INSTRUCTION MANUAL

PowCom™ Hybrid 1.02.xx

Document Number: POWCOM_HYBRID-MAN Rev. 3

UNIPOWER, LLC
65 Industrial Park Rd
Dunlap, TN 37327
Phone: +1-954-346-2442
Toll Free: 1-800-440-3504
Web site: www.unipowerco.com

For Contact Information, please go to https://www.unipowerco.com/contact/

Refer to the UNIPOWER License Agreement in this package before installing or using this product.

Unless specifically noted, all addresses, data characters and persons referenced herein, and all examples involving names of companies and products, are fictitious examples and are designed solely to illustrate the use of UNIPOWER products.

Product names, logos, brands, and other trademarks featured or referred to within this product manual are the property of their respective trademark holders. These trademark holders are not affiliated with UNIPOWER LLC or our products. They do not sponsor or endorse our products.

LIMITATIONS AND AUTHORIZATIONS FOR USE AND PERMITTED APPLICATIONS

UNIPOWER's products are not designed, intended for use in, or authorized for use as critical components in, human life support systems/equipment, equipment used in hazardous environments, or equipment used in nuclear control equipment or systems. Any such use requires the prior express written consent of an authorized executive officer of UNIPOWER LLC, which consent may be withheld by UNIPOWER LLC in its sole discretion. Users assume all risk and liability for, and agree to indemnify and defend UNIPOWER from and against any claims for personal injury (including death) or property damage resulting from any such use or application which is made in the absence of such prior express written consent.

If you find errors or problems with this documentation, please notify UNIPOWER. UNIPOWER does not guarantee that this document is error-free. The information in this document is subject to change without notice.

REV	DESCRIPTION	CHK'd & APPR'd / DATE
3	ECN# 46140	JR / 12-28-23

Contents

Chapter 1 - General Introduction....6
1.1 General Introduction....7
1.2 Hardware Requirements....7
1.3 Feedback & Support....8
Chapter 2 - Installation....9
2.1 Installation....9
2.2 Compatibility with PowCom™ Hybrid Software Versions....10
2.3 Modem Installation (HCL, HCX, HLX)....10
2.4 Null-modem Cable (HCL, HCX, HLX)....10
2.5 USB Cable....10
2.5 Ethernet Cable....11
Chapter 3 - Main Window....13
3.1 Main Window....13
3.1.1 Module Information....18
Chapter 4 - Main Menu....20
4.1 Communication menu....20
4.1.1 Call via modem....20
4.1.1.1 New / Phone list....20
4.1.1.2 Edit....21
4.1.1.3 Delete....21
4.1.1.4 Quick search....22
4.1.1.5 New Password....22
4.1.1.6 Calling....22
4.1.1.7 Call other number....23
4.1.1.8 Modem Setup....23
4.1.1.9 Export....23
4.1.2 Direct communication....24
4.1.3 Network connection....24
4.1.4 Com port setup....25
4.1.5 Properties....26
4.1.5.1 Communication....26
4.1.5.2 Modem....26
4.1.5.3 Licence....26
4.1.5.4 Options....26
4.2 Supervision menu....27
4.2.1 Set parameters....27
4.2.2 Program Version....28
4.2.3 Set date and time....29
4.2.4 Set installation data....29
4.2.5 Change user password....30

4.2.6 Battery log 30
4.2.7 System logs 30
4.2.7.1 Alarm history 30
4.2.7.2 Inventory 31
4.2.7.3 Peak load 31
4.2.7.4 Site data 31
4.2.7.5 Maintenance and service 32
4.2.7.6 Statistical data 33
4.2.8 Alarm Information 33
4.2.9 Alarm dial back 34
4.2.10 TCP/IP settings 34
4.2.11 Inventory 35
4.3 Utilities 36
4.3.1 Data Log 36
4.3.2 Inventory Log 36
4.3.3 Update Configuration 36
4.3.4 Load / Delete Battery File 37
4.3.5 Modify configuration 38
4.3.6 Configuration wizard 38
4.3.6.1 Config Wizard - 1 38
4.3.6.2 Config Wizard - 2 47
4.3.6.3 Config Wizard - 3 50
4.3.6.4 Config Wizard - 4 53
4.3.6.5 Config Wizard - 5 59
4.3.6.6 Config Wizard - 6 60
4.3.6.7 Config Wizard - 7 60
4.3.6.8 Config Wizard - 8 61
4.3.6.9 Config Wizard - 9 62
4.3.7 Button Bar 62
4.4 Tools Menu 63
4.4.1 Download SD card 63
4.4.2 Hybrid CSV Reader 64
Appendix A - PLS Sources 65
Appendix B - PLS Logic Tests 74
Appendix C - PLS Actions 75
Appendix D - CSV Reader Shortcuts 86

FIGURES

Figure 2-1 Powcom Hybrid Setup 9
Figure 2-2 Null-modem cable 10
Figure 2-3 USB cable 11
Figure 2-4 Ethernet cable 11
Figure 2-5 Crossover Ethernet Cable 12
Figure 2-6 Straight-Through Ethernet Cable 12
Figure 3-1 Main Window 13
Figure 3-2 Flow Diagram Legend 13
Figure 3-3 Main Window with Displayed Modules 18
Figure 3-4 Module Data 19
Figure 4-1 Communication menu 20
Figure 4-2 Example of a phone list 20
Figure 4-3 Open New/Phone List 21
Figure 4-4 Change Telephone List 21
Figure 4-5 Phone List Password 22
Figure 4-6 Calling 22
Figure 4-7 Other Number 23
Figure 4-8 Network Connection 24
Figure 4-9 Com port setup 25
Figure 4-10 Properties 26
Figure 4-11 Set Parameters, Adjust limits 27
Figure 4-12 Set Parameters, Battery settings 28
Figure 4-13 Remote Unit Information 28
Figure 4-14 Set Date and Time 29
Figure 4-15 Installation data 29
Figure 4-16 Battery Log 30
Figure 4-17 Alarm History Log 30
Figure 4-18 Inventory 31
Figure 4-19 Peak Load 31
Figure 4-20 Site Data 32
Figure 4-21 Maintenance and Service 32
Figure 4-22 Statistical Data 33
Figure 4-23 Alarm History 33
Figure 4-24 Alarm Dial Back 34
Figure 4-25 TCP/IP Address 34
Figure 4-26 Inventory 35
Figure 4-27 Unit / Module Information 35
Figure 4-28 Data Log 36
Figure 4-29 Update Configuration 37
Figure 4-30 Configuration Warning 37

Figure 4-31 Load / Delete Battery File 37
Figure 4-32 Config Wizard - 1 - General Settings 38
Figure 4-33 Config Wizard - 1 - Modules 40
Figure 4-34 Config Wizard - 1 - Battery 41
Figure 4-35 Depth of Discharge (example) 42
Figure 4-36 Discharge Cycling 43
Figure 4-37 Charging parameters (example) 43
Figure 4-38 Config Wizard - 1 - Genset 44
Figure 4-39 Config Wizard - 1 - Load 46
Figure 4-40 Config Wizard - 2 - Adjust Limits 47
Figure 4-41 Config Wizard - 2 - Battery Settings 49
Figure 4-42 Config Wizard - 3 - Extended Alarm Texts 50
Figure 4-43 Config Wizard - 3 - External Limits 51
Figure 4-44 Config Wizard - 3 - External Measurements 52
Figure 4-45 Config Wizard - 4 - Logic 53
Figure 4-46 Config Wizard - 4 - View 55
Figure 4-47 Logical Operation Diagram 55
Figure 4-48 System specific limits 56
Figure 4-49 Config Wizard - 5 60
Figure 4-50 Config Wizard - 7 61
Figure 4-51 Config Wizard - 8 61
Figure 4-52 Config Wizard - 9 62
Figure 4-53 Download SD Card 63
Figure 4-54 Hybrid CSV Reader 64

1.1 General Introduction

PowCom™ Hybrid is a Windows™ based communication program that is used to control and supervise the hybrid systems. PowCom Hybrid software allows system control through a local or remote PC interface, and will automatically adjust its interface to the capabilities of the connected system.

Windows based communication allows for enhanced management capabilities and enables the system to be accessed from any location. The benefits include:

- Simple access of system status
- Alarm display
- Battery function and condition.
- Site installation information.
- System data logging and collecting
- Current flow between the components

NOTE Some functions described in this manual may not be available to all systems due to different hardware configurations.

1.2 Hardware Requirements

PowComT™ Hybrid software requires a computer with:

- Microsoft Windows™ XP, Windows™ 7/8/10 installed with at least one serial port available.

NOTE It can be used with Windows™ Vista as well but this operation system is not supported by UNIPOWER.

- Modem (except HCC)
- Null-modem cable (except HCC)
- USB port

to connect a serial computer port to external hardware.

The modem must be Hayes compatible and must communicate at one of these baud rates: 9600 and 38400. The baud rate must be at least as high as the one in the power system.

PowCom Hybrid is automatically adjusted to the baud rate of the power system if the baud rate of the power system is lower than the one set in PowCom Hybrid software. The baud rate in the power system can only be changed manually via controller front display.

1.3 Feedback & Support

Product support can be obtained using the following address and telephone numbers.

Manufacturing facility:
UNIPOWER, LLC
65 Industrial Park Rd
Dunlap, TN 37327
United States

Phone: +1-954-346-2442
Toll Free: 1-800-440-3504
Web site – www.unipowerco.com

When contacting UNIPOWER, please be prepared to provide:

1. The product model number, spec number, S build number, and serial number - see the equipment nameplate on the front panel
2. Your company's name and address
3. Your name and title
4. The reason for the contact
5. If there is a problem with product operation:
   - Is the problem intermittent or continuous?
   - What revision is the firmware?
   - What actions were being performed prior to the appearance of the problem?
   - What actions have been taken since the problem occurred?

2.1 Installation

1. Download the latest PowCom™ Hybrid setup file of your choice from the software downloads page on the UNIPOWER web site.

NOTE The downloaded program works in read-only mode until the license key has been entered.

2. Obtain a license key from your UNIPOWER sales associate.

NOTE Your company may have a company license with a license number distributed internally. It is recommended to check this before contacting UNIPOWER.

3. After extracting the zip file run setup.exe.

NOTE Administrator rights for Windows XP™, Vista,Windows™ 7/8/10.

4. The program will prompt for an installation directory. Select the directory for installation. The default directory is:

   C:\Program Files\UNIPOWER\PowCom Hybrid

   Press "Next" after entering the directory.

NOTE In most cases, warnings caused by DLL files appear during installation if the \WINDOWS\SYSTEM folder is newer than the current version on the installation disk. These warnings should not cause any problem with the operating system.

5. If the version of PowCom™ Hybrid being installed supports multiple languages, select the preferred language in the language selection page, see Figure 2-1.

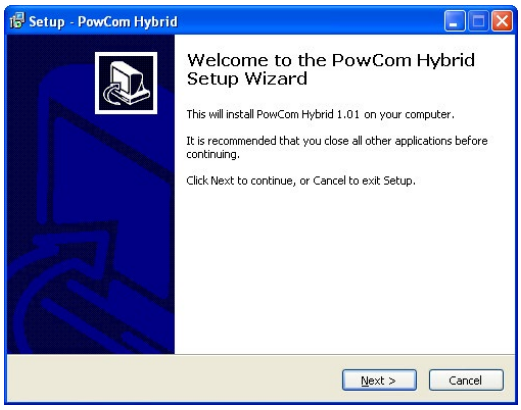


Figure 2-1 Powcom Hybrid Setup

2.2 Compatibility with PowCom™ Hybrid Software Versions

Data files associated with PowCom Hybrid are not compatible with any other version of PowCom files. This software can only be used for hybrid systems controlled by HCL or HCC, HCX or HLX controller.

2.3 Modem Installation (HCL, HCX, HLX)

For modem installation, please consult the modem documentation.

2.4 Null-modem Cable (HCL, HCX, HLX)

For serial communication, it is possible to use a serial port (RJ45) on the Internal connection board.

CAUTION The RJ45 connector is not galvanically insulated and may damage the USB port on the PC due to opposite pole grounding.

For direct communication with a controller via a null-modem cable select:

Communication → Direct communication in the PowCom™ Hybrid software.

The baud rate for both, PowCom™ Hybrid and the controller, should be the same. If the baud rates differ, it is impossible to make a connection.

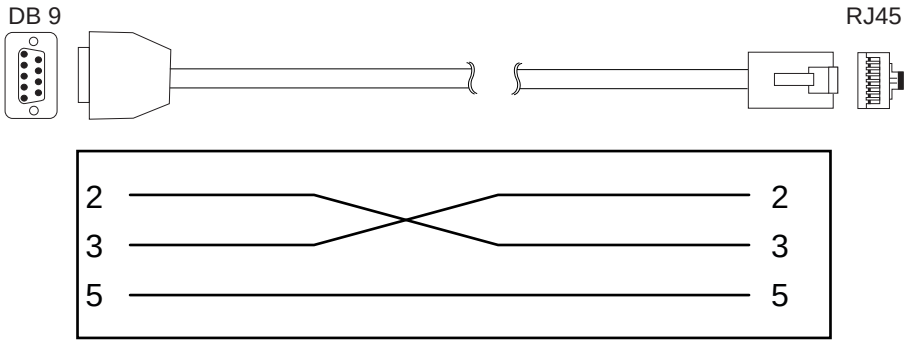


Figure 2-2 Null-modem cable

2.5 USB Cable

Use a standard USB AM-BM cable to connect the controller to a PC, Figure 2-3.

When the HCL/HCC is connected to a PC, a virtual COM port is created and should be set as a communication port in PowCom Hybrid. For port setting see section 4.1.1 - COM Port Setup.

When the HLX/HCX is connected to a PC an HID driver for the USB cable is activated.

Select Communication → USB communication in the PowCom™ Hybrid software.

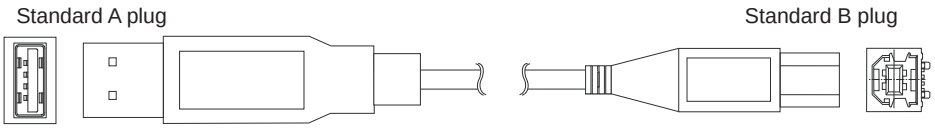


Figure 2-3 USB cable

NOTE In Windows XP the Com port can be found by following this path: *Start Menu → Settings−Control Panel → System → Hardware → Device Manager → Ports (COM & LPT) → CP210x USB to UART Bridge Controller* (COM6). (Com port COM6 is used as an example.).

NOTE Install the PowCom™ Hybrid software before connecting to the controllerfor the first time, otherwise Windows will not recognize the controller correctly.

2.5 Ethernet Cable

An Ethernet cable is used for Internet connection and delivers data between a computer and the remote system controller. The Ethernet port is located on the front panel of the controller (RJ-45), Figure 2-4.

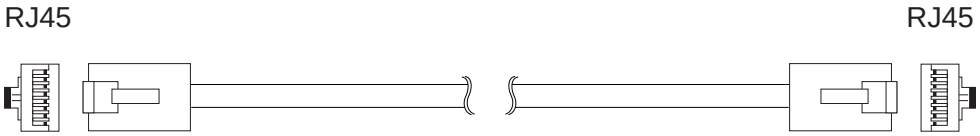


Figure 2-4 Ethernet cable

For a direct communication with the controller it is necessary to use a Crossover Ethernet Cable, Figure 2-5. To establish an Ethernet connection, the PC and the controller must have the same range of IP address settings.

Example:

Controller IP address set-up:	PC IP address set-up:
TCP/IP address: 10.131.12.106	IP address: 10.131.12.107
Net mask: 255.255.0.0	Subnet mask: 255.255.0.0
Default gateway: 10.131.12.1	Default gateway: N/A

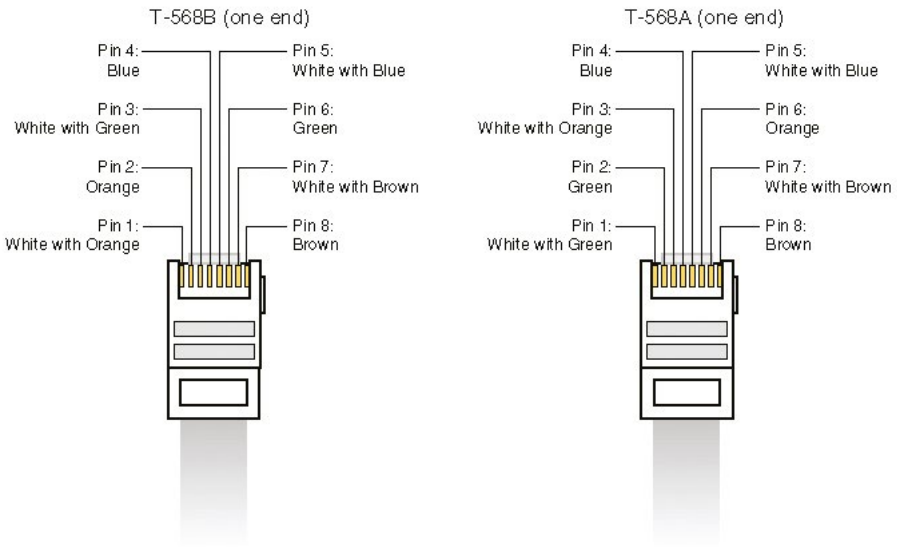


Figure 2-5 Crossover Ethernet Cable

For remote communication with the controller use a Straight-Through Ethernet Cable, Figure 2-6.

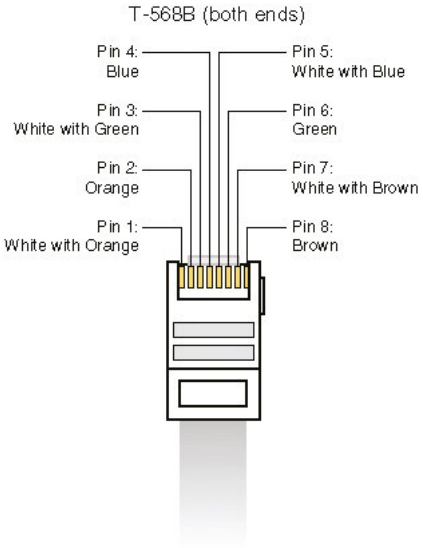


Figure 2-6 Straight-Through Ethernet Cable

NOTE You can get the IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

3.1 Main Window

The PowCom™ Hybrid Main Window displays various information about the system. The majority of the window is occupied by a flow diagram that shows basic system information.

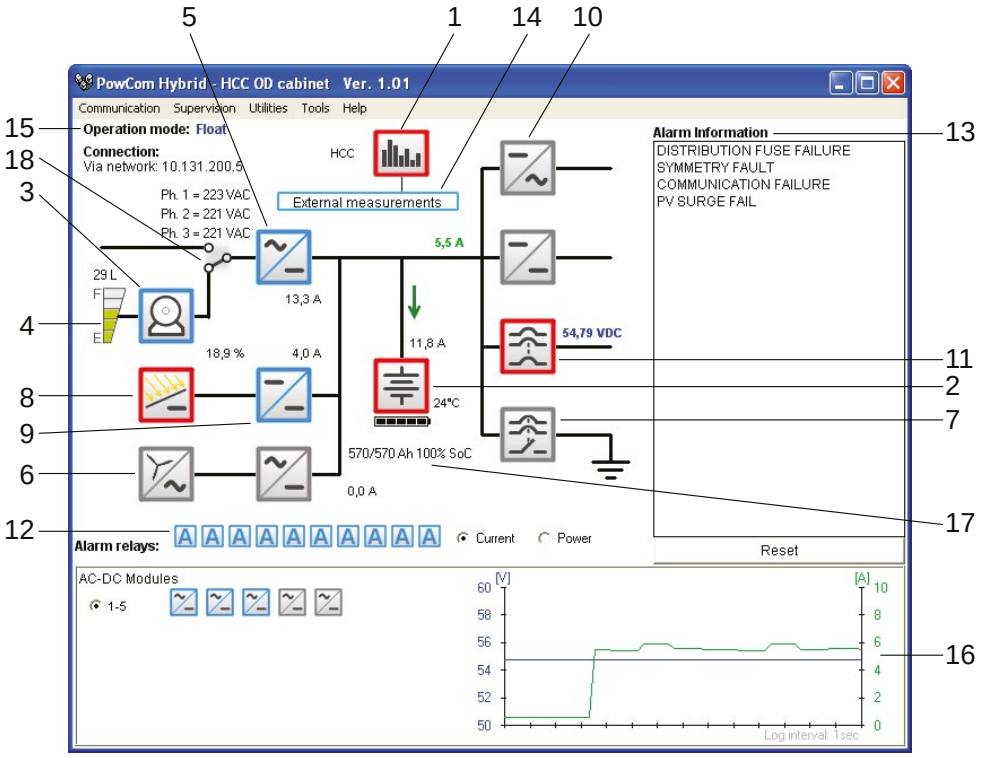


Figure 3-1 Main Window

The displayed output values of system modules and devices can be switched between Current and Power.

