pro Control : Ver.2.5.0.6 EZ Logger Lite: Ver.3.1.CV93.EZ.NOB.9917	Scott Lin
1.2	26-Aug-2010	Pro Control : Ver.2.5.1.0 EZ Logger Lite: Ver.3.1.CV93.EZ.NOB.0305	Scott Lin

After installing Pro Control, locate its icon or the desktop shortcut and double-click to start the program.

Figure 1-1 Pro Control Icons

1.2. Pro Control Main Menu

Figure 1-2 Main Menu

The following table introduces the main menu and toolbar shortcuts.

Table 1-1 Pro Control Main Menu and Toolbar	
Field	**Definition**
File	Use this menu to export or import inverter data, view the error history, or exit this program.
Setting	Use this menu to configure the communication methods, change the language, choose a background images, configure how Pro Control sends reports, and send test Mail, SMS, and FAX alerts.

Inverter	Use this menu to remove or reconnect networked inverters, change the monitored channels, define group settings and view group graphs, directly edit parameter settings on the inverter itself, generate real-time and history graphs, assign an alias for the current inverter, or reset the total converted energy and the hours of operation of operation counter for the currently selected inverter.
Record	Use this menu to set the sampling rate and schedule for recording inverter data, and start and stop recording.
EZ Logger	Use this menu for the currently selected EZ Logger, to connect, backup or restore recorded data, clear recorded data, display the available memory, or assign an alias description.
View	Use this menu to customize the displayed toolbars.
Help	Use this menu to open this help file or view software version information.
	Click this button to export/import the selected inverter's data
	Click this button displays the error history for the current inverter
	Click this button change report settings
	Click this button change inverter parameters
	Click this button generate a graph of the current inverter data
	Click this button change the record settings
	Click this button backup/restore EZ Logger data
	Click this button view EZ Logger memory status
	Click this button generate an energy graph of the current inverter data

1.3. Root List

Currently connected inverters are displayed in the Root-List on startup. The following figure displays the root list populated with inverters.

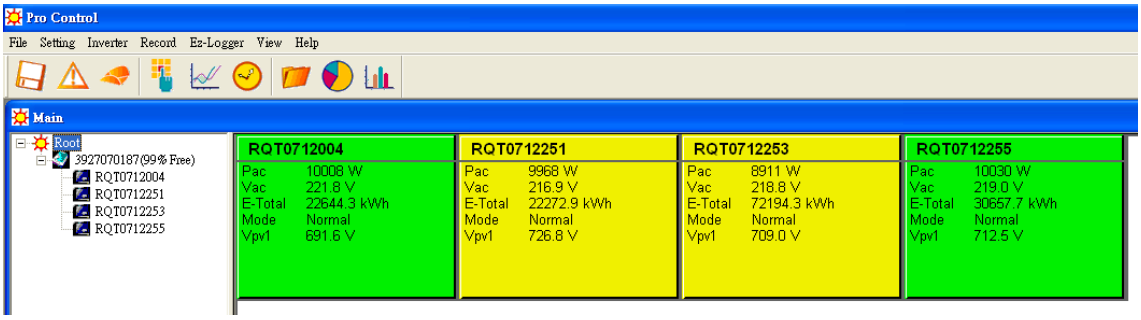

Figure 1-3 Overview

1.4. Start the Main Window

After starting the program, the Main window is blank. Select an inverter from the Root-List. The right panel displays that inverter's information.

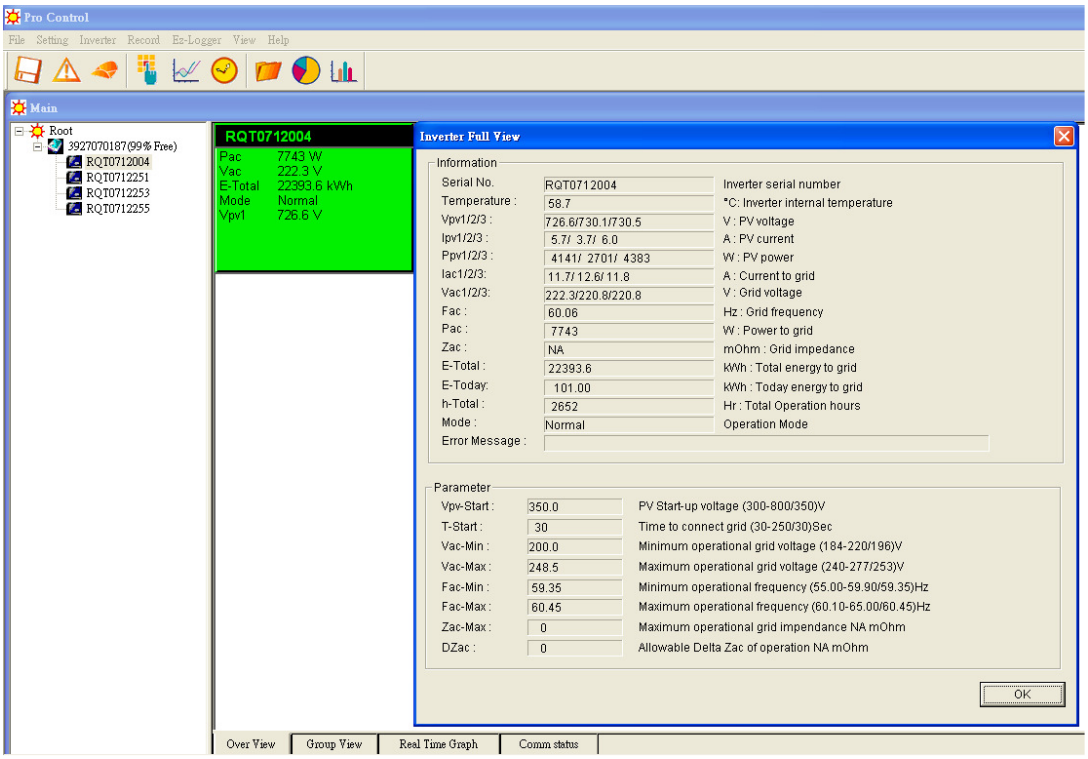

Figure 1-4 Main Window

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1.5. Change the Display Language

The software interface supports multiple languages option. To change the language, select the **Setting** menu and then **Language** to see a list of available languages.