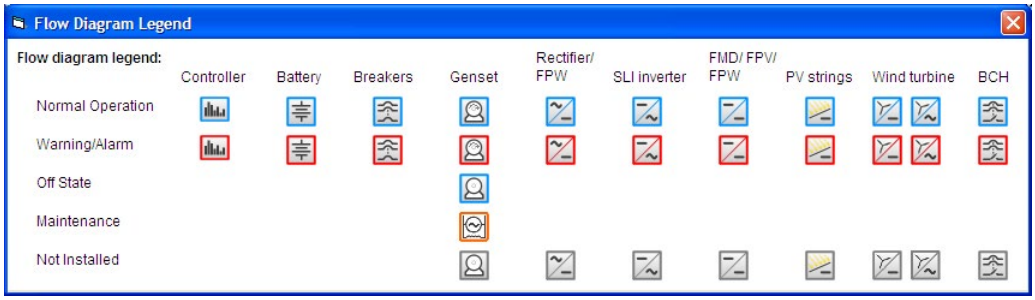


Figure 3-2 Flow Diagram Legend

1. Controller Icon

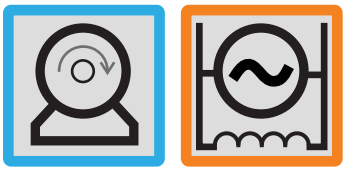
The controller icon indicates which type of a controller is connected (HCC/HCL). After clicking on the icon, a window with basic controller data is displayed.

2. Battery Icon

The value above the Battery icon displays battery current/power. When the current value is negative the battery is discharging. Clicking on this icon displays battery symmetry information if the system is set up to measure it. If a battery temperature probe is installed, battery temperature information is displayed on the right side of the icon.

Startup charging mode is displayed below the Battery icon during the first battery charge. From then on, the values below indicate present/nominal battery capacity, also expressed as a percentage State of Charge value (example: 567/570Ah 99.4%SoC).

3. Generator Icon



The Blue Generator icon shows the Generator is connected. An arrow inside the icon indicates the Generator is ON. If the icon is without the arrow, the Generator is OFF.

The Red Generator icon displays an alarm or warning. An arrow inside the icon indicates the generator is running while in an alarm condition, a missing arrow indicates the generator has stopped due to the alarm.

The Orange Generator icon indicates the Generator is in Maintenance mode. In this mode the Generator can be turned ON/OFF manually. This is possible only via Direct Connection.

After clicking on the icon, a Generator operation window is displayed.

4. Fuel Tank Icon

This icon shows the fuel volume in the tank. To make the icon active, the fuel tank must be properly configured via PowCom™ Hybrid Config Wizard - 1 (Genset tab). Also, the analogue input for fuel measurement must be connected to the Alarm board / Genset interface kit.

5. Rectifier Icon

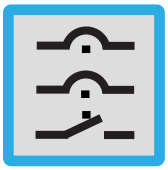
Next to the Rectifier icon is displayed rectifier output current/power. When clicking on it, module information is displayed on the left bottom side of the main window.

For more information see Module Information in section 3.1.1 - Module Information.

6. Wind Icon

This icon represents a wind turbine that converts kinetic energy from the wind into mechanical energy, which is then generated to electricity.

7. Brake Chopper Icon



This is an icon of a Brake chopper which is used to absorb mechanical energy and protect a wind turbine against overloading.

8. PV String Icon

An icon representing solar photo voltaic panels which generate power when exposed to high levels of light. The percentage value above the icon displays the relative value of maximum convertible solar irradiation to the PV panels. If no Irradiation sensor is connected to the system, a zero percentage value is shown.

9. Converter Icon

This icon displays the current/power of a DC/DC converter. When clicking on it, module information is displayed on the left bottom side of the main window.

10. Inverter Icon

This icon displays the current/power of the inverter (SLI 1.5kW). When clicking on it, module information is displayed on the left bottom side of the main window.

11. Breaker Icon

The value next to the Breaker icon displays the system voltage.

12. Alarm Relay Icon

The alarm relay icon is displayed in blue and indicates an alarm condition for a specific relay. A Red icon signals an alarm.

13. Alarm Information

Details of signaled alarms are shown on the right side of the main window. If the main window is small and the Alarm Information is not displayed the Alarm icons indicate if they are active. Click on them and the Alarm Information opens in a separate window.

14. External Measurements

This button is available only if external measurements are set in the system. If it is clicked on, a window with detailed information about external measurements (that are system specific, i.e. they are not standard measurements), appears. These measurements and their descriptions are programmed in the configuration of the system.

15. Operation mode

To achieve optimal running of the system, the controller offers various operating modes to accurately manage the hybrid cycle:

- Start-up charge - Start-up charge ensures the battery is fully charged and ready for cycling operation.
- Charge - The battery is charged with an intelligent charging algorithm.
- Float - Battery is fully charged but power source is still available. It is typical for applications where solar/wind energy is used or a generator keeps running due to some failure.
- Discharge - The battery is discharged to a pre-defined depth of discharge.
- Disconnected - The system is switched to Disconnected mode if a failure condition appears.
- Maintenance - This mode is used for switching the generator ON/OFF independently of operation mode.
- Equalization - This is a periodic limited overcharge of the battery which can, to some extent, restore battery capacity, revive battery efficiency and extend battery life.

16. Graphic chart

The Graphic chart in the right bottom corner displays value history for the selected interval (time on the x-axis; voltage, current or temperature on the y-axis). It can be changed by a right mouse click on the chart. Values displayed at the icons can be displayed in the graph, when clicked on. A right button click changes the source for a blue line, a left button click changes the source for a green line.

17. Remaining Battery Capacity and State of Charge

Remaining battery capacity and state of charge information is displayed together with effective total battery capacity. Effective total battery capacity value is based on average load provided in configuration and can differ from C10 battery capacity value.

18. ATS Switch

The ATS icon visually indicates whether the AC power is supplied from the AC grid or from the Genset.

3.1.1 Module Information

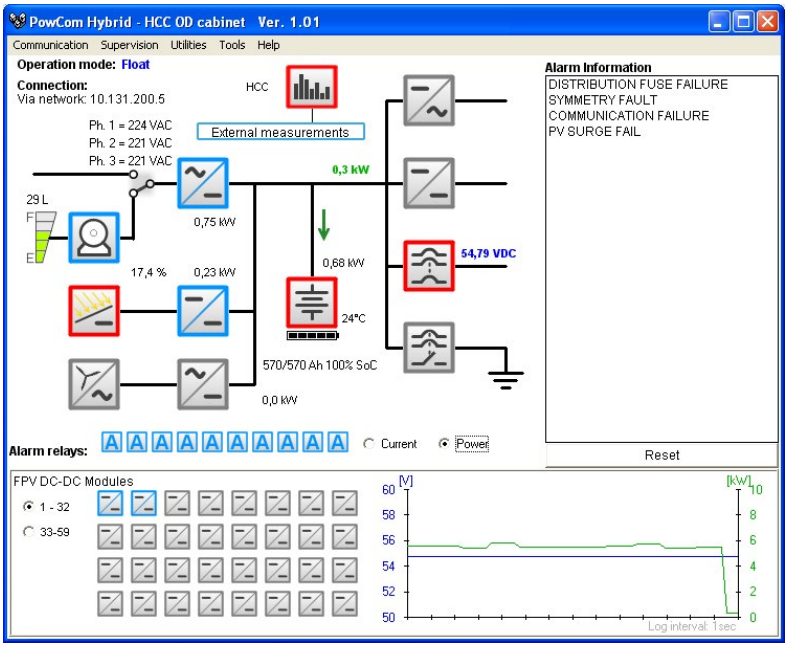


Figure 3-3 Main Window with Displayed Modules

Click on a rectifier, converter or inverter icon and detailed module data regarding the installed module appears on the left bottom side of the Main Window, Figure 3-4.

Module data

Displayed information depend on the connected system.

The scrollbar at the bottom is used for selecting a module number for which the data is displayed. If another module is selected with the scrollbar the information regarding the selected module appears on the screen after approximately one second.

When the small rectifier icon in the left bottom corner is clicked on, a dialog box with additional information about the module (serial number, revision, etc.) opens. See Figure 3-4.

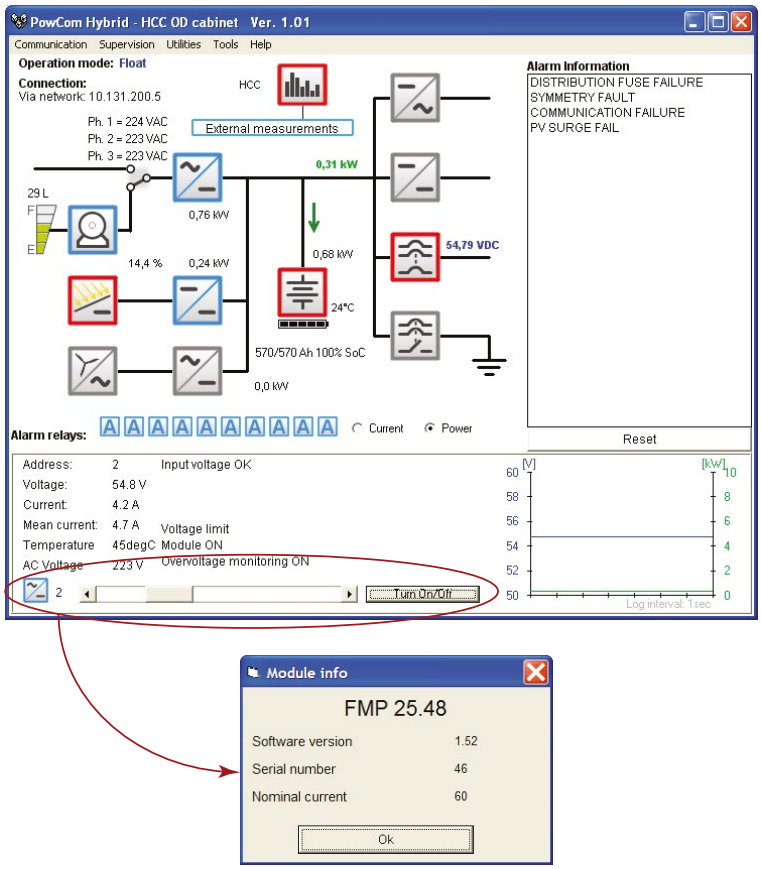


Figure 3-4 Module Data

If the system configuration allows it, the module can be turned On/Off manually directly from the controller display. (See PowCom™ Hybrid Config Wizard - 1 → *General Settings* → *Turn rectifier On/Off manually*.)

NOTE While the rectifier is manually turned off the mean current value invalid and current share among the modules does not run in a standard way. For value correction it is necessary to remove the module from the slot.

4.1 Communication menu

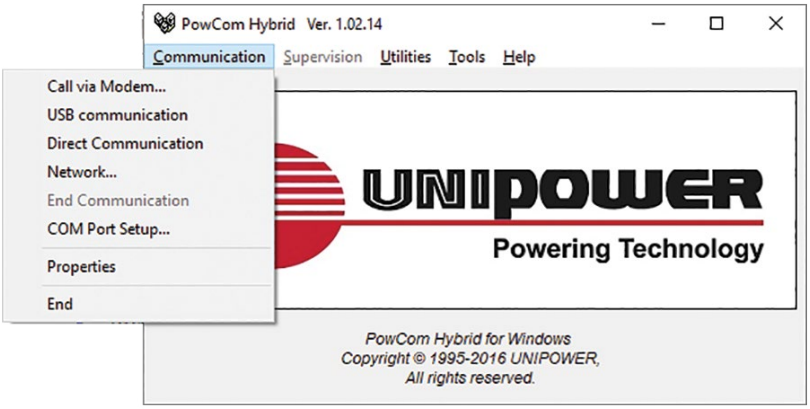
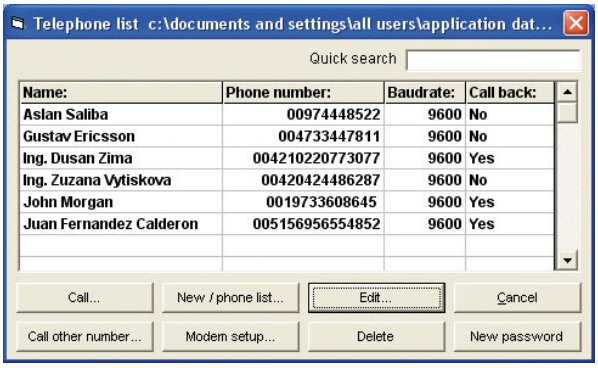


Figure 4-1 Communication menu

4.1.1 Call via modem



Name:	Phone number:	Baudrate:	Call back:
Aslan Saliba	00974448522	9600	No
Gustav Ericsson	004733447811	9600	No
Ing. Dusan Zima	004210220773077	9600	Yes
Ing. Zuzana Vytiskova	00420424486287	9600	No
John Morgan	0019733608645	9600	Yes
Juan Fernandez Calderon	005156956554852	9600	Yes

Figure 4-2 Example of a phone list

4.1.1.1 New / Phone list

To create a new phone list click on *New/Phone List*. Define the phone list name and save it in a selected folder.

To open an already existing phone list click on New/Phone List. Select the list and *Open*, Figure 4-3.

Several telephone lists can be created, each of them can be protected with a password.

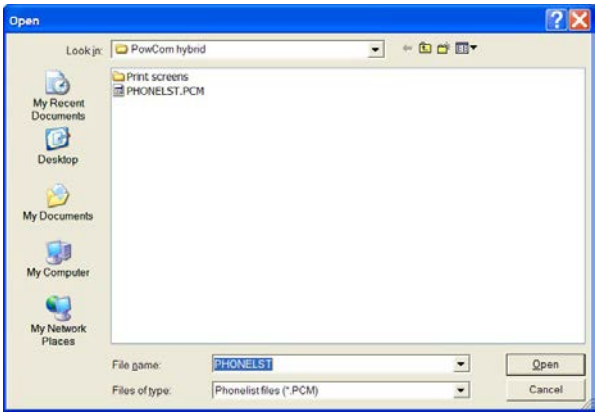


Figure 4-3 Open New/Phone List

4.1.1.2 Edit

To enter a contact in a phone list click on *Edit*. Fill in the name, telephone number, baud rate and callback if needed.

If no baud rate is entered, use 9600. If the modem you want to communicate with is adjusted to a lower speed, the program will automatically adjust the speed when contact is made.

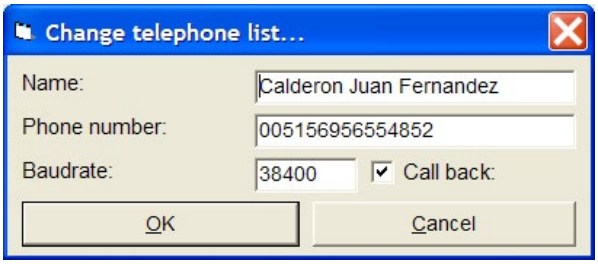


Figure 4-4 Change Telephone List

If a new contact needs to be added, click on the blank line at the bottom of the telephone list. Select *Edit* and enter required information.

The phone list is sorted in alphabetical order automatically when a number is added to the list.

To edit a telephone list, highlight the line and select *Edit*. Make necessary changes and click *OK*.

4.1.1.3 Delete

To delete a line in the telephone list, select the line and click on *Delete*.

4.1.1.4 Quick search

If a telephone list is too long, the *Quick Search* field may be used. Start typing a required name and the first item in the list that match will be highlighted. If *Enter* is clicked, PowCom dials the number automatically.

4.1.1.5 New Password

The password for the phone list is blank by default.

To change the password for the telephone list, click on *New Password*. Enter the old password if it exists, if not, click on *OK*. Fill in a new password twice to ensure correct spelling. (The password can contain all numbers and letters regardless of the letter case used.)

Figure 4-5 Phone List Password

4.1.1.6 Calling

This window is displayed when a modem connection is made. Messages from the modem are shown in a text box.

To dial-up, select a number from the list and click on *Call*.

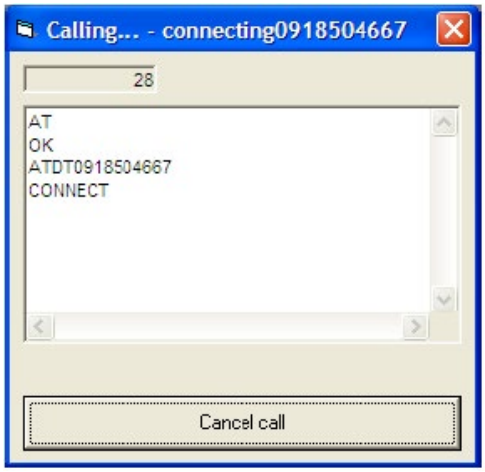


Figure 4-6 Calling

If a connection cannot be established, an error message such as: NO CARRIER/BUSY/NO

DIAL TONE/NO CONNECTION or CANNOT CONNECT TO THE MODEM is generated.

In such case PowCom™ Hybrid software does not hang up automatically. It is necessary to click on Cancel Call to hang up.

4.1.1.7 Call other number

If the number you wish to call is not listed, click on *Call Other Number*. Enter the telephone number, baud rate and callback if needed, and click on *OK*.

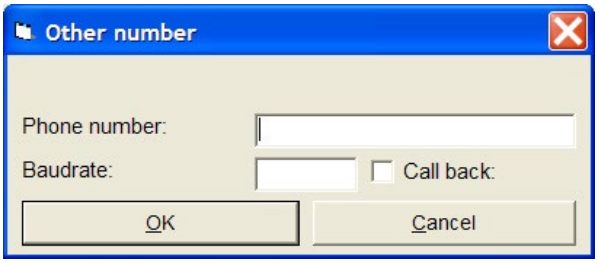


Figure 4-7 Other Number

4.1.1.8 Modem Setup

To change the initialization string for the modem, click on *Modem Setup* and enter the string.

NOTE Switch data compression off, select direct asynchronous communication, set the terminal speed to follow the line speed, select no hand shake. For some modems these parameters are set by default. For high speed modems data compression (v42/MNP) have to be usually switched off.

Examples of suitable initialization strings for some modems:

Modem Type	Initialization String
US Robotics Sportster 14400	AT&K0
Lasat Unique 14400	AT&Q0&K0
UCOM Fastlink 14400	AT&Q0
HIDEM 14400 fax	AT%C0\N1
HANDY 144 CC	AT&F&C1|&Q0&K0
XLINK 28800	AT%C0\N1 (Rockwell chipset)

4.1.1.9 Export

By clicking on *Export*, the phone list will be exported to a .txt file where only names and phone numbers are saved.

4.1.2 Direct communication

Direct Communication is used to access the system, which is directly connected to the controller by a null-modem cable or USB cable. It is important to set the com-port and baud rate correctly before selecting *Direct Communication*.

When the connection is made the installation information of the system is shown in a dialog window and the system password has to be entered.

4.1.3 Network connection

Network Connection can be established either directly by a Crossover Ethernet Cable, or remotely by Straight-Through Ethernet Cable, see section 2.5 - Ethernet Cable.

Remote Network Connection is established through a TCP/IP server that works as a link to a network of hybrid systems connected to that server. To use this connection, a server program must be running on the computer or on any other computer reachable within the TCP/IP network. TCP/IP must be installed on the computer.

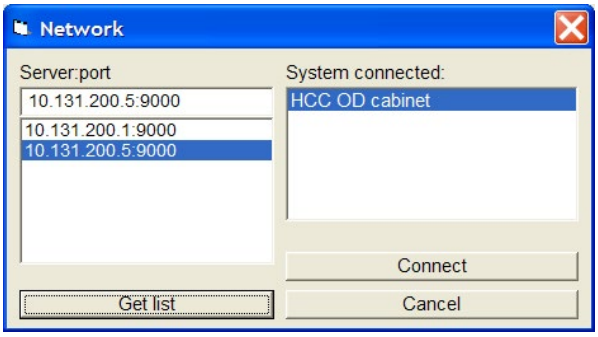


Figure 4-8 Network Connection

Server: Port

Enter the address and port number of the PowCom™ Hybrid server here in the format:

IP address:port.

Example: 199.200.110.101:9000

If a name-server is available symbolic names can be used for the address, otherwise the standard TCP/IP notation is used.

9000 in the example is the port number. PowCom™ Hybrid only accepts a port number higher than 1000 to avoid conflict with standards used in TCP/IP. The port number must be the same as the one used by the server. The Standard port number for the controller is **9000**.

Get list

When the address and the port number are entered into a *Server:Port* field, select *Get List*. A list of systems connected to the server is displayed.

Connect

Highlight one of the systems in the list and select *Connect* to set up the connection to that system. When connection is made the installation information about the system is shown and the system password has to be entered.

Cancel

Click on *Cancel* to leave this window without making a connection.

4.1.4 Com port setup

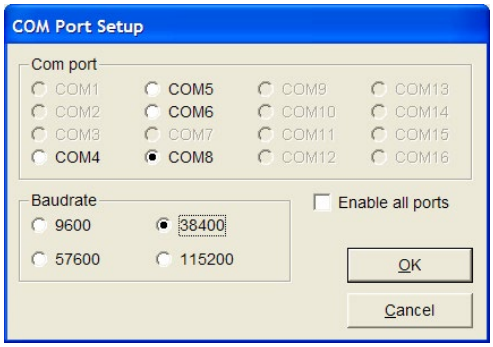


Figure 4-9 Com port setup

Select the correct COM port and communication Baud rate. The Baud rate value should always be the same as the Baud rate set in the controller. If an incorrect Baud rate is selected, Direct communication will not work.

- HCL: 38400 baud
- HCC: 38400 baud

Once the connection is made a system password has to be entered. The default password is **1234**.

4.1.5 Properties

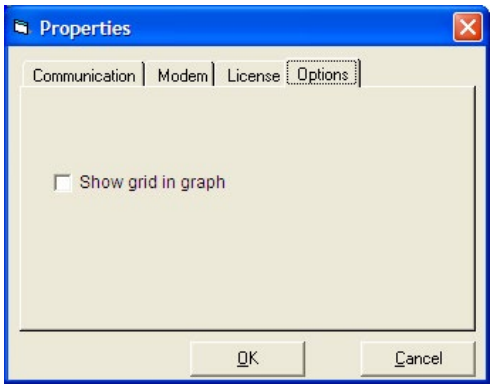


Figure 4-10 Properties

4.1.5.1 Communication

Message timeout sets the time PowCom™ Hybrid software waits for a reply before sending a new request. The default value is 1.0. However, when communicating over the long distances, via mobile phones, radio modems or other equipment that cause a delay in the data flow, it may be necessary to increase the set time. In most cases 2.0 is sufficient.

With time-out increased, it takes longer for PowCom™ Hybrid to discover a broken connection. The system does not allow values under 1.0.

4.1.5.2 Modem

Dial up timeout sets a period of time during which the software waits for a modem to connect to another modem. The default setting is 60 seconds. This period is usually sufficient, but occasionally needs to be increased if the remote modem has been set up to wait for many rings before answering.

4.1.5.3 Licence

After PowCom™ Hybrid installation, the program is in Read-only mode. Some functions may be inactive or invisible and their availability depends on License level key, which has to be ordered from your UNIPOWER sales associate.

Fill in a License number. Click on the *Activate license* button, then *OK*. For correct registration of the License number key to the Windows™ registry, it is necessary to restart the application.

4.1.5.4 Options

This sub-menu displays grid in a graph, if desired.

4.2 Supervision menu

4.2.1 Set parameters

The Set Parameters menu allows some system parameters to be changed and allows manual control of battery equalization, see Figure 4-11.

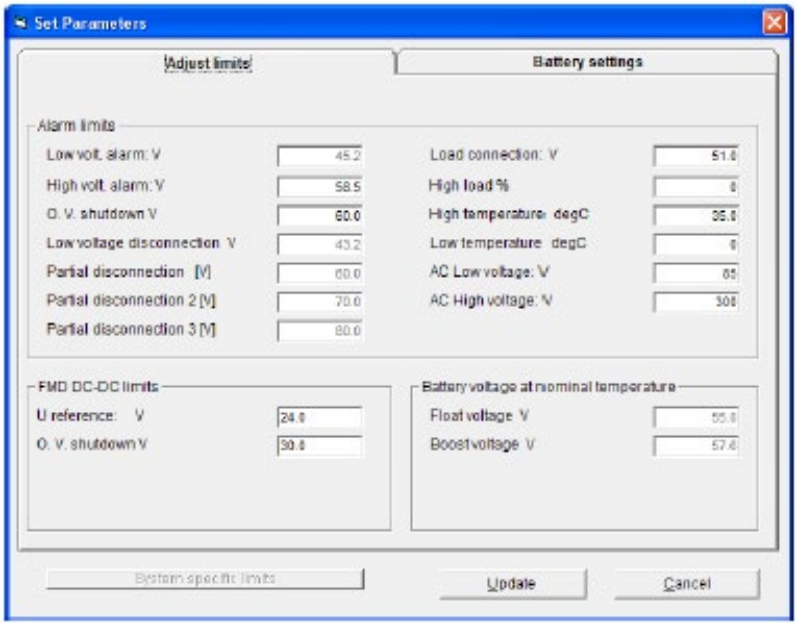


Figure 4-11 Set Parameters, Adjust limits

NOTE Gray values cannot be changed, they are there only for information.

The following page Set Parameters/Battery settings dialog, Figure 4-12, allows manual override of the battery equalization function.

Equalization can be turned On manually at any time by the *Start* button.

If equalization has already started, the *Start* button is inactive.

If equalization is in process it can be turned Off by the *Cut-Off* button (the *Cut-Off* button is active only if equalization is in process).

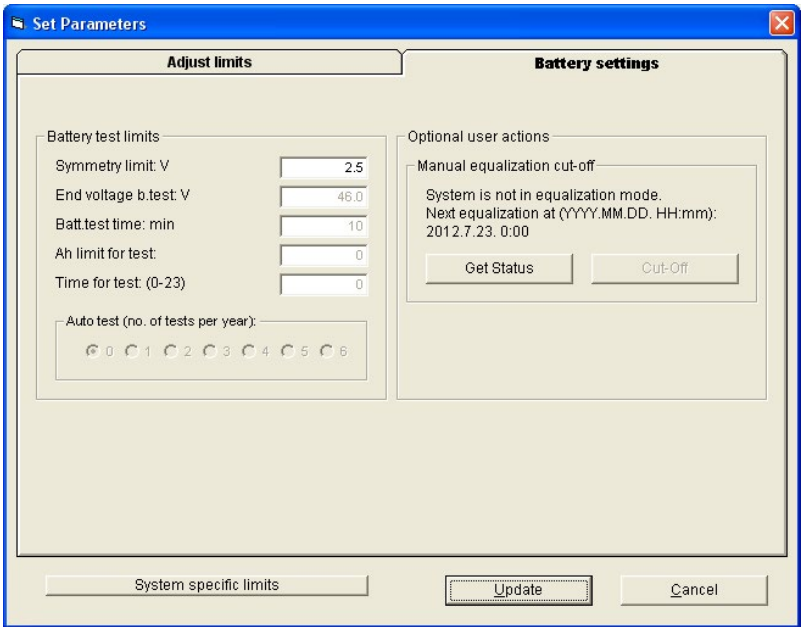


Figure 4-12 Set Parameters, Battery settings

NOTE These parameters are factory set and can only be modified with PowCom™ Hybrid software license level 30 or 50.

NOTE For a detailed description of individual Alarm limits and Battery settings see section 4.3.6 - Configuration Wizard.

4.2.2 Program Version

This window provides information about controller type, hardware version, serial and configuration numbers.

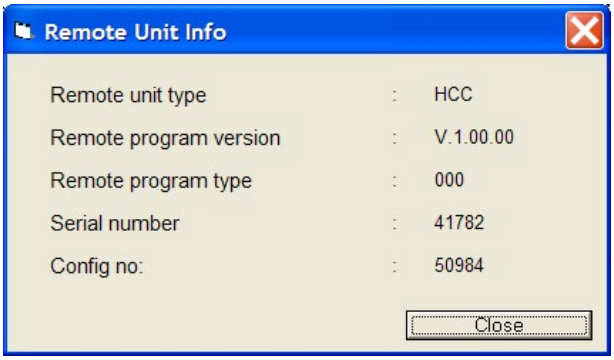


Figure 4-13 Remote Unit Information

4.2.3 Set date and time

This function allows setting of the date and time in the controller.

The *System time* button enables the user to set the date and time of the controller according to the PC system time the controller is connected to.

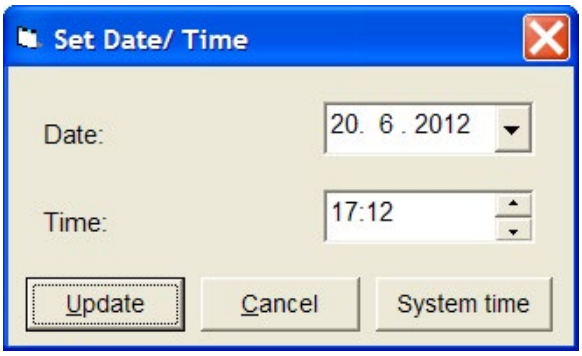


Figure 4-14 Set Date and Time

4.2.4 Set installation data

This menu allows the system description to be changed. The description is displayed when connected to the system and has no influence on the function of the system, but is necessary for system identification.

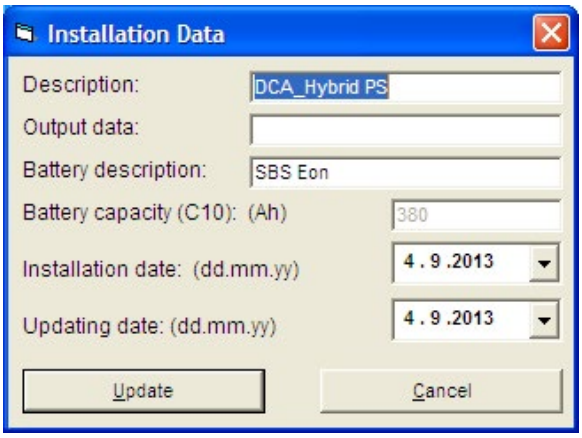


Figure 4-15 Installation data

The installation date should be set when the system is installed to ensure correct battery cycling data collection.

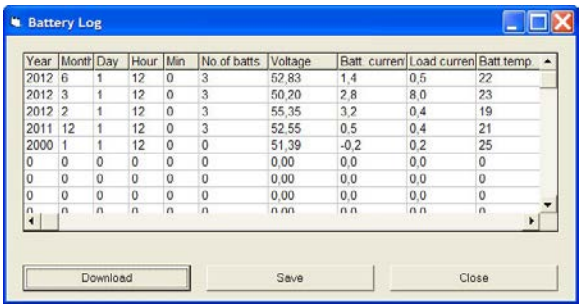
4.2.5 Change user password

To change user password, the software will prompt for the old user password first (default password is 1234). Then enter a new password twice for verification.

4.2.6 Battery log

The Battery Log function enables downloading of stored battery data to the controller on the first day of every month. Download takes a while, and it is indicated by a progress bar.

Click *Save* to save the log as a delimited text file (in which the Tab character usually separates each field of text). This way it can be imported into Excel or other spreadsheet programs.



Year	Month	Day	Hour	Min	No of batts	Voltage	Batt. curren	Load curren	Batt.temp
2012	6	1	12	0	3	52,83	1,4	0,5	22
2012	3	1	12	0	3	50,20	2,8	8,0	23
2012	2	1	12	0	3	55,35	3,2	0,4	19
2011	12	1	12	0	3	52,55	0,5	0,4	21
2000	1	1	12	0	0	51,39	-0,2	0,2	25
0	0	0	0	0	0	0,00	0,0	0,0	0
0	0	0	0	0	0	0,00	0,0	0,0	0
0	0	0	0	0	0	0,00	0,0	0,0	0

Figure 4-16 Battery Log

4.2.7 System logs

4.2.7.1 Alarm history

The Alarm History Log lists the 500 most recent events. To see the data use the *Download* button, see Figure 4-17.

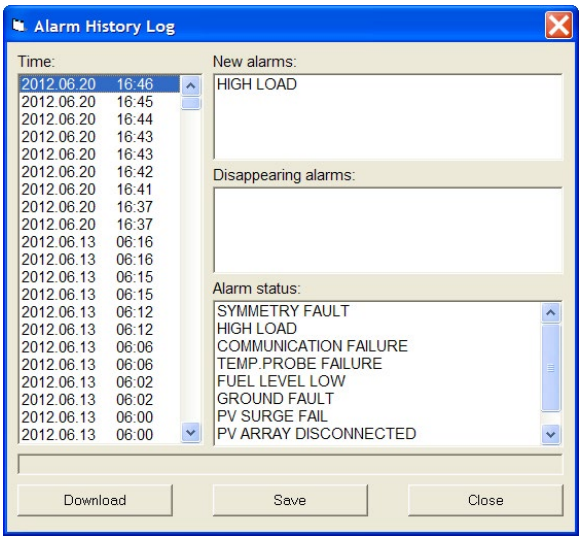
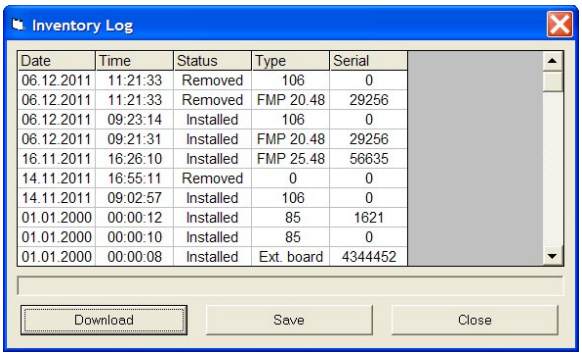


Figure 4-17 Alarm History Log

4.2.7.2 Inventory

This contains modules and units history, their installation and removal. Up to 200 last events can be recorded. To see the Inventory, use the *Download* button.

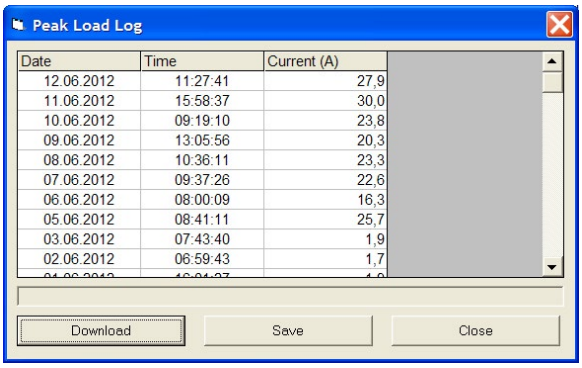


Date	Time	Status	Type	Serial
06.12.2011	11:21:33	Removed	106	0
06.12.2011	11:21:33	Removed	FMP 20.48	29256
06.12.2011	09:23:14	Installed	106	0
06.12.2011	09:21:31	Installed	FMP 20.48	29256
16.11.2011	16:26:10	Installed	FMP 25.48	56635
14.11.2011	16:55:11	Removed	0	0
14.11.2011	09:02:57	Installed	106	0
01.01.2000	00:00:12	Installed	85	1621
01.01.2000	00:00:10	Installed	85	0
01.01.2000	00:00:08	Installed	Ext. board	4344452

Figure 4-18 Inventory

4.2.7.3 Peak load

The Peak load log lists the highest load current value for up to last 30 days together with the time of occurrence. To see the Peak load log, click *Download*.



Date	Time	Current (A)
12.06.2012	11:27:41	27,9
11.06.2012	15:58:37	30,0
10.06.2012	09:19:10	23,8
09.06.2012	13:05:56	20,3
08.06.2012	10:36:11	23,3
07.06.2012	09:37:26	22,6
06.06.2012	08:00:09	16,3
05.06.2012	08:41:11	25,7
03.06.2012	07:43:40	1,9
02.06.2012	06:59:43	1,7

Figure 4-19 Peak Load

4.2.7.4 Site data

The controller has a register of 200 entries where an integer for fuse size and a 16 byte description for load fuses can be stored. It can be modified through this dialog.

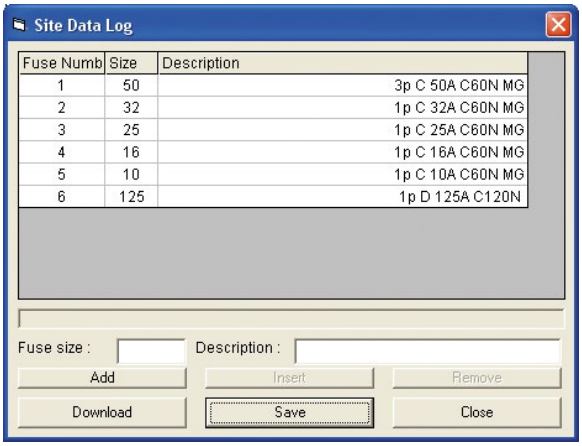


Figure 4-20 Site Data

4.2.7.5 Maintenance and service

The controller has a register of 50 entries with date and a 16 byte description for storing maintenance entries. If the register is full, a new entry overwrites the oldest.

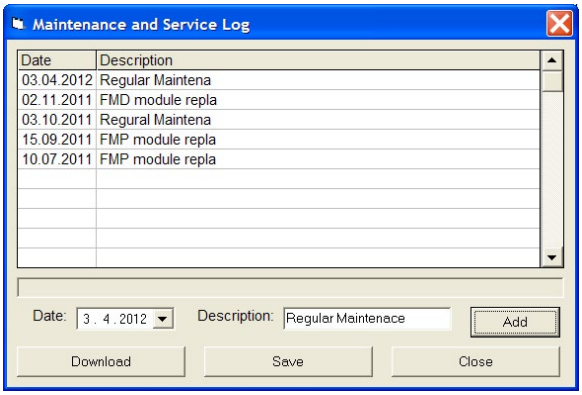
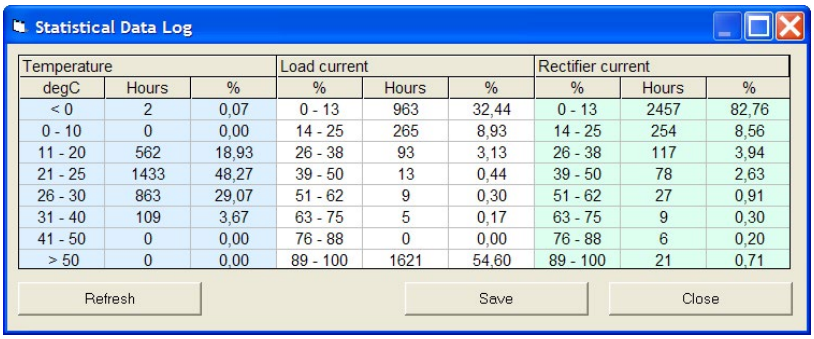


Figure 4-21 Maintenance and Service

4.2.7.6 Statistical data

This log contains statistical data about rectifier current, load current and battery temperature.



Temperature			Load current			Rectifier current		
degC	Hours	%	%	Hours	%	%	Hours	%
< 0	2	0,07	0 - 13	963	32,44	0 - 13	2457	82,76
0 - 10	0	0,00	14 - 25	265	8,93	14 - 25	254	8,56
11 - 20	562	18,93	26 - 38	93	3,13	26 - 38	117	3,94
21 - 25	1433	48,27	39 - 50	13	0,44	39 - 50	78	2,63
26 - 30	863	29,07	51 - 62	9	0,30	51 - 62	27	0,91
31 - 40	109	3,67	63 - 75	5	0,17	63 - 75	9	0,30
41 - 50	0	0,00	76 - 88	0	0,00	76 - 88	6	0,20
> 50	0	0,00	89 - 100	1621	54,60	89 - 100	21	0,71

Figure 4-22 Statistical Data

4.2.8 Alarm Information

The list shows active alarms at present. The list is usually displayed on the right side of PowCom™ Main window, see section 3.1, Figure 3-1. If the main window is small the Alarm information is displayed in a separate window.

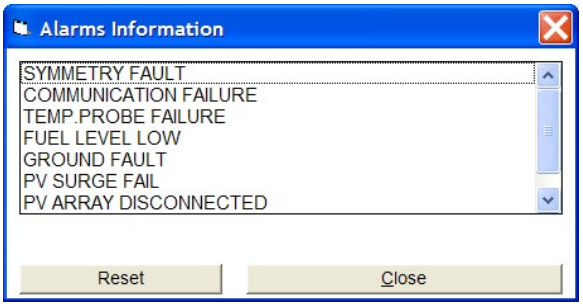


Figure 4-23 Alarm History

4.2.9 Alarm dial back

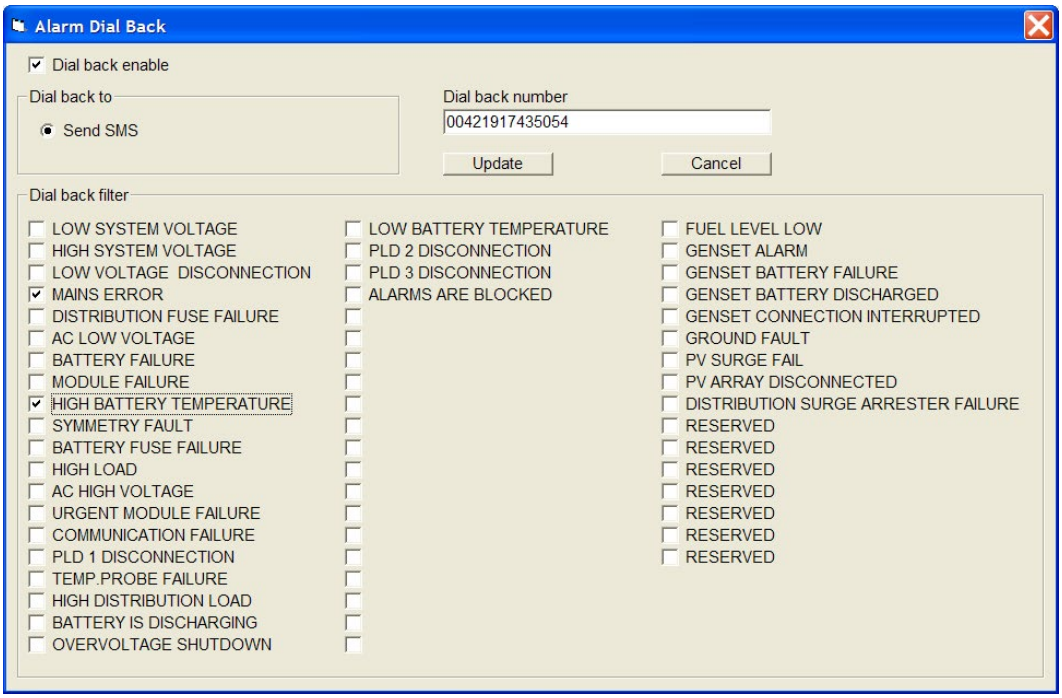


Figure 4-24 Alarm Dial Back

In case of an alarm, the controller can be set to send a text message to a certain number. Mark the alarms that need to trigger the sms message. Enter the Dial back number and tick Dial back enable.