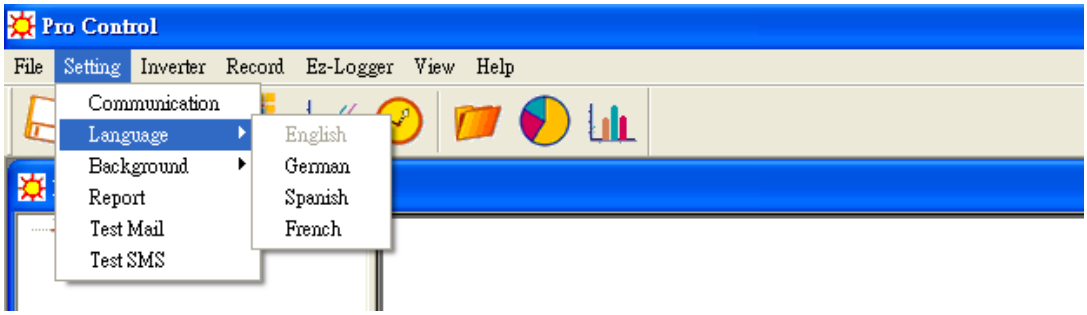

Figure 1-5 Changing Language

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1.6. Standby Mode

After a long period of inactivity, most computers will enter a power saving mode, and switch off the hard disk. This program will stop recording when your computer enters standby mode. For continuous monitoring you need to disable your computer's standby mode. To disable your computers standby mode, click the Start Menu->Settings->Control Panel->Power Options.

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1.7. Changing an Inverter's Name

Inverters are listed under their serial number. You may want to change the serial number to a meaningful name such as the inverter type or location. Double click the left mouse button over the desired inverter, and then type in the new alias. Now press the 'enter' or 'return' key to keep the new name.

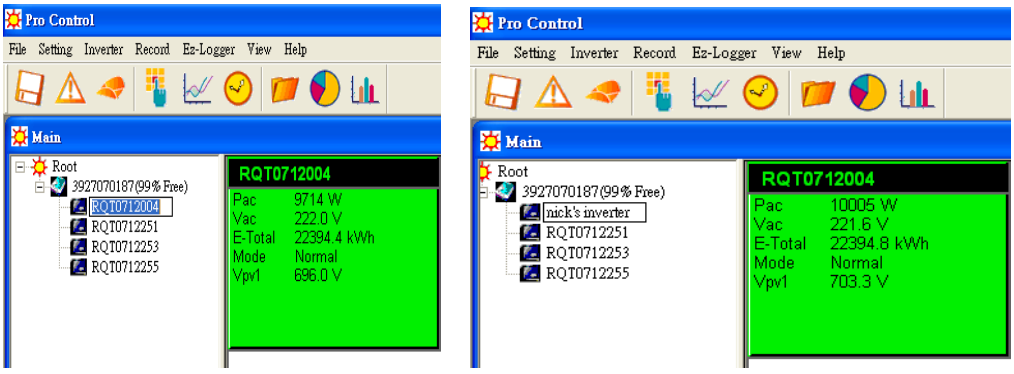

Figure 1-6 Changing an Inverter's Name

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2. Connecting your PV Inverter(s)

Every inverter is equipped with a serial port. Directly connect your inverter to your PC via a serial cable and the RS232 ports on the corresponding devices. Alternatively, you can use the RS232 port to connect the inverter to a modem.

2.1. Direct Serial Connection

Connect an RS232 cable from the serial port on your computer to the corresponding port on your inverter.

The default settings of Pro Control are already optimally configured for most equipment. It is recommended that these settings with exception to the Com Port remain unchanged. To display or edit these settings please see Serial and Ethernet Communication Settings.

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2.2. Serial Connection via Modem

Connect the modem to your PC via the RS232 port. Select **Modem**, in the communication settings. Now enter the dial number of the receiving modem connected to the inverter. After connection is established, available inverters display in the Root List.

The cable to connect inverter to modem is a dedicated female-to-female type. Please contact your local dealer to obtain this cable.

2.3. Serial and Ethernet Communication Settings

To configure Pro Control for Ethernet or serial (RS232) connection, click **Setting** from the main menu, and then select **Communication**. The following window displays.

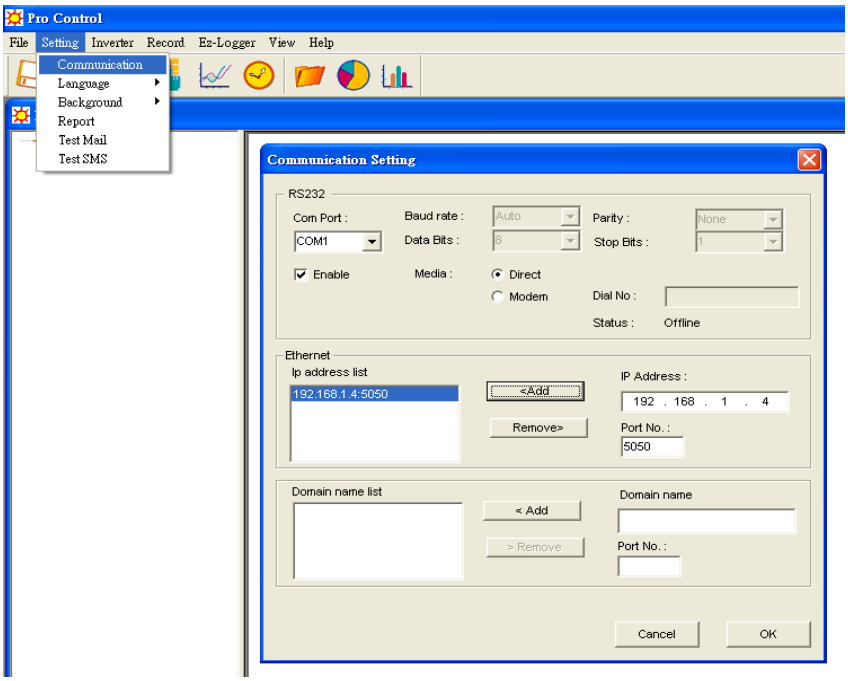

Figure 2-1 Communication Setting

The following table describes the fields in this screen.