Dial back requires a GSM modem connected to the controller.

4.2.10 TCP/IP settings

The IP-address of the controller must be set via PowCom™ Hybrid or directly on the controller before the Network interface communication is established.

Enter the IP address, net mask and default gateway.

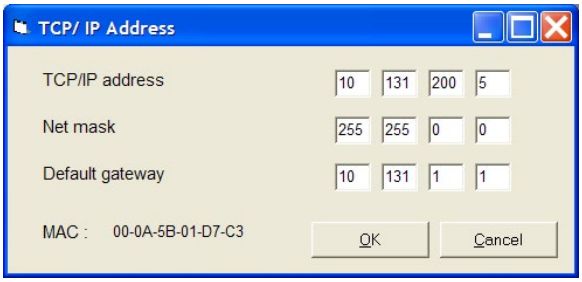


Figure 4-25 TCP/IP Address

4.2.11 Inventory

The inventory menu displays a list of all modules and units in the system.

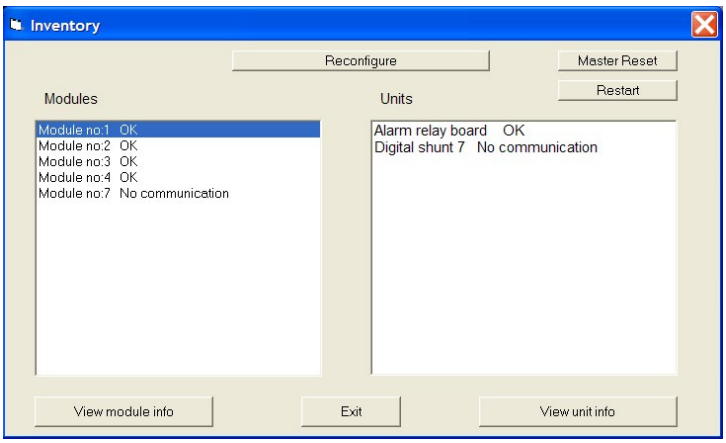


Figure 4-26 Inventory

Click on a module or a unit and select View Unit/Module Info. Further information about the selected item is displayed.

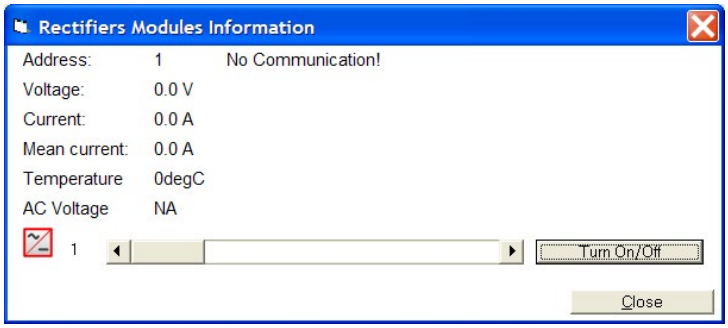


Figure 4-27 Unit / Module Information

If the modules or units are permanently removed from the system, the system needs to be reconfigured otherwise a Communication Failure alarm is generated. Click on *Reconfigure* to remove all non-communicating modules and units from the Inventory.

NOTE If Direct Communication is used, system Master Reset can be performed. The controller can also be restarted without resetting anything. For security reasons the *Master Reset* and *Restart* buttons are not visible when connected via Network or Modem.

4.3 Utilities

4.3.1 Data Log

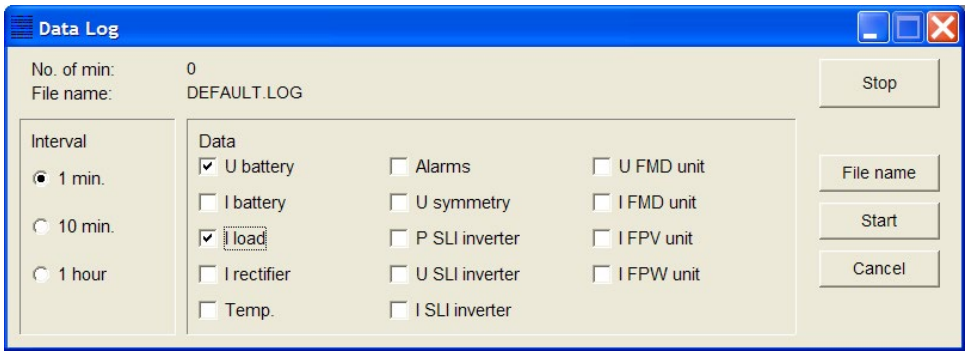


Figure 4-28 Data Log

The Data Log function is used for time data collection from the controller to the PC.

PowCom™ Hybrid must be connected to the system during the logging period.

Before data collection, it is important to select the time interval in which the data is recorded as well as the data type. Then select *File name*, define the target folder and click Start.

Data logging is a manual function and must be started and stopped manually.

The report can be opened and viewed as a spreadsheet.

4.3.2 Inventory Log

The Inventory log provides information about the system setting. It enables to file and save all the system data and up-to-date measured values from the controller.

4.3.3 Update Configuration

If the system configuration needs to be updated use a configuration file.

1. Open the PowCom™ Hybrid software and choose *Update configuration* from the Utilities Menu.
2. Choose *Select update file*.
3. Locate the folder with up dated file. Select the file and click *Open*.

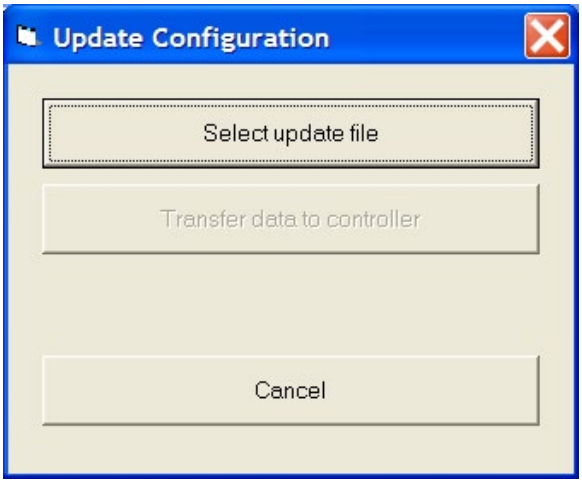


Figure 4-29 Update Configuration

4. Choose *Transfer data to controller* button. The transfer process will take a few seconds.
5. Once the transfer is completed, choose *Close*.
6. Click on the controller icon in the PowCom™ Hybrid main window and check if the configuration number has been updated.
7. If a warning like below appears, just make sure the correct configuration file is used, otherwise operation of the whole system may be changed.

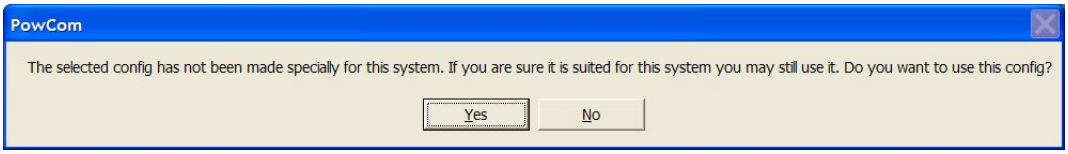


Figure 4-30 Configuration Warning

4.3.4 Load / Delete Battery File

If a desired Battery type is not listed in PowCom Hybrid Config Wizard - 1 (Battery Tab), it can be uploaded to PowCom™ Hybrid manually using this function. PowCom™ Hybrid software must be disconnected from the system.

Click *Load File*, select required Battery file (.csv) and *Close*. If a battery file is not needed it can be deleted.

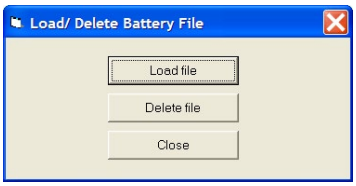


Figure 4-31 Load / Delete Battery File

4.3.5 Modify configuration

NOTE This item is accessible only for users with license level 30.

Some default parameters can be modified and alarm relay assignment can be changed. Accessible Config Wizard pages are 1, 2 and 5.

4.3.6 Configuration wizard

Through this guide it is possible to create or modify the whole system configuration.

NOTE This item is accessible only for users with license level 50.

4.3.6.1 Config Wizard - 1

GENERAL

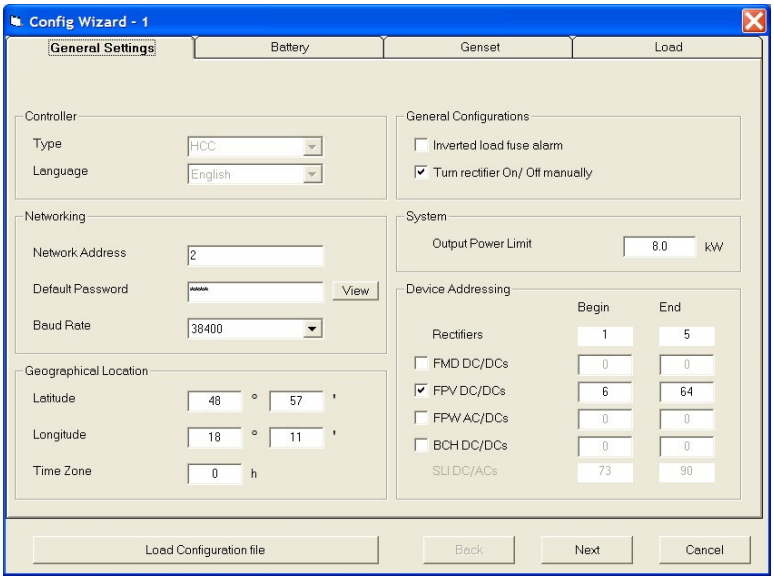


Figure 4-32 Config Wizard - 1 - General Settings

Controller

- **Type** - Select the type of the controller in the system HCL or HCC, HCX or HLX.
- **Language** - Select the preferred language.

Networking

- **Network Address** - Communication channel for the USB serial line (set to 1 by default).
- **Default Password** - Default password is usually set to 1234.
- **Baud Rate** - Here a Baud rate for the controller is set. The default baud rate setting for the controller serial connection (USB) is 38400.

Geographical Location

Geographical parameters of the system site location are set here. It is important to set them accurately for optimal operation of photo voltaic panels.

- Latitude (-90° to 90°)
- Longitude (-180°to 180°)
- Time Zone (-12 to 12 hours)

System

- **Output Power Limit** - This value refers to the maximum input power of all installed rectifiers. At the same time, the limit must be lower than the maximum output power of the Genset.

  When the rectifiers are distributed unevenly per phase (e.g. two rectifiers per phase L1, one per phase L2 and L3), one phase may be overloaded even though the set power limit is below the maximum GenSet Power.

  Example:
  Genset with max. power 11kW has a limit 16A/230V per phase. With 4 rectifiers installed, two rectifiers are fed from phase L1, one from phase L2 and one from phase L3. With the Power limit set to 9kW the set maximum power is below the maximum Genset power (with efficiency considered), yet phase L1 is overloaded (the current of phase L1 is over 21A).

CAUTION It is important to set *Output Power Limit* correctly to protect the Generator from overloading and subsequently being damaged.

NOTE For Pure Solar and Solar Enhanced applications (Genset not used), set the *Output Power Limit* to 0kW. (If the power limit is set to 0kW, power limiting is disabled.)

MODULES

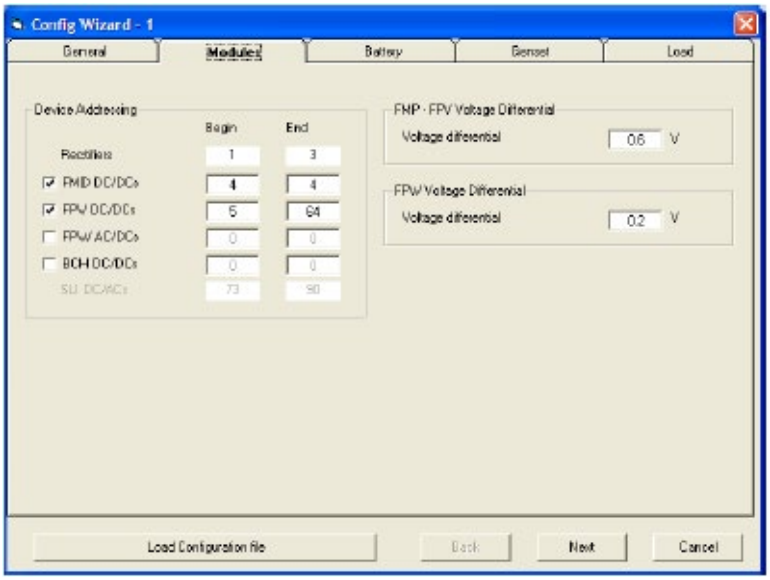


Figure 4-33 Config Wizard - 1 - Modules

Device Addressing

Module addressing is pre-defined in the order below. The maximum number of modules that can be supervised by a controller is 64. The modules need to be addressed according to their real positions in the power shelves.

- Rectifiers (AC/DC converter)
- FMD (DC/DC converter)
- FPV (photo voltaic DC/DC converter)
- FPW (wind AC/DC converter)
- BCH (DC/DC break chopper)

FMP - FPV Voltage Differential

FPW Voltage Differential

Voltage Differential [V] - Voltage differential prioritizes the renewable source of power to reduce fuel consumption (maximum voltage difference 0.8V).

BATTERY

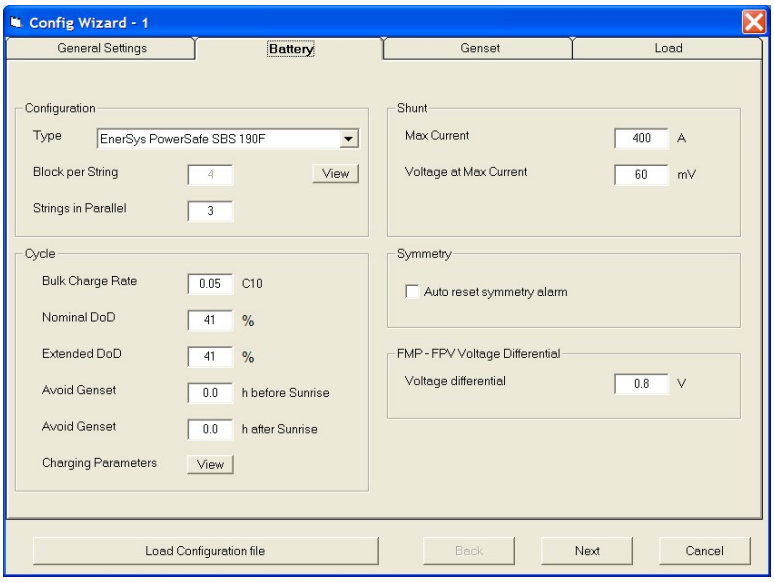


Figure 4-34 Config Wizard - 1 - Battery

Configuration

- **Type -** A type of battery is selected from the list. If the battery you need to use is not in the list, it can be uploaded to PowCom™ Hybrid manually (see 4.3.4 Load/Delete Battery File).
- **Battery Parameters** - Basic parameters such as: battery type, capacity, maximum charge rate, etc. are displayed.
- **Block per String** - This value is taken from the battery file, depending on the voltage/ block relation.
- **Strings in Parallel** - This number defines the number of battery strings connected to the system.

Cycle

- **Bulk Charge Rate** - This is a maximum charging current in cycling applications. To achieve a long battery life and reliability, it is important to control the recharge cycle carefully. The default value is defined in the battery file. This value is modifiable in the Config Wizard, depending on the license level. The battery current limit is calculated from this value.
- **Nominal DoD [%]** - This is the “depth of discharge” capability of battery cycling. To correctly control the depth of discharge during the discharge phase, it is represented by Cap1 parameter.

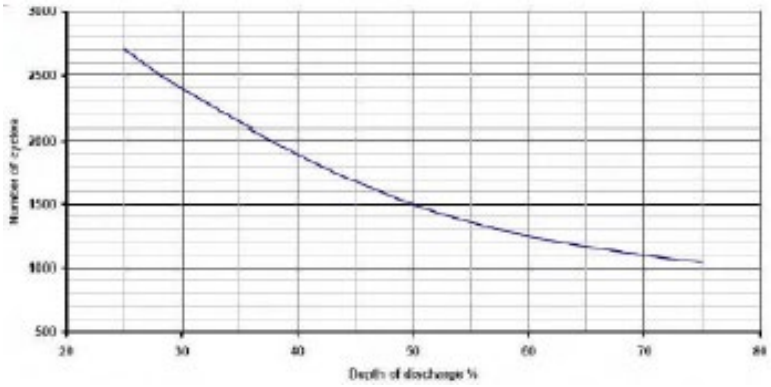


Figure 4-35 Depth of Discharge (example)

- **Extended DoD [%]** - This value is greater than Nominal DoD and it is represented by Cap2 parameter. Extended DoD is applicable only in systems with PV panels installed.

Normally, if discharged battery capacity drops to Cap1 value, Generator is turned ON, see Figure 4-36.

- **Avoid Genset before Sunrise [h]** - To avoid short-term Generator running, and fuel consumption, it is possible to postpone Generator startup by setting this value, Figure 4-36 (2a).
- **Avoid Genset after Sunrise [h]** - If the FPV converters do not provide enough energy for battery charging after sunrise due to bad weather conditions, the battery keeps discharging to Cap2 value until the FPV converters start working, see Figure 4-36 (2b).

If the FPV converters do not start feeding the battery before reaching the Cap2 value, Figure 4-36 (2c), or the time interval Avoid Genset after sunrise expires, Figure 4-36 (3), the generator turns ON automatically.

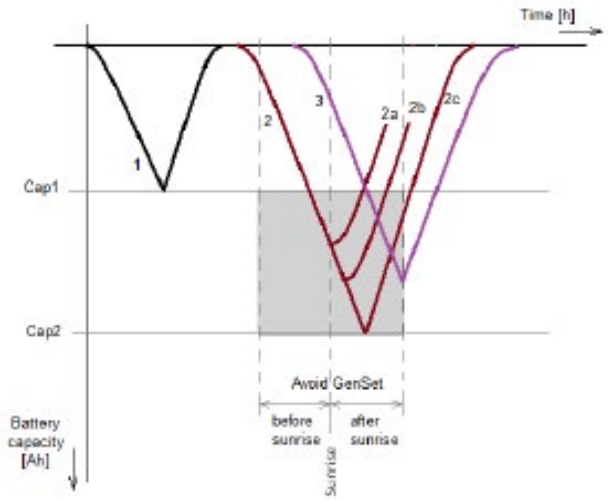


Figure 4-36 Discharge Cycling

Charging parameters - When clicked on the View button, a window with Charging parameters appears. These parameters are calculated from the Battery file and parameters set in this Battery Tab.

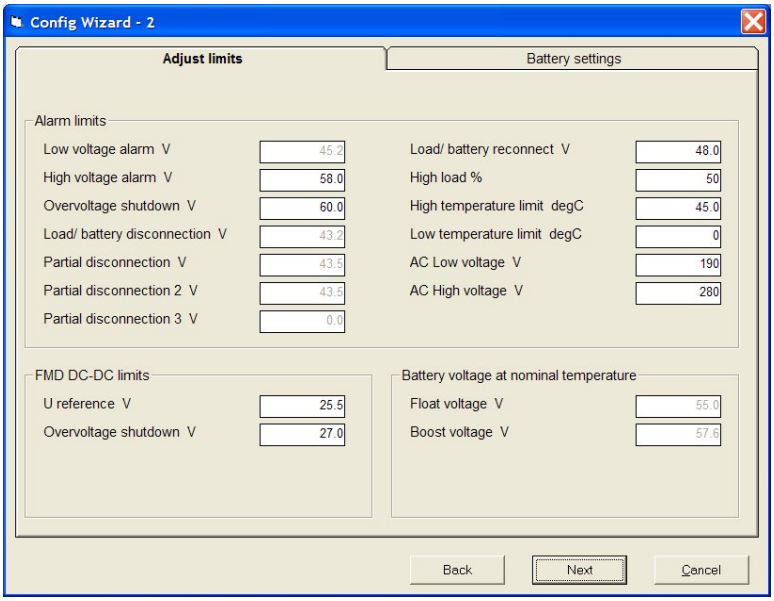


Figure 4-37 Charging parameters (example)

Shunt

These parameters define the shunt used in the system for battery current measurement.