Table 2-1 Communication Settings	
Field	**Definition**
RS232	
Com Port	Select **Com Port** connected from your PC to the modem.
Enable	Click to enable serial communication
Baud Rate	This field specifies the maximum number of bits transmitted per second. The default Baud Rate setting is set to **AUTO**. However, if the Pro Control cannot find your inverter, select the lowest Baud Rate. Once connection is established, you can try faster rates to obtain the best connection.
Parity	Setting the parity is optional and used for error checking. Select from **odd**, **even**, or **None** (default).
Data Bits	This field specifies how many bits are sent with each packet of data. The default value is **8** and corresponds to the same settings on the remote inverter.
Stop Bits	The stop bit duration indicates the end of data transmission (default setting is **1**).
Media	
Direct	Select the method of connection to your inverter. Use **Direct** if the inverter is connected to your PC with a serial cable. Select **Modem** if your inverter is remotely connected via a network.
Modem	
Dial No.	Enter the number of the receiving modem.
Status	This field displays the inverter connection status.
Ethernet Multiple inverters can be monitored remotely over an Ethernet network. You need to know the IP address of each inverter you wish to connect.	
< Add / > Remove	To add a remote inverter to the list of remote inverters, type its **IP Address** and then click **< Add**. To remove an entry from the list of remote inverters, select the inverters IP address and then click **> Remove.**
IP Address	Enter the IP address of the remote inverter and click **< Add** to append that inverter to the list of remote inverters.
Port No	The default port settings for all inverters is 5050
Cancel	Click this button to exit the current window without saving.
Ok	Click this button to save your settings and exit the current window.

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2.4. Hardware wiring and RS485 settings

RS485 interface uses a higher voltage than RS232, and therefore it is recommended for use over long distances between inverters and PC.

There are four pins in a RS485 card, T+, T-, R+, and R-. If you want to link each inverter by a four-wire cable, be sure to make the correct connections.

You can also link each inverter via the telephone line (recommended).

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2.5. Connecting multiple PV Inverters

If you want to connect multiple inverters, the optional RS485 card (optional) for each inverter is required. The RS485 card allows connection of multiple inverters in series. The first inverter connects your computer via an RS485-to-RS232 converter. The next inverter connects to the RS485 card of the first inverter. Subsequent inverters are daisy chained in the same fashion.

For more detailed information please refer to the RS485 card's manual.

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2.6. Troubleshooting your Connection

If the Root-List is empty then no inverter is detected. Please see the following procedure:

a) RS232 Connection

- Check the cable connections between inverter and computer. Make sure both ends are well connected.
- Make sure there is no card in the RS485 expansion slot as it disables communication with RS232.

b) RS485 Connection

- Check the RS485 card on each inverter is inserted correctly.
- Check the connection between inverters. The four wires on each terminal blocks (R+, R-, T+, T-) are fully secured.
- Check the wire connections on the RS485-to-RS232 converter. The terminals (R+, R-, T+, T-) on RS485 card must be connected to (T+, T-, R+, R-) respectively on the converter as the following table displays.

Table 2-2 Wire Communication Exchange

RS485-to-RS232 converter	The inverters communication card
R+	T+
R-	T-
T+	R+
T-	R-

c) Check the COM PORT settings in Pro Control are correct; see Serial and Ethernet Communication Settings

d) Click **Inverter** from the main menu, and then **Connection**. Now select “Re-register All” to refresh the connections to your inverters.

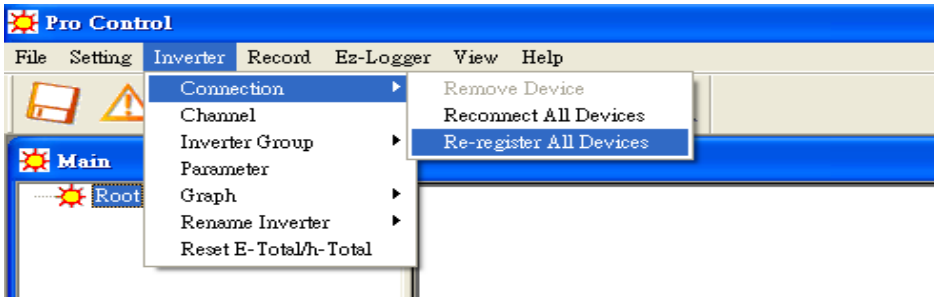

Figure 2-2 Troubleshooting Inverter Connections

e) Please close Pro Control and then restart the program.

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3. Inverter Parameter and Data

3.1. Adjusting inverter parameters

The parameters of each inverter can be adjusted remotely with Pro Control. In the Root-List select the desired inverter to change. Click **Inverter** in the main menu and then **Parameter**, to enter the parameter settings window.

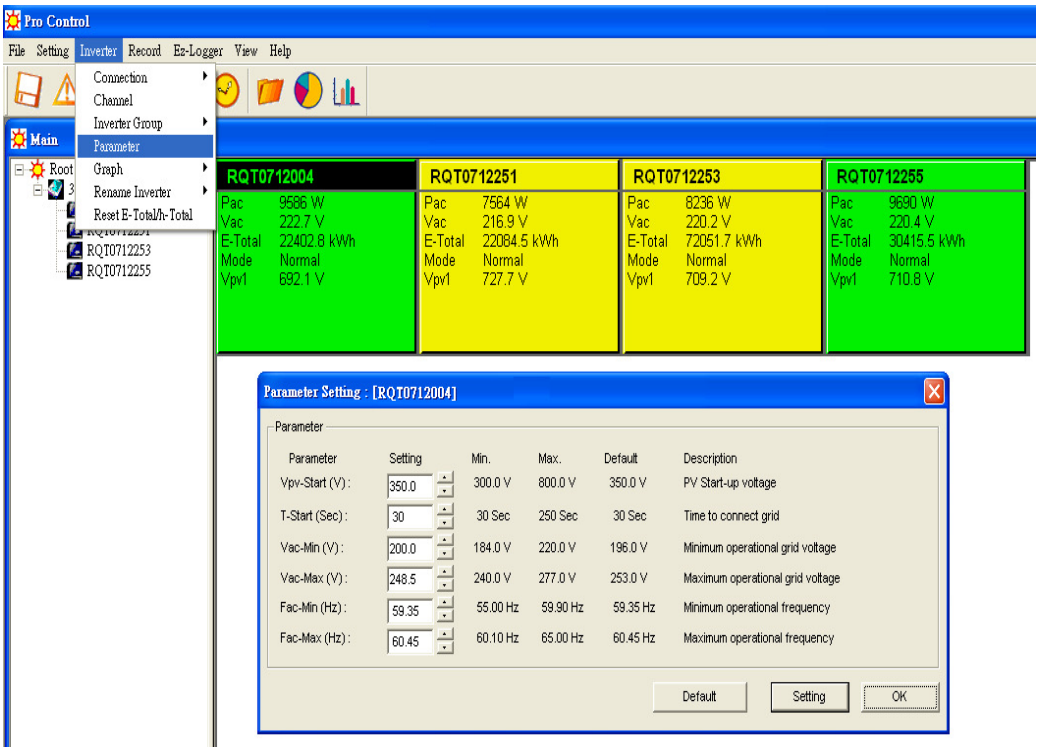

Figure 3-1 Parameter Setting

The following table describes the parameters in this screen.

Table 3-1 Parameter Setting	
Parameter	**Definition**
Vpv-Start(V)	This is the voltage required to start the inverter.
T-Start(Sec)	This is the time delay between reconnecting to the grid (i.e. after a fault)
Vac-Min(V)	This is the minimum voltage that the inverter maintains grid connection.
Vac-Max(V)	This is the maximum voltage that the inverter maintains grid connection.
Fac-Min(V)	This is the maximum frequency that the inverter maintains grid connection.
Fac-Max(V)	This is the maximum frequency that the inverter maintains grid connection.
Zac-Max(mOhm)	This is the maximum impedance that the inverter maintains grid connection
Dzac(mOhm)	This is the maximum rate of change of impedance allowed by the inverter to maintain grid connection.

To avoid accidental alteration of parameter settings, a password is required. To obtain this password please contact your local dealer.

Figure 3-2 Password

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3.2. History Graphs

To display the data history graph for an inverter, first select the inverter's name in the Root List. Now go to the main menu and select **Inverter** and then **Graph**. Choose **History Graph** to plot inverter data over a specified period.

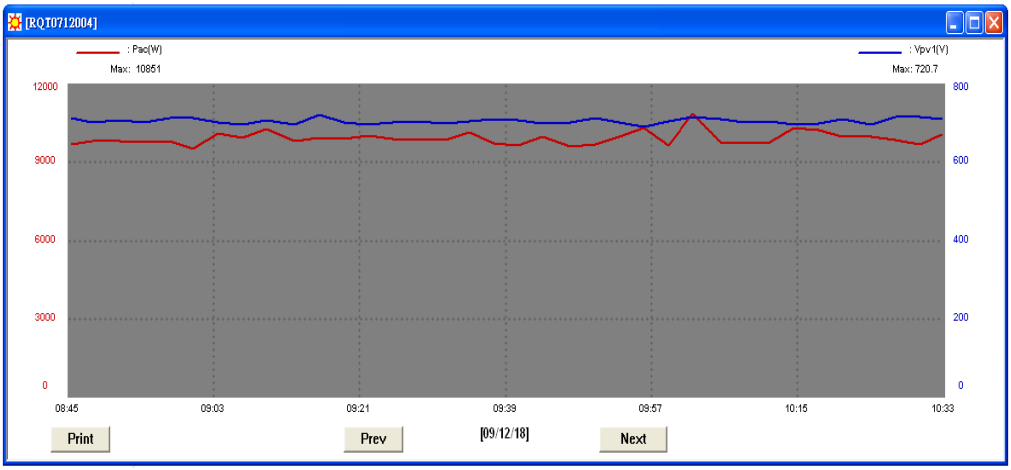

Figure 3-3 History Graph

The following table describes the buttons in this window.

Table 3-2 History Graph	
Button	**Definition**
Print	Click this button to print the current graph
Prev	Click this button to scroll the timeline backwards to an earlier record.
Next	Click this button to scroll the timeline forwards to a later record.

3.3. Real Time Graph

Select an inverter from the **Root** list, and then click **Real Time Graph** on the main panel. The following graph displays the current voltage and power output to the grid according to a time interval set in the **Record Settings** screen (see Setting the Recording Interval)