- Max Current [A]
- Voltage at Max Current [mV]

Symmetry

- Auto reset symmetry alarm - This option enables automatic reseting of the Symmetry fault alarm.

Partial Cycling

- **Partial Cycling Enabled** - When this mode is enabled battery cycling is performed only within a predefined SoC range and not repeatedly going to full recharge. The lower limit is given by Nominal DoD, the upper limit by SoC Limit.

This way the diesel consumption is reduced; however, this is at the cost of battery life. This function is enabled only for deep cycle battery applications (no RE source).

- **Partial/Full Cycle Ratio** - This is a ratio between a set of partial recharges followed by one full. For instance value 10 means that every 10th cycle will be full.
- **SoC Limit** - When the SoC Limit is set to 80%, the batteries will only be recharged to 80% of the effective battery capacity during each cycle.

GENSET

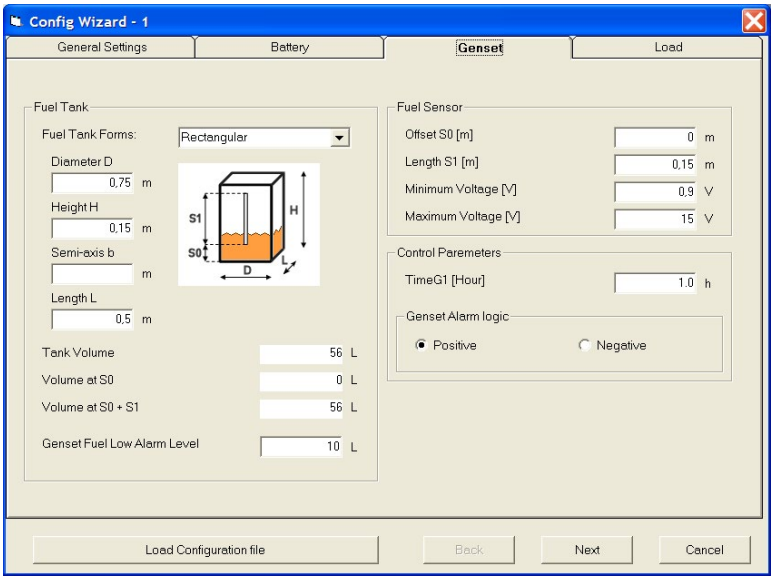


Figure 4-38 Config Wizard - 1 - Genset

Fuel Tank

- **Fuel Tank Forms [m]** - Select which fuel tank form is used. Enter the dimensions of the tank (Diameter D, Height H, Semi-axes b, Length L).
- **Tank volume [L]** - Tank volume is automatically calculated according to the given dimensions.

- **Volume at S0 [L]** - The minimum volume of the fuel in the tank which can be measured.
- **Volume at S0 + S1 [L]** - The maximum volume of the fuel in the tank which can be measured.
- **Genset Fuel Low Alarm Level [L]** - This alarm sets the minimum level of fuel in the tank. When the fuel drops below this level, the alarm is activated and the generator is turned OFF.

NOTE For Pure Solar and Solar Enhanced applications (Genset not used), these fields are not available.

Also, certain Alarms (40-45) are factory disabled for applications without a Genset. If not, please contact Customer Support.

Fuel Sensor

- **Offset S0 [m]** - Minimum height for fuel sensor measurement.
- **Length S1 [m]** - Height range for fuel sensor measurement.
- **Minimum Voltage [V]** - Sets the minimum Fuel Low Alarm Level voltage value.
- **Maximum Voltage [V]** - Sets the maximum Fuel Low Alarm Level voltage value.

Control Parameters

- **Time G1 [hour]** - Time G1 is defined only for the HCC controller and saves fuel consumption in the generator. If a total FMP current is lower than FMP0 current, a countdown of TimeG1 is initiated. After expiry of the time the generator turns OFF.

Genset Alarm Logic

The Genset alarm occurs based on the signal from the GenSet alarm output. If this alarm is active for more than 5min, the generator is switched to NO Operation mode and then switched OFF.

Both functionality and visibility can be disabled via Config Wizard - 5. It is possible to invert the alarm logic:

- Positive - UMF7 > USys + 8V (set alarm), UMF7 < USys + 6V (reset alarm)
- Negative - UMF7 > USys + 8V (reset alarm), UMF7 < USys + 6V (set alarm)

ATS

- **ATS is installed** - This function can be enabled only if an installed ATS switch allows overriding the ATS control signal by the HCX controller.

LOAD

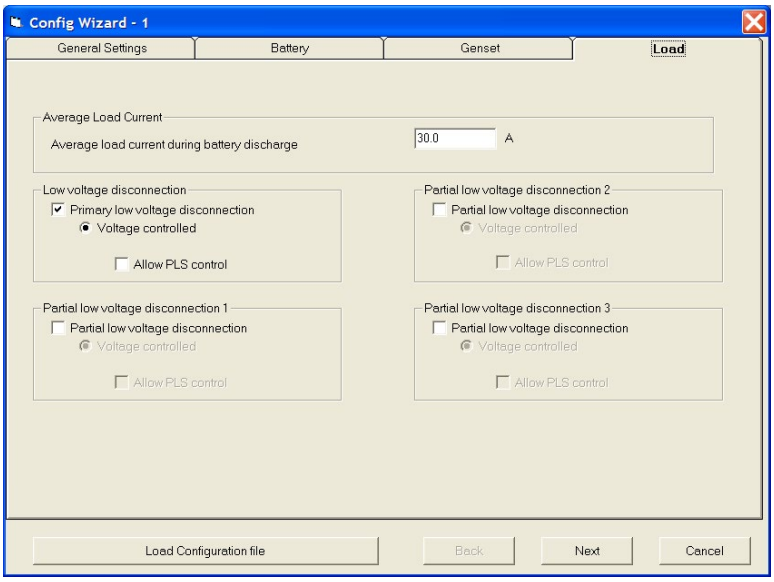


Figure 4-39 Config Wizard - 1 - Load

Average Load Current

- **Average Load Current during battery discharge [A]** - This value is set according to the DC load connected to the system. It helps in optimizing the Cap0 and Cap1 parameters.

Low voltage disconnection

- **Primary low voltage disconnection** - enables control of the LVBD relay in the system. *Allow PLS control* enables LVBD relay control using PLS logic.

Partial low voltage disconnection

- **Partial low voltage disconnection 1** - enables control of the PLD1 relay in the system. *Allow PLS control* enables PLD1 relay control using PLS logic.
- **Partial low voltage disconnection 2** - enables control of the PLD2 relay in the system. *Allow PLS control* enables PLD2 relay control using PLS logic.
- **Partial low voltage disconnection 3** - enables control of the PLD3 relay in the system. *Allow PLS control* enables PLD3 relay control using PLS logic.

4.3.6.2 Config Wizard - 2

ADJUST LIMITS

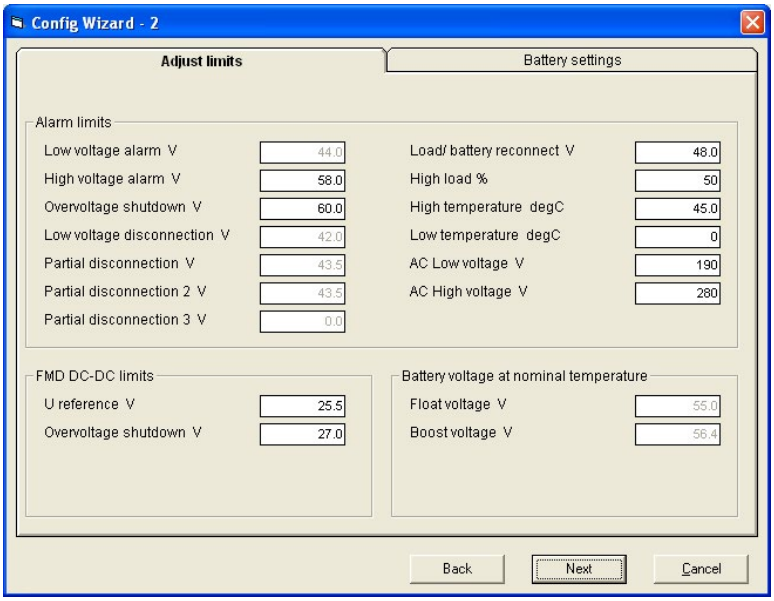


Figure 4-40 Config Wizard - 2 - Adjust Limits

Alarm Limits:

- **Low voltage alarm [V]** - Indicates a partially discharged battery. It is automatically uploaded from the Battery file. This value cannot be modified.
- **High voltage alarm [V]** - Alarm occurs when the system voltage exceeds the set limit. If the set value is less than the *Low Voltage alarm* value, a Warning with this message appears:

  Low voltage alarm value has to be less or equal to High voltage alarm value -1 V.

- **Overvoltage shutdown [V]** - This alarm appears when the system voltage exceeds the rectifier *Overvoltage Shutdown* limit and the rectifiers are switched OFF. Rectifiers usually need to be restarted.

  The *Overvoltage shutdown* value has to be greater or equal to formula:

  High voltage alarm value + 0.5 V.

  If the condition is not met, the value is automatically adjusted.

- **Low voltage disconnection [V]** - When the system voltage drops below the set limit, an alarm is generated and the battery is automatically disconnected after 30 seconds (System Shutdown). Low Voltage Disconnection must be allowed in Config Wizard - 1, Load Tab.

  This value is automatically uploaded from the Battery file and cannot be modified.

- **Partial disconnection [V]** - To extend backup time for high priority loads, low priority loads can be disconnected. Disconnection can be voltage and/or PLS controlled.

  Partial Load Disconnection must be greater than *Low Voltage Disconnection* but less than *Load Connection* value.

- **Partial disconnection 2 [V]** - To extend backup time for high priority loads, low priority loads can be disconnected. Disconnection can be voltage and/or PLS controlled.

- **Partial disconnection 3 [V]** - To extend backup time for high priority loads, low priority loads can be disconnected. Disconnection can be voltage and/or PLS controlled.

- **Load / Battery reconnect [V]** - If the PLD or the LVBD relay is disconnected, it will be re-connected again if the system voltage exceeds this limit and the mains is restored.

  If the *Load Connection* value is less or equal to Low Voltage Disconnection, then *Load Connection* value is automatically adjusted to *Low Voltage Disconnection* +5V.

NOTE It is recommended to set this value to 5V greater than the *Low Voltage Disconnection limit*.

- **High load [%]** - *High Load* alarm is activated when the load current exceeds the capacity of the installed modules multiplied by the *High Load* limit. This is an indication that the system requires increased rectifier capacity.

- **High temperature [°C]** - When the battery temperature exceeds the set limit, an alarm occurs.

- **Low temperature [°C]** - *Low Temperature* limit sets the bottom limit for battery temperature. If the value is lower an alarm is generated.

  Low Temperature limit can not be greater than the *High Temperature* limit value -10°C. If this condition is not met, the value is automatically adjusted.

- **AC Low voltage [V]** - This alarm is generated when AC mains voltage drops below the set limit and the Generator is ON for more than 30s. This alarm is activated only when rectifiers with AC mains voltage reading are used in the system.

- **AC High voltage [V]** - This alarm occurs when AC Mains voltage exceeds the set limit and the Generator is ON for more than 30s. This alarm is activated only when rectifiers with AC mains voltage reading are used in the system.

FMD DC-DC limits

DC-DC settings set the limits of secondary voltage for dual systems. This option is accessible only if the modules (converters) are installed in the system.

- **U reference [V]** - U reference is a voltage reference for a secondary voltage.
- **Overvoltage shutdown [V]** - If the voltage rises above this limit, the DC/DC converter that delivers the highest current will be switched OFF.

Battery voltage at nominal temperature

- **Float voltage [V]** - Float voltage is the constant voltage applied continuously to a battery string. Float voltage value varies significantly, depending on the battery construction and ambient temperature. When the battery is used in a cyclic application, Float voltage mode lasts only a short time after the battery is fully charged. This value is automatically uploaded from the Battery file and cannot be modified.
- **Boost voltage [V]** - Boost voltage is applied during battery charging in a cyclic application. This value is automatically uploaded from the Battery file and cannot be modified.

BATTERY SETTINGS

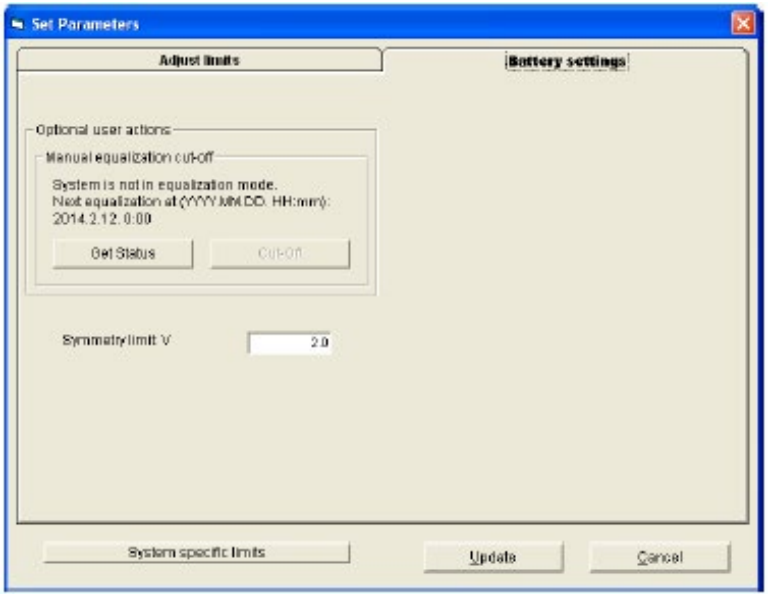


Figure 4-41 Config Wizard - 2 - Battery Settings

- **Symmetry limit [V]** - If the voltage in one block differs from this limit (from the average block voltage) the system gives an alarm. Symmetry measurement can be disabled if the value for this limit is set to 0.0.

Optional User Actions - Manual Equalization Cut-Off

During the battery equalization period it is possible to *Cut-off* the equalization manually. This is possible only via Direct Connection and it is visible only if open in *Supervision/Set Parameters*.

When the *Get State* button is clicked, the system displays if the battery is currently in equalization state and when the next equalization takes place.

System Specific Limits

In this window, limits that are specific for the system can be set. If no limits are defined, the button remains grayed out.

NOTE These limits are programmed in Configuration Wizard (Config Wizard - 3, Ext. Limits Tab) and are available only for PowCom™ Hybrid software license level 50.

4.3.6.3 Config Wizard - 3

This page contains 3 Tabs that allow naming of Extended Alarm texts, Extended Limits and External measurements.

EXTENDED ALARM TEXTS

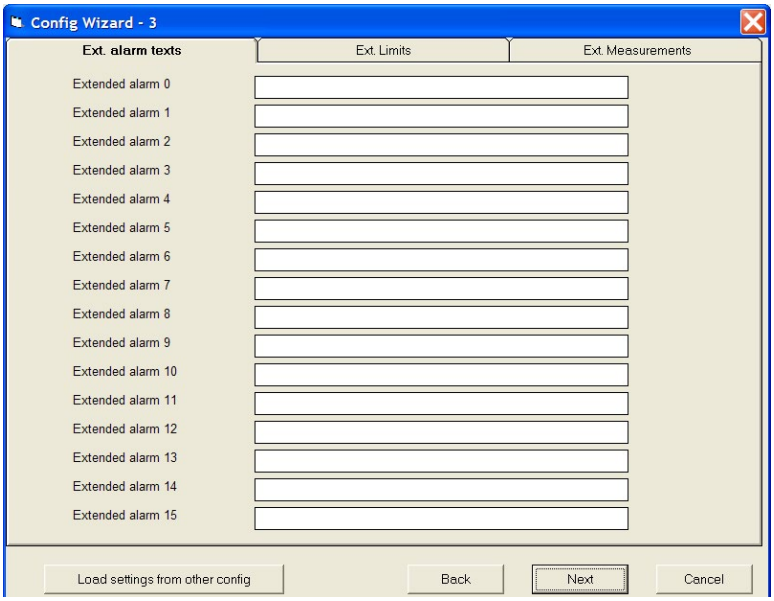


Figure 4-42 Config Wizard - 3 - Extended Alarm Texts

Names of the alarms are entered here. Up to 16 user alarms containing maximum16 characters each can be defined.

EXTERNAL LIMITS

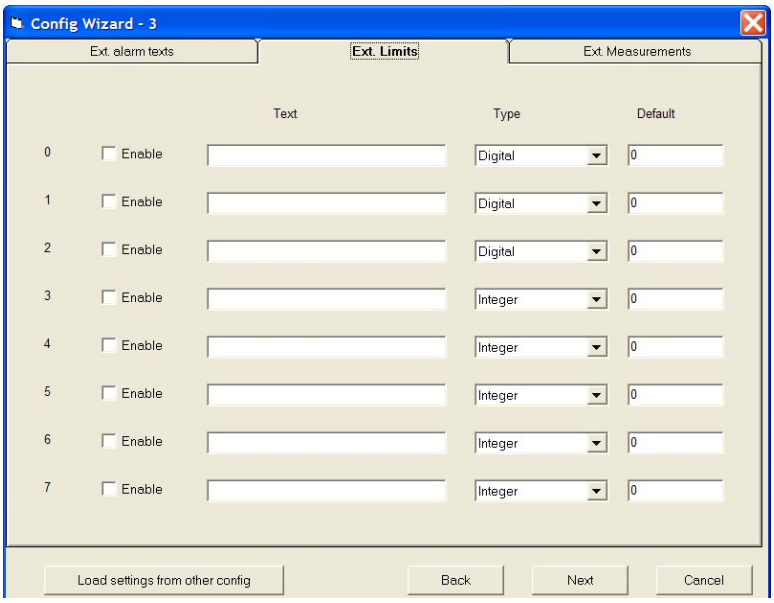


Figure 4-43 Config Wizard - 3 - External Limits

Here, up to 8 configurable limits can be defined. Each limit has a default value. When activated, these limits can be adjusted from PowCom™ Hybrid or the controller menu. After a Master Reset, external limits revert to their default values.

The limits are stored in variables as User limits 0-7 (Config Wizard - 4) and can be used by PLS as part of its logical operations. The text describing the limit can have up to 16 characters.

The entered limits are always stored as integers. There are 5 types of limits available:

1. **Integer** - Limit presented as an integer.
2. **Decimal x.x** - Limit presented as a number with one decimal.
3. **Decimal x.xx** - Limit presented as a number with two decimals.
4. **Decimal x.xxx** - Limit presented as a number with three decimals.
5. **Digital** - Limit presented as binary values On/Off.

Example:

If *Decimal x.xx* is selected, a variable value of 1234 is displayed as 12.34. When the limit (12.34) is entered from PowCom™ Hybrid or the controller display, this value is multiplied by 100 to get an integer number. Regardless of the limit type, the value is always stored as an integer.

If *Digital* limit is selected, the setting can be either On or Off. The value stored in the variable in this case would be 1 or 0.

EXTERNAL MEASUREMENTS

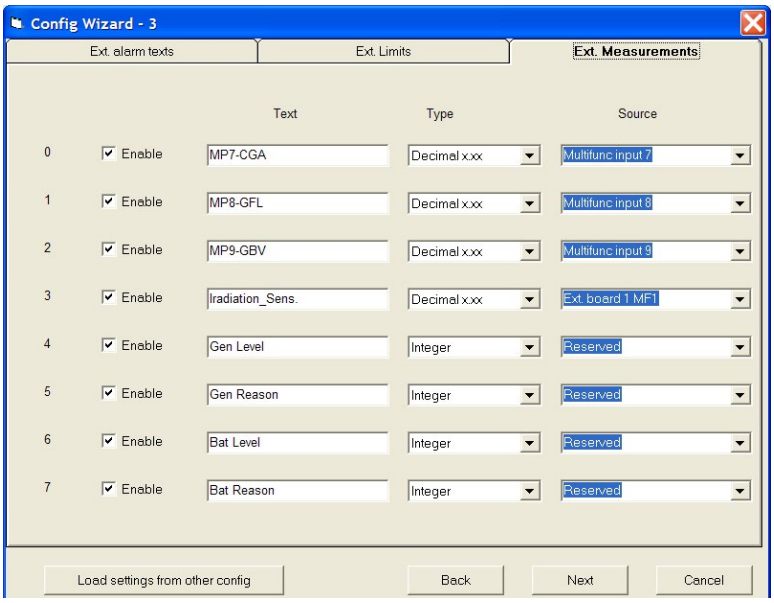


Figure 4-44 Config Wizard - 3 - External Measurements

Here, up to 8 configurable inputs can be defined.

When activated, these inputs can use the same sources of measured values as those used in the PLS. This includes all inputs to the controller, and also values created by the PLS (e.g.: Multifunctional inputs, HCC temperature, Sys. voltage...).