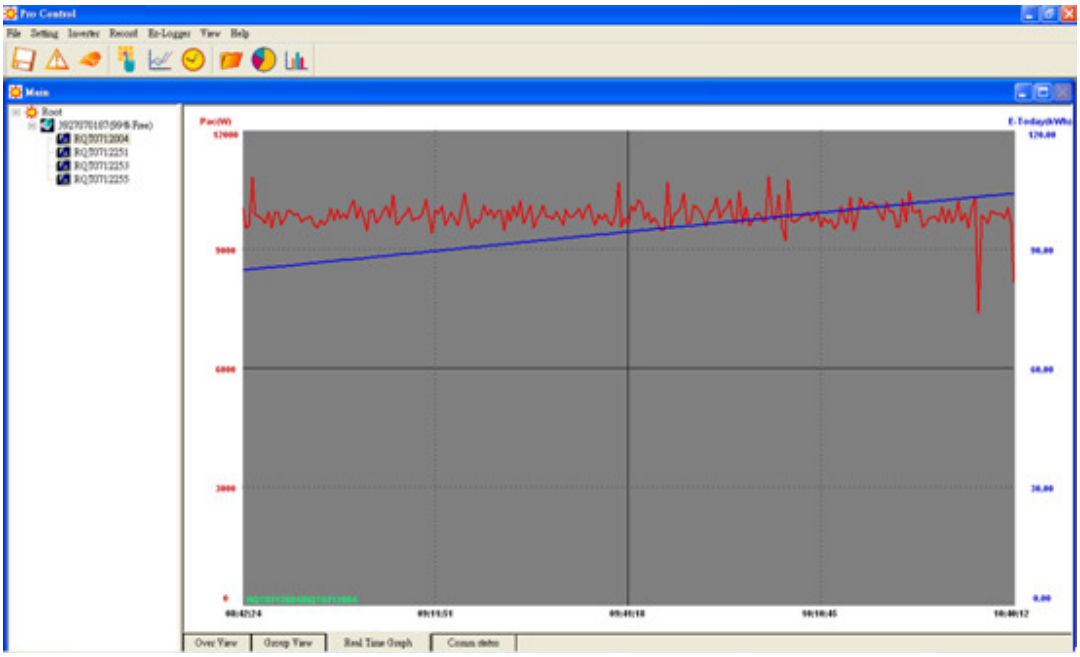

Figure 3-4 Real Time Graph

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3.4. Energy Graphs

To display the output power for an inverter or multiple inverters, first move the cursor to screen, double click right key of mouse and select EZ -Logger then inverter.

As the following windows display.

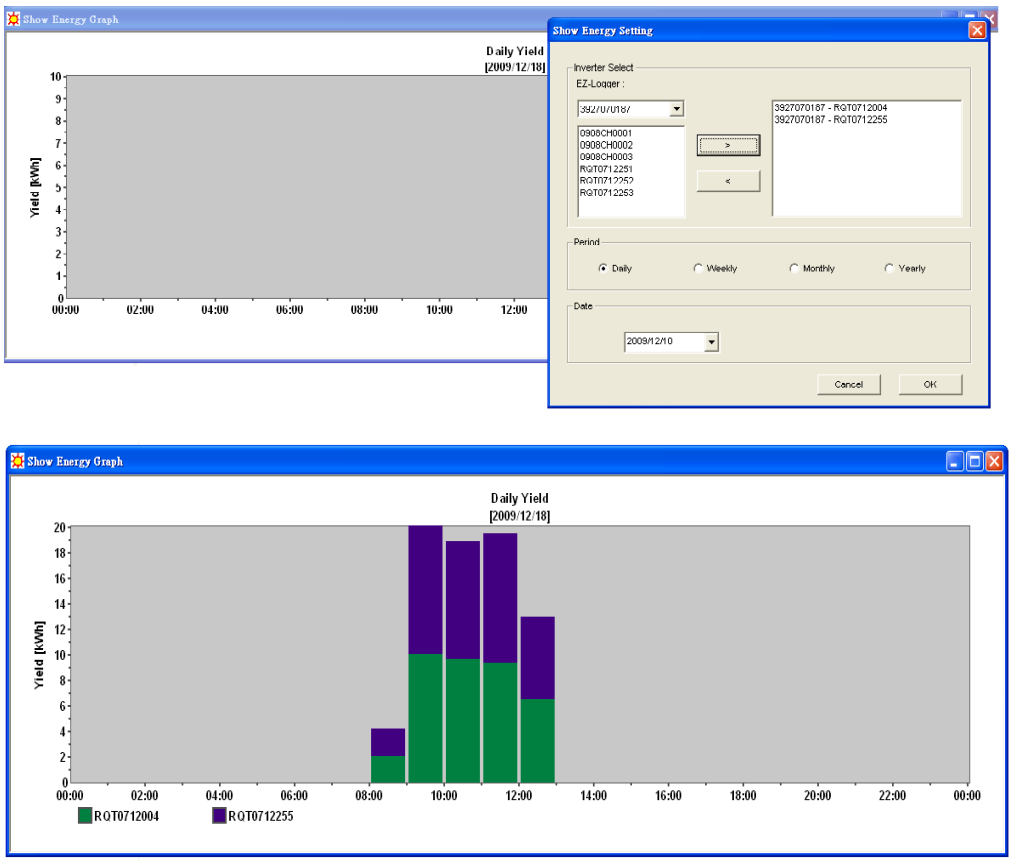

Figure 3-5 Energy Graph

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3.5. Start/Stop Recording

After starting Pro Control, the program automatically records the inverter data. To manually begin or end a recording select the **Record** menu and then select **Start Record** or **Stop Record**.

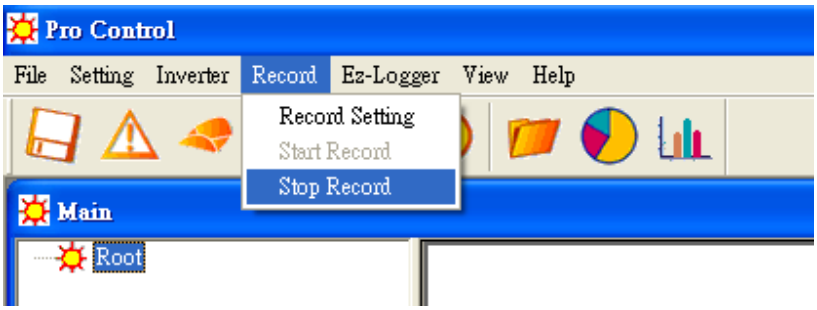

Figure 3-6 Start/Stop Recording

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3.6. Setting the Recording Interval

Select the **Record** menu and then **Record Setting**. To change the frequency of recording samples, change the value (seconds) in the "Real Time Sampling Interval" field.

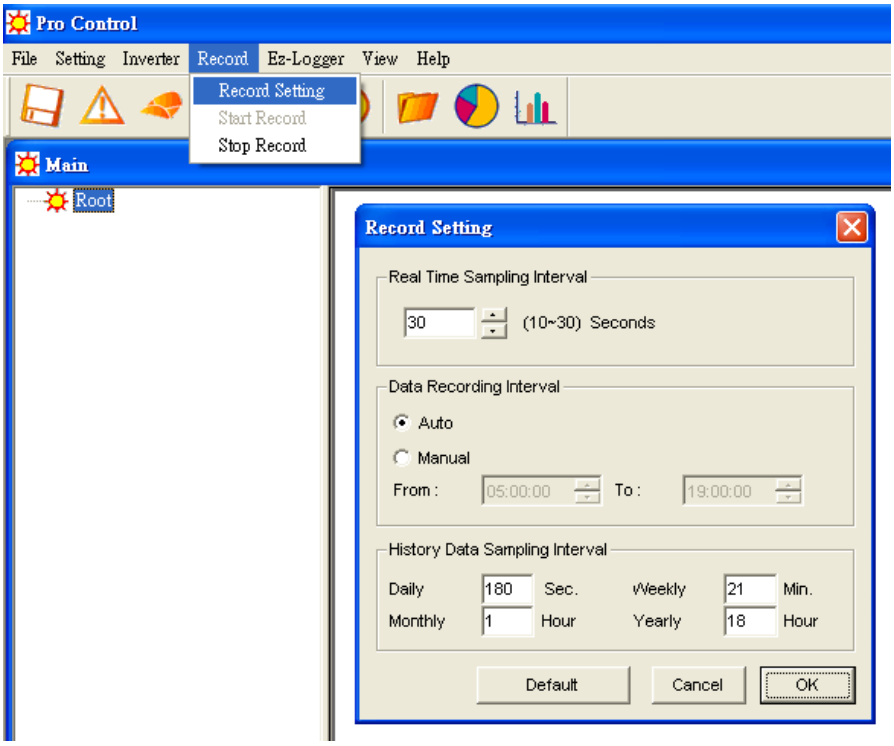

Figure 3-7 Record Setting

Table 3-3 Record Setting	
Field	**Definition**
Real Time Sampling Interval	
(1~1000) Seconds	Enter the delay in seconds between data record entries.
Data Recording Interval	
Auto	Select this option to have Pro Control automatically record inverter data during periods of activity (i.e. sunlight).
Manual	Select this option to set a fixed time period to record inverter data.
From	Enter the time in 24-hour format for Pro Control to start monitoring inverter data.
To	Enter the time in 24-hour format for Pro Control to stop monitoring inverter data.
History Data Sampling Interval	
Daily	Select the period in seconds to display the **Daily** history graph.
Monthly	Select the period in hours to display the **Monthly** history graph.
Weekly	Select the period in minutes to display the **Weekly** history graph.
Yearly	Select the period in hours to display the **Yearly** history graph.
Default	Click this button to return the Record Settings back to their original values.
Cancel	Click this button to close this window without saving.
OK	Click this button to save the current settings and close this window.

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3.7. Inverter Channels

Available inverters are displayed on the main screen on a grid of summary boxes that displays the inverter identity and fields that contain information about the internal status. The displayed fields are called channels. There are 18 channels available, from which 5 are displayed on the summary box. Displayed channels can be customized with the channel selection window.

Select **Inverter** from the main menu, and then click **Channel** to view the channel selection options.

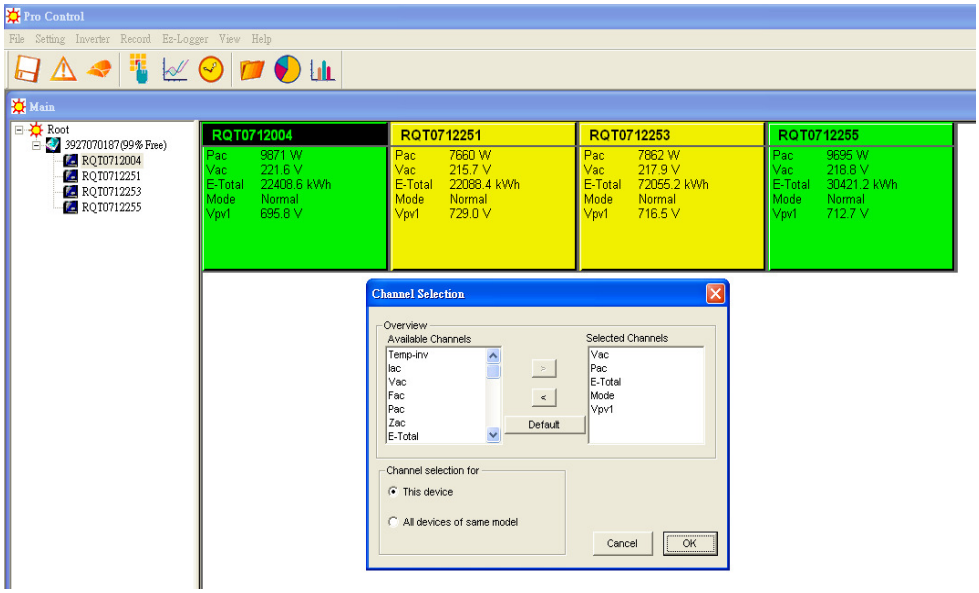

Figure 3-8 Inverter Channels

The following table describes the fields in this screen.

Table 3-4 Inverter Channels

Field	Definition
Overview	
Selected Channels	This field lists the channels that display on the inverter summary box.
> <	Select a channel in the Selected Channel list or the Available Channel list, and then click < or > to add or remove that channel.
Default	Click this button to return the channel lists back to their original settings.
Channel Selection For	
This device	Enable this field to apply the Selected Channel list to the currently selected inverter from the Root List.
All devices of (model)	Enable this field to apply the Selected Channel list to all inverters of the same model as the currently selected inverter from the Root List.
Available Channels	
Vpv1	PV1 voltage
Vpv2	PV2 voltage
Vpv3	PV3 voltage
Ipv1	PV1 current

Ipv2	PV2 current
Ipv3	PV3 current
Iac	Grid current
Vac	Grid voltage
Fac	Grid frequency
Pac	Power supplied to the grid
Zac	Grid impedance
E-Total	Total energy supplied to the grid
h-Total	Total operating hours
Temp-inv	Inverter internal temperature
Temp1	External temperature sensor 1
Temp2	External temperature sensor 2
RAD1	Irradiance sensor 1
RAD2	Irradiance sensor 2
Cancel	Click this button to close this window without saving.
OK	Click this button to save the current settings and close this window.