There are 5 types of inputs available:

1. **Integer** - Input presented as an integer
2. **Decimal x.x** - Input presented as a number with one decimal
3. **Decimal x.xx** - Input presented as a number with two decimals
4. **Decimal x.xxx** - Input presented as a number with three decimals
5. **Digital** - Input presented as binary values On/Off

Example:

If *Decimal x.xx* input is selected, a variable value of 1234 is displayed as 12.34.

If *Digital* input is selected, the value will be displayed as ON if the source is different from 0 and OFF if the source is 0.

4.3.6.4 Config Wizard - 4

This is the page where the PLS is programmed. The PLS is built up of 32 logic units. Each can take 2 selectable inputs which can be combined with 2 fixed limits in a logical operation that can produce 2 individual actions depending on the result of that operation.

NOTE Refer to the appendices for listings of all the available sources, tests and actions.

LOGIC

32 logical units are executed one after another every second, starting with logical unit 0. Using these logical units, it is possible to create quite a complex functionality.

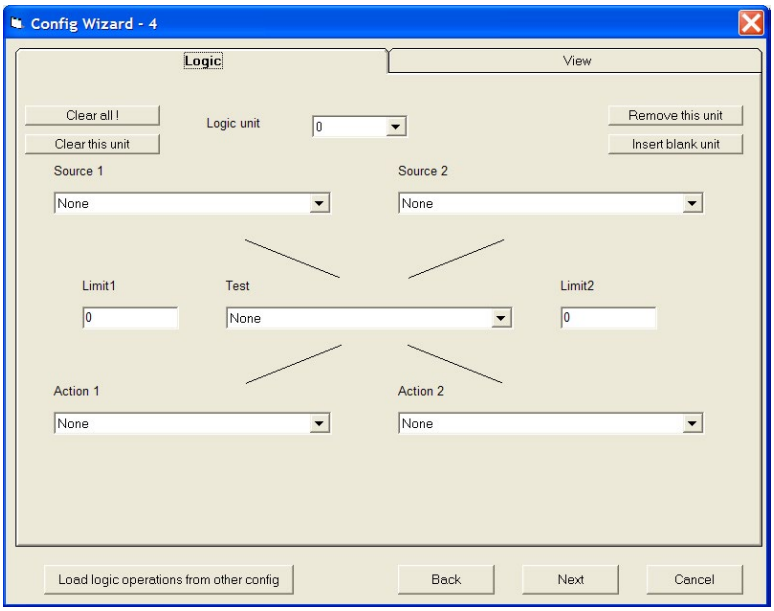


Figure 4-45 Config Wizard - 4 - Logic

Source 1 and Source 2

These are the inputs of the logical operation. The input can be either physical (e.g. analog or digital inputs from various boards), or user limit inputs created on the previous page. System limits (U1, U2) or system measurements (system voltage or load/battery/ rectifier current) can be also used.

Results created by logical operations (digital signals, counters, temp 0-7...) can also become inputs (sources) for logical operations.

NEED MORE INFORMATION? For a complete list of the available inputs see Appendix A.

Limit 1 and Limit 2

These Limits are constants used for comparison with Sources in the logical operation.

Test - Logical Operation

This is the logical operation that can be selected. The output from the logical operation is a result that can be either true or false. The logical operation is built up by a combination of Source 1 and Source 2 and the constants Limit 1 and Limit 2.

Action 1 and Action 2

This is the action that will be performed depending on the result of the logical operation. There are two basic types of actions:

1. **True/False result** - A True result means Set (increment) a and False result means Reset (decrement) the action.
2. **True result** - This action is performed only if the result of the equation is True.

Buttons

- **Load logic operations from other config** - already existing configuration can be uploaded clicking on this button.
- **Clear All** - This will clear all the logic units (0-31).
- **Clear this Unit** - Clears the currently selected unit.
- **Remove this unit** - This will remove the selected unit following unit numbers are decremented by 1.
- **Insert blank unit** - This will insert a blank unit in front of the selected unit and increment the numbers of the following units.

VIEW

In this Tab overview of all 32 logic units is displayed.

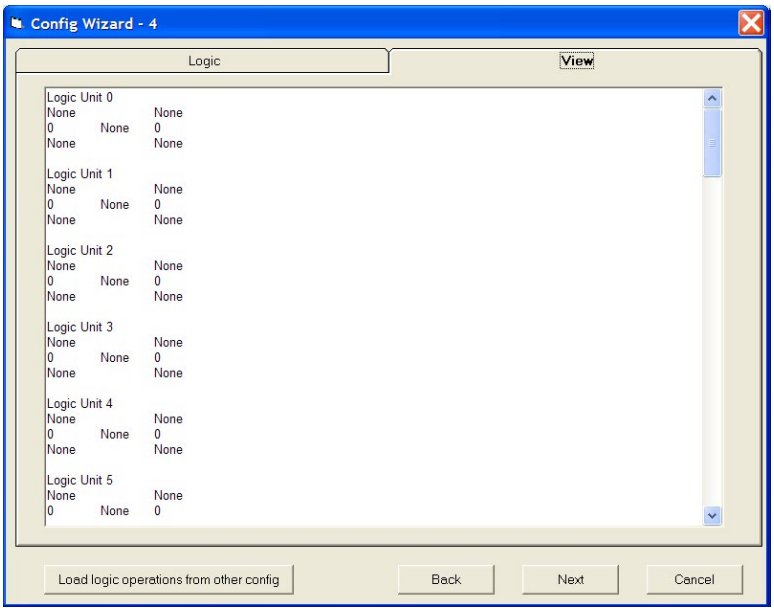


Figure 4-46 Config Wizard - 4 - View

Logic Operation Examples

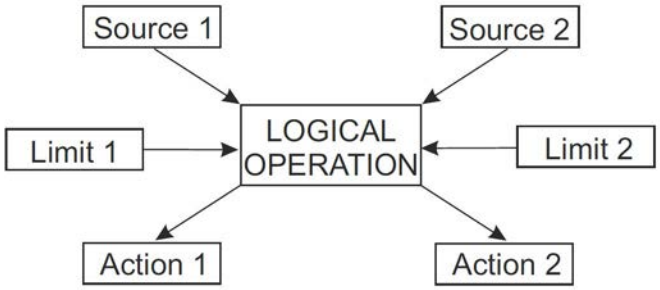


Figure 4-47 Logical Operation Diagram

- **Alarm from Digital input**

Digital input has a voltage range 0-100VDC. Digital input has a hard coded threshold level at 10V with hysteresis ±2V.

HCC Digital inp 1		None
0	Source1	0
Set/Reset Ext alarm 0		None

Logical Operation result:
If Source 1 <> 0 the result is true, if Source 1 = 0 the result is false.
The alarm text for Ext Alarm 0 has to be defined in Config Wizard - 3.

- **Alarm from Analogue input**

Multifunctional input has a voltage range 0-100VDC.
An analog input gives an alarm if the voltage on that input is greater than 10V.

Multifunc input 1		None
1000	Source1 > Lim1	0
Set/Reset Ext alarm 1		None

Logical Operation result:

The value of ananlogue input is a multiple of 100, that means, Lim1 is used as a fixed limit set to 1000, which corresponds to 10 V. The alarm text for Ext Alarm 1 has to be defined in Config Wizard - 3.

- **Alarm from Analogue input with adjustable limit**

Enter the User limit text in Config Wizard - 3, select the limit type (e.g: Decimal x.xx), set the default limit value (e.g.: 2000) and Enable.
An analog input gives an alarm if the voltage is greater than the set limit. The limit can be adjusted by a user: Supervision/Set Parameters/System specific limits default value, e.g. 20.00V.

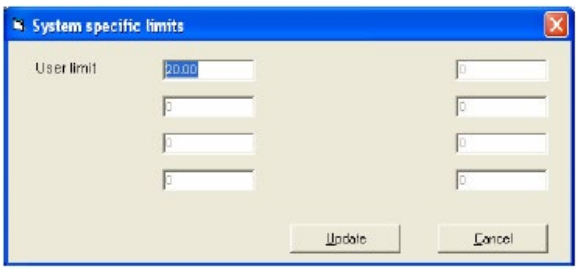


Figure 4-48 System specific limits

Multifunc input 1		User limit 0
0	Source1 > Source2	0
Set/Reset Ext alarm 2		None

Logical Operation result:
If Source1 > Source2 than set Extended alarm 2; if Source1 < Source2 Reset Extended alarm 2.

- **Re-scale a measurement**

Let's assume that we have a system, which has a DC/AC inverter on the output to provide 230VAC from the 48VDC. We want to measure the AC output voltage and display it. For AC voltage measurement, an AC/DC converter is needed with a scale e.g. 0-5VDC. So, 5VDC represents 300VAC. Output of the measuring device has to be connected to an analog input.

None		Multifunc input 1
300	Always true	500
Source2 * Lim1/ Lim2 to Temp0		None

Logical Operation result:
If 300VAC is measured it is read as 500 (5.00V). Each time this cell is executed (once every second) the input value is multiplied by 300 and divided by 500 and the result is put into the Temporary variable Temp0. Temp0 will then contain the AC voltage in Volts.

- **Alarm from Temporary variable**

If we continue with the previous example, the scaled value can be tested and the alarm is given if AC voltage drops below 200 VAC.

The scaled value can be displayed, by setting up a user defined measurement in Config Wizard - 3. Enable the Ext. measurement, enter the text (e.g.: AC voltage), set the type (integer) and then select Temp 0 as a source.

Temp0		None
200	Source1 < Lim1	0
Set/Reset Ext alarm 3		None

Logical Operation result:
If Source1 < Source2 than set Extended alarm 2; if Source1 > Source2 Reset Extended alarm 3.

- **Alarm for more than 2 sources**

This example shows how to test more than two inputs using temporary variable (Digital signal).

Alarm 3 reports MAINS ERROR (The list of alarms can be found in Appendix A).

HCC Digital inp 1		Alarm 3
0	Source1 AND Source2	0
Set/Reset Digital signal0		None

Logical Operation result:
Digital signal 0 keeps the result of the first test.

Multifunc input 1		Ext. board1 MF5
1000	(Source1 < Lim1) AND (Source2 < Lim2)	1000
Set/Reset Digital signal 1		None

Logical Operation result:
Digital signal 1 remembers the result of the second test.

Digital signal 0		Digital signal 1
0	Source1 AND Source2	0
Set/Reset Ext alarm 0		None

Logical Operation result:
Both variables have to be true to get the alarm.

- **Alarm with hysteresis**

This example shows how one condition sets an alarm while another resets it.

An alarm is given if the system voltage drops below 45V and it is removed when the voltage rises above 50V.

System Voltage * 100		None
4500	Source1 < Lim1	0
Set Digital signal 0		None

Logical Operation result:
Set temporary variable (Digital signal 0) if the system voltage drops below 45V.

System Voltage * 100		None
5000	Source1 < Lim1	0
Set Digital signal 0		None

Logical Operation result:
Reset temporary variable (Digital signal 0) if the system voltage rises above 50V.

Digital signal 0		None
0	Source1	0
Set/Reset Ext alarm 0		None

Logical Operation result:
If Digital signal 0 = true, set Extended alarm 0, if Digital signal 0 = false reset Extended alarm 0.

- **Alarm indication with delay**

This example shows how to delay an alarm when conditions are met. The Ext. alarm will be indicated after 5 minutes delay.

HCC Digital inp 1		None
0	Source1	0
Increment/Reset counter 0		None

Logical Operation result:
If Digital input 1 = true, the counter value increases, if Digital input 1 = false the counter is reset.
The test is repeated every second, so the counter value increases every second until the Digital input 1 is true.

Counter 0		None
300	Source1 > Lim1	0
Set/Reset Ext alarm 0		None

Logical Operation result:
After 300 seconds (5 minutes) the alarm is generated.

NOTE Counters will not increment above 32400, or decrement below 0.

4.3.6.5 Config Wizard - 5

In this page, alarms are interconnected with the alarm relays. An alarm relay number activating the alarm must be selected here. It is possible to select more than one relay for an alarm. Relays are numbered 3 to 10, depending on weather the External connection board or Alarm relay board is used.

NOTE Make sure the selected relay exists in the system as Config Wizard does not prevent you from using any of them.

Select alarms

- **0-23** - Standard system alarms
- **24-39** - User alarms defined in Config Wizard Page 3.
- **40-55** - Generator and PV input alarms. Disable function can be used here. If, e.g. the PV is not used, all related alarms can be masked. Alarm can be set to either:

  - Functionality Disabled (FD) or
  - Visibility Disabled (VD)

- **56-63** - Status messages

The two columns of check boxes on the left are used to select other options for each alarm:

- **M** - Alarm is treated as a message (Selected alarm will cause a blinking yellow light on the controller and the alarm text will show up under Messages in the controller menu. The behavior will not be affected in PowCom™ Hybrid.)
- **D** - means default for the dial back function. This function has to be activated from PowCom™ Hybrid (Supervision/Alarm dial back).

The *Load relay info from config* button can be used for uploading an existing configuration.

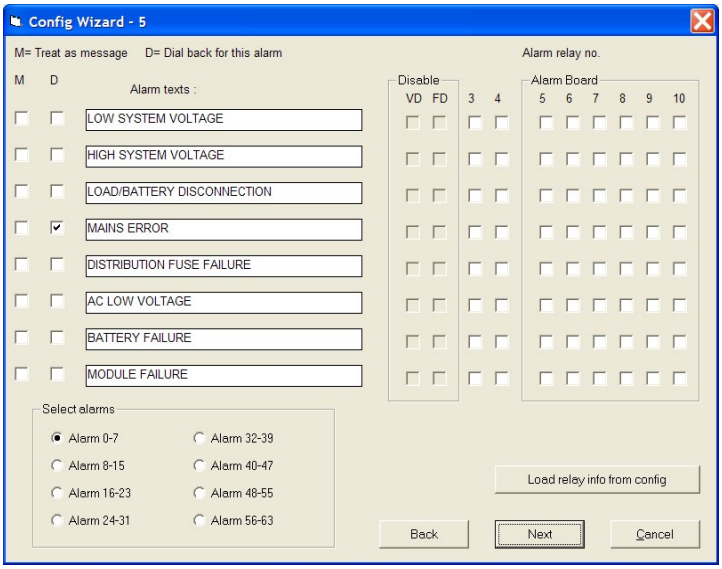


Figure 4-49 Config Wizard - 5

4.3.6.6 Config Wizard - 6

The functionality of this page has been implemented in the controller firmware, therefore the setup is no longer needed.

4.3.6.7 Config Wizard - 7

In this page, the factory set configuration number is displayed. If the configuration has not been modified, the text below says: *This is an official UNIPOWER config!*

With an appropriate license level number, the configuration can be modified. After modification, the text below changes to: *This is a user defined configuration!*

Click *Save configuration* to save the config file to a PC. (Readable copy of configuration file is generated automatically in HTML format.) If working Offline, by clicking the *Next* button you will exit the Config Wizard.

It is necessary to be Online to transfer the configuration data to the controller. To do so, click *Next* and you will be taken to the following page.

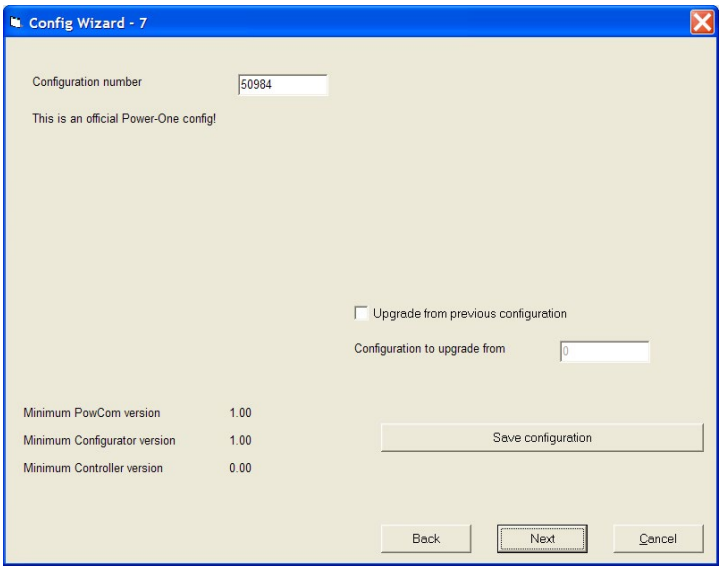


Figure 4-50 Config Wizard - 7

4.3.6.8 Config Wizard - 8

After applying all necessary settings in Config Wizard - 1, it is important to transfer the set data to controller. To move forward between pages click the *Next / End* button.

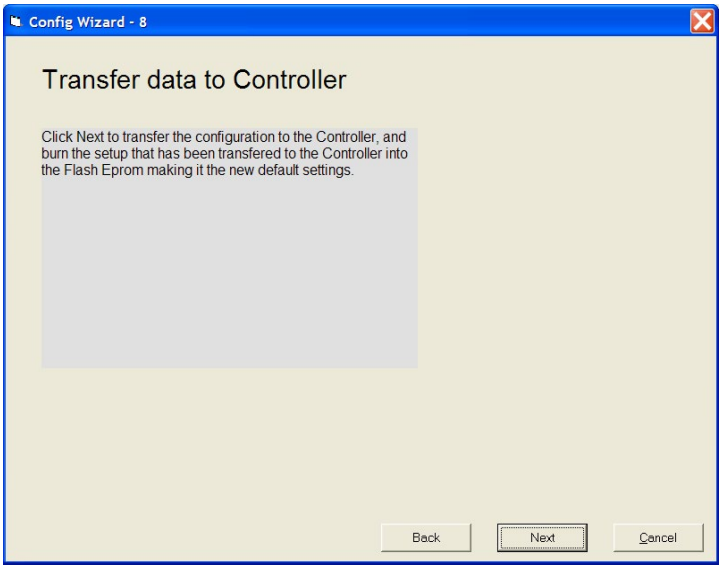


Figure 4-51 Config Wizard - 8

4.3.6.9 Config Wizard - 9

Finish the configuration setup in Config Wizard - 9.

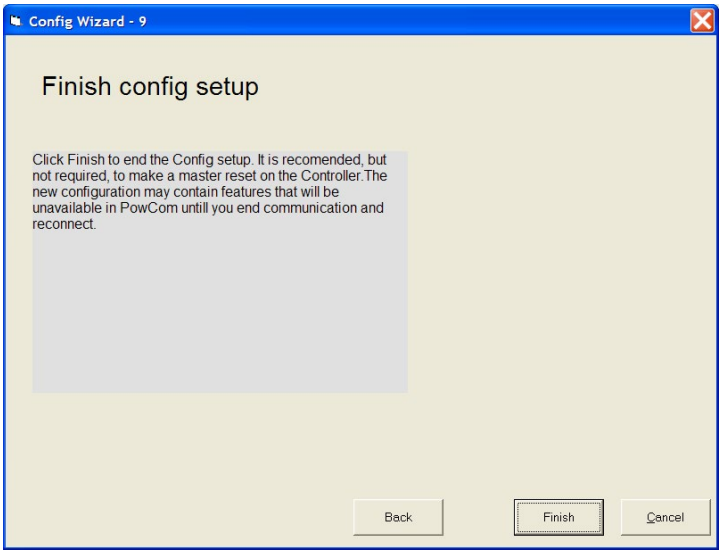


Figure 4-52 Config Wizard - 9

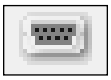
4.3.7 Button Bar

For starting Direct communication:

For opening the Network connection window:

For starting the phone list for communication via modem:

For opening the window for selection of baud-rate and serial port:



To open the Set parameters window. (Only when communication is established.):

4.4 Tools Menu

4.4.1 Download SD card

The data logging function is used for collecting system data which can be later used for analysis or statistical calculations.

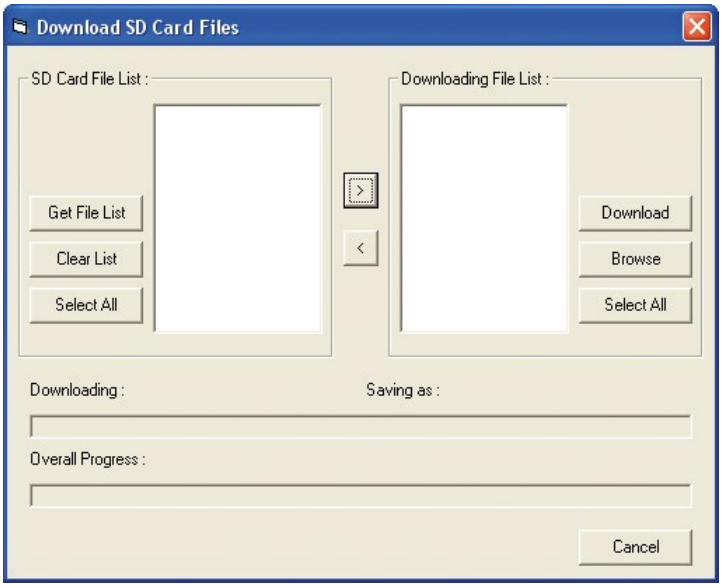


Figure 4-53 Download SD Card

The system controller logs the data at regular 10-minute-time intervals with the date and time stamp. The data is saved in separate files for each day in comma separated values file format (e.g.: 20100513.csv).

NOTE SD card downloading can be applied only to the controllers with an SD card fitted.