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4. History Data Record

4.1. Inverter Data Log

After executing this program, inverter data are automatically stored in the folder **X:\Program Files\Pro Control\HistLog**. Where "X" indicates the drive that Pro Control is installed. However, this data can only be read by Pro Control. If you want to export this data for other applications such as MS EXCEL, please refer to Export/Import History Data.

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4.2. Export/Import History Data

Use this function to **Export** data to your computer, or **Import** existing data from your computer. In the main menu select **File**, now select **Export/Import**. The following figure displays.

Choose an inverter from the **Inverter** list box, and then select the date range to export. Click **View** to see the results. Now click **Export** to save that data in a **CSV** file. Enter a file name you can remember.

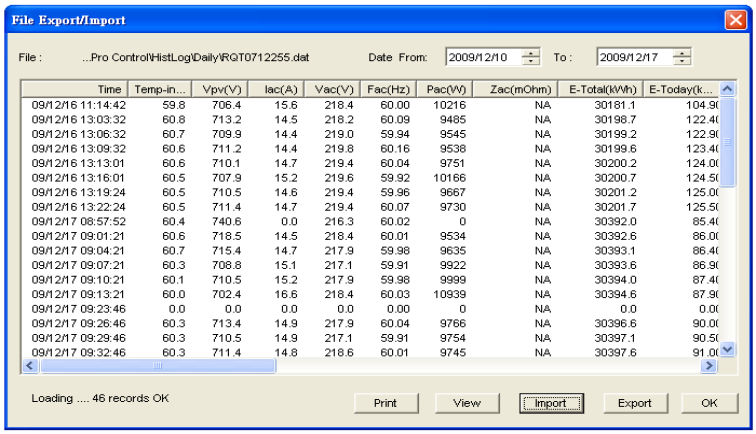

Figure 4-1 Export/Import History Data

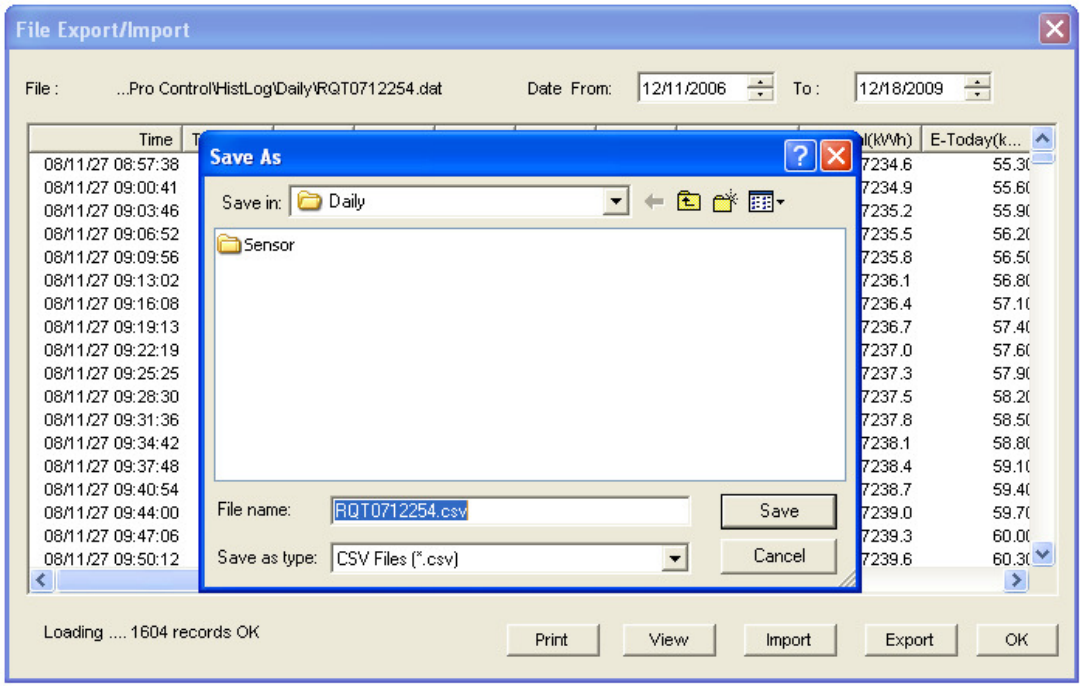

Figure 4-2 Export History File

To import data, click **Import**. A window prompts locate the ".CSV" file in your computer. Load the file you want to have Pro Control import data from.

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5. Error Message Report

5.1. What Happens When an Error Occurs?

The status box of each inverter displays a color according its operating state. In the event that an inverter error or grid-fault prevents the PV system from supplying power, the status box changes color. The status box is **GREEN** during normal operation.

The status box turns **YELLOW** if the inverter stopped working during the last 2 days but has now returned to normal. If the inverter has not yet returned to normal operating conditions, the status box is **RED**. This indicates the inverter is currently not successfully converting power.

When the status box color is not **GREEN**, the reason for the error is displayed inside the box.

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5.2. How do I Export or Import Error History?

To see the recorded list of errors, click **File** in the main menu, and then select **Error History**. You can also Export/Import the error history by clicking those buttons.