NOTE The ontroller supports max. 2GB microSD card, sufficient for more than 20 years of data logging.

4.4.2 Hybrid CSV Reader

The Hybrid CSV Reader provides time series and daily/weekly/monthly total statistical analysis for a range of data including:

- Rectifier, solar, wind, load power, fuel consumption.
- Renewable energy contribution, Generator operating hours and duty cycle.
- Battery cycles, average DoD, average temperature and estimation of remaining life.

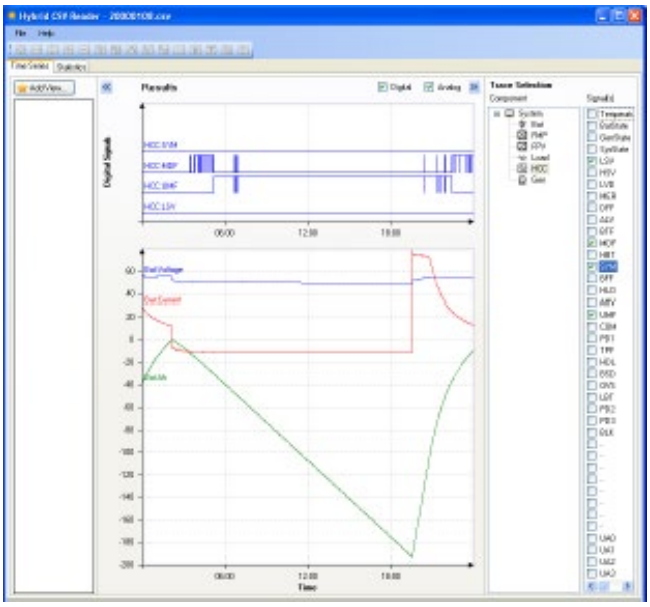


Figure 4-54 Hybrid CSV Reader

Appendix A - PLS Sources

Index	Source	Source scale	Description
0	None		Returns 0
1	Multifunc input 10	*100V	Symmetry / Analog input on Alarm board MF10
2	Multifunc input 11	*100V	Symmetry / Analog input on Alarm board MF11
3	Ext. board 1 MF5	*100V	Multifunctional input 5 on the first Extension board
4	Ext. board 1 MF6	*100V	Multifunctional input 6 on the first Extension board
5	Ext. board 1 MF7	*100V	Multifunctional input 7 on the first Extension board
6	Ext. board 1 MF8	*100V	Multifunctional input 8 on the first Extension board
7	Ext. board 1 MF9	*100V	Multifunctional input 9 on the first Extension board
8	Ext. board 1 MF10	*100V	Multifunctional input 10 on the first Extension board
9	Ext. board 1 MF11	*100V	Multifunctional input 11 on the first Extension board
10	Ext. board 1 MF12	*100V	Multifunctional input 12 on the first Extension board
11	Ext. board 2 MF5	*100V	Multifunctional input 5 on the second Extension board
12	Ext. board 2 MF6	*100V	Multifunctional input 6 on the second Extension board
13	Ext. board 2 MF7	*100V	Multifunctional input 7 on the second Extension board
14	Ext. board 2 MF8	*100V	Multifunctional input 8 on the second Extension board
15	Ext. board 2 MF9	*100V	Multifunctional input 9 on the second Extension board
16	Ext. board 2 MF10	*100V	Multifunctional input 10 on the second Extension board
17	Ext. board 2 MF11	*100V	Multifunctional input 11 on the second Extension board
18	Ext. board 2 MF12	*100V	Multifunctional input 12 on the second Extension board
19	Ext. board 3 MF5	*100V	Multifunctional input 5 on the third Extension board
20	Ext. board 3 MF6	*100V	Multifunctional input 6 on the third Extension board
21	Ext. board 3 MF7	*100V	Multifunctional input 7 on the third Extension board
22	Ext. board 3 MF8	*100V	Multifunctional input 8 on the third Extension board
23	Ext. board 3 MF9	*100V	Multifunctional input 9 on the third Extension board
24	Ext. board 3 MF10	*100V	Multifunctional input 10 on the third Extension board
25	Ext. board 3 MF11	*100V	Multifunctional input 11 on the third Extension board
26	Ext. board 3 MF12	*100V	Multifunctional input 12 on the third Extension board
27	Ext. board 4 MF7	*100V	Multifunctional input 7 on the fourth Extension board
28	Ext. board 4 MF8	*100V	Multifunctional input 8 on the fourth Extension board
29	Ext. board 4 F9	*100V	Multifunctional input 9 on the fourth Extension board
30	Ext. board 4 MF10	*100V	Multifunctional input 10 on the fourth Extension board
31	Ext. board 4 MF11	*100V	Multifunctional input 11 on the fourth Extension board
32	Ext. board 4 MF12	*100V	Multifunctional input 12 on the fourth Extension board
33	HCC Digital inp 1	Digital (0/1)	Digital input 1 on Alarm board
34	HCC Digital inp 2	Digital (0/1)	Digital input 2 on Alarm board
35	Ext. board 1 Digital inp 1	Digital (0/1)	Digital input 1 on the first Extension board
36	Ext. board 1 Digital inp 2	Digital (0/1)	Digital input 2 on the first Extension board
37	Ext. board 2 Digital inp 1	Digital (0/1)	Digital input 1 on the second Extension board
38	Ext. board 2 Digital inp 2	Digital (0/1)	Digital input 2 on the second Extension board
39	Ext. board 3 Digital inp 1	Digital (0/1)	Digital input 1 on the third Extension board

Index	Source	Source scale	Description
40	Ext. board 3 Digital inp 2	Digital (0/1)	Digital input 2 on the third Extension board
41	Ext. board 4 Digital inp 1	Digital (0/1)	Digital input 1 on the fourth Extension board
42	Ext. board 4 Digital inp 2	Digital (0/1)	Digital input 2 on the fourth Extension board
43	Reserved		
44	Reserved		
45	Reserved		
46	Reserved		
47	Reserved		
48	Reserved		
49	Reserved		
50	Reserved		
51	Reserved		
52	Reserved		
53	Reserved		
54	Reserved		
55	Reserved		
56	Reserved		
57	Reserved		
58	Reserved		
59	Reserved		
60	Reserved		
61	Reserved		
62	Reserved		
63	Reserved		
64	Reserved		
65	Digital Signal 0	Digital (0/1)	An internal variable. It has a digital value. It can be set and used for Logical Equation.
66	Digital Signal 1	Digital (0/1)	An internal variable. It has a digital value. It can be set and used for Logical Equation.
67	Digital Signal 2	Digital (0/1)	An internal variable. It has a digital value. It can be set and used for Logical Equation.
68	Digital Signal 3	Digital (0/1)	An internal variable. It has a digital value. It can be set and used for Logical Equation.
69	Digital Signal 4	Digital (0/1)	An internal variable. It has a digital value. It can be set and used for Logical Equation.
70	Digital Signal 5	Digital (0/1)	An internal variable. It has a digital value. It can be set and used for Logical Equation.
71	Digital Signal 6	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
72	Digital Signal 7	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.

Index	Source	Source scale	Description
73	Digital Signal 8	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
74	Digital Signal 9	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
75	Digital Signal 10	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
76	Digital Signal 11	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
77	Digital Signal 12	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
78	Digital Signal 13	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
79	Digital Signal 14	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
80	Digital Signal 15	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
81	Digital Signal 16	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
82	Digital Signal 17	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
83	Digital Signal 18	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
84	Digital Signal 19	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
85	Digital Signal 20	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
86	Digital Signal 21	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
87	Digital Signal 22	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
88	Digital Signal 23	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
89	Digital Signal 24	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
90	Digital Signal 25	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
91	Digital Signal 26	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
92	Digital Signal 27	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
93	Digital Signal 28	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
94	Digital Signal 29	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.

Index	Source	Source scale	Description
95	Digital Signal 30	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
96	Digital Signal 31	Digital (0/1)	An internal variable. It has a Digital value. It can be set and used for Logical Equation.
97	Alarm 0	Digital (0/1)	LOW SYSTEM VOLTAGE
98	Alarm 1	Digital (0/1)	HIGH SYSTEM VOLTAGE
99	Alarm 2	Digital (0/1)	LOAD/BATTERY DISCONNECTION
100	Alarm 3	Digital (0/1)	MAINS ERROR
101	Alarm 4	Digital (0/1)	DISTRIBUTION FUSE FAILURE
102	Alarm 5	Digital (0/1)	AC LOW VOLTAGE
103	Alarm 6	Digital (0/1)	BATTERY FAILURE
104	Alarm 7	Digital (0/1)	MODULE FAILURE
105	Alarm 8	Digital (0/1)	HIGH BATTERY TEMPERATURE
106	Alarm 9	Digital (0/1)	SYMMETRY FAULT
107	Alarm 10	Digital (0/1)	BATTERY FUSE FAILURE
108	Alarm 11	Digital (0/1)	HIGH LOAD
109	Alarm 12	Digital (0/1)	AC HIGH VOLTAGE
110	Alarm 13	Digital (0/1)	URGENT MODULE FAILURE
111	Alarm 14	Digital (0/1)	COMMUNICATION FAILURE
112	Alarm 15	Digital (0/1)	PLD 1 DISCONNECTION
113	Alarm 16	Digital (0/1)	TEMP.PROBE FAILURE
114	Alarm 17	Digital (0/1)	HIGH DISTRIBUTION LOAD
115	Alarm 18	Digital (0/1)	BATTERY IS DISCHARGING
116	Alarm 19	Digital (0/1)	OVERVOLTAGE SHUTDOWN
117	Alarm 20	Digital (0/1)	LOW BATTERY TEMPERATURE
118	Alarm 21	Digital (0/1)	PLD 2 DISCONNECTION
119	Alarm 22	Digital (0/1)	PLD 3 DISCONNECTION
120	Alarm 23	Digital (0/1)	AlarmS ARE BLOCKED
121	Counter 0	Integer (0-32400) *	A counter can be manipulated by an Action and can be used as an input for Logical Equation.
122	Counter 1	Integer (0-32400) *	A counter can be manipulated by an Action and can be used as an input for Logical Equation.
123	Counter 2	Integer (0-32400) *	A counter can be manipulated by an Action and can be used as an input for Logical Equation.
124	Counter 3	Integer (0-32400) *	A counter can be manipulated by an Action and can be used as an input for Logical Equation.
125	Counter 4	Integer (0-32400) *	A counter can be manipulated by an Action and can be used as an input for Logical Equation.
126	Counter 5	Integer (0-32400) *	A counter can be manipulated by an Action and can be used as an input for Logical Equation.
127	Counter 6	Integer (0-32400) *	A counter can be manipulated by an Action and can be used as an input for Logical Equation.

Index	Source	Source scale	Description
128	Counter 7	Integer (0-32400) *	A counter can be manipulated by an Action and can be used as an input for Logical Equation.
129	Counter 8	Integer (0-32400) *	A counter can be manipulated by an Action and can be used as an input for Logical Equation.
130	Counter 9	Integer (0-32400) *	A counter can be manipulated by an Action and can be used as an input for Logical Equation.
131	Counter 10	Integer (0-32400) *	A counter can be manipulated by an Action and can be used as an input for Logical Equation.
132	Counter 11	Integer (0-32400) *	A counter can be manipulated by an Action and can be used as an input for Logical Equation.
133	Counter 12	Integer (0-32400) *	A counter can be manipulated by an Action and can be used as an input for Logical Equation.
134	Counter 13	Integer (0-32400) *	A counter can be manipulated by an Action and can be used as an input for Logical Equation.
135	Counter 14	Integer (0-32400) *	A counter can be manipulated by an Action and can be used as an input for Logical Equation.
136	Counter 15	Integer (0-32400) *	A counter can be manipulated by an Action and can be used as an input for Logical Equation.
137	User limit 0	Integer Decimal x.x Decimal x.xx Decimal x.xxx Digital	User defined limit 0 It is defined on Page #3, Tab: Ext. Limits
138	User limit 1	Integer Decimal x.x Decimal x.xx Decimal x.xxx Digital	User defined limit 1 It is defined on Page #3, Tab: Ext. Limits
139	User limit 2	Integer Decimal x.x Decimal x.xx Decimal x.xxx Digital	User defined limit 2 It is defined on Page #3, Tab: Ext. Limits
140	User limit 3	Integer Decimal x.x Decimal x.xx Decimal x.xxx Digital	User defined limit 3 It is defined on Page #3, Tab: Ext. Limits
141	User limit 4	Integer Decimal x.x Decimal x.xx Decimal x.xxx Digital	User defined limit 4 It is defined on Page #3, Tab: Ext. Limits

Index	Source	Source scale	Description
142	User limit 5	Integer Decimal x.x Decimal x.xx Decimal x.xxx Digital	User defined limit 5 It is defined on Page #3, Tab: Ext. Limits
143	User limit 6	Integer Decimal x.x Decimal x.xx Decimal x.xxx Digital	User defined limit 6 It is defined on Page #3, Tab: Ext. Limits
144	User limit 7	Integer Decimal x.x Decimal x.xx Decimal x.xxx Digital	User defined limit 7 It is defined on Page #3, Tab: Ext. Limits
145	Ext. board 1 MF1	*100V	Multifunctional input 1 on the first Extension board
146	Ext. board 1 MF2	*100V	Multifunctional input 2 on the first Extension board
147	Ext. board 1 MF3	*100V	Multifunctional input 3 on the first Extension board
148	Ext. board 1 MF 4	*100V	Multifunctional input 4 on the first Extension board
149	Ext. board 2 MF 1	*100V	Multifunctional input 1 on the second Extension board
150	Ext. board 2 MF 2	*100V	Multifunctional input 2 on the second Extension board
151	Ext. board 2 MF 3	*100V	Multifunctional input 3 on the second Extension board
152	Ext. board 2 MF 4	*100V	Multifunctional input 4 on the second Extension board
153	Ext. board 3 MF 1	*100V	Multifunctional input 1 on the third Extension board
154	Ext. board 3 MF 2	*100V	Multifunctional input 2 on the third Extension board
155	Ext. board 3 MF 3	*100V	Multifunctional input 3 on the third Extension board
156	Ext. board 3 MF 4	*100V	Multifunctional input 4 on the third Extension board
157	Ext. board 4 MF 1	*100V	Multifunctional input 1 on the fourth Extension board
158	Ext. board 4 MF 2	*100V	Multifunctional input 2 on the fourth Extension board
159	Ext. board 4 MF 3	*100V	Multifunctional input 3 on the fourth Extension board
160	Ext. board 4 MF 4	*100V	Multifunctional input 4 on the fourth Extension board
161	Ext. board 4 MF 5	*100V	Multifunctional input 5 on the fourth Extension board
162	Ext. board 4 MF 6	*100V	Multifunctional input 6 on the fourth Extension board
163	Reserved		
164	Reserved		
165	Reserved		
166	Reserved		
167	Reserved		
168	Reserved		
169	Reserved		
170	Reserved		
171	Temp0	User defined	Temporary variable

Index	Source	Source scale	Description
172	Temp1	User defined	Temporary variable
173	Temp2	User defined	Temporary variable
174	Temp3	User defined	Temporary variable
175	Temp4	User defined	Temporary variable
176	Temp5	User defined	Temporary variable
177	Temp6	User defined	Temporary variable
178	Temp7	User defined	Temporary variable
179	Ext. board 1 Temperature 1	Integer (-127 to 127)	Battery temperature sensor for the first Extension board
180	Ext. board 1 Temperature 2	Integer (-127 to 127)	Ambient temperature sensor for the first Extension board. Must be allowed in External measurements.
181	Ext. board 2 Temperature 1	Integer (-127 to 127)	Battery temperature sensor for the second Extension board
182	Ext. board 2 Temperature 2	Integer (-127 to 127)	Ambient temperature sensor for the second Extension board. Must be allowed in External measurements.
183	Ext. board 3 Temperature 1	Integer (-127 to 127)	Battery temperature sensor for the third Extension board
184	Ext. board 3 Temperature 2	Integer (-127 to 127)	Ambient temperature sensor for the third Extension board. Must be allowed in External measurements.
185	Ext. board 4 Temperature 1	Integer (-127 to 127)	Battery temperature sensor for the fourth Extension board
186	Ext. board 4 Temperature 2	Integer (-127 to 127)	Ambient temperature sensor for the fourth Extension board. Must be allowed in External measurements.
187	Multifunc input 1	*100V	Symmetry / Analog input on Alarm board MF 1
188	Multifunc input 2	*100V	Symmetry / Analog input on Alarm board MF 2
189	Multifunc input 3	*100V	Symmetry / Analog input on Alarm board MF 3
190	Multifunc input 4	*100V	Symmetry / Analog input on Alarm board MF 4
191	Multifunc input 5	*100V	Symmetry / Analog input on Alarm board MF 5
192	Multifunc input 6	*100V	Symmetry / Analog input on Alarm board MF 6
193	Multifunc input 7	*100V	Symmetry / Analog input on Alarm board MF 7
194	Multifunc input 8	*100V	Symmetry / Analog input on Alarm board MF 8
195	Multifunc input 9	*100V	Symmetry / Analog input on Alarm board MF 9
196	Ext. board 1.battcur	*10V	Battery current reading from the first Extension board
197	Ext. board 2.battcur	*10V	Battery current reading from the second Extension board
198	Ext. board 3.battcur	*10V	Battery current reading from the third Extension board
199	Ext. board 4.battcur	*10V	Battery current reading from the fourth Extension board
200	Reserved		
201	Reserved		
202	Reserved		
203	Reserved		
204	Phase 1 fault	Digital (0/1)	Mains failure on the first line

Index	Source	Source scale	Description
205	Phase 2 fault	Digital (0/1)	Mains failure on the second line
206	Phase 3 fault	Digital (0/1)	Mains failure on the third line
207	Module status HCC	Integer (bit array 0-255)	Module status flag for all communicating rectifiers
208	Module flags	HCC Integer (bit array 0-255)	Module status2 flag for all communicating rectifiers
209	Reserved		
210	Reserved		
211	Reserved		
212	Reserved		
213	Reserved		
214	Reserved		
215	Reserved		
216	Reserved		
217	Reserved		
218	Reserved		
219	Reserved		
220	Reserved		
221	Reserved		
222	Reserved		
223	Reserved		
224	Reserved		
225	Reserved		
226	Reserved		
227	Reserved		
228	Reserved		
229	Reserved		
230	Reserved		
231	Reserved		
232	LVD Limit		
233	HCC Temp.1 (Batt)	Integer (-127 to 127)	Battery temperature sensor measurement
234	HCC Temp.2	Integer (-127 to 127)	Ambient temperature sensor measurement
235	HCC Shunt Input	1A	Total shunt current
236	Reserved		
237	Mains voltage phase 1		AC Input voltage on addresses 1 and 4
238	Mains voltage phase 2		AC Input voltage on addresses 2 and 5
239	Mains voltage phase 3		AC Input voltage on addresses 3 and 6

Index	Source	Source scale	Description
240	Alarm relay 1-8	Bit field	Bit mask of alarms (First byte)
241	Alarm relay 9-16	Bit field Bit	mask of alarms (Second byte)
242	Sys. voltage *100	*100V	System voltage measurement with 2 decimals
243	Multifunc. input 12	*100V	Symmetry / Analog input on Alarm board MF12
244	U1	*10V	U1 reference voltage
245	U2	*10V	U2 reference voltage
246	U3	*10V	U3 reference voltage
247	U4	*10V	U4 reference voltage
248	Batt. temperature	Integer (-127 to 127)	Temperature measurement
249	Battery current (A)	*1A	Total Battery current
250	Load current (A)	*1A	Total Load current
251	Rectifier current (A)	*1A	Total Rectifier current
252	System voltage	*10 V	System voltage measurement with 1 decimal
253	U2-flag	Digital (0/1)	Indicate U2 is activated
254	U3-flag	Digital (0/1)	Indicate U3 is activated
255	U4-flag	Digital (0/1)	Indicate U4 is activated

* NOTE: It won’t increment above 32400.