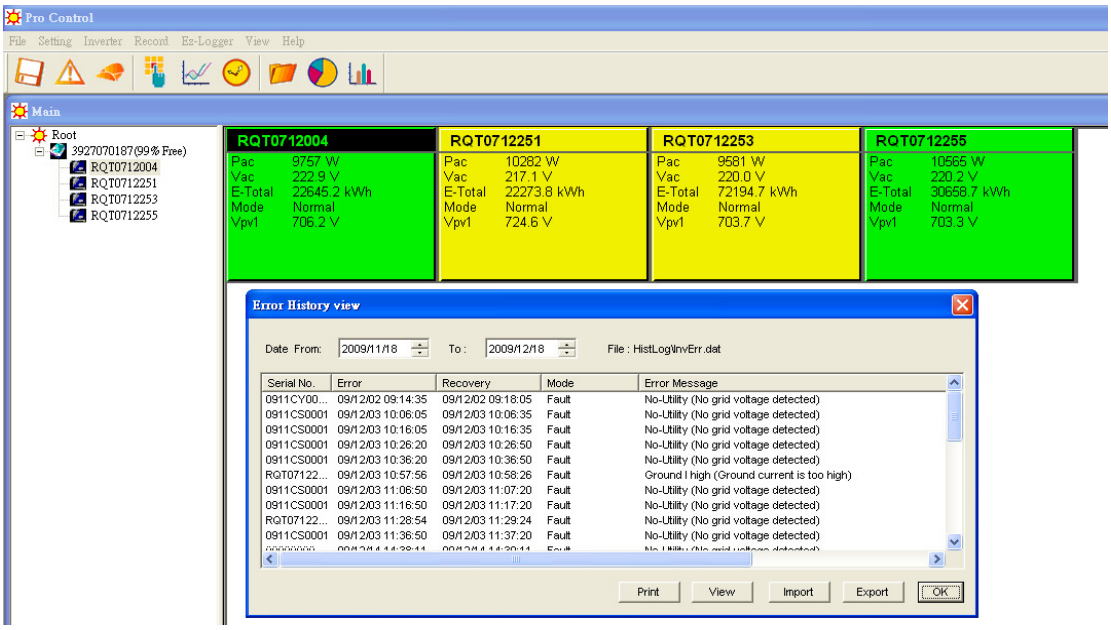

Figure 5-1 Export/Import Error History

The following table describes the fields in this screen.

Table 5-1 Error History View	
Field	**Definition**
Date From/To:	This field displays the recording period for this error history.
File	This field displays the file name and location of the current error history.
Serial No	This field shows the identifier of each inverter with an error history entry.
Error	This field displays the date and time of the fault.
Recovery	This field displays the date and time that normal operation resumed.
Mode	This field displays the nature of the error.
Error Message	This field displays the error message. For a list of error messages and their explanations please refer to your PV Inverter manual.
Print	Click this button to print the error history list.
View	Click this button to view the inverter status at the time this error occurred.
Import	Click this button to read and display a previously saved error history.
Export	Click this button to send the error history to a file on your PC.
Ok	Click this button to close the current window.

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6. Message Report Settings

In the event of an error or malfunction and you are not in front of your computer, Pro Control automatically generates and transmits the error message by fax, email or mobile phone text message.

6.1. Configuring Reports

Pro Control can send daily or event driven reports by mobile phone text message, fax or email. In the main menu, click **Setting** and then **Report** to configure how you would like to send your reports.

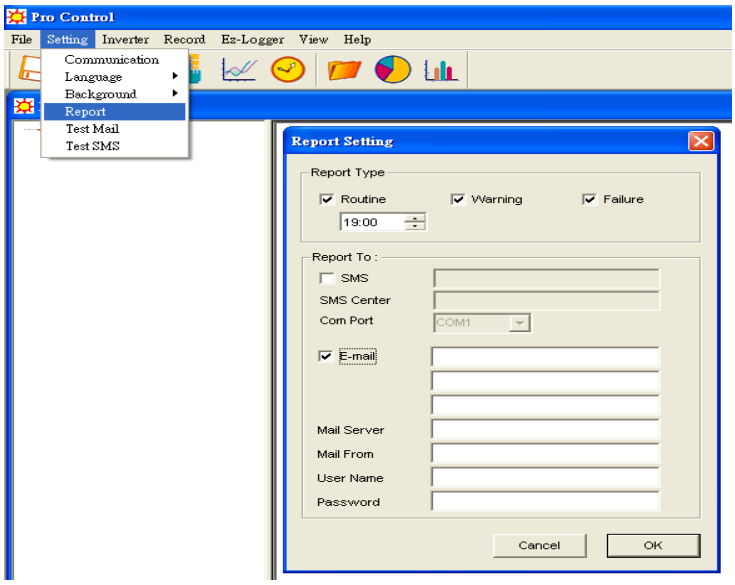

Figure 6-1 Report Setting

The following table describes the fields in this screen.

Table 6-1 Report Setting	
Field	**Definition**
Report Type	
Routine	Enable this check box to generate daily status reports, and then enter the time to generate daily status reports.
Warning	Enable this check box to generate reports for faults for recoverable errors such a ‘grid fault’ or ‘impedance fault’.
Failure	Enable this check box to generate reports for irrecoverable errors such as components failure in the inverter.
Report To	
SMS	Enable this check box send the report as a text message to your mobile phone. Prefix the report with your own message.

SMS Center	Enter the number of the SMS service that forwards your text messages.
Com Port	Enter the serial port number used to communicate with your modem.
Fax	Enable this check box send the report as a fax. Prefix the report with your own message.
Com Port	Enter the serial port number used to communicate with your modem.
Email	Enable this check box send the report as an email. Prefix the report with your own message.
Mail Server	Enter the web address of your email forwarding service (e.g. mail.foobar.com).

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6.2. Mail Report Format:

The mail report is transmitted via the Internet, and includes all the inverter's information. The following is an example of a standard report.

Inverter Routine Report 2009/12/18 11:31:35

	Value	Description
Alias Name	RQT0712004	Inverter alias name or serial number
Temperatur	55.4	°C: Inverter internal temperature
Vpv1/2/3	698.2/701.8/702.9	V : PV voltage
Ipv1/2/3	5.9/4.3/6.2	A : PV current
Ppv1/2/3	4119.3/3017.7/4357.9	W : PV Power
Iac1/2/3	15.2/15.1/15.2	A : Current to grid
Vac1/2/3	223.1/220.8/222.3	V : Grid voltage
Fac	59.99	Hz : Grid frequency
Pac	10104	W : Power to grid
Zac	NA	mOhm : Grid impedance
E-Total	22639.8	kWh : Total energy to grid
E-Today	112.30	kWh : Today's energy to grid
h-Total	2677	Hr : Total Operation hours
Mode	Normal	Operation Mode
Error		

Figure 6-2 Routine Report

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