Appendix B - PLS Logic Tests

Test	Description
None	Test is false
Source1 > Lim1	
Source1 < Lim1	
(Source1 > Lim1) AND (Source1 < Lim2)	
(Source1 > Lim1) OR (Source2 > Lim2)	
(Source1 < Lim1) OR (Source2 < Lim2)	
(Source1 > Lim1) OR (Source2 < Lim2)	
(Source1 > Lim1) AND (Source2 > Lim2)	
(Source1 < Lim1) AND (Source2 < Lim2)	
(Source1 > Lim1) AND (Source2 < Lim2)	
(Source1 > Lim1) AND Source2	
(Source1 < Lim1) AND Source2	
Source1	
Source1 OR Source2	
Source1 AND Source2	
Source1 XOR Source2	
NOT Source1	
NOT (Source1 OR Source2)	
NOT (Source1 AND Source2)	
NOT (Source1 XOR Source2)	
Source1 OR (NOT Source2)	
Source1 AND (NOT Source2)	
Source1 XOR (NOT Source2)	
Source1 > Source2	
Source1 < Source2	
Always True	Test is true
Source1 > (Source2 + Tempcomp)	
Source1 < (Source2 + Tempcomp)	
Source1 > (Source2 + Lim1)	
Source1 < (Source2 - Lim1)	
Source1 OR Lim1 (Binary)	Bitwise operation
Source1 AND Lim1 (Binary)	Bitwise operation (use to test for single bits)

Appendix C - PLS Actions

Index	Action	Description
0	None	Does nothing
1	Set/Reset ext. alarm 0	Set extended alarm if test is true, reset if false
2	Set/Reset ext. alarm 1	Set extended alarm if test is true, reset if false
3	Set/Reset ext. alarm 2	Set extended alarm if test is true, reset if false
4	Set/Reset ext. alarm 3	Set extended alarm if test is true, reset if false
5	Set/Reset ext. alarm 4	Set extended alarm if test is true, reset if false
6	Set/Reset ext. alarm 5	Set extended alarm if test is true, reset if false
7	Set/Reset ext. alarm 6	Set extended alarm if test is true, reset if false
8	Set/Reset ext. alarm 7	Set extended alarm if test is true, reset if false
9	Set/Reset ext. alarm 8	Set extended alarm if test is true, reset if false
10	Set/Reset ext. alarm 9	Set extended alarm if test is true, reset if false
11	Set/Reset ext. alarm 10	Set extended alarm if test is true, reset if false
12	Set/Reset ext. alarm 11	Set extended alarm if test is true, reset if false
13	Set/Reset ext. alarm 12	Set extended alarm if test is true, reset if false
14	Set/Reset ext. alarm 13	Set extended alarm if test is true, reset if false
15	Set/Reset ext. alarm 14	Set extended alarm if test is true, reset if false
16	Set/Reset ext. alarm 15	Set extended alarm if test is true, reset if false
17	Increment/Reset Counter 0	Increment counter if test is true, reset if false
18	Increment/Reset Counter 1	Increment counter if test is true, reset if false
19	Increment/Reset Counter 2	Increment counter if test is true, reset if false
20	Increment/Reset Counter 3	Increment counter if test is true, reset if false
21	Increment/Reset Counter 4	Increment counter if test is true, reset if false
22	Increment/Reset Counter 5	Increment counter if test is true, reset if false
23	Increment/Reset Counter 6	Increment counter if test is true, reset if false
24	Increment/Reset Counter 7	Increment counter if test is true, reset if false
25	Increment/Reset Counter 8	Increment counter if test is true, reset if false
26	Increment/Reset Counter 9	Increment counter if test is true, reset if false
27	Increment/Reset Counter 10	Increment counter if test is true, reset if false
28	Increment/Reset Counter 11	Increment counter if test is true, reset if false
29	Increment/Reset Counter 12	Increment counter if test is true, reset if false
30	Increment/Reset Counter 13	Increment counter if test is true, reset if false
31	Increment/Reset Counter 14	Increment counter if test is true, reset if false
32	Increment/Reset Counter 15	Increment counter if test is true, reset if false
33	Increment/Decrement Counter 0	Increment counter if test is true, decrement if false
34	Increment/Decrement Counter 1	Increment counter if test is true, decrement if false

Index	Action	Description
35	Increment/Decrement Counter 2	Increment counter if test is true, decrement if false
36	Increment/Decrement Counter 3	Increment counter if test is true, decrement if false
37	Increment/Decrement Counter 4	Increment counter if test is true, decrement if false
38	Increment/Decrement Counter 5	Increment counter if test is true, decrement if false
39	Increment/Decrement Counter 6	Increment counter if test is true, decrement if false
40	Increment/Decrement Counter 7	Increment counter if test is true, decrement if false
41	Increment/Decrement Counter 8	Increment counter if test is true, decrement if false
42	Increment/Decrement Counter 9	Increment counter if test is true, decrement if false
43	Increment/Decrement Counter 10	Increment counter if test is true, decrement if false
44	Increment/Decrement Counter 11	Increment counter if test is true, decrement if false
45	Increment/Decrement Counter 12	Increment counter if test is true, decrement if false
46	Increment/Decrement Counter 13	Increment counter if test is true, decrement if false
47	Increment/Decrement Counter 14	Increment counter if test is true, decrement if false
48	Increment/Decrement Counter 15	Increment counter if test is true, decrement if false
49	Set/Reset HCC digital output 1	Set Digital output if test is true, reset if false
50	Set/Reset HCC digital output 2	Set Digital output if test is true, reset if false
51	Set/Reset ext.board 1 digital output 1	Set Digital output if test is true, reset if false
52	Set/Reset ext.board 1 digital output 2	Set Digital output if test is true, reset if false
53	Set/Reset ext.board 2 digital output 1	Set Digital output if test is true, reset if false
54	Set/Reset ext.board 2 digital output 2	Set Digital output if test is true, reset if false
55	Set/Reset ext.board 3 digital output 1	Set Digital output if test is true, reset if false
56	Set/Reset ext.board 3 digital output 2	Set Digital output if test is true, reset if false
57	Set/Reset ext.board 4 digital output 1	Set Digital output if test is true, reset if false
58	Set/Reset ext.board 4 digital output 2	Set Digital output if test is true, reset if false

Index	Action	Description
59	Reserved	
60	Reserved	
61	Reserved	
62	Reserved	
63	Reserved	
64	Reserved	
65	Reserved	
66	Reserved	
67	Reserved	
68	Reserved	
69	Reserved	
70	Reserved	
71	Reserved	
72	Reserved	
73	Reserved	
74	Reserved	
75	Reserved	
76	Reserved	
77	Reserved	
78	Reserved	
79	Reserved	
80	Reserved	
81	Set/Reset digital signal 0	Set internal signal (digital variable) if test is true, reset if false
82	Set/Reset digital signal 1	Set internal signal (digital variable) if test is true, reset if false
83	Set/Reset digital signal 2	Set internal signal (digital variable) if test is true, reset if false
84	Set/Reset digital signal 3	Set internal signal (digital variable) if test is true, reset if false
85	Set/Reset digital signal 4	Set internal signal (digital variable) if test is true, reset if false
86	Set/Reset digital signal 5	Set internal signal (digital variable) if test is true, reset if false
87	Set/Reset digital signal 6	Set internal signal (digital variable) if test is true, reset if false

Index	Action	Description
88	Set/Reset digital signal 7	Set internal signal (digital variable) if test is true, reset if false
89	Set/Reset digital signal 8	Set internal signal (digital variable) if test is true, reset if false
90	Set/Reset digital signal 9	Set internal signal (digital variable) if test is true, reset if false
91	Set/Reset digital signal 10	Set internal signal (digital variable) if test is true, reset if false
92	Set/Reset digital signal 11	Set internal signal (digital variable) if test is true, reset if false
93	Set/Reset digital signal 12	Set internal signal (digital variable) if test is true, reset if false
94	Set/Reset digital signal 13	Set internal signal (digital variable) if test is true, reset if false
95	Set/Reset digital signal 14	Set internal signal (digital variable) if test is true, reset if false
96	Set/Reset digital signal 15	Set internal signal (digital variable) if test is true, reset if false
97	Set/Reset digital signal 16	Set internal signal (digital variable) if test is true, reset if false
98	Set/Reset digital signal 17	Set internal signal (digital variable) if test is true, reset if false
99	Set/Reset digital signal 18	Set internal signal (digital variable) if test is true, reset if false
100	Set/Reset digital signal 19	Set internal signal (digital variable) if test is true, reset if false
101	Set/Reset digital signal 20	Set internal signal (digital variable) if test is true, reset if false
102	Set/Reset digital signal 21	Set internal signal (digital variable) if test is true, reset if false
103	Set/Reset digital signal 22	Set internal signal (digital variable) if test is true, reset if false
104	Set/Reset digital signal 23	Set internal signal (digital variable) if test is true, reset if false
105	Set/Reset digital signal 24	Set internal signal (digital variable) if test is true, reset if false
106	Set/Reset digital signal 25	Set internal signal (digital variable) if test is true, reset if false

Index	Action	Description
107	Set/Reset digital signal 25	Set internal signal (digital variable) if test is true, reset if false
108	Set/Reset digital signal 27	Set internal signal (digital variable) if test is true, reset if false
109	Set/Reset digital signal 28	Set internal signal (digital variable) if test is true, reset if false
110	Set/Reset digital signal 29	Set internal signal (digital variable) if test is true, reset if false
111	Set/Reset digital signal 30	Set internal signal (digital variable) if test is true, reset if false
112	Set/Reset digital signal 31	Set internal signal (digital variable) if test is true, reset if false
113	Set Digital signal 0	Set internal signal (digital variable) if test is true, do nothing if false
114	Set Digital signal 1	Set internal signal (digital variable) if test is true, do nothing if false
115	Set Digital signal 2	Set internal signal (digital variable) if test is true, do nothing if false
116	Set Digital signal 3	Set internal signal (digital variable) if test is true, do nothing if false
117	Set Digital signal 4	Set internal signal (digital variable) if test is true, do nothing if false
118	Set Digital signal 5	Set internal signal (digital variable) if test is true, do nothing if false
119	Set Digital signal 6	Set internal signal (digital variable) if test is true, do nothing if false
120	Set Digital signal 7	Set internal signal (digital variable) if test is true, do nothing if false
121	Set Digital signal 8	Set internal signal (digital variable) if test is true, do nothing if false
122	Set Digital signal 9	Set internal signal (digital variable) if test is true, do nothing if false
123	Set Digital signal 10	Set internal signal (digital variable) if test is true, do nothing if false
124	Set Digital signal 11	Set internal signal (digital variable) if test is true, do nothing if false
125	Set Digital signal 12	Set internal signal (digital variable) if test is true, do nothing if false

Index	Action	Description
126	Set Digital signal 13	Set internal signal (digital variable) if test is true, do nothing if false
127	Set Digital signal 14	Set internal signal (digital variable) if test is true, do nothing if false
128	Set Digital signal 15	Set internal signal (digital variable) if test is true, do nothing if false
129	Set Digital signal 16	Set internal signal (digital variable) if test is true, do nothing if false
130	Set Digital signal 17	Set internal signal (digital variable) if test is true, do nothing if false
131	Set Digital signal 18	Set internal signal (digital variable) if test is true, do nothing if false
132	Set Digital signal 19	Set internal signal (digital variable) if test is true, do nothing if false
133	Set Digital signal 20	Set internal signal (digital variable) if test is true, do nothing if false
134	Set Digital signal 21	Set internal signal (digital variable) if test is true, do nothing if false
135	Set Digital signal 22	Set internal signal (digital variable) if test is true, do nothing if false
136	Set Digital signal 23	Set internal signal (digital variable) if test is true, do nothing if false
137	Set Digital signal 24	Set internal signal (digital variable) if test is true, do nothing if false
138	Set Digital signal 25	Set internal signal (digital variable) if test is true, do nothing if false
139	Set Digital signal 25	Set internal signal (digital variable) if test is true, do nothing if false
140	Set Digital signal 27	Set internal signal (digital variable) if test is true, do nothing if false
141	Set Digital signal 28	Set internal signal (digital variable) if test is true, do nothing if false
142	Set Digital signal 29	Set internal signal (digital variable) if test is true, do nothing if false
143	Set Digital signal 30	Set internal signal (digital variable) if test is true, do nothing if false
144	Set Digital signal 31	Set internal signal (digital variable) if test is true, do nothing if false

Index	Action	Description
145	Reset Digital signal 0	Reset internal signal (digital variable) if test is true, do nothing if false
146	Reset Digital signal 1	Reset internal signal (digital variable) if test is true, do nothing if false
147	Reset Digital signal 2	Reset internal signal (digital variable) if test is true, do nothing if false
148	Reset Digital signal 3	Reset internal signal (digital variable) if test is true, do nothing if false
149	Reset Digital signal 4	Reset internal signal (digital variable) if test is true, do nothing if false
150	Reset Digital signal 5	Reset internal signal (digital variable) if test is true, do nothing if false
151	Reset Digital signal 6	Reset internal signal (digital variable) if test is true, do nothing if false
152	Reset Digital signal 7	Reset internal signal (digital variable) if test is true, do nothing if false
153	Reset Digital signal 8	Reset internal signal (digital variable) if test is true, do nothing if false
154	Reset Digital signal 9	Reset internal signal (digital variable) if test is true, do nothing if false
155	Reset Digital signal 10	Reset internal signal (digital variable) if test is true, do nothing if false
156	Reset Digital signal 11	Reset internal signal (digital variable) if test is true, do nothing if false
157	Reset Digital signal 12	Reset internal signal (digital variable) if test is true, do nothing if false
158	Reset Digital signal 13	Reset internal signal (digital variable) if test is true, do nothing if false
159	Reset Digital signal 14	Reset internal signal (digital variable) if test is true, do nothing if false
160	Reset Digital signal 15	Reset internal signal (digital variable) if test is true, do nothing if false
161	Reset Digital signal 16	Reset internal signal (digital variable) if test is true, do nothing if false
162	Reset Digital signal 17	Reset internal signal (digital variable) if test is true, do nothing if false
163	Reset Digital signal 18	Reset internal signal (digital variable) if test is true, do nothing if false

Index	Action	Description
164	Reset Digital signal 19	Reset internal signal (digital variable) if test is true, do nothing if false
165	Reset Digital signal 20	Reset internal signal (digital variable) if test is true, do nothing if false
166	Reset Digital signal 21	Reset internal signal (digital variable) if test is true, do nothing if false
167	Reset Digital signal 22	Reset internal signal (digital variable) if test is true, do nothing if false
168	Reset Digital signal 23	Reset internal signal (digital variable) if test is true, do nothing if false
169	Reset Digital signal 24	Reset internal signal (digital variable) if test is true, do nothing if false
170	Reset Digital signal 25	Reset internal signal (digital variable) if test is true, do nothing if false
171	Reset Digital signal 25	Reset internal signal (digital variable) if test is true, do nothing if false
172	Reset Digital signal 27	Reset internal signal (digital variable) if test is true, do nothing if false
173	Reset Digital signal 28	Reset internal signal (digital variable) if test is true, do nothing if false
174	Reset Digital signal 29	Reset internal signal (digital variable) if test is true, do nothing if false
175	Reset Digital signal 30	Reset internal signal (digital variable) if test is true, do nothing if false
176	Reset Digital signal 31	Reset internal signal (digital variable) if test is true, do nothing if false
177	Reserved	
178	Reserved	
179	Reserved	
180	Reserved	
181	Reserved	
182	Reserved	
183	Reserved	
184	Reserved	
185	Reserved	
186	Reserved	
187	Reserved	
188	Reserved	

Index	Action	Description
189	Reserved	
190	Reserved	
191	Source2 * Lim1/Lim2 to Temp0	Set the temporary variable Temp0 to Source 2 * Lim1/Lim2
192	Source2 * Lim1/Lim2 to Temp1	Set the temporary variable Temp1 to Source 2 * Lim1/Lim2
193	Source2 * Lim1/Lim2 to Temp2	Set the temporary variable Temp2 to Source 2 * Lim1/Lim2
194	Source2 * Lim1/Lim2 to Temp3	Set the temporary variable Temp3 to Source 2 * Lim1/Lim2
195	Source2 * Lim1/Lim2 to Temp4	Set the temporary variable Temp4 to Source 2 * Lim1/Lim2
196	Source2 * Lim1/Lim2 to Temp5	Set the temporary variable Temp5 to Source 2 * Lim1/Lim2
197	Source2 * Lim1/Lim2 to Temp6	Set the temporary variable Temp6 to Source 2 * Lim1/Lim2
198	Source2 * Lim1/Lim2 to Temp7	Set the temporary variable Temp7 to Source 2 * Lim1/Lim2
199	Source2 - Lim1/Lim2 to Temp0	Set the temporary variable Temp0 to Source 2 - Lim1/Lim2
200	Reserved	
201	Reserved	
202	Reserved	
203	Reserved	
204	Reserved	
205	Reserved	
206	Reserved	
207	Reserved	
208	Reserved	
209	Reserved	
210	Reserved	
211	Reserved	
212	Reserved	
213	Reserved	
214	Reserved	
215	Reserved	
216	Reserved	

Index	Action	Description
217	Reserved	
218	Reserved	
219	Reserved	
220	Reserved	
221	Reserved	
222	Reserved	
223	Reserved	
224	Reserved	
225	Reserved	
226	Reserved	
227	Reserved	
228	Reserved	
229	Reserved	
230	Reserved	
231	Trigger/Reconnect PLD2	Trigger PLD if test is true, reconnect if test is false. Note: Voltage must be over reconnect limit for reconnect to take place.
232	Trigger/Reconnect PLD3	Trigger PLD if test is true, reconnect if test is false. Note: Voltage must be over reconnect limit for reconnect to take place.
233	Reserved	
234	Source2 to Relaytest	Set the value in Source 2 to relaytest variable causing that relay to be activated.
235	Set/Reset mains failure	Generates mains failure alarm
236	BattClim = BC*(L2-S1)/(L2-L1) (L1<S1<L2)	While source1 is larger than Lim1 scale the battery current limit so that at Lim1 it is 100% of the set limit and at Lim2 it will be at minimum current (5A). This can be used to make the battery current limit reduce with higher temperature.
237	Source2 to limits[L_MAX_ TEMPCOMP_UP]	Set the “Max Temperature compensation up” to the value in Source2
238	Source2 to limits[L_MAX_ TEMPCOMP_DOWN]	Set the “Max Temperature compensation down” to the value in Source2

Index	Action	Description
239	Trigger/Reconnect PLD	Trigger PLD if test is true, reconnect if test is false. Note: Voltage must be over reconnect limit for reconnect to take place.
240	Trigger/Reconnect LVD	Trigger PLD if test is true, reconnect if test is false. Note: Voltage must be over reconnect limit for reconnect to take place.
241	Reserved	
242	Set U1 to Lim2	Set the U1 reference to the value in Lim2
243	Set U2 to Lim2	Set the U2 reference to the value in Lim2
244	Set U3 to Lim2	Set the U3 reference to the value in Lim2
245	Set U4 to Lim2	Set the U4 reference to the value in Lim2
246	Reserved	
247	Reserved	
248	Reserved	
249	Reserved	
250	Reserved	
251	Reserved	
252	Reserved	
253	Reserved	
254	Turn rectifiers OFF	Reserved for future use
255	Turn rectifiers ON	Reserved for future use

Appendix D - CSV Reader Shortcuts

Index	Shortcut	Alarm Description
0	LSV	LOW SYSTEM VOLTAGE
1	HSV	HIGH SYSTEM VOLTAGE
2	LVD	LOW VOLTAGE DISCONNECTION
3	MER	MAINS ERROR
4	DFF	DISTRIBUTION FUSE FAILURE
5	ALV	AC LOW VOLTAGE
6	BTF	BATTERY FAILURE
7	MDF	MODULE FAILURE
8	HBT	HIGH BATTERY TEMPERATURE
9	SYM	SYMMETRY FAULT
10	BFF	BATTERY FUSE FAILURE
11	HLO	HIGH LOAD
12	AHV	AC HIGH VOLTAGE
13	UMF	URGENT MODULE FAILURE
14	COM	COMMUNICATION FAILURE
15	PD1	PLD 1 DISCONNECTION
16	TPF	TEMP.PROBE FAILURE
17	HDL	HIGH DISTRIBUTION LOAD
18	BSD	BATTERY IS DISCHARGING
19	OVS	OVERVOLTAGE SHUTDOWN
20	LBT	LOW BATTERY TEMPERATURE
21	PD2	PLD 2 DISCONNECTION
22	PD3	PLD 3 DISCONNECTION
23	BLK	ALARMS ARE BLOCKED
24	UA0	<USER ALARM 0>
25	UA1	<USER ALARM 1>
26	UA2	<USER ALARM 2>
27	UA3	<USER ALARM 3>
28	UA4	<USER ALARM 4>
29	UA5	<USER ALARM 5>
30	UA6	<USER ALARM 6>
31	UA7	<USER ALARM 7>
32	UA8	<USER ALARM 8>
33	UA9	<USER ALARM 9>
34	UA10	<USER ALARM 10>
35	UA11	<USER ALARM 11>
36	UA12	<USER ALARM 12>
37	UA13	<USER ALARM 13>
38	UA14	<USER ALARM 14>
39	UA15	<USER ALARM 15>

Index	Shortcut	Alarm Description
40	GFL	FUEL LEVEL LOW
41	GSA	GENSET ALARM
42	GFB	GENSET BATTERY FAILURE
43	GBD	GENSET BATTERY DISCHARGED
44	GCI	GENSET CONNECTION INTERRUPTED
45	GND	GROUND FAULT
46	PVS	PV SURGE FAIL
47	PVA	PV ARRAY DISCONNECTED
48	DSA	DISTRIBUTION SURGE ARRESTER FAILURE
49	GSF	GENSET FAILED TO START
50	GOM	GENSET ON MANUAL MODE
51	<RESERVED>	
52	<RESERVED>	
53	<RESERVED>	
54	<RESERVED>	
55	<RESERVED>	
56	GSS	GENSET ON STATE
57	GSM	GENSET MAINTENANCE
58	SDE	SD CARD ERROR
59	<RESERVED>	
60	<RESERVED>	
61	<RESERVED>	
62	<RESERVED>	
63	<RESERVED>